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THE MONTH.

THE events which have been transpiring in the mining industry of the Province are not such as to warrant a hopeful outlook for the immediate future; the condition of the public mind to which these events have given rise is akin to desperation and is certainly confused. Not merely the letters and articles which appear in the public press but the private expressions of individual views, of which the MINING RECORD is the frequent recipient, seem to agree only in one point, namely, that there is something wrong, although as to what remedies should be applied there appear to be as many different opinions as there are individuals affected. It would not be particularly helpful if we were to add another voice to this discordant outcry. To adopt the diagnosis of one man and advocate his remedy would be merely to superadd a grievance to another and render final amendment less hopeful than ever in his opinion. If, however, a common agreement could be arrived at as to the causes which are blameable for the present unsatisfactory state of affairs, we

would have traversed half the distance towards the remedy. Therefore an attempt to investigate the conditions which are giving rise to the undoubted discontent which exists should have some good effect, even if the investigation be not complete, and even if the conclusions arrived at be incorrect, because, if light is thrown upon a subject correct conclusions in regard to it are a matter of course in a very short time, even if they are not immediately appreciated by the man who holds the lamp.

The first symptom of disorder has been the increasing difficulty of securing development capital for the mining industry of British Columbia. We have within the last month seen \$7,500,000 of development capital wiped off the slate, and we have also seen a very fine property abandoned on the ground that the eastern investor would no longer follow the capitalist who had a bond upon it. There are other instances beyond number.

Many people are inclined to deal with this difficulty of obtaining development capital as if it were more than a mere symptom, which it is not. Here the first confusion arises. One man says: "Let us alter our laws; let us cut here and carve there; let us restrict here and encourage there;" another, "Let us educate the outside capitalist; let us advertise our resources," and so forth and so on. Then the millennium will arrive, the owners of prospects will all be rich and mining shareholders will wax fat.

It is necessary to do away with this false impression that the difficulty of obtaining development capital is the cause why British Columbia suffers and to ask the question:—What creates this difficulty?

The reason it is now difficult to secure capital to develop mines in British Columbia is that the promises made in the name of the Province to investors who have already supplied capital have not been kept. What induces capital to come into a country which has never, so far, produced anything but the hope or promise of profits. And what maintains the inflow but the realisation of past expectations and the promise of future profit. It is idle to promise profits in the future with nothing to be shown but losses in the past.

It may most unhesitatingly be stated that the average return to capital hitherto invested in mines in British Columbia has been unduly low, and that the expectations upon which that capital has been contributed have not been fulfilled. British Columbia has been judged largely on the record of Rossland, Toad mountain and the Slocan. The results in these districts have been almost

uniformly unsatisfactory to the investor. Much wealth has been produced and money has been made by those who have been fortunate enough to sell properties to the investor, but the investor himself has as yet received little or no return, and in many cases has been obliged to put up with serious loss. The investor is a sadly selfish individual. He does not contribute his money to increase the output of the precious metals from British Columbia, but to receive dividends upon his outlay. He naturally suspects a concealed irony in the statement that the wealth produced in British Columbia is increasing when he discovers that little or none of it is apparently available for him. Both in Eastern Canada and Great Britain, British Columbia mines have the unenviable reputation of a sink into which money may be put but out of which none ever comes. This is the plain unvarnished truth, and is unquestionably the opinion entertained abroad of British Columbia mines, whether it is deserved or not. Is it admitted that this reputation of our mines as a field for investment is the reason why the inflow of capital has ceased? Once that is admitted a great step has been gained. If it is once conceded that it is the bad name which British Columbia has received as a field for productive mining investments which is the cause of the cessation of the inflow of capital, then the whole root of the trouble is laid bare by the discovery of how that bad name has been earned, and the remedy consists in taking means to restore the good name of the country.

A few hypothetical reasons for the bad odour in which British Columbia stands may be catalogued and examined in detail, with the view, if possible, of discovering those which are valid and those which are not.

- I. Inadequate mineral resources.
- II. Exaggerated anticipations on the part of the investors.
- III. Extravagance and incompetence on the part of the representatives of investors.
- IV. Bad mining laws.
- V. Unstable relations between labour and capital.
- VI. Overtaxation and injurious incidence of taxation.
- VII. Extensive swindling on the part of company promoters.
- VIII. Abnormally high cost of production from inefficiency of labour.

I. Inadequate mineral resources :

As a reason for the disfavour with investors this count may be dismissed at once. Whatever British Columbia suffers from, it is not lack of mineral or area of mineral territory. Of course it must be remembered that most of the mineral in British Columbia requires elaborately contrived transportation and treatment facilities for its profitable handling. However much mineral there is in the country the rapidity of its development is measured by the rapidity with which railways, mills and smelters, are brought to bear upon the mines. This is a slower process than the discovery and the acknowledgment of the importance of the mines themselves. So that capital

invested in the development of mines where there exists no means of handling the ore, may for a time suffer a check of the same nature as if the resources of the country were inadequate. But such a temporary drawback to profit earning is fully appreciated, and understood, and while it may be chafed against is never put forth as a valid reason for giving the country a bad name.

II. Exaggerated anticipations on the part of investors :

Undoubtedly this has had a great deal to do with the poor returns of which investors complain, and which have given a bad name to British Columbia. Without going beyond the list of productive mines, or considering the wildcats from which gold was to be extracted by some process of stock-broking alchemy, we may safely say that mines were unloaded on investors, and cheerfully accepted by them, at prices which discounted the possible progress of the country for many years to provide an adequate return on the investors' money. It is not necessary to particularise. Examples without number will rise of themselves in the reader's mind. It is noticeable in this connection that while mines within what may be called the "boom" area, namely, Rossland, Slocan and Toad mountain, have returned a very low average return to the investor, mines developed outside that area have returned, or are returning, a high average. But British Columbia's reputation has been necessarily judged by the former and not by the latter.

III. Extravagance and incompetence on the part of the representatives of investors :

These also have been efficient allies of the baseless enthusiasm of the investor himself. People who overestimate the value of a mine at ten times its proper worth are exceedingly likely to overestimate a superintendent in the same proportion. Particularly has this been the case in reference to English companies operating in British Columbia. We refer not to the few which survive in a sound and solvent condition, but to the many which have departed leaving upon the shoulders of British Columbia the unsavoury reputation which justice would lay upon their own.

IV. Bad mining laws :

The British Columbia mining law is probably not perfect. But it must not be forgotten that the mining law has undergone no material change since the time when capital was flowing freely into the country. So far as the conditions under which an industry is carried on are regulated by law it will quickly adapt itself to any reasonable change; but it cannot be subjected to continual change without great loss and damage. The fact of there being continual changes rather than the changes themselves is what dislocates an industry. There cannot be a doubt that the impression widely held abroad that the government of British Columbia is administered in a spirit unsympathetic with, if not hostile to, the mining industry, and that some at least of the difficulties which the investor meets in endeavouring to secure

an adequate return on his capital are due to this want of sympathy, is a potent factor in maintaining and accentuating the distrust felt of British Columbia. The mines of British Columbia must cease to be considered merely as a convenient source of revenue, and as a *corpus vile* for experimental legislation.

V. Unstable relations between labour and capital :

Looked at positively and with reference to British Columbia alone, it might certainly be said that if the relations between labour and capital were more stable there were less likelihood of friction breaking out at any moment into open war, British Columbia as a field for investment would be more attractive than it is. As a matter of fact, however, mere instability of these relations, apart from actual warfare, does not particularly affect the profit and loss account of mines actually in operation. It is in the profit and loss account of the mines that the trouble originates. Moreover the labour problem, like the poor, we have always with us, and not only we but every other country, in one form or another. There has nothing occurred between capital and labour in British Columbia which would occasion any special discrimination against the Province as a field for mining investment compared with New Zealand, Australia or the United States.

VI. Overtaxation and injurious incidence of taxation :

The mining industry of British Columbia is undoubtedly overtaxed. Of that there cannot be any question at all. Directly and indirectly its contributions to the provincial revenue are far in excess of what is necessary for its own regulation and development and its legitimate ratio of the expenses of government. But even more oppressive than the amount of the taxes levied is the method of their levy. The taxes are none of them upon property but all upon industry and development. So long as one is content to hold mining property and not work it the taxes are infinitesimal, but so soon as any attempt is made to develop and produce, a series of excessive imposts are encountered. An example of this may be given which would be ludicrous if it were not an illustration of a system which is disastrous in its effects. A mining company may hold a Crown Grant to a piece of mining property merely by paying an insignificant sum demanded as the tax on "wild land," but as soon as an attempt is made to work the ground it is necessary to take out a license costing \$100. If it were the other way about it would be a comprehensible system of taxation. If a company were charged a fee to hold mining property without working it, and that fee was remitted when it did work the ground, the system would be capable of being understood. But as it is, it is monstrous taxation. That is merely an illustration of the system of taxation by which industry is throttled. Development is taxed, cost of production is taxed, everything connected with the industry is taxed except the holding of mineral land without the intention of working or the desire to work it. There is nothing in

British Columbia which is having a worse effect upon the mining industry than this, and nothing which is doing more at once to justify and extend the evil reputation as a field for investment which the country is securing.

VII. Extensive swindling on the part of company promoters :

To describe the operations of all company promoters as swindling would be harsh and untrue. But it must be confessed that the operations on the London Stock Exchange which have had the mineral resources of British Columbia as their excuse, and the investor as their victim, come perilously near to justifying the accusation. To making such a sweeping assertion, however, we would prefer to paraphrase the brilliant epigram of a Glasgow professor made at the time of the City of Glasgow bank failure. He said "Call a spade a spade and not an agricultural implement, call a bank director a bank director and not a swindler." So we would take refuge under his mordant innuendo that the greater includes the less and say : Call a spade a spade and not an agricultural implement ; call a London company promoter a London company promoter and not a swindler, allowing the honest company promoter to escape in the exaggeration permitted to the epigrammatic form of speech.

In this connection look at the capital of the British America Corporation, a capital of £1,500,000 completely destroyed without the mines of British Columbia being responsible for the loss of a single sixpence of it. So far as this company is concerned its mining risk was transferred for a sum in cash equivalent to its whole capital and more, and largely in excess of all that it sunk in the purchase and development of British Columbia mines. The risk for which the country is responsible rests wholly upon the mines operated by the subsidiary companies of the B. A. C.; the odium which British Columbia will receive from the loss of this capital should devolve upon the financial operations of its manager. Until a new class of men with new methods take hold of the British Columbia mining market it is hopeless to look forward to any great improvement in the country's standing among investors who have been victimised.

VIII. Abnormally high cost of production from inefficiency of labour.

This is a matter on which it is difficult to procure reliable comparative statistics. Frequently where such a cause for lack of profits is assigned the real blame lies on the management and organisation of the labour. In well-managed mines the cost of production in British Columbia appears to compare favourably with the same classes of mines in other countries.

If the foregoing analysis be in any sense reasonable the trouble in British Columbia seems to be mainly traceable to exaggerated anticipations on the part of investors ; extravagance and incompetence on the part of the representatives of investors ; overtaxation and in-

jurious incidence of taxation, and extensive swindling on the part of company promoters.

With the exception of one, these matters must be largely left to right themselves. As the boomed shares shrink those who buy them at the lower price will make money and change their attitude towards the country, and as investors find out that the Province is not a Tom Tiddler's ground they will insist on a prudent and economical management, while it is to be hoped that a generation of more business-like promoters will succeed to the first exploiters of our resources.

Legislation has it in its power to remedy the effects of injurious taxation, and also by insisting upon full information of the working of our mines to limit, to some extent, the deprivations of the wild-cat promoter. It is quite absurd that in a country so rich as British Columbia, any doubt should be felt as to the ultimate outcome. We must face the problems raised by the present condition of the mining industry in a free and open spirit. Nor will it be long before lost ground will be recovered, provided we go about to recover and not to lose more. We have, however, remarked that the immediate outlook is not hopeful. This is true in the sense that, perhaps, for the next two or three years the inflow of fresh capital will be restricted. But the interim will afford a breathing space in which now unproductive and only partially profitable undertakings will become productive and profitable. It will be a period of active development. Then, later, conditions will be more perfectly comprehended, the opportunities for investment will both appear and be more favourable, a repetition of the fatal mistakes which have been committed in the past will be less likely. While the common sense of the legislator will have had a sufficient opportunity for assertion in remedying the more gross defects of the present mining law and taxation systems. When this time arrives the mining industry of British Columbia will have entered on the really important stage of its career, which must eventually bear to a condition of unprecedented prosperity.

A MOST interesting and valuable article appears in the *Denver Mining Reporter*, under the head of "Costly Cheap Labour," which is inspired by the action recently taken by the Rhodesian Legislature to encourage the immigration of Chinese into Rhodesia. The Rhodesians have been induced to take this step not out of love of Chinese but because no white labour can be induced to enter Rhodesia and work alongside of African labour, and of African labour there is not enough procurable to supply the demand. This has led the *Mining Reporter* to make certain comparisons between Colorado and Rhodesia for the reproduction of which no apology is necessary:—

"The Rhodesian gold output amounted last year to a little less than two million dollars. It is, however, growing fast, and might be assumed to be at present at about \$200,000 per month. To produce this requires, according to the official figures, the labour of 7,000 native miners, taking no account of the white bosses, foremen, mill hands, superintendents, managers and office employees. This corresponds to a production of \$28.50 per month per individual, or \$342 per year. Now compare this with the results attained in the United States, where free white labour does the work. In Colorado, where the metallic output last year was \$56,250,000, the entire population of the mining districts—men, women, children, merchants, professional men and office employees—was 70,000, which corresponds to an output per capita (of population and not of workers) of over \$800. In Arizona the average results were even higher. In no part of the West were they much less.

"From these figures it would look as if cheap labour, like cheap everything else, did not pay in mining at least. And if one makes a comparison of the various mineral regions of the world it is not difficult to show that net profits under slave or semi-slave labour are nowhere anything like as large as they are under high-priced and free labour, even though gross production may increase and become very large. In Russia, Germany and Spain, where mining labour is free but miserably paid, the industry is languishing. In Australia and Mexico, where wages are lower than in the United States, there is nothing like the life and push and snap to the industry that one finds with us, and in parts of our own country where, through over population or other causes, labour is not so well paid as it used to be, there are indications of industrial decadence, either existing or approaching.

"In fact, few of the wise 'sayings' that have come down to us from the past are truer than the one which insists that 'the labourer is worthy of his hire.' Any system which disregards this fundamental policy will probably have to pay directly or indirectly for the disregard of human rights. The Rhodesian and Transvaal ores average from \$8 to \$12 per ton in gold values, and the industry seems in danger of collapse because operators have difficulty in obtaining labour at 50 cents per day. Transport these regions and their deposits to the Western United States and they could be made to pay handsomely with \$3 wages. At the Homestake mine in the Black Hills, and the Treadwell in Alaska (where, it is true, the ore body is vastly larger), magnificent profits are resulting from \$2 to \$4 ore, under \$3.50 wages, and there are hundreds of deposits in the West no wider and just as difficult of access or extraction as those of India and Africa, where full wages (\$3) are paid, and handsome dividends continually accrue. What is the reason?"

The point of view occupied by the *Mining Reporter* is interesting and to a large extent borne out by the history of different countries and different industries. We have only to look at the industrial development of the Southern States since the incubus of slave labour was removed and still more at the industrial and commercial supremacy of Great Britain and the United States which may be taken as types of dear labour countries to find very strong support for the general proposition maintained by the *Mining Reporter*. The particular comparison instituted between Rhodesia and Colorado, however, is of very little value. The average return *per caput* of the labour employed in Rhodesia is \$342 a year

while the average return per caput of the labour employed in Colorado is, according to a calculation based on the figures of the *Mining Reporter*, about \$4,000 a year. But it is evident that the return *per caput* must rise as the gross output rises the difference between working on a large scale and working on a small scale affecting the comparison. It is evident also that a thousand and one factors, besides the mere question of labour, affect the validity of the comparison. But aside from all that the question may be raised whether labour in America is more highly paid because it is more efficient or whether it is more efficient because it is more highly paid. As a matter of fact it would seem that those two factors act and react upon one another. The economic law regulating the relation between the value of labour and its price may be stated as follows:—

The coefficient of efficiency is greater in high-priced labour than it is in low-priced labour.

That is to say, that the value in production of one labourer who is worth \$3.00 a day is greater than the value in production of six men who are only worth 50 cents a day. But it must be remembered that the man must be worth \$3.00 a day to begin with. The law works out in this way. Under the stimulus of educative influences, comfortable surroundings and the physical and mental well being induced by a comfortable livelihood, the coefficient of efficiency in the high-priced labourer tends to increase, and in a generation or two he has become worth a remuneration of \$3.50 a day. But while his wages increase there is under the law stated a cumulative benefit accruing to the industry in which he is employed and to the country of which he is a citizen. On the other hand the coefficient of efficiency of the low-priced labourer remains the same, or becomes less or increases in a less degree, and the country of which he is the representative infallibly gets left behind in the industrial race. This is the explanation of how, with continually increasing wages, Great Britain and the United States have not only maintained but increased their industrial lead over other countries in which wages are lower. One of the most mysterious things about old-fashioned political economy is that while every one has always admitted that the efficiency of a horse is a matter of breeding, development and generous living, the efficiency of human labour, in which surely nerve, brain and will power, have more influence, should always have been treated as if it were a constant factor per head of the human beings employed. This false premise has fortunately disappeared from economic thought and in time we suppose will also disappear from popular argument. At the same time there are two fallacious conclusions to which an imperfect appreciation of the principle involved gives rise. The first of these may be termed the fallacy of the working man. He is apt to think that by an arbitrary increase of the remuneration of labour the coefficient of efficiency may be arbitrarily and immediately increased forgetting that the measure of his wage, at any particular time, is the productive value of his labour at that particular time.

The second fallacy is the employer's fallacy. He is apt to consider that an arbitrary reduction of wages will not inevitably affect the efficiency of the labour employed. By the struggle between the employer and the employed, each trying to enforce an incomplete appreciation of the truth, an equipoise is maintained and the progress of society in accordance with the natural law of their relations is provided for.

Many are now casting round for a reason why the mining development of the West Coast of Vancouver Island is proceeding so slowly. Some blame the mining laws, others bad management, but the most probable reason is lack of scientific mining and realisation that the development of a single copper proposition is a very serious undertaking, requiring an abundance of capital. There is a very general impression that the mineral belts of the West Coast are much broken up by great volcanic disturbances, with the result that the copper veins have become so faulted that only isolated patches of copper ore can be found.

It is undoubtedly true that these great disturbances have occurred and that the sedimentary strata have accordingly been greatly broken up and altered by intrusions of igneous rocks, but this condition of affairs is far from being inimical but is actually responsible for the presence of the ore bodies.

As a general rule the faulting of the ore bodies has been slight, as can be observed by a general examination of the ore-carrying belts, notwithstanding the precipitous character of the mountains.

The miner, however, must be prepared to meet with a surface glide where a mass of rock, carrying ore, may slip down the mountain side for some considerable distance. A good miner who surveys his ground before commencing work would soon detect a mere piece of float, even though of considerable size.

On the West Coast the copper ores generally occur in more or less isolated lenses and shoots deposited along great shear planes or contacts, often very irregular. It will thus be seen that the miner must be prepared to follow the ore in whatever direction it may lead him, and to pluckily follow a stringer of ore branching out from an ore body, as it may, and often does, guide him to another chamber of ore. Rock work, however, costs money and the explorer must be prepared to sink \$30,000, and even more, on primary development work before he can say he has a mine or not.

Now for a word of warning. Many of the most promising showings on the coast are simply skins of ore deposited on the surface of the rock from copper-bearing solutions percolating through the joints and faults. These are commonly known as "blankets" and "blow outs." These "blankets" can often be traced in isolated patches along a line of slip which gives rise to the impression that the outcrop of a well-defined and regular vein has been discovered. Such an impression often

results in the running in of a long tunnel to cut the vein in depth, and a few thousand dollars has been spent in convincing the investing public that mining on the coast is treacherous. Until men cease to buy on mere surface showings, without a careful preliminary examination of the local conditions, and learn the golden rule to follow the ore instead of running crosscuts to catch problematical veins at such and such a depth, the investor will continue to mourn his losses.

Several of our readers who are thoroughly in agreement with the policy consistently maintained by the MINING RECORD of discountenancing boom language when applied to the conditions of mining in this country, have called our attention to a paragraph which appeared in connection with a leading article entitled "The Opportunities of Lead Refining," in our last issue, and have asked us for an explanation of what has certainly the appearance of a somewhat senseless exaggeration. The paragraph reads as follows:

"Emancipated from the hampering conditions imposed on their development by the exigencies of an American corporation, and possessed of ready access to the market of the world, it is much more likely in the event that the silver-lead mines of British Columbia will dominate the American Smelting and Refining company, than that the American Smelting and Refining company will dominate the silver-lead mines of British Columbia."

While we agree that the wording is not altogether happy, the paragraph was not written to suggest that under any conceivable circumstances the British Columbia mines could interfere with the operations of the American Smelting and Refining company, but merely to emphasise what we believe to be true, that that company is unable to control the independent development of the British Columbia mines which would "in the event" become a very potent factor in the world's supply of both silver and lead. If our faith in the ultimate great development of our silver-lead mines, was too optimistic expressed, we have erred in very good company, for Mr. J. D. Kendall, than whom few are more careful in expressing an opinion when the future is under discussion, predicted in 1899 — a year before production increased 206 per cent. — that British Columbia would in the near future "become in all probability one of the most important producers of silver-lead ore in the world, if indeed it will not occupy the first position." This, we think, is sufficiently strong language coming from a man who deservedly enjoys an eminently high position in his profession.

While mine operators in this country are too frequently given to the inexcusable habit of making a mountain out of a mole-hill when complaining [of legislation, which though generally beneficial, may put them to slight additional inconvenience or cost, it must be admitted that a real grievance is to be found in the compulsory inspection of boilers by a government official whose work is largely unnecessary and whose fees are

excessively exorbitant. In nearly every case of company operation, boilers are insured and the insurance companies for their own protection inspect the boilers so insured at regular and stated intervals. For this the mining company pays a moderate fee. The arrangement has proved an entirely satisfactory one up to the present time, but at the last session of the legislature an Act was passed which compels a mining company to pay a heavy fee for a government inspection, while, of course, the fee for inspection imposed by the insurance companies must still be paid. The government might surely accept the certificate of a reputable insurance company without requiring a special inspection, and the argument that such a course is not followed in other parts of the world is hardly convincing. Another recent complaint of the mine-owners is that the mine-signal code incorporated in the Metalliferous Mines Inspection Act last session, is unworkable. It is alleged that the unworkability of the system was demonstrated by the mine-managers at Rosslund, to the satisfaction of the Hon. the Minister of Finance, who recently visited that district. From what we can gather, however, Mr. Turner reports that the only section of the code which is condemned as unworkable is that relating to "station signals." If this is correct the mine-managers have not succeeded in making out much of a case, for that clause in the code was taken direct from the act in force in the State of Montana and has proved under precisely similar conditions eminently workable. Moreover the clause in question, before its adoption by the Mines department, was submitted and received the approval of all the important mine-managers in the Province, including Mr. Bernard McDonald, of the Le Roi mine, and Mr. Kirby, of the War Eagle and Centre Star.

We regret to learn that less attention is to be paid to British Columbia by the Geological Survey Department this season than last, and that probably but one party will be in the field and investigation confined to the Crow's Nest area only. Although the greater part of West Kootenay has been surveyed geologically there yet remains a vast extent of country in South Yale and other coming mineral productive centres which have not yet been reported upon, and the information is much desired. Meanwhile it is unsatisfactory to note that no less than six very able members of the Geological staff and chiefs of field parties, Messrs. Low, Barlow, McEvoy, J. M. Bell, Brock and Gwillim, have lately resigned from the department in favour of more remunerative private engagements. This should emphasise the fact which we have previously remarked that the salaries paid by Government to members of the Geological survey is absurdly incommensurate, and unless a change is made in this regard the department cannot hope to retain the services of the most capable men for any length of time. We would also suggest the advantage of a freer distribution of the departmental literature.

A very praiseworthy effort is being promoted to organise an Association of Assayers entitled to practice in British Columbia, under authority of the act which came into force in March last. There is clearly a good opportunity and scope for such an organization as proposed, apart from the benefit that would accrue from a scientific standpoint, in reducing the scale of fees charged for analytical work to a fixed and uniform standard, and in the adoption of a system whereby the same method for determinations will be generally followed. For example, the determination of copper in ores the electrolytic method is now admittedly the best, and if always employed checking would be simplified. We regret to learn meanwhile, that several assayers residing in the Province, who are quite capable of passing the examination required by law, have neglected the opportunity of doing so, and consequently have rendered themselves liable to prosecution if they continue to practice professionally until after securing the necessary certificate of competency.

The following is the statement of costs filed by the Anaconda Copper company for the year ending 30th April, 1901, with the county clerk of Silver Bow County, Montana, for assessment purposes :

Tons of ore extracted.....	1,276,896.
Gross yield per ton.....	14.20
Cost of mining per ton.....	\$ 3.97
Total cost of mining.....	5,069,071.61
Cost of transportation (27 miles) per ton.....	.15
Total cost of transportation.....	191,534.48
Cost of reduction per ton.....	4.14
Total cost of reduction.....	5,288,720.76
Paid for labor.....	5,572,392.64
Paid for machinery etc.....	4,785,399.73
Paid for freight.....	191,534.48
Cost of marketing.....	2,007,415.75
Gross proceeds.....	18,128,558.51
Recapitulation—	
Cost of mining.....	\$ 5,069,071.61
Freight on ore.....	191,534.48
Cost of reduction.....	5,288,720.76
Selling and marketing.....	2,007,415.75
Total expenditures.....	\$12,556,742.60
Net proceeds.....	5,571,815.91

The tax levied in Montana is 3 per cent. on the net proceeds so that the Anaconda company paid in taxes \$167,154.47 or 3 per cent. on \$5,571,815.91. Had the Anaconda mine been located in British Columbia it would have paid 2 per cent. on \$10,640,887.52 or \$212,837.75 to the Provincial treasury, \$45,683.28 more. The cost of mining, dead work, management, insurance and depreciation in the Anaconda mine is very low, \$3.97 per ton. When we compare a fully developed mine producing over a million tons a year with the partially developed and smaller mines of British Columbia in which the charge for mining, dead work, management, insurance and depreciation, is necessarily high per ton of ore shipped it is easy to see how unfair our system of taxation is. The mine which labours under the greatest difficulties pays the highest proportionate tax on its production.

THE B. A. C. LIQUIDATION.

STORMY SCENES IN LONDON.

MR. WRIGHT HOWLED DOWN AT THE SHAREHOLDERS MEETING OF THE B. A. C.

SHARES AT 6D. A PIECE AND NO TAKERS.

THE LONDON STOCK EXCHANGE V. THE B. A. C. DIRECTORS — SENSATIONAL DEVELOPMENTS RE THE ROSSLAND, GREAT WESTERN AND KOOTENAY MINING "SPECIAL SETTLEMENTS" — FOUR PETITIONS BY CREDITORS TO COMPULSORILY WIND UP THE CORPORATION—A VERY MIXED COLLECTION OF ASSETS — ALARMING DEFICIT — A BANK BALANCE OF £157 IN LONDON — THE COURT ADJOURNS MR. PAULL'S PETITION TO JUNE 13TH.

(Special from our London correspondent.)

TO-DAY Whitaker Wright faced the music, and although I have never hesitated to criticise, month by month, the operations of the group over which he has presided for so long, I admit he faced it bravely. Probably never in the history of the city has a board of directors had to meet such an infuriated crowd as that which gathered in the great hall at Cannon Street hotel, to hear from the directors of the ill-fated British America Corporation an account of their stewardship. It seemed almost as if the Stock Exchange had sent half its members to back up the proprietors in their denunciation of the gentlemen under whose management the company, which was to do so much for British Columbia, has come to such a sad pass. As a matter of fact the Stock Exchange is as much interested as the unfortunate public, and I am afraid that British Columbia—so far as the London market is concerned—has received a blow from which it will suffer both directly and indirectly. It is not like a single company with a few thousands of pounds of capital which has come a cropper. Millions of pounds sterling are involved—apparently lost irretrievably. And after having listened to the whole sorry story to-day, which of course only confirmed my private information, I am fain to admit that there seems little hope of much being saved out of the wreckage. To punctuate this it is sufficient to point that the market quoted the price of B. A. C's to-day at 3d. to 6d. for the fully paid £1 share. I append the price extremes in London since the beginning :

	1898	1899	1900	1901
Highest.....	23s. 6d.	28s.	19s. 6d.	10s.
Lowest.....	12s.	14s.	6s. 3d.	now 3d.

Dividend paid 2s. (xd on 29, 3, 1900) and rights of subscription in Le Roi issue.

Of course it has all arisen out of the awful Globe crisis at the end of 1900 and the beginning of the present year. At the time it was felt by those behind the scenes, that working as it did in such close partnership with the London & Globe Finance Corporation, the B. A. C. must be badly hit, especially as it had to arrange for the completion of its share in the dealings in connection with making a market in the shares of the subsidiary Rossland, Great Western & Kootenay Mining Companies. And so the event has proved, for it is in connection with the "special settlements" in regard to the dealings in these two companies that the B. A. C. has fallen. Mr. Wright, himself, to-day admitted as much, for he said that the position of the corporation had in no wise altered since December of last year, when the

crisis in the affairs of the group were most acute, and asserted that it was simply the aftermath of the Globe crash. He added that the whole of the trouble had arisen owing to the action of certain members of the Stock Exchange. In this way he, of course, referred to the doings of the so-called "syndicate" whose secession, at a critical juncture last December, is said to have been responsible for the debacle, and all the subsequent developments. Be this as it may, he claimed that the Globe people were going for this syndicate, and that they had the highest legal authority for their belief that its members could be held responsible for their treachery. After having been howled down in the early stages of the meeting he succeeded in quieting his critics, secured a fair hearing, and in about 12 minutes had apparently convinced the meeting that he was more sinned against than sinning, that the whole of the trouble lay of the door of the "syndicate," that he courted every investigation, so far as his actions were concerned, that he didn't mind whether the corporation was wound up compulsorily, i. e., by order and under the supervision of the court, or voluntarily, i. e., by the shareholders' own liquidator, but he plainly intimated that in any scheme of reconstruction the constitution and company must be altered. The new company must be a mining company pure and simple, and he didn't see then why it might not eventually become a success despite its present critical condition. It was a marvelous performance, and although I have always regarded Mr. Whitaker Wright as a man of great parts, and quite able to defend himself, he astonished us all by the way in which he hushed the shareholders section of the meeting. The Stock Exchange side, however, had suffered too much to sit down tamely. They shouted for lists of the company's assets, asked how far they were mortgaged, how much money the corporation possessed at the time they were stating their willingness to complete their bargains in the shares of the two companies, which have brought them down. What had become of the profits of the Le Roi No. 2 "bear squeeze," and the flotation of the other subsidiary concerns, made other pertinent remarks, which only insiders can make, and earnestly besought the shareholders to refuse to sanction the voluntary liquidation of the company, but rather to get into line with the Stock Exchange petitioners—numbering four now—who are asking the courts to see the matter through. Investigation, said the Stock Exchange representatives, would thereby be assured—investigation was what was wanted. But the board had meanwhile agreed to allow of a committee of shareholders to be appointed to superintend the liquidation, and it was very obvious that even some of the most bitter opponents of the previously howled-down managing director were wavering. When it came to the show of hands it was evident that the board had won, but the conduct of the chairman in regard to the appointment of liquidator was somewhat less clear, and angry shouts were raised against him. He was, undoubtedly, not an ideal chairman, where it was necessary to turn away natural wrath, to appease an angry crowd, and I am much mistaken if some of his actions are not challenged. For that there will be an appeal to the law courts is undoubted. Mr. Whitaker Wright, for his part, indicated the determination of the group, of which he is the head, to fight the syndicate to the bitter end. The Stock Exchange element, and they are exceedingly strong, seem as equally determined that no stone shall be left unturned to wreck the policy of the board, and defeat the steps to reconstruct the ill-managed corporation. The end of the meeting was confusion, but I take it that there is no doubt that on the show of hands the board won over the form under which the corporation is to be wound

up. Of course a "poll" was demanded and this resulted as follows:

Votes cast for the board, i. e., for voluntary liquidation, 403,448.

Votes cast for the creditors of the Stock Exchange, i. e., for compulsory winding-up, 16,750.

Total capital of £1,500,000 into £1 shares fully paid and all issued.

The first-named total of course includes the vast number of shares controlled by the B. A. C. and other companies, etc.

It is very difficult to ascertain the extent of the corporations assets, as the meeting at which the board met the creditors of the Stock Exchange (May 23rd) was private. I have made inquiries, however, in well-informed quarters and gather that the following may be considered as about correct on the date in question. And a perusal of it will show that the poor B. A. C. has not had its interests confined to B. C., but has travelled far and wide to ruin:—

ASSETS—ESTIMATED VALUES.

£254,320 representing 50,864 Le Roi No. 2 shares, £5 fully paid, valued at £5.

£60,000, representing 12,000 Le Roi No. 2 shares, £2, 10s., paid, valued at £5 (said to be mortgaged.)

£840, representing 168 Rossland & Great Western shares, £5, valued at £5.

£7, 10s., representing 75 London & Globe, valued at 2s.

£50,000, representing 20,000 London Valley Coy's shares, valued at 2s. 10d.

£200,000, representing 80,000 Moolort Gold Coy's shares, valued at 2s. 10d.

£58,750, representing 235,000 Standard Exploration shares, fully paid, valued at 5s.

5,625 Columbian Proprietary and a number of Columbia Kootenays, unvalued.

£157, representing "cash in hand."

£50, representing calls in arrear various shares.

£1,843, representing various debtors.

£23,000, representing moneys at Vancouver.

Total, £646,667, 10s. od.

LIABILITIES.

£260,000 due on sundry loans and to various creditors, excluding of course the amounts due to the Stock Exchange, estimated by the creditors at £1,500,000.

It is not surprising perhaps, after being placed in the possession of the above information, that the Stock Exchange creditors should push for a compulsory liquidation and more light, and four petitions were down for hearing on June 5th, and one for June 12. After hearing the speeches of counsel, Mr. Justice Wright acceded to the request of Messrs. C. & A. Paull, backed up by the counsel representing Messrs. Flower, Camden & Douglas, sr., and also the fifth petitioner, for a postponement in order that affidavits might be put in dealing with the new phase created by the shareholders decision of Monday last, Thursday week, June 13, being the date fixed for the rehearing of the claims of the Stock Exchange firms. I understand that it is quite possible that Mr. Whitaker Wright, S. Macleay, and various officials of the corporation will be subpoenaed to attend on that date, or at a subsequent hearing if such should be required.

MINES OF BOUNDARY DISTRICT—No. VI.

THE B. C. MINE, SUMMIT CAMP.

(By S. F. Parrish, M. E.)

THIS property, the B. C. mine, owned by the "B. C." Chartered Company, Limited, of Montreal, Quebec, is situated in Summit Camp, in the Boundary district, on the divide between the North Fork of Kettle river and Boundary creek, about midway between the towns of Grand Forks and Greenwood.

The location was made in 1896 and development work was commenced in the summer of 1897. A shaft was sunk to a depth of 160 feet, mostly in ore and vein matter. From this two levels were turned, one at 50 feet and the second at 150 feet, and drifting was started in a general northerly and southerly direction, following the strike of the ore body, far as it could be determined.

gravity of about 3.00. There are different stages of alteration, of course, between the above-mentioned limits, one piece of rock not infrequently showing various degrees of metamorphism.

The microscopical determinations of a number of specimens of this highly altered limestone have revealed the presence of the following minerals, most of which are seen in each specimen: quartz, plagioclase, epidote, garnet, zoisite, magnesium and calcium carbonates, actinolite, kaoline, pyrite, chlorite and serpentine.

Into this mass of rock sheets of porphyry, varying in thickness, from four or five feet to thirty odd feet, have intruded, the intrusions having apparently followed more or less closely the bedding of the limestone. A microscopical examination of these sheets of eruptive rock reveals the following minerals: plagioclase, orthoclase, microcline, biotite and a little quartz, and the decompo-



MINE BUILDINGS B. C. MINE, MAY, 1901.

A branch of the Columbia & Western railway was completed to the mine in the autumn of 1899, this being a spur from the line from Eholt to Phoenix, and early in January, 1900, ore shipments were started from the dumps of ore that had accumulated during the development work. In June of the same year stoping was commenced.

The mine is equipped with a sufficient plant to break and hoist more than 200 tons of ore a day through the present shaft.

The country is limestone which has undergone various degrees of alteration from a white crystallised or marbleised rock, containing about 48 per cent. lime, and 7.30 per cent. silica and having a specific gravity of 2.67, to thoroughly metamorphosed limestone, having ordinarily a small gold value, about 3-100 of an ounce, and containing 70 per cent. to 80 per cent. silica and from 6.25 to 8.75 per cent. lime, with a specific

sition of these minerals, viz.: chlorite, carbonates and kaolinite. An analysis of two different varieties gives, respectively, silica 82.79 per cent. and lime 2.37 per cent., and silica 53.21 per cent. and lime 5.52 per cent.; specific gravity about 2.67. It will be noted that the porphyry is not mineralised at all.

Cutting through the above described rock formations are several faultings having a general northerly and southerly strike, with a slight dip to the east. There does not appear to have been any great vertical displacement, but there are indications of a more or less extensive lateral movement. It is in or near this faulting that the ore is found, extending into the country rock in a lense-shaped mass so far as developed, having an extreme width of about sixty-five feet by about 200 feet in length. This extends from the surface of the ground to a depth of nearly 300 feet, below which it has not as yet been followed.



MINE BUILDINGS B. C. MINE, MAY, 1901.

granted mineral claims: B. C., Truckee, Reveille, Hilda, Vashti, Falcon, J. W., London, Daisy fraction, B. C. fraction and Novelty fraction. These contain a total area of 268 acres. Practically all the important development work done to date on the group has been done on the B. C., this being about 6,700 lineal feet, of which 1,410 feet is sinking and raising and 5,290 feet cross-cutting and drifting. As stated above by Mr. Parrish, ore shipments commenced in January, 1900. The tonnage shipped since then, to May 31 of the current year, is as follows:

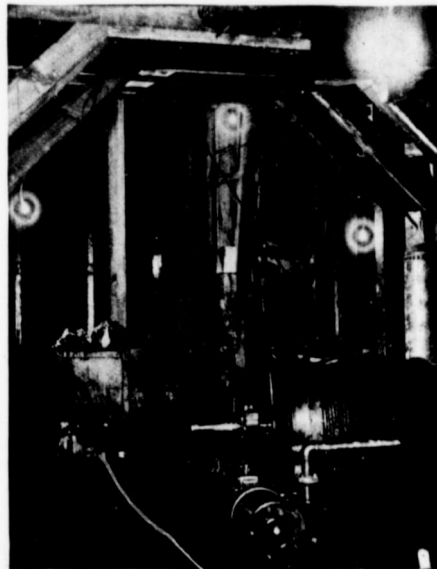
	Tons.
January, 1900	457
February, "	883
March, "	660
April, "	214
May, "	308
June, "	1,437
July, "	1,400
August, "	1,547
September, "	2,928
October, "	3,672
November, "	2,213
December, "	3,775
January, 1901	2,950
February, "	3,596
March, "	3,160
April, "	5,832
May, "	4,532

39,570

Reduced to pounds the quantity of ore sent to the smelter is 79,140,482 lbs. gross, or 78,101,110 lbs. net. The yield of gold, silver and copper, from this was gold, 728.83 ozs.; silver, 111,779.74 ozs., and copper, 4,366,203 lbs. The average copper values were therefore

nearly seven per cent. With very little exception this ore was treated at the Trail smelter.

The power plant at the B. C. mine includes four boilers, together about 225-horse power; a straight line Rand 4-drill air compressor; half of a class G Ingersoll-



STATION THIRD LEVEL B. C. MINE.

Sergeant air compressor, rated at ten drills; one large and two small hoisting engines; two sinking pumps; an electric light engine and dynamo and a full complement of accessories. At the present time a diamond drill plant is at contract work in the mine, prospecting both horizontally and vertically. Quite recently there were 110 men employed here, but the pay roll at the present time is not up to this its maximum number.

The manager, Mr. S. F. Parrish, M. E., has had many years' mining experience having been engaged in mining in Colorado, for about 24 years, of which 13 to 14 years were spent in Leadville, in charge of various work and properties, among the more important of these having been the mines of the Chrysolite Silver Mining Company and the Yak Mining, Milling and Tunnel Company.

the stamp mill is an economical crushing device. There may be exceptions to this, however. For example, sectional machinery for crushing is not usually satisfactory. This applies to rolls, Huntington mills, and other roller mills, of large capacity. The smaller sizes are less difficult to keep in repair, but their consumption of power is large in the proportion to the work done. Sectional stamp mills, on the other hand, are eminently successful, accordingly they would be justifiable for crushing for cyaniding in a remote district where heavy pieces of machinery could not be transported. Again, crushing in rolls is most efficiently done on dry ores, unless the ores are singularly free from aluminous or sericitic matter. If the ores were very wet it might prove too expensive to dry them. It rarely pays to dry ores when extra fuel must be burnt for that purpose. If it cannot



STOPE IN B. C. MINE, BOUNDARY DISTRICT.

THE DUTY OF STAMP MILLS IN CRUSHING AND AMALGAMATION.*

(By Courtenay De Kalb, M. E., Kingston, Ont.)

IT is with reluctance that I venture to speak upon this important subject, for which I am not aware of possessing any special fitness. I enter the field only upon the solicitation of our Secretary, in the hope that I may stimulate others to offer the fruits of their experience in discussion. I have used the stamp mill on a large variety of ores, crushing for amalgamation, for amalgamation and concentration, and for cyaniding without amalgamation. The latter I have come to regard as ordinarily of very doubtful expediency, to say the least, for I do not think anyone will maintain that

be done by waste gases from the boilers, then it will in all probability have to be abandoned. Here, then, is an argument for using the stamp mill merely as a crusher. In passing I may add that crushing finer than one millimetre (about No. 16 mesh) in rolls is not economically possible. Hence, in crushing for cyaniding, the crushed product must be sorted in hydraulic classifiers, the first spigot discharge being then reground in some other type of mill. For this purpose I have found either the Huntington or the ball mill suitable.

The tendency of the stamp mill is to make an excessive quantity of fines. Under ordinary working condi-

* Paper read before the March meetings of the Canadian Mining Institute.

tions the percentage of the total ore fed which will be crushed finer than No. 100 mesh will vary between 28 per cent. and 40 per cent. I have found about 32 per cent. to be near the average. All that prevents the production of a larger proportion of fines is the masking of the blow upon the smaller particles by the crushing of the larger particles on the die. I am inclined to believe that very nearly all the fines are produced in the crushing of the larger particles, those which rest upon the die and protrude above the general mass of ore upon it, especially where low discharge is employed. It may not be commonly known that the crushing in a stamp mill is accomplished mainly by the reaction from the die after the stamp has fallen. If a stamp is allowed to fall upon a single lump of ore resting upon the die it will be found that the upper portion of the lump will have been merely fractured, while a considerable portion of the lump adjacent to the die will have been reduced to powder. The force of the blow has developed spherical waves in the ore particle, which traverse it until they meet with resistance from the die. They are then reflected backward, meeting succeeding oncoming waves, the result of which is to overcome the cohesion of the mass, comminuting the lower portion of the lump. Further experimentation will be necessary to determine the other conditions under which crushing is accomplished in the stamp mill, but the statement I have made has, at least, been demonstrated by careful tests in the laboratory of the School of Mining. So far as it goes it leads to two conclusions regarding crushing for high capacity, viz., the feed should be kept thin, and the crushed material should be hurried out of the mortar as rapidly as possible. This is only affirming on theoretic grounds what has long been practically recognised and applied in California, and in other places where high amalgamating capacity and high crushing capacity were compatible. Nevertheless, there is a tendency even in California to overfeed the battery in a desire to put through a large amount of ore, and I think that this error on the part of millmen is too general everywhere. To be sure, it is an economic question, to be determined independently in every mill, but it is very easy to err on the side of high capacity at the cost of reduced inside amalgamation. Mr. Dana Harmon, in a very suggestive paper on the Stamp Milling of Free Gold Ores, read before the Technical Society of the Pacific Coast (Sept. 7, 1900), affirms that if the ore is one that will yield its values in amalgamation, at least 60 per cent. of the gold should be caught in the mortar. This would not be altogether an unsafe rule for the millman, though I should modify it so far as to claim that 60 per cent. of the amalgamable gold should not be allowed to escape through the screen.

I have observed a marked tendency to discard inside copper plates in the West, and many of the best superintendents no longer attempt to use plates on the chuck blocks. When a low discharge is used the scour is undoubtedly excessive, and any amalgam that may have formed on them is necessarily washed out with the pulp, which is difficult to save. Fine particles of amalgam will escape from the ordinary mercury traps, and while outside gates will catch fine gold they accomplish very little, if anything, in arresting amalgam that may have issued from the mortar. I have used with success in narrow mortars, back plates with protecting cast-iron shields so placed as to leave a space about one-eighth of an inch wide between the copper plate and the shield on the upper edge, and one-quarter of an inch wide on the lower edge. The pulp washes up between the two plates and over the shield, and on the return flow a portion of that which washed over the shield also passes between the shield and the copper plate. Amalgama-

tion is thus facilitated, and scour is prevented. In setting back plates, they should always be placed so that the upper edge of the plate is higher than the normal rise of the pulp wave, and my experience has been that the greater amount of amalgam will be found in a band approximately coinciding with the upper limit of the rise of the wave. It is merely a question of time of contact, admitting of union between the gold and the mercury. For the same reason I prefer multiple apron plates, each plate not more than two feet long, and successively overlapping each other, so that the pulp in falling from one to the other may have a better opportunity for prolonged contact, with the mercury under each recess thus formed. Time is all important in amalgamation, and many millmen do not provide the proper conditions in this respect for perfect extraction of the gold. A very common fault is that of using too much water, so that the pulp is swept too rapidly over the apron plates. As thin a stream of pulp should be obtained as will flow smoothly and freely over the plate, maintaining the crescent wave which is one of the indications of proper distribution of the pulp. Every effort should be made to save the gold by amalgamation, and no reliance should be placed on the concentrators for this purpose. If any amalgamable gold large enough to be caught in the mortars and on the plates is saved on the concentrators, it is a sure indication that the milling conditions need modification.

I wish to insist upon the importance of a careful study of the pulp, which should be made with every ore, and at intervals of a few months with the same ore, unless the tailings assays show that the best possible results are being constantly obtained. For this purpose, after a "clean-up," before adding any mercury, ore should be crushed in an ore battery until normal conditions are established, taking care to feed a good average of the ore milled, and then the whole pulp stream should be saved until several barrels are filled. Allow this sample to settle, syphon off the clear water, and dry the residue. Weigh and screen through a series of sieves beginning with a size slightly larger than that of the rated size of mesh in the battery screen, and carried down as fine as No. 150 mesh, or even to No. 200 mesh. Weigh these several products and calculate to percentages for plotting a sizing curve, which will show graphically just what quality of crushing your mill is doing. Divide each one of these products into two portions, mixing as for sampling and combining opposite quarters, and assay one of these portions corresponding to each size of screen mesh. The other portions should be tested as to the amount of amalgamable gold contained by pan amalgamation, and the residues then concentrated on a vanning plaque. After assaying all products the results can also be plotted for convenience, when, if the experimenter were careful, the whole story should appear. Comparative tests of this sort, made upon pulp obtained after varying the milling conditions, will readily show the way to secure the most perfect work possible in both amalgamation and concentration. In no other way may one so speedily and surely determine what adjustments to make as regards height of drop and discharge, size of screen, and quantity of water needed, and an effort to reach the same end by merely varying the milling conditions and assaying the tailings will take a longer time, involve losses that need not have occurred, and finally yield only an approximation to the accuracy which may be reached by such a searching investigation as that outlined above.

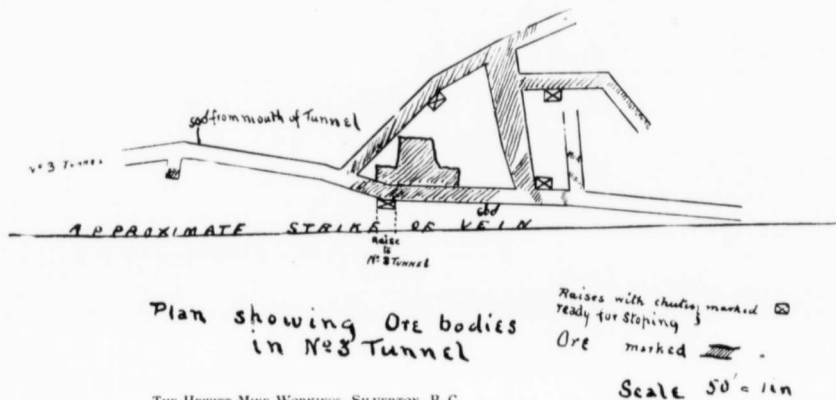
The question of fine breaking of the ore before feeding to the stamp mill has received so much attention in late years that some mention must be made of this inno-

vation. Like most good things, it has been abused by unthinking men, whose aim has been to cheaply crush a large amount of ore. When the gold in the ore exists in the free state, by which I mean that it is not locked mechanically or otherwise in the sulphides, and when the amount of coarse gold is large, there is no doubt that the results are highly economical. Since the stamp mill is not an economical crusher, the less work of this sort that we exact of it, while securing the best possible results in amalgamation, the better. Furthermore, the coarser the material fed the less duty is the mill performing, and also the splash is affected to some extent, which has a direct influence on amalgamation. The main question is that of time for complete amalgamation. The finer the ore fed the more rapidly will it pass through the mortar. This may be corrected by increasing the height of discharge, or by using roomier mortars. The economic gain in crushing is then lost, however, and the only benefit, if there be any, is to be looked for in superior amalgamation due to more prolonged retention of ore in a finer state of sub-division in the mortar.

The weight and speed of stamps is a point regarding which there is little agreement in opinions. So far as crushing efficiency is concerned there is little difference

important losses of amalgam undoubtedly occurred from the too frequent application of this chemical. A solution of caustic soda, or lye from the leaching of wood ashes, will cleanse plates perfectly; they are not solvents for gold, and incidentally they are free from the poisonous quality of KCN.

In this brief, sketchy paper, I have not attempted to do more than throw out a few suggestions on important points, merely as a basis for discussion, with out any pretence of adding new knowledge, and certainly I shall not attempt to lay down any rules concerning the duty of stamp mills. This matter is relative, dependent upon so many varying circumstances, that the only guide for the millman is to study his pulp often and critically, so that he may know, and not guess, when he has obtained the combination of highest crushing capacity with the highest amalgamable capacity, adjusted to the line of the highest economical results. It is not easy to do this, not nearly so easy as men may think, and a man must possess the peculiar qualities of the experimenter—in other words he must know something of scientific methods of analysis—in order to be sure that he has attained the result at which he is aiming.



THE HEWITT MINE WORKINGS, SILVERTON, B. C.

between the two, within the limits of weights which may be regarded as standard to-day, viz., 850 lbs. and 1100 lbs.; that is to say, the difference in speed bringing the output per horse-power expended to practically the same point. So far as I have observed the choice depends upon the character of the ore, the lighter stamp producing enough less violent splash to facilitate the amalgamation in the mortar of more fine gold, when the height of the discharge in the two cases remain the same. A very slight modification in the height of discharge, however, will give to the heavier stamp the same advantage. Any material difference between light and heavy stamps is to be looked for in the wear and tear of the mill, the abrasion of shoes and dies per unit of ore crushed, and the relative weights of metal thrown on the scrap heap in the form of worn out shoes and dies. On this important point I have no certain data on which to base conclusions. The experience of millmen with regard to this would be of great value.

I wish to commend Mr. Harmon for his protest against the use of potassium cyanide solution for brushing and brightening the plates. Prudently used it may do no harm, but I have known many mills in which

DRY SILVER-LEAD ORES IN THE SLOCAN.

THE HEWITT MINE, SILVERTON.

THE Hewitt mine is situated on the southwest slope of what is known as the Hewitt mountain, overlooking the Galena Farm and Slocan lake and is, in a direct line about three miles east from the town of Silverton, B. C. The mine has an altitude of 5,300 feet above sea level and 3,500 feet above Slocan lake. The property is reached from Silverton by a wagon road that was built last fall and which runs to the foot of the mountain to a point where connection will be made with the aerial tramway now under construction from the mine, at present there is a good rawhide trail from the mine to the wagon road over which the shipments to date have been made.

The Hewitt vein runs nearly east and west, with a dip of 70 degrees to the north and it outcrops right down the mountain so that all tunnels are driven directly on the vein. The vein is a fissure which cuts diagonally across the formation which, as shown in the tunnels, consists of granite and slate belts alternating and must be either at or close to the contact between the

granite area to the south and the slates of the Slocan district to the north.

below the apex of the hill, and was continued for only 200 feet when it was abandoned owing to the smallness and bad construction of the early work. No. 2 is 120 feet vertically below No. 1, and has a total length of 500 feet, the ore bodies in this level exceeded 100 feet in length and last fall sorted ore to the extent of 85 tons was packed out on mules and shipped to the smelter with results shown in the following table :

Lot No.	Net weight assay.	Silver ozs.
1	44159	115.1
2 and 3	66057	297.5
4	43693	125.1
5	19800	254.4

Lead Per cent.	Zinc Per cent.	Net Returns.
6.2	15.5	\$1153.43
10.9	12.6	5382.52
4.9	13.4	1434.39
12.3	13.1	1447.54

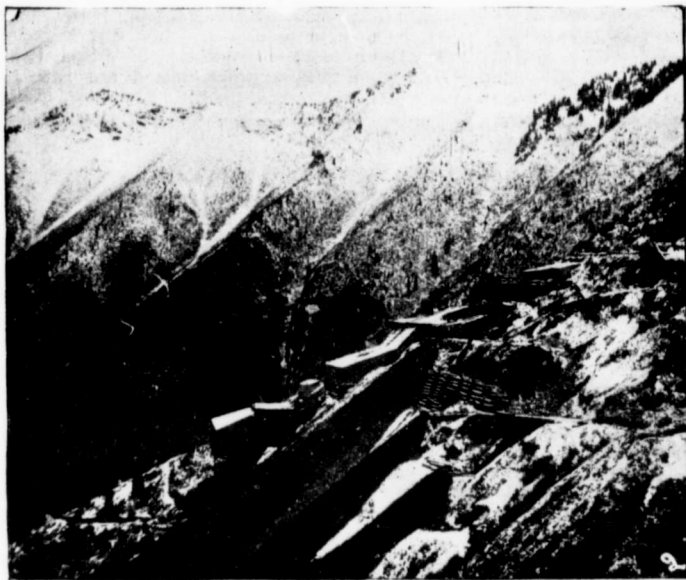
The result being net returns over freight and treatment of \$108.43 per ton, packing cost \$10.00 per ton.

Tunnel No. 3 is ninety-five feet vertically below No. 2, and is in a total distance of 705 feet and is connected with No. 2 by a raise, on this level the ore bodies are much more extensive than on the upper level seeming to prove that they increase with depth. The total depth below the surface of the ore bodies on No. 3 level is 460 feet. Since January 1st, 1901, there have been shipped

The vein, until the ore body is reached, is well defined and runs from three to five feet in width and carries a lot of talcy vein filling, when the ore bodies are near the vein is less confined, seeming to swell out to large proportions, the full dimensions of which have not yet been proved, but cuts from the main tunnel No. 3 have been made a distance of over sixty feet to the north, without getting out of the vein formation or losing the ore. The opinion of experts who have seen the property differ as to these ore bodies, some think that it is an ore zone that is cut by the vein, others that a cross vein comes in at this point and the ore formed at the point of intersection, but which is the true view cannot be proved until further development work has been done. In the meantime the owners are more than satisfied with the results obtained so far, as is proved by the fact that neither the property nor any interest in it can be purchased at the present time.

The development work consists of four tunnels run on the vein, which are numbered 1, 2, 3, and 6. No. 1 tunnel was the original prospecting tunnel 240 feet

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CONCENTRATOR NEAR SILVERTON—A TYPICAL VIEW OF COUNTRY.



INTERIOR OF ORE SHED, HEWITT MINE, AT NO. 3 TUNNEL.

from Nos. 2 and 3 levels 566 tons of ore, which were rawhided down the hill on the snow, this ore was not sorted, being mostly sacked in the workings as it was broken down, this ore gave average net returns of \$35 per ton over freight and treatment.

An aerial tramway about 2500 feet long and having a vertical fall of 1000 feet is at present in process of construction from No. 3 tunnel to the foot of the steep hill, and is to have a loading station at No. 6 tunnel, when completed the mine will be able to ship ore all the year round at a cost of not to exceed \$2.00 per ton for transportation from the mine to the steamers on the Slocan lake, a nice reduction from the original packing charge of \$10.00 per ton.

Tunnel No. 6 is being run to tap the ore body at a depth of over 800 feet below the surface, being vertically 349 feet below No. 3, it is already in a distance of over 350 feet but will have to be 1100 feet in length before it comes under the ore in the upper workings.

The ore is what is known as a dry ore carrying a lot of Ruby silver as well as many of the rare forms of silver crystals, tests have been made on some of the crystals that have given assay results of over 60 per cent. in silver, picked samples of ore can be selected that will assay away into the thousands of ozs. to the ton, native silver is also found. The ore in addition to its silver values carries a trace of gold, 66 per cent. silica, 10 per cent. iron and only about 5 per cent lead, and in shipping the mine run, the zinc is much lower than in the returns of sorted ore shipments given above.

This ore is in great demand by the smelters, as it is needed as a flux to help to smelt the heavy lead ores of the Slocan, with the result that most favourable freight and treatment rates, can be secured, so much so that

mining division that has received systematic development up to the present date, local mining men having been afraid to tackle dry ores in the galena belt, but the success of the Hewitt should cause attention to be directed to the many promising dry-ore prospects that are to be found in the district.

The Hewitt has been worked by the present owners since August, 1899, at which time it was taken on a



DUMPS AND TUNNELS NOS. 1, 2 AND 3, HEWITT MINE, ELEVATION 5,300 FEET.

working bond as a prospect having nothing in sight but a small outcrop at the apex of the mountain, and only about twenty feet from the end line of the property, not a very encouraging condition as the ultimate purchase price was considerable, but the work progressed and



WATER-SUCTION BLAST FOR THE VENTILATION OF TUNNEL. IN OPERATION AT EMILY EDITH MINE, NO. 1 TUNNEL, NEAR SILVERTON.

ore as low as 20¹/₂ ozs. of silver to the ton can be shipped without loss to the mine.

The Hewitt is the first dry-ore property in the Slocan

the developments made the bondholders so satisfied that they purchased the various interests and acquired the ownership of the property before the expiration of

the bond, for the first fifteen months only about eight men were employed, but in November last year increased accommodations were erected, since which time an average of twenty-five men have been on the pay roll, as soon as the tramway is completed this force will be greatly increased.

Something like \$25,000.00 has been spent in development work by the present owners.

Amongst the surface improvements already completed may be mentioned two miles of wagon road to give an outlet from the foot of the mountain to Silverton, the shipping point; a fine trail from the wagon road to the mine; a camp building 20 x 60 feet to accommodate thirty-two men, having separate dining, sitting and sleeping rooms, also kitchen and wash room, with hot and cold water—in every way model quarters for a crew of that size.

Amongst the improvements under consideration in addition to the tramway which is being built, are buildings to accommodate double the number of men, also an office building with quarters for officers and owners when at the mine.

The property is owned by a syndicate of five members and all the interests are pooled, making it to all intents and purposes a close corporation.

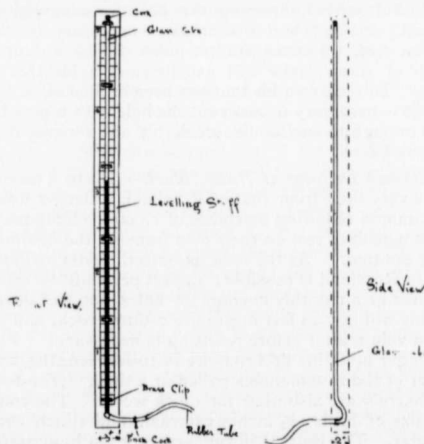
A RAPID METHOD OF LEVELLING.

(By E. Philip Gilman, A. R. S. M., F. G. S., etc.)

THE following short description, together with accompanying sketches, will illustrate a somewhat novel and very rapid, yet accurate, method of levelling. The only apparatus required are two levelling staffs constructed as follows:—

Take a plain piece of seasoned wood, five or six feet in length, three inches in width and two inches thick.

Cut a long groove down the front from within a few inches of the top to within a couple of inches of the bottom.



A long glass tube about three-quarters of an inch thick having an inside bore of half an inch, is placed in this groove and firmly held in place by half a dozen brass clips screwed into the wood flush with the surface.

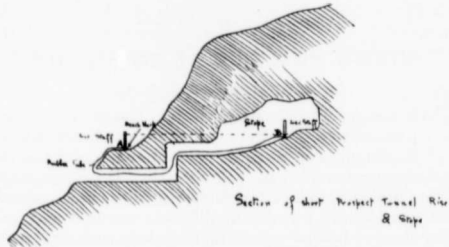
The tube should have the appearance of being neatly countersunk in the staff, the face of the latter projecting about one-eighth of an inch and so protecting the glass.

Bend the glass tube at the bottom as shown in the diagram, using a little beeswax to give it a rigid seat.

The staff is shod with a brass plate and then accurately graduated in feet, starting with the bottom of the plate as zero.

Divide each foot into tenths, subdividing each tenth in a similar manner.

Readings can thus readily be taken to 1-100 of a foot. The two staffs are now connected by means of a stout rubber tube (about three-quarters of an inch in thick-



ness, with an inside bore of half an inch and of any suitable length, say sixty feet), by slipping the ends over the bent extremities of the glass tubes.

Now fill the latter (together with the rubber tube) with colored water, until the liquid stands exactly half way up each tube. Insert a cork at the top of each tube to keep out dirt and prevent the water from being spilt. The apparatus is now ready for use.

METHOD OF LEVELLING.

Two men only are required, viz., one for each staff. The rear staff is placed on the ground in a vertical position at the starting point (called station No. 1), while the front staff is taken forward to the next station (No. 2). Each man now reads the height at which the water is standing in the glass tube on his staff. (Reading by the meniscus, as in the case of a burette).

One man only does the booking, an example of which is shown in tabular form.

After booking the two readings the man holding the front staff, continues to hold it in position while the

Example of Booking

Station	1	2	3	4	5	6	7	8	9	10
Rear Staff	3.00	2.75	2.50	2.25	2.00	1.75	1.50	1.25	1.00	0.75
Front Staff	2.50	2.25	2.00	1.75	1.50	1.25	1.00	0.75	0.50	0.25
Relative Elev.	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Relative Elev. (ft.)	1.50	1.25	1.00	0.75	0.50	0.25	0.00	-0.25	-0.50	-0.75
Relative Elev. (in.)	18.0	15.0	12.0	9.0	6.0	3.0	0.0	-3.0	-6.0	-9.0



one in charge of the rear staff now moves forward to station No. 3. The two readings are again taken and the man at station No. 2 now goes forward to station No. 4, and so on. Extreme accuracy may thus be attained.

The great advantage of this method is that levels may be run around corners, over falls of rock, through thick brush, broken and precipitous ground and generally where, under ordinary circumstances, it would be difficult and most tedious to set up an instrument or to get a clear sight.

Under such conditions a great saving of time and labour is effected.

For underground work staffs five feet in length will prove a convenient size. For surface work staffs eight feet long may be employed.

Some years ago Dr. Luigi Aita of Padua, devised a somewhat similar water level, but he used small sliding glass tubes about eight inches in length.

A modification of the above and one very similar to the apparatus just described by me, was used several years ago by us, experimentally, at the Royal School of Mines in London.

MINING PRACTICE AT ROSSLAND.*

(By R. B. Brinsmade, B. S., E. M.)

THE mining in Rossland, B. C., has been in some part carried out by men who came from Butte, Montana, and were in consequence skilled in the methods there employed. The vastly different geological and topographical conditions, prevalent at Rossland, have necessitated a radically different method of developing the ore bodies and extracting their contents, from that in use at Butte City.

The country rock of the mines is a hard igneous formation, mostly diorite, containing the fissure and shear veins worked. The strike of these veins is approximately east and west with a dip to the north of 50 to 70 degrees. The rock is not only very dense (about 12 cu. feet in place weigh a ton) but very hard to drill and tough to break. These facts cause a large bill for drilling and powder, but to compensate, no timbering is needed to hold up the sides or the back, all the timber used being for other purposes.

The values of gold and copper are contained in pyrite, chalcopyrite and pyrrhotite, which are distributed through the pay shoots of the veins in irregular masses. Those portions stoped vary in value from \$50.00 per ton, down to the pay limit which, in January 1900, was about \$11.00 per ton, but has since been reduced. As yet there has been no attempt at concentration, as the friable nature of the chalcopyrite renders the ordinary jiggling method impractical. There is little sorting underground, as frequent assays are the only way to distinguish between pay ore and waste, so that where rock is broken down, too low for the smelter, it is thrown on the dump.

Development.—The mines have been developed by running inclines along the dip of the vein, and from these inclines driving horizontal drifts at 125-foot intervals along the strike, and usually within the walls of the vein. The centre line of the main shaft coincides roughly with the median line of the pay shoot, which extends 300 to 450 feet along the strike of the vein. The vein structure is complicated by numerous dikes and faults, that largely increase the quantity of development work necessary to extract the ore. The proportion of pay ore to the area of the main shaft varied from 42 per cent. on the 4th level to 78 per cent. on the 1st level (the ore only having been exhausted on the first four levels). The stopes vary in average width from 5.2 feet on the 1st level, to 13.2 feet on the 5th level.

The mine was first worked successively from the tunnels on the 1st, 2nd and 4th levels. The main shaft changes from 58 to 64 degrees dip, near the 3rd level. Intersecting the ore shoot are numerous dikes; and the diamond drill is employed to find the continuation of the vein, as well as to evaluate the ore bodies when discovered.

Upraises from the drifts enable the ore to be stoped by the overhand and breast methods.

Diamond Drilling.—Two sizes of drills are used; one with a bit of 2½ in. outside and 1¾ in. core diameter, and the other with 2⅝ in. outside and 15-16 in. core diameter. The machines being seldom used for borings over 300 feet deep are set on two vertical bars jackscrewed against the rock walls; and are run by compressed air from the percussion drill mains.

In starting the drill especially from those drifts in which tramming is being pursued, a short crosscut is first cut out by percussion drills to give a space for the machine, and the proper handling of the rods. The rods are square threaded at their ends and come in five-foot lengths, they are pulled, in lengths of five to twenty feet, according to the space available behind the drill. The holes are cored throughout. The core barrel is five feet long, and the frequent slips and small seams in the country rock permit the cores procured to be easily broken off by the usual choker device. The average length of the pieces of core is five to eight inches, though pieces as extreme as quarter inch and four-and-a-half feet have been obtained. In careful sampling, the core barrel is sometimes pulled out for every six inch advance. The drilling engines are screw feed, and fitted for 300, 700 and 1,000 rev. per inch of advance. Their ordinary speed is 300 r. p. m., with a maximum allowance on the engine of 1,500 r. p. m. The water is pumped through the drill rod by a small independent boiler feed pump run by compressed air. The average progress is 8 feet in an 8-hour shift, with a record of 18 ft. 9 in. The core is broken up and assayed, after a careful examination by the mine superintendent. While drilling in ore, sludge samples are taken by running the discharged water for a fraction of the time, into a tin pail, in which the sludge settles out. The Rossland rock is very hard on bits and diamonds; it occupies the time of a skillful bit setter, to keep one drill running for 24 hours daily, and the wear of carbons is somewhat less than 1-64 carat per foot of hole drilled. Each bit will only drill about 12 feet before resetting is necessary. By skillful setting, reaming the hole for a new bit is generally avoided, but is sometimes necessary for the last few feet. For the shallow holes drilled, an application of screw jacks will usually start a bit that is stuck. To recover a bit that has been broken off in the hole, it is necessary to ream out the hole with a new bit large enough to enclose the stuck bit and recover it in the core barrel.

Diamond Drilling at Butte, Mont.—Butte practice varies very little from that of Rossland. Deeper holes are common requiring machines of 1,000 feet capacity. These machines rest on their own frames, the columns being omitted. As the rock is softer, faster drilling than in Rossland is possible; 14 feet per shift is often obtained as a monthly average on holes 500 feet deep. One bit will last 40 feet in granite country rock, and 25 feet in vein matter before resetting is necessary. For the longer holes the drill rods are in 10-foot lengths, and 30 feet of rod is sometimes pulled at a time. Ten-foot core barrels are also used for quick work. The common size of bit is 1½ inches external, and 1 inch core diameter. The Butte drill runners work ten hour shifts which accounts in part for the greater advance per shift. The cores according to the common practice are stored in long core boxes of 1-inch pine and properly labeled.

Shaft Sinking.—The Centre Star shaft is 18' 4" x 7', out to out of timbers, and is on an incline of 70 degrees. The whole round is drilled before any blasting is done, the machine drills are set up at given points. Two machines with four men work at once, and it usually takes

* Abstract of article from *Mines and Minerals*.

two shifts to drill the round of 18 holes, for very hard rock as many as 3 *extra* holes are sometimes put in the cut. After the round is drilled the cut of rows Nos. 1 and 2 are loaded and fired, then (as the shaft is practically dry) the debris mucked and hoisted. Afterwards the end holes are loaded and fired in the order of rows 3, 4, 5, 6, and when the rock from these is cleaned up the round is completed. The machine men do all their own blasting and loading, as it is impractical to have a separate gang for blasting in the shaft as is now the system in the stopes and drifts (described under "Labour Conditions"). The amount of powder used per foot of a 9 ft. x 20 ft. shaft sunk was 25 lb. of No. 1 dynamite as the average for a recent period.

The rock is hoisted during sinking by a bucket let down from a sheave in the ladder compartment, by a small Bacon timber hoist in the station above. The only timbering put in during sinking is the temporary skids on the foot wall on which the bucket slides. These skids are of round poles, 6 inches in diameter, and are held firmly in place by spiking them to sprags, whose ends are wedged into holes cut into the shaft walls.

The former custom was to leave a rock bulkhead, below the two hoisting compartments, at the level above. When the shaft had reached the next level, timbering was begun from below and lined in by a transit through the hole of the ladderway, the rock bulkhead being knocked out last of all. This method has been abandoned in favour of the bulkhead (as used in Butte). By this method the timbering goes on contemporaneously with the sinking, sufficient space being left to keep the lowest set from being injured by the heavy blasts. This clearance is 20 to 25 feet among the sump.

In timbering the shaft the shaft sets are of sawed yellow (Northern) pine, framed on the surface, and are placed five feet apart, being separated by posts. The only lining used is 2 in. x 12 in. planks placed on the hang wall sets, to keep large pieces of rock from falling into the skip.

Drifting.—Where possible the drifts are driven along the hanging wall, so as to have one free face to break from. As drifting here requires no timbering, and is in equally hard rock, it is mechanically the same as cross-cutting and the two will be considered together; though drifting, when along a vein wall, makes quicker progress.

The advance per round of holes is about $3\frac{1}{2}$ feet. Sixty per cent. dynamite is used for primer cartridges, and 50 per cent. for the balance of the explosive. Forty per cent. dynamite is employed if soft rock is struck. It takes 30 per cent. more powder for the top holes than for the cut. The average consumption of powder was $10\frac{1}{2}$ pounds per foot advance for a recent period. The grade of the drift is about $\frac{7}{8}$ of 1 per cent. and the drainage runs at the ends of the track ties. The speed of drifting varied from 60' to 100' per month with one drill, working three shifts per day and every day in the month. The shifts were $7\frac{1}{2}$ hours net, half hour being allowed for lunch—unlike Butte where the miners and muckers underground have the same pay, the muckers and trammers here receive only \$2.50 and the machine \$3.50 per shift. It is therefore more economical to keep the machine men constantly drilling, and leave the loading and the tramping to the muckers. This system was pursued in the above figures.

No timber except the track ties are put in while driving the drifts.

Raising.—The raises are put in at irregular distances along the drift, and at least 50 feet apart. There are usually two compartments, one a manway, and the other an ore chute.

For drilling the back in the raises the men stand on

a temporary platform of sprags and two-inch plank, that is pulled down before every blast. The permanent timbering is kept within 15 feet of the back. The drills used are No. 2, Rand pattern, throughout the mine, and are set on a bar placed at right angles to the hangwall of the raise. The bars of extra heavy hydraulic pipe can be used for spans of under 13 feet.

In the timbering of the raises the manway is petitioned from the chute by 2 in. x 12 in. planks nailed on to the stulls by six-inch wire spikes. A double bulkhead is put in every 12 or 15 feet to prevent rock from blasting, falling into the manway. During blasting the drill is kept on the topmost plank bulkhead. Often the plank bulkhead is removed after the double bulkhead above has been put in.

The stulls are round pine (barked) of 10 in. to 16 in. diameter. They are set about ten degrees upwards from a perpendicular line to the hangwall, hitches being cut out for them in the walls, and the stull ends wedged tightly into place. The lag poles are unbarked fir or black pine, and they are spiked to the stulls. The chute gate is made by spiking 2 in. x 12 in. plank to two vertical drifts set in the drift below, and by putting between these a double plank gate, as in Butte practice.

Narrow Stopes.—The greater part of the workings consist of narrow stopes, under 15 feet wide. Having carried up the raise a sufficient height, stoping begins at the lowest limit of the pay ore and the stope is then driven to boundary of pay shoot. Round stulls (the same as in raising) are then put in, and a close floor of lag poles spiked on to the stulls. Stoping above the floor then commences.

The ore broken is kept up close to the face for the machine men to work from and the number of floors vertically, depends upon the need of ore for shipment and the convenience of working; sometimes 30 feet is left between floors. The floor poles are taken up as soon as the floor above is put down, unless needed for convenience in climbing to the working face. The broken ore that will not slide by gravity into the chute, is sometimes shoveled into temporary inclined wooden troughs leading to the chute, or else pushed in wheelbarrows thither, on a plankway.

When the pay ore begins just above the drift, a raise need not be kept ahead for the whole back can be worked as a stope. In this case there is a permanent tight floor left above the drift. The blasts in stoping are very heavy, nearly $1\frac{1}{2}$ pounds of powder per ton of ore stoped having been a recent average.

Wide Stopes.—As it is not practical to use the drill bar for stopes over 13 feet wide, some other stoping system has to be devised for wider stopes. The square set method has been adopted for a permanent system for the wide stopes of the Centre Star as it has also been in the Le Roi. The drift having been driven the breast stope is then completed. Then square sets of round pine timber, 12 inches diameter and framed on the surface by the Butte system, are put in and floored over with round poles as in the narrow stopes.

The drill columns are then set vertically between the back, and a temporary scaffold or a pile of broken rock as a base, and back stoping is pursued, when the next floor of set timbers is inserted. Enough space is always first excavated above last floor put in to give room for drilling the back. For a change in width of the ore body the stope can be extended by attacking the breast, or as many sets left out as are necessary. This is similar to the system pursued in the wide veins of Butte, with the exception that the timber in Rossland is used as a platform for drilling and loading, and has little function as a support to the roof.

Blasting.—For cleaning out downward drill holes for loading, a straight blow-pipe made of one-inch pipe is used; this pipe has at its top an elbow from whence it is coupled to the hose of the air drill. The tamping for uppers is usually small stones wrapped in paper, as there is no clay underground. The powder is kept in a small house near the railroad and a thawing temperature is maintained therein by hot-water pipes heated by a stove in an adjoining cabin. A powderman watches the powder house and keeps account of the powder distribution. There is a powder boy per shift in each mine, who takes supplies to the various working faces, shortly before blasting time. In the mine workings above the lowest tunnel it is, in winter, nearly as cold as on the surface, and the powder, if left long before firing, would soon freeze again.

Tramming.—The shaft stations are untimbered, and the shaft sets are supported by large stulls set at right angles to the hanging wall above and below the station. The wall plates of the shaft sets facing the station are left out for a height of 20 feet towards the station, and posts 20 feet long are employed there on the shaft sets.

Two types of station are in use, one with a shaft bin, and one from which the cars are dumped directly into the skips. In the latter case the full car goes along the track, and when it arrives opposite the skip, the car is revolved 90 degrees on its turntable and dumped into the skip. The hinged steel hopper prevents the rock from falling outside the skip when dumping the car. At the 200-foot level of the Centre Star, turn-sheets as in Butte practice have been put in with good results. A lessening of the number of cars required for tramming is the only thing gained by the installation of station bins in a self-sustaining formation like this.

The tracks are 15 lb. per yard and are spiked in the drifts to ties $2\frac{1}{2}$ feet apart. The switches are made by hinging a rail at the point of the frog, the other end being split—a common type. No horses or means for mechanical haulage are used underground.

The company's own standard mine car is only 2 ft. $11\frac{1}{2}$ in. from track to top of body being especially designed so that the top shall be as low for loading as the capacity of 16 cubic feet of rock will admit. The turntable on the truck allows it to be dumped in any direction, and the axles are roller bushed of the Anaconda type.

Hoisting.—At the War Eagle main shaft there has recently been installed a steam hoist, made by Webster Camp & Lane, Akron, Ohio, with two drums each 6 ft. x 3 ft. with a capacity of 1,700 feet of round rope of $\frac{7}{8}$ inch diameter. The average winding speed is 800 feet per minute, with a maximum of 900 feet. All the motions are controlled by hand levers, except the steam drum brake. The engines are 14 in. x 18 in. stroke with a Stevenson reversing gear. A Lane friction clutch permits of either drum being run independently of the other; a necessary thing where there are several levels from which hoisting is done. The Centre Star put in a duplicate of this engine at its main shaft. The round rope is prevented from cutting the foot-wall shaft timbers by rollers on the wall plates at long intervals. A flat rope would be impractical in an inclined shaft.

The skip employed runs on a 30 lb. per yard steel track spiked to the foot-wall plates in the shaft. The shaft guides are chiefly for safety purposes, for the skip dogs will grip them in case of accident to the rope, as in vertical shafts. The guides also serve to keep the skip steady, as the skip body is only fastened to the frame on the rear axle.

Weight of skip	2,400 lbs.
Load of ore.....	4,600 "

Total weight without rope	7,000 "
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It is proposed to increase the hoisting capacity when it becomes necessary, by attaching a cage under the skip. For lowering the huge stulls and shaft sets in the shaft, a special timber skip has been installed. At each shaft station there is a small crane to unload the stulls from the skip in the shaft, and it has proved to be a great labour-saving device.

The War Eagle steam hoist replaced a 300 h. p. electric hoist run by the current brought into Rossland from Bonnington Falls, B. C., 30 miles away.

A good example, however, to show that an electric hoist of correct construction will work acceptably, is the one recently installed at the Josie shaft of the British-American Corporation, made by the Denver Engineering Works. It is 150 h. p. with an average consumption for counterbalanced hoisting of 50 h. p. It works at a potential of 250 volts with a three-phase motor; and has two drums each holding 1,000 feet of rope.

The hoisting signals are a modification of the Montana code, and the combination of the pull rope and the electric bell as in Butte is used.

Ventilation.—In the War Eagle mine there is a fine draught above No. 3 tunnel level, the main shaft acting as an upcast in winter and as a downcast in summer; but on the 5th and 6th levels (below the lowest tunnel) the ventilation is more difficult. Where the stope is holed through into the drift above, there is more or less of an air current even though there are no steam pipes in the main shaft to make it a strong upcast as in the Butte mines. But in the uncompleted stopes artificial ventilation is needed; especially in the stopes where the vast quantity of powder fired at one time would blockade them for many hours, if there were no strong draught to clear the air.

A root blower on the surface blows a positive current down a main, set in the ladderway of the main shaft. This main is round, of galvanized steel, and is riveted and soldered with telescope joints. Branches of smaller piping are taken off at each level, where necessary and led to the broken faces.

Light.—The tunnels are lit throughout by 16 c. p. lamps furnished with horizontal tin reflectors painted white on inside and black outside. At the working faces candles are used.

Pumping.—As yet the water encountered is insignificant in amount and non-corrosive. In sinking the Centre Star main shaft below the 3rd level, a small boiler feed pump was set on the shaft bottom that threw a stream to a wooden tank placed just below the 3rd level. A sinker pumped from this tank to the 2nd or adit level. The water column was a butt-welded 3-inch-diameter pipe with sleeve coupling; and both pumps were driven by compressed air.

Air Compressor.—At the War Eagle hoist is a 200 h. p. forty-drill compressor run by an electric synchronous motor. The synchronous motor has worked badly for the great changes of load on the air system throw it out of "step," causing a stoppage. These stoppages at first caused long delays owing to the small starting motor; but since the installation of a large polyphase induction motor for starting, the synchronous motor can be brought up to speed and started with small bother.

At the Centre Star mine a compressor of the same size has been put in, to be driven interchangeably by electricity or steam. A feature unusual in Western mine practice is its condensing system. The exhaust steam is passed through a surface condenser by a vacuum pump and is thence forced back into the boilers by a boiler feed pump. The condenser cooling water is passed over a cooling tower, and returned to the vacuum pump (the circulation being performed by a separate pump). The cooling tower is a series of horizontal troughs (of wood and galvanized steel) that expose the water in thin sheets for partial evaporation in the atmosphere, by which the residue is cooled.

Blacksmithing.—There is no hand drilling done except by the timbermen to cut hitches for placing stulls and sprags, and the hardness of the rods renders picks of little use. There remains little to be sharpened but machine bits, which are made (as in Butte) by welding a star steel point to an octagon steel shank. They are + points with the cutting edge including an angle of 70 degrees. They are tempered by heating them in batches (after sharpening and cooling slowly) to a dull red and plunging in water. The hand steel and picks have their temper drawn to a straw color. Each machine drill drills from 20 to 30 bits in eight hours.

Headframes.—At the War Eagle is a large structural steel headframe, very expensive as it was imported from the Eastern United States necessitating not only heavy freightage, but a high import duty. Hence the new frame at the Centre Star mine, 72 feet from the base to the centre of the sheaves, is entirely of wood, the timber of the Pacific slope being peculiarly adapted for this purpose on account of its great size and strength, and ease of framing.

The hoisting engine is set on the hang wall side of the inclined shaft; this simplifies the headframe, as the posts in the direction of the shaft act as back braces for the frame.

Surface Tram.—To transport the ore from the main shaft down to the shipping bins at the railroad, the War Eagle employs a double track gravity tram. This tram is set for nearly its whole length on a trestle, not only to save grading, but to escape the effect of the snow fall which, in Rossland, is sometimes five feet on the level before spring. The tram has a fall of about 350 feet in a total length of 1,300 feet, and in profile, has a concave and a convex curve. The rope is kept down on the concave curve by a pulley in an overhead frame, and kept up on the convex curve by a sheave of four feet diameter set between the tracks.

The tram car holds five tons of ore, and is dumped automatically at the lower end of the tram. The wheels on the car body run up on tripping tracks set at the sides of the car and turn the whole car about its front axle. At the same time the tripper releases the catch on the front door of the car, and the door opens to pour the load of ore into the chute on top of the shipping bins.

At the upper end the tram cars are controlled by two horizontal sheaves in tandem, around which the rope is wound twice, the upper sheave being provided with two band brakes. One engineer controls the brakes and loads the tram cars for the decent.

Steam Line.—An interesting innovation is the transmission of steam through a 6-inch pipe from the boiler house at the Centre Star, up the slope of the hill for nearly 1,500 feet to the War Eagle shaft house. The pipe is well set above the bottom to allow for drainage and packing. The interior of the box is filled with dry

coal ashes to serve as packing. The necessary condensation is drained by four steam traps set at intervals along the pipe. A number of anchors hold the pipe in place at the bends. When on the surface the box is naked; but for part of its length it lies underground and is there enclosed in a wooden conduit large enough to permit the free entrance of men for repairs.

Labour Conditions.—Rossland is a union town, the local miners' union being a branch of the Western Federation of Miners.

The scale of wages for the leading positions was:

Shift boss	\$ 5 00	Machinists	\$ 4 00
Shaft men	4 00	Blacksmiths	4 00
Machine men	3 50	Blacksmiths helpers ..	3 00
Timbermen	3 to 3 50	Hoisting engineers ..	3 to 4 00
Shovellers and car men	2 50	Powder and tool boys ..	2 50
Carpenters	3 50	Surface laborers	2 50

The surface men work ten-hour shifts except the carpenters, who work nine. On May 1st, 1899, the Provincial eight-hour law went into effect that allows underground labour of all kinds to work but eight hours. At first, at the War Eagle mines, this was applied by putting on three shifts in 24 hours, which reduced the actual working time of the men to 7½ hours, as half hour was allowed for lunch. This was a wasteful arrangement, as in spite of the power blowers for forcing out the smoke after blasting, such huge charges as were used to break the rock rendered sometimes a stope unapproachable, thereafter, for several hours. An air drill was necessarily often idle also to permit the machine men to load, blast and then clear the muck away sufficiently to set up again.

In the spring of 1900, the three-shift system was abandoned in favour of the two-shift, arranged thus: The first shift started at 7 a. m. and worked with an hour's intermission till 4 p. m. The second shift started at 4 p. m. and with an hour for supper at 6 p. m. finished at 1 a. m. From 1 a. m. to 7 a. m. a special blasting gang loaded and fired all the ground drilled for breaking. By this method the working faces were freed from smoke before the machine men were started work at 7 a. m.

As the ore bodies of Rossland are wide and homogeneous and the rock in general offers an equal resistance to drilling, it was found practical and desirable to put the machine men on the contract system to stimulate them to utilize the air drills to the best advantage during the short eight-hour shift. As the companies did not wish to allow sub-contracting, and it was expected that the machine men's time would be utilized entirely for drilling—the contracts were let on the basis of a price per foot of hole drilled, instead of by the foot of drift or shaft advanced, or by the cubic yard of stope excavated, as is customary in other camps where the contract system of mining prevails.

The contract system was inaugurated by the companies after a shut down of several weeks, and the miner's union at first declared against the change. After a conference of several days between the mine managers and representatives of the miners, in which the Dominion Labour Commissioner and two Provincial officials assisted; a mutually satisfactory agreement was reached and the contract system has been in successful operation ever since. It would be interesting to give comparative results between the contract and the former day's pay system; but they will not appear till the publication of the next annual report by the companies' directors.

At Butte, Montana, the contract system was tried for stopping some years ago in one of the mines but proved a failure; as the variable nature of the rock, and the careful sorting required before tramping, necessitate the exercise of carefulness as well as mere speed.

In spite of the great recent fall in the market prices of some of the Rossland stocks, there is more work going on and more ore being shipped from the camp than ever before. Boom conditions of the early nineties have passed away, but the vast low-grade ore bodies now in sight, and the extensive improvements in mine equipment and labour organization, coupled with the greatly decreased smelting charges at Northport, Wash., and at Trail, B. C., render the future a very hopeful one.

MINING AND MILLING COSTS IN CALIFORNIA.*

THIS is something which can never arbitrarily be determined until the character of the mine has been demonstrated. The width and length of the ore-shoot must be known, and the character of the walls ascertained. The probable quantity of water which will have to be handled is always problematical, and, as a matter of course, the character of the walls and vein material itself will determine the method and expense of timbering. It is not uncommon to hear it said that in California mining and milling can be accomplished, under favourable conditions, for less than \$1.00 per ton; but these conditions so rarely obtain, even in California as to scarcely be worth mentioning, for they by no means constitute or illustrate the typical features of California mining. There are mines in slaty rocks, not particularly hard, where the veins are 3 ft. to 7 ft. in width, which, being worked through tunnels and having free water-power, are operated at a very low cost; but even this class of mine does not represent the majority—indeed, such constitute a very small minority.

In the greater number of mines in California operations are conducted through shafts, which necessarily increase the expense of mining. In the central gold belt the mines vary so greatly in size, depth, character of ore and wall rocks, and quantity of incoming water, that a statement of cost would convey but little information, and comparison would be valueless unless accompanied by a complete knowledge of existing conditions and an itemised cost sheet. At a number of larger mines elaborate cost sheets are kept, and to a number of these the writer has been given the freest access. The cost of mining in the larger mines, under ordinary conditions, may be fairly represented by the cost sheet of the Wildman Company, at Sutter Creek, California, which has been kindly furnished by the superintendent, John Ross, jr.

Detailed average cost of mining one ton of ore for the years 1896, 1897, 1898, at the Mahoney mine of the Wildman Company:—

	Total cost for 134,866 tons.	Cost per ton.
Timbers	\$24,499 18	18.163
Spiling	4,913 05	3.642
Lumber	1,017 57	0.755
Charcoal	1,242 01	0.92
Candles	1,840 59	1.365
Powder	4,386 75	3.252
Fuse	780 16	0.578
Caps	186 05	0.138
Water	7,538 00	5.589
Freight	1,338 42	0.992
Iron	1,224 24	0.908
Steel and steel rails	1,417 27	1.05
Hardware	3,139 48	2.328
Oil	775 37	0.575

* California Mining Bureau Bulletin, No. 18.

	Total cost for 134,866 tons.	Cost per ton.
Grease and tar	117 27	0.087
Coal	229 57	0.170
Miscellaneous	3,241 69	2.403
Power drill machinery	2,346 90	1.740
Surveying	667 50	0.495
Cement	15 00	0.011
Insurance	103 77	0.077
Taxes	737 63	0.547
Wire rope	630 28	0.472
Office supplies	97 67	0.072
Superintendence and labour	160,003 58	118.621
Totals	\$222,495 00	164.950

Detailed average cost of milling one ton of ore for the years 1896, 1897, 1898, at the Mahoney mill of the Wildman Company:—

	Total cost for 134,901 tons.	Cost per ton.
Shoes	\$2,310 00	1.712
Dies	2,078 63	1.541
Screens	441 97	0.328
Quicksilver	870 14	0.645
Hardware	1,199 05	0.889
Water for power	10,699 60	7.931
Freight	1,064 00	0.789
Cyanide potassium	162 00	0.120
Wood	220 88	0.164
Charcoal, iron and steel	97 74	0.073
Oil	63 95	0.047
Grease	23 13	0.017
Lumber	67 34	0.050
Miscellaneous and coal	1,529 46	1.134
Timbers	17 95	0.013
Assay supplies	516 59	0.382
Office supplies	275 73	0.204
Expressage, bullion	391 16	0.290
Hauling and loading sulphurets	2,354 65	1.746
Silver-plating plates	281 50	0.208
Insurance	423 14	0.314
Taxes	701 11	0.520
Plates	86 49	0.064
Superintendence and labour	16,791 58	12.447
Totals	\$42,667 79	31.628

The above costs includes all repairs and equipment.

COMPANY MEETINGS AND REPORTS.

PAYNE CONSOLIDATED.

AT the annual meeting recently held in Montreal, the chairman stated: In March last your directors deemed it advisable to suspend the payment of dividends, owing to the scarcity of ore in sight above No. 5 level. This level has been a disappointment in that it has not produced anything like the quantity of ore as found in the level above, and as estimated by Mr. Bernard MacDonald, in his report, at about the time this company took over the property.

No. 8 tunnel has not yet reached the ore shoot, progress having been very slow, owing to the many drawbacks to which your manager makes reference in his report.

Your directors have under consideration the advisability of installing a compressor and concentrator, to be operated by water power, and one of your directors, Mr. F. B. Mathys, has recently paid a visit to the mine to thoroughly investigate and report on same.

MANAGER'S REPORT.

I have practically stoped out all the large ore reserves that were blocked out above No. 5 level. I am still stoping out smaller streaks above this level with profitable results. There is a large block of ground above No. 5 level, between raise No. 2 and chute 35, which I am now prospecting, and from present indications I believe it will produce considerable ore. Have extended Nos. 4 and 5 levels to the main fault.

I have done very little prospecting to locate the vein on the east side of this fault, but as soon as I get the winze connected with No. 8 will endeavor to locate it.

No. 5 level shows ore in the bottom in several places, and one continuous shoot, from six inches to two feet wide and about 200 feet long, which looks very encouraging for the future of the mine.

The stopes between Nos. 4 and 5 levels were not as good as there was reason to expect from indications shown in those levels. Have cut a station at chute No. 46, in No. 5 level, and started a winze to be connected with No. 8 winze, now down about 60 feet, and soon as it is sunk to a depth of 125 feet will start level No. 6. This winze has two compartments and is permanently timbered, and large enough to handle all output, materials and supplies necessary for the working of the property below No. 5 level.

Since assuming the management of the mine I have driven No. 8 tunnel 630 feet, making a total of 930 feet as a crosscut; thinking I might cut the vein that crops on the Thursday Fraction claim.

As I did not find it I believe I passed through a broken section of it, caused by a large fault we encountered about 700 feet in. After stoping No. 8 tunnel as a crosscut I started a level about 30 feet from the face of tunnel, the course being about the same as the strike of vein, and I expect to cut the vein on the turn of the fault as it shows in No. 5 level. I had about 230 feet to drive from crosscut, if the fault continued down on the same dip as it shows above No. 5 level. I have driven about 175 feet in this direction and have 55 feet yet to drive.

When I cut the vein I will then have to drive on it about 100 feet in a northerly direction, so as to be able to start an upraise to connect with the winze I am now sinking in No. 5 level. Will have to sink and upraise 329 feet more before winze is completed. Progress in tunnel No. 8 was very slow for many unavoidable causes, principally the large flow of water encountered in driving, the hardness of the rock, compressed air line freezing and danger from snowslides, making it very difficult to secure and keep good men at work.

I am now driving No. 8 tunnel by hand, on contract, owing to our pipe line giving out. I did not think it advisable to try and repair it at present, on account of the deep snow and danger from slides.

From my knowledge of the property and the indications showing as development progressed, I have every confidence that we will find large bodies of as valuable ore as has been produced in the past.

We are in a position where we must install some kind of power to operate below No. 5 level and it is very necessary to get it in as soon as possible. Owing to the rock becoming much harder below No. 4 level, we will have to change our method of mining from hand to mostly machine work to obtain better results and reduce our operating expenses. My experience during the past year proves this conclusively. I am confident I can reduce our expenses from 15 to 20 per cent. with a suitable plant. I have looked into the matter considerably and would recommend that we put in a water-power plant of 250-horse-power capacity, which will

furnish ample power to operate a compressor that will supply air for ten drills, run a 75-ton concentrator, operate the hoist in No. 5 level, and furnish power for an electric light plant suitable for our requirements.

From estimates made we have from 75,000 to 100,000 tons of fillings in the mine and on the dumps, which in my opinion will pay handsomely to have concentrated. Have had some of the fillings tested at Kaslo Sampling Works, but will make a further test of about 1,000 tons, and results from such test will approximately prove their worth and satisfy us whether it will justify us in putting in a concentrator at the present time or not.

FINANCIAL STATEMENT—ASSETS.

Mines, mineral claims and assets	\$2,607,004	92
Permanent equipment	16,044	14
Office furniture	556	74
Mine supplies and stores on hand, as per inventory	2,082	51
Accounts receivable	14,459	28
Cash on hand and in banks	116,867	41
	<u>\$2,757,015</u>	<u>00</u>

LIABILITIES.

Capital stock	\$3,000,000	00
Less in treasury	400,000	00
	<u>\$2,600,000</u>	<u>00</u>
Accounts payable	12,142	27
Profit and loss	144,872	73
	<u>\$2,757,015</u>	<u>00</u>

PROFIT AND LOSS.

To Cost of mining and developing	\$149,775	21
" Freight and treatment	209,225	05
" Tools, appliances, etc.	2,102	54
" General expenses	3,817	52
" Montreal office expens's ..	1,800	71
" Ore tax	8,812	21
" Written off permanent equipment	1,844	52
" Repairs to b'ld'gs tramway, etc.	1,159	53
" Directors' compensation ..	4,000	00
	<u>\$382,537</u>	<u>29</u>
" Dividends	234,000	00
" Balance	144,872	73
	<u>\$761,410</u>	<u>02</u>
By Balance brought forward ..	\$ 34,762	10
" Proceeds ore sales	717,056	07
" Miscellaneous receipts	9,591	85
	<u>\$761,410</u>	<u>02</u>

DUNCAN MINES.

An extraordinary general meeting of the members of the Duncan Mines, Ltd., was held on Monday at Winchester House, Old Broad Street, E.C., for the purpose of considering and, if deemed expedient, of passing the following extraordinary resolution:—"That it has been proved to the satisfaction of this meeting that the company cannot by reason of its liabilities continue its business, and that it is advisable to wind up the same, and that accordingly the company be wound up voluntarily, and that Mr. William McEwen, of Monument Square Chambers, E. C., chartered accountant, be and he is hereby appointed liquidator for the purposes of such winding up." Mr. A. McNab (the chairman of the company) presided.

The secretary (Mr. R. Roy Meldrum) having read the notice convening the meeting,

The chairman said: Gentlemen, the directors have found it necessary in the interests of this company to call you together for the purposes set out in the notice which the secretary has read. We are not in a position to realise our assets to such an advantage as to pay off our liabilities, and consequently we have no alternative but to go into liquidation. This has happened by reason of circumstances which I will tell you. The Granite mine did not continue to bear out the prospects with which it started, although your directors were fully convinced from the reports received from that company that it was, in fact, a really sound and valuable one. Although it opened so well, the fact that a "horse" intervened, splitting up the vein into numerous stringers, caused considerable sums to be spent in following these stringers and opening up the property. After sinking over 200 feet the vein was found again with a width of 1½ feet. The Granite company were informed that it could be worked much more economically by driving tunnels through the Poorman property, which latter they had acquired, and I have already told you the details of this transaction. The directors felt it to be in your interests to assist the Granite as much as possible, because we are, as you know, large shareholders in that company. The result is that the Granite Gold Mines became considerably indebted to us. In order to protect you and your interest on that indebtedness, we obtained and registered a judgment against the Granite Gold Mines, Ltd., in British Columbia, which we believe, and are advised, fully carries out that purpose. We are convinced that the Poorman and Granite worked together will prove a sound asset of your company. We further have an independent report to be submitted to you with the scheme of reconstruction (with which I will deal shortly), and from which you will see the desirability of doubling the number of stamps now on the property. It is obvious that we must have capital to do so. You will recollect I dealt with the value of the Queen Bess property at our last general meeting, and Mr. Hart, the chairman of that company, gave you some very good statistics. Nothing has happened since then to make us alter our opinion of the value of the Queen Bess property. We consider our holding of shares in it a valuable asset. Now as regards the course for us to adopt in the circumstances I have detailed. I should tell you that when the board found itself confronted with so many difficulties an informal meeting of the largest shareholders of this company was invited to discuss the position with the board. They represented about £90,000 of the issued capital of the company. After an animated discussion, an independent committee was appointed, and those who were most critical were appointed members of it. They, I should tell you, have independently investigated the affairs of the company, every information available being placed at their disposal. Three of these gentlemen were strangers to the board. They are here and can tell you themselves what they think of the position of the company, and its prospects if the necessary additional capital we require can be raised.

THE PROPOSED SCHEME OF RECONSTRUCTION.

A scheme of reconstruction has been under consideration which, if carried out, will place this company on a sound basis and provide sufficient capital for the purposes I have indicated. Shortly it is as follows: The liquidator will sell our assets to a new company, who will take over the liabilities. You will have the right to apply for shares in the new company pro rata with your holding in this company, and to raise the neces-

sary capital I have referred to, the new shares will be issued as £1 shares, with 15s. paid; the 5s. will be payable in small assessments. The capital to the amount of 100,000 shares will be guaranteed. I may add that the Granite shareholders, it is proposed, shall have the opportunity to apply to the liquidator for shares in the new company. The chairman concluded by moving the resolution, of which notice had been given.

Mr. Griffiths seconded the resolution.

In reply to a question regarding the directors' fees, the chairman said that he and those of his colleagues who were present had written to the secretary expressing their willingness to forego their fees, providing the others would do the same. He could speak for one of the two absent directors, and it only remained now for Mr. Drummond, who was in America at present, to acquiesce in the arrangement. He might also mention that the directors of the Granite company had waived their fees and, further, that the directors of the Duncan company gave up their fees last year.

Mr. Little expressed regret that the directors had not presented a formal scheme of reconstruction at that meeting. He wished to know by whom the underwriting was guaranteed, and what would be the expense of the underwriting. Further, was it proposed that there should be any new directors in the reconstructed company?

The chairman said it was proposed that the new company should have a capital of £300,000, and that this should be underwritten to the extent of 100,000 shares. The proposal to underwrite came from some of the committee of shareholders to whom he had referred, who expressed the wish that the scheme might be an assured success, and this could only be done by underwriting. He himself proposed to write a large block of shares, as did also Mr. Charles Shephard, another director, and Mr. Bett. The terms of the underwriting would be sixpence per share, and, as far as he and Mr. Shephard were concerned, they would take no commission in respect of their holdings. (Hear, hear). The chairman added that at the meeting of large shareholders to which he had referred, £90,000 out of a total of £133,000 of capital was represented. He further stated that upon the passing of the liquidation resolutions it would be necessary for the liquidator to get the consent of the court to call a meeting for reconstruction. The solicitor thought that something like six weeks to two months would complete the matter.

A shareholder asked if the mines were working at the present time, or whether they were closed down.

The chairman replied that the Duncan company did not work any mines—they were worked by the subsidiary companies. The Queen Bess, in which they held 47,000 shares, was one of the companies, and the Granite company was being worked and was making a profit monthly.

Mr. Griffiths said he was perfectly satisfied to leave the matter in the hands of the board, although he hoped the board of the new company would be strengthened by the addition of one or two thoroughly experienced gentlemen.

The resolution was carried unanimously.

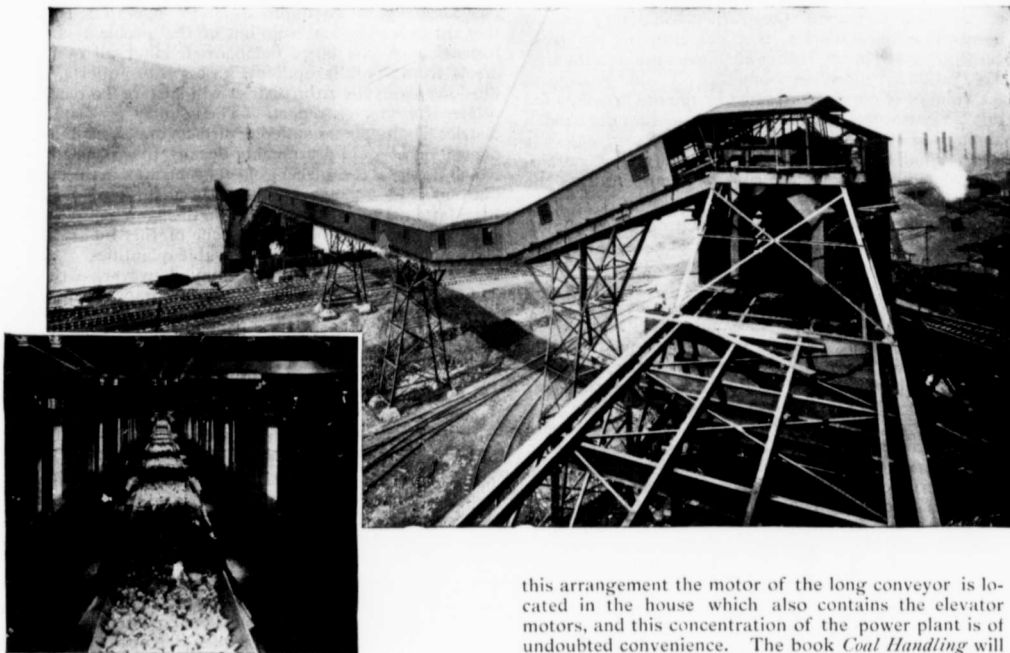
The chairman said that he was quite satisfied that the company had turned the corner. They had that day received official notice of a new vein being discovered in the Granite; and this No. 2 vein, as it was called, if it bore out the position it was in now, would double the output of the mine quite easily. When they obtained the fresh capital they required, there was no doubt they would go forward again, and he hoped much more successfully than they had done in the past.

A vote of thanks to the chairman closed the meeting.

COAL HANDLING BY THE ROBINS SYSTEM.

THE Robins Conveying Belt Company, of New York, have just issued an interesting and handsomely illustrated pamphlet entitled *Coal Handling*, which relates to their system of handling coal in almost every conceivable service—at breakers and washeries, in storage and power houses, on docks, at coke plants, etc., etc. One of the most striking illustrations is here reproduced and shows the coal-handling apparatus which this company has recently installed at the works of Jones & Laughlins, Ltd., Pittsburg, to carry coal from the river front to the coke ovens. The amount of coal conveyed daily varies from 2500 to 3000 tons and as the elevator and conveyor can easily handle 500 tons per hour, the daily consumption of the thousand coke ovens dependent on the system can be cared for in a single

shown in the illustration the conveyor runs at a somewhat steep incline, the grade being 20 degrees. After reaching a sufficient height the conveyor runs horizontally crossing several railway tracks, including the main line of the Baltimore & Ohio railroad over which it passes at a height of 24 feet. Near its inshore end it takes an upward curve and on reaching a height of 68 feet delivers its load to another similar conveyor, running nearly at a right angle to the first. This conveyor is 250 feet between centres. The second conveyor delivers the coal into three hoppers distributing it equally between them, and automatically ceasing to deliver into a hopper as soon as it is filled. This is accomplished by means of "trippers" and an arrangement of chutes designed by the builders, the Robins Company. Both conveyors are driven at the end where they receive the load and not at the head ends as one would expect. By



shift, including the time lost in shifting boats and other similar delays. The enormous quantity of coal handled daily and the low cost at which the work is done, place this system ahead of any known installation of a similar nature. The elevator consists of a double row of steel buckets, each measuring approximately four feet long by two feet wide and two feet deep and these buckets, seventy in number, are attached to a steel chain. The elevator is supported at its head and foot on a boom which is moved in an inclined plane by an electric motor and in this way its position can be adjusted to any stage of water. Another motor drives the chain and a third warps the coal barges into position and moves them along under the elevator as fast as the coal is removed. Through these three motors one man operates the entire system controlling the working of the elevator and shifting the boats with perfect ease. This elevator was designed by Jones & Laughlins, Ltd., and built at their works. At the head end of the elevator the coal is delivered to a Robins conveyor of the thirty-inch size. As

this arrangement the motor of the long conveyor is located in the house which also contains the elevator motors, and this concentration of the power plant is of undoubted convenience. The book *Coal Handling* will be mailed on application to the Robins Conveying Belt Company, 18-21 Park Row, New York City.

THE MINISTER OF MINES REPORT, 1900.

WE are indebted to Mr. W. F. Robertson, the Provincial Mineralogist, for advance sheets of the Minister of Mines Report for 1900, which will be issued to the public in the course of the next few days. This report is dated March 11th, 1901, and it is therefore to be noted that a somewhat serious delay has taken place in its publication in consequence of the exceptional stress of work in the Government printing office. The delay is nevertheless both annoying and regrettable, as the value of the report, which is otherwise admittedly considerable, is thereby much discounted, and particularly so in this instance inasmuch as it contains a special report by the Provincial Mineralogist on the Atlin district, a section of the country in which a new season has now begun, and consequently the information

here afforded for the first time officially and therefore from an authoritative and responsible standpoint, is at least this year of little practical utility to prospectors or investors. The matter, however, was unavoidable.

The report may be divided into four sections. First, the statistical tables given; second, the general remarks on the progress of mining; third, the original matter provided by Mr. Robertson, and fourth, the official reports of the various Gold Commissioners and Mining Recorders.

The statistical tables and general remarks on mining have already been published as a pamphlet for distribution at Buffalo and Glasgow, and are familiar to the public. The statistics show a satisfactory increase in the volume of the mining industry, and particularly give evidence of the development of the newly productive districts of East Kootenay and the Boundary. They show how the harvest of many years of patient work is beginning to be reaped. One rather disquieting feature however, of the statistics, is a reduction in the gross value produced in the Rossland mines although the tonnage produced shows an increase. A sudden drop in the amount of copper contained in the ore accounts for this circumstance, though what accounts for the sudden diminution in copper it would be hard to say, unless it be more indiscriminate shipments of everything containing gold enough to pay the cost of treatment from the Le Roi mine.

The remarks made on the general progress of mining merely draw attention to the salient features of the preceding tables except in one paragraph concerning prospects in which a somewhat elaborate comparison has led to conclusions which admit of an ambiguous construction. We quote: "The statistics show what these mines have, during the past year (1900), paid back in principal and interest to the lenders of the money for their development. This total amount so returned was in 1898, \$6,529,420; in 1899, \$6,751,604, and in 1900 reached the sum of \$10,069,757." This is the expansion of a comparison of mining prospects to promises, which we can hardly describe as quite happy, nor can this description be applied when the promise of a prospect is likened to a promissory note, for the promise of the most promising prospect surely cannot be compared with the legal obligations associated with discountable paper. Again, the writer of the paragraph undoubtedly did not mean to imply that the investing public have received \$10,069,757 out of British Columbia mines in 1900. Yet we are constrained to admit that from the wording of the paragraph in question such an implication is at least possible.

To turn to more important matters: Unquestionably the most valuable portion of the annual volume is Mr. Robertson's report on the Atlin district as the result of a personal examination, while he has also made interesting reports on some of the "newer" producing mines of the Kootenays, including the St. Eugene, at Moyie, and the Boundary district. The report on Atlin can only be described as condemnatory of the district on present indications, but it is noted that the district has been insufficiently prospected, especially for quartz. In placer mining the report writes *finis* at the end of last season. In hydraulic mining it holds out a dubious future to three or four big companies. So far as the observations regarding quartz mining are to be taken as the result of an exhaustive examination they do not point to a single mineral claim on which it would be worth while doing annual assessment. These are the impressions derived from the report. In regard to placer mining we are told that "be the theories of formation or deposition what they may, the practical fact is that gold in quantity to

pay for ordinary placer working has only been found, as indicated, over a limited area and in a few creeks." Further on the report says, "As far as the creek claims are concerned, however, the season of 1900 will see the great majority of them either worked out, abandoned or sold to some hydraulic company, which by the use of water-power and suitable appliances will be able to move the gravel and get the gold much cheaper than could possibly be done by the laborious and costly methods of placer mining in vogue, and thus much unprofitable placer ground will be turned into very profitable properties."

We naturally gather from this that there is a hydraulic mining future before Atlin. But when we return to the section of the report dealing with hydraulic mining we find that conditions of water-power and dump are such that little is to be hoped for, unless all the resources of each separate creek are consolidated in the hands of one company. To quote again: "It is to be feared that the only practical solution of the problem is the formation of one large company holding all of Pine creek, from the falls up." With regard to quartz, few illusions about the Atlin district will survive the reading of Mr. Robertson's report. The country rock of the district has in places suffered surface enrichment from deposition of gold presumably during the glacial flow which brought the placer gold concentrates in the creek bottoms, and while there are fissures these also have been fattened on the surface from the same source and so far as developed below the zone of this infiltration, show no evidences of gold in payable quantities. This report is very discouraging. It may, however, perhaps be hoped without prejudice to its accuracy — for it is that of an eminent and duly qualified engineer, — but merely with due regard to its limitations, that there may be in the Atlin district some yet undeveloped resources, and which may afford the hope of future progress and development in spite of present discouraging circumstances. In fact the Provincial Mineralogist implies this and we find an indication of something of the sort interpolated in the report itself:—

"Later advices from the district state that, on the right bank of Spruce and the left bank of Pine creeks, shafts have been sunk through the heavy wash on the benches to a depth of 30 to 50 feet, and that the yellow strata of what has been called the 'first run' of gold has been struck and proved to be quite rich — which facts very much strengthen the theories of deposition already given. These benches have recently been tested by shafts at Gold Run—a blind gulch of the left bank of Pine creek about two miles above 'Discovery' — and are stated as proving rich enough for profitable drift mining."

If these later advices are correct they possibly point to an important and welcome change in the conditions affecting the immediate future of at least a section of the Atlin district. Mr. Robertson also visited the Bennett Lake Mining Division and inspected a number of surface showings of mineral there. But no particularly interesting information was procurable from this locality, although the description of the geology and topography of the country is of interest and value.

As usual the bulk of the report is occupied with the official statements of the respective Gold Commissioners and Mining Recorders. These statements, doubtless, serve a useful purpose and may be referred to for information about different districts. But improvements might, we think, be introduced which would render this feature still more attractive. There is, at present, little attempt at summarising or arrangement, and each chapter is built up upon a separate plan according to the in-

dividual taste of the compiler. Several of the reports, however, by Gold Commissioners are exceptionally well compiled, and we would especially commend those of Mr. Bowron, gold commissioner for the Cariboo district; Mr. McMynn, mining recorder for the Kettle River mining division, and Mr. Kirkup, gold commissioner for the Trail Creek division. Mr. Kirkup's report might well be taken as a model upon which all returns of this character would in the future be based. It gives most valuable information about the Rossland mines. One feature in connection with it is incomprehensible however. In the statistical table on pages 710-711 of the report the tonnage of the Rossland mines is given as 217,636 tons of a gross value of \$2,739,300. Mr. Kirkup, on page 858 of the report gives the tonnage of the Rossland mines as 217,636 tons (the same) but the gross value as \$2,333,125 a difference of \$406,175. We submit that both of these statements cannot be correct. Their publication side by side in the same departmental report, without a word of comment or explanation, is an extraordinary circumstance. In conclusion we have to congratulate Mr. Robertson, its editor, upon the creditable appearance of his third report, which is quite up to the usual excellent standard both as regards matter and manner. The typographical work of the report and the illustrations interspersed through it are exceedingly good and reflect great credit, as usual, upon the Government printing office, while the maps which accompany it are certainly not its least valuable feature.

RECENT PUBLICATIONS.

A Treatise on Canadian Company Law, containing a commentary on the Companies Act of the Dominion, with incidental reference to the law of the various Provinces, with full notes of the jurisprudences and appendices of the statutes and useful forms, by W. J. White, K.C., assisted by J. A. Ewing, B.C.L.; C. Theoret, Montreal, Canada, 1901. Price \$1.00.

IN a very compact and well-arranged form this subject has been exhaustively dealt with. The value of the work, from a legal standpoint, is vouched for by the well-known reputation of the author, Mr. W. J. White, K. C., assisted by Mr. J. A. Ewing, B.C.L., both of the Montreal bar.

The work and the treatise is a commentary on the Companies Act of the Dominion, and contains the necessary incidental references to the Company Laws in the various Provinces showing the differences existing but, advisedly, containing no criticism of the relative advantages of the differences existing in the Provincial Acts.

As a law work the book forms a valuable addition to the law library of every lawyer throughout the Dominion and to those holding stocks in companies existing under Dominion charter. The concise and clear language should recommend it as an addition to the study table. Although the paragraph system of arrangement of a work of reference is the up-to-date form adopted, it tends in some respect to limit the off-times necessary elaboration on points of interest to a layman, but in the work under revision we fail to trace either unnecessary prolixity or undue compression. The introductory chapter is one of historical as well as instructive interest. The writers deal in some twenty-one pages of the incidents usually attending the promotion of companies which are applicable both to Dominion and Provincial incorporation.

Very useful comment will be found in the fourth chapter on the uses and abuses of the Companies Acts, and

the "one-man" company question is dealt with in a comprehensive form, reference being made both in this chapter and throughout the book to the leading decisions upon the law in both Great Britain, the Dominion of Canada, and the United States of America.

Shareholders will find their rights and liabilities most fully dealt with in another chapter, in fact this seems the point to which the authors have directed most attention.

A very useful and comprehensive chapter on the financial matters with which corporations have to deal will be found in chapter twelve. The powers of appropriation of the monies to specific purposes and the limitation of these powers and the consequences attending an access in the exercise of these powers, will be found here completely dealt with, and will enable any shareholder in corporations under Dominion charter to appreciate the necessity for more than the casual inquiry into the dealing by the management with the funds entrusted to them. On the part of the subject, which is least attractive to intending investors, viz., the mode of dissolving and winding up companies, there is an exhaustive dealing with, whilst forms of general utility and in compliance with the act appear to have received great thought and attention.

In the Appendix the Companies Act and the acts in the various Provinces are reprinted, and the book closes with an analytical and alphabetical index which is extremely well arranged and easy of reference. We do not find in the book that very special consideration has been given to what is of most interest in British Columbia, and especially to our readers. Only slight reference seems to be given to the mining laws and mining companies and we regret that this want, which is an existing and long felt one, was not thought of sufficient importance to form a part of the otherwise comprehensive and learned treatise upon the subject of companies. At the same time even for those interested, whether as advisors or holders of Stock in Mining Companies, the work under review possesses unusual attractions and we gladly welcome it as a much-wanted addition to legal literature.

The Auriferous Quartz Deposits of Southern British Columbia, by J. D. Kendall; The B. C. Review, London, 1901. Price 1s.

This is a reprint in pamphlet form of a paper recently contributed by the author to the B. C. *Review* and the B. C. MINING RECORD.

Mr. R. H. Parkinson, C.E., P.L.S., of Hedley, B.C. has published an excellent map of the Osyoos Mining Division, compiled from the latest surveys. The map is drawn to a considerable scale and shows navigable routes, waggon roads, trails, Indian reserves, mineral claims and towns. As there is much enquiry at the present time respecting the Similkameen valley, this map should find a ready sale.

CORRESPONDENCE.

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

THE LIQUIDATION OF THE GRANITE MINES.

To the Editor B. C. MINING RECORD.

SIR:—In your issue for the month of May you called attention to the liquidation of the Granite Gold Mines, Ltd., and perhaps, naturally, attached some blame to the engineers who reported upon the properties

for the Duncan Mines, naming Messrs. Hardman and Bennetts. In your issue of this month you further refer to the subject and exonerate the engineers, whom you now name as Messrs. Hardman and Kendall, and you attribute all the blame to bad management and over-capitalization. The present is scarcely the time to enter into details of the causes which led to the failure of this company, but the figures quoted in your last article are so definite and the impression conveyed by it so misleading that I think it necessary, in the interests of the Duncan Mines, the parent company, to give some of the actual figures and to state the facts as they occurred.

In the first place, Mr. Kendall never reported on the properties for the Duncan Mines; I believe he has described the Poorman mine as it was some three years ago, in an article in your paper, but this mine was not included in the original properties of the Granite Gold Mines, having been subsequently acquired, and it therefore does not affect the subject of this letter. It is perfectly safe to say that had the Granite and Royal Canadian mines (which were those taken over by the Granite Gold Mines) proved, on working, to yield ore of the quantity and quality which the estimates of the engineers stated that they would yield, the company would not have been in the position in which it finds itself.

Mr. Hardman's last report is dated 19th November, 1898, and the Granite Gold Mines was not formed until June, 1899. In this report the working capital required was stated to be £10,000 as you say. This amount was provided by the Granite Co. on its flotation, but, in addition, during the six months that had elapsed between the writing of the report and the flotation of the company, the Duncan Mines had vigorously carried on development work on both mines, spending an additional £7,500 on this work. The whole of the £10,000 provided by the Granite Gold Mines, and a further sum of £9,000 lent by the Duncan Mines were, with the exception of the cost of an eight-drill compressor which it was decided to put in, expended in development. The mines therefore had more than double the amount that the reports called for spent on development before milling was commenced. Mr. Hardman's figures for machinery referred to in your report, a twenty-stamp mill, but the Duncan Mines erected and paid for a twenty-stamp mill. Moreover they fully equipped the Granite Mine with pumps, hoists, aerial rope tramway, flume, pipe line, etc., and in fact handed over the properties to the Granite Gold Mines as a going concern. That company did not have to spend one cent for machinery with the exception of the compressor already mentioned. As for the machinery it is only necessary to say it was the best that could be got, and no expense was spared in its first cost or in its erection. The contractors were perhaps unfortunate in their choice of an advisory engineer and some mistakes were made, but not more than is often the case. These mistakes the contractors put right at their own cost, and the company therefore only suffered through the delay thus caused.

Since the mill has been working no stamp mill in the country has been run more economically or has succeeded in obtaining such a good percentage of extraction and such a low value in the tailings. The aerial tramway has worked to perfection and no complaint has been made about the plant provided by the Duncan Mines.

My object in writing this letter is merely to satisfy anyone who cares to read the facts that the Duncan Mines are not in any way to blame for the failure of the Granite Gold Mines. In regard to the question of capitalization, which you cite as one of the causes of fail-

ure, it is surely evident that this does not in the slightest degree affect the question, as the company never reached the stage when the effect of over-capitalization would have been felt.

I am, yours truly,
GEORGE H. WHITE,
Secretary.

Duncan Mines, London, June 13th, 1901.

THE MONTH'S MINING.

KAMLOOPS.

(From Our Own Correspondent.)

THE shaft on the Iron Mask, by the time this is in print will be down 300 feet, when exploratory work will at once be commenced at this level. The staff of men has been increased to 22, and this number will be increased as the work progresses. The B. C. Exploring Syndicate intend at once putting a force of men sinking and drifting on the Josie claim which adjoins their Lucky Strike property. This company has purchased over 50 acres of land adjoining the Canadian Pacific Railway and Thompson river, some two and a half miles from the Iron Mask. The site is favourable for the whole of the company's property, being nearly 1400 feet lower and a regular grade between them. The company will first use it as a shipping site and as the camp develops as a smelter site. The dredge at Edwards' Point, North Thompson river, nears completion.

DREDGING ON THE NORTH THOMPSON. The heavy machinery has arrived and most of it is in place on the dredge. The dredge will be completed about the end of July should there be no delay in the remaining machinery coming to hand. The Clearwater Dredging Syndicate, a local company, have this spring given their leases at the junction of the Clearwater and Thompson rivers, a very thorough and systematic test and are well satisfied with the results. Other lease holders on the Thompson river could follow their example with advantage to themselves and the dredging industry of this part of the Province.

The Glen Iron mine continues to ship 10 to 14 car loads of iron ore per week to the Hall Mines smelter and to give employment to 22 men.

During the month the Cherry Creek Copper Mines, Ltd., has been incorporated with a capitalisation of \$500,000 in 500,000 shares of \$1.00 each, to acquire the Copper King, Copper Jack and Edward Seventh claims at Cherry creek. The company is a local one, its directorate being mainly business men of the city.

Mr. Irvine's property, near Sicomos, has been taken over by St. Louis capitalists, and a company is to be at once incorporated to operate the property. The property consists of three claims, and has outcroppings of pyrrhotite with copper pyrites showing fair gold values. The vein has a width of 40 feet and has been traced the length of one claim. Mr. Irvine is erecting buildings on the property for the accommodation of the men.

BOUNDARY DISTRICT.

(From Our Own Correspondent.)

THE BUSINESS AND MINES OUTLOOK. Notwithstanding that many of the business people of the towns in the Boundary district find business quiet, it is evident to those who take the trouble to make careful enquiry that the mining and smelting industries of the district are surely, if slowly, gaining in importance. Probably the chief reason that business men have ground for complaint is that there are more stores and other places of business in the towns than there is a sufficient amount of trade for, that is, to keep all fairly busy. Of course, this undesirable condition of affairs is not chargeable against the mining industry of the district — it is the natural sequence to over-sanguineness at the time of railway building, which misled many to take the inflated state of business that attended the outlay of an unusually large amount of money in railway construction and other works as the normal condition of things. With the cessation of the considerable expenditure that the carrying out of these enterprises involved, there was, of course, less money in circulation, and then business men realised that there were more places of business than there remained trade for. But though the transient population of the district is smaller there is an increasing resident population, and since this is an evidence of permanent rather than temporary progress there is room for much satisfaction that improvement of this nature is taking place right along. Too many judge the state of affairs by the amount of railway and stage travel and the patronage the hotels are receiving, but it is well at times to turn to other indications

less apparent to the casual observer. And one of these is the number of residence buildings vacant in a town. There are to-day fewer houses well and conveniently built, unoccupied in Greenwood than at any time since the sharp reaction that followed the completion of the railway. Nearly every cottage residence affording ordinary comfort and convenience is occupied. At Grand Forks there are many more residences now than there were a year ago and in that town, too, the family population has increased to a marked extent. Phoenix, with several surrounding mines providing an increasingly large pay roll, affords a striking illustration of steady and substantial progress in a similar direction. The writer of this letter had, in the ordinary course of his duties, occasion a month ago to contribute to the Greenwood *Miner* some comments upon what he considered himself fully justified in regarding as an improved business and mining outlook. In the course of his observations he expressed himself as follows: "In order to conclusively demonstrate that there is in the district an improved business and mining outlook, a comparison will here be made between the mining and smelting industries as they are to-day and that obtaining twelve months ago. And the contrast may be made in a few short sentences exhibiting the total tonnage of ore shipped from district mines and treated at district smelters as at May 31 of last year and as at the present time respectively. By May 31 of last year, less than 3,000 tons of ore altogether had been shipped from the district; to-day the aggregate of ore shipped exceeds 230,000 tons. Twelve months ago not a single ton of ore had been smelted in the district; to-day the total of ore treated at district smelters exceeds 185,000 tons, whilst more than 43,000 tons of Boundary ore has been reduced at outside smelters. Add the statement that twelve months ago there were only about 600 men regularly employed in connection with the mining and smelting industries of the district, while to-day there are at least 1000, and the tale of progress is briefly told."

In last month's issue of the RECORD, prominence was given in its editorial columns to some figures showing the number of lineal feet of work done in underground development of the mines of the Boundary district and the tonnage of ore treated at the district smelters. There is not a great deal to add to that creditable record, but the following further particulars relating to the work done by the smelters may be read with interest. The total quantity of ore treated

THE SMELTING at the Granby smelter, at Grand Forks, to the end of RECORD. April was 136,443 tons. The tonnage for May was 19,075 tons, making 155,518 tons in all, of which quantity 62,387 tons were smelted during the latter part of 1900 and 93,131 tons during the current year. During three months ended May 31, 57,783 tons were run through the two furnaces of the Granby smelter, giving an average daily tonnage during that period of 328 tons. The average for seven months — November to May, both inclusive—during which 120,648 tons of ore were smelted, was 611 1-2 tons per day. The British Columbia's Copper Company's smelter at Greenwood, working with one furnace, smelted 11,830 tons of ore during May, bringing the aggregate up to 36,687 tons. The daily average tonnage for the respective months was: February, (ten days), 301 1-2 tons; March, 330 1-3 tons; April, 377 1-3 tons; May, 291 1-3 tons. The daily average for the three months ended May 31, was 366 tons. Preparations for doubling the treatment capacity of the Granby smelter are being pushed on with plans for another furnace for the British Columbia Copper Company's have been forwarded to the company's office in New York. Nothing is being done at the Standard Pyritic Smelting Co's works, but it is stated that a commencement of operations may be looked for at an early date.

Last month the RECORD published some particulars of the Montreal & Boston Copper company's Sunset group, in Deadwood camp. Mention was then made of the fact that lately surface openings had been made. During a recent visit to the mine a better knowledge of the later developments at the Sunset was obtained, and it was then learned that what earlier had been described as "surface openings" had now assumed the shape of a crosscut tunnel through the hill which constitutes the big outcrop on this claim. On each side of this hill an opening was made a few weeks since and the presence of ore in quantity having been disclosed by this surface work, the driving of a tunnel was definitely decided upon and this work pushed on with from both sides simultaneously. There was not nearly so much encouragement derived at first from work on the eastern side of the hill, but

THE SUNSET. Once the ore was entered it proved more than equal to the most sanguine expectations that had been previously indulged in. From the time the ore was cut the drive, which the manager states is almost at right angles to the ore body, remained in ore, and when visited the face of the tunnel, still showing ore freely was between 90 and 100 feet in from where the ore was first encountered. Half a dozen large heaps of ore at the mouth of the tunnel showed somewhat different characteristics, the ore varying as the tunnel passed through it. The manager, Mr. H. Johns, stated that average samples of much of it returned three per cent. copper and small values in gold and silver as well. The tunnel on the western side of the hill was not nearly so far in as that on the eastern side, but after passing through solid rock freely mineralized it was then entering ore similar to that met with in the other tunnel. The distance through the hill is given roughly at 250 feet and the southern bluff around which the railway has been built is about a similar distance at nearly right angles to the drives. It is believed that much of this area is ore that

may be sent to the smelter. There is nothing at present to indicate how far to the north the ore extends, but Mr. Johns thinks himself warranted in estimating that there are altogether at least 250,000 tons of ore available above the 100-foot level of the mine. This level, by the way, though 100 feet from the collar of the shaft, is but about 75 feet below the crosscut above mentioned, the tunnels having been started about 25 feet lower than the level of the mouth of the shaft. It now seems that the old tunnel run into the hill from the south side passed under the big body of ore, the dip of which, as it goes down, appears to take it above the old tunnel. A raise from the 100-foot level at 35 to 40 feet up was in ore for the first time last Saturday. It is stated that for a short distance both the old tunnel and the shaft were in ore, the dip of which was not then apparent, but which has seemingly been proved by the latest developments in the new workings. But whether earlier indications were or were not misleading one thing is now clear, viz., that a big body of ore has been opened up, and this being so it will be followed wherever it goes. As it is expected that shipping on a considerable scale will soon be practicable, preparations are being made towards facilitating loading the cars with economy and despatch. The safety platform cage now in use is to be taken out of the shaft and a two-ton skip substituted for it. An automatic dumping arrangement will be put in, and from this chutes will carry the ore some 70 ft. down to the sorting floor and thence to the ore bins, passing over "grizzlies" on the way and thus separating the fines from the roughs. A railway switch will be put in below the bins, so that there will be no tramping of the ore from the time it is put into the skip, the above mentioned arrangements providing for its being shot from one point to another between the shaft and the railway cars. The ore from the crosscut tunnel through the hill will be trammed where necessary to a floor above the cars and loaded thence. A switchback from the ore-loading siding up to the boiler house will admit of mine timbers, fuel, etc., being landed on a level with the mouth of the shaft. A recent addition to the Sunset is an assay outfit, in charge of Mr. M. Galbraith as assayer. Mr. Galbraith is a McGill graduate, who recently arrived at the mine from Montreal. Now that there is an ample supply of ore to allow of shipments to the smelter being made right along the company will be better satisfied to know the general values of ore it is shipping, so that Mr. Galbraith's advent at the mine is timely. Mr. Johns is sanguine that in the fall he will be in shape for regularly maintaining an output of about 300 tons daily and that he will have 100 men or more employed on the mine. For the present he is concentrating his efforts on the Sunset, but later the Crown Silver, on which a recent surface opening was made that promises similar good results, will also have attention.

The directors of the Morrison Mines, Ltd., have issued the following financial statement: The Morrison Gold Mining Company was organized on March 25, 1896, under the laws of the State of Washington, U. S. A., with a capital stock of \$1,000,000 divided into 1,000,000 shares of the par value of \$1 per share. Four hundred thousand shares of the capital stock were placed in the treasury and sold for development purposes. The proceeds of this treasury stock amounted to the sum of \$31,232.40, which was spent for labour, supplies, buildings and machinery, and all the other necessary expenditures in connection with the formation of the company and development of the property.

On January 18, 1900, the Morrison Mines, Ltd., was organized with a capital of \$150,000, divided into 1,500,000 shares of the par value of ten cents per share, each share assessable to the par value thereof; the holders of shares in the Morrison Gold Mining Company taking stock in the Morrison Mines, Ltd., share for share; the new company purchasing all the assets and assuming all liabilities of the old. The assets consisted of the Morrison mineral claim, together with all the buildings, tools, machinery, and other personal property of every kind and description belonging thereto. The liabilities consisted of about \$1,250 in unpaid accounts for labour and supplies.

Assessments were levied and they took effect as under:

No. 1,	of 3 mills per share,	on May 11, 1900.
" 2,	3 "	June 11, 1900.
" 3,	2 "	July 23, 1900.
" 4,	2 "	August 23, 1900.
" 5,	2 "	September 23, 1900.
" 6,	2 "	October 23, 1900.
" 7,	2 "	November 23, 1900.
" 8,	2 "	December 21, 1900.
" 9,	2 "	January 21, 1901.

On May 31, 1900, at the adjourned general meeting of the company, the following resolution was offered and adopted:

"That for all assessments paid the shareholders shall receive fully paid treasury stock at rate of ten cents per share, said treasury stock to be issued to the shareholders at such time when the assessments shall have amounted to one cent per share."

Pursuant to the above resolution there have been issued to the stockholders of the company 199,071 fully paid shares. This resolution was annulled at an extraordinary general meeting called for that purpose on February 12, 1901.

Assessments were discontinued in February last owing to the contract entered into with the Standard Pyritic Smelting Company, mention of which was made in our circular letter of May 20, 1901. On April 23,

1901, assessments Nos. 10 and 11, a levy of one cent each, went into effect. Explanations of the necessity for same were also set forth in our circular of May 20.

There are 998,617 assessable shares of record on our books, upon which the total levy of four cents per share amounts to \$39,944.68, of which amount there has been collected up to date the sum of \$24,427.98. The total number of shares issued and of record on our stock ledger is 1,197,688, leaving a balance now in the treasury of the company of 302,312 shares.

The shareholders have been very prompt in the payment of assessments heretofore, there being due only \$39, due on assessments prior to Nos. 10 and 11. Payments on Nos. 10 and 11 have been coming in very well, we having already collected \$4,494.67, leaving a balance of \$15,477.67 still due on same.

Following is the balance sheet of the books of the company:

The Morrison Mines, Limited, May 21, 1901,		Dr.	Cr.
Capital	.....		\$150,000 00
Assessment account	.....		39,944 68
Bills payable	.....		2,000 00
Boarding house	.....		269 22
Ore account	.....		75 43
Property account	.....	\$151,238 02	
Interest account	.....	186 35	
Development account	.....	11,419 95	
Supplies account	.....	2,416 44	
General expense account	.....	2,278 97	
Office expense account	.....	2,123 19	
Fuel account	.....	625 85	
Powder account	.....	1,784 12	
Assaying	.....	273 00	
Hauling	.....	47 00	
Permanent improvements	.....	1,747 00	
Legal account	.....	528 10	
Freight account	.....	35 22	
Individual shareholders	.....	15,516 70	
Cash on hand in bank	.....	2,119 40	
		\$192,289 33	\$192,289 33

Respectfully submitted,

A. F. OLIVER,
Secretary-Treasurer.

Accompanying the foregoing statement is a report by Mr. Roy H. Clarke, M. E., on the Morrison mine, which he visited and carefully examined about a month ago. It is too long to reproduce in full here, but the following quotations from it give particulars of the development work done and of the ore bodies so far as they have been opened up.

Development.—Some 2,550 lineal feet of work has been done at the Morrison mine, distributed as under:

Tunneling—

Main tunnel and drifts	.....	1815 feet.
Station 40 x 30 x 16, head of winze	.....	300 "
Station at 100-foot level	.....	30 "
Drift on 100-foot level	.....	30 "

2175

Sinking and raising—

Main winze	.....	120 feet.
No. 2 shaft connection with tunnel	.....	170 "
No. 1 shaft	.....	30 "
No. 3 shaft	.....	25 "
No. 4 shaft	.....	15 "
No. 5 shaft	.....	15 "

375

Total development work 2,550 feet.

The above does not include about 600 lineal feet of surface cuts two to three feet in width and varying from five to fifteen feet in depth.

There are three important ore shoots encountered in the tunnel. The first large ore shoot begins at a point about 450 feet from portal of main tunnel and is the same shoot through which the No. 2 shaft has penetrated a distance of about 100 feet. It extends easterly a distance of 140 feet. It varies in width from 5 to 12 feet. The second ore shoot begins about 615 feet from portal and extends for about 80 feet. It varies from 6 to 8 feet in width. The third ore shoot begins at a point about 715 feet from portal and extends for about 90 feet to face of drift. The ore widens from two feet at point of beginning to eight feet at centre, and on to the face the drift is all in ore. This shoot splits about the centre, one branch going southeast and the other turning to the northeast and dipping east. There are two other shoots, but as far as they have been opened up they are small and of low values.

The greater part of the 5,000 tons of ore lying on the dumps contains I believe, about the right amount of silica, iron and lime, to make it a good self-fluxing ore, similar to the other ores of the Boundary country. However, the large amount of iron pyrites present may make it necessary to roast a portion of a lot to reduce the amount of sulphur in it before it is smelted. It is evident from the particulars of assays given in

this report that the ore thus far encountered is low grade. The average value per ton lies between \$5 and \$6. On the other hand the ore is fairly uniform in value, every sample showing some gold, silver and copper, the largest value being gold. The other large mines of the district are mining their ore, where they do not have to hoist it from below, at a price in some cases not exceeding \$1 per ton. I believe it can be made possible to mine the ore in the Morrison above the main tunnel, if large bodies be encountered, at a cost not to exceed \$1.25 per ton. The Morrison mine is yet in the prospect stage, only one level is partially exploited. The showing made on this level is much more promising than could have been expected from the showings on the surface. The ore bodies are larger and the values are higher. I am of opinion that present showings will fully warrant the company in carrying out the proposed development.

An extraordinary general meeting of stockholders in the Brandon & Golden Crown Mining company was held on Thursday, June 20, at the Hotel Armstrong, Greenwood. About 1,200,000 of the 1,500,000 shares in the company were represented either personally or by proxy. Among those present at the meeting were Hon. T. Mayne Daly, president of the company; W. L. Orde, secretary; Geo. H. Collins, W. A. Fuller, W. J. Porter and J. A. Russell, local members of the board of directors, and G. K. Coldwell and Jno. Inglis, of Brandon, Manitoba, both large shareholders in the company and proxies for numerous other Manitoba shareholders.

AND
GOLDEN CROWN. The meeting having been convened for the purpose of formally authorizing reorganization of the company, the necessary special resolutions were submitted and passed unanimously authorizing voluntary liquidation of the company and reconstruction of the same. It was decided that the new company shall be designated the Golden Crown Mines, Ltd., and that the nominal capital shall be similar to that of the existing company, viz., \$1,500,000 in 1,500,000 shares of \$1 each. The shares in the new company, however, are to be issued as paid up to 95 cents each, leaving an assessable margin of five cents per share, providing an available capital of \$75,000, which will, it is considered, be ample to pay off all existing liabilities, meet the cost of liquidation and leave a balance amply sufficient to thoroughly prove the value or otherwise of the mine, which is already equipped with all the plant and machinery likely to be needed in carrying out this object. Mr. W. A. Fuller was appointed liquidator and it was decided to hold, at Rossland, on July 9, the general meeting necessary for the confirmation of the resolutions passed as stated above. The registered office of the new company will be in Greenwood. It is anticipated that all preliminaries will have been arranged in time to admit of the mine being unwatered in August and development work being resumed immediately thereafter.

ROSSLAND.

(From Our Own Correspondent.)

Notwithstanding that the corrected ore shipments from Rossland camp show that over 42,000 tons were sent out from here to the Trail and Northport smelters during last month, Rossland is by no means happy at the present moment. There is every indication that the labour question, which we all thought safely disposed of for the year, will be in evidence all summer. The trouble first originated at the Northport smelter, and there is no saying just where it is going to end. There are so many different versions as to what is happening and what the immediate future has in store for us all that it is difficult to get at the true facts. When the smelter closed down about three weeks ago, it was officially given out that it was only a temporary measure rendered necessary by the state of some of the original furnaces which badly needed repairs. It was also officially denied that there was any "labour" question connected with the move. Sometime later, however, Mr. Bela Kadish, the smelter manager, is said to have called the men together and to have informed them that the local Mill and Smeltermen's union must be abandoned, and that only men not connected with the union would be employed. In Rossland Mr. Macdonald, the Le Roi manager, stated that the foreman's life had been threatened by the union men, and that some 30 of the men would never be employed again. The union men issued a manifesto denying all charges of attempted violence and claiming that the accusation was a mere pretext to break up their union. The end of the matter was a lockout by the management and a strike by the men. If the managers are sincere in their statement they certainly went about the matter in a most peculiar way. Had their foreman really been threatened, and had they wanted to discharge a few of their men in consequence it could have been done, as it frequently is in the mines, without anyone knowing anything about the matter, instead a great parade of the trouble was openly made by the management who appear to have practically invited the men to strike. The men have urged arbitration of all matters involved, but the Le Roi manager have refused. A great many explanations of the situation have been given. It is stated that the whole move is a stock-jobbing transaction and the later English papers certainly bear out the idea, other indications go to show that the mine managers have determined to lower the

THE STRIKE
AT
NORTHPORT.

standard of all wages and that the Northport matter is merely the first move in the campaign to be inaugurated over the Kootenays. It is asserted that Mr. Bernard Macdonald would never have thought of starting on a campaign of this sort himself unless so instructed from London. On the other hand it is also stated that Mr. Macdonald is the prime mover in the matter, and his well-known anti-union views bear this out. Whatever be the motive it is clear that trouble, and deep trouble at that, is in store for the mining industry in this section of the Province unless something steps into prevent.

The Miners' union here is now making preparations to join in the fight if it is decided to do so, in which event the contest is sure to be a long and bitter one.

As the Le Roi management have never replied to the manifesto issued by the Smelters' union, or contradicted the assertions made in that document, public opinion is somewhat in favour of the men and against the company. Everyone is furious at the tangle coming at the present time just when the whole community was looking forward to a most prosperous summer.

If the smelter question is the only one involved, a settlement may still be arrived at, but if the matter spreads and gets to work among the mines it will be hard to say just where it will end, short of shutting down practically all working properties.

The ore output for May, as shown by the corrected figures was the heaviest month on record. The details showing the following:

Le Roi	23,028
Centre Star	8,091
Le Roi No. 2	4,365
War Eagle	3,480
Great Western	2,857
Iron Mask	340
I. X. L.	38

Total tons. 42,199

The figures given are as nearly accurate as it is possible to get them and can be relied upon as the gross net weight within a few tons. The dry tonnage given in the official report will be a little less than the figures quoted.

Mr. W. H. Aldredge, manager of the Trail smelter, returned about the middle of June from a prolonged visit in the east, presumably on business connected with the Gooderham deal for the plant and the new

government refinery scheme. With Mr. Aldredge came Mr. Ladoux, of New York copper fame, one of the men who was employed by Mr. Gooderham to report on the smelter purchase. Neither gentleman would make any statement for publication so the public is left to guess at what has or is happening. Although Mr. Gooderham recently stated that the deal for the Trail smelter by himself and his associates was not abandoned but was still pending, it is generally believed here that the matter will at least be allowed to stand until the War Eagle-Centre Star situation is in some better state than it appears to be at present. Mr. Kirby, of the Gooderham mines, also returned from a lengthy trip in the east, but he also declines to give out any information concerning his visit, or in connection with the outlook for the War Eagle and Centre Star mines.

So far as these two properties go, the Centre Star has been keeping up a daily shipment of over 300 tons, and the War Eagle about half that amount. It is stated that the present plans of the War Eagle will be finished by mid-summer, by which time the management will be able to state definitely whether the lower workings of the mine are in a satisfactory condition or not, and possibly in response to public opinion in Eastern Canada some official announcement may be published.

For the moment the alleged want of management in both the War Eagle and Centre Star is over-shadowed and forgotten in view of the larger labour question now looming up. Several changes have taken place on the War Eagle staff and Mr. Kirby's retirement in July is rumored but no definite statement is obtainable. Mr. A. C. Garde, mechanical engineer in charge at the War Eagle-Centre Star headquarters, resigned early in the month to assume the responsible position of general manager of the Payne mine at Sandon. Mr. Garde takes charge at an exceedingly interesting stage of the Payne's history, and it remains to be seen what the new manager will do with his opportunity. The Payne is now the biggest dividend payer in British Columbia, having paid to date over \$1,305,000 to its owners.

Work has been prosecuted vigorously during the past month on the Le Roi, Le Roi No. 2, Rossland Great Western, and the Kootenay mines, all owned by British capitalists, and at one time controlled by Whitaker Wright and the defunct British American corporation. We cannot say here how these properties will be affected by the London situation as it daily develops, or by the Northport labour troubles, but up to the present the first three properties have shipped steadily to the smelter all month.

No effort is apparently being made to ship from the Kootenay mines and no arrangements are in progress to provide shipping facilities from this mine. All the new machinery for the Le Roi and allied mines is in place and has worked smoothly and satisfactorily. The Iron Mask continues to ship a few car loads a week to Trail, but beyond increasing the development no active measure to get this property on a dividend-

paying basis, has been taken, which apparently justifies the rumor that a deal is on for the mine, which is more than probable.

In the Homestake the workings have been unwatered and connected up and ore shipments have been announced to commence during the latter end of June, consequently the stock of this property is rising and in demand. The White Bear is undergoing a reconstruction and arrangements have been made to raise more funds for continuing the diamond-drill workings which have so far proved successful, meantime the mine remains closed down. Rossland is always full of "fairy stories" but at the present time there are so many contradictory rumors afloat that it is extremely difficult, if not impossible, to ascertain the real state of affairs regarding any given mine or mining property. Usually very well-informed mining men now confess their inability to solve many of the statements being made from day to day, and the news from England only makes "confusion worse confounded" notwithstanding all that is said, however, if only the labour difficulties are properly and definitely settled, Rossland will have a good and prosperous season this summer otherwise the outlook for mining is gloomy enough in all conscience.

F. C. M.

VMIR.

(From Our Own Correspondent.)

The experimental cyanide plant of ten tons capacity, which has been in operation at the Ymir mine since February, has been found entirely satisfactory, and it is now announced that a larger plant sufficient to handle the whole output of tailings will be installed as soon as possible. The capacity of the new plant will probably be of 150 tons per day, as the daily crushing averages about 175 tons of which about 20 tons are saved in the concentrator. The effect of the cyaniding will be shown in a further saving of about \$1 per ton, which will result in an addition to the monthly profit of about \$500 per month.

The Tamarac mine is making a further shipment of ore to the works at Silica. The results obtained from the first 100 tons are very satisfactory, showing a gross value for the ore of \$17 per ton. As there is a large quantity of this ore exposed in the mine, it is probable that a mill to treat the ore locally will shortly be erected.

Work has been resumed on the Wilcox mine owned by the Broken Hill Mining Development Co. This property is, next to the Ymir mine, the best developed mine in the district. It has two distinct veins, on the first of which a tunnel has been run 350 feet exposing an average width of ore throughout that distance of about two and a half feet. The average of a large number of cross samples taken from various points in this tunnel is \$17. At a distance of 154 feet from the mouth of the tunnel an upraise of 100 feet connects with the surface, and with a winze which has been sunk 65 feet below the floor of the tunnel. The ore in this tunnel consists of oxides and carbonates from which gold can be easily panned out. On the second vein two tunnels of 350 and 180 feet, respectively, have been run and the last named connects with a shaft sunk 135 feet. This shaft is all in ore averaging three feet, with an average value of \$22 in all values. A car load of this ore taken from the dump of the shaft and shipped to Northport returned \$57 per ton in all values. This ore is different from that in the first vein and consists of decomposed quartz carrying galena and iron pyrites.

The British Lion Gold Mining Co., of Ontario, has applied for and obtained a supplementary charter increasing its capitalization from \$80,000 to \$180,000. This company is operating the Big Four group about five miles from Ymir. The group consists of four claims, on all of which a good showing of ore has been obtained. This company will expend a considerable sum in the development of the property this summer.

The Golden Monarch Mining & Milling Co., are energetically pushing work on their Foghorn property on Wild Horse creek. The crosscut tunnel is now in 300 feet and has about 300 feet farther to go. A second tunnel has been started to run in on the vein. The Foghorn is situated in what is known as the Wild Horse free-milling belt; and is one of the richest properties in that belt. The shaft which is sunk about forty feet in the ore, is said to have one of the first showings of free-gold quartz to be seen in this Province.

A contract has been let for driving a crosscut tunnel on the Shiloh mine, owned by the Silver Crown Consolidated Mining Co., of Spokane. This property lies quite close to the town and has the promise of a big mine.

There is considerable activity now in the Eric district, ten miles south. Finch & Campbell have started on the construction of a stamp mill on their Second Relief mine and have also a force at work on their Keystone property, whilst the concentrator at the Arlington mine is nearly completed.

AINSWORTH, SLOCAN AND NELSON.

(From Our Own Correspondent.)

The long tunnel which has been driven on the Highlander mine at Ainsworth, has encountered the lead at a depth of 900 feet. The vein

is claimed to be of high-grade galena ore and more than 27 ft. in width, as no hanging wall has been encountered. The values contained in the ore are not known but it is asserted that the whole vein carries high-grade ore.

The Congo group on Red mountain, in the Slocan district, is to be developed this season by the owners. The Congo is said to be one of the most promising properties in that section of the camp. The lack of transportation has greatly retarded the development of this as well as other properties in the neighbourhood.

Work has been suspended on the Last Chance mine in the Slocan. The reason given for cessation of operation being that the stopes are too wet to carry on mining, consequently no ore will be taken out until the seepage subsides.

The Payne mine of the Slocan has been closed down, the whole force being laid off. It is rumoured that a complete change of management is to occur soon.

The total amount in dividends paid by the Payne Mining and Milling Company, is \$1,438,000 the largest paid by any mine in British Columbia. The company have on hand \$180,000 to construct a concentrator and compressor and do development work. The concentrator is soon to be built after which a larger force of men will be employed and a larger output expected.

The main shaft house at Bruce Mine, Ontario, was burned, the loss is estimated to be \$33,000, with insurance at \$20,000.

The International and Happy Medium claims, situate about a mile north of the mouth of Twelve-Mile creek, were bonded to R. E. Fishburn for \$12,000. A contract to run a tunnel 100 feet has been let by Mr. Fishburn.

The Silver King mine, of Nelson, is sinking a shaft 1000 feet and expect to have it completed within the next thirty days. This, when completed, will be the deepest shaft in British Columbia.

The Poorman mine, Nelson, has closed down temporarily, owing to an accident to the compressor.

Mr. E. Mansfield, the well-known mining operator of London, England, returned to Nelson a few days ago, and work is to be resumed on properties in Camp Mansfield.

The tunnel on the Estella and Rover in the East Kootenay is now in between 600 and 700 feet, at 260 feet a crosscut was driven which shows 12 feet of ore, another crosscut has 11 feet of ore, while still another has about 7 feet. Stopping has commenced on the Estella tunnel and there are about 100 tons of ore on the dump.

The Whitewater mines in the Slocan district has closed down with no immediate prospects of re-opening. The reason given for the shut down is that there is no market for their ores.

SLOCAN CITY MINING DIVISION.

(From Our Own Correspondent.)

The early spring so confidently looked for did not materialize, and the snow line is still below many of our prospects. Heavy rainfall, with a few very hot days in the latter part of May, gorged the mountain streams and these did a good deal of damage to roads and trails. The most notable event of the month is the distribution of a \$20,000 dividend by the Arlington, and its taking of first place in tonnage in the Slocan shipping list. There are no new shippers to note but several of the prospects are storing ore from their development work. The chief items of interest from the different creeks are as follows:

THE ARLINGTON DIVIDEND.

Ten Mile.—The upper portion is still under heavy snow. The Enterprise concentrator is nearly completed. Development work on the Iron Horse is having satisfactory results. Work in a small way is being carried on at a dozen points on the creeks.

Twelve-Mile.—The V. & M. people are locating their compressor plant and flume. Mr. Fishburn has bonded the new find northwest of the V. & M. at \$30,000 for the two claims. Mr. Williams is on his way out from London to commence work on the Myrtle group at the head of this creek.

Springer Creek.—Prospectors are busy with assessment and development work. A small crew are again at work on the Phoenix. The Evening Star has a few men on, ground sluicing and tracing the outcrop of the ledge. The Exchange ledge has been found on the claim below, after intermittent search for years. The Republic group has been surveyed and will be Crown granted. The Arlington is as busy as ever shipping about 100 tons weekly and preparing for extensive improvements. The Hampton group will shortly make another shipment of ore. Mr. Collom, managing director for the Arlington and Speculator groups, has arrived from California, bringing his family with him. He will watch the installation of machinery on the Speculator.

Lemon Creek.—The freshet in this creek did considerable damage, washing out the wagon road, some of the bridges on the upper trail and the Chapleau flume. The Rose, which has shown extraordinary rich ore, is being prospected and several outfits have gone into the Gold Hill section with the idea of taking out more or less ore this summer. July should see work resumed by the Chapleau, Kilo and Hoodoo properties.

TROUT LAKE AND LARDEAU.

(From Our Own Correspondent.)

Several well-known properties in the Trout Lake mining division are to be developed this season. The Miner-Graves syndicate have secured two fine properties, the Virginia and the Cromwell, and propose expending not less than \$10,000 in development work. A six-ton shipment was sent to the smelter last autumn from the Cromwell giving returns of \$100 per ton in gold. On the Virginia there has been 100 feet of work done.

The Triune, in the Lardeau, is shortly to start work again. This is one of the richest silver-lead properties in the Kootenay. Shipments up to date have brought returns of over \$23,000 in all values.

The Metropolitan and Sunset, a couple of North Fork properties will be worked extensively this season.

James McKay Anderson, western manager of the Gold Hill Exploration Co'y, of Toronto, is in the Lardeau looking after the interest of his company. He intends putting a force of men to work on the Copper Queen group and other properties owned by the company.

The Bennison group of claims on the eastern slope of the Duacan on the boundary between East and West Kootenay, will be developed this season by the Kootenay Consolidated company. The property is managed by Major Clohecy.

The Old Gold property, in the Lardeau, is to be opened up by Mr. J. W. Westfall of Trout Lake. Development work will be continued on adjoining properties which are owned by the same company. On the Primrose property, one of the Old Gold groups, there was a new find made late last fall; this property will be thoroughly prospected this season and much is expected from this new discovery.

Rich free-milling gold ore is being found in various points in the Lardeau mining division. On Fish creek west from Lexington mountain there has been a discovery of rich free-gold ore, while numerous new discoveries have been made on Lexington mountain. Several good discoveries have been made further up Pool Creek in the same belt while a discovery of very rich gold ore has just been made almost in the townsite of Ferguson.

The famous Eva group is located in this free-gold belt and until the Eva property was proven there was little prospecting done for free gold. Prospectors and mining men contended that the country was a silver-lead belt and that there could be no free milling gold properties. Prospectors are now beginning to realize that gold is where you find it, and are just beginning to prospect for gold. There is much excitement in the Lardeau division over the recent discoveries and many prospectors and mining men are going into that country to examine the new finds.

LILLOOET.

(From Our Own Correspondent.)

The Ben d'Or mines situated on Cadwallader creek, about 70 miles from Lillooet, in the Lillooet mining division are reported sold to a New York syndicate for \$750,000. The property is being taken over on an eighteen months working bond; the first payment of \$125,000, is to be made on the 25th of June. The Ben d'Or is a producing mine having shipped bullion almost continually since the completion of their ten-stamp mill which is in operation on the property. Recent development work on the property have opened up large bodies of free-milling gold ore. Active development work will be commenced on the property at once by the New York people.

The Lorne mine in the Lillooet mining district, has closed down. The reason given is that the ore in the lower levels has turned base and cannot be treated with the present milling plant.

CATALOGUES, CIRCULARS AND TRADE NOTICES

A REMARKABLY EFFICIENT CABLE.

THE following interesting article was published in a recent issue of the *St. Louis Star*:

"A number of prominent engineers, chiefly those employed by big office buildings, examined the cables of elevator No. 1 of the Bank of Commerce building, on Sunday last, and found that after five and a half years of continual service the inside strands of the rope were in as good condition as the day they were made. The test was made by the engineers at the invitation of the A. Leschen & Sons' Rope Co., who are the manufacturers in America of the patent flattened strand wire rope, and was done in order to satisfy themselves as to whether the oval centre of the five strands cut the inside wires. The examination proved that the wire was not even indented by the oval or flattened strand. This rope is an English invention, and some years ago the firm secured the sole right of American manufacture. At once it was attacked by competing rope companies on the ground that the flat center would cut the inside wires, leaving the outside in good condition, thus making it dangerous. The flattened strand causes all of the outside wires to rest evenly on pulleys or wheels, and to the claim that this would give 150 per cent. more service than any round strand

wires, no refutation could be made. A few days ago Engineer James H. McCord, of the Bank of Commerce building, discovered that some of the outside strands were broken, and ordered a new cable. The American manufacturers thought this occasion would be a good one to put to a practical test that the argument whether their patent strand cut the inside wires or not, and invited forty of the prominent engineers of the city to examine the rope for themselves. At noon yesterday they gathered at the bank building, where the old cable was stored, and cut it all to pieces in a fruitless endeavour to find a flaw. Even at the point where, through constant wear the outside strands had parted, the inside strands were perfect. After the examination a luncheon was served at McTague's, where Mr. McCord told the company of his experience with the wire, saying that all other cables he had used lasted but three years, and concluded with the statement that he had replaced the old cable with one of the same kind. Mr. J. H. Joyce, engineer of the Telephone building, in a brief address, said that he had bought one of the cables under discussion, and that it has now been in service three years and one month, and that the longest service he had ever secured with those elevators with a round cable was two years.

ENGINES AT THE PAN-AMERICAN EXPOSITION.

The Lane & Bodley Co., of Cincinnati, Ohio, have addressed the following circular letter to exhibitors of engines at the Pan-American Exposition, calling attention to the inadequate accommodation afforded to exhibits of this character, and inviting a general protest:

Gentlemen,—The writer has just returned from the Pan-American Exposition at Buffalo, where we have an engine on exhibition. You are also exhibitors. We are addressing this letter to all who have engines installed in the cellar.

We believe that all engine exhibitors have been imposed upon. We believe that 99 per cent. or more of the visitors would spend a week on the grounds, and would leave without knowing there is an engine exhibit.

The engines are down in a hole, and there is nothing to indicate that the hole exists, nor that it contains an engine exhibit. This hole is roofed over as low down as possible, to clear the tops of the fly-wheels of the engines, and a few inadequate sky-lights are inserted. It is entirely boxed in, and when the weather gets warm, will be a sweat-box in which we do not believe it will be possible for men to stay.

We request that you immediately write to the Exposition authorities, and urge that the roof over the engine, which is a temporary affair, be raised to the level of the roof of the machinery building, and that the inner partitions of the machinery building be removed, so that visitors may look down upon the engines from the machinery building, and that suitable conspicuous access be provided to this subterranean exhibition space, and that conspicuous signs be placed in various parts of the machinery building, calling attention to the fact that there is an exhibition of steam engines, notwithstanding appearances to the contrary.

We believe a prompt protest and request for a satisfactory remedy will be effective now, but would not be later.

Yours truly,

THE LANE & BODLEY CO.

VICTOR TURBINES AND PUMPING MACHINERY.

We have received two exceedingly useful catalogues, Nos. 22 and 23 respectively, from the Stilwell-Bierce & Smith-Vaile Co., of Dayton, Ohio, the first being devoted to an elaborate description of Victor Turbine Water Wheels and the second to various types of pumps, pumping engines, motors, purifiers and receiving tanks, and washing and filter presses. Both catalogues are well printed, and handsomely illustrated and contain much information of a valuable character to engineers. No. 23, in particular, contains some excellent rules and tables for finding the power, speed and water consumption of cylinder gate turbines under heads ranging from 3 to 50 feet, and for small "Register Gate" turbines under heads of 3 to 100 feet. This firm recently consigned to the Remington Martin Co., of Washington, N. Y., no less than nine car loads of Victor turbines and appurtenances, there being five 39-inch, one 24-inch, two 21-inch and one 18-inch improved cylinder gate Victor turbines, with penstock draft tubes, etc. Each wheel is mounted singly upon a horizontal shaft and incased in a steel penstock with a heavily-ribbed cast-iron head, this head being rounded so as to give the best possible appliance of the water to the wheel. The total power developed by the wheels will be 4,375 horsepower under 42 feet wetting head of water. These wheels will be installed in a new pulp and paper mill at Norfolk, N. Y.

ROBINS BELT CONVEYOR PATENTS.

On October 15th, 1900, the suit of Robins Conveying Belt Company, of New York, against the Exeter Machine Works, was argued before Mr. Justice Wheeler, of the U. S. circuit court for the southern district of New York. The Robins Conveying Belt Company complained that the Exeter Machine Works had advertised, and in two instances had sold, belt conveyer apparatus which infringed letters pat-

ent Nos. 499, 472, dated June 13th, 1893, and 561,604, dated Nov. 17, 1896, both of which are the property of the Robins Conveying Belt Company. On November 15th, 1900, Mr. Justice Wheeler issued an interlocutory decree establishing the validity of the patents in question, and an injunction restraining the Exeter Machine Works from infringing or in any way advertising the apparatus covered by these patents. An accounting was ordered before Special Master John M. Shield. His report, dated March 6th, 1901, awarded damages to the Robins Conveying Belt Company which have since been paid.

MICHIGAN COLLEGE OF MINES.

The Michigan College of Mines has received from the present legislature of Michigan the largest appropriation in its history. It provides, among other things for two very greatly needed buildings. One of these is to accommodate the departments of Civil and Mining engineering. It will provide mining and hydraulic laboratories and a draughting room, together with lecture and class rooms. The amount allotted for its construction and equipment is \$42,500. The other building will be devoted to the work of the departments of chemistry and metallurgy. The laboratories will be fitted up in accordance with modern ideas of lighting, plumbing and ventilation. Among the laboratories, will be one for metallurgical operations. The amount of appropriation for this building is \$35,000. The appropriation further more provides for an addition to the present engineering building, which will take care of the needs of the course in blacksmithing. Provision is also made for extending the equipment of the electrical laboratory, and for enlarging the central heating plant to take care of the new buildings. The work of planning for the erection of these buildings is already begun, and is being prosecuted as rapidly as possible. It is hoped that one or more of the buildings will be ready by the fall of 1902.

THE ALLIS-CHALMERS COMPANY.

The Allis-Chalmers Company announce having acquired the entire business of the Edward P. Allis Co., Milwaukee, Wis.; Fraser & Chalmers, Chicago, Ill.; Gates Iron Works, Chicago, Ill., and the Dickson Mfg. Co., (exclusive of locomotives), Scranton, Pa. In a circular just issued the company states that the "Allis-Chalmers Co. will continue to build under the same management, the same lines of machinery as heretofore manufactured by the several companies and hopes to merit a continuance of the generous patronage accorded the several companies in the past," which we hope, considering the high reputation enjoyed by the respective establishments before amalgamation, will undoubtedly be realised. The general offices of the Allis-Chalmers Co., is Home Insurance Building, Chicago, Ill.

AIR COMPRESSORS.

We have received from the New York and Franklin Air Compressor Cos., 95 Liberty street, New York, a copy of their new catalogue illustrating and describing the latest types of New York-Franklin Air Compressors, designed for the operation of pneumatic tools and machinery in machine shops, boiler shops, shipyards, foundries, stoneyards, mines and tunnels, for sinking caissons and for every other service to which compressed air is applied. The catalogue contains much valuable information and data relating to the points to be considered in the selection of air-compressing machinery and its proper installation in the attainment of the highest economical results. It will be sent post paid to all interested inquirers.

ELEVATING AND CONVEYING MACHINERY.

The Jeffrey Manufacturing Co., of Columbus, Ohio, have issued an illustrated circular (No. 61) showing various types of elevating and conveying machinery for mills factories, mines, industrial and power plants manufactured at their works.

MINING STATISTICS AND RETURNS.

THE COAST—MT. SICKER DISTRICT.

THE shipments from the Lenora mine, Mt. Sicker, during the month of May aggregated 1,183 tons.

BOUNDARY DISTRICT.

The tonnage of ore shipped by the Boundary District mines during June, up to the 20th, inclusive, so far as has been ascertained from the mines is as under:

	Tons.
Old Ironsides and Knob Hill	12,373
Mother Lode	6,600
B. C.	2,975
Snowshoe	210
Total	22,158

Shipments for five months of the current year ended May 31st, aggregate 150,211 tons. Grand total to date 261,170 tons.

The aggregate tonnage of ore shipped this year to the end of June, is estimated at 165,000 tons.

ROSSLAND.

	1901.	1900.	Increase.
Shipments for January, (revised)	30,894	24,933	5,961
" February "	26,778	6,960	19,818
" March "	34,172	279	33,893
" April "	40,160	6,834	33,326
" May (estimated)	47,000	15,704	31,296
" June "	32,000	17,161	14,839

N. B.—The returns for May probably include shipments for three days in April.

Total production to date approximately 212,000 tons.

EAST KOOTENAY.

The St. Eugene mine at Moyie, continues to ship regularly to Antwerp. Twenty car loads of ore from the Paradise mine, Windermere district, have been shipped this month. The North Star, Kimberley, continues to send out 1,100 tons of ore monthly to the Trail and Everett smelters.

THE SLOCAN.

The shipments of ore from the Slocan and Slocan City Mining Divisions, from January 1st to June 13th, 1901, aggregate 11,335 tons. The only mines now producing on a large scale are the Slocan Star and Arlington.

1901 DIVIDENDS.

Since January 1st, \$393,500 have been distributed in dividends, as follows: Payne, 3 per cent. on issued capital \$78,000; St. Eugene, \$210,000; Arlington (Slocan lake) \$20,000; North Star, \$78,000; Ymir, \$96,000; Centre Star, \$105,000.

THE METAL MARKET—JUNE.

SILVER.

THE silver market has been steady during the month, but without appreciable advance in price, the latest quotations remaining 59¼ @ 59¾. An improvement in prices is looked for.

COPPER.

The market is unchanged. The demand remains active at present prices. Buyers are said to be willing to enter into long time contracts with refiners. A considerable increase in production from the main producing centres is anticipated, but stocks are low and the demand shows no signs of falling off. Latest quotations are Lake 17c. @ 17¼; Electrolytic, 16 60 @ 16.75.

LEAD.

The market is unchanged. St. Louis, 4.27½ @ 4.37½; New York, 4.37½; London, £12.7.6—2.69 cents per pound.

SPELTER.

New York, 4.20; St. Louis, 3.75; London, £16.2.6—25.85 cents per pound.

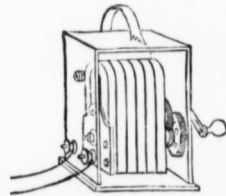
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