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MINING IN THE BOUNDARY DISTRICT.

A SOMEWHAT remarkable circumstance in connection with the opening up of the Boundary mines, and one which appears to have failed, heretofore, to elicit remark, is that the district has so far escaped the experience common to most Western mining camps of what is generally understood by a "boom." It is true that just before and immediately after the completion of the Columbia & Western railway, there was some considerable speculation in mineral prospects and town property, while also the trade possibilities were much over-estimated, with in some cases, unfortunate results; but such as it was the movement was of briefest duration and even at its height bore no resemblance to a "boom" in the sense in which the term is usually applied. The reason of this probably was that actual operations in the Boundary were commenced at a time when confidence in the mines of the province had been rudely shaken by the many failures in other districts of wild-cat undertakings conceived during the Rossland excitement

of 1896-98, while the low-grade character of the ore deposits may also have had some deterrent effect upon capital. But whatever the reason, the fact that the Boundary has not passed through a "boom" period is by no means altogether to be regretted, for it is attributable to this that with very few exceptions mining has been carried on in the district, on the lines of legitimate effort rather than as an excuse for stock market manipulation. It is, meanwhile, impossible to regard the progress that has been made in the short time since this field became productive without satisfaction, or possible to doubt that the district has before it a great and prosperous future. We have already published the favourable conclusions arrived at by Dr. Ledoux, and it is gratifying to know that the opinions of this eminent authority are in the main shared by many other prominent mining engineers and metallurgists. After spending some days at the Knob Hill mine recently, a mining engineer of exceptional professional standing estimated that there were now "in sight" at the property upwards of seventy million tons, which at the present rate of production would require nearly a hundred and forty years to mine, and still more recently the president of one of the largest metal refining concerns in the world, after visiting the district, expressed astonishment at the magnitude of the ore deposits and approval of the skilful manner in which operations are being conducted.

Economic handling of the ores has now indeed been reduced to a very fine point, and we believe we are correct in stating that nowhere else in America is copper ore mined and smelted at so low a cost as in the Boundary. Only three or four years ago Mr. Hedley, of Nelson, was ridiculed in certain quarters for what was then considered to be his absurdly optimistic ideas concerning the possible costs of smelting in the district; but Mr. Hedley's estimate has since in actual practice been cut in half and the ores are now being reduced to a copper matte of between 40 and 50 per cent. at a cost of considerably under two dollars per ton, and by the quarrying system mining costs are also exceptionally low, the ore being placed on railway trucks at a cost of between 35 and 50 cents per ton. These achievements are both remarkable and gratifying, but it would be imprudent to say that costs have now been reduced to the lowest pos-

sible point. Mine operators in the district have always realized that the establishment here of a profitable industry was entirely dependent on careful and economic management, but during the past few months the absolute necessity of close economy in working has been emphasized by the decline in the price of copper from sixteen to eleven and a-half cents or thereabouts, which represents a difference of nearly two dollars per ton in the value of the Boundary product under that formerly obtaining. In low-grade copper mines such as these, a decline of only one cent in market quotations is a most serious matter, as may be illustrated by the statement that a fall of one cent in copper depreciates the value of a car load of matte three hundred dollars. It is not, therefore, surprising that the Granby Company has not considered it advisable to declare a dividend this year, but on the other hand it is surprising that these and other mines in the district have managed to continue operations without loss, which we understand is the case, notwithstanding the low price of copper, besides other unfavourable conditions to which a new mining territory must expect to be subjected. From the statistics recently compiled by Dr. Ledoux in respect to copper consumption and stocks, it is unquestionable that of late influences have been at work other than those affected by the laws of supply and demand to depress the price of copper and there is in consequence every reason to expect a considerable rise in the market in the near future.

The Boundary mines have meanwhile creditably passed an exceptionally hard test, and there can no longer be any doubt raised as to the great industrial possibilities of the district.

CANADIAN GOLD EXPORTATIONS.

EVERY one is aware that the greater part of the gold produced in Canada finds its way into the United States, but probably few know that the Dominion is not only the source from which that country derives most of its foreign gold, but that considerably more than half of it is the product of our mines. The following table prepared by the United States Treasury Department shows the gold imports into the United States for the eight months ending August 31st:—

	1901.	1902.	Changes.
France	\$ 204,425	\$ 434,347	I. \$ 229,722
Germany	15	15	I. 15
Great Britain	11,290	14,145	I. 2,855
Canada	10,181,474	11,597,252	I. 1,415,778
West Indies	774,243	208,609	D. 565,634
Mexico	5,007,721	5,915,101	I. 907,377
Central America	427,069	495,621	I. 68,552
South America	723,322	1,092,972	I. 369,650
Australia	3,431,604	D. 3,431,604
Japan	2,659,800	7,100	D. 2,652,700
Other countries	73,460	166,200	I. 86,740
Totals	\$23,494,611	\$19,925,362	D. \$3,569,249

This table is especially interesting in that it signifies something more than that Canada is gaining ground as a gold producing country. Thus, it can hardly be asserted that for this large amount of gold exported into the United States during the first eight months of the year, Canada received an equivalent in return, which came back to the country either in the shape of cash or credits after the gold had been sold. In the case of lumber, for example, if the trade returns show that a million dollars worth is exported to a country, it may be taken for granted that the exporters receive that price for it, which came back into the country in one form or another. But this is not the case with gold bullion, particularly when it is produced by placer mining. It is probably quite true that for every dollar of gold taken out of placer diggings, reckoning the expenditures of those who do not produce any of the metal as well as those who do, at least a dollar is spent in winning it, and probably in many cases more than that sum, but this is not the point now under consideration, which is that a very large proportion of Canadian gold imported by the United States, the bulk of it coming from the Yukon, is sent out of the country by the American miners, who produce it, or in other words the profits of our mining in that part of the Dominion go largely into the pockets of foreigners. It would be useless to attempt to follow the intricacies of business and trace an ounce of gold from the time it is taken out of the ground until it reaches the United States mint; but every year the amount of "gold dust" taken to the mint or the assay offices by the miners themselves is decreasing, and the proportion handled by the large mercantile companies and the banks is increasing. But this does not alter the real facts of the case in any degree. In the majority of cases the miner prefers to carry in his pocket a draft, so as to be free from the trouble and risk of carrying the gold, but it does not follow that because a Canadian bank ships a quantity of gold to the United States, it gets back cash or available credit in return. Probably in the majority of cases these shipments have been drawn against by the owners of the gold, who are now, as they were in the days when every man carried his own "poke," chiefly citizens of the United States. There is consequently no means of ascertaining what Canada receives from the United States in exchange for the large amount of gold sent into that country every year. To ascertain this it would be necessary to discover what it costs to produce the gold, and how much of the cost of production found its way into the pockets of Canadian farmers, traders, or manufacturers. The remainder would represent the profit,

and of this the proportion which would be found to come to Canada would be relatively trifling. If everything used in producing the gold were Canadian, and the gold itself remained in Canada, the advantage to the country would be far greater than it is at present, when it is known that, as far as the Yukon is concerned, a considerable portion of the supplies comes from the United States, a large proportion of the transportation is undertaken by the United States vessels and railways, a large portion of the middlemen's profits goes into the pockets of United States trading companies and the very large proportion of the gold itself is produced by American miners. As has been already pointed out in the MINING RECORD, there is no reason to anticipate any great falling off in the gold output of the Yukon. New fields are likely to be found, and those already known are far from being exhausted. Present indications point also to the successful development of quartz mining. Under these circumstances, Canadians themselves should, before it is too late, begin to take a livelier interest in Yukon development.

THE CONDITION OF THE LOCAL STOCK MARKET.

IT is alleged in mining circles that the quotations published for British Columbia mining stocks and the transactions said to take place in them are largely fictitious. Whether this is the case or not, only those on the inside can say with certainty, but it is evident even to casual observers that there is not at present an active market for such shares in this province. In view of the stringency in the money market, it would be a matter of surprise if mining shares were dealt with in to any great extent in Toronto. Monetary conditions at the present time do not encourage speculation. With call loans in New York at as high as 10 per cent, 60 day loans at the same figure and Consols selling as low as 92, it would be a matter of surprise if money would be available for dealing to any considerable extent in such slow-moving stocks as British Columbian mining shares. Moreover, the quoted prices must be to a large degree unreliable. In some cases quotations are unquestionably below the actual intrinsic values, and there are few instances where prices are over-representative of values. A few years ago the disposition was to place high values on all descriptions of mining stock in this province. Now the tendency is quite the reverse, so much so that if one were to endeavour to form an idea of the value of mining investments in the province from the stock quotations, he would be hopelessly astray, and would no doubt fall very far

short of the truth. Certainly such an estimate would not be one that could be called extravagant.

Dullness in the stock market, however, does not imply lack of progress in mining. The transactions in shares really have no legitimate relation to the magnitude of the industry or the rate of development of new properties. Far more progress is being made now than during the days when speculation in stock was fashionable and transactions involving many thousands of dollars were of daily occurrence. In all mining districts there are three stages, so far as stock sales are concerned. The first is when reports of new discoveries are made and companies are being formed to exploit properties on the strength of surface indications or preliminary development. The second stage is when work has proceeded sufficiently to give the public a fairly accurate idea of the general character of the country, the difficulties to be encountered in establishing mines and the probable chances for making profitable investments. The third stage comes when mining has reached a permanent basis. In the first stage transactions in shares will, if the money market is easy, be likely to be many and frequent, with great fluctuations. It is all, or chiefly, speculation pure and simple. In the second stage, which is that of the present time in British Columbia, there will be little or no real demand for stock. In the third stage stocks are sought as investments, and transactions in them become a part of the regular business of exchanges, being affected by the same class of causes as influence prices in the railway share market or the produce exchange.

A STORY OF "MILLIONS."

THE MINING RECORD, as our readers are aware, is published largely as a philanthropic institution, and whenever we hear of a really deserving case we never refuse to accord it gratuitous advertising. A correspondent, taking advantage of this weakness of ours, has sent us the prospectus of the International Oil and Mining Syndicate, of Tacoma, Washington, which is certainly entitled to our best consideration. The International Oil and Mining Syndicate own eleven "propositions," the estimated value of which, "based upon the present value of the properties" and according to "a competent expert," (name not stated) is three million, nine hundred and thirty thousand, six hundred dollars. The most valuable of the properties is at Deer Park, West Kootenay district. This comprises thirteen claims in all and is valued at one million eight hundred and fifty thousand dollars (and no cents). As the names of the

claims at Deer Park are not given, we can express no opinion concerning them, but the prospectus states that the ore assays "from \$12.00 to \$43.95 per ton, an average of over \$22.00 per ton. There is ore enough in sight on these groups to supply us at 500 tons per day for a great many years. Mining, smelting and transportation charges will be less than \$5.00 per ton." Old residents in the Kootenays will be astonished to learn that such valuable mines exist on the Arrow Lakes, and that ores in this locality can be so cheaply mined and treated. Then besides the Deer Park claims the company owns six properties in the Meyers Creek mining district, near Chesaw, which are estimated to be worth one million three hundred and fifty thousand dollars, two claims at Northport worth a modest three hundred thousand dollars, five claims in the Curlew mining district worth three hundred and fifty thousand dollars and other lesser properties—not of course including the oil lands, which "an expert mineralogist declares to be the largest field of oil-bearing rock in the world, and confirmed his declaration by becoming interested in an adjoining proposition." We must not, however, forget to allude to the most important item in the list of assets. The company has "cash on hand, office furniture and other assets," to the value of a thousand dollars. This, perhaps, sounds small after the free mention of millions, but still a thousand dollars in hand is—well, not to be despised. The liabilities show that one million six hundred and sixty three thousand four hundred and thirty-eight dollars' worth (presumably) of stock has been sold, while there still remain in the treasury eight million three hundred and thirty-six thousand five hundred and sixty-two shares of the par value of one dollar each. You can actually buy these shares from the company on the instalment plan at ten cents apiece, and we learn through our correspondent that there are people in Vancouver who have been actually fools enough to do it. They deserve their fate.

ORE IN SIGHT.

WE have received from the secretary of the Institution of Mining and Metallurgy the following circular:—

"The Council of the Institution of Mining and Metallurgy, recognizing the great importance to the mining industry and to the public generally of the subject dealt with in the paper on 'Ore in Sight,' by Mr. J. D. Kendall, appointed a committee to consider what steps the institution might usefully take in

defining the term 'ore in sight.' The views expressed by leading members of the profession showed a great divergence of opinion as to the definition of the term. After due consideration and discussion, the Council came to the following decision:

"1. That members of the institution should not make use of the term 'ore in sight' in their reports without indicating, in the most explicit manner, the data upon which the estimate is based; and that it is most desirable that estimates should be illustrated by drawings.

"2. That as the term 'ore in sight' is frequently used to indicate two separate factors in an estimate—namely, (a) ore blocked out—that is, ore exposed on at least three sides within reasonable distance of each other; and (b) ore which may be reasonably assumed to exist, though not actually 'blocked out'—these two factors should in all cases be kept distinct, as (a) is governed by fixed rules, whilst (b) is dependent upon individual judgment and local experience.

"3. That in making use of the term 'ore in sight' an engineer should demonstrate that the ore so denominated is capable of being profitably extracted under the working conditions obtaining in the district.

"4. That the members of the institution be urged to protect the best interest of the profession by using their influence in every way possible to prevent and discourage the use of the term 'ore in sight,' except as defined above; and the Council also strongly advise that no ambiguity or mystery in this connection should be tolerated, as they (the Council) consider that such ambiguity is an indication of dishonesty or incompetency."

We propose to publish in our next issue extracts from the discussion on Mr. Kendall's admirable and timely paper, but it may be said meanwhile that the author's views are generally indorsed by the leading British representatives of the engineering profession. Our contemporary, the *Engineering and Mining Journal*, of New York, however, objects, and we think rightly, to the Institute's recommendation that "ore in sight" should demonstrate that the ore so denominated is capable of being profitably extracted under the conditions obtaining in the district," and suggests instead that the engineer in making his estimate should classify his ore into different grades and give his opinion as to how far the different grades can be worked under existing conditions. In a new country such as British Columbia where conditions are constantly changing for the better by the introduction of improved methods of treatment and other means for the reduction of costs this especially applies.

ZINC MINING POSSIBILITIES.

Great hopes are entertained respecting the possibilities of turning to profitable account Slocan galena ores carrying an excess of zinc—a circumstance which heretofore has been distinctly detrimental instead of, as now appears likely, desirable. In smelting silver-lead ores, merely with a view to the recovering of those metals, an ore containing an excess of zinc is metallurgically troublesome, and consequently it has been the practice on the part of the smelters to tax all ore containing over and above a certain percentage of refractory material, so much per cent. of excess. So long as British Columbian mine owners had a market for their lead ores in the United States, and were commanding a good price for their product, no attempt was made to market ores carrying a very high percentage of zinc, but since this market has been closed and the basis of dealing has been on London quotations, less unduly heavy freight and other charges, the margin of profit on lead mining operations has been so reduced that none but the very richest mines—and these are not always the most important in this country—could afford to continue working. Thus production since 1900 has fallen off very considerably, and so far as lead mining is concerned there is little likelihood of improvement in the British Columbian situation until the institution of certain tariff reforms and amendments looking towards the establishment of lead manufacturing and paint works in Canada. It has been estimated that there is a market in the Dominion itself for from one-half to two-thirds of the lead annually received in British Columbia, but under present conditions all our lead is exported in the form of ore or matte, while all the manufactured lead consumed in the country is imported. There is meanwhile some talk of building large refinery works at Nelson, experimental tests with an electrolytic process at the small plant at Trail having proved, it is understood, reasonably successful, and pressure is also being brought to bear on the Dominion Government to subsidize the undertaking and also to effect such changes in the tariff as to render the importation of white lead, lead pipe and other manufactured forms of lead practically prohibitive. It is thought that by this measure sufficient encouragement will be afforded local industry and that a local market at better prices will thus be provided for at least the bulk of lead mined in the country. Should these plans be carried out, the effect, of course, will be to greatly stimulate activity in our lead mining centres; but meanwhile the suggested utilization of the zinc by-products is of more immediate interest. Spelter is in great demand in the States

and it is significant that the supply from the chief sources of production is not increasing. The representative of a large Kansas smelting concern, who has been in the Slocan district for some weeks, has, it is said, made mine owners very favourable offers to purchase ores carrying zinc of 60 per cent. and over. Ores having a lower percentage than this are also accepted but for every unit under 60 per cent. a penalty is imposed. The available tonnage of ores in the Slocan carrying fair zinc values is by no means inconsiderable, the Slocan Star mine for example being in a position to ship a large tonnage monthly, while its output could possibly be increased to a thousand tons. Another mine, the Ivanhoe, could send out 10 tons per day, the Payne at least 5 tons, and the Bosun and Mountain Chief both have large available supplies of zinc ores up to 42 per cent. in this metal. In many cases the ore would require to be concentrated in order that the resulting product should not fall below the required percentage, but provided a satisfactory market is arranged, mine owners would hardly hesitate to install the necessary plant. For ore or concentrates carrying 60 per cent. zinc it is understood that the smelter settlement will be between \$30 and \$32 per ton, assuming that the ore does not carry an excess of either lead or iron. From this, of course, the transportation rate of \$11 would be deducted, and if the ore carries silver there will be a further charge of \$2 per ton, as the gathering of these requires some further process. Nevertheless the marketing of the zinc affords a cheap method for the recovery of the silver values, in which much of the zinc ores of the Slocan are very rich, and in the case of large shipping mines like the Slocan Star and Enterprise, the separate treatment of the zinc ores will save the companies a very considerable sum which at present is charged against them by the lead smelters for excess of zinc.

Judging from the superintendent's report, which we publish elsewhere in this issue, the Stenwinder mine, one of the properties of the New Fairview Corporation, has every chance of entering ere long the profit-earning stage. No thanks, however, to the erstwhile management of Messrs. Dier & Davidson. Mr. Russell, under whom operations have since been carried on, appears to have worked intelligently and also at great personal sacrifice in the interests of the shareholders.

It is stated that the Olalla Company has "practically decided" to build a 50-ton smelter, and that the plant will probably be operated by "gas-power."

A court of arbitration in Western Australia has ordered that the minimum rate of wages paid by employers on the East Coolgardie goldfields shall be as follows: Rock drill men in shafts, 14s 4d per shift; rock drill men in rises, 14s 10d per shift; rock drill men in all parts of the mine, 13s 4d per shift, the men to be held jointly and severally responsible for the breakage of tools or injury to machinery; miners, 11s 8d per shift; braccemen and platemen, 11s 8d per shift; mullockers and shovellers, 10s 6d per shift; truckers, filling and trucking, 10s 6d per shift; truckers from chute, 10s per shift; men working in cyanide vats, 11s 8d per shift; timbermen working together, and directly in charge of and responsible to the underground manager for the work under their control, 13s 4d per shift; surface labourers, 10s per shift. The shift is to consist of eight hours, including the customary allowance for crib; surface men's shift to consist of eight hours exclusive of crib time. The court decided that no sufficient reasons had been adduced to warrant interference with Sunday labour, which was already, except when necessary, absolutely prohibited by Act of Parliament. Total Sunday closing, in the opinion of the court, would mean an incalculable diminution in the production of the mines and largely increased expenses. The court declined to direct that the contract system should be totally abolished, but it directed that all agreements should be in writing, should contain a clear specification of the work required to be done, the price to be paid, the price at which stores and explosives would be supplied to the contractors, and the dates of the progress payments to be made, notices of these terms to be posted one clear day before tenders are received. The court also strongly recommended that the form of agreement at present in use at the Great Boulder be adopted on other mines. It will be noted that the above scale of wages, which is, however, generally higher than that previously in force, is still somewhat below the standard of pay received by miners in British Columbia, while at the same time climate and conditions of life in the Kootenays are vastly superior to those existing in Coolgardie.

From the recent appointment of a Deputy Minister of Mines, it is hoped that the Department will be able to render more effective service in the interests of the industry. Notwithstanding the criticisms which have appeared in several of the Kootenay newspapers the creation of the post was a quite justifiable step, and one for which the MINING RECORD was largely responsible. In the past too much of the Provincial Mineralogist's time has been occupied with office

routine work which might have been attended to equally well by a non-technical substitute, possessing merely some knowledge of the mining conditions and laws. By the appointment of a Deputy Minister, who, it is stated, has the necessary qualifications, the Provincial Mineralogist will feel at liberty to spend the greater part of the year in the field, while also we may expect that henceforward the Department will be more energetically administered in the matter, especially of issuing at regular and more frequent intervals special reports and statistical returns. If this course is pursued the Legislature should not hesitate in making the additional grant required.

As we pointed out last month, Mr. Kirby and others who endeavour to show that the mining industry in British Columbia suffers from excessive taxation, weaken the cause they advocate, and defeat the ends they have in view by making statements which can either be disproved altogether or are found to be not strictly accurate. Mr. Bernard MacDonald, for example, publicly stated that blasting powder, by reason of the tariff, is very much more expensive in British Columbia than it is in the Western States, and that this constituted a heavy tax on mining in this country. The *Nelson Tribune* after investigating the matter has discovered that Mr. MacDonald's contention was incorrect in that higher freight rates and not the tariff on explosives are responsible for the slightly higher cost. The point is in one sense not very material, but although we are in sympathy with the efforts that are being put forward to improve the conditions under which mining is carried on in the province, a case is surely never strengthened by exaggeration or misrepresentation.

Apropos of the 2 per cent. tax, a Fairview mine owner writes: "I appreciate the good work you are doing in trying to show the hardships against which operators in this country have to contend. I fancy, however, that the Government will perceive the necessity of altering the incidence of the tax. In our case the 2 per cent. tax bears very hardly. For example, supposing the cost of mining, management, etc., is \$1.50 per ton and the cost of milling, 75 cts. per ton on \$4 ore, and supposing we get an extraction of 85 per cent. or recover \$3.40 per ton, we would be called upon to pay 2 per cent. on \$2.65, when in reality the profit would not be over \$1 per ton. If a tax were placed on net profits it would be a step in the right direction. But in the interests of the country, mine-taxation might well be suspended for at least

a year or two until the industry is on a more profitable footing."

A Rossland correspondent writing to the MINING RECORD states that "the coke difficulty which is affecting the Northport and Trail smelters is the result of a contest between the C. P. R. and the Great Northern railway for the long haul. At Fernie there are coke ovens but no coal ready, while at Morrisey, eleven miles east, plenty of coking coal is available. Morrisey and Fernie are connected by the C. P. R., and the Great Northern connects at Morrisey only. If the railroads could agree there would be no trouble in treating the Morrisey coal at the Fernie coke ovens and later in transporting it to the smelter. As matters stand the Northport smelter has been buying coke at the Coast, in Washington and in the East, but the strike caused the latter supply to fail entirely and for four days in October the Le Roi plant was "closed down" for want of fuel. The Rossland Board of Trade has taken the matter up and will try to effect some arrangement with the railroads by which the present stupid state of affairs can be averted.

The attention that is now being given to quartz mining in the Yukon is most significant, and it is worth noting that a test consignment of ore was actually made this month from a claim near Dawson to a Puget Sound smelter. The material in this case was, of course, exceptionally rich, but even so a year or two ago it would scarcely have paid to ship out of the Yukon anything short of gold bullion. Since 1899 the costs of mining in that territory have fallen at least fifty per cent. and it seems probable that there will be still further reductions in this respect. It is reported that most promising quartz finds have been made on both Hunker and Lepine Creeks, as well as at several points along the Yukon River. At Indian River and elsewhere in that neighbourhood large bodies of conglomerates are being exploited. The Dominion Government has already recognized Yukon quartz mining possibilities and in order to encourage effort in this direction mills have been established for the free testing of ores.

The report of the directors of the Hall Mining and Smelting Company, Limited, for the year ended June 30, 1902, presented to the shareholders at the third ordinary general meeting on October 23rd last, states that in consequence of the exhaustion of the ore reserves, and the necessity therefore for writing off the amount of £19,751, charged to development account

at June 30, 1901, and also writing off £1,094 from the value of the mine supplies, there is a loss on the mining account of £6,980; on the other hand, the smelting account shows a profit of £5,071. After taking credit for sundry receipts, £1,735, and providing for the general expenses, including debenture interest and the balance of preliminary expenses not dealt with last year (together £5,772), there is a loss of £5,945, which together with £6,073 written off for depreciation, must be added to the amount brought forward from last year—viz., £6,980—making a total debit balance to be carried forward of £19,599. It was not until the spring of the year that the permanence of the ore body at the lower levels became doubtful. Before deciding to abandon operations, the board subsequently had the mine examined by the best expert available, whose views entirely coincided with those of the other two. The board have leased the mine to Mr. H. S. Davys, formerly superintendent, on satisfactory terms, one of the conditions being that they can resume possession should they wish to do so, whenever the output reaches 50 tons a day. The advantage of this arrangement is that the mine will be thoroughly explored by one who knows the property well and has faith in his ability to find other ore bodies entirely free of expense to the company. The most serious obstacle to the expansion of the smelting branch of the company's business has again been the loss caused by the fall in the prices of metals. Some further extension of the time for final settlement of purchase is necessary, and steps to that end will be taken as soon as possible. Notwithstanding the difficulties which have had to be met, the business still shows a profit, and there is every reason to expect reasonable profits in the future, more especially owing to the cheapening of flux and to the reduction of working expenses through the installation of the electric plant. As soon as a refinery is erected in the immediate vicinity there will be a considerable saving in the freight which now has to be paid for sending the bullion to a distant refinery in the States. Recognizing the desirability of reducing the management expenses, the board have decided to reduce their number to three. Since Mr. Davys has been in charge, the position at the mine has so far improved as to give rise to the hope that operations may be resumed by the company in the future.

The Atlin Board of Trade has addressed a letter to the Minister of Customs, at Ottawa, calling attention to the unsatisfactory wording of the clause in the customs regulations relating to mining machinery. This clause reads, to the effect, that machinery which

is not actually manufactured in Canada may be admitted duty free. The Atlin Board of Trade desire to be informed whether "bucket dredges" are included in the free list under this heading. The matter has also been taken up by the Nelson Board of Trade, a member, Mr. Croasdaile, stating that he knew of cases where machinery nominally manufactured in Canada, actually was not, and that merely because Canadian manufacturers "claimed" that they could make certain classes of machinery, which in point of fact they did not, mine owners were compelled by the customs authorities to pay a heavy duty. At present, consequently, the question whether or not certain articles are dutiable is settled at the discretion of subordinate officials, and it is high time, in justice to mine operators, that the department rendered a definite ruling as to what machinery may be brought into the country duty free.

The directors of the Sullivan Company are not to be congratulated on the manner in which the Marysville smelter undertaking has been conducted. In fact they appear to have made between them a pretty average mess of things. The shares of this concern are held largely in the East, but the controlling interest is vested in a few Spokane operators. According to a Mr. Layton, representing Eastern interests, the company has spent during the past few months upwards of \$100,000 upon smelter construction work, and has practically nothing to show for this large expenditure beyond a flume and a quantity of brick. It is further stated that the company is in debt to the tune of \$9,000 and that approximately \$75,000 will be required to complete and equip the smelter. It is difficult to say whether this money will be forthcoming. Meanwhile, here is another instance of "American" mismanagement. British directorate boards will have to look to their laurels so far as this country is concerned if this sort of thing continues.

The result of the final clean-up of the season at the Consolidated Cariboo Hydraulic mine amounted to only \$17,500. This is decidedly disappointing, and it is doubtful now whether the total yield of \$61,000 will even be sufficient to defray this year's costs of operating, although these, of course, will be less than heretofore, on account of the shortness of the season. Moreover, the installation, which was completed last spring of an electric light and power drill plant should effect a material reduction in the cost respectively of lighting the mine and of extending the bed-rock

sluice cuts, and of driving the new tunnel. On the other hand, to offset this, the company has had to do a certain amount of dead work this season in the removal of material caused by slides. It is meanwhile most unfortunate that for two consecutive seasons the precipitation should have been so inconceivable as to cause a shortage of water supply in spite of the precautions taken and the large expenditures made to provide against such a contingency.

In recent press despatches from San Francisco it is reported that the change from coal to mineral oil as fuel on the railways is not by any means proving as satisfactory as was at first anticipated and it is not unlikely that a return to the use of coal will be made in consequence. While oil is certainly the cheaper form of fuel, it appears that Californian oil has a bituminous base and that its action on parts of the locomotives of the Southern Pacific railway has created so much trouble that it has been considered advisable to abandon its use. This, if true, will mean a great deal to Vancouver Island colliery owners, to whom the substitution of oil for fuel purposes in what was formerly their chief market was a matter of very serious concern.

The manager of one of the largest Slocan mines writing to the MINING RECORD takes a very hopeful view of the situation in respect to zinc mining possibilities in that district. He says: "The fact that our zinc ores have now become saleable in the United States is the best thing that has happened to us in the Slocan for years. I have recently closed contracts with the Lauzon Zinc Co., of Iola, Kansas City, by which we sell at a fair profit all our zinc concentrates, which are simply a bi-product. Our present output of zinc amounts to over 100 tons per month, but within six months we shall probably double this. Several of the other large companies have made similar arrangements. Both the railways have made a special rate of \$11 per ton for haulage—a cut of \$4 per ton. These are big doings."

Conditions in the Atlin district this season appear to have been decidedly more satisfactory than last year and from a seemingly well informed source we gather that the aggregate value of the summer "clean-ups" will approximate closely to a million of dollars. Contrary to all anticipations the increased output resulted from successful ground sluicing operations, the yield from hydraulic being relatively small.

THE GRANBY MINES AT PHOENIX, B.C.

(By C. M. Campbell, B.A., B.Sc.)

THE history of the Phoenix Camp may be said to date from 1897. In the fall of that year Mr. J. F. Hemenway came to this district as the agent of the Miner-Graves Syndicate, then commencing operations on the Old Ironsides claim. In March, 1898, the present superintendent, Mr. W. F. Williams, took charge of mining operations with a force of twelve men. At this time a small amount of development work had been done at the base of No. 1 shaft then down 100 feet. Since then it has been a case of constant progress, till at present, with the mine working full blast, there are over 400 names on the pay roll and the underground workings are miles in length.

The position of the different claims in this district may be seen on reference to the plan. The block surrounded by the heavy lines includes the claims owned by the Granby Consolidated Mining, Smelting and Power Company, Limited. It is with the operations on these claims that this article will deal.

GEOLOGY.

The town of Phoenix is built on both sides of a valley. The Stenwinder and Brooklyn are the chief mines on the north side and the Knob Hill, Old Ironsides and Snowshoe the chief ones on the south side. The north side of the valley consists almost entirely



Phoenix from Spion Kop.

of limestones and breccias, highly altered by metamorphism. On the south side a band of volcanic tufa divides the district into two parts. This band is well exposed at the railway cutting by the new compressor building and also on the War Eagle claim. It is bedded and dips 45 degrees to the east. It is coarse and fine in texture, the fine part having a somewhat quartzitic appearance similar to some of the ash rocks of the Rosslund district.

The country on both sides is mineralized and consists chiefly of limestone, magnetite, copper and iron pyrites, hematite and epidote. The zone of oxidation

is perhaps greater on the west than to the east, being in places 50 feet deep. The average composition has been determined to be about 38 per cent. of silica, 10 per cent. of oxide of iron, 15 per cent. of lime and 4½ per cent. of sulphur. The workable ores will run about 1.7 per cent. of copper, \$1.60 in gold and 33 cents in silver per ton, the values being chiefly in the copper pyrites. The above figures are, of course, only approximate, and often vary.

The deposit is of immense size. Surface explorations give it a length from north to south of over a mile and a width of over 300 feet. The foot wall is



Group of Miners.

rather well defined but apparently there is no hanging wall. Crosscuts seem to indicate a width of 300 to 400 feet. It will thus be seen that the width varies. A crosscut may be in ore at a distance of 400 feet from the foot wall while another will pass out of ore at 300 feet. Diamond drill borings have reached a depth of 600 feet without reaching the bottom of the deposit.

DEVELOPMENT.

Outside the early prospect holes the first extensive development was the sinking of No. 1 shaft. This is a vertical two-compartment shaft and goes down to a depth of 200 feet. But little work was done at the 100-foot level, the main workings being at the 200-foot.

Another shaft (No. 2) was then sunk. This is now down over 400 feet with stations at the 200, 250 and 300-foot levels.

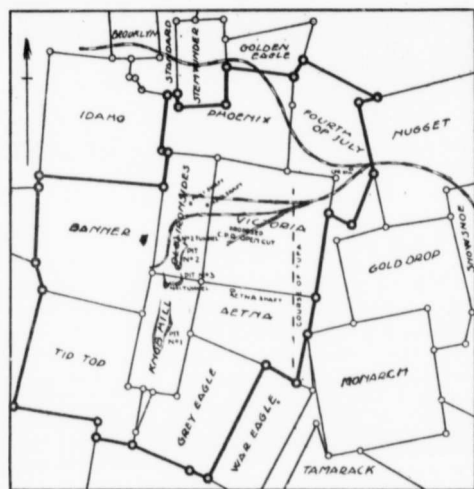
From these two shafts, by means of drifts and crosscuts, large masses of ore have been blocked out, as shown on the plan of the 300-foot level. After the ore is blocked out stoping is then proceeded with.

The Knob Hill was opened by means of a tunnel (No. 1). This runs approximately north and south and has a length of 1,300 feet. Workings, of a development character, beneath this level are reached by means of a winze 200 feet deep. The 100-foot level of this mine connects with No. 2 tunnel, the mouth of which is situated below the machine shop.

METHODS OF UNDERGROUND WORK.

Different methods have been in use. In the Old Ironsides the square set method was at first the only method used and is even yet used to a large extent. By this method a drift having been driven, that part where a stope is to be made is widened, the floor levelled, mud sills put in and on these the timbers are placed. Round timbers are used entirely. These are often two feet in diameter. The dimensions of the several parts and their relations to each other are shown in Fig 1. It will be noticed that the tenons on the posts butt each other. They have been designed this way to carry vertical pressures which are the greatest in this deposit. In this way the end grain or greatest strength of the timber is opposed to the vertical pressure. In most mines, such as those at Rosslund, the side pressure is greatest and consequently it is the tenons of the caps which meet each other.

Before the installation of timber framing machinery the work was all done by hand. Under these condi-



Plan of Claims.

tions slightly different joints were cut. These are seen on reference to Fig. 2.

The caps in all cases run across the lead, while the girts run with the lead. The caps are cut out of heavier timbers.

The sill floor having been put in place properly spragged to the roof and walls and the top lagged, drilling is then proceeded with and a slice taken off the roof. The first floor of square sets are then inserted. In this way the whole slope is filled with timbers. The timbers are usually kept from 4 to 10 sets, depending on the nature of the ground, from the face.

Each floor is lagged with three to six-inch unbarked poles, cut in the neighbourhood. These poles are 11 feet in length and when four square sets have been covered the adjoining four are lagged in the opposite

direction, forming a checker-work arrangement. This gives better support.

The ore on the sill floor is shovelled into cars and taken to the shaft station. In the erection of the first floor chutes are inserted every few sets and all the ore on the upper floor is shovelled into these chutes, and from these it falls into a car. To facilitate the ore reaching the chutes, alternate sets in the upper timbers are often left unlagged and in this way gravity brings down most of the ore to the chutes and the shovellers have seldom to work it down. A little shovelling is done above the sill floor; round poles answer the purpose of flooring as well as planks, and are much cheaper.

Different reinforcement methods are in use. These are designed to steady the timbering and keep the members in their original position. In angle bracing



(Fig. 4) the head of the brace should lean in the direction from which the pressure comes.

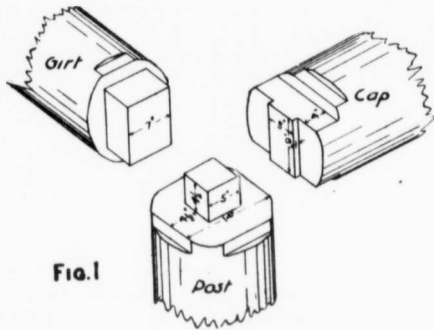
Filling is shown in Fig. 5, and consists in filling in crib work about the sets with wasted rock. The pillars are often 15 to 20 feet square and run from sill floor to the roof. The cribwork is floored with lagging, laid from sill to sill in order to prevent the contents of the crib from falling through should the floor be penetrated by workings from a lower level.

The erection of the square sets is in charge of a timber gang consisting of a timber boss and usually four men. These work on the morning shift.

A large part of the Knob Hill has been worked by an open stope. In this mine the rock does not cave in as readily as in the Old Ironsides and the stope has been left untimbered. In working this

stope the drift was first widened, then, instead of all the broken ore being removed, only the excess was taken away and the machines were then set up on what remained and another slice taken off the roof. This operation was repeated and the height of the stope further increased. All the ore was then removed, leaving an untimbered stope averaging 25 feet in height, about 50 feet wide and about 600 feet long. A longitudinal section is shown in the diagram of the quarry workings.

The square set method is gradually giving place to a cheaper method. Reference to Fig. 6 will explain



this. Heavy chutes with iron gates have been built and the raise started in above the timbers. The excess of ore is drawn off through the chutes. Several of these raises will run parallel to each other and as they increase in height openings will be broken through from one to the other for convenience and for ventilation.

All large pieces of rock left after blasting are bulldozed so that nothing too large to go through reaches the chute. Bulldozing consists in placing a stick or two of powder on a rock too large or too hard to treat with a hammer. This is covered with a shovelful of finely broken rock and the fuse ignited, when the rock is shattered.

BLASTING.

This is performed by a separate gang, who work on the night shift. The holes have previously been cleaned out by the machine men, all tools removed and turn sheets laid down to receive the ore blasted and thus aid the shovelling. The blasters then load the holes and cut the fuse to the length required so that the charges in the different holes will explode in regular order, each hole breaking towards space. The firing is then proceeded with. Sixty per cent. powder is used in almost all cases in both mine and quarry.

TRAMMING.

Most of the mine cars in use stand 4 feet 2 inches above the track and will hold 20 cubic feet. This means a capacity of one and a half tons. Cars of slightly different dimensions are in use in the Knob Hill. A few ton-cars are still used to a small extent.

Cars are all pushed to the shaft stations by man power and caged by a cage tender. At the surface a topman replaces the full car with an empty and dumps the contents of the loaded car in the adjacent bins.

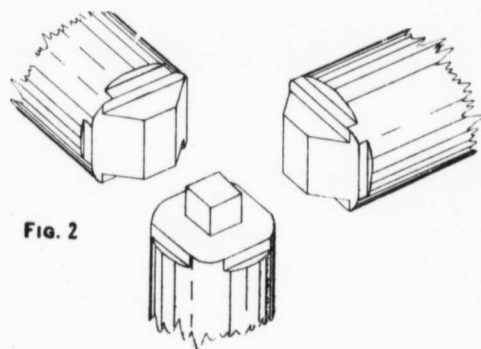
Tracks in the mine are 12 lbs. to the yard, and switches in use are shown in the sketch (Fig. 7). Where most of the traffic goes by the side line a hinged tongue is occasionally put in. This is easier to make and a turn may be made in less space with this arrangement. When the other switch is put in, the carman has to guide his car to the right track by throwing his weight on one side of the car or the other. On the 250-foot level the cars are not caged, but their contents dumped into a chute leading to the 300-foot level.

HOISTING.

The shafts in which ore is hoisted are both of the two-compartment type. The extra compartment is used for ladders, pipes, etc. The hoisting compartment is lagged with two-inch plank. At level stations posts 15 feet long are used. The upper end plates run across the station a distance of about 20 feet and are kept in place by braces and posts. The lower end plates are also extended and support the steel turn sheet. The timber hoist is situated between the blacksmith and carpenter shops. It has been sunk to the 200-foot level and is slightly inclined. A skip is mounted in the shaft and is used solely for lowering timber and steel, men being forbidden to ride on it. It is operated by a small compressed air hoist. The hoisting signals are all pull bell.

PUMPING.

The greater part of the mines are dry. Shaft No. 2 is, however, wet, so that the cage tender always



wears rubber caps, coat and boots while on shift. A Knowles steam plunger pump is stationed at the 300-foot level in No. 2 shaft, and another at the 200-foot level in No. 1. These handle the mine drainage with ease. The water is pumped into large reservoirs on the surface. These are situated at elevations greater than the mine buildings and are used as a source of water supply in case of fire.

At the mine stations notices are posted cautioning the men to see that all loose rock is barred down before work is started. Ground should be carefully examined for missed holes and muckers should always examine large rocks before breaking them, as they may include part of a hole containing powder. All powder obtained in this way is put in boxes prominently placed at different places in the mine.

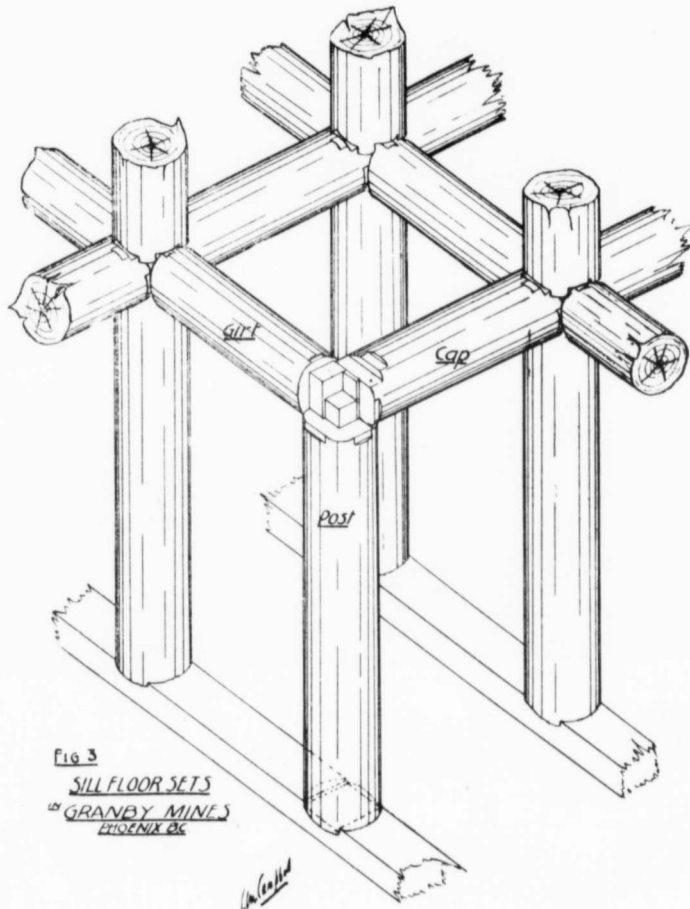
THE ORE QUARRY.

This is worked in connection with the Knob Hill mine. This mine is entered by a tunnel from the

At the lower end of the quarry ore is now being loaded directly into railroad cars. The method is shown in a photo. The loaded cars are run over an open trestle and dumped into the railway cars which have been switched on the track beneath.

STRIPPING.

Preparations are now being made to greatly extend the quarry workings. A contract has been given to strip a large area to the east of the present pits. On account of the contour of the ground and the fact that dirt has to be transferred across the present



neighbourhood of which raises penetrate to the surface. The ore is blasted down in the quarry and shovelled into the raises. From the chutes at the bottom of these it is run into cars and from these trammed to the bins. Work in the quarry is all done with the tripod. Larger holes than underground are drilled and much greater charges are employed, consequently very large quantities of ore are often broken down at a blast.

quarry, the ordinary stripping methods could not be employed.

The equipment in use includes two gallows frames, a double drum engine, two iron wire ropes and a couple of skips. The ground to be stripped lies between the two frames. A heavy iron rope stretched between the two acts as a tramway for the skip. This rope can be drawn taut by a block and tackle worked by one of the drums. To the other drum is attached

a lighter iron rope which draws the skip back up the grade after it has been dumped. The ground is loosened by plows and drag scrapers are used to carry the dirt to the skip. The skip is made of two-inch plank

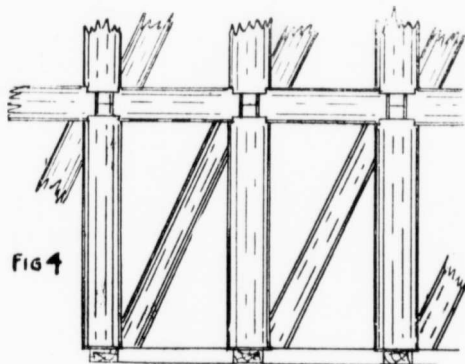


FIG 4

ANGLE BRACING

and is about eight feet square. Three eye-bolts are attached to it and to these chains are hooked which are connected to the traveller on the upper rope. It will carry the contents of three scrapers or about one-half cubic yard of dirt. When loaded, the upper rope is slackened and the chains connected to the traveller are attached to it. It is then drawn to position and runs to its destination by gravity. When near the gallows frame a man with a long pole strikes one of the catches, when the skip, hanging by only two chains, turns over and dumps its contents. Two

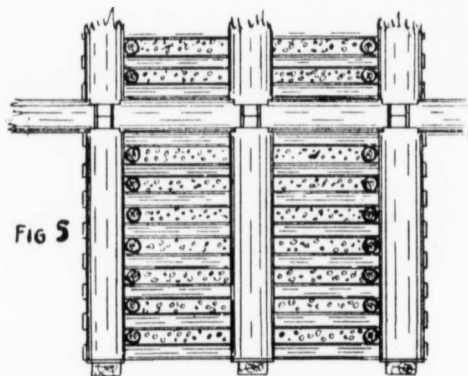


FIG 5

FILLING

skips are used, one being loaded while the other is dumping.

THE SURFACE PLANT.

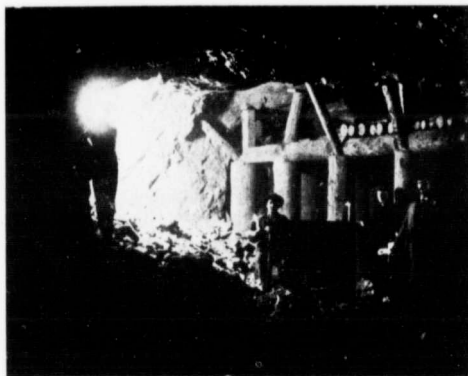
The surface plant has been enlarged to a great extent this summer, a very large amount of money having been expended both in buildings and machinery.

SHAFT HOUSE NO. 1.

This covers the first shaft. In addition to this in its different wings it also includes the boiler room, engine rooms, old machine shop, dry room and old blacksmith shop. The boiler room contains three Jenckes boilers, two of 80 h.p. each and the third of 60 h.p. These burn cordwood, which is quite plentiful in the neighbourhood.

In one engine room a ten-drill Canadian Rand air compressor has been installed. In this room, by means of a horse-power upright engine and dynamo is manufactured the electric power for underground and surface lighting and for the different motors about the works. The other engine room contains a Jenckes hoisting engine.

The old blacksmith shop which contains two forges is used for repairing broken mine cars, shoeing horses, making doors for chutes and work of a similar character. Two men are employed here.



Underground View Showing Timbering. The figure to the extreme right is Mr. W. T. Williams, the Superintendent.

NO. 2 SHAFT HOUSE.

The hoisting engine in this building is also from the Jenckes Machine Co. It is much larger than the other, having a drum 60 inches wide. A great part of this building is utilized for store room purposes, and here a complete stock of mine supplies is kept on hand. The shaft house is extra large, the additional space being used to store the timbers which are needed on the 300-foot level.

BINS.

A covered tramway about 100 feet long runs from No. 1 shaft to the smaller ore bins. Built up against these and practically forming part of them are the bins which receive the product of No. 2 shaft. The total capacity of both bins is about 4,000 tons. These bins are shown in a photograph, as is also the method of loading ore cars. Two shippers, one on each shift, look after the loading from all the bins. Powerful Shay locomotives are used to draw the ore train to the Grand Forks smelter.

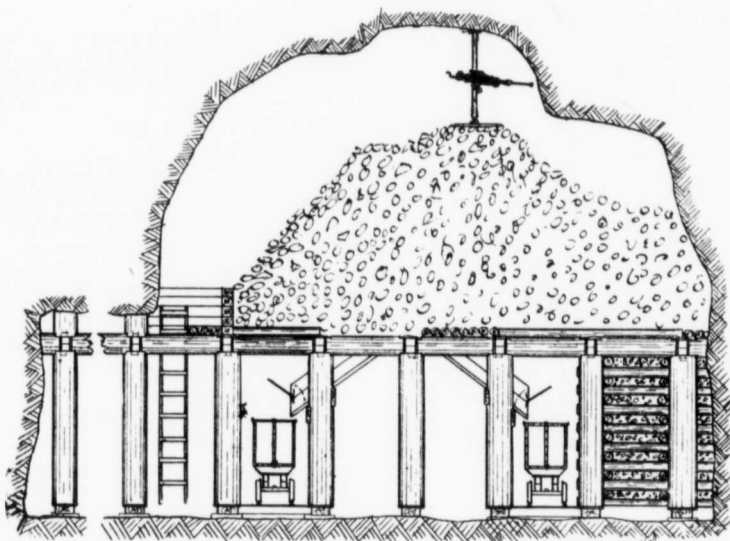


Fig. 6. Cross Section Through Stope.

CARPENTER SHOP.

The ground floor of this building, which measures 40 feet by 60 feet, is on a level with the bottom of the timber shaft and also with that of No. 2 shaft. The upper floor contains the framing saws, shown in the photo, a large 40-inch swinging cut-off saw and a wedge cutter. The motive power is furnished by a 45 h.p. engine made by the Jenckes Machine Co. This company also supplied other parts of the plant,

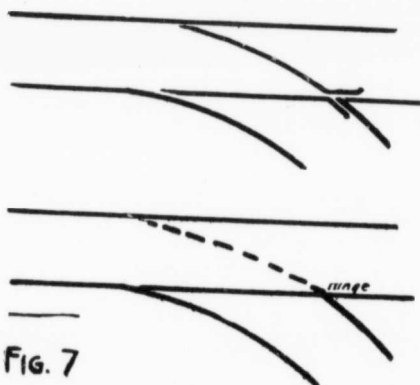


Fig. 7

such as the shafting, pulleys, etc. The fumer and carriage were made by the Denver Engineering Co. The timber used in the mine is obtained from the neighbourhood of Midway, and is brought, by means of a spur track, right up to the shop door. It is cut in definite length so that there will be little waste

when cut into mine timbers. When ends are left over they are fed into the wedge-cutting machine.

BLACKSMITH AND MACHINE SHOP.

These are united in one large building. At the end nearest the timber hoist is the blacksmith shop. This is equipped with six modern forges with their accessories. Compressed air is used in connection with these. The ordinary steam hammer is replaced by a machine drill with a hammer in the chuck. It is worked by compressed air. The chief tools to be sharpened are the machine drills. Of these each machine uses from ten to thirty per shift. The drills run from 18 inches to 15 feet in length and are made by welding a star steel point to an octagon steel shank. Hand drills, which are used to a small extent by the timbermen to cut hitches, and shovellers' picks are also sharpened here.

The machine shop will shortly be equipped with modern designs of machinery necessary for the maintenance of a large mining plant. Orders have been placed for two engine lathes, one with 32 inch swing and 18 foot bed and the other with 15 inch swing and 8 foot bed; a crank shaper, stroke 24 inch; an upright drill press, 32 inch swing; a Merrill pipe-cutting and threading machine, capacity 4 feet 8 inches; a power splitting shear, capable of cutting one-half inch plates and hand power bending rolls capable of treating one-half inch plates. The whole installation will be driven by an electric motor.

A small elevator leads from the mouth of No. 2 tunnel to the floor of the machine shop. This facilitates the handling of the Knob Hill supplies.

(To be continued.)

THE PERIODIC LAW OF THE ELEMENTS.

(By A. A. Watson B.Sc., Assayer and Mining Geologist,
Vernon, B. C.)

ONE of the fundamental principles of modern chemistry is that enunciated by Mendelejeff that "the properties of the elements are periodic functions of their atomic weights." An atom is the smallest particle of an element which can exist, and it cannot be divided by any means either chemical or mechanical. Every atom of a given element has the same weight, but the atoms of different elements have different weights. The lightest atom is the atom of hydrogen, the heaviest is uranium.

If the properties of the elements were functions of their atomic weights then the heavier the atom of an element the greater would be its specific gravity, and its other physical properties would be greater in like ratio. But the natural law pointed out by Newlands in 1863 and further developed by Meyer and Mendelejeff, is that the properties of the elements vary periodically as one goes up the scale starting at the lightest element. The next element to hydrogen in the order of atomic weights is lithium, which has an atomic weight of 7.01. The next is beryllium with an atomic weight of 9.1. Beryllium is accordingly placed at the head of group 2. Next comes boron, with an atomic weight of 11, then carbon, 11.97; nitrogen, 14; oxygen, 16; and fluorine, 19.1, as shown below:

GROUPS.

1	2	3	4	5	6	7
Hydrogen 1	Beryllium 9.1	Boron 11	Carbon 12	Nitrogen 14.01	Oxygen 16	Fluorine 19.1
Lithium 7.01						
Sodium 23						
Potassium 49						

The next element on the list in the order of atomic weights is sodium, with an atomic weight of 23 elements between fluorine and sodium, being still undiscovered. Now sodium is a very similar element to lithium. It is a metal, it is very light, oxidises very rapidly, and when placed in water combines with it just as lithium does but more violently. Sodium is therefore placed in group 2 under lithium. Going on up the scale we get back to potassium, with an atomic weight of 49 and possessing properties very like those of lithium and sodium, but while lithium combines slowly with water and sodium rather violently, potassium combines with water with extreme violence, bursting into flame and exploding in the process. The medicinal qualities of lithia water, soda water and potash water are sufficiently well known to demonstrate the similarity of the properties of the elements lithium, sodium and potassium to the most casual observer.

The valency of an element, or power of attaching a number of other atoms to itself, increases and falls periodically with the atomic weight. For instance, sodium in the first group combines with one atom of chlorine. Magnesium in the second group combines with two atoms of chlorine, aluminum with three, silicon with four, phosphorus in the fifth group with three, sulphur in the sixth group with two and chlorine in the seventh with one.

The relation of acids to metals is shown with great clearness. The members of the first group are the most metallic and the members of the last group are the most acid, and the acid character of the elements increases regularly as we pass from group to group.

The periodic law has been very useful to chemists in enabling them to search for and predict the discovery of unknown elements. When the table of atomic weights is examined it is found that a great many gaps occur. These gaps are caused by the fact that a great many elements occur in nature which are so rare that they have not yet been discovered. Perhaps the most noteworthy example of the value of the periodic law in this connection is the discovery of gallium by De Boisbaudran. At the time of Mendelejeff's earliest publication there was no element known which could be placed opposite the atomic weight 69 in group 3. Mendelejeff predicted that an element would be discovered with an atomic weight about 69; it would have a low melting point, its specific gravity would be midway between that of sodium and aluminum, or about 5.9; it would not be acted upon by air, would decompose water at a red heat and would be slowly attacked by acids and alkalis. This hypothetical element is called eka-aluminum. When gallium was discovered and isolated it was found that it had properties in exact accordance with the predicted properties of the undiscovered element eka-aluminum. Gallium has an atomic weight of 69, its melting point is 30.15 degrees and its specific gravity 5.93.

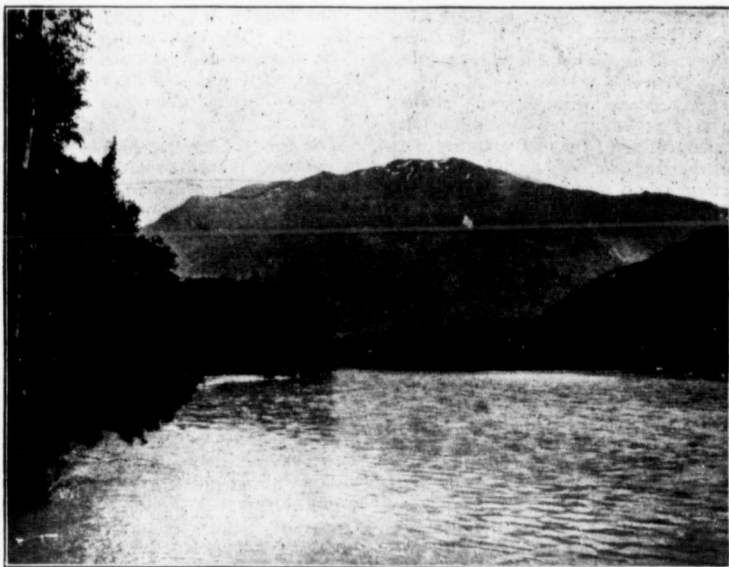
Another element predicted by Mendelejeff is scandium. He predicted the discovery of an element similar to boron which he called eka-boron. It would have an atomic weight of about 44, a specific gravity of 3.5 and would be insoluble in alkalis. In 1879 Nilson discovered the new element scandium which has an atomic weight of 44, specific gravity 3.8 and is insoluble in alkalis.

There was also a gap in group 4. Mendelejeff predicted the discovery of a raw metal which he called eka-silicon; it would be a grey metal obtained by reducing the oxide with sodium. It would decompose steam very slowly, would be scarcely acted on by acids, but easily by alkalis. The oxide would be obtainable by burning the metal in the air; it would resemble titanium oxide but would be less basic than that oxide, although more basic than silica and the atomic weight of the element would be 7.2. The discovery of germanium by Winkler entirely confirmed Mendelejeff's predictions.

KITAMAAT—A NEW AND PROMISING DISTRICT.

(By W. F. Best.)

DURING a recent visit to the Valley of the Kitamaat I had an opportunity to examine the Golden Crown mine, which is situated about four miles from the steamboat wharf at Kitamaat. The claims included in the group are the Golden Crown, Paragon, Peerless, Porcupine and Crystalline, all of which are situated on Crown Mountain, upon the south fork of Wahugh Creek. The first mentioned of these claims was located in 1898, since which



Skeena River.

time the regular assessment work has been done and a crown grant will issue to the owners next year.

The mineralized ledge discovered on the Golden

the walls, and 15 feet of porphyritic rock of the dolroyte variety, between the schistose matter and the granite, on the hanging wall side of the deposit.



Patarmigan Mine, Bornite Mountain, Skeena River.

Crown consists of a compact mass of crystalline quartz varying in width from 16 feet to 24 feet. This ledge fills a fissure in the granite of the district, there being about six inches of schistose matter on each of

The whole face of the cliff on the southern side of the creek has been cleared of vegetation and earthly debris, so that the nature and extent of the quartz ledge is clearly defined. A crosscut tunnel has also

been driven across the ledge at a point about 100 feet below the outcrop at the top of the hill, by which means the general nature of the ore body has been ascertained.

The ledge is well mineralized throughout, the ore being iron and copper sulphides with gold and silver values as indicated by numerous assays made in Seattle and Greenwood, B.C.

The highest gold values thus far found were from \$40.00 to \$47.00, while in some parts of the ledge only 40 cents in gold were found. Silver values range from half an ounce up to an ounce, and the copper from seven up to thirteen per cent.

From appearances where exposed the ledge is continuous and compact, with no evidence of faulting or other irregularity, and apparently well worth a thorough examination. On the hanging wall about three feet of the ledge is highly mineralized, and apparently the amount of ore in the ledges increases with depth.

There is excellent water power available close at hand for a compressor plant, mine lighting, etc., and from indications the Golden Crown ledge is a permanent and extensive one, that will repay those who expend capital in its development.

A very good trail on which the Government expended \$1,500 has been constructed from tidewater to the Golden Crown group, and of late development work on the Peerless and Paragon appears to indicate that pay ore in considerable quantity exists in the portion of the ledge running through these claims.

It would not be surprising to find that another important mining district exists in the Kitamaat section, of which the Golden Crown is the pioneer camp.

THE COMMISSION ON COAL MINING.

(Specially reported for the Mining Record.)

LADYSMITH, Oct. 4.—In its sittings at Ladysmith the Royal Commission has obtained strong confirmation of the necessity of further legislation in the direction of safeguards in coal mines. During the four days spent there, twenty witnesses gave their views of what they considered necessary to attain the object of the Government in appointing the Commission—the prevention, or at least reducing as far as possible explosions underground. The personnel of the Commission greatly assists in obtaining the views of the men, who, after they understand the real object of the enquiry, are eager to help in the work. Here, too, the officials of the mines have rendered every assistance, several of them depriving themselves of much needed rest to attend the sittings. A review of the evidence given here would show conclusively that the two subjects on which all coal miners lay most stress as safeguards are watering dusty mines and explosives. As to the first, there is almost unanimous testimony in favour of pipes, hose and spray; but some division of opinion as to what is the best explosive. It is evident that black powder, with all its varying quality and possible danger, still holds first place in the estimation of the working miner as a getter of coal. Unless legislation, such as

exists in Great Britain, absolutely prohibits the use of this explosive, it will probably long continue to be the chief, if not the only explosive in use. As such legislation would require much consideration before its enactment it remains to render the use of black powder as harmless as possible. It is becoming more apparent as the evidence comes in that only by increasing the discipline of the mine in the direction of thorough inspection by the shot-lighter before, as well as after the shot, can the maximum of safety be secured with opportunity to earn a fair wage. That the method of inspecting holes is faulty there is no doubt and while efficient, careful men may be trusted to clean and load the hole with some regard for the general safety, there is probably in every mine, men who either from sheer wilfulness or ignorance, cannot be trusted. An increase in the number of shot-lighters would be the only remedy for the present state of things—one of those cases where a liberal expenditure is the surest economy. The Commission does not concern itself with questions of expenses and it may be reasonably assumed that owners and operators will willingly meet the requirements of safety for their property.

As one of the witnesses expressed it, there is plenty of knowledge to prevent explosions if it was applied, but it is useless without application. Eminent authorities on gas, dust, ventilation lamps, etc., were quoted in some of the questions put. All these dealt, however, with conditions obtaining in coal mines in Great Britain, the United States or elsewhere. These are valuable in a way, but actual conditions as they exist to-day in the coal mines of the Province, obtained from those who work in them are of much greater value in arriving at a just conclusion. The difficulty about tamping material does not appear so strongly here as in other places, the shale of the district, properly treated, apparently affording good material.

Stoppings of wood, or stone, brick and cement for permanent stoppings, appear to be preferred. Enquiry as to blown out shots in narrow places as compared with the effect of similar happenings in wide places proved the greater danger of the former and the necessity of employing the best class of men in such work.

Those who had seen the panel system in operation were strongly in favour as confining the effects of an explosion to that particular panel; and it is not impossible that the future may see a greater adoption of this method in fields which lend themselves to it. Some of the witnesses were strongly in favour of the prosecution of men who, by wilful acts, endanger the common safety. Others, more lenient, felt that discharge was sufficient for a second offence. Fear of unpopularity with fellow-workers on account of giving information of illegal acts is evidently a reason for the escape of the offender from deserved punishment. A provision subjecting a participator to this extent to some penalty would probably meet this difficulty—accessories should not escape. There can be no safety without a sense of personal responsibility for a witnessed offence.

As an instance of the necessity for government inspection of powder, a witness testified that a handful of powder placed on a log burned with lots of flame and smoke but without explosive character.

Most of those who had considered the matter, favoured the ventilating of old workings, rather than closing them up. Electric appliances were condemned in gaseous mines, except in the intake. Naked lights are such an assistance to the miner as compared with the dim uncertain glimmer of the safety that they are preferred to work by; some of the witnesses believing that the risk of explosion caused greater care and that any immunity from explosion by the use of the safety was more than offset by the accidents from falls of roof, accidents with boxes, etc.

The importance of good eyesight and hearing for candidates for firemen was admitted, the quick seeing of the "cap" on the lamp being one of the safeguards. An examining test for eyesight was favoured.

Witnesses were almost unanimous in their views that the length of experience prescribed qualifying overmen, firemen and managers should be extended and that the year's experience demanded of the miner before certificate of competency should be of a practical character.

A miner of long experience made a very good suggestion. He advocated a means of communication between all parts of the mine and with the surface, so that in case of fire or explosion in any part quick notice could be given and lives saved thereby. He instanced one explosion where men in another part of the mine were entirely in ignorance of its occurrence for some hours and exposed to danger for that time for want of means to readily carry the information.

Every subject within the scope of the Commission was fully enquired into, and having concluded at Ladysmith this evening, the Commissioners left for Nanaimo, where they will sit on Tuesday, having first examined the neighbouring mines. Nanaimo will be the last place visited and will probably occupy the whole of next week.

Nanaimo, Oct. 16.—After having examined at length over ninety witnesses in the various places where its sessions have been held, the Commission on Explosions in Coal Mines left for Victoria to-day after visiting and inspecting the mines of the New Vancouver Coal Company, accompanied by Manager Russell, the Inspector of Mines and the Miners' Union representative, Ralph Smith, M.P.

The work got through at Nanaimo has been the heaviest at any place, this important coal mining centre furnishing abundant material, the efforts of the Secretary of the Miners' Union and others being constant to keep the witnesses' chairs filled. Public interest in the proceedings was also more apparent here. An occasional attempt to inject politics, although always discountenanced by the Commissioners, gave a zest to the proceedings. Expert evidence played a more important part and the suggestions

thrown out were of a highly interesting character. Two of the main questions may be regarded as fully answered by the investigations, namely, the explosive character of coal dust and the necessity for watering dry and dusty mines. As to explosives, opinions differ in respect to the safety of even the permitted explosives. The manager of a local powder company was a witness and expressed an ability to manufacture a powder, which would fully answer government requirements of safety and equal some of the older blasting powders. This is to be done under a system of government inspection and marking, if the amended law should so provide. In this connection much was heard of the special Bull Dog now on the list of permitted explosives, which seemed a general favourite with miners. The effect on the different explosives in the flame produced, of the method of cleaning, loading and tamping the hole, was fully gone into.

Much of the evidence was cumulative in favour of examination of shots before and the place after the firing; the understanding of English by all who go into a mine to work; tamping with any clayey material; longer experience and less theory for officers, etc. Occasionally a witness would differ with the general view; but the weight of evidence in favour of regulations for safety far outweighed these. In all the enquiry there has been evinced a general agreement of opinion on the necessity for more stringent regulations, with here and there a note of dissent. It would probably, however, be no difficult task to foreshadow the recommendations of the Commission on the matters within its scope.

Comparison of the death roll from explosives in Great Britain and British Columbia was made by one of the witnesses, who gave as a result in ten years—1892 to 1901—the last year of which returns are available—Great Britain .55 while the Province showed the high rate of 6.61. The latter were from the report of the Minister of Mines and the former from the figures published by the British Home Secretary's Department. While these are lumped as deaths from explosions, the specific causes of the explosions are not given, this being always largely a matter of speculation.

Taking, perhaps, the three most important witnesses at Nanaimo, their evidence may be summarized as follows: Mr. Ralph Smith, a practical miner of twenty-five years' experience, said he did not think either the mine managers or the companies had carried out the Mines Regulations Act as they do in England. According to section 3, special rules where gas is discovered a competent man should examine the mine once when there is one shift in twenty-four hours, and where there are two, twice in that time. This should be done immediately previous to the miners going into the place. That was not done in this country and never had been. The limit of time should be measured by the extent of the district, but not more than an hour and a half. In England where gas is discovered in a mine two or three times the company is compelled to operate that place with safety

lamps for a certain period until reported free; that was not done here, and there is no regulation to that effect. Men go in with unlocked lamps in their hands to examine places and open lights on their heads. The Mines Regulation Act defined a gaseous mine as one where gas is discovered at any time. He would say that any mine that gave off gas to the extent of having accumulation of fire-damp explosive in a safety lamp was a gaseous mine. One of the reasons of the large percentage of accidents here compared with other countries was the large percentage of inexperienced miners permitted to operate places. In Great Britain the miners are brought up in the mines thoroughly trained from boys; there it is a trade. Here men by hundreds are taken who never saw a coal mine. In Fernie he understood they had directly imported aliens for the mines. The late amendment as to certificates did not go far enough. Every man in a mine was a source of danger to every other man in that mine and every law should apply to all. Educational tests should apply to everyone employed. The witness favoured an amendment of the present act to that effect. The organization of coal miners was the strongest point of safety. The Coal Mines Regulation Act in England was brought into existence by bodies of organized miners and the influence of trades unions. It is not possible to get the factor of safety where the men were not or could not be organized. It was highly important the men should take advantage of the privilege of examination of the mine.

The witness believed the intention of the Coal Mines Regulation Act was that every man employed in a mine should be able to read the regulations which are posted to instruct the miners. Every man who cannot read the rules is a serious danger. He did not see the reason for translating them—the managers could not read Chinese or the other languages of the different foreigners employed. If a man could not read the rules he was unlikely to understand the instructions in a way he should. He considered dust a very dangerous element in coal mines and opposed the use of black powder and the use of electric appliances in gaseous mines. All sorts of things were dumped into air courses here—a source of danger. The law should prevent a mine being worked three shifts. Had never studied any particular system of watering, but some good system was an absolute necessity. Did not consider the shot-lighters had any power of judgment under the act as to examining the holes of some and not of others before firing—there was an ambiguity in respect of that—it simply says examine the place. His interpretation was that the act also provided for an examination after the shot, and it was so interpreted in the mines of the New Vancouver Coal Company. Under certain conditions a blown-out shot was very dangerous; some importance in that respect might be attached to the tamping. Clay was supplied in some mines in Great Britain to prevent tamping with coal dust; would favour a law compelling owners to supply clay where proper tamping could not be procured by the men.

Had always found practical miners very careful in

tamping. Black powder should be subject to government inspection. Had a long experience in safety lamps; would consider the open Clanny a dangerous lamp. Had never had the Wolf in his hands. The clad Clanny is as good as a miner could have, but not for a fire-boss. GuesSED every fire-boss carried matches now—a very grave source of danger. Would suggest two men being sent to examine the mine. Lamps should be tested in a gaseous mixture before the men got them. A near-sighted man would be dangerous as a fire-boss; would favour examination for sight. Seventy men was a good proportion for an air split. Was in favour of stopping off old workings—dirt and rock faced by a strong wall. Favoured as much air in a mine as possible—a reasonable moderate circulation without reducing the volume. There should be more discipline in mines; had never known of a conviction under the Coal Mines Regulation Act.

Considered it impossible to calculate the strength of powder for a second use of a hole; it was dangerous to fire a hole a second time, and would prohibit it absolutely. The division of a mine by such a system as the panel was absolutely indispensable. One year's experience was too little as a fire-boss or shot-lighter. The English act prohibits a man going to the coal face without two years' experience; an official should have five years' experience. A manager was not safe in a mine who was a theorist merely—was just as dangerous as a Chinaman. A man should lose his certificate, or it be suspended for breaches of the act.

Suggestions by the witness to the management of mines has met due consideration in many instances and been carried out. The witness went at length in subjects of management, such as dividing mines into sections and making a shot-lighter responsible for a given area.

Witness considered it would be a check on the officials if the inspector posted the results of his examination. While he did not desire to reflect on anybody, did not think the inspectors examined thoroughly—going through the old workings, travelling the air courses, in the sense the act is supposed to mean. His experience was, of course, confined to one mine. Advocated making the men acquainted with the plan of the mine to enable escape if necessary and as to intake and air courses, and question them on it. In this the Union and management might work together. Believed such knowledge would have saved lives at Extension and other places.

In reply to Mr. Hawthornthwaite, the witness had no reason to know an inspector dare not do his duty in British Columbia, and had no personal experience that would not prove to him he would dare not do it; but was prepared to say that where political influences were strongly connected with government administration that are generally interested in coal mining operations, there is a tendency in that direction.

Mr. T. J. Shenton also criticized the direction of mines, but later in the enquiry voluntarily withdrew any imputation on any particular inspector and desired to speak generally as to inspections.

Various firemen and others of the minor officials having testified, Mr. Francis Henry Sheppard, civil and mining engineer, was sworn and gave long interesting testimony from the expert point of view. The witness stated that the bulk of his testimony rested on examination after the two explosions at Cumberland and Fernie, but it was evidently also based on a long period of research. The condensed result, said Mr. Sheppard, of those two examinations was that a dangerous condition of the temperature of the mine might exist and yet be very hard to detect; combined partly with dust in the atmosphere and a low percentage of fire-damp. These conditions were very difficult to detect. Probably as low as one and a half per cent. of gas, if the other conditions are ripe, is sufficient to cause an explosion under some exciting cause, such as a sudden shot; and if very ripe, it had been asserted that the sudden shutting of a door would cause an explosion. Another source of danger is the simultaneous firing of shots, or rapid succession of shots, which witness knew to be fully as dangerous as blown-out shots. The rapid succession of shots has a result on the atmosphere very similar to the blown-out or windy shot. As to dust, the greatest source of danger was the newly created dust along the working faces; this was gathered from observations at Fernie.

The greatest zone of violence was along the working faces; the dust on the hauling roads did not enter into it at all. There was very little coking at Fernie away from the line of working faces. Any system of watering should be carried to where the danger lies—the working faces. Services of water should be laid in proximity to the working faces under a head so as to be thoroughly sprayed. The whole of the places in a dry and dusty mine should be continually watered to render the atmosphere safer. A lamp that would detect a lower percentage of carburetted hydrogen or fire-damp would be too delicate for use by the ordinary miner or in examinations, but would be of great service in expert hands. Some instrument should be supplied to the ordinary fireman and miner which would detect 1.5 per cent. and also to determine the dusty condition of the atmosphere of the mine, which should be known to the officials. Only by these means could precautionary measures be taken. Under the present system it is simply a matter of opinion; the inspector might determine a mine as dry and dusty which might not be particularly dangerous—it is simply a matter of his judgment. It should not be taken out of the hands of the inspector, but given all the importance it is possible to give; he should have some strong counsel or advice in determining whether a mine is dry and dusty and sufficiently dangerous. It had been suggested that if a delicate gas test had been in use at Fernie the explosion there might not have occurred. Quoting from his report on the Fernie disaster as applicable generally to the present enquiry, the witness stated the ordinary safety lamp will indicate about two and a half per cent. of C.H. 4, and while there are lamps and instruments which will indicate as low as one-quarter of one per cent. they are so delicately con-

structed as to be of no practical use to the ordinary miner.

Probably the cause that contributed more largely than any other to the explosive condition of the Fernie mine as a whole, is the fact that these mines were working a double shift. The explosion took place about the middle of the second shift, and the dusty condition naturally had increased all day, and cooling or settling intervals had intervened, and instances are on record which go to show that the second shift following immediately upon the first produces conditions in a dusty mine which are dangerous. The inference to be drawn from the evidence of force, direction and zone of greatest violence, is that the greatest danger lay, not in the hauling roads or old workings, but in the newly created dust of the working faces. The atmosphere passing through the faces is no doubt charged to some extent with a low percentage of C.H. 4, and while this may be to some extent dangerous in itself, it is much more likely to become so under some exciting cause, similar to that which probably caused the explosion, viz., an explosion of fire-damp and dust combined. The fact that dust may be created as freely, where blasting conditions do not obtain, to wit, where coal is soft and friable, as in room 7 off McDonald's level suggests that watering precautions may be necessary, irrespective of those provided for in the Mining Act, governing blasting conditions.

Some practical method or appliance is much needed to determine the condition of mine atmosphere, both with regard to low percentage of fire-damp, and dangerous conditions as to the presence of dust. The installation of a thoroughly efficient watering appliance in dry and dusty mines should be more imperative.

While the use of the ordinary blasting powder does not appear to have contributed to this explosion, its continued use under conditions prevailing in portions of No. 2 mine will always be a source of danger and the substitution of more modern and safer explosives is suggested. As to tamping, no dust or similar inflammable material should be used in tamping; but clay or decomposed shale should be always employed; ordinary clay would be too dry. Holes should be entirely clean of cuttings or coal dust. Blown-out holes are very dangerous and a blown-out hole would ignite dust even without gas present under certain conditions.

This danger was intensified in a narrow way. Coal dust has exploded without the presence of gas, notably at the Brancepeth Colliery, where the coal hopper exploded, killing three men. A great deal depends on the chemical condition and fineness of the dust; dust in lignite mines does not seem to be very dangerous—explosions are seldom heard of. The chemical analysis of anthracite was such that it did not supply the dangerous volatile dust. Any coals of high and fixed carbon like anthracite, 82 and 85, witness would not consider dangerous. Fernie was about 70, leaving room in the analysis for volatile hydro-carbon. In some of the lignites the analysis

is very high and the lignite mines are not as dry as bituminous; there was a certain amount of adhering moisture and moisture contained in the coal.

It is possible to get a new black powder with less flame than that now used; how serviceable it would be witness could not answer; absolutely flameless powder had yet to be found. Experiments with the gelatine and water cartridge showed there was absolutely no flame, at any rate none showed on a photographic plate. It was, however, rather a delicate thing to use; hardly fit for the hands of a miner. As to lamps, all the old style should be prohibited—the bonnet Clanny is probably the best of them. The illuminating power of the Wolf is higher than any lamp on the market—a good feature. The largest percentage of accidents were from falls of roof and good light is essential. The A. H. Gray has an illuminating power of 67-100 of a candle power; the Wolf claims one candle power. The self-lighting apparatus would not be dangerous except in case of breakage of lamps or glass or somebody tampering with it and igniting the match while in that condition. With that exception did not think there was any danger in the self-igniting process. All firemen should have that or some self-igniting lamp. Holes should be examined before charging; part of the shot-lighter's duty should be to clean out the holes and tamp the charge. Electric installation of any kind should not be in the return air-way, but if the mine is particularly fiery or known to contain large volumes of standing gas, the witness would not favour them at all; some sudden fall of roof or something of this kind might suddenly drive out the gas from the workings across the main road. or stoppings, hewed logs are the best—in case of creep they would tighten. Did not consider it possible to wholly ventilate or wholly isolated abandoned workings; it was very difficult to stop them effectually; the pressure of gas from coal means something enormous, having been found in some instances as high as 200 to 250 pounds to the square inch; would endeavour to ventilate as long as he possibly could. As to velocities, the high velocity of air combined with a heavy concussion would excite dust and with a blown-out shot might supply the conditions which would cause an explosion; any high velocity in the shaft or open part of the mine would not be so much a source of danger; would recommend to reduce the velocity by reducing the air-ways; a good velocity around the workings could not exceed probably 200 feet per minute. At Fernie the manager had testified it was going at 300 feet per minute from the face of McDonald's level to the face of Dever's level—that meant 30,000 cubic feet at a winning heading of the mine; such a velocity would have been absolutely dangerous with the atmosphere charged with fire-damp.

As to the panel system, you have less openings, so that in case of spontaneous combustion the plan of ventilation is more easily carried out; witness would recommend the panel system; the fields in Vancouver Island are not very suitable to the panel system.

The witness dealt at length with the various matters within the scope of the Commission, emphasizing an extension of the age at which a mine manager is now permitted to pass for that position, also considering that the present examination did not bring out the practical parts of a man's experience—was in fact too technical.

Mr. David Moffat, who had been forty-seven years in coal mines, told the Commission that coal dust will help or augment an explosion of fire-damp or gas was generally admitted, but he had failed to read of dust alone causing an explosion. When coming in contact with a naked light ventilate or remove the gas or dilute it with air, and we will not need to fear dust explosions. Old or abandoned workings should be sealed and proper pipes inserted in stoppings to allow the drainage of any gas that might accumulate; if not sealed should be ventilated.

Where safety lamps are used powder should be fired by battery and the use of squibs or fuse prohibited. Reducing the current of air during the time of firing shots might allow an accumulation of gas which might for the time being be rendered inexplosive for want of proper mixture, but would be dangerous when the air current was at its regular velocity, by bringing gas into contact with the miner's lamp.

Would recommend the removal of dust as far as possible and watering the roads. Dividing the air currents into two or more separate splits greatly reduces the danger of explosions and the return air from each split being carried directly into the main return air-way, the gas generated in one portion of the mine does not pass into another and an explosion which might occur in one section would not damage another. Also if one portion of a mine gives off more than others a larger current will be required in order to dilute them and render them inexplosive; this could be done by the use of regulators. Splitting air current and the use of over-casts reduced number of trap doors. Velocity of air current should be tested by aerometer in the most remote working place.

A fire-boss should not have more places than he can carefully examine, and such examinations should occur as short a time as possible before the miners go to work.

Dangerous causes exist to-day that did not formerly exist; mines are more extensive, coal is mined at greater depth and distances, liberating more explosive gas; mining machinery with their dust and noise are used and trains of coal are run at a high rate of speed with electricity at from 250 to 500 volts through bare wires. With all these and other dangers there are less accidents than took place twenty years ago. But fire-damp and coal dust while the miner's greatest foe are not productive of more than .48 per cent. of fatal accidents. Ignorant men are introduced by the hundred to mine coal, nearly as ignorant as the animals that haul the coal from them, and their ignorance of English prevents their proper instruction. Witness had been connected with three explosions in British Columbia, two at Wel-

lington and one at Nanaimo; that in Wellington in '84 was, in his opinion, caused by a fire-boss who, having found gas in a heading worked by Mr. Fear, had allowed him to go in with a safety lamp in his hand and a naked light on his head. The disaster in January, 1888 in No. 5 Wellington, he believed, was caused by a Chinaman leaving a trap door open and allowing gas to accumulate inside. Witness believed that trades unions were a decided benefit to miners and owners.

Mr. Thomas Russell, a mine manager with an experience of nearly thirty years, would ventilate mines so that the air would be as near as possible like that on the surface. Watering should be compulsory, and any dispute as to its necessity would leave to the inspector or arbitration. The inspector should have power to close down the mine if thought dangerous until dispute was settled. In mines giving off any gas black powder should be prohibited. A mine might be dusty with no gas present. Had made experiments with dust headed to a 150 degrees Fah. and always exploded in coming in contact with flames. Considered dust worse than gas and the cause of many explosions. Too much attention has been taken to gas while dust has been neglected. Comparing with the flame from a shot from a cannon, the witness gave the result of experiments approximating a blown-out hole with different explosives; in some cases the flame extended 60 feet and a per cent. of gas in the air always ignited. Legislation prohibiting tamping with coal should be passed to guard against the action of careless men. All explosives should have government inspection and marking and firemen should have a lamp with re-lighting apparatus or carry two lamps. Firemen probably carried matches; the place for a man who carried matches in a mine was in jail.

Where air in the return shown one and a half per cent. of gas even in the main intake, no electrical apparatus should be permitted. Old workings should be walled off. High velocity of air should be considered dangerous. Two shifts, with sufficient time for cooling, could be worked without particular danger. The Germans had a theory that a mine was safe if air was increased in ratio to the amount of coal hoisted. The mining law should provide that some men with each shift should be familiar with the geography of the mine, and all should be able to read and write English. Would exclude without exception men of every nationality who could not read the special rules and understand orders given them. Three hours should be the outside limit between examination and men going in. It should be compulsory that every one examining should make a report, including the inspector, and that he should examine report books of mines. Government should supply inspectors with gas tester to test air in return at least once a month. The furnishing of permitted powders to miners at cost by the Government, he thought was a political question and would not add to safety. Overmen and managers should have five years' experience underground and examination not too theoretical.

The certificates of all alike should be cancelled for certain offences. Encouraged miners to examine mines; it added largely to safety. Here there was examination and reports monthly. While at Union it was only once taken advantage of; there was no union there nor agent; organization meant safety. The coming into force of the Workmen's Compensation Act would lessen the danger in mines, would make discipline better and the management would be more accurate in rigid discipline; as far as witness knew, discipline was as good here as in England. Referring to some remarks which had fallen from Mr. Hawthornthwaite, the witness stated that they were very unfair. Mr. Dunsmuir had never given him any indication that he wanted to restrict expenses at the expense of the safety of the mine, and he considered such statements without truth, foolish and unfair.

After a statement from Mr. Morgan, inspector of mines, as to the discharge of two miners from Wellington mine who had reported violations to him, in which it appeared they had addressed a letter to him to show to the management as they were going to leave, the Commissioners declared the sittings of the Commission closed.

SAFETY LAMPS AND COLLIERY EXPLOSIONS.*

(By William Blakemore, Montreal.)

THERE can be no doubt that the subject of safety lamps is of the greatest importance in connection with coal mining; possibly of greater importance than the regulation of blasting, with which it divides the attention and interest of mining men.

The result of thirty years' experience, during which time I have tested every safety lamp which has been put on the market, leads me to the conclusion that the best result which can be obtained is only a certain percentage of safety, and of the lamps which approximate the closest to this standard I would specify the improved Hepplewhite Gray for testing processes, and the Muesler. The former will, in my judgment, detect the presence of a smaller percentage of fire damp in the air than any other lamp, certainly than any other oil and wick lamp; and as long as this is the method of illumination I do not see how it is possible to construct a lamp mechanically more perfect than this. The fact that the only inlet is by way of the vertical tubes which admit air and gas at the top of the lamp and deliver them direct to the flame seems to me to give the maximum efficiency in this particular. I commenced to use the Hepplewhite Gray for testing purposes when it was first invented, and have continued its use ever since; the only objection which has developed with experience is its liability to become extinguished by a sudden jerk, but this is a defect which it has in common with the best lamps, and can hardly be considered an element of danger. I have always found the finger-holes and slides upon the tubes of great value for testing purposes, and the proper manipulation of

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these renders the lamp as sensitive as can reasonably be expected for practical purposes.

With reference to the Mueseler, this lamp, when bonnetted, is as efficient and safe as any lamp with which I am acquainted for ordinary working purposes, and if used in combination with the more delicate lamp above referred to, furnishes a combination which I think meets the requirements of the case.

I am aware that the Wolf lamp is largely used in Pennsylvania and is growing in favor; it is a good lamp, but possesses one drawback which I consider fatal to all lamps of this class, viz., that it burns benzoline oil. The presence of a volatile oil in connection with a safety lamp is an added source of danger and will not long be tolerated in mines. I agree with Mr. Ashworth's remarks that the safety of a lamp is dependent, not upon ordinary conditions prevalent in a mine, but upon its ability to resist exceptional conditions which may be instantaneously produced, and this point must never be lost sight of, because the exceptionally dangerous condition may be produced at any moment and without the slightest warning. This is why all such lamps as the Clanny must be resolutely condemned, because although they may be perfectly safe under the normal conditions prevailing in a mine they become unsafe and highly dangerous in the presence of a sudden outburst of gas, an acceleration in the velocity of the air current, or the presence of a large quantity of coal dust.

As reference has been made in Mr. Ashworth's paper to the Fernie explosion I may be permitted to say that in my judgment the preponderance of the evidence adduced at the inquest pointed to the Clanny lamp as the undoubted origin of the explosion. This lamp was being used in immediate proximity to a feeder of gas, and at a point where, according to the evidence of the chief mine superintendent, the velocity of the air current was ten feet a second. After the explosion a lamp was found within a few feet of this feeder completely shattered, and although of course there can be no direct evidence on the point, the conjunction of all the elements necessary to produce an explosion rendered the matter one of easy natural deduction, especially as it was proven that the air was heavily charged with dry coal dust at this point. The behaviour of different lamps in a mixture of coal dust and air will undoubtedly form a subject for careful investigation, as hitherto the experiments made with coal dust have been more or less confined to testing its behaviour in the face of explosives; it may, however, be interesting to mention that in connection with the Fernie explosion one of the most experienced miners, Angus Ferguson, stated that he had frequently, when carrying a bonnetted Clanny in the works along the main haulage road where there was heavy coal dust but no gas, found the coal dust accumulate upon the lamp, and on shaking it slightly to get rid of the same a dull red flame would fill the lamp. The next question to solve would be—at what point this flame would connect with the outside of the lamp, and this is undoubtedly one of the problems of the times in connection with dry and dusty mines, because the conditions referred to prevail in so many.

My concluding remark must be an endorsement of Prof. Galloway's observation in his report on the explosion at the Universal Colliery, viz.: that recent occurrences lead to the irresistible conclusion that

coal dust is relatively more dangerous in a mine than fire damp.

(By Mr. W. D. L. Hardie, Lethbridge, Alta.)

During many years' practical experience in bituminous coal mines, both in America and Europe, I have paid much attention to modes of working and the dangerous elements that enter into the practice of coal mining. I have found in nearly all, if not every one of the superior coking coals, which lie comparatively flat and not much faulted, whether marsh gas be present or not that the dust has a more or less marked "greasy feel," indicating that in addition to the carbon there must be some of the heavy hydrocarbons of the paraffin series present in the volatile matter. When such a seam gives off fire-damp the damp is very likely to be "sharp," indicating that hydrogen, as well as the heavy hydrocarbons, is likely a constituent of the fire-damp.

Under these conditions, which, I think, from personal examination, hold good at Fernie, B.C., the inflammable point of the explosive gas given off is very much lower than that of ordinary fire-damp. Under such conditions the explosive point is reached with a less percentage of gas, and of course the quantity of the gas to give the maximum explosive force will also be much less in the explosive mixture. If the Fernie coal dust carries a small percentage of heavy hydrocarbons or free hydrogen, it can be readily imagined how easily the dust could be raised to an incandescent heat and the hydrocarbons distilled in quantities large enough to cause an explosion of any magnitude, if plenty of coal dust has been deposited in the mine, having its initial cause in the ignition of a small quantity of gas, or from many other causes, even if explosive gases were not present in such quantities as could be detected with ordinary, or even improved safety lamps. By improved safety lamps I do not mean those specially designed for delicate work.

Under these circumstances it is of the utmost importance that the smallest percentage of gas should be detected, but it is just of as much importance that all the other dangers should be known and cared for. For years I have used the Ashworth-Hepplewhite-Gray lamp in several forms, including Clow's hydrogen flame, the Pieter lamp without and with Garforth's rubber ball, and Shaw's gas-testing machine, with singularly good results. To the use of these appliances and a fairly good knowledge of gases, and a good grasp of "the hydro-carbon in coal dust" theory I attribute my success, in over twenty years' practical experience, in avoiding accidents in some of the most gaseous, dry and dusty mines on this continent. In one colliery which exploded before I took charge I had the greatest difficulty for a long time in instilling into the officials' minds the great necessity of getting a complete knowledge of "the hydro-carbon in coal dust" theory, but was successful in avoiding accidents while I remained there! Since then there have been several minor explosions, and one very large one, killing over 100 men, dating not more than six months back.

I do not think that the coal dust theory should ever be lost sight of in mines where the volatile constituents form any considerable percentage of the analyses. In anthracite mining the problem is not so difficult; in such seams the danger is mostly, if

not altogether, marsh gas. The South Wilkes-Barre Colliery, Pennsylvania, U.S.A., is perhaps the most fiery colliery in the United States, as much as three and four per cent. of fire-damp being detected almost constantly in the fan drift by the Shaw gas tester, but there the problem is not a particularly difficult one, because there is no dangerous coal dust, no element not well understood.

By far the largest number of explosions on the American continent take place in dry and dusty bituminous coal mines, some of which gave off fire-damp, while in others that have exploded never a sign of fire damp has been seen on a safety lamp, yet the lives lost in each of these mines count up in hundreds. In many of them I am sceptical as to whether there was any gas given off. I trudged round the East mine of the South-west Virginia Improvement Co., Pocahontas, Va., and worked at the coal for over six months after the explosion there, in the vain hope that I would be able to find something that would indicate that there was some marsh gas present, but I never saw it. In the presence of several officials of the company and Andrew Roy, then the chief mine inspector of Ohio, I fired a heavy shot in a wide room where the coal was mined at least five feet deep. After such a shot a long tongue of red flame invariably shot out from twenty to thirty feet, and if the coal came down, flame at white heat played around behind the coal, in many cases dying out gradually, the last small flame presenting the blue cap. This only supported my idea of the distillation of the hydro-carbons in the coal dust. I have seen the same phenomena in most seams of a good coking quality. If marsh gas be present, forming a mechanical mixture with air, the phenomena will be intensified.

From the foregoing remarks it will be seen that I am not one of those who believe that it is necessary to have a percentage of marsh gas present before we can have a "coal dust explosion." But woe will surely betide the manager who has both coal dust and gas present if he does not carefully take care of both with the most advanced knowledge of the day. I would not think of being in charge of any dry and dusty mine without endeavouring to detect explosive gas with the most improved safety lamp or other detector known to the mining fraternity, even if in my mind I thought there was no possibility of gas being present: one can never tell.

Even if it be admitted that gas must be present before a "coal dust explosion" can take place, "the enquiry into the Seaham disaster in 1880 showed that the presence of two and one-half per cent. of fire-damp in a dry and dusty mine created an atmosphere which would in the presence of a blown-out shot, over-powdered shot, or a badly placed shot, bring about a fearful disaster." There are not so very many who can detect even three per cent. of fire-damp with the ordinary safety lamp. Of course there are lots who think they can, but can they?

Where gas, coal dust, or both are present in a mine it is the duty of the manager to know all that is knowable about the dangers connected with the same so that he may do the best to protect the lives of the men intrusted to his guidance and protect the company's valuable property from damage or destruction.

It is a well known fact that increased temperature reduces the temperature of ignition and that a low barometer reduces the violence of a gas explosion,

but these are factors of small moment where coal dust is one of the elements when looking into the mechanical effect of an explosion; but in the case of gas detection, increase in temperature and reduction of temperature (low barometer) may be of considerable importance.

Another point, I will mention in passing, is that the effect of coal dust on the flame of a testing lamp is not generally given the consideration it should have by the fire bosses and other officials in dry and dusty mines, on this continent. Here is another opportunity for the distillation of explosive gases on which I have laid so much stress. Coal dust in contact with the flame of a testing lamp is a condition that might well be made the subject of a scientific paper. Coal dust in the meshes of the gauze of an ordinary safety lamp becomes incandescent almost instantly and passes the flame to the mixture outside of the lamp.

Mr. Ashworth's lamp is simply an improvement on the Gray lamp, which had the good fortune to be highly recommended by the Royal Commission, and there is no doubt but it is a good lamp; however, it has not passed through its course without considerable objection being raised to it by many able mining engineers and mine managers in Great Britain. As recently as the years 1892-3 Mr. Stokes and Messrs. Ashworth and Clowes had considerable controversy as to the relative merits of the Stokes and the Ashworth lamps. From the discussion that followed I gathered that both lamps had about an equal number of supporters, but all seemed to be unanimously of the opinion that both lamps were good and capable of detecting equally small percentages of gas, but the Stokes lamp had the advantage of using alcohol instead of hydrogen gas used in the Ashworth lamp then under discussion. Both lamps use oil for testing for over two and one-half per cent. of gas.

Mr. Ashworth in his paper does not discuss the percentage of gas his lamp will detect, but satisfied himself with saying that "it will detect more readily and with greater certainty the presence of the blue cap than any Davy lamp which was ever made." This is definite, but not very informative, and presupposes a knowledge not had by all who will read his paper.

Mr. Ashworth's paper is a valuable one; if it will induce the mine managers and mining engineers in Canada and the United States to give safety lamps and other subjects in coal mining the thought they deserve, by giving the chase for cheap coal just a little less attention, it shall have served a good purpose.

MINING IN THE YUKON.

A CORRESPONDENT writes that shipments of boilers and steam plant from the Coast cities has now reached the large aggregate valuation of approximately five million dollars. The machinery is used in the process of thawing the frozen gold charged gravels, and hoisting, transferring and handling the precious earth. While one part of this immense equipment is engaged in the winter work extensively, another large portion is used only in summer. But there is still another classification to be added, namely those machines which work both summer and winter. It is probable that 1,000 to 1,500, and may be more, steam plants are in use in the Yukon alone.

Exact figures are not-obtainable, but figures secured by special request from the quarterly reports of the mining inspectors to the Gold Commissioner show that the Bonanza District, which includes Bonanza and Eldorado Creeks and all their rich hills and gulches, lead the others in the number of steam plants used, claims operated and men employed. The Hunker District, including Gold Bottom, Last Chance, and all the tributaries, is second; Dominion is a good third; Gold Run fourth; and Sulphur fifth. After these come the more distant mining districts of Stewart, Clear, Forty Mile, Hootalinqua and Eureka, each ranking in the order given.

The total number of men engaged in all these mining districts last winter was 6,200, working on 1,380 claims. A total of 598 steam plants were then at work.

During the months of April, May and June, which may be said to constitute the most active season of the year because of the clean-up when the winter dumps are washed, the five largest districts alone had as many men engaged in mining as all in the country combined during the winter, while at the same time 140 fewer claims were operated.

While all these figures, gathered from reports, are not exhaustive, complete, nor satisfying in respect to showing how many men are pursuing mining and prospecting in the Yukon, they are an aid in the way of gathering the relative strength of the districts included, and of getting some idea of the number of steam plants engaged in each locality at different seasons of the year. During the summer, scores, if not hundreds, of new plants have been installed, and several new streams have come to the front, none of which is included in this review. No doubt they will take prominent parts in future reports. Duncan, on the Stewart, for instance, had but a handful of men last winter, but this winter will have from 400 to 500. Boucher, discovered only last July, has perhaps 100 men.

Men and plants engaged and claims operated in the different districts, as covered by the two last quarterly reports, now complete, are shown in statistical form as follows, the first table being for January, February and March:—

District.	Number of Men.	Claims Operated.	Steam Plants
Hunker.....	1,195	296	99
Bonanza.....	1,840	475	287
Gold Run.....	485	104	46
Dominion.....	825	215	114
Sulphur.....	245	94	42
Stewart.....	266	78	None
Clear Creek.....	215	33	3
Forty Mile.....	95	52	2
Hootalinqua.....	65	15	2
Eureka.....	35	19	3
Totals.....	6,166	1,381	598
For April, May and June:			
Bonanza.....	3,025	495	326
Hunker.....	1,495	335	148
Dominion.....	900	265	140
Gold Run.....	515	88	49
Sulphur.....	185	74	37
Totals.....	6,120	1,257	700

RECENT PATENTS OF MINING APPLIANCES

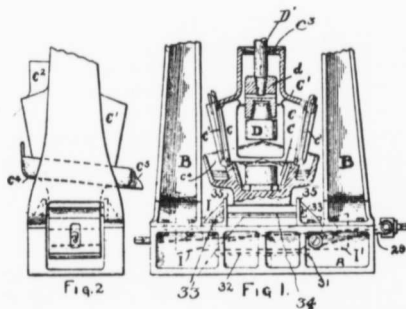
MR. ROWLAND BRITAIN, patent attorney, Vancouver, kindly sends us the following report, as being representative of the most recent improvements in the work of ore recovery and reduction:

Stamp mill, No. 76,957, C. E. Billin, Chicago.—

1. In a stamp mill, the combination with a frame, a stamp and mortar carrying a die, means to adjust the mortar comprising faced wedge blocks having a right and left screw rod, and connections between the frame and rod.

2. In a stamp mill the combination with a frame, a reciprocating stamp, a mortar having a die, a wedge supporting the mortar, means to operate the wedge to adjust the mortar, and links connecting the wedge and frame to centre the former in the latter.

3. In a stamp mill, the combination with a frame, a stamp reciprocating therein, a mortar carrying a die in alignment with the stamp, a wedge supporting the mortar and comprising a pair of blocks having



oppositely inclined contacting faces, a tapped rod pivoted in each block, a reversely threaded screw rod engaging the tapped rods, and a pair of links pivoted to the frame and connected to a screw rod.

Treatment of telluride gold ores, U. S. No. 709,037, W. Pethybridge, London England:—

1. A process for the decomposition of ores containing telluride of gold, consisting in reducing the ore to a finely divided state then exposing it to the action of a solution of ferric chloride of a specific density of about 1.18 and containing the treatment until the tellurium is in solution.

2. In the decomposition of ores containing telluride of gold, the process of reducing the ore to a finely divided state and then exposing it to the action of a solution of ferric chloride alone to attack the tellurium.

3. In the decomposition of ores containing telluride of gold, the process of reducing the ore to a finely divided state and then exposing it to the action of a heated and agitated solution of ferric chloride alone to attack the tellurium.

4. In the decomposition of ores containing telluride of gold together with iron, the process of reducing

the ore to a finely divided state, treating it with hydrochloric acid and water to form ferric chloride in solution, and then decomposing the telluride of gold by means of such ferric chloride.

Patents issued to British Columbia inventors this month are as follows: S. Erb, Chemainus, U. S. patent on a log carriage offset. This device is an attachment to a heavy log saw carriage and is designed to throw the log from the face of the saw during the backward run of the carriage. The patent has been taken up and is being manufactured by the William Hamilton Manufacturing Co., and has been running in the Chemainus mills for some time now with every satisfaction.

J. Kellington, New Westminster, on a machine for depositing a measured quantity of salt in cans of meat or fish. This is a very simple machine yet does its work in an accurate and rapid manner, the progress of each can through the machine operating the mechanism which fills the measure and empties it into the can.

The same inventor has received also a patent on his machine for washing cans, which is also characterized by simplicity and directness of operation. Both these inventions are controlled by Messrs. Ewen & Co., canners, of New Westminster.

Messrs. Letson & Burpee, Vancouver, have received a U. S. patent on a door for closing a retort. This patent is on improvements on the Ross door, of which this firm are the assignees, in which the internal pressure is made use of to keep the door steam-tight against its seat.

THE LATE DR. SELWYN.

We regret to learn of the death, which occurred in Vancouver on October 24th, of Dr. A. R. C. Selwyn, C.M.G., LL.D., F.R.S. Dr. Selwyn, who was in his seventy-eighth year, was an eminent scientist, and for many years occupied the post of director of the Geological Survey of Canada. He was born at Kilmington, Somerset, Eng., and was the son of the late Rev. Townshend Selwyn, Canon of Gloucester Cathedral. He was instructed at home under private tutors and was afterwards sent to Switzerland to complete his education. His inclination being toward the study of natural science, he was allowed every opportunity to gratify his desire. Dr. Selwyn's first appointment was to the staff of the survey of Great Britain as an assistant geologist. He remained in that position until 1852, when he was chosen by the Secretary of State for the Colonies to assume the duties of Director of the Geological Survey of Victoria, Australia. He remained in Australasia for seventeen years, and before returning to England undertook, in addition to his regular work in Victoria, special examinations of the Tasmanian and South Australian coal and gold fields. Dr. Selwyn was appointed one of the Commissioners of the Victoria mines in 1856, and member of many other investigating boards during the next ten years thereafter. In 1869 he resigned his position

in Australia to come to Canada, being appointed, on the recommendation of Sir William Logan, to be his successor as Director of the Geological Survey. He remained in active discharge of his duties until January, 1895, when he retired on a pension. The deceased was a Fellow of the Royal Society of London; a Fellow of the Royal Improvement Society of Germany; Geological Society, London; and a dozen other scientific organizations.

RECENT MINING PROGRESS AT ROSSLAND

(From our own Correspondent.)

THE LeRoi profits for the five months—May to September, both inclusive—make a remarkably good showing. That the mine can do still better is reasonably sure, as although the costs of production, including mining, freight and treatment, have been steadily lowered, the scarcity and price of coke and the continued depression in our copper market has reduced the total net earnings. For the months mentioned the net profits of the mine and smelter amount to nearly \$420,000 and as this is at the rate of over a million of dollars per annum, dividends should be within reasonable distance, notwithstanding the disadvantages referred to.

The tonnage and net profits for the five months are worth reproducing and as the figures are all official, their accuracy can be relied upon:—

Month.	Tonnage.	Net Profits.
May	13,047	\$66,932
June	14,828	94,302
July	16,170	108,348
August	18,578	79,487
September	15,665	65,000

The net profits for September are Mr. Mackenzie's estimate. As, however the estimate in the preceding four months has invariably been considerably lower than the real earnings, it is only fair to presume that the September profits will closely approximate \$70,000.

Roughly about ten per cent. of the tonnage comes from the old second-class dump and the balance from the mine.

In March and April the output reached the maximum, 24,528 and 25,593 tons having been shipped from the mine during these two months, and the average assay values were respectively \$9.92 and \$10.25. Since then the values per ton of ore shipped have appreciated, the returns for the four following months being \$15.86, \$17.70, \$17.67 and \$15.00 per ton. On account of the difficulty in obtaining a regular supply of coke the smelter has only had two furnaces in operation for some time, and for a period the entire plant was closed down. Under the circumstances the showing is a remarkably good one and must be highly satisfactory to the shareholders, as well as to the Bank of Montreal, which has so steadfastly stood by the mine.

The main shaft of the Le Roi was down 1,320 feet on the 1st of September and at the present time the 1,400-foot level has been passed. So far as known the lower levels of the mine have been rather disappointing, but it has been semi-officially stated that there is sufficient ore in sight at the present time to last the mine for at least a year supposing no further discoveries were made in that time, and Mr. Mackenzie has alluded to the uncovering of at least two bodies of high-grade ore during the past summer which has resulted in the marked increase of ore in sight of this class.

The latest returns from Le Roi No. 2 gives the estimated net profits for September at \$10,000, and in view of the satisfactory returns announced for previous months the declaration of another dividend by the company is probable, provided the last dividend was paid out of earnings in hand and was not anticipated.

Mr. Kirby's experiments in the concentration of War Eagle and Centre Star ore at the silica works are being watched with unusual interest by mining men generally. It is understood that the mine manager satisfied himself last spring that the plan he is now carrying out experimentally was entirely satisfactory and he personally desired to put up a 500-ton concentrator during the summer, but it is said that his directors having in mind doubtless the troubles that were encountered during the past, insisted that the plan should first be tested on a small commercial scale, and as a result the silica works were acquired. It is stated quite positively that Mr. Kirby has no doubt about the success of his concentration scheme and that beyond all question a 500-ton plant will be built early next spring. The details of the process have not been given out, but oil is not used, and the process is said to be a combination of several water concentration schemes already well known and in use in the mining world.

The shipments from the War Eagle and Centre Star have kept up steadily all month six days a week and the minimum of 450 tons per day from the combined mines, as promised by Mr. Kirby, is being exceeded. The announcement has been made that the properties would shortly send down to Trail a combined output of 24,000 tons per month, but up to the present time only about half that amount has been attempted. Judging from Eastern stock quotations the public are watching for further information, and as practically nothing has been given out since the last general meeting of shareholders no one on the outside has any idea of the real condition of either properties.

The main shaft of the War Eagle reached a depth of 1,580 feet in February and the exploration of the lower levels was then commenced and has continued up to the present time. The public will, however, receive no further information until the annual meeting in January next, when presumably some details will be forthcoming both about the mines, and the concentration scheme which promises to accomplish so much for the camp.

The Giant has been a steady shipper to Trail all month and Hon. Mr. Mackintosh, the resident director, has announced that in November he hopes to be in a position to speak definitely about ore in sight, the erection of further plant, etc. Present indications are satisfactory and the outlook for this property is distinctly good.

The Homestake, which has struggled so hard with the south belt problem, recently announced a sale of a large number of shares for non-payment of assessment dues and it is satisfactory to note that in almost every instance the shares were redeemed before the sale day was reached. The original sale day has been adjourned a month and the secretary states that before that time all the shares will be redeemed. Preparations to resume work are now in progress, and by the 1st of November the compressor will be in active operation once more.

The White Bear and the Green Mountain mines are being steadily developed, but no announcement as to results attained has been so far made. It is understood, however, that in the case of the Green Mountain the development of the ledges located by the diamond drill has turned out very fairly satisfactory.

Among the many mining men well known here in the earlier days of the camp who visited Rossland this month were M. R. Galusha and "Jim" Wurlner, of boom fame. Mr. Galusha stated that work on the Jumbo property would be commenced, but fixed no date.

Nothing further has been said about the recent discovery of fairly high grade ore in the Kootenay mines referred to by Manager Bernard Macdonald in his cable to the directors last month. Development work is going on steadily in the Kootenay and in the Rossland Great Western, but no late discoveries of importance have been announced.

The new manager of the Velvet mine, Mr. Gray, has sent some encouraging cables to England as to the progress attained and as to the values of the shipments made of late. The difficulties encountered in obtaining proper shipping facilities will have to be overcome before the Velvet's output is on a commercial basis.

The Iron Mask and the I. X. L., both of which promised so well, remain idle and no one seems to know why or what the owners intend to do. An exhaustive expert examination of the Iron Mask was made last spring but the details were not made public.

Nothing further has been heard of the Elmore oil process of concentration since the English agent returned home and no details have been given out as to the results of the rather large shipments sent to the Old Country to be tested from the Le Roi, Le Roi No. 2 and other mines. Notwithstanding this, however, it is well known that all the mine managers are figuring on concentration and it is certain to prove an important factor in the camp's production in the near future.

Four ore trains now leave Rossland every working day and the normal weekly output is close to 8,000 tons. The camp is still feeling the effect of the close-

down last year, but business is very fairly good. The monthly pay roll is now nearly \$100,000 with every prospect of a steady increase week by week.

Notwithstanding the creditable showing made by the Le Roi mine for the past five months the stock has remained weak on the London market. The manager, Mr. Mackenzie, meanwhile positively asserts that the property is not being "gophered." That the output is a representative one and that so far as he is concerned there is absolutely nothing in the situation to warrant the depreciation of the stock. To understand the attempted manipulation, it is necessary to recall the attack on the Le Roi last spring, at the general meeting of shareholders, when a strong effort was made to force the amalgamation of Le Roi and Le Roi No. 2 on a very favourable basis for the latter. The attempt failed as did the move to reinstate Mr. Bernard Macdonald as general manager. It very nearly, however, succeeded and those responsible for the scheme have since done their best to boom Le Roi No. 2 and "bear" Le Roi. Lately the Le Roi people have taken a more active part in the fight and it is current gossip in Rossland that Mr. J. H. Mackenzie will shortly assume the control of all the original Whittaker Wright flotations in Rossland, comprising Le Roi No. 2, Rossland Great Western and the Kootenay Mines. Mr. Mackenzie states that he is ignorant of the move, if there is one, but declines to contradict the statement or to be quoted as doing so. At present there are strong indications that Mr. William Thompson and Mr. Macdonald will shortly retire from the positions they hold here in favour of Mr. Mackenzie.

MINING IN THE KOOTENAYS.

(By a Special Correspondent.)

NELSON District.—Shipments from this district show a fair increase and the outlook is, on the whole, promising. Very satisfactory reports have been received of development at the Silver Glance mine. Four cars of ore were recently shipped to the smelter at Everett, netting the owners a profit of about \$12,000. Work on the government wagon road up Porcupine Creek is progressing rapidly, the upper end being in the neighbourhood of the Union Jack mine. As soon as the road is available for traffic, the machinery and building material for the Union Jack electric plant will be hauled up. A force of men is now at work on the flume and on the construction of the dam and power house. Good progress is being made with the tramway to connect the Venus with the Athabasca mill, and the indications are that it will be ready for operation by the middle of next month. Meanwhile preparations are being made at the mine and it is hoped the full capacity of the mill will be taxed, so soon as transportation facilities are provided. The Chicago National Development Company is pushing forward development work on the Carthage group, on the north fork of Wild Horse Creek, and two tunnels have been run on the vein, a distance of 488 and 135 feet respectively. Work is now being directed to crosscutting the vein at a much lower level, and a third tunnel is being driven for that purpose, being now in about seventy feet. A fine strike has been made on the Double Standard claim adjoining the Hunter V. mine. A considerable body of ore has been discovered near the surface rich in native silver.

Kaslo and Slocan.—The proposals made by Minneapolis capitalists recently and which at the time attracted so much attention, have as yet not materialized. The option the syndicate had secured has been allowed to lapse. However, the general opinion is that the projects in view will be in abeyance for a short time only. The Monitor has so far this year shipped 1,000 tons of ore running 127 ozs.

silver and \$9 in gold, or an average of \$70 per ton. It has about thirty men on its pay-roll. It is turning out one of the best paying mines in the Slocan.

Ainsworth.—Reported discoveries of valuable iron deposits in the vicinity of Crawford Bay on Kootenay Lake, have been rather frequent of late. The past week two prospectors located a claim and state that the lead is 100 feet wide, and the ore on the surface is 30 per cent. iron. The strike of the lead is north and south, which is different from the hematite iron leads discovered to the southward of Crawford Bay, which run east and west.

Boundary.—Work has been resumed at the B.C. at Eholt with a force of 70 men. An average daily shipment of 140 tons of ore is now made to the Boundary Falls smelter. Mr. W. Work Slater, a director of the Jewel Gold Mines, Limited, is hopeful that a contract will be closed for shipping 20,000 to 30,000 tons. The Jewel has been idle for some time, but it is too good a mine to be allowed to remain unworked.

The Lardeau.—The Calumet and British Columbia Gold Mines, Limited, which was largely promoted by Messrs. Rosenberger and Musselman, of Nelson, was recently floated to acquire and work the Eva mine in this district. The capital of the company is \$500,000, divided into shares of one dollar each, and a first issue of 100,000 shares was, it is said, over-subscribed, as was also a second allotment of the same number of shares which were offered at a 100 per cent. premium. The Eva is thought to be a very promising mine and is now developed by 2,000 feet of tunnelling and shaft work. The new company has purchased from the Camborne Townsite Company ten acres of land on Pool Creek, on which to erect stamp mills and power plant. A tramway is also to be built from Pool Creek to the mine. The Nettie L. is about ready to commence operations. The company has recently installed a compressor plant and has also let a contract for 1,100 cords of wood to be delivered at the mine this winter. Mr. A. C. Garde, manager of the Payne mine, has taken an option on the Linsay and Knob Hill groups of mineral claims on Canyon Creek, in the Trout Lake district. A force of men will be immediately put to work and shipments will most likely commence at an early date. The bonds call for payments of \$30,000 and \$15,000 respectively. The properties were owned by Messrs. P. A. Lingren and Erickson. It is reported that the owners of the Lucky Jack group, on Lexington Mountain, have given an option on their property for \$90,000. This should add another good property to the 100 of those working on this gold belt. A rich free gold strike was recently made on the Beatrice mine, at a deeper point than the previous workings. The vein just found is from 10 to 15 feet wide and carries exceptionally good values. The recent discovery made on the Rossland-Criterion, owned and operated by the Ophir-Lade Syndicate, and the strike on the Beatrice, are additional evidences of the richness of the mines in this locality.

The Similkameen, Camp Hedley.—The owners of the Nickel Plate mine and group of mineral claims are proceeding with the construction of a tramway and water flume preparatory to installing a 60-stamp mill and concentrating plant. This mine and the several neighbouring mineral claims forming the group are situated on Nickel Plate Mountain, which lies toward the head and on the east watershed of Twenty-Mile Creek, a tributary of the Similkameen River. The mountain reaches an altitude of about 7,000 feet and it is pretty well covered with mineral locations, but little important development work has been done outside of that on the Nickel Plate group, the owners of which are understood to be Mr. M. K. Rodgers, of Seattle, who is the manager of the mine; Mr. John R. Toole, of Montana, and the estate of the late Marcus Daly. The Provincial mineralogist, who visited the property last year, thus refers to it in the published annual report for 1901 of the Minister of Mines of British Columbia; "Nickel Plate Camp may be put down as a gold comp. for, although some copper is found, the chief value lies in the gold, which seems to be associated with arsenopyrites, and does not appear to be found to any extent with the iron pyrites in the absence of arsenic. The rock formation of the mountain, from a hasty examination, appears to be composed of very highly altered sedimentaries interspersed with planes of igneous rocks—andesites, etc., which are so exposed as to produce the appearance of being bedded. It would appear as though on this property the ore body consisted of a highly silicified band or bed, now so much altered that its original character is obscured. The ore-bearing body on which the discovery was originally made outcrops on the face of the hill at an altitude of 6,300 feet, striking nearly horizontally along the hillside and dipping

into it at an angle of about 17 degrees. It has a total width of about 40 feet, overlying a bed or sheet of apparently igneous rock, the mineralization being strongest near such contact. The mineralization, which, to a certain extent, is disseminated throughout the ore-bearing body, is much more pronounced along lines of fissure in the body, and naturally varies in amount along such lines, so much so as to render sampling of the mine very indefinite. The mineralization consists of iron pyrites with a considerable proportion of arsenopyrite, with which latter the high assay values obtained in this mine are associated. From selected samples assays of considerably over \$100 per ton in gold have been obtained, but the ore as mined will not run nearly so high, probably not much over \$20 per ton. This property has been developed by tunnels entirely, the configuration of the hill rendering such the best method, since, approximately, two feet of tunnel gain one foot in depth. For the past three years active development work has been carried on continuously with a force of about 20 men. No ore has been shipped nor has any been taken from the property, but such as has been broken in the process of development has been stored in the mine ready for shipment or treatment when the proper facilities are afforded. Consequently no authentic data are available as to just what the ore as mined will run, but, as before stated, it is estimated in the neighbourhood of \$20 per ton. A sample taken, representing roughly the assorted ore, gave on assay \$56.80 in gold, 1.96 oz. in silver per ton and 2 per cent. copper, while another sample taken, of the lower grade ore, gave \$8.80 in gold."

From another source the following information has been obtained: The Nickel Plate ore is an arsenical iron, carrying gold, but singularly enough, there is free gold disseminated through the very middle of the arsenical iron. It is an extraordinary formation. A number of mining men have examined the ore, and, although a little puzzled, they are none the less well pleased with the outlook. From 10 to 40 per cent. of the total values can, it is estimated, be saved on the plates after the ore is milled. The remainder of the gold is held in the arsenical ore. It is easily concentrated, however, at a ratio of 10 or 11 to 1, and it will make a high grade product which can be shipped to the smelters. The property was bought about three years ago by the late Marcus Daly on the advice of Mr. Rodgers, who was then in his employ as a mining engineer. About \$60,000 was paid for it. Since then money spent in development and the purchase of neighbouring mineral claims has brought the expenditure up to about \$400,000. The new mill and other improvement planned will, when completed, make the investment here show a total of \$600,000 to \$700,000.

COMPANY MEETINGS AND REPORTS.

THE NEW FAIRVIEW CORPORATION.

THE superintendent has submitted the following report: In my former report I made the following recommendations:

- 1st. That a flume and pipe line be constructed from Reed Creek, a distance of two and three-quarter miles.
- 2nd. That an electric light plant be installed.
- 3rd. That the milling capacity be increased by the addition of more stamps.
- 4th. That a small plant for the treatment of the concentrates by cyanide be erected.
- 5th. That the development work be kept well advanced to ensure a large ore supply.

Construction.—Twenty additional stamps were purchased and added to those already installed. Ten Ostenburg tables, for the separation and concentration of the sulphurets, have been made, and are giving complete satisfaction. The small cyanide plant was erected, and has proved an unqualified success. The flume and pipe line was constructed, and is working satisfactorily, and on the receipt of the Pelton wheel, already shipped from San Francisco, and the last consignment of pipe, which has been delayed through strikes, but which we are advised, will be shipped immediately, we shall connect it, and thus be able to save a considerable amount in steam costs by its use. A first class electric light plant has been installed, and is now in operation, furnishing light for mine, mill and other buildings in connection with the works.

Development.—The development work done since my last report was issued is very extensive, and proves that our former estimate of ore reserves was safe and conservative.

We now extract the ore by what is called the pillar and arch system (the method used in many of the large mines of Lake Superior, as well as in Montana and Alaska), which can only be utilized with very large ore bodies. We are thus enabled to extract the ore, holding the walls by arches and pillars, using only a minimum of timber, and thus saving a great amount of money. This necessitates the extraction of the entire vein, with the exception of the supports, and as the work progresses we shall utilize the leaner portions of the vein for this purpose. This method reduces the general average value of the ore, as waste is included, but, as mentioned in former report, with large milling capacity, it will be found the most profitable manner of working, as sorting charges would be greater than the expense of milling.

We now have about 6,000 tons of broken ore in the stopes, and have been able to keep the mill supplied, and increase the ore reserve, using only two and three drills. At the present time only one drill is employed on this work, the other being used opening up new ore reserves, constructing chutes, etc., in order to have large reserves for use when the entire mill is in operation.

As the development work in the third level was limited, it was impossible to extract much ore from that part of the mine until a raise and stope had been completed to the second level, as in the method employed, we utilize the broken ore from the mines to stand on to drill the holes above, thus saving the cost of staging.

One month ago the third level stope was completed, and since then we have milled 1,526 tons from this level. We found on reaching the second level that the ore which we had worked above was the middle portion of the vein, and that we still had fourteen feet of ore of a similar character to the third level ore above the second level, which was an agreeable surprise, as it increases our tonnage very considerably. Whether the values of this large body of ore will continue as good as we have in the third level stope cannot be determined for some time. This discovery proves what we have always believed, that the values on the foot wall side of the vein are greater, and that the ore is of a different character. The ore taken from the second level, which is now proved to be the middle of the vein, is not free milling to any great extent, and contains a third of its value in silver, which can only be saved in the shape of sulphurets. On the third level (on the foot wall side) the value of the ore is on the average 85 per cent. gold and 15 per cent silver, and the gold is carried in a free state to a greater extent, thereby allowing its extraction on the plates and in the mortars, which saves the expense of further treatment.

Values.—During the months of February, March and part of April the mill was closed, as the work outlined in our former report, viz., the reconstruction of the hoisting and compressor plant and buildings, placed that machinery out of service for the time mentioned. Part of April and May the mill was worked on the dump ore which gave returns, as stated in former report of from \$2 to \$3 per ton. Since that time the mill has been treating the ore at the second level of the main vein and that from the north ledge proving the ore values from these parts of the mine to average about \$3 per ton.

One month ago we were able, as above mentioned, to take the ore from the lower level, and to accurately determine its exact milling value. We cleaned out the ore bins, mortars, etc., of the mill, and ran 14 stamps for two weeks entirely on the ore from the lower portion of the stope, with the following results:

	Value.
680 tons of ore from the foot wall side being milled.	
168.40 ozs. bullion.	\$1,630 13
5 tons high grade sulphurets, value pr ton \$211 00	1,055 00
50 tons low grade concentrates, " " 18 00	900 00
600 tons tailings " " 3 70	2,220 00
Value per ton.	\$8.53 \$5,805 13

In addition to these values we lost about ten per cent. carried off in the slimes.

On the first day of this test we found that the values could not be saved by any mechanical means, and it was necessary to clean out a large hole on the Stembert claim, and store all of the tailings therein for future treatment by cyanide.

As we found it necessary to do some timbering at the intersection of the two levels, which occupied a week, we then ran 454 tons from the second level. On the completion of the work mentioned, we returned to the third level ore, and ran 846 tons to date, with the following result:

	Value.
Ore milled, 1,300 tons.	
137½ ozs. bullion	\$1,557 87
7 tons sulphurets, value	\$145 00
60 tons low grade concentrates, value	15 95
1,100 tons tailings, value	2 80
	3,080 00

Value per ton, \$5.07, in addition to slime losses. \$6,619 87

We have proved by these mill tests that the value of the ore is considerably higher in the lower level, gradually decreasing as height is gained. The first test came from the bottom part of the level. We have proved that the values at the third level in this stop are considerably higher than our estimate and that the portion taken in the upper levels is lower than our estimate. We have proved by our prospecting work that in the east end of the second level we have a large quantity of ore worth on the average \$4 per ton where former sampling showed the poorest ore in the mine. We have also proved that we have a large quantity of ore above the second level of good values of which we had no former knowledge. We have proved that the use of larger screens, recommended in my last report, is of great advantage, and there is no doubt but that, with the full 46 stamps running, we shall be able to crush from 150 to 175 tons of ore per day. In this connection we also find that the larger screens cause less slimes, thus making a better cyaniding product.

Mill.—In March an order was given to the Jenckes' Machine Co. for a carload of shoes and dies, which are made in Germany. These should have been delivered three months ago. We received them only last week, and in consequence had to hang up a portion of the mill for three months. This unavoidable delay caused us considerable loss, as we would have crushed 3,000 tons more ore in that time.

In our first mill test we found that we could not, by the use of Frue vanners alone, make concentrates high enough in grade, to net more than 60 per cent. of their value, as the freight and treatment charges are excessive. Therefore I constructed tables, which separate slimes from the sands and classify the concentrates, taking off a streak which contains the galena, carrying a high percentage of silver and gold, and bringing the shipping product to a value of from \$150 to \$900 per ton. The shipping and treatment charges are no more on this grade than on the lower values, in fact, we now receive the lead values, which on the lower grade were not allowed, and now obtain 90 per cent. of gross value.

The second product, which we ran over Frue vanners and saved in the shape of low grade concentrates, was worth about \$15 to \$25 per ton, and was treated by the small cyanide plant, with which we made an extraction of 75 to 85 per cent. with a perfect precipitation. We expected to be able to run a considerable portion of the sand over with this mineral and have but a small loss in tailings. We, however, found that when we treated ore from the third level especially, which was of higher grade, that fully a third of our value was being lost, as even the slimes contained values, ranging from \$2 to \$4 per ton.

After many careful tests, we have concluded that nothing remains but to erect large cyanide tanks, and treat the whole product of the mill; as with the small plant now in use we have demonstrated that the whole of the tailings after leaving the tables, where the high grade sulphurets are extracted, can be run direct into these tanks and treated at a very low cost, which should leave handsome profits.

We now have stored, for future treatment, sufficient value in these tailings and low grade concentrates to pay the cost of the erection of this plant, when they can be treated. We already have the foundation made for a cyanide plant with a capacity of 200 tons per day, and as quickly as possible shall make the tanks, etc. To avoid expenses and freight charges we do all of this work on the ground, manufacturing the lumber in our own mill at the mine, and practically doing all the work in connection therewith, thus saving at least 60 per cent. of costs.

We cannot expect to have this large plant finished for at least three months, and I would recommend that only enough stamps be operated to crush the ore taken out in development until this is accomplished. We, however, have room is necessary to store 3,000 more tons.

On the completion of the work now under way, with careful management, this property should pay very fair profits.

GRANBY MINES.

The annual meeting of the Granby Consolidated Mining, Smelting and Power Company, Ltd., was held at Montreal on Oct. 7th. The annual report, which was read and adopted,

was considered to be very satisfactory. Mr. S. H. C. Miner, the president, in an address to the shareholders, said that the company had had much to contend against during the year. The price of copper had been exceedingly low, having declined from 17 to 11½ cents. Mr. Miner further explained that owing to the scarcity of coke, it was found impossible to operate over two out of the four furnaces at Grand Forks. In fact, it was only during the month of April that the four furnaces were in operation. He further stated a year ago he had hoped at this annual meeting to announce a dividend to the shareholders, but unforeseen events, already mentioned, have made this impossible. The mines were all in excellent condition. The members of last year's board were re-elected.

B. C. EXPLORATION SYNDICATE.

The sixth annual general meeting of this company was held in London on September 18th. The chairman stated that the home office expenses for the year had been reduced to £251, and that the directors had waived their fees. £11,000 had been expended in exploration work in British Columbia, £26,000 in the development of the Lucky Strike and Iron Mask mines at Kamloops, and some £16,000 on the Frederick Arm property. The chairman paid a very high tribute to the ability and integrity of the mine manager, Capt. Argall. The Iron Mask mine had been developed to the 500-foot level, and the workings from that point have been driven 344 feet on the lead, which has also been cross-cut for 202 feet in other directions. He stated that the company had "a practically unlimited body of 5 per cent. copper ore" and were in a position to supply a 50-ton smelter with ore daily from the reserves for a year or a year and a half. The report on the Frederick Arm mine was not satisfactory, although the company has not abandoned the mine.

ARLINGTON MINES, LIMITED.

The annual meeting of the Arlington Mines, Limited, was held in Slocan during October. A financial statement covering the operations for the year was presented and adopted. The election of officers resulted in the old board being re-appointed as follows: President, Mr. R. P. Rihet; secretary, Mr. John Lawson; managing director, Mr. J. Frank Collom; executive board, Messrs. R. P. Rihet, A. B. Williamson, John Lawson, Thomas Birney, W. A. Macdonald and J. Frank Collom. The ensuing year will be, it is thought, a memorable one for the company, as new works will be installed for the treatment of ores at the mine.

PERSONAL NOTES.

MR. REGINALD A. DALY, formerly instructor in geographic geology in Harvard University, who was last year appointed geologist of the Canadian Commission co-operating with the United States Commission in locating the international boundary, left Rossland, British Columbia, on October 15th on his return to Ottawa, after having spent the season now closing in the field with the Boundary Commission party under Mr. W. F. O'Hara. Dr. Daly joined the Dominion Geological Survey in May, 1901, and the following month left Ottawa for British Columbia. By the middle of July he had reached the camp of Mr. J. J. McArthur, D.L.S., who in the spring had commenced operations at the western extremity of the boundary line. The summary report for 1901 of the Geological Survey Department included an interesting report by Dr. Daly on the area covered that year. "This being an east and west belt of country 80 miles in length, parallel to, and limited on the south by the 49th parallel of latitude, with a breadth of 10 miles north of this line, and stretching from the Gulf of Georgia at Point Roberts to a meridian running about four miles east of Chilliwack Lake." This season Dr. Dalys field work has been along the boundary line east from the Okanagan River through the Boundary and West Kootenay districts of British Columbia.

Mr. Byron C. Riblet, engineer, of Nelson, B.C., has returned to that city from Encampment, Wyoming, where for eight months he has been engaged in superintending the construction of an aerial tramway to connect the Ferris-Haggerty Copper Mining Company's important copper mine, situate in the Battle Lake district of Carbon County, Wyoming, with the smelter at Grand Encampment. This tramway is stated to have cost about \$300,000 and to be 16 miles in length, crossing the Continental divide over a summit rather more than 11,000 feet in height.

RECENT PUBLICATIONS.

THE Mineral Industry, its Statistics, Technology and Trade in the United States and Other Countries to the end of 1901. Vol. X, supplementing Volumes I to IX. Founded by the late Richard P. Rothwell. Edited by Joseph Struthers, Ph.D. The "Engineering and Mining Journal" (Inc.), New York and London, 1902. Price \$5.00.

When Mr. Rothwell founded the "Mineral Industry" in 1892, he erected a lasting monument to himself. The mantle of Elijah has surely fallen upon Elisha, for Dr. Struthers, the present editor of this notable work, having formerly acted as assistant editor under Mr. Rothwell in the publication of Volumes VIII and IX, has certainly in Volume X well and fully carried out the original idea of the founder as regards the encyclopedic character of the information he supplies, and also in respect to the publication of absolutely reliable statistical data. The great value of the "Mineral Industry" which has now become indispensable to the mining engineer and metallurgist as a work of reference, lies in its not only "up-to-dateness" (to coin a phrase), but also in that it contains in a concise form information that could only be secured from official sources at the expense of a great deal of time and trouble. Again no improvement in metallurgical science or engineering practice is allowed to pass without mention in its pages. In fact, it is both a history of the progress of the mining industry and a technical encyclopedia in one. The present volume contains nearly a thousand pages; the illustrations and diagrams are numerous and well produced; and as usual among the contributors are many of the leading specialists of both America and Europe.

The Terlingua Quicksilver Deposits, Brewster County. Bulletin of the University of Texas. Bulletin No. 4. October, 1902.

This Bulletin is one of a series published by the University of Texas Mineral Survey and deals with the quicksilver deposits at and near Terlingua, Brewster County, Texas. The brochure contains seven chapters, of which the first six are devoted to describing the deposits, methods of mining and reduction, etc., and the history, geology and topography of the district. The seventh chapter, written by Mr. W. B. Phillips, is on the subject of the occurrence, production and prices of quicksilver in the United States. The Brewster County quicksilver deposits are found in a belt paralleling the Rio Grande River at a distance of twelve miles and lying between the Fesno canyon on the west and several miles beyond Terlingua Creek on the east. The county has been fairly well prospected, and in some instances, the individual sections promise good values. At the present time only one company is actually producing quicksilver, the production last year being 2,032 flasks, or about 10 per cent of the production of the United States.

MINING RETURNS AND STATISTICS.

THE LARDEAU.

SHIPMENTS over the new branch line last month are said to have approximated \$50,000 in value. The tonnage aggregated 350 tons and represented consignments from the Nettie L., Silver Cup, Winnie, Old Gold, Guinea Gold and Primrose properties.

NELSON.

During September 60t tons of lead bullion were shipped by the Hall Mines smelter.

EAST KOOTENAY.

The following table is an approximation of shipments from the Windermere district to the end of September:—

Mine.	Pounds.	Value.
Paradise.....	1,508,310	
Paradise, in transit.....	300,000	
Delphine.....	73,831	\$3,520 26
Delphine, in transit.....	1,35,500	
Red Line, in transit.....	162,000	
Swansea.....	4,000	
White Cat.....	2,000	
Silver Belt.....	29,500	1,456 00
M. T. Fraction.....	34,000	2,252 25
M. T. Fraction, in transit.....	45,000	
Bunyan.....	1,000	49 00
Total.....	2,385,141	\$7,286 55

ROSSLAND.

Our Rossland correspondent telegraphs on October 25th shipments for the year to date are as follows:—

	Tons.
Le Roi.....	199,855
Le Roi No. 2.....	54,256
Centre Star.....	24,918
War Eagle.....	13,431
Giant.....	2,779
Velvet.....	1,300
Cascade.....	300
Bonanza.....	60
Kootenay.....	50
Spitzee.....	20
White Bear.....	25
Total.....	296,904

SLOCAN.

Shipments from the Slocan district to the end of October approximate 25,000 tons, Slocan City Division having contributed nearly 5,500 tons to this total. Shipments to the 18th of October, have, according to a table published by the New Denver *Ledge*, been segregated as follows:—

NAME.	Tons.
Payne.....	1318
Ivanhoe.....	452
Sunset (Jackson Basin).....	827
Reco.....	322
American Boy.....	883
Arlington.....	3160
Hewett.....	765
Bosun.....	930
Last Chance.....	168
Wonderful.....	181
Enterprise.....	1840
Lavina.....	85
Bismark.....	62
Monitor.....	960
Queen Bess.....	160
Silver Glance.....	223
Whitewater.....	2962
Ottawa.....	8
Capella.....	40
Florence.....	1
Trade Dollar.....	20
Neepawa.....	101
Hartney.....	25
Marion.....	80
May.....	5
Paystreak.....	7
Surprise.....	22
Slocan Star.....	577
Duplex.....	7
Emily Edith.....	20
Wakefield.....	300
Prescott.....	4
Rambler.....	3884
Molly Gibson.....	1500
Washington.....	187
Folliott.....	3
C. O. D.....	2
London Hill.....	115
Ruth.....	784
Slocan Boy.....	115
Antoine.....	104
R. E. Lee.....	124
Speculator.....	4
Red Fox.....	40
Hampton.....	4
Mercury.....	21
Dardanelles.....	21
Porcupine.....	2
Charleston.....	11
Pinto.....	10
Noble Five.....	21
Total tons.....	23,302

BOUNDARY DISTRICT.

Shipments from the Boundary district to the end of October of approximately 897,000 tons exceed the total output of 1901, which was 390,000 tons. The following table showing production from January 1st to October 25th. of this year, is published by the Phoenix Pioneer:—

	Tons.
Granby Mines, Phoenix	248,524
Snowshoe, " "	9,858
Mother Lode, Deadwood	102,220
Sunset " "	7,220
B. C. Mine, Summit	7,498
Emma, " "	4,348
Winnipeg, Wellington	785
Golden Crown, " "	625
No. 7 Mine, Central	482
Jewel, Long Lake	2,175
Providence, Providence	43
Total, tons	384,735
Granby Smelter treatment, tons	335,238

THE YUKON.

The statement of the export of gold from Dawson to the outside as prepared to date by the Territorial Comptroller, Mr. J. T. Lithgow, is as follows:—

Month.	Ounces.	Value.
May	1,326.06	\$ 19,890.75
June	2,306.73.44	3,550,324.55
July	154,208.38	2,313,130.70
August	145,032.88	2,175,493.64
September	146,454.68	2,196,778.10

The June shipments were the heaviest of any month, because of the washing in that month of the big winter dumps, representing months of work in the cold season. July also had some of the winter gold among its shipments. August and September shipments may be said to represent summer work alone, and the fact that they each have more than two million dollars to their credit is considered a most favourable commentary on the summer operations of the camp. The exports in September contained more gold in small pokes, being taken out by individual miners, than those of any other month. Men who have worked through the season and taking the last opportunity to go out with several hundred dollars in dust have been numerous in September. Export certificates issued in September numbered 280. Free certificates, that is, those for the taking of American gold from the lower Yukon through the British territory to the outside world free during September, numbered 143. Gold shipped by free certificate during the month aggregated 8,832 ounces worth \$130,000. The most of it was from Forty-Mile, Koyukuk and Rampart, with a major portion to be credited to Rampart.

COMPANY NOTES AND CABLES.

LE ROI.—Cabled returns for September: "Shipped from mine to smelter 13,667 tons, containing 6,778 ozs. of gold, 12,144 ozs. silver, and 580,000 lbs. copper. Shipped from the dump to the smelter 1,998 tons, containing 600 ozs. of gold, 930 ozs. of silver, and 50,720 lbs. copper. Estimated profit on this ore, \$63,000." (August profit, \$79,487.)

LE ROI No. 2.—Cabled returns for September: "Shipments last month amounted to 6,070 tons; contents, 2,645 ozs. gold, 6,030 ozs. silver, 125 tons copper. The returns from ore after making a reduction of all smelting charged amounted to \$39,500. The cost of mining may be taken at \$21,500, leaving profit for last month \$18,000." (August profit, \$16,000.)

GIANT.—Cable from the resident director at Rossland, dated 22nd September:—"400 tons of ore shipped to the smelting works; net proceeds \$4,000, after allowing for smelting cost; the tunnel has already been driven a length of 240 feet." (Office note.—This is evidently the output since last cable published—namely, since end of August.)

VELVET ROSSLAND.—Cable received from manager says: "310 tons shipped yielded \$6,750 net."

SNOWSHOE GOLD AND COPPER.—Cable from Mr. G. T. Waterlow, deputy chairman:—"Having spent two weeks on the Snowshoe mine, I am fully satisfied that prospects are most encouraging. We are now shipping about 150 tons

daily. The returns from ore are satisfactory. Have already commenced constructing additional railway spur. The main shaft has been sunk to a depth of 300 feet, exposing large ore body. Shall begin to erect hoist at once. Erection of all machinery is being vigorously pushed ahead. With equipment mentioned shall be able to ship at the rate of 15,000 tons per month. Everything looks most favourable. Personally, I am quite satisfied.—Waterlow."

YMIK.—A recent telegram to London from the Company's Manager at Nelson, B.C., says: "During last month 50 stamps ran 20 days 14 hours. Estimated profit on operating is \$3,000 (£618). This is after deducting development, \$3,082 (£635). August profit £23, after deducting bush fire expenses, £924."

CARIBOO GOLD FIELDS.—It is now estimated that the output of this mine for the season will be more nearly \$20,000 than \$15,000. The big elevator at the mines is working successfully, and the plant generally is proving effective.

LE ROI.—Manager's report of the Le Roi Mining Company, Ltd., for August:—

The tonnage shipped during the month, together with its contents and gross values per ton, was as follows:—

	Dry tons.	Ozs. Au.	Ozs. Ag.	Lbs. Cu.	Value wet. per ton.
1st class	17,010	7,790	14,141	782,885	\$15.00
2d class dump	1,568	667	773	40,862	\$11.81
	18,578	8,457	14,914	823,687	

Mine Expenditure.—The expenditure for the month on mine account was \$54,187. The cost per ton of breaking and delivering the ore on the railroad cars was \$2.40, a reduction of 47c. as compared with July. The cost of development, including the deepening of the main shaft, was 74c. making the total cost of mining and exploration equal to \$3.14 per ton.

Northport Smelter.—The expenditure for the month was \$131,174. The following statement gives particulars concerning the public ores purchased during the month:—

Received from.	Dry toas.	Ozs. Au.	Ozs. Ag.	Lbs. Cu.	Value wet.
Le Roi No. 2, Ltd.	4,455	1,885	5,441	210,823	
Velvet Mine	168	197	138	26,130	
White Bear Mine	5	2	7	212	
Great Northern R.R.	7	72	121	3,983	
Total	4,635	2,156	5,707	241,148	

The tonnage treated during the month was 16,668 tons, segregated as follows:—

Roasted ores	8,200
Raw ores, Le Roi	1,766
Raw ores, Le Roi second class	1,427
Public	5,206

Profit for the month:—

The gross value of the first-class ore shipped from the mine was equal to a value of \$15 per ton, equal to \$255,145

From this deduct difference between gross value and refiners' settlement rates, and interest on gold and silver values for 90 days, and copper 60 days at 6 per cent., equal to \$2.93 per ton 49,838

Deduct cost of mining and smelting 205,307

Net estimated profit first-class ore 71,271

The gross value of the second-class dump ore shipped from the mine was equal to a value of \$11.81 per ton \$18,518

From this deduct difference between gross value and refiners' settlement rates, and interest on gold and silver values for 90 days, and copper 60 days at 6 per cent., equal to \$1.71 per ton 2,681

Deduct cost of loading and smelting 7,621

Net estimated profit second-class dump ore 8,216

Total net estimated profit for the month 79,487

Development.—The development work performed during August was as follows:—

Level.	Advance, feet.	Level.	Advance, feet.
450 North drift	..25	1,050 North crosscut	..27½
600 West Tregear drift	..22	1,050 South drift	..31
600 East Miller drift	20	1,200 East drift	..40
800 Tregear rise	..43½	1,200 South crosscut	..45
1,050 East winze	..36½	1,200 West drift	..60
1,050 West main reef	..40	1,200 Main shaft	..36

There is no change on the lower levels since the last monthly report. Good progress is being made in sinking the main shaft, which has now reached a depth of 1,320 feet. The intermediate stope between the 9th and 1,050 levels is producing high grade ore, the extent of which is greater than anticipated. A new stope, which was commenced on the extreme western end of the 600 Mulligan, is turning out well, the ore averaging over \$20 per ton. Exploratory work is being carried on adjacent to the Miller and Tregear stopes between the 7th and 5th levels, which, I believe, will be profitable, and increase the tonnage of high grade ore in sight. On the 450 level driving is being done west on the north vein to undercut the croppings on the surface which look favourable. From the 900 Tregear a diamond drill hole to the south is being bored for the purpose of exploring the south vein.

ARLINGTON, ERIE.—The following smelter returns have been received:—

	Tons.	Net Smelter Returns.
May	65.5	\$2,488
June	119	4,610
July	122	4,171
August	120	3,721
September	122	4,604

COAL EXPORTATIONS AND TRADE.

THE mine inspector for the State of Washington, Mr. Owen, is quoted as having made the statement that the coal market in that state was better now than it had been for the past year and a half. It is said the Southern Pacific is thinking seriously of abandoning the use of oil on their locomotives and going back to coal. The California oil is of a bituminous base, and when engines are running under high steam pressure the bitumen crystallizes in the flues of the boiler, causing numerous delays and the loss of speed. This is said to be particularly true of the passenger engines, and so much trouble has resulted from it that an early return to coal is expected. With California, the great consumer of Vancouver Island coal, this change on the part of the Southern Pacific will be welcome news to the mine owners and miners. The Southern Pacific was a heavy purchaser of Vancouver Island coal in the past. According to a report of Mr. J. W. Harrison, a coal and metal broker of San Francisco, every effort is being put forward by oil producers to substitute oil for household purposes, but so far without success, the difficulty being to avoid the smell and smoke from the petroleum. The increased danger in handling is also against the introduction of oil for domestic uses. The fact that the experiments to utilize oil for steam fuel has failed and that there is little present fear of oil coming into general use for domestic needs, suggests that ere long there will again be an increased demand for Vancouver Island coal for industrial purposes in the California market. Coal oil fuel will, seemingly, though still formidable enough not prove quite so successful a competitor of coal in the future as in the past.

Coal exportations from Vancouver Island collieries during the month of September were as follows:—

	Tons.
New Vancouver Coal Co.	19,274
Ladysmith	17,956
Total	37,230

The Fernie Free Press announces that there is further danger of labour troubles at the Evans West collieries. The miners at Morrissey have until recently been paid by the day, but on the 20th of October, at their own request were put on the tonnage system. In No. 1 mine the scale was fixed at 40 cents a ton and in the other two mines 55 cents, and 65 cents respectively, the men to lay their own tracks on all branch lines and also move the McGinty. The rate

allowed for timbering was \$1 a set and where it was lag-ganged \$2 a set. The miners complain that the wage scale throughout is too low and ask that the tonnage rate be 60, 75 and 85 cents, the company to lay the track and move the McGinty. They also demand \$5 for each set of timbers and \$14 for breaking off rooms 8 feet wide and 20 feet deep, but the management only offers 50 cents a yard. The manager, meanwhile, contends that the scale suggested by the men is exorbitant.

TRADE NOTICES, CIRCULARS AND CATALOGUES.

THE TRENTON IRON CO.'S WESTERN BRANCH.

THE Trenton Iron Co. announce the appointment of Messrs. Brown, Beal & Co. to the San Francisco agency.

MINING AND SURVEYING INSTRUMENTS.

Messrs. John Davis & Son, Ltd., (Derby, England) send us through their Canadian representative, Mr. F. F. Peacock, of Montreal, a copy of their most recent catalogue dealing with mining, surveying and other instruments of precision. The instruments made by this British firm are noted for absolute reliability and beautiful workmanship. In most of the surveying instruments a special aluminum alloy is now incorporated and the surveying instrument accessories usually catalogued as extras, such as dividing on silver fixed stadia hairs, vernier shades, dust and rain guards for telescopes and eye-pieces, are included in the specifications. Another advantage: transits, levels, and dials fit on to their respective legs with a uniform size, pitch of thread, and diameter, so that all are interchangeable. Special attention is directed to the "Hoskold" transit theodolite, as with this instrument the connecting of underground and surface surveys may be performed with the greatest ease and accuracy. The company also manufacture a standard lamp of a bonneted pattern for working miners, which gives a good light and are of little weight. A "fire bosses" lamp made of aluminum is also held in great favour by miners. Copies of this catalogue may be obtained from Mr. Peacock, Canada Life Building, St. James' Street, Montreal.

AIR COMPRESSORS.

The Chicago Pneumatic Tool Co., of New York, issue a catalogue of the class of air compressors manufactured by this company at their Franklin, Pa. works. Although designed for the operation of pneumatic tools in shop and field riveting, drilling, chipping, hoisting, etc., and possessing features particularly desirable for such duty, these compressors are also suitable for all of the customary employments of compressed air power. This catalogue contains new illustrations of all of the latest types of compressors, and a very complete illustrated description of the chief features of design. Also all necessary data pertaining to standard styles of compressors, an article on the uses of compressed air and much valuable information relative to the proper installation of compressed air equipment and tables not heretofore printed in similar publications. The catalogue will be sent free to all interested enquirers.

CHAIN BELTING.

The Jeffrey Manufacturing Co., Columbus, Ohio, announce that their new "chain" catalogue, No. 72, is now ready for distribution and will be mailed to those interested upon application.

PELTON WATER WHEELS.

The Pelton Water Wheel Company's catalogues are always well compiled and handsomely got up. The ninth and latest edition is no exception to the rule. The catalogue contains upwards of ninety pages, is well illustrated, neatly bound and contains in addition to price lists and specifications a great deal of exceedingly interesting and valuable information on the subject of power transmission and other useful data.

DIRECT CURRENT GENERATORS.

The Canadian General Electric Co.'s slow speed and moderate speed generators have proved so practical and efficient that they have come into very general use for lighting and power purposes. The old design, however, has recently been considerably improved on and may now be said to embody the very latest ideas in modern dynamo construction. The company has meanwhile issued "Bulletin 819" describing these modifications.

DAVIS CRUSHING ROLLS.

Catalogue No. 34, published by the F. M. Davis Iron Works Co., of Denver, Colorado, is devoted to a description of the Davis Standard Crushing Rolls with instructions for their erection. These rolls retain in their design the good points of the original Cornish rolls, while also embodying new and improved features. The rolls are now perfected are of simple and massive design and are entirely self-contained.

THE JEANESVILLE PUMP.

The Jeanesville Iron Works Co., of Denver, Colorado, and Jeanesville, Pennsylvania, are sending out advance sheets from their catalogue descriptive of the well-known Jeanesville pump. The several patterns are here shown and the applicability of each to different requirements fully discussed.

DAVIDSON FANS.

A neat catalogue is issued by the Massachusetts Fan Co., of Waltham, Massachusetts, dealing principally with the "Davidson" Fan, which was first put on the market in 1891, and has since had a ready sale, being put to all manner of uses for heating, drying, ventilating, etc. For drying purposes it is used in connection with the company's sectional "hot blast" heater, while for ventilating work and in the removal of gases and vapours, the form of the blades ensures a movement of large volume of air quietly and with a minimum expenditure of power. The apparatus can be run continuously without unusual attention.

THE METAL MARKET.

THE month has been more or less featureless. Silver continues dull, chiefly on account of limited demand from the East and allotment. Indian exchange continues steady. Quotations are lower at 50½¢. The average price last month was 57.52 cents. Copper after showing some improvement upon news of the settlement of the anthracite coal strike, has suffered a reaction. Production is, however, being well maintained, while consumption is also reported as being satisfactory. The latest New York quotations are for Lake copper 11¼@11½¢, electrolytic in cakes, ingots and wirebars, 11½@11¾¢; cathodes, 11¼@11¾¢; casting copper, 11¾@11½¢. The average price of copper last month was 11.48¢. The lead market is dull but steady. The latest quotations are 3.97½@4.05, St. Louis; 4.05@4.10, New York. The European market has been rather more active at somewhat higher prices. English lead is quoted at £10 16s 3d to £10 17s 6d. Spelter continues in strong demand, and in consequence of the destruction by fire of large works at Kansas, production for the next three months will be curtailed to the extent of 1,000 tons monthly. The latest sales at East St. Louis were on a basis of 5.20—the highest point ever attained. The New York quotations are 5.35@5.40. The acting secretary of the Treasury Department at Washington in reply to a letter enquiring whether raw zinc ores when imported into the United States for smelting and consumption are dutiable, states in reply that there is no specific provision in the present Tariff Act, to wit, the Act of July 24th, 1897, a copy of which is forwarded to you under separate cover and, further, there has been no decision of the Board of U. S. General Appraisers or the courts as to the classification of crude zinc ores and that question is one which is primarily determined by the Collector of Customs. In all probability, however, the ores would be held dutiable under paragraph 57 at one cent per pound. The character of the merchandise, however, would be determined by the Collector of Customs and the classification governed accordingly, subject to the protest of the importer.

THE LOCAL STOCK MARKET.

THE market is almost lifeless and entirely without feature. Speculation in mining stocks in the East has practically ceased and it is shrewdly suspected that many reported transactions are quite fictitious. Quotations in many cases do not represent the intrinsic value of stocks, but until a greater number of British Columbia mines enter the dividend-earning stage the present apathetic attitude of investors is likely to continue. During the month sales are reported of Cariboo-McKinney at 20@22¢, Fairview at 7½@8¢, North Star 19, Payne 15½, War Eagle at 18½@19½, Giant at 3¾@4¼, and Waterloo at 3. Cariboo-McKinney is fairly firm on satisfactory advices from the mine and dividend rumors. Rambler Cariboo has declined from 80 to

60, and Fairview has also weakened, as a result of outside manipulation. Republic stocks have slumped badly, but a recovery may be shortly expected if arrangements now in progress are satisfactorily effected for the treatment of the ores.

NOTICE.



NOTICE is hereby given that the following definitions of the West Coast, Vancouver Island, Mining Division, be substituted for those at present in force:

WEST COAST, VANCOUVER ISLAND, MINING DIVISION.

Commencing at Amphitrite Point; thence northerly along height of land separating drainage area of those streams emptying into Pacific Ocean north of such point, from drainage area of those streams emptying into Barkley Sound, following each height of land to a point where it intersects the height of land separating drainage area of those streams emptying into Pacific Ocean on west from drainage area of streams emptying into Straits of Georgia on east; thence north westerly along such divide to a point west of Conuma (or Woss) Lake; thence south westerly on the height of land separating the streams draining into Kynuquot Sound on the north from those draining into Esperanza Inlet on the south to Tachu Point; thence by Pacific Ocean, including all Coast Islands, to point of commencement.

And further that the name "Clayoquot Mining Division" be substituted for "West Coast, Vancouver Island, Mining Division."

EDWD. GAWLOR PRIOR,

Minister of Mines.

Department of Mines,

Victoria, B.C., 22nd October, 1902.

NOTICE.



NOTICE is hereby given of the establishment of the Quatsino Mining Division, Vancouver Island, under the following defined boundaries:—

QUATSINO MINING DIVISION.

Commencing at Tachu Point; thence north-easterly on the height of land separating the streams draining into Kynuquot Sound on the north from those draining into Esperanza Inlet on the south to a point west of Conuma (or Woss) Lake; thence north-westerly on the height of land separating the drainage area of those streams emptying into the Pacific Ocean on the West from the drainage area of those streams emptying into the Straits of Georgia on the north-east to Cape Scott; thence by Pacific Ocean, including all Coast islands, to point of commencement.

EDWD. GAWLOR PRIOR,

Minister of Mines.

Department of Mines,

Victoria, B.C., 22nd October, 1902.

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

EDWARD E. POTTS, of Quatsino, Esquire, to be Mining Recorder for the Quatsino Mining Division, to reside and usually perform his duties at Quatsino.

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