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MINING REVIEW

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Gambling in Mining Stocks.

The present interest in mining investment affords opportunity for a study of some traits of human nature and for reflection upon business methods and the mining industry. Men all like to have money; and they all need to have it in these days, if they desire to enjoy the comforts of life and the respect of their neighbors unalloyed with their pity. Men also are lazy and do not like hard work and the easiest way of getting rich is of course the most attractive. Hence gambling ranks easily first as the most fascinating means of making money. Gambling with cards and similar devices contains a mixture of skill and chance. It was forbidden by the Romans not so much on account of moral sentiments as for its tendency to make those who indulged in the practice unmanly. But old men were allowed the privilege. In our own time larger stakes can be got without the personal unpleasantness of impoverishing one's companions, if instead of betting on cards against friends one can bet on the prices of goods or shares against the public. The loss in this case is distributed among strangers and does not press remorseful feelings upon the happy winner. Thus the gambling of the Produce Stock and Mining Exchanges has become popular, and the occasional stories of vast fortunes gained in days or weeks decoy the eager multitude to try their skill and chance in selecting the right object upon which to bet as to the probability of rise or fall in prices. Marvellous stories have come to us during the past two years of fortunes made in London by gambling in gold shares. Mining properties that had only a remote chance of ever paying a dividend have had their shares run up in value 500 or 1000 per cent., not that the public believed they would ever pay a dividend, but because at the start some one made a fictitious sale to a friendly broker at an advanced price. The report of this in the papers led an outsider to buy at a higher price, another person seeing the shares rising "took a flyer" and in turn people rushed in, bidding for shares that they hoped to unload on some eager speculator at a still higher price in a few days. This went on till political troubles excited public distrust and the failure of many properties to show merit made people realize that there must be a basis of value even for gambling. Betting on shares could not be carried for long to a high figure.

Now it is just as legitimate to bet on the rise of mining shares as on the price of wheat, and those who choose to gamble in that way have a perfect right to decide upon what risks they will take. But they have no right to consider that they are engaged in the mining industry; for they have no thought of receiving money from dividends obtained by working the mines, but are wholly concerned in the advance in the price of shares. If trade gambling is to be tolerated at all, mining shares are as good a game as any, and the only advice we have to give the gamblers is the same that we would give to euchre or poker players—avail of skill as far as possible and do not trust

wholly to blind luck. Try to find out that your partners and opponents are honest and will permit a square deal. This is where the public is very much to be blamed. It invests in schemes of such transparently fraudulent nature that they are doomed to speedy exposure and ruin. There is not a ghost of a chance of their shares rising in value for more than a few weeks. The "Mail," "Telegraph" and "Press" give publicity to the facts and any bubble soon bursts under their influence. One of the latest instances of this is the Coolgardie Mine, the shares of which have been freely sold of late in the east. We copy the following interesting information from a B. C. contemporary.—

"A private letter was received at this office a few days ago from a gentleman in Montreal, making enquiries as to the standing of the Coolgardie Mining company. Being thoroughly conversant with every mine and prospect of importance in the southern portion of the Yale district, we had no hesitation in stamping the company bogus at a glance, and yet noting the many reputed names attached to the prospectus, we were constrained to make a searching enquiry into the matter, to see if by some possible chance the claims of the prospectus had any foundation in fact. Turning to the records for the Kettle river mining division of Yale district, we soon ascertained that no claim bearing the name Coolgardie had ever been located or recorded in Copper camp, and therefore the first assertion of the prospectus was proven to be untrue. Did no other false statement exist in the prospectus, this in itself would be sufficient to condemn it, but upon reference, we find that the whole structure is built upon untruth, as in paragraph three it says the principal work has been done on the Mother Lode, thereby leading its readers to suppose that the Coolgardie Company had some connection with the Mother Lode claim—which, by the by, is in Deadwood camp—and is under bond to the Boundary Mines Company, a New York private syndicate of capitalists. The next and succeeding paragraphs are equally false, and in fact we have no hesitation in saying that no such company as the Coolgardie is or ever has been operating in any of the Boundary Creek camps. The only claim bearing the name Coolgardie, recorded in the Kettle River Mining division, was located in Summit camp on the 17th July, 1895, and recorded on the 22nd July, 1895, and as nothing is on record to show that the claim ever passed out of the hands of the locators, it is hardly likely the prospectus could refer to it. Even if it did, it would not divest the prospectus of its glaring untruths or invest the company with an air of respectability, as the records show that this claim located in Summit camp was allowed to lapse, owing to the fact that no assessment work was recorded within the specified time allowed by law, and on this account the claim has been recently relocated, and under these circumstances could not by any chance now belong to the Coolgardie Mining company."

Flaming advertisements ask people to put money into the shares of a company that will in future buy mines in various districts or all

over the world. It is not our place to give advice as to how to gamble in mining shares, but to save our friends who have this mania from certain eventual loss we would say do not *hold* shares that are not based on genuine properties and honest work, or in companies where you know nothing of the character of the promoters or the management. If they buy such shares let them make quick turns and get out at the least adverse rumours in order to avoid the inevitable crash.

The sad feature of this speculation to the active mining man is that the money wasted in this betting on shares cannot be applied to genuine mine operations. Men who are known in the community where they live, go from door to door soliciting capital for promising and well managed enterprises, guaranteed by their character and skill, and after they are snubbed and metaphorically kicked out of the office, the glib tongued "wildcat" promoter from unknown parts enters and is received with open arms and is rewarded with the sight of an open check book. It is hard to bear; but still it has its good side. The talk of the affair advertises mining and calls public attention to that industry. It is easier to get capital for mining during a boom and some properties will be developed that otherwise would never have proved their riches. And again the money lost in share gambling only changes hands and those who lose it are perhaps no better custodians than those who gain it. So we say—Go it boys! if you want to gamble, cards, horses, elections, mines and church raffles all are fair game; only use your wits and be as skilful as you can; don't be fools and be gulled by transparent frauds, nor go it blind. There is more chance with your eyes open; and when you use them *above all look at your men*. Tie to good and able people and your chance of luck is greatly increased. But if you have any ambition to get rich by means that will be of the greatest benefit to your country and countrymen and of the most interest and educational advantage to yourself, then invest in the development of mines and see that your money is really spent in exploitation. Herein is Canada's greatest prospective source of wealth. She is a mining country *par excellence* and mining is the most generally advantageous industry that can be engaged in both to nations and to individuals.

Government Examination of Joint Stock Company Schemes.

Boards of Trade have here and there had under recent discussion certain recommendations to the Provincial and Dominion Governments for protecting the public against the schemes of the promoters of Mining Companies. The subject is vital to the interests of the whole country. Either something must be done to give share certificates a documentary character for honesty, or else results disastrous to mining enterprise and incidentally to all other enterprise will assuredly follow.

Joint Stock Companies were in the first instance created corporations by letters patent to enable men to conduct collectively such business undertakings as they could do individually or in partnership. There were defects in the mercantile law of partnership which rendered that form of association unsuitable for mining and other enterprises. The technicalities of real estate law were also in some measure maintained by partnership law. It was necessary to make shares transferable without breaking up the association, to give to real estate owned by the association the character of personal property, to vest the control of affairs in an elective managing body. Now all this could have been attained by statutory modification of the law of partnership for particular enterprises. It has been admirably attained by the law of British Columbia relating to mining partnerships than which nothing more practicable could be desired for enabling co-operating practical miners to carry on their business in a sensible, economical and honest fashion. (The reader is referred to the Canadian Mining Manual, 1894, for further particulars). Such a partnership cannot create a fictitious capital, that is, as between the partners. Nor can it enter into any of the many stock-jobbing plans for obtaining from the

community large sums of money to be repaid only in sorrowful experiences.

By what means was it that the legal system originally intended to facilitate the formation of joint stock companies by enabling them to avoid the technical difficulties incidental to partnerships—and for such purpose only—by what means was it that the legal system expanded into its present form? Probably under the influence of the Stock Exchange. It was found that industrial and mining stocks could be sold readily, that they had a speculative value often far from their real value. It was found, not for the first time in the history of human nature, that share certificates take their value from public opinion apart from the value of the property they represent, and that democratic legislatures are frequently more ready to accommodate their constituents with opportunities to befool themselves than are much abused autocratic rulers. It was therefore made available to clothe companies with the right to issue any conceivable amount of capital, apart from the means of promoters, the objects in view, the value of the property or industry to be exploited. A concrete example will serve to illustrate:—No names are given for obvious reasons, but the story owes nothing to imagination. A company was formed in New York for buying and working certain mines in Eastern Ontario, capitalized at five millions of dollars. Over 100,000 shares changed hands at about \$3.00 a share. The company in its nine years of life has never paid a dividend and it probably never will. The promoters were first class business men, the mines bought up were producing properties, the influence the company could command through its directorate was weighty and widespread. The consolidated mines were taken over at prices above their value. Now, had the department which gave legal sanction to this association required evidence—and historic evidence at that—as to all the transactions entered into by the promoters for the company; had the department required from an independent expert testimony of the value of the properties acquired, and had the money raised from working capital been placed under the control of an officer required to give security to a guarantee company for the honest expenditure of money raised for working capital, it is altogether probable that the shares would have had even now a certain value and that the large investment made by the public in good faith would not have been utterly wasted.

Why should a Mining Company be allowed to issue shares in a mode not allowed to any other corporate enterprise? Let a commercial company, formed for the purpose of buying dairy products for example, issue paid up stock at 10 cents in the dollar, and all the world will cry out against the swindle, and ask why government gives corporate bodies power to make such issues. The obvious principle is that a mining share is a share of a mine; that it is a share of a sum representing the purchase of the mine and the working capital for machinery and wages, and that the owner of the share is entitled only to a part of the net earnings at certain times. Any device for giving a share any other character should be stated on its face. For example, where a part of the stock is issued fully paid up it should appear that no other stock can be issued fully paid up, without which guarantee the purchaser of the non-assessable stock may find his purchase swamped under a deluge of subsequently issued stock or completely cut out by preference stock or bonds. The infirmity of the stock issue should appear on its face. Without it the purport of the certificate that it represents a share of a certain property is falsely stated. The law cannot protect people from every roguish expedient or trick of mining company managers, but it can advertise the public that there are certain reservations of powers attaching to share certificates that people should know, and which therefore should appear on the face of the document, in precisely the same manner that when a man sells a house he must make a good title or else the buyer may withdraw from the contract.

The very travesty of protection is afforded to shareholders against false statements in the advertisements of mining and other companies by the Ontario Statute, "An act representing the liability of Directors," which provides that directors and promoters shall be liable to pay to shareholders any loss or damage they may sustain by reason of any untrue statement unless it is proved that he had reason to believe that the statement was true, or that the statement was made on the authority of an engineer, accountant or expert, believed to be competent. Practically this statute was formed for the benefit of "guinea-jig" directors, who,

by means of it may shelter themselves behind the report "of any mining fakir whomsoever so long as they avow their belief in him." It is a copy of an English Act which would have afforded the genius of Dickens an illustration of "How not to do it." It is to be hoped that the incertitude, ineptitude and inefficacy of the law for the protection of the public who seek safe investments in legitimate mining enterprises, will prevail no longer than until next session, and that meanwhile the Provincial Departments will exercise the powers they are clothed with to examine the schemes submitted for incorporation and to require that share certificates shall announce on their face the facts they do not certify:—As that the stock is subject to the issue of such mortgage bonds as the directors may see fit to make, is also subject to be rited with further increase of capital stock, and to be postponed to the issue of preferred stock if such is the case; also that the title to the property of the company has or has not been proved to the department, as the case may be. Let it be kept steadily in view that the better the character of Canadian mining share certificates shall be made, the more readily will capital seek investment in Canadian mines.

A Pretty Kettle of Fish.

Much interest is being taken in the outcome of an action for criminal libel now before the Montreal courts preferred by Mr. W. L. Hogg, secretary-treasurer of the Granite Creek Mining Co. against Dr. H. B. Cameron, a resident of Granite Creek, Yale District, B. C., a shareholder and one of the original founders of the Company.

The enterprise was originally incorporated in 1894 under the name of the Stevenson Gold & Platinum Hydraulic Mining Co. with an authorized capital of \$1,000,000 in \$100 shares to acquire and work a placer mining claim on Granite Creek, Yale District, B. C., containing 640 acres. A year later a re-organization took place under Dominion Charter, the authorized capital being reduced to \$150,000 in shares of \$10.00. The present directors comprise: W. Barclay Stephens, J. N. Greenshields, and Dr. C. R. Gillard of Montreal. A. W. Fleck and W. Dale Harris of Ottawa, Robert Stevenson, Granite Creek and W. J. Hogg, Vancouver.

The alleged libel is contained in a circular letter addressed by Dr. Cameron to his fellow shareholders in which he charges the secretary-treasurer, Mr. W. L. Hogg, with disposing of certain additional areas adjacent to the company's property, at a figure considerably in excess of that which, it is said, he actually paid for them.

Dr. Cameron was arrested at his house in the far distant Yale District and taken east to Montreal, some three thousand miles, without an hour's notice, without opportunity to consult a lawyer or make arrangements to defend himself or put his affairs in order.

Without in any way commenting upon the merits of the case, we cannot refrain in passing from expressing our opinion of a criminal code which permits such an iniquitous procedure. Any one of us who may have sounded a note of warning with respect to British Columbia "wild-cats"—and goodness knows the crop is exceedingly plentiful—may according to this remarkable law be hauled off to Red Mountain or the Slocan and be detained there for several months at great personal loss and inconvenience and without any hope of redress simply on the strength of the cooked up statement of some unscrupulous scalliwag.

However, the case of Dr. Cameron has been the means of disclosing some particulars of the peculiar methods of this Company's management which deserve mention, and to which we will briefly refer.

Dr. Cameron's circular having aroused the suspicions of some of the Ottawa shareholders, that matters were perhaps not altogether right, a meeting was held and a resolution passed authorizing the doctor and Mr. J. H. Lyster to proceed to Montreal and examine the books at the registered office of the company in St. Francois Xavier street. This they did but Mr. Barclay Stephens, who was in charge of the office, informed them, so it is stated, that the books had been taken temporarily

to British Columbia by the secretary-treasurer. They then asked to see the Stock Transfer book, but this, they were informed, was in the safe, and Mr. Barclay Stephens, vice-president of the company by the way, had not the combination or had forgotten it.

Granting that the statements of Dr. Cameron and Mr. Lyster are correct, either the vice-president made a false statement, in which case he is not competent to be entrusted with any responsibility in the management of a joint stock enterprise, or if the truth was told, he was guilty of a serious contravention of the Companies' Act and liable to a fine or imprisonment or both. It may be well to refer in this connection to the statute which provides (Sec 44, 45 & 46):

"Such books (*i. e.*, the books of account of the company) shall during reasonable business hours of every day, except Sundays and holidays, be kept open for the inspection of shareholders and creditors of the company, and their personal representatives, at the head office or chief place of business of the company and every such shareholder, creditor or personal representative may make extracts therefrom. 40 Vic. Cap. 43, Sec. 37.

"Every director, officer or servant of the company, who knowingly makes or assists in making any untrue entry in any such book, or who refuses or wilfully neglects to make any proper entry therein, or to exhibit the same, or to allow the same to be inspected and extracts to be taken therefrom, is guilty of a misdemeanor. 40 Vic. Cap. 43, Sec. 49.

"Every company which neglects to keep such book or books as aforesaid, shall forfeit its corporate rights. 40 Vic. Cap. 43, Sec. 38."

As we pointed out in our last issue the greatest security must be given to shareholders in the proper supervision of company accounts and in Canada, as in the Mother Country, carrion crows of finance must be promptly punished for infringement of this very necessary provision of the Companies' Act.

Another very suspicious circumstance of the management of this Company's affairs is the remarkable statement circulated by Mr. W. L. Hogg, the secretary-treasurer, to the effect that there had been a clean up at the mine from one day's washing this summer which realized something like nine hundred dollars. On investigation this proved to be wholly untrue, and on being questioned, Mr. Hogg coolly admitted at a meeting of the shareholders its falsity adding the audacious explanation that it was a "joke." If, as is generally supposed, this fiction was circulated to facilitate the more speedy disposal of the Company's stock on the Eastern Market, the character of Mr. Hogg's humor will be more readily apparent.

Further, if we may believe the testimony of Mr. Brunel, a civil engineer, employed for several months in construction work at the mine, the operations there under Mr. Stevenson are very far from being conducted in a businesslike or workmanlike manner; there are he says, "no specifications, no books, no pay-sheets or inspector to protect the shareholders' interests."

"As any one could predict the result of drawing heavy loads of lumber with horses up a flume, the bottom of which was only $1\frac{1}{4}$ (one and a quarter) inches, had so badly strained the joints and damaged the bottom to such an extent that the horses' feet had gone through in several places; the effect of all this caused the flume to leak like a sieve when the water was turned on, thus causing a tremendous land slide, which buried another miner's claim below so utterly that the man could not find his tunnel next morning. This led to a law suit. The flume was patched up and another attempt made, and again was a land slide narrowly averted by a miner living below, who in order to save his house and property shut the water off at the dam. Later on another attempt was made, which resulted in a failure."

"Now, about this time, the 30th of June, the limit for completion of Mr. Stevenson's contract expired, and yet fully $\frac{1}{3}$ of the construction work remained unfinished. Things commenced to look blue for a wash up in the face of the promises Mr. Stevenson had made the Ottawa

shareholders that he would return in the fall and pay them a dividend of 50 per cent."

"Mr. Stevenson was now desirous of sending a circular to the shareholders explaining why the work was not finished, and desired me to write a report for that purpose, after having failed to induce Dr. Cameron, a shareholder, to do so. I told him that a report I could write would do him more harm than good, and he subsequently induced one of the workmen to write one. This report has never been produced."

From the above it is quite evident that the affairs of the company are in a state of internal disorder, and in the interests of the shareholders, it is hoped a thorough and unprejudiced investigation may be made speedily.

The Nova Scotia Coal Trade.

Our prognostications on the subject of the coal trade of Cape Breton during the present season are now in a fair way for fulfilment as the statement below will show. This gives at the mines of the Dominion Coal Co., a total output of 1,032,448 tons, from the 1st January to 31st October, and at the time of writing the November shipments justify an estimate of 80,000 tons. If to this is added 40,000 tons for December, the year's total should approximate to 1,150,000, or somewhere about 200,000 tons in excess of any previous year's shipments.

Some of the individual mines have done remarkably well, notably Reserve and Caledonia. The former will exceed 250,000 tons for the year which will entitle it to be called the "banner" mine of C. B., and the latter will not be more than 10,000 tons behind. As this has been achieved without any banking—or at any rate very little—it must be considered highly satisfactory. Everyone expected Reserve with its extensive workings and splendid system of haulage to do well, but there will be general surprise to find Caledonia so little behind. For two years this mine has been a source of trouble and expense to the Company—upwards of \$250,000 have been spent in converting an old into a new Colliery and almost everything modern which was supposed to improve the equipment of a mine has been brought there, and yet little or no result had followed. The season of 1894 found bankhead and screens only partially ready and it took nearly three months to get them and the dumping cages into running order. The consequence was that the end of the season placed only 125,000 tons to the credit of Caledonia. The

season of 1895 found things in pretty much the same condition only that the hindrance was a complicated and erratic mechanical cager known as "Mitchell's devil." This lost at least 75,000 tons during the season. When at last the Company realized that something must be done—and that experimenting did not pay.—the matter was taken in hand, and the same system of haulage by means of which Reserve has climbed to the top of the tree was installed at this mine and the result has more than realized expectations, enabling Caledonia to tread closely on the heels of Reserve, and come out with the very large total of about 240,000 tons this year.

Another mine which has surprised onlookers is Old Bridgport, which has jumped from 50,000 tons in 1894 and 100,000 tons in 1895 to 145,000 tons this year. The Hub has also done well, approximating to 120,000 tons.

The unfortunate mines have been Gowrie and Victoria. The former has been reduced to less than half strength, and even with that has only been able to work two or three days a week for lack of trade. There is some reason to hope that matters will brighten somewhat for this veteran mine, which as long ago as 1873, was the largest producer in C. B., except Old Sydney, and it is expected that the new coal washing plant now being erected near Morrison lake will contribute to the development at Gowrie.

In the case of Victoria the misfortune has arisen from a totally different cause, viz:—the collapse of a large pump which was supplied under contract to deal with the whole of the water in the mine. This has broken down three separate times causing the water to flood the workings and put an end to mining operations. With exemplary patience the Company have allowed the contractors to repair their work again and again and we believe they are now sanguine that the last job is a good one and the mine likely to be free from water within a few weeks. This will be too late to contribute much more to the shipping of the present season, but if having got rid of the water the Company will set to work in earnest to develop the mine for next season, they may do much to retrieve the losses of the last two years and to place this excellent mine on a more satisfactory footing.

We think the Dominion Coal Company may congratulate themselves on one fact at any rate that within three years the capacity of their mines has been doubled, for by the particulars given below it will be seen that in spite of Victoria and Gowrie being reduced to half strength, the mines have yielded over 9,000 tons as one day's work and this for nine months work is equal to 2,000,000 tons per annum. Clearly what they now require

ST. LAWRENCE COAL TRADE.

By courtesy of Messrs. Carbray, Routh & Co., Montreal, we are enabled to publish this month our usual summary of the deliveries of bituminous coal to St. Lawrence ports during the shipping season just closed. The figures since 1885 are:—1894, 796,282 tons; 1893, 737,891 tons; 1892, 626,087 tons; 1891, 602,323 tons; 1890, 543,656 tons; 1889, 467,525 tons; 1888, 517,539 tons; 1887, 482,103 tons; 1886, 377,500 tons; 1885, 360,000 tons.

	MONTREAL.		SOREL.		THREE RIVERS.		QUEBEC.		TOTALS.		EACH FIELD.		
	1895	1896	1895	1896	1895	1896	1895	1896	1895	1896	1895	1896	
Cape Breton.	General Mining Association.....	73,273	74,610	8,686	8,808	1,843	2,144	31,633	33,473	115,435	119,035		
	Dominion Coal Company.....	415,081	485,804	8,223	9,053	7,957	5,571	23,252	47,345	454,513	547,773		
	Cape Breton Colliery.....		4,750						1,330		6,080		
	Totals.....	488,354	565,164	16,909	17,861	9,800	7,715	54,885	82,148	569,948	672,888	569,948	672,888
	Intercolonial Coal Company.....	66,571	33,569							66,571	33,569	66,571	33,569
	Scotch, English and American.....	79,777	67,434					8,652	18,933	88,429	86,367	88,429	86,367
	634,702	666,167	16,909	17,861	9,800	7,715	63,537	101,081	724,948	792,824	724,948	792,824	

is more trade and possibly a little more energy in the sales department. The resources of their property are almost boundless, they have at enormous expense equipped and developed their mines until they are able to place in the market double the quantity shipped this season, manifestly they are carrying a lot of dead weight, unless they are able to greatly increase their sales. As far as we can judge it is not possible materially to do so in Canada or Newfoundland. They must therefore look to the foreign market. They should be able to increase their tonnage to the Eastern States if well represented, especially now that Pennsylvania and other American bituminous coal is rising in price. They may also hope towards the end of 1897 to begin to reap a portion of the harvest expected from Mr. Whitney's gas scheme. There are again the South American and West Indian markets yet untouched and a share of these could be secured at remunerative rates. The result of the Presidential election in the States does not encourage any expectations of "free coal" there—or even a reduction in the duty, and under these circumstances it is not likely that our own tariff will be interfered with beyond equalizing it with that of the States by reducing it from 60 to 40 cents. Sellers of coal, therefore, know pretty well what conditions they have to contend with in the near future and whilst an increased trade is more than ever a necessity for large concerns it is certain that nothing short of the most energetic and enlightened enterprise will secure this.

At Old Sydney Mines work has continued steadily to date and so brisk has been the demand during the fall that since the stock of banked coal was exhausted at the end of September the mine has been running "double shift." By the end of the year it is expected that 230,000 tons will have been shipped, and altogether the old mine will have had one of the best seasons on record. We understand that it is intended during the winter months to make extensive alterations in the system of haulage, and also to increase the speed of the hoisting with a view to a larger output next year. Messrs. Matheson & Co., of New Glasgow, have put in a pair of Lancashire boilers capable of working at 100 lbs. pressure by means of which the steam plant will be greatly improved. In consequence of the extensive area of the old workings and the presence of dust it has been decided by the management to discontinue the use of the naked lights after this season and to work exclusively with safety lamps. This will considerably increase the cost, but we are pleased to recognize the fact that this "ancient and honourable Company" regard safety as the first consideration.

Those of our readers who read the paper published in our last issue from the pen of Mr. Wm. Blakemore, the Mining Engineer of the Dominion Coal Co., on "The Economic Value of Coal Dust" will be interested in knowing that considerable progress has been made by that company on the lines indicated. At several of the mines coal dust is already being used to generate steam by the aid of the "Argand" blower, and although better results would have been achieved with a higher class apparatus, it has been clearly demonstrated that the experiment is a success, and in all likelihood next season will find the company using this fuel exclusively. In order to utilize the same product a large coal washing plant capable of washing 600 tons daily is being erected between Glace Bay and Louisburg under the superintendence of Dr. Slocum of Pittsburg. This is expected to be ready for work next month and will supply fuel for coking. In the first instance at the works of the "Light and Heat" Company, Halifax, and later in the States. The Company has also commenced the manufacture of briquettes and expect to have a large sale for these, as their qualities become more widely known. They have been used in the Company's own locomotives and have yielded better results than either coal or coke. We consider this one of the most important industries in Canada and one which should be encouraged in every possible way. The sale of briquettes is enormous even in markets within easy reach of Cape Breton. During September more than 15,000 tons were exported from Swansea and Cardiff to South America and the West Indies, and in Austria where this is a comparatively new industry over 125,000 tons were made last year.

The paper by Dr. A. R. C. Selwyn, C.M.G., to be read before the Canadian Mining Institute on a comparison of gold quartz mining in Canada and Victoria, Australia, will lend special interest to our gold miners and create a valuable discussion.

Dominion Coal Co.

OUTPUT AND SHIPMENTS JANUARY 1st, TO OCTOBER 31st, 1896.

	Largest Day's Output 1896.	OUTPUT.	SHIPMENTS.
Caledonia	1,615		
Dominion	1,250		
Victoria	631		
Gowrie	543		
Hub	892	1,032,448	948,820
International	1,137		
Old Bridgeport	1,207		
Reserve	1,784		
	9,178		

In Pictou County the Acadia trade has fallen off, partly due to general depression, partly to competition with water borne coal at Halifax the barge system facilitating Cape Breton trade. Probable output in 1896 is 190,000 tons. Operations have been of the usual character, and no new machinery has been set up.

At the Drummond colliery it is estimated that the total sales for the year 1896 will fall short by some 18,000 tons those of 1895. This falling off is by water. The railway sales show an increase of some 22½ per cent. over those of 1895. During the year the improved shaker screen, picking belt and tippler, have been duplicated, and the cost of labor generally reduced on the bankhead. The screens can now easily handle 1,000 tons in 9 hours, the coal classified and thoroughly cleaned of all refuse. Egg coal and nut are made a specialty at this mine and are finding a steadily increasing trade. A new lift has been opened up at a depth of 4,658 feet on the incline, the coal being of excellent quality. The work of opening up is fully two years ahead of requirements. The rolling stock has been increased by 50, I. C. R. pattern, 6-ton hopper cars, constructed by Messrs. Rhodes, Curry & Co. of Amherst. The mining, hoisting and transportation equipment is now most complete and, with coal so superior and so readily accessible, the colliery is in splendid position for transacting an extensive business.

In Cumberland County the output from Springhill will be about 410,000 tons, the sales up to 1st November, being 297,000 tons, an increase of 38,000 tons over last year. No returns from the Joggins and the Cape Breton Colliery have been received.

The Iron Ore Trade of the United States.

The report of Mr. John Birkinbine on the Iron Ore Trade of the United States in the year 1895, recently published, is of interest to the Canadian producer, to whom it points very clearly to the conclusion that the prospect of exporting this mineral to the American market becomes more and more remote. In the first place this appears from the fact that the production of the New York mines is very similar in character to our own, the bulk of the output being the magnetic ores of the Adirondack range. In 1889, New York was but a short way behind Alabama and Pennsylvania as a producer. In 1895 its output had fallen to 307,000 tons from 1,247,000 tons in 1889. With the extension of steel manufacture the growing importance of Bessemer ores renders magnetic ore less desirable, and accordingly we find that while it counted for 17.26 per cent. of the ore used in 1889, its use had fallen to 7.95 per cent. of the ore used in 1895. Mr. Birkinbine says:—"While pure magnetite may contain more iron than pure red hematite and while there is some of the former of most excellent quality most of the deposits of magnetic iron ore wrought in this country are comparatively lean, or if rich in iron, carry phosphorous, sulphur or titanium in excess of what is now considered desirable." It is therefore not to be wondered at that out of a total consumption in 1895, of nearly six-

teen millions of tons of ore, magnetic ore counted only for one and one quarter millions of tons.

The prices of ore at the mines range widely :—From 66 cents per ton in Alabama ; 73 cents in Minnesota ; 98 cents in Wisconsin, to \$1.95 in New York and \$2.17 in New Jersey. Probably Ontario would cost as much at the mine as any New Jersey or New York ore with duty and long freight haul to enhance the price of the former.

"The quantities of ore in sight, the apparent ease of mining, and the grade of material won on the Mesabi range may be pronounced marvellous ; but the other ranges (Gogebic and Vermilion) each in turn were surprises, and have done their part in making Lake Superior region the greatest iron ore producing district of the world, for no other section has in forty years supplied 100,000,000 tons of this mineral. No other iron range so far discovered possesses greater apparent reserves than the Mesabi. conservative estimates formulated from the records of properties now exploited and worked, together with others determined by systematic explorations and analyses, show that the Mesabi range can supply ore which will equal in average iron and phosphorus contents double the quantity, which the entire Lake Superior region has produced in fifty years. In this estimate there are not included a number of properties which have been imperfectly explored."

With this record before us, and of the value of any estimate prepared by so eminent an authority as Mr. Birkinbine there can be no question whatever, what ground can there be for any hope that even the remission of duty will galvanize into life the iron ore mines of Eastern Ontario or lead to the opening up of new mines in the Thunder Bay District? It is well therefore to face the inevitable conclusion that unless the enterprise of this country is adequate to the task of developing its own iron manufacture it must remain tributary to the neighboring country, whose greater enterprise and intelligence have made such use of advantages they possess, (in no greater degree than we do ourselves,) that they may now compete with the world in the cheapness and excellence of their iron and steel.

Valuable Discovery of Corundum.

The discovery of Corundum, in Carlow, Hastings County, Ont., announced by the Geological Survey, adds what is practically, if not actually, a new mineral of economic importance to the list of those already known in Canada ; for though corundum was noted by Dr. Hunt, many years ago as occurring in small crystals in Burgess, it has not since been identified there. The present discovery is due to Mr. W. F. Ferrier, who identified the mineral among some miscellaneous rock specimens, which, came into his hands, and after considerable difficulty succeeded in ascertaining the source of the particular specimen in question, approximately. Having informed the Director of the Survey of the circumstance, he was instructed to visit the locality indicated and endeavour if possible to find the deposit, which he succeeded in doing.

In the place examined by Mr. Ferrier and surveyed by Mr. A. A. Cole, who accompanied him, the corundum is described as occurring in a coarse grained reddish pegmatite, which forms, together with gneiss, a cliff from 80 to 100 feet high. Well developed crystals, often of large size, and irregular masses of the corundum are thickly distributed through the rock. The mineral was observed for a distance of 300 feet across the strike and was traced along the strike for about 700 feet.

The dimensions of this particular deposit, with the large proportion of corundum contained in the mass, appears likely to render it of immediate value ; while it is more than probable that this is not an isolated occurrence, and that further discoveries of the same kind will be made in Hastings district now that attention has been called to the mineral.

Next to the diamond, corundum is the hardest of all known substances, especially in its gem form. Its value depends entirely on its abrasive power, and can be easily determined by taking a piece of plate glass previously weighed, placing on it a weighed portion of the sample to be tested, rubbing the material on the glass and continuing the operation until the glass ceases to lose in weight, the total loss in weight giving the abrasive power of the sample. If the weighings are accurately made and the same weight of material is taken for each experiment the relative loss suffered by the glass will prove a sure indication of the relative value of the different samples and such experiments should always be tried on the corundum of any locality before deciding to commence mining. Almost all the corundum and a large proportion of the emery of commerce are used for the manufacture of the well known corundum and emery wheels.

The mineral offers a good field for profitable operations, if it be borne in mind that the discovery and proper mining of the mineral are only a portion of the problem. The preparation for market is equally important and any neglect of this will surely prove most disadvantageous. A good article of well prepared corundum will sell for double that of emery of the same "number ;" and although the latter is much reduced in price, rough ore being worth at present about \$20.00 per ton at the ports of shipment, at existing prices, a good mine, well managed, should pay very satisfactory profits.

EN PASSANT.

The following papers will be contributed to the Inter-Provincial Conference of Mining Engineers to be held in Montreal during the first week in February next in addition to those mentioned in our last issue. "Notes on some Mining Camps in British Columbia" by Mr. John E. Hardman, S. B., M. E. "The Responsibilities of the Mining Engineer" by Dr. Porter, Lecturer in Mining Engineering, McGill University. "The Mechanics of Mining" by Mr. D. W. Robb, Amherst. "The Canadian Pig Iron Industry," by Mr. George E. Drummond, Montreal. "Gold Quartz Mining in Canada and Victoria Australia" by Dr. A. R. C. Selwyn, C. M. G. Ottawa. "Initial Payments on Bonds and Options" by Howard West, A. R. S. M. New Denver, B. C.

In one of his rugged truisms Carlyle asserts that a blockhead may do more harm to society than a deliberate villain. It is quite certain no interest has suffered more from the intermeddling of fools and blockheads than the mining industries of the Dominion. For weeks past the *Toronto World* and *Globe* have been filled with "fake" mining despatches, evidently inspired and paid for by enterprising but unscrupulous brokers intent on unloading on a gullible public stock in many of them absolutely worthless. British Columbia gold mines. Perhaps, however, the most notable and the most ridiculous were the remarkable series of despatches published in the *World*, announcing the discovery of "a coal field," at Chelmsford, Ont., "quite equal in value to the best Pennsylvania anthracite," apparently inspired by an individual who has earned no great reputation as a mining engineer and who has already figured as the promoter of a worthless gold mining venture in the same neighborhood entailing considerable loss to a number of prominent but too confiding citizens. But if the party in question is not a capable mining engineer he is shrewd enough and thoroughly understands that, like the beater of the other big drum, he has only to make enough noise and he will be sure to attract attention.

In our issue of August we took occasion to remind our readers that the discovery was in all probability anthraxolite, a substance years ago named by Professor Chapman and of little commercial value. It has been observed to occur at various points in Canada, as for instance in

the vicinity of Port Arthur, Ont., near Point Levis, the Island of Orleans, in the Province of Quebec, and as far north indeed as Labrador. The Sudbury deposit is of precisely the same character as that discovered in the localities mentioned. Samples examined by the officers of the Geological Survey gave a very high percentage of ash, in commenting on which Dr. Dawson properly observes that it "renders the material entirely useless as a fuel, even if present in sufficiently large quantity." Notwithstanding these warnings a number of Toronto people have organized a company with the object of exploiting the deposit and, incidentally, of course, the pockets of those who have been foolish enough to take stock in the enterprise.

Whether Sudbury and the natives thereof entertain any respect or none for the opinions of the geologists of Canada, which by the way, do not differ from those of geologists elsewhere, is certainly very unimportant. It is however, very important, and certainly to be deprecated that a respectable newspaper like the *World*, should open its columns to such trash as has recently appeared in relation to this so-called Sudbury coal—much of which has been copied into other widely circulated papers and can only serve to mislead and deceive the public. In these items which seem to be anonymous, a little truth is so cleverly mixed with so many lies and so much ignorance that only the geologist would be likely to detect and separate them. The conspicuous double column puff of 30th October, may be first referred to.

It opens with a series of lies such as the "surprise" of the geological world, etc.—and then in every succeeding paragraph there is either a lie or a gross misrepresentation of facts. The only names mentioned as the authorities for the statements made are a Mr. Currie, and a Mr. Grenville Cole, Ph.D.—but these gentlemen are unknown to the mining authorities as promoters. Therefore, the reliance and value to be placed on their statements and opinions can only be estimated by knowing what their experience in mines and mining properties or mineral deposits has been in the past. As company promoters and speculators they have probably been heard of. The paragraph under the heading "Like Pennsylvania Beds" seems plainly to indicate that neither of these gentlemen has any scientific or practical knowledge of coal deposits, and option holders would do better to accept the statements of the geologists, Selwyn, Dawson, Coleman, Hoffman and others who agree with them. Such statements as those recently in the *World* can only be compared to those issued by the vendors of quack medicines.

Mr. John Blue, C. & M. E., of the Eustis Mining Company has gone to Mexico for a few weeks on a professional trip.

Mr. John E. Hardman, S.B., the well known Canadian mining engineer has returned to Montreal from a four months' inspection of some of the principal gold camps of British Columbia in the interest of an English Banking House. Mr. Hardman, while satisfied that the future for the mineral development of the province is full of promise, is of opinion that the stories that have come east are altogether too highly coloured and that the development done to date is very far from warranting the prevalent excitement. With respect to Rossland, he believes the growth of the town to be five years in advance of the mines and that much eastern capital will surely be dropped in "wild-cat" investments. In all of which the REVIEW in common with every reputable mining engineer who has carefully investigated the Camp, heartily concurs.

Mr. T. J. Watters of the Lake Girard Mica System, at present in England, is reported to have issued the Prospectus of a new syndicate to take over his mica and phosphate lands in Ontario and Quebec. Capital is reported to be placed at £160,000 sterling.

The next ordinary meeting of the Mining Society of Nova Scotia, will be held at Halifax, on Wednesday 16th December next. The following papers are down for consideration: "A Comparison of Nova Scotia and Southern Iron Methods," by C. A. Meissner, M. E., General Manager Londonderry Iron Company Ltd. "The Shaw Gas Tester, with practical illustrations of its uses," by Chas. Fergie, M. E., Manager Intercolonial Coal Mining Co., Ltd. "Coal Mining as an Investment," by W. Blakemore, M. E., Mining Engineer Dominion Coal Co., Ltd. "Some notes on Low Grade Gold Mining in Nova Scotia," by C. F. Andrews, M. E. It is hoped every member will endeavor to be present.

We regret to hear of the death at Chicago of Mr. Elbran S. Bowers, (of Bowers Bros.) well known to the trade as an extensive purchaser of Canadian mica. The deceased gentleman is reported to have been drowned in Lake Michigan.

The coal trade during the past year has been by no means satisfactory, as prices have been low, consumers loth to buy and slow to take delivery. The uncertainty of the tariff has effected the activity of many manufacturers who have curtailed their business in dread of possible change. The Pictou coal trade has particularly felt this in the lessened demand from the iron works, who require considerable expenditure yearly for the maintenance of their plant, and until they are assured of a permanency in the present scale of duties, are unable to induce the investment of fresh capital. In any re-adjustment of the duties the facts should be borne in mind that coke and anthracite coal are now admitted free, and that bituminous screenings or slack coal comes in at a duty of only 20 per cent. ad valorem. The consumption of this latter quality, owing to improved methods and patent appliances, has enormously increased. A large proportion of the receipts of coal at Montreal is of this class of fuel, coming by steamers from Great Britain, while throughout Ontario, bituminous screenings are extensively used, being imported from the United States. The duty on slack coal, owing to the low first cost or selling price amounts to very little, the freight in most cases amounting to much more than the original cost.

For these reasons the maintenance of the present rate of duty is essential to the coal producer in Canada, and does not by any means afford him now the protection that existed before the removal of the duty on coke and anthracite coal, and the extended use of slack coal.

The following are the names of the committee appointed by the Nova Scotia coal producers to interview Mr. Laurier's Tariff Commission: Mr. H. A. Budden, (Intercolonial Coal Co). Mr. R. H. Brown, (General Mining Association.) Mr. Arthur Drysdale, Q. C. M. P. P. (Acadia Coal Co) and Messrs W. B. Ross and B. F. Pearson, the Dominion Coal Co. This is a strong delegation whose representations will command attention—and we trust no interference with existing regulations.

For the year ending 31 October, 1893, the gold product of Ontario mines was returned as \$32,960, for 1894 as \$32,776, and for 1895 as \$50,281. Returns received from owners of six mines for the period commencing 1 November, 1895, and ending 20 September, 1896, show that the quantity of ore milled was 9,612 short tons, which yielded free gold of the value of \$118,468, besides 351 tons of concentrates estimated at \$13,337, and a quantity of tailings to be treated by the cyanide process estimated at \$10,800. The total value of ore treated is therefore \$142,605, or an average of \$14.83 per ton, whereof \$12.30 or 83 per cent. of the whole is free milling.

From returns issued by the Geological Survey of the United States, the total production of asbestos in 1894 only amounted to 325 short tons of a value of \$4,463, while the imports almost wholly from Canada amounted to \$256,018.

The imports of mica by the same country during the same period, very largely also from Canada, amounted to \$126,184.

A lively time may be predicted at the annual meeting of shareholders of the Granite Creek Mining Co. next month.

Whether compressed air, or electricity, or any other agency is best suited for the transmission of power in coal mines, can hardly be said to be satisfactorily determined yet by experience. To-day we have arguments in favor of one system, and to-morrow we shall have another system advocated with equal cogency. At a joint meeting of mining engineers at Pittsburgh, Mr. Cyrus Robinson stated that in his experience, wherever electricity had been adopted as a means for the transmission of power in a coal mine, its use had been gradually extended to all parts where power was required, every addition increasing the economy by decreasing the fixed charges on the balance of the operations. In plants where an electric system of haulage has been installed he has noticed that gradually electricity is extended to the running of fans, pumps, screens, and coal-cutting machines. With the system in general use for haulage, coal-cutting, etc., the greatest economy is effected, and where the mine is free from gas, a very slight investigation is sufficient to prove the advantage and economy of electricity over all other systems of power transmission for the coal mine. This is the opinion of one who has had some experience in electrical transmission of power, and there can be no doubt that Mr. Robinson is fully convinced that electricity is superior to any other agency in mining operations, but we should like to know whether his experience of other systems is sufficient to entitle him to institute a fair comparison.

One of the richest pieces of placer ground ever discovered was the famous Montana bar, Confederate Gulch, Montana. The bar comprised less than an acre of ground, but yielded \$1,200,000 in three months as the result of the labor of four men. The dust, which of course contained some black iron, weighed 7,000 pounds, was packed in nail kegs, and floated on a raft to St. Joseph, Mo., in the fall of 1864. Confederate Gulch produced in all about \$3,000,000.

Notwithstanding the number of high explosives which the engineer and the miner have at command for their various operations, still another, says *Invention*, has recently been added to the list. It is one, moreover, which distances in power the blasting agents at present in general use, and can be put on the market at a very reasonable price. It is known as fulminate, and is the invention of M. Girard, chemist at the municipal laboratory of Paris. It is a nitro-compound, and consists of nitro-glycerine absorbed into other explosives as carriers, instead of being absorbed into an inert substance, as in the case of dynamite. It is made in four varieties, in which the ingredients and their proportions are varied so as to produce different degrees of strength, the prices varying also. In all respects the new explosive has given good results, and proved itself well worthy of consideration. It promises to become no mean rival to the most powerful blasting agent at present in use. It has not as yet been commercially placed in this country, but a considerable quantity was employed in a hard place in the Iron Gates operations, and with eminent success, which success has been certified by the engineers of those works.

In view of the fact that deaths after explosions in coal mines are usually due to carbon monoxide, which is very dangerous when breathed in small quantities for a considerable time, the demonstration which Dr. Haldane gave, at the British Association, of a method devised by him for the detection and estimation of this gas in the air is extremely interesting. His method depends upon the fact that carbon monoxide is readily absorbed by the blood when the two are shaken up together.

The quantity of carbon monoxide present in the air with which the blood has been shaken can be ascertained very easily by the extent to which the colour of the blood is changed. Dr. Haldane claims to be able to detect in this way 0.01 per cent. of gas in the air.

The production of coal from peat is becoming quite an industry in Norway. The process devised by the Norwegian engineer, Rosen-dahl, consists in heating the peat in closed retorts to 250° centigrade and maintaining this temperature for seven hours. Tar and gas remain in the material of which after the process 80 per cent. is left. According to analyses made at the Christiania University, the product consisted of 65 per cent. carbon, 16 per cent. oxygen, 6 per cent. hydrogen, 3.7 per cent. water and only 5 per cent. ash. This peat coal possesses a theoretical heating value of 6,500 calories. It is, therefore, in this respect, equal to the average bituminous coal. Peat coal is now being sold in Norway for \$1.75 a ton, while coal costs from \$4 to \$5. The producing cost of peat coal is about 75c. a ton. According to tests made in the Krupp works, at Essen, Germany, peat coal is well adapted to foundry purposes. Thorough experiments were made in Norway as regards the value of peat coal for domestic heating, and it was found that for heating a medium-sized room by means of peat coal and fill-stove, with an outside temperature of 40° F. to 72° F., 4c. worth of peat coal were sufficient, while the quantity of coal required cost twice as much. A company in Norway and one in North Germany are engaged in the production of peat coal after this patent by which the extensive moors in those countries can be utilized.

Authorities have differed much as to the rate of increase in temperature from the earth's surface downward, and we are still without any law that is applicable in all cases. Mr. Joseph Libert has recently given this matter considerable study at a colliery in Belgium, where he was able to take observations as low as 3,770 feet beneath the surface. His conclusions show an increase of temperature of one degree. Fah. for 53.97 feet of vertical depth. This agrees pretty nearly with observations made a few years previously by another scientist. Mr. Libert says that the law of increase cannot be correctly expressed as arithmetical progression, for the rate of increase is greater at greater depths. For instance, he found at a depth of 2,263 feet the temperature increased one deg. for 65 feet of depth, while for depths from 2,263 feet down to 3,770 feet it showed one deg. Fah. for 43 feet. Other observations taken at bore holes of still greater depth show such variations that no strict rule can be adopted as applicable to all circumstances.

Long before the coal-fields of the world are exhausted there is little doubt the worker on the borderland of engineering will have discovered some plan of tapping the inconceivably great stores of energy around us. The very earth we live on is whirling around like a huge flywheel, and if we could only find some way of utilising its momentum we could draw upon it for ages for all the power we want without appreciably affecting the speed of its revolution or the length of our day. It is, indeed, naturally drawn upon now in various things intimately associated with the work of the harbor and dock engineer. The flow of the tide in enormous volume up and down a river is accompanied by a vast expenditure of power in overcoming the frictional resistance of the river bed, in the grinding of shingle into sand, and in the transport of sand banks from one part of the river to another. Even the flow of water through the sluices of locks involves a loss of energy, as does the working of a tide mill, which latter is one way of utilising as the others are of destroying some of the earth's momentum. No true engineer will believe that with so many sources of energy around us the progress of mankind and the work of the engineer will cease with the exhaustion of our coal-fields.

The Gold Fields of Western Ontario.

BY DR. A. P. COLEMAN, TORONTO.

Gold is very widely distributed in the Province of Ontario, having been found at many points between the townships of Madoc and Marmora in the east, and the boundary of Manitoba, more than nine hundred miles to the northwest. In the eastern part of the Province it has been obtained to a greater or less extent at several points east of the town of Peterborough, such as Deloro, Belmont and Madoc; near Parry Sound on the Georgian Bay; east of the famous Sudbury nickel mines at Wahnapiatae, from which magnificent specimens come; west of Sudbury, at the Vermillion mine; north of lake Huron, at the Ophir mine in Galbraith township; and north of lake Superior, at the Empress mine, near Jackfish bay; but the most promising region at present lies west of lake Superior, from Moss township to Shoal lake on the boundary of Manitoba.

The gold deposits of the eastern part of the Province have been known for thirty years, and have been worked to a small extent during that time; but some of the ores are difficult to treat, such as those mined near Deloro, and it is only recently that the difficulties seem to have been successfully met, so that their development belongs to the future. The deposits near Sudbury also are attracting attention, but cannot yet be called mines. On the north shore of the upper lakes only the Empress mine requires mention. Here work has been begun on a series of bedded or lenticular quartz veins enclosed in green Huronian schist, near an outcrop of granite. A very complete ten-stamp mill has been at work for some months, and several bricks of gold have been obtained. The ore is not high in gold and is rather refractory, so that not more than 40 or 45 per cent. is extracted by the stamp mill, the rest being contained in the concentrates, which consist of iron and copper pyrites with some galena; nevertheless the gold obtained by free milling methods already more than pays for the mining and milling. By tunnelling in from near the foot of a lofty hill the veins can be struck about one hundred and forty feet below the level of the present open working, and the ore obtained in the easiest way, without the need for hoisting or pumping apparatus. When this tunnel is made, supposing that the veins retain their present thickness of about twenty feet in all, the mine should afford at least a reasonable return for the comparatively small capital invested.

Attention is, however, specially directed at present to the main gold region of Ontario, which extends for more than two hundred and fifty miles from Moss township westward, and has been proved to be at least a hundred and thirty miles wide, between the Little America mine just south of the international boundary in Minnesota and lake Minnetakie twenty miles north of the Canadian Pacific Railway. Here the number of locations, usually of forty acres each, taken up for gold mining purposes within the last four years runs into the hundreds. Many of these will of course not prove workable mines; but, on the other hand, new finds are constantly being made, sometimes in quite new localities, sometimes in regions supposed to have been well explored years ago.

In general the gold bearing veins occur in green chloritic and hornblende schist, probably of Huronian (Keewatin) age, and are of a bedded or lenticular kind; but sometimes they are found in masses of eruptive granite or gneiss which have pushed their way up through the Huronian schists. In the latter case the veins are commonly true fissures, and may be followed for considerable distances. In either case the contact of an eruptive rock with schist seems of importance, since the best veins are found within a mile or two of such a contact.

In addition to gold bearing veins there are deposits of other kinds which are worthy of attention, such as fahlbands, wide bands of schist heavily charged with sulphides, and showing a considerable amount of free gold; and dikes of felsite or quartz porphyry containing pyrites and gold; though up to the present none of these have been mined sufficiently to prove their value.

During the past summer all the gold deposits on which any important amount of work has been done were visited, except the Huronian mine in Moss township; and it is proposed to give a brief preliminary report on what was observed.

Our canoes were dropped into the water at Sayanne, a station on the Canadian Pacific Railway seventy miles west of Port Arthur, and traversed nearly seven hundred miles of lake, river and portage before ending the summer's travels at Rat Portage. On Lac des Mille Lacs and the waters of Partridge river no delay was made though gold was found year's ago by the McKellar's on Partridge lake.

On and near Reserve Island in the river Seine, near the entry of Partridge river, several gold bearing veins have been discovered, and two or three of them are being opened up by Mr. H. B. Proudfoot, but at the time of our visit his shafts had not been sunk more than twenty feet and it was impossible to judge of the real value of the locations.

On Sawbill lake, which opens into the Seine from the north some distance below Proudfoot's camp, and thirty-three miles southwest of Bonheur station on the Canadian Pacific Railway, the now well-known Sawbill mine is situated. At our arrival early in July we found that a shaft had been sunk to a depth of 49 feet, and that the vein had increased in width from four feet on the surface to six at the bottom and showed very distinct walls. The vein can be traced for more than a quarter of a mile on the surface, and will no doubt afford a great quantity of ore. The quartz contains the usual sulphides, and free gold can frequently be seen. Mr. F. S. Wiley, the manager, states that the shaft has since been sunk below ninety feet, with no diminution in the width of vein nor in the gold contents of the quartz. It is worthy of special note that this promising mine is in what has been mapped by the Geological Survey as biotite-granite gneiss of the Laurentian, so that gold occurs in satisfactory amounts in a rock hitherto looked on as barren. Several other gold bearing veins of a somewhat similar kind have been located in the region since work began at the Sawbill mine, and there is reason to suppose that diligent prospecting will disclose a number of valuable deposits.

Still farther down the Seine, a little west of its expansion, Steep Rock lake, the Harold Lake Mine, owned by Messrs. Wiley and Gibbs, is situated. Here several veins, in general, not very large, have been more or less opened up by shafts or drifts, and a five-stamp mill worked intermittently has yielded a number of gold bricks. One small vein on the shore of Harold lake contains ore exceedingly rich in free gold, in leaf form. The country rock here is quite varied, granite of the greenish altered kind, often called protogine, piercing green and yellowish rocks of the Huronian.

From this point westward to Shoal lake, another expansion of the Seine river, no mining has been done, though a number of locations have been taken up, especially west of Calm lake.

Shoal lake may be looked on as the focal point of the Seine river and Rainy lake gold region, hundreds of locations having been taken up during the last three years within a radius of ten miles of this small lake, and a very considerable amount of work has been done on several of the properties.

Up to the present the most important mines have been found in an area of protogine granite about six miles in length from northeast to southwest and about a mile in width, lying between Shoal and Bad Vermillion lakes. The whole granite area has been located and scores of veins have been found, varying greatly in gold contents but generally true fissure veins with well defined walls of slickensided talc or sericite schist.

The largest amount of development has been done on the Foley mine, now owned by the Ontario Gold Mines Co., the property comprising AL74, 75, 76. On one of their veins, the Bonanza, one shaft had been sunk to 210 feet and another 1,200 feet away to a depth of 113 feet, and more than 300 feet of drifting had been done at various levels at the time of our visit, July 17. The vein proves very uniform in width, running from 2½ to about 4 feet, and the ore, which contains a considerable amount of visible gold, is said to average 120 in free milling gold and \$5 in concentrates per ton. By this time a well equipped twenty-stamp is being erected, and before the new year should be producing gold. There is every reason to expect that this will prove a very profitable mine.

The Ferguson mine is situated northeast of the Foley mine in the same area of granite, on locations AL110, 111 and K223. This property is owned by the Seine River Gold Mines Company of England, which is at present doing mainly exploring work. There are several veins ranging from a foot to three feet or more in width and traceable for hundreds of feet. On the Daisy vein two shafts had been sunk to a depth of fifty

*Preliminary Report of the Ontario Government.

feet, and sinking had been begun on the Government vein at the time of our visit, rich specimens coming from the latter ore body. On the Finn vein, one of the widest, a shaft had been sunk seventy feet. The work thus far done shows that the veins are not usually very wide, but that there is in the aggregate a large amount of fairly rich ore available.

The only other property in the region requiring special mention is the Lucky Coon or Hillier mine, on 655P, where a shaft has been sunk to the depth of about fifty feet on one of the veins and a five-stamp mill erected. The quartz looks well, and the vein chiefly worked is about eight feet wide at the bottom of the shaft. Owing to disagreements among the owners the mill was run for only a short time. This mine has been taken hold of by Edinburgh capitalists, who propose to develop it this winter with the intention of purchasing if the results are satisfactory.

Many locations have been taken up in the Keewatin schists east of Shoal lake, and also along Little Turtle river and lake, north of Bad Vermillion lake. These deposits are mainly bedded veins or fahlbands, and have been very little developed, though rich specimens of free gold come from them, and a plucky company of Norwegians have pounded out a few hundred dollars worth of gold with hand stamps from a vein on the Little Turtle.

On Rainy lake itself gold has been found at a number of points; but the only mines worked are two in Minnesota. Of these only the Little America mine on a small island near Rainy Lake City has produced much gold. From it several thousand dollars worth have been obtained, and after many vicissitudes it is now said to be worked at a profit. Minnesota, however, contains only a narrow fringe of the gold bearing Huronian rocks which cover so wide a surface to the north and northeast in Canada.

North of Rainy lake and south of the Canadian Pacific Railway, at Wabigoon, is a very promising region on the shores of lake Manitou and smaller bodies of water near by. Ore deposits of varying kinds and of all degrees of richness occur here, and brilliant specimens are found, but nothing that can be dignified with the name of mining has yet been attempted. A two-stamp Tremaine mill has been at work for a time under the management of Mr. E. B. Haycock of Ottawa, who reports an average of about \$25 per ton from small amounts of rock obtained from a number of veins on lake Manitou, in the aggregate about eighteen tons. Difficulty of access from the want of a summer waggon road, by which to bring in the supplies and machinery, has retarded development in this district.

Gold has been found at various points north of the railway, e.g. on Minnetakie and Sturgeon lakes; but the locations are yet only in the prospecting stage.

A canoe journey westward over seldom visited waters took us from Manitou lake to Regina Bay, a part of Whitefish Bay, the long southeasterly projection of the octopus-armed Lake of the Woods. The Regina mining camp with its trim buildings comes as a pleasant surprise to the canoeist who for five days has seen no human being outside his own party. The Regina (Canada) Gold Mine Company (Limited), of London, England, is operating this mine, Lieut.-General H. C. Wilkinson, being managing director. At the time of our visit a shaft had been sunk one hundred and sixty feet, and 500 feet of drifting had been done on the main vein, besides the sinking of small shafts for the testing of one or two other ore deposits. The vein on which most work has been done begins in a mass of protogine granite near the shore, and runs into a weathered diabase (trap) towards the south. There is a rich shoot of ore running down through the granite into the diabase. The gold is fine and difficult to save by the present concentrators. The mill is of ten stamps, and the number of men employed about fifty.

Many locations have been taken up near the Regina and farther northwest on Yellow Girl and other bays, but none have been worked seriously. Nearer Rat Portage, however, especially along the contact of Laurentian and Huronian running northwest from Andrew bay to Black Sturgeon lake, a number of shafts have been sunk, generally to a depth of fifty feet, and at several points abandoned or active mining plants may be seen. At the time of our visit only two mines were producing gold, the Golden Gate, whose ore was being crushed at the mill of the adjoining Gold Hill mine, and the Triumph, which was having its ore tested with a two-stamp Tremaine mill.

There are a number of other promising properties, including some wide fahlbands, north of the Canadian Pacific Railway, such as the Scramble mine, and two or three others said to have been found by the aid of a divining rod imported from Sweden. However found, these sulphide bearing bands of schists readily yield gold in the pan, and probably some of them will turn out valuable mines.

The most justly famous mine in our whole western gold field is undoubtedly the Sultana, on an island seven miles southeast of Rat Portage, owned by Mr. John F. Caldwell of Winnipeg. After years of hard struggle against adverse circumstances, this plucky and energetic mine owner is reaping a solid reward in the shape of a great body of rich quartz in places forty feet wide, and already followed more than three hundred feet in depth. Nearly a thousand feet of drifting have been done and there is ore enough in sight to keep the well equipped ten-stamp mill, or one double its size, running for years. The ore bodies appear to be lenticular, the lower one of immense size, and are enclosed in the sheared and schistose edge of an area of coarse porphyritic granitoid gneiss, mapped by the Geological Survey as Laurentian, but adjoining green Huronian rocks. The ore is somewhat quartzitic looking, contains one or two per cent. of iron pyrites, and is free milling to the extent of 75 or 80 per cent. A recently finished chlorination plant extracts the gold carried by the sulphides very satisfactorily. Gold mining at the Sultana has been reduced to a thoroughly business-like basis, the mill running with scarcely a halt and the weekly brick being turned out with perfect regularity. If this splendid mine had been in the hands of a stock company much would have been heard of its dividend-paying powers; but its owner is too modest to boast of its success.

Perhaps the most interesting mining development of the year is to be found on a western Shoal lake, thirty-five miles from Rat Portage and about ten miles east of the boundary of Manitoba. The Mikado mine, found by an Indian a year ago, has been purchased for \$25,000 by a London company under the chairmanship of Col. W. T. Engledue, and has been worked sufficiently to show that the ore is very rich, though not enough sinking has been done to prove the extent of the deposit. The quartz contains a variety of sulphides, including a sulphide of bismuth, new to the Lake of the Woods region, and a considerable part of the gold is carried by these refractory minerals; but probably two-thirds of the gold contents are free milling, the gold occurring as thin plates rather than nuggets. The ore treated is the richest found in large quantities in Ontario, and the ore now on the dump after only a few months' work by a small force contains values sufficient to pay for the mine and a simple equipment.

Several other finds of very rich ore have been made in the vicinity of the Mikado, and next summer will probably see the development of an important mining camp in that district.

At a number of other points on Lake of the Woods and its bays promising finds of gold have been made, e.g. at Camp Bay to the southeast, but none of them have been worked sufficiently to make sure of their value.

Looking at our gold mining region as a whole, one is struck by the wide extent over which gold has been found, the variety of deposits that occur, the ease with which they may be reached, the free milling character of most of the ores, all points in its favor as compared with most gold regions.

No part of the region is more than forty miles from a railway or steamboat, and most of the mines are within a few miles of the rails or of navigable waters. In winter a road sufficient to take in heavy machinery may be made without difficulty to any point in the region, and the Ontario Government has shown itself liberal in granting assistance to such roads.

All parts are readily reached by canoes in summer. Plenty of water of good quality is found everywhere, and wood for fuel, building or mine timbering almost everywhere. The region is not an inaccessible desert, nor covered with malarious swamps, nor cut off from civilization by precipitous mountains. Supplies of all sorts are cheap; efficient labor can be obtained on easy terms, the labor of white men, not of negroes or Indians; and life and property are as safe as anywhere on the globe.

The laws relating to mining and mining locations are simple, and generally admitted to be fair and favorable to the prospector and mine owner. All locations are bounded by east and west and north and south

lines, reducing boundary disputes and the customary litigation of mining countries to a minimum.

In conclusion, the impressions formed during the summer's work may be summed up in the statement that the prospects are better than ever before. One mine has already proved to be a splendidly paying property, and several others are apparently on the point of becoming so. The number of properties on which promising finds of gold have been made has greatly increased, and the area of known gold bearing rock has been considerably widened. Many of the properties located will no doubt prove of little value, as is the case in every mining region of the world; others will not turn out to be extensive enough to justify an independent mill, though they may be worked at a profit when within reach of a customs' mill; but it may be looked on as certain that a considerable number of the locations taken up will eventually prove to be paying mines.

MINE DRAINAGE.

BY HANS C. BEHR, MECHANICAL ENGINEER.*

Mines worked through shafts are subject to flooding by penetrating water-bearing ground. Even if not encountered at first, water is liable to be struck at any time, and appliances should therefore always be in readiness to handle it. For moderate inflow the water can generally be hoisted in bailing-tanks without encroaching too much on the time required for other hoisting operations. When, however, a large permanent flow is struck, the entire hoisting capacity may be required for bailing until a suitable pumping-plant can be installed.

In deciding upon the capacity of a proposed pumping-plant, it is necessary to ascertain as nearly as possible the maximum quantities of water that may be encountered at different levels. In well-opened mines this can generally be done without difficulty; not so in sinking a shaft in new ground. But, if other mines are adjacent, a record of their water production is a very good guide.

The pumping-plant should be able to handle a much larger quantity of water than any recorded maximum, so that a considerable increase can be taken care of without resorting to bailing. Bailing arrangements should, however, also be in readiness to meet at once any extraordinary increase that may occur at any time.

The water is generally found in a mine at various levels, and, where economy rather than simplicity is the object, any considerable quantity of water should be collected and led to pumps at the levels where it issues, and not be permitted to first find its way to the bottom, from where it would have to be raised the entire height to the surface, thereby increasing the cost of pumping in proportion to the increased lift for that part of the water.

In many mines, the quantity of water varies, not only as new bodies are tapped or opened ones drained, but also with the seasons of the year; and observations extending over at least a year should therefore be available for fixing on the capacity of a pumping plant. In the Kennedy Mine, Amador County, California, the water production varies from 75,000 gallons per day during the dry season to 150,000 gallons during the wet season, and is handled by bailing-tanks.

The generally variable nature of water inflow necessitates a corresponding variation in the work of the water-raising apparatus. Bailing adapts itself most readily to such variation, as it gives equal though low mechanical efficiency for a very wide range of capacity. With pumps the case is different, since the number or length of strokes can only be varied economically within certain limits.

Mine pumping plants should be designed and constructed with the aim of obtaining the greatest possible security against breakdowns, and at the same time admitting of rapidly making repairs and replacing worn parts. If possible, the pumping-plant should also be so designed that it will give the highest mechanical efficiency for that rate of flow which prevails most of the time and furnishes the largest proportion of all the water. Large excess over this, if known to be of short duration, can be

taken care of by bailing-tanks or cheaper and less efficient emergency-pumps. A sudden influx of large quantities of water can be handled by bailing with powerful direct-acting hoisting engines, which bring the tanks to the surface rapidly. Often a mechanically less efficient plant may, owing to other conditions, prove to be commercially the most efficient.

Timbered shafts are universally used in the west. They are generally arranged with three compartments—two for hoisting, and one for the pumps. The latter should be partitioned off from the hoisting compartment, so that it can be made to serve as upcast to ventilate the bottom of the shaft, because the pump-shaft is usually warmer than the hoisting compartments, due either to steam pipes for operating direct-acting pumps, or to the warm water in the column-pipes.

Where the mine has two separate shafts connected below, so that one serves as upcast shaft, the pumps should, if possible, be placed in the latter.

The kind of pumps, source of power, and the means of transmitting this to the pumps underground, depend on surrounding conditions, and only a careful study of these can decide the proper kind of plant to be adopted.

PRELIMINARY REMARKS ON MINING PUMPS.

Water-Raising Machines used in Mining. The pumps used in pumping out mines are chiefly reciprocating. Centrifugal pumps find some application for low lifts, and generally in open workings. Of other water-raising appliances used, the bailing tank is the principal one, and finds a wide range of application. Pulsometers are used as a low-lift auxiliary to pumps, etc. The same is true of ejectors. It is also occasionally possible to employ siphons for raising water over an eminence.

Reciprocating pumps may be divided into plunger, piston and bucket (or lift) pumps.

The oldest pump used in mines is the draw-lift pump, with a valved bucket working in the barrel. The modern forms of this type of pump are much used for sinking where the pumps are operated by rods. They are not suitable for working against heads of over 200 ft. The pump-barrels and bucket-packing also are exposed to great wear, particularly when the water carries sand. The bucket cannot be packed while the pump is running. Nevertheless, their use in mining is very extensive. In the Cornish system they are generally arranged so that the bucket can be hauled up through the column-pipe for repairs.

Plunger, or force, pumps are suitable for much higher lifts. Vertical, single-acting plungers are the typical form of the modern pumprod system. In these the plunger-packing can be taken up while the pump is running, and, as the packing is located at the highest part of the pump-barrel, away from the course of the water, little sand or grit is liable to reach it. The pump can, therefore, run quite a long time before repairs are required at that point.

Horizontal, double-acting plungers are generally used for high-pressure, direct-driven pumps. These are arranged either with or without cranks and flywheels. In the former case they are called direct-acting pumps; in the latter, rotative pumps. Flywheel, or double-crank pumps of this class, with mechanically actuated valves designed by Riedler, have been used continuously for single lifts of 1,300 ft.

Piston pumps are suitable only for lower pressures. The piston-packing and cylinder are subject to wear, while the pump must be stopped and the piston taken out to pack it.

Centrifugal pumps are, as generally constructed, only suitable for low lifts, but are capable of handling large volumes of water. As they have no valves, the water may contain large quantities of sand and gravel without impairing the efficiency of the pumps while they last. The capacity of centrifugal pumps can only be varied economically within very narrow limits, as they require to be run at a certain speed to pump against a given head.

Injectors, pulsometers, etc., are not economical water-raising machines, and can only be considered as temporary appliances or as substitutes for better apparatus during its repair. The steam used to operate them acts so that a large proportion of its energy is wasted by being applied to heat the water which they deliver.

Conditions Affecting the Working of Pumps. The operation of pumps is influenced by many conditions: the height above sea-level;

*Report to California Mining Bureau.

the barometric pressure; the temperature of the water pumped; the size, length, and course of the suction and delivery-pipes; the area, weight, and lift of valves, etc. The height above sea-level, and therefore the existing atmospheric pressure, limits the height to which water may be drawn by suction or the velocity with which it will follow the piston or plunger, thereby limiting the speed of the pump for a given suction lift. The higher the temperature of the water the less will be the admissible suction lift, because if the reduction of pressure at the upper end of the suction-pipe be sufficient, the water will begin to boil at a temperature much below that at which it would boil under atmospheric pressure, and give off steam, which will fill the pump-barrel, instead of the water doing so. The suction lift must therefore be kept so low that the pressure will be sufficient to prevent steam from forming. The suction height is the vertical distance from the level of the suction water to the highest point of the piston displacement and spaces connected with it. The greater also the head pumped against the less is the admissible speed, because with the longer column shocks are more severe.

Starting Pumps. In starting a reciprocating pump it is necessary to remove the air from the pump-barrel and the spaces communicating with it. Where these waste spaces are large compared with the piston or plunger displacement, and the head pumped against is high, the air, particularly in high altitudes, will not be sufficiently compressed on the working-stroke to lift the discharge valve and escape into the discharge-pipe in case it is full of water. Again, if atmospheric pressure exist at the beginning of the suction-stroke, the air in the pump may not be sufficiently expanded and lowered in pressure on completion of the suction-stroke so that the outer air can lift the water in the suction pipe, cause it to force open the suction-valve, and enter the pump.

Priming and Draining. The operation of expelling the air from a pump and filling it with water is called *priming*. Means are generally provided in a by-pass pipe with a cock for priming the pump from the discharge-pipe in case the latter already contains water, the escape of air being then generally effected through a cock near the highest part of the space communicating with the working-barrel. When no air-escape is provided, the air will be forced out through the discharge-valve into the discharge-pipe as soon as the pump is put in motion. When there is no water in the discharge-pipe, pumps with large waste spaces generally require independent means for priming them, such as an opening with a funnel, through which water may be poured. Pumps placed below the supply from which they draw do not require priming. Pumps and pipes should be fitted with means for draining them to prevent freezing and to draw off sediment.

Methods of Driving Pumps. Main pumps for shafts are either operated through rods from a motor or engine at the surface, like in the familiar Cornish system of pumping, or, as in more modern methods, by transmitting power to motors directly coupled to the pumps, either through pipes, in the form of steam, compressed air, or pressure water, or as electricity through wires. Some one of these modes of transmission is required, where, as is usually the case, pumps or other machines are used to raise water from winzes or low places, and force it up to the nearest station-tank at the pump-shaft. Hand pumps are also similarly used to raise small quantities of water from low places into launders in the drifts. Pumps should be started in motion gradually, and not in such a manner as results from throwing them suddenly into gear with driving machinery already in motion.

Distribution of Pumps. The distribution of pumps along the line of the shaft depends, first of all, upon the lift allowable for the individual pumps. This condition determines the spacing of pumps in the Cornish system, in which they are generally 200 ft. to 250 ft. apart. Where, however, the pumps are capable of working against a very high head, as in some of the modern direct-acting types, they should, for economical reasons, be spaced according to the levels at which water issues.

Though the water which is generally encountered in sinking a shaft does not always issue at the lowest point, it is nevertheless usually necessary, if pumps are put in, to have the lowest pump so arranged that it can follow close to the shaft bottom as it goes down, in order to be prepared to handle any water that may be struck there, or

which may flow down from upper levels. Pumps used for this purpose are called sinking-pumps.

When the sinking-pump has been lowered so far that the limit of its admissible lift is reached in raising water to the next higher pump, another permanent pump is put in near the bottom of the shaft. The sinking-pump then delivers its water to this lowest fixed pump, and is made ready to proceed with further sinking.

Desirable Features of Mining Pumps. The welfare of a mine, if subject to influx of water, depends largely upon the reliability of the pumps. These should therefore be so constructed and arranged that there may be the least possible chance of their failure. The following are some of the main desirable features: (1) They should be capable of running a long time without requiring packing, repairs, or adjustment; (2) They should, if possible, be capable of being operated and repaired under water. This is particularly desirable in the lowest, or sinking pump; (3) They should be able to handle sandy and sometimes acid water, without too rapid wear or deterioration.

1.1.19. In addition, they should be so arranged with reference to the driving power that they can be operated for a wide range of capacities to adapt them to the varying conditions of the water production of the mine.

PIPES.

Pipes used in connection with mining pumps are, firstly, those for conveying the water handled by the pumps, constituting in reality a part of the pumps; and, secondly, those used for conveying power to the motors operating the pumps, in the form of pressure water, steam, or compressed air. While the main object of this chapter is to treat more at length of the former, it is proper, though perhaps to a more limited extent, to consider also the latter, as they are intimately connected with the operation and care of pumps in mines.

The suction- or inlet-pipes and the discharge-pipes of a pump or hydraulic pumping-engine affect the working of these to a great extent, and it is necessary to consider them in a different manner from ordinary continuous flow water-pipes, in order to fix upon the most advantageous arrangement, size of pipes and pumps, and admissible speed of the latter.

Material of Pipes. Cast-iron, formerly used exclusively for larger pipes subjected to pressure underground, is now rarely employed in American mines for this purpose. While this material is less subject to corrosion than either wrought-iron or steel, the pipes made from it have to be very heavy, with a proper factor of safety to withstand the pressure, and the sections are therefore more difficult to handle.

The cheapness of wrought-iron pipes, their greater security under water-hammer, and the facility with which sections of any length can be cut off and fitted to place at the mine, have led to their utmost universal use in general practice.

1.2.05. In cases where the corrosive action of the mine-water on the iron pipes is very strong, and their destruction rapid, pipes of other materials have been used.

At the Barranca Mine, Mexico, drawn copper tubes were put in at great cost. Wooden pipes, where the pressure is not great, or, for higher pressure, iron pipes lined with wood, are sometimes used.

Wrought-Iron Pipe. Formerly, column-pipes larger than 14 ins. in diameter for mine use were made of boiler plate, riveted hot, often with butt-joints and lap-strips; the rivets being counter-sunk on the inside. Now, iron and steel lap-welded tubes up to 24 ins. diameter can be obtained, and manufacturers are preparing machinery for sizes up to 30 ins. in diameter.

Welded pipes are either lap-welded or butt-welded. The latter should be used only for smaller sizes, and for moderate pressure, as they are liable to split open at the weld. Lap-welded tubes or hot-riveted pipes of boiler plate are the only wrought pipes suitable for pump columns in shafts, and for all purposes where heavy pressures and water-hammer are encountered. Lap-welded tubes are also used for steam and compressed air pipes. Iron boiler plates, including those of which welded tubes are made, have less strength in the direction of their width than their length, which latter is the direction of strain when manufactured into a welded pipe. Sheets of mild steel are homogeneous in this respect, besides possessing greater strength; therefore, for larger sizes steel pipes are nearly always used. Welded pipes may be obtained in lengths up to

20 ft. For the sake of facility in handling, however, the sections composing a line of pipe in a mine are usually not over 16 ft. in length.

Ordinary pipes, either lap or butt-welded, having screwed ends for connection by threaded flanges or couplings, are classified by manufacturers according to nominal inside diameter. The actual diameter is generally in excess of nominal diameter. Lap-welded tubes connected by other means than the regular coarser pipe threads, that is, by flanges shrunk or riveted on, or by leaded joints, or finely threaded sleeves or flanges, are known according to their exact outside diameter. Such pipe is generally called tubing; when connected by fine thread, it is known as casing.

The different sizes of lap-welded tubing can each be obtained of different thickness of material to suit different pressures. The following table of standard sizes and thickness may prove useful for reference:

TABLE I.

Dimensions, etc., of Lap-Welded Tubes of a Prominent Manufacturer.

Outside Diameter of Pipe, in inches.	Inside Diameter of Pipe, in inches.	Thickness of Metal.		Weight per Foot, in pounds.	Bursting Pressure, lbs. per sq. inch.
		Birmingham Wire Gauge.	Inches.		
3	2.73	10	.135	4.05	5,900
4	3.70	9	.150	6.00	4,800
5	4.67	8	.165	8.40	4,200
6	5.64	7	.180	11.00	3,800
7	6.61	7	.180	13.00	3,200
8	7.58	..	3-16	15.65	2,900
9	8.55	..	..	23.10	3,500
10	9.52	..	..	25.75	3,100
12	11.5	..	..	31.00	2,600
13	12.5	..	..	35.40	2,400
14	13.5	..	..	36.35	2,220
15	14.5	..	..	39.00	2,070
16	15.5	..	..	42.00	1,930
18	17.5	..	5-16	58.40	2,150
20	19.5	..	5-16	65.15	1,970
22	21.5	..	5-16	85.00	1,750
24	23.5	..	..	93.50	1,930

The thickness given in the table is known as standard. Pipe can be made one or two gauges lighter, but would not come any cheaper per foot. On special orders, the pipe can be made thicker to almost any extent. Numerous experiments have demonstrated that in properly welded pipes the weld is practically as strong as the rest of the metal.

Heavy Riveted Pipes used for pump-columns should, if possible, be made of mild steel, because then they can usually be made from a single sheet, requiring only one longitudinal joint. Steel admits of this method of construction, because, it has about the same strength across the sheet as lengthwise. Iron, being fibrous in its nature, and having less strength across the sheet, should therefore be bent so that the fiber runs around the pipe, in order to secure the greatest strength. As the sheets are limited in width, this necessitates making a wrought iron riveted pipe section of several sheets riveted together by circular seams. Longitudinal seams should be double riveted.

Heavy riveted column pipe sections are usually connected by cast or wrought-iron flanges riveted to the sections. Where laid on the ground and not liable to be disturbed, they are often connected by lead-caulked joints, with cast or wrought iron rings to hold the lead.

Riveted sinking-columns, inside of which a pumprod works as in the Cornish system, should have the rivets countersunk on the inside, and the circular seams made as butt-joints with outside lap-strips, so that the lift-pump bucket can be drawn up and lowered through the column-pipe without catching on obstructions.

Light Riveted Pipes* are used principally for water supply for power or for hydraulic mining where the pressure is constant and where the pipe is not subject to being crowded out of line, as in a shaft. The sheets, rarely thicker than 1/4 in., are riveted up cold, often, on account of transportation, at the point where put in use. They are now almost universally made of steel. If made of iron, the sheets must, for reasons previously stated, be bent in the direction of the fiber. The longitudinal seams should be double-riveted. The lengths of pipe, except for very heavy pressure (when both internal and external sleeves caulked with lead are used), are generally joined by simply slipping the ends into each

other like the sections of a stovepipe. The sections are made larger at one end for this purpose. These pipes will stand considerable pressure when it is constant, but they are not suitable for withstanding any water-ram. Iron pipes of this kind have been subjected continuously for many years to a constant fiber-stress of 17,000 lbs. per square inch on the section of the sheet. At the line of the rivets, where their insertion reduces the iron section of the sheets, the stress would in that case be about 22,000 lbs.

Wooden Pipes, made of staves like a continuous barrel, hooped with steel bands, as in Fig. 1, have been in use for a number of years in connection with irrigation and gravity water supplies for cities. They are economical, especially for light pressures, and may be used for pressures of 200 ft., if steady, the spacing of the bands varying with the pressure. They are very smooth on the inside, and offer little resistance to the flow of water. They are not suitable for pump-columns, but there are cases in mining where this class of pipe can be used to advantage. The water does not come in contact with the steel bands, and cannot corrode them; and if the pipe is continuously filled with water, the wood will at all times be saturated and cannot decay. Where a pipeline is required in a mountainous country, difficult of access, it is an advantage that the parts of which this pipe is composed are all light, can be closely packed, and easily transported. The entire pipe-line can be taken down without any injury to its parts, and be re-erected elsewhere.

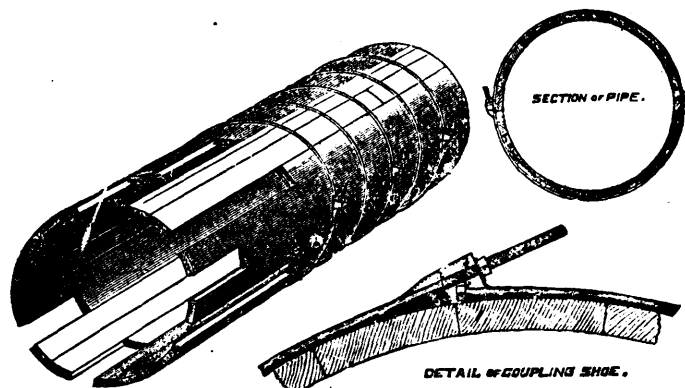
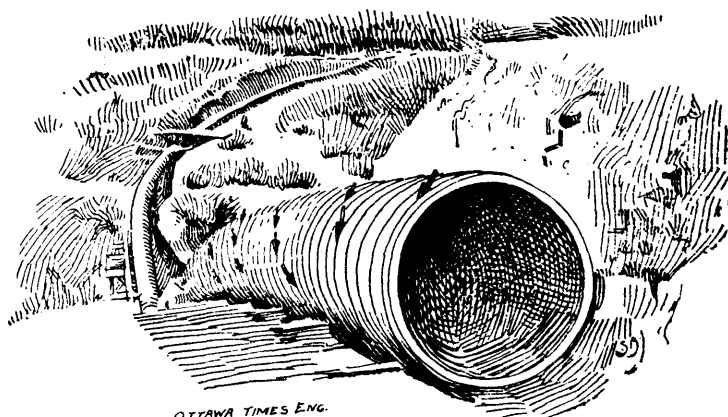


FIG. 1.



OTTAWA TIMES ENG.

FIG. 2.

This class of pipe has been ably discussed by Hamilton Smith in his "Hydraulics," and also by Aug. J. Bowie in his "Practical Treatise on Hydraulic Mining." Numerous examples of (completed) pipe-lines, with experiments on flow, leakage, and stress on material, are given in those two works.

These pipes do not contract and expand with heat, and can, if necessary, be left on the surface. The pipe is very rigid and not readily flattened by snow or landslides. Fig. 2 is a view of a completed pipe-line of this kind.

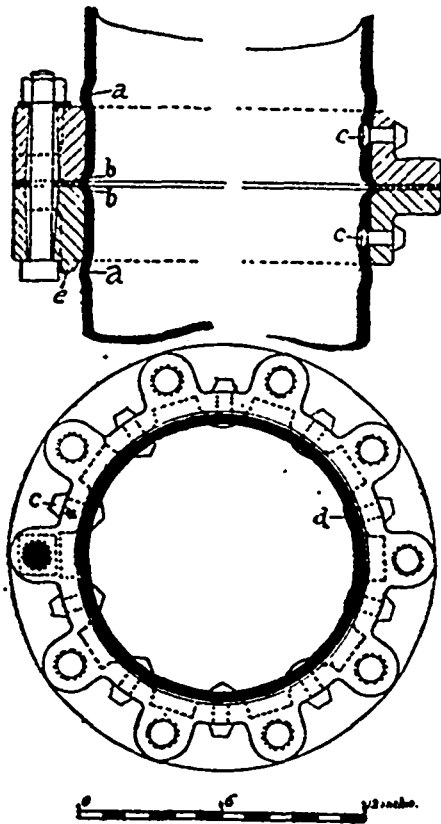


FIG. 2

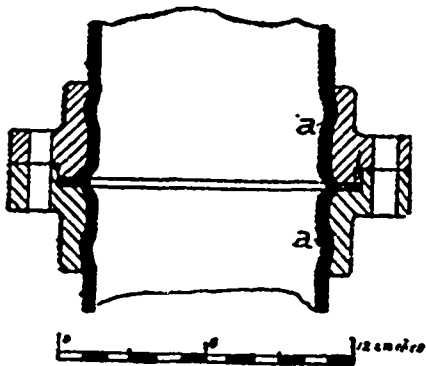


FIG. 3

Flanges for sinking pumps, where the pumprod works inside of the pipe, should have these rivets countersunk on the inside, as at *d*, Fig. 3. In putting flanges on pipes care must be taken, in the first place, to have their faces come square with the pipe, and also to have the bolt-holes of the two flanges in line, so that the lengths of a column or pipe-line are interchangeable. In order to allow for inaccuracies in this respect, and also to provide for possibly required variations in position of elbows or other connections, the bolt-holes are sometimes made oblong, as in Fig. 5, so that one flange can be slightly rotated upon its mate. In this case a wrought-iron washer must be placed below the nut to give it an even bearing. Such a washer is an advantage also for

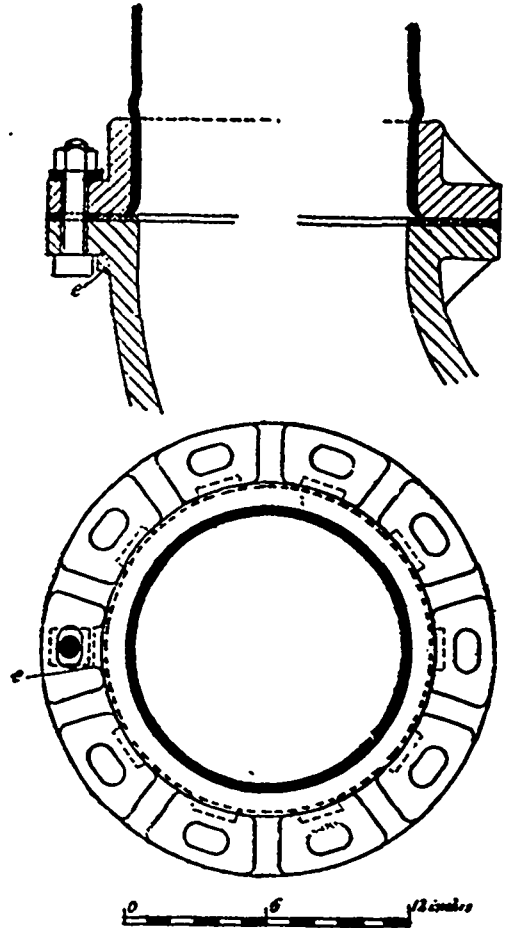


FIG. 5.

ordinary round holes, as it provides a better bearing for the nut than the rough casting. A projection *c*, Fig. 3 and Fig. 5, should be cast on one flange of each pair, to absolutely prevent the bolt from turning when the nut is screwed up. Where it is desirable to get the flanges of as small diameter as possible, bosses are carried up around the bolt-holes to the full depth of the flange, Fig. 3. In this way the bolts can be brought closer to the body of the pipe than in the form shown in Fig. 5, while the thinner metal between the bosses affords facility for riveting to the pipe. Flanges of larger diameter are, however, always required where the pipes connect to cast elbows or nozzles, so as to allow room for the bolt-heads or nuts on the back of the flange of the casting. (See Fig. 5.) Where a greater number of such connections are required, it is sometimes preferable to make all the flanges of the larger size. Such flanges should be ribbed between the bolt-holes. Nearly all flanges obtained from dealers in pipe are much too light, and have too few bolts to be suitable for pipes subjected to heavy pressure and deflecting strains, like pump-columns or high-pressure steam-mains.

The smaller sizes of pipes, and often larger ones also, have their ends threaded, and are connected together by threaded sleeve-couplings or by flanges screwed on. The flanges of largest steam-pipes are often put on in this manner. This method of securing flanges is generally also necessary for pipe of extra thickness. Where a tight pipe is required

Pipe Connections. Wrought iron pipes are connected principally by flanges, screwed ends and couplings, leaded or cemented sleeves, or by simply slipping the smaller end of one length into the larger end of the next. In underground work, shafts, etc., welded tubes with flanges or screwed connections are used for water, steam and air-pipes. Leaded joints are only used where a water-pipe is permanently located and not liable to be disturbed, such as pipes for water distribution. They are not suitable for pump-columns in shafts or inclines.

Flanges are the usual means of connecting pipes underground. They are commonly made of cast iron, and, in case of welded pipe, either screwed or shrunk on the ends of the tube, which, in the latter case, is expanded behind the flange, as at *a*, Fig. 3, and then headed over in front, as at *b*. Instead of expanding the pipe behind the flanges, it is preferable to have the bore of the flange recessed, and to hammer the pipe into the recess, as shown at *a*, Fig. 4. This gives a firmer hold on the flange. It is sometimes necessary to put in rivets, as at *c*, Fig. 3, in case of riveted pipe or where the pipe-line is subject to lateral disturb-

under high pressure, the ends are sometimes screwed through the flange, so as to project beyond its face, and then faced off level with the flange.

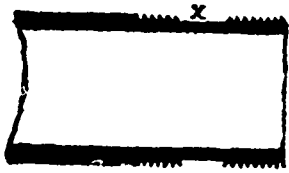


Fig. 7

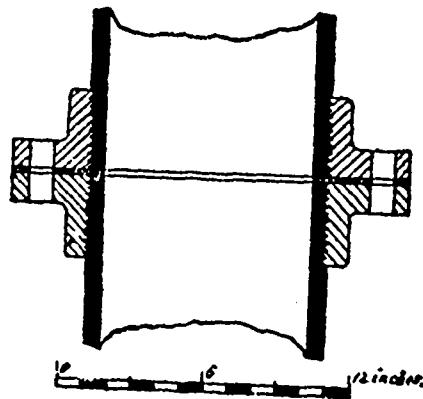


Fig. 6

This is a good plan for high-pressure steam-pipes where leaks are liable to occur at the threads. By the construction described, and illustrated in Fig. 6, it will be seen that the packing entirely prevents leakage at the thread by covering the joint between pipe and flange. Ordinarily a putty of red lead is used with threaded joints. For air-pipes, shellac varnish makes a very tight joint.

A water-tight threaded joint may also be secured by cutting away a portion of the thread, as at *x*, Fig. 7, and wrapping hemp or wicking into the groove before screwing into place. This joint is stated to be water tight under heavy pressure, even when the thread is so loose that the pipe can be rotated by hand. For column-pipes of Cornish pumps screwed flanges are not generally used; nor are they used in such cases where it is occasionally necessary to cut pipes to lengths, and where screw-cutting machinery of large size is not at hand. Where flanges are used on riveted pipe they are not shrunk on, but simply riveted to the pipe, and the latter caulked, if the metal be sufficiently heavy.

A flange connection which has been used with success in English collieries, is shown in Fig. 8. The ends of the tubes are expanded after the flanges *a a* are slipped on. When put together the double conical ring *b*, with packing *c c* encircling each end, is inserted, and the bolts in the flanges drawn up. This joint has been used for water and steam; for the former, under pressures up to 4,000 lbs. per square inch. The inside ring and the outer flanges are not machined.

To be continued.

Hoisting from Deep Shafts.*

In hoisting from shafts over 2,000 ft. in depth, the question of the best form of winding drum becomes important. It is not good practice to have round rope wind over itself and the drum becomes of an unwieldy size when provision is made for winding in a single layer. Large diameters of drums have also a distinct disadvantage in starting the load, which disadvantage is met in part by using a taper drum. Flat ropes winding on a single reel, as largely used in the United States, combine the advantages of a conical drum with a simpler form of construction; but round ropes are in more general favor amongst engineers. A third form of construction, which permits the use of small drums and round ropes, consists in passing the rope around one or two grooved drums and balancing the cages, so that the rope simply passes a few times round the drum and off again. A system of this description, as made by Messrs. Fraser and Chalmers, is used in Germany, and of late it has been adopted on Lake Superior for the deep copper mines, where it is known as the Whiting hoist. The hoist consists of twin engines driving direct on a small grooved drum which is coupled by two connecting rods to a similar drum in front, like the two driving wheels of a locomotive. The front drum is set at a slight angle to the horizontal, so that the rope may lead straight to the proper groove of the other drum, and cause no chafing. The rope, after several turns over both drums, leads back behind the hoisting engine and around an anchorage grooved pulley fixed on a tension carriage which runs on a trail track, and is adjustable as to distance from a hoist by a steam winch. This tension carriage controls, by its position, the depth from which hoisting is to take place from time to time. It is fitted

with grips which clamp the carriage to the rails while hoisting is in progress, and which are released when a new adjustment of the depth of hoisting is necessary. The whole operation of changing the adjustment from one level of the mine to another occupies only a few minutes. This adjustability is very convenient for sinking work, as the skip may be run down to any point desired, while the upper one is just on the landing dogs. Any stretching of the rope can be immediately remedied by the tension carriage adjustment.

The following particulars of the hoist at the Red Jacket shaft of the Calumet and Hecla Copper mine on Lake Superior will show a simple arrangement for a very deep mine. The shaft is about 5,000 ft. in depth at the present time, and cuts the lode at 3,200 ft. Size of shaft 13½ ft. by 23 ft. inside timbers. A twin compound-condensing Corliss engine, 16 in. and 32 in. by 48 in. stroke, drives direct two grooved drums of 7 ft. diameter with three grooves on each drum. Diameter of rope 1½ in. The grooves of the drums are made of soft maple blocks. The run-way of the tension carriage is 650 ft. long. Steam pressure 120 lb. The average speed of hoisting is about 1,200 ft. per minute, but is run up as high as 1,900 ft. The weight of cage is 2,500 lb., and of load 3,000 lb.

This style of hoist has met with the approval of South African engineers, and one is now being erected by the Durban Roadreport Deep Level Mine of the following details:—The shaft will be about 1,000 ft. vertical and 2,000 ft. on the incline of reefs. The engine is a twin Corliss steam engine, cylinders being 20 in. by 48 in. stroke, arranged to be made compounded later by the addition of tandem cylinders. Drums 8 ft. diameter. Revolutions per minute 75, giving a hoisting speed of 1,880 ft. per minute. The cylinders are fitted with a Seymour equalized cut-off, giving a range from zero to 75 per cent. of stroke. The weight of skip will be 3,300 lb., and of load 5,000 lb.

In connection with heavy hoisting work, it may be of interest to give a few figures from the De Beers diamond mines in South Africa as probably establishing a record in the way of capacity for a single shaft. The hoist was designed by Mr. L. I. Seymour, while engineer to the company, and consists of a pair of vertical tandem compound-condensing engines operating at 100 lb. to 120 lb. steam pressure, and running 75 revolutions per minute. The engines run two reels for flat wire rope of 3½ in. by 13-16 in., and are 9 ft. diameter at start. There is one throttle valve for the two high-pressure cylinders and one for the two low-pressure cylinders, both worked by a hand lever, which also works the cut-off mechanism. A small steam engine operates the reversing gear. Brakes are operated by a foot lever. There is a large steam receiver between the high and low-pressure cylinders to equalize the steam pressure, which is at about 23 lb. in it. The hoisting is from the 1,200 ft. level, and the total lift about 1,250 ft. Two automatic dumping skips are in use, each weighing 4,400 lb. and holding 9,600 lb. of rock. The skip is loaded at the bottom by tippers working from the chute by a hand lever, and the rapidity of handling is shown by the fact that as high as 92 skip trips have been made in one hour. On one occasion, during a single shift of 11 hours 43 minutes, the weight of ore hoisted to surface was 3,665 tons 2,240 lb., or at the rate of 7,400 tons per 24 hours. These engines have been in use now over three years, and consume only 2½ lb. coal per horse power per hour.

Firing Shots in Mines.

By FRANK BRAIN, A.M.I.C.E.*

Now that safety explosives are engaging so much attention, and the use of gunpowder in mines pretty generally being abandoned, the methods of firing the charges are also receiving consideration.

The old methods—the gunpowder straw and the time fuse still have their advocates, and, contradictory as it may appear, there are collieries even to-day using so-called flameless explosives, and firing these explosives by means of the common time fuse ignited by a heated wire. The electric fuse has, however, very largely displaced all other means of firing shots, and with the cheaper and more convenient forms of apparatus now in use, this method cannot fail to become increasingly popular. Her Majesty's Inspectors of Mines not only approve, but very generally strongly recommend electric shot firing. Just lately, however, so-called safety igniters have been introduced to public notice, more particularly

*Paper read by Mr. Walter McDermott before the Institution of Mining and Metallurgy.

*British Society of Mining Students.

in German mines. Two kinds have been mainly used there, those of Norres and Roth, the principle in each case being the same. The igniter fires the charge inside a metal case which is attached to the end of the fuse. In the Norres igniter the flame is produced by pulling a wire, which wire passes through the closed end of the metal case.

This was proved to be a weak point, as the hole thus made for carrying the wire allowed part of the fuse flame to issue, and it was found this was sufficient to ignite a fire-damp mixture. Several fatal accidents having occurred by premature explosions when using these igniters in German mines, investigations were carried out at Schalke and at the Westphalian Testing Station, Gelsen Kirchen, by Beigrath Kalthemer and others, with rather remarkable results. It was found that if a tarred safety fuse, with double cotton covering, was gripped by pincers after ignition, and so held until the burning of the core had passed the point so gripped the fuse on the other side almost always exploded with a loud report, and the throwing out of sparks—varying in intensity and volume; and that even the placing of the foot upon the safety fuse had the same effect.

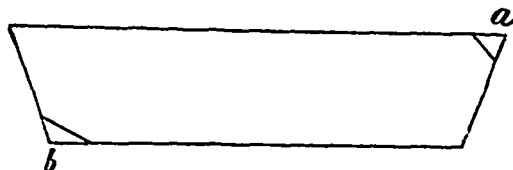
This action was found to vary in different makes of safety fuse. In practice, the fuse is tightly closed over—its whole length being enclosed in the tamping. Where the covering is such that the burning of the powder core does not destroy it, and where the attachment of the igniter to the outer end closes it, the only escape for the generated gases is forward, and if these conditions are perfect, an immediate firing of the shot takes place. So quickly does this take place that serious accidents have resulted. A knot tied in the safety fuse proved to have very much the same effect. The safety fuse with gutta percha covering, which is of such a nature that the powder core, when ignited, burns away the outer covering, and thus allows the generated gases to escape, was proved not to possess this disadvantage. This gutta percha fuse exhibited, however, a danger of another kind. Inside the explosion chamber of the testing station filled with 9 per cent. fire-damp mixture, experiments with this class of safety fuse showed that, when sharply kinked, the sparks given off would cause an ignition of the explosive mixture.

Further details of the experiments are given by Herr Winkhaus, in an interesting communication to *Gluckauf*, a German technical paper, and he concludes his article by referring to the electric system of shot-firing as being trustworthy, and as being widely adopted, stating that, in addition to almost complete safety as regards fire-damp explosions, electric ignition has the great advantage that it completely precludes accident from premature firing of a shot, or its hanging fire.

The Liquefaction of Certain Alloys of Gold.

One of the most interesting and important papers that has been published for a long time appears in *Philosophical Transactions*, on the liquefaction of certain alloys of gold by Mr. Edward Matthey, of the well known firm of Johnstone & Matthey, refiners of precious and rare metals. Owing to the wide use of the cyanide and other processes, a considerable amount of bullion has found its way into the market in which the precious metals are alloyed with lead or zinc and sometimes both.

Assays made from different parts of ingots of such bullion showed such a wide difference that not even an approximation of the true value of the ingots could be obtained from them. The following case of an ingot of gold may be taken as typical.



Four assays were made on a portion of the metal cut from the part marked *a*, at the top of the ingot; the highest of the results of assay indicated that 661 parts of gold were present in 1,000 parts of alloy, while the lowest assay gave only 465 parts. On the other hand three assays of the piece of metal cut from the bottom of the ingot at *b* gave 652 parts of gold in the 1,000 as the highest, and 332.5 parts as the lowest. It is clear therefore that the action of gravity does not explain the distribution of the precious metal.

“The ordinary course, where divergent results of assay are obtained on portions of metal cut from such an ingot, would be to melt the entire mass, and take a “dip” assay piece, that is to remove a portion of the metal, from the well stirred fluid mass. This was done in all the cases cited in the paper here abridged and as regards the mass of gold to which reference has just been made, assays on the portion of metal removed from the fluid mass gave results which were still very conflicting, the lowest assay showing the presence of 562.3 parts of gold per 1,000, and the highest 653.5. It was evident therefore that the re-arrangement could take place within the limits of a fragment of metal which did not weigh more than a few grammes.”

The average of the total number of assays gave the ingot under consideration a value of £965, while on refining the value was found to be £1,028, or a difference of £63 in an ingot weighing 12.223 kilograms.

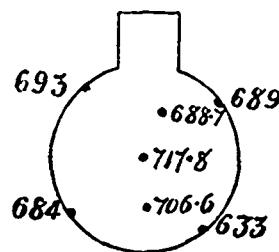
An analysis of the ingot showed that it contained the following metals besides gold:

Silver	8.1 per cent.
Lead.....	16.4 “
Zinc.....	5.5 “
Copper.....	4.0 “
Iron.....	0.3 “

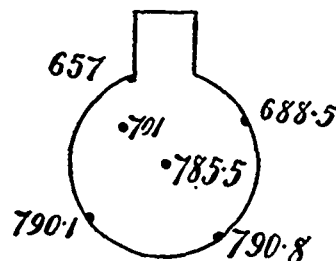
“Suspicion at once fell upon the lead and zinc as distributing elements, and their influence was systematically investigated by a lengthy series of experiments, in the course of which gold alloys, containing different proportions of gold and of impurities were cast in spherical moulds, two and three inches in diameter, the solidified masses being explored by assays made on metal representing all parts of the mass. The general rule of these experiments was to show that lead exerts a greater distributing influence than zinc. The problem was then attacked from a different point of view. I availed myself of Roberts-Austen’s method of fixing the solidifying points of metals on “cooling curves” obtained by the aid of a thermo-junction connected with autographic recorders. Such curves showed that a triple alloy of lead, gold and zinc has three “freezing points.” The mass sets as a whole, at a single main point of solidification but the lead and zinc associated with some gold retain a certain amount of individual independence, and by falling out of solution, separately destroys the uniformity of the mass even though the mass itself be small.

The investigator next turned his attention to discover a metallic solvent, which would distribute the metals evenly through the mass and make a homogeneous alloy. After a long series of experiments it was found that alloys of gold containing not more than 30 per cent. of lead and of zinc may be made practically uniform by the addition of 15 per cent. of silver to the mass when fluid.

The following figures illustrate a few of the many experiments which led to the above conclusion. The cuts represent sections of spherical castings and the figures represent parts of gold per thousand.

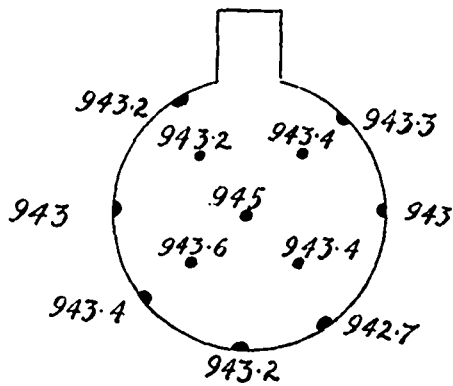


Gold 700 parts; lead 200 parts; Weight about 2 kilogrammes.

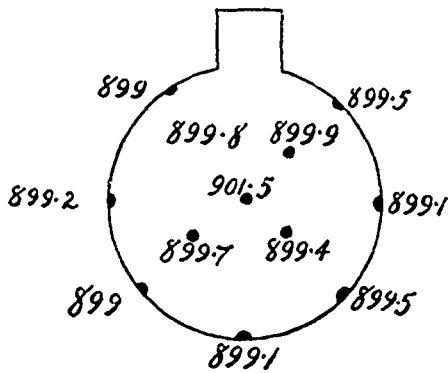


Gold 75 parts; lead, 15 parts; zinc, 10 parts; weight about 2 kilogrammes.

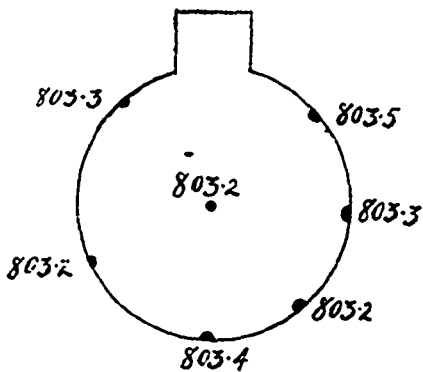
There is evidence of rearrangement by liquation in this case, which sends gold to centre, while gravity also appears to send gold to lower parts of casting.



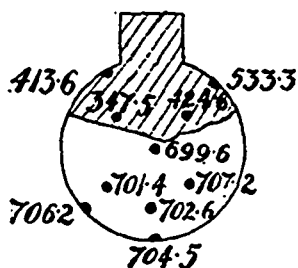
Gold 95 parts; zinc 5 parts; weight 4,430 kilogrammes. A slight but decided tendency of liquidation of gold towards the centre.



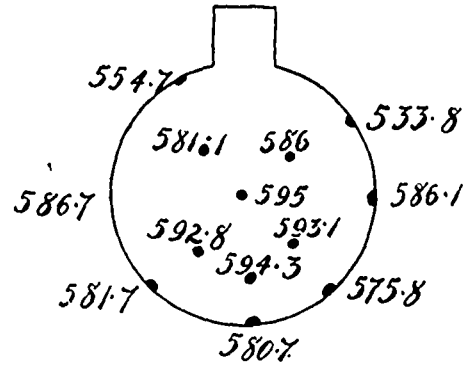
Gold 90 parts; zinc 10 parts; weight 4,200 kilogrammes.



Gold 77.5 parts; Silver 7.5 parts; Zinc 15 parts; weight 3,930 kilogrammes.



Gold 63 parts; Silver 7 parts; Lead 20 parts; Zinc 10 parts. The shaded portion is a white alloy, the remainder yellow alloy.



Alloy similar to previous one only containing 15 per cent. of silver. There is still a tendency for the gold to liquate toward the centre, but the addition of an extra 8 per cent of silver has greatly modified the arrangement of the gold. A similar alloy only containing 20 per cent. of silver gave a practically homogeneous mass, the difference between the centre and the extreme portions being very slight.

The author draws the following conclusions from the experiments.

(1.) Alloys of gold with base metals notably with lead and zinc, now often met with in industry, have the gold concentrated towards the centre and lower portions, which renders it impossible to ascertain their true value with even an approximation to accuracy.

(2.) When silver is also present these irregularities are greatly modified.

The method of obtaining "cooling curves" of the alloys shows that the freezing points are very different when silver is present in the alloy and when it is absent from it.

(3.) This fact naturally leads to the belief that if the base metal present does not exceed 30 per cent., silver will dissolve it and form a uniform alloy with gold.

The author of this paper has brought to light some very valuable facts, which will be of interest to everyone handling bullion.—F. H. M.

MINING NOTES.

British Columbia.

(From our Correspondents).

SLOCAN DISTRICT.

Once in a while the Slocan Silver Mining Camp receives a small type reference amongst the outside papers, more as a satellite of the great Rosslund camp than apparently from any merit of its own. Rosslund is a gold camp. Slocan is a silver lead camp. Yet the net profit on shipments of silver ore are as agreeable as those upon gold, and the value of Slocan silver lead shipments gross and net, considerably exceeds that of the Rosslund gold and copper shipments. However, as a man heavily interested in mining in Kootenay said, "Gold is fashionable." It appears, therefore, that making money on silver mines is unfashionable. This state of affairs held until this last summer season, when the matter of fact dividends of Slocan mines caused a much increased interest, and at present it can safely be said that at no time in its short history has the Slocan been so much in demand amongst mining investors.

The extension of operations and greatest activity has been in the district lying back of Slocan Lake on the east and south for seven miles. In this district some 18 miles long by 7 miles broad, there is a great variety of dry silver ores in a country rich of mixed slate and granites.

Since the first of April, some 15 prospects have been bonded. These are doing active development work in almost every case with good indications of becoming shippers. The capital invested in this particular section is not American; it is Canadian and English capital, representing Vancouver and Winnipeg men as Canadians, and London for the English.

The ores of this district are chiefly the richer combinations of silver, such as ruby silver, native silver, Argentite grey copper and zincy associations, together with a considerable amount of gold—1 oz. to 7 oz.—in the Argentite ores of the southern portion.

It is through this district that the C. P. R. contemplates building its connection of the Nakusp & Slocan Ry. with the Kootenay & Columbia Ry.; probably this piece of road down the Slocan River will be the first link between the present C. P. R. main line at Revelstoke and the future Crow's Nest Passenger Ry., as it is certainly the most expeditious and expedient.

In the Sloean proper, that is Three Forts, Sandon and Bear Lake, things are settling down for the winter, and a steady output. The influence of the late presidential contest has withheld some operations in the hopes of an advance in silver. This, however, will have little effect upon production this year, which has been estimated at 25,000 tons of a nominal value of \$100 a ton. Such ores as these are can be mined here at a profit whatever the probable rise or fall in silver, where in some cases 20 cents an ounce covers the cost of production.

During the past summer West Kootenay has received a fair amount of consideration from the Provincial and Dominion governments. Mr. W. A. Carlyle, the Provincial mineralogist, has investigated and reported upon the chief Trail Creek mines, and owing to a fine autumn was able to pretty well cover the ground in the Sloean, Ainsworth and Nelson mining divisions. His report upon the latter will probably be held over until the New Year, in order to get returns in full of production for 1896.

These reports are looked upon here as valuable and having the stamp of genuine authority and knowledge. They have another merit much appreciated in mining camps. *They come out at once.* Not after their living interest is gone. It is also said that the Geological Department will get out a provincial map of the more developed portions of West Kootenay, taking in Trail and the Sloean. This will be a god-send, especially if wagon trails and mineral claims are indicated.

There is a class of mineral veins in the southern granite belt of the Sloean, concerning which we shall be much relieved to have the opinion of Mr. McConnell and Mr. Carlyle as these veins appear to confound the insight of our "experts."

The Cody Creek concentrators will not contribute towards the output of the present year. At present the machinery for the one belonging to the Noble Five Co. is being put in. A 150 ton concentrator is expected on the "Galena Farm," southeast of Silverton, to mill the large bodies of galena shown up.

The controlling interest of the "Ruth" has been sold to London people. Two thirds having been transferred for a sum representing a quarter of a million for the whole. At present however, it is not clearly known what the figure was. This group of claims is quite close to the Sloean Star, and up to the present time was owned and worked by the original locators. This shows the sunny side of Sloean mines as ideal poor man's properties.

The people now having a bond upon the "Galena Farm" group will soon install a hoisting plant upon that property. This will be the first hoisting plant in this division.

The "Topaz" and "Silver Nugget," on the divide between Eight Mile Creek and Ten Mile Creek are showing up very favorably under the bond obtained by Mr. Hugh Sutherland of Winnipeg. These properties carry silver in a native form as distinct nuggets. Some weighing upwards of an ounce. The usual form in which native silver occurs in this district is as leaf silver or filaments, more often as a thin leaf in seams of otherwise barren rock.

It is rumored that the C. P. R. will build a good modern steam boat for Sloean Lake. At present there are three boats running on this lake, which is 26 miles long. They are all too small to handle the ore and traffic generally.

The first snow fell in the valleys on November 8th, and about two feet cover the summits. It is probable that the rawhiding season will begin earlier than usual this year, and with its advent close upon fifty mines will ship ore. At present some mines are paying as high as \$35 a ton for packing to boat or railroad, chiefly as test shipments from newly opened districts.

The prospecting season is over, without any discoveries of new and rich fields in particular. Although reports from the heads of creeks, flowing into Kootenay Lake from the west, give some exciting data Rich Galena finds have been made at the head of Yuill or Kokanee Creek, and a few fair free gold locations have been made on the Kootenay slopes, southwest of Balfour.

BOUNDARY CREEK.

The Boundary Creek Mining and Milling Co. has been recently incorporated. This company owns a group of eight claims situated about a mile above Greenwood City. They are chiefly quartz properties and are a very promising group. A small smelter shipment from the "G. A. R." (one of the claims) returned \$100 per ton in gold and silver. A small force is now at work, and a number of miners have expressed their willingness to take payment in stock. Shares are quoted at 10c.

Two shifts are working on the new shaft of the Stemwinder, a cross cut at the 50 foot level showed the ore body to be 12 feet wide.

A contract has been let by the Old Ironsides Co. for a continuation of the shaft to the 100 ft. level, and a cross cut of the ore body at that level.

On the "No. 7" they are drifting alongside the vein at a depth of about 130 feet. No ore is being taken out, but from stray pieces seen,

the quartz appears to be well mineralized with fine grained pyrites blende and galena. An assay of a typical piece gave about \$40 per ton in gold and silver.

It is understood that the "Sunset" Deadwood camp has been bonded through Mr. Campbell of Vancouver by a Montreal syndicate for \$16,000, 10 per cent. down. The "Sunset" has a huge ore body of magnetite with copper pyrites disseminated and carrying a few dollars in gold, although in one cut \$20 assays are obtained. It is probable, as has happened with the Mother Lode and Old Ironsides, that development work will show the magnetite to be superficial, and the copper pyrites will be found in the mixed silicious and calcareous gangue typical of Greenwood camp.

The ore body in the tunnel on the Mother Lode is reported to have a width of over 30 feet.

Six men are working on the "R. Bell" Summit camp (one of the group owned by the Keough Gold Mining Co.). A main working shaft is being sunk and connections will be made with the ore body at a depth.

The Knob-Hill on the same deposit as the Old Ironsides has been bonded for \$30,000 through J. P. Greaves of the Old Ironsides Co. It is understood that the Old Ironsides Co. are responsible for the bond, 10 per cent. was paid down.

Another important deal was made within the month. E. Heueage, on the examination of the properties by W. L. Austin of Denver, Col., bonded the "Lincoln" and "City of Paris" for \$26,000, 10 per cent. down. These two claims are situated in White's camp, and are amongst the oldest and best developed properties in camp.

On the Lincoln, over 200 feet of work has been done. The vein is about 10 feet wide, and is quartz carrying gray copper with an average value of about \$6 gold and 40 ozs. silver. On the City of Paris the vein is about the same width, with an average of 5 ozs. silver, \$15 gold and 7 per cent. copper. Work will be continued on both properties throughout the winter.

Nova Scotia.

Considerable local excitement has been caused by the discovery of alluvial gold on the Chaticamp River.

Chaticamp is situated on the west shore of Inverness County, Cape Breton. The Chaticamp River is from 300 to 500 feet wide for the first few miles from the shore. The river in its course cuts a large number of quartz veins (of varying size) running through the Laurentian formation, many of these veins contain iron pyrites, magnetite, small quantities of copper pyrites and it has been claimed that they also carry nickel and cobalt, which we are disposed to think is open to dispute. On either side of the river are hills varying from 800 to 1,200 feet in height and from the foot of these hills to the river bed, there is a gravel consisting of fragments of the surrounding rocks, and it is in the gravel that the gold has been found. People who have been prospecting there state that several sights of gold have been found in each pan of "dirt." The result is that there has been a big rush for areas, over 1,000 having been already taken up in the district. It is far from our desire to throw cold water on any legitimate mining enterprise, and we are as anxious to see Chaticamp have a fair trial as anyone, at the same time we would remind those interested, that there was a similar excitement over the finds of alluvial gold in the Middle River not so many years ago, and further that the source of Middle River is in the same range of hills as the Chaticamp River. It is a matter of history that no one has made any money by working the alluvial deposits of Middle River, and although we don't wish to forbode evil, we are a little afraid a similar result awaits the new discoveries at Chaticamp.

Major R. G. Leekie, President of the Federated Institute of Canadian Mining Engineers, has taken a working bond of the famous old Dufferin mine and proposes to thoroughly exploit it. Should the result prove satisfactory, a big mill will be erected, and it is possible that a chlorination plant will also be put up. The past record of the Dufferin as a gold producer will bear the strictest investigation. During the thirteen years it was worked it produced nearly 40,000 ounces of gold and it is needless to add as this mine is in Nova Scotia, nothing but free milling gold was extracted, although the quartz is at times heavily charged with mispickel, which often carries gold and not infrequently in very considerable quantities. That the mine will now have a fair trial goes without saying, and we hope to see it one of the heaviest producers next year.

The new lead which was recently discovered at Springfield, on the Modstock property has been opened up and is reported to be looking extremely well. The Modstock mine returned 163 ounces of gold last month.

The Brookfield mine produced 292 ounces last month from 500 tons. The new mill and chlorination plant at this mine are rapidly approaching completion, and bar accidents will be running before the end of the year.

The new 30 stamp mill at New Egerton mines 15 Mile Stream is completed. Owing to the illness of the manager Mr. McNaughton, only 15 stamps are running up to date.

The new 20 stamp mill at the Blue Nose Company mine at Goldenville is finished and is running full blast. We expect to hear good accounts of this property in the near future.

Mr. D. Touquoy, was in town with a 66 ounce brick of gold as the result of his months work. Mr. Touquoy probably brings into town the prettiest bricks of gold smelted in the province, the value of the bullion generally running very nearly \$20 per ounce.

Owing to the breaking of the pumping gear the Victoria mine, Cape Breton, belonging to the Dominion Coal Company, has been temporarily shut down.

We are pleased to note that the returns from the New Egerton mine are up again. In August 400 tons of Quartz yielded 93.75 oz., while in September 428 tons yielded 186 ounces or nearly double for very little more quartz crushed. Both these returns are considerably below the returns for each of the first six months of the year, which averaged over 300 ounces per month.

Some of our friends at the Mines office, have taken exception to our note with reference to a circular issued by a Dartmouth journal, for which we are sorry. No unkind inference was intended against any one in the Mines office, and we may say at once that we have always received the utmost courtesy from everyone in that office. What we wanted to arrive at was an explanation of that circular which is still a mystery to us.

A trial lot of coke has been made by the People's Light & Heat Co., at their new works on the Worth West Arm, Halifax. Everything proved eminently satisfactory, and we may mention incidentally that none of the trees in the district were killed, no one was suffocated, and no shoals of dead fish have been thrown up on the shores of the arm, much to the surprise of some of the citizens of Halifax.

Mr. Thompson the pioneer of the Cow Bay gold district has taken up an additional 200 areas in that district. The lead has not been found up to date, although some rich boulders have been discovered.

(From another Correspondent.)

The Golden Lode Mining Co. of South Uniacke, Hants Co., has just paid their 20th 5 per cent. consecutive monthly dividend on their capital stock of \$30,000 besides putting to rest a considerable sum, equipping their mine with an efficient and modern plant, and doing a large amount of development work, exposing a large valuation of "ore in sight." The vein of quartz in this little mine is free milling, and but nine inches wide and gives from \$100 to \$250 per ton. The deepest level is about 600 feet and shows increased richness. 403 feet was sunk in this mine before any pay ore was seen.

The Lake Lode Mine of Caribou, Halifax Co., which has been a steady producer for a number of years, and which has been in rather low grade ore for the past few months has now encountered very rich ore in its bottom (700 foot) level, and the management feels confident a new and important strike has been reached.

The Libbey Mine at North Brookfield, Queen's Co., will soon have its \$80,000 crushing concentrating and chlorinating plant completed. This mine is now down about 350 feet on a true fissure vein, giving about 15 in. of crushing matter and has returned an average \$8,000 per month for nearly two years, with a small crew of men and an inferior ten stamp mill. Mr. Libbey, however, is not depending entirely on this small vein for the ore supply for his new plant, but has other large veins from 8 to 10 feet in width, which have been tested and proved of great value.

The New Egerton Co. of Fifteen Mile Stream, Halifax Co., has about completed their new 30 stamp mill and has put in a new eleven drill air compressor and over ground electric light plant. This company has been encouraged to the above expenditures from the large dividend made from this mine in the past two years with an inferior plant.

The Blue Nose Co. of Goldenville, Guysboro Co., have just completed their new 20 stamp mill, together with a modern pumping, hoisting and mining outfit.

The New Glasgow Co. of the same place, James A. Fraser, manager, with their little 10 stamp mill, are gradually but surely increasing their monthly returns. Two years ago they commenced with a production of 50 ounces per month and a pay-roll of \$1,500. They are now producing over 200 ounces per month with no increase in the pay-roll, and are doing a large amount of development work besides. Their lodes are both increasing in width and richness as depth is attained.

R. G. Leckie, M. E., president of the Mining Society of Nova Scotia, has secured a six months' working option of the Dufferin Mine, Salmon River. The option price is \$100,000. Every mining man in Nova Scotia felt a thrill of joyous hope when it became known that Mr. Leckie had succeeded in securing this once famous mine. There are no two opinions as to why this mine has not continued to be a large producer since 1890, as it did from 1880 to 1890, when it frequently rolled up a dividend sheet of \$20,000 per month. Mr. Leckie has an expensive and long job ahead of him to get the mine in shape, but his reward is sure.

Every dollar in the above named enterprises is provincial except that of the latter, through Mr. Leckie, which I believe will be Quebec capital.

At last the pessimistic scales of "shallow depths" have gradually fallen from the eyes of our provincialists, and a new era of gold mining prosperity is at hand, and the cry of the past years "go to the U. S. A. or to England and get capital to develop your mines" is now reversed. Even the well known miserly element of the capital representing community is now whispering, "Let us in, can't you!" There is plenty of money right here to open up your mine! This condition of affairs is but the natural results of a prosperous industry. This, we are happy to say is the condition of gold mining in N. S. to-day. There is not one solitary instance of a well equipped working mine in the province that has not made money in the now closing year of 1896.

The output from the Joggins colliery of the Canada Coals and Railway company for the year will amount to 56,555 tons. This is a considerable decrease from the previous year, and is due entirely to loss of time caused by the strike in the early part of the year and dull trade. Only one slope is being worked, as the other has been closed down for repairs.

A considerable portion of No. 2 slope is under water, which has been kept from rising higher than the 1,900 foot levels by a pump stationed there. From the surface down to these levels the slope has been thoroughly repaired, and the levels are now undergoing extensive repairs which it is expected will be completed by the end of the year. The water will be pumped out and the lower section of the workings re-started, and later on the slope will be sunk probably to a distance of 600 feet.

At No. 3 Slope, operations are proving very successful, and the workings are being rapidly extended. This slope is sunk 1,900 ft. and will be sunk an additional 600 ft. in the near future. The coal in this slope is of excellent quality and of good steaming power. The sales have vastly increased within the last two months, so much so that the management cannot supply the demand. Prices have advanced and good steady trade prevails particularly in water shipments. All the workings are operated in the longwall system now, as this system has proved to be much more economical where thick clay prevails. The fan recently erected at this slope is doing good work, and has turned out very satisfactory, much more so than anticipated.

Ontario.

Manager J. C. Foley's last report to the shareholders of the Ontario Gold Mines Company is as follows:—

BONANZA OR NORTH SHAFT, DEPTH 210 FEET,

Levels North Shaft:—

100 foot level.	North drift, 37 feet, 8 inches.
100 "	South drift, 51 feet, 7 inches.
150 "	North drift, 44 feet.
150 "	South drift, 143 feet, 2 inches.
200 "	North drift, 77 feet.
200 "	South drift, 14 feet, 10 inches.

This shows much progress on the 150 foot level, especially in South drift, where the vein is looking splendid, being over two feet in width. The north drift is looking very satisfactory showing a progress of 44 feet since September last, of little over 1 foot a day, while the progress in South drift is 40 feet. The other drifts could not be pushed to that extent, owing to our main force of men being at work on mill construction. The total number of feet of drifts in Bonanza shaft on October 1st. were 368 feet, 2 inches, all in good ore.

No. 5 or south shaft, 1 200 feet from North Shaft, and on same vein has a depth of 125 feet.

62 foot level north drift,	21 feet, 5 inches.
" south drift,	52 feet, 2 inches.

Showing a progress of 40 feet, one inch, in both drifts in No. 5 shaft from September 1st to October 1st.

The vein in both drifts is looking exceptionally well, and has surpassed all our anticipations and hopes, as well in width and richness of ore. The average width for the last thirty or forty feet is 4 feet and better, and Mr. Chewett, the Canadian Stockholders' expert, pronounced the rock to be at least \$50.00 ore. I do not put the value on it now, hoping to agreeably surprise you with our mill run.

Three hundred and fifty feet east of No. 5 vein on A.L. 75, a new vein has been discovered running 12 inches in width and has been traced on the surface and stripped for over one hundred feet. It has been called the "Lucky Joe" and is very rich indeed, and although narrow will give us at least 400 or 500 tons of very rich ore, even if it does not go very deep, which of course we cannot determine until developed. Mr. Chewett pronounces the rock \$200.00 ore. We have also discovered another vein about 70 feet west of No. 5 exposing 14 inches of quartz and equally as rich as Lucky Joe, showing beautiful specimens. I think by running a cross-cut three hundred feet east and west of No. 5 shaft we could intercept and prove all these companion veins and believe such a work will tell an agreeable tale of still more agreeable surprises. The cost would

be from \$6,000 to \$7,000 and can be commenced whenever the board of directors think it advisable.

The 40 ton mill building is up and partly boarded in, and the roof will have been finished by the time this reaches you.

The new barn 26 x 30 to take care of our horses and their necessary winter supplies, as hay, oats, etc., has been completed, also a new root house to store the winter supplies, such as potatoes, and other vegetables, thus guarding against frost. This makes, together with new office, new sleeping camp, addition to kitchen and boarding house, six new buildings and additions erected this season.

The tram is being vigorously pushed to completion, 2,200 feet of trestle work is ready and waiting for the ties and rails which unfortunately have been delayed by the strike on the C.P.R. The new hoist at the North Bonanza shaft is erected, and at present the shaft house structure is being raised to a height of trestle work.

Our steam launch "Wanda" tows all the lumber for trestle work across the lake and proves itself a good investment.

The last shipment of Fraser & Chalmers Corliss Engine, etc., is on its way from Rat Portage to the mines. Weather good and work progressing satisfactorily. We have six other shafts on veins on this property, not enumerated in mine workings, one six feet, two of ten feet, one of fourteen feet, one of seventeen feet, all in ore and one of 31 feet. The latter a new bonanza showing a six foot vein of concentrating ores averaging \$22.35 to the ton.

I have closed mostly all the contracts for winter supplies and will state that barring all unforeseen accidents, the mill will be running and turning out bullion by December 1st.

A correspondent from Rat Portage writes:—

"Since you were here the Bullion Mining Co. have acquired the Master Jack Mine, the Jennie Leigh Mine, four locations on Shoal Lake near the Mikado Mine, one of them adjoining, as well as some other prospects. The Company have sunk 75 feet on the Master Jack on a vein which appears to be a true fissure six feet wide. The assays have run from \$10 to \$22; from thirty feet deep to the bottom of the shaft the vein is all in quartz without any base rock so far as they have sunk. They will start drifting at a depth of one hundred feet. This property has been sold by the Bullion Mining Company to the Rat Portage Mining Co. The Bullion have started a camp on the Jennie Leigh property and will let the contract for sinking two shafts, one hundred feet each, to test it. The surface indications are that a large body of ore will be found before that depth is obtained. The pay streak has widened in the one shaft, which is down 22 feet from 18 inches to 5 ft. 6 inches, the other shaft was only started a few days ago. If this property proves as good as it indicates it will be purchased by the Lake of the Woods Mining Co.

The Bullion Mining Co. have ten men stripping and sampling their several properties on Shoal Lake, but not sufficient work has been done yet to form an opinion of them. The Mikado Mining Co., will deliver to the Reduction Works at Rat Portage another run of ore before it freezes up. They have a first-class camp and will continue developing all winter. I do not think they have decided yet whether they will build a mill this winter or the first thing in the spring, transportation would be much easier if left until navigation opens.

The Western Mining Co., composed of a number of Winnipeg men, have acquired several options in this and the Seine River District and intend doing enough work on them this winter to prove their value.

Another lot of ore is being shipped into the local reduction works from the Mikado mine. In my last letter I stated that a former run had yielded 417 oz. of gold, but did not make it clear that this result was obtained from 114 tons of ore, the concentrates retaining about 30 per cent. of the bullion. A mill is to be installed on the property, which it is intended to erect from the proceeds of ores now being mined. Mr. Breidenbach, the manager of the works, informs me that the mine has paid all expenses in connection with its development up to date, and the shareholders will not likely be called upon to pay for the placing of the machinery necessary for its future operation.

At the Sudbury Copper Nickel Mines of the Canadian Copper there has been a good deal of activity during the season, but during the winter, as usual, their will be some reduction in the working force.

For some time past negotiations have been going on for the purchase of three of the largest nickel properties in this district, known as the Levac group, and the sale is now reported to have gone through. Mr. Robt. J. Tough, one of the owners, has left for Europe to sign the papers and close the deal. The consideration is \$350,000. The highest price offered for the same properties some years ago, when the nickel mines were in the flush of a premature boom, was \$220,000. It is said that a special part of the business of the new company will be to supply the British government with nickel for the navy-yards. Two other nickel properties, down the range, have also been bonded recently, the one at \$90,000 and the other at \$30,000. A mining broker here states that there are two reasons for the new interest in our nickel mines—first, the growing belief that nickel is bound to be used more extensively in the general industries before long, and, secondly, that English investors are giving more attention to mining enterprises all over Canada this year than any time in the past. There are now only three first-class nickel properties in the district that have not been bought up.

The Drury Nickel Company in the township of Drury, has resumed work at its mines and at last accounts had a force of about fifty persons employed.

At a meeting of shareholders of the Saw Bill Lake Gold Minning Co., held at Hamilton this month, the following, being the first, report of the directors was submitted:—

In pursuance of the prospectus the stock book was opened April 6th, 1896, and the treasury stock was all disposed of at par, and we learn that a considerable number of shares have since changed hands at a high premium. A conveyance of mining sections 313 X and 314 X from the patentees to the company has been duly executed and registered.

An agreement has been entered into with the owners for a lease for ninety-nine years, at a consideration of \$1.00 per year—of a portion of location No. 323 X, giving to this company the right to the use of land necessary for the erection of all buildings and stamp mills, and giving access and use to this company of water front. Your attention is directed to the reference of the managing director to the recent discovery of a ledge of quartz running across location 314 X, and which, upon a superficial investigation, carries a width of from 20 to 500 feet.

While your directors have no desire to raise any false hopes in the minds of the shareholders, there is good reason to believe that this ledge will greatly enhance the value of this property. The ledge also extends across two locations owned by a New York Syndicate, and experts who have examined the property for them have pronounced the ledge to be of surprising richness and extraordinary width. In pursuance of Mr. Wiley's Report your directors recommend that steps forthwith be taken to purchase a ten-stamp mill and such other mining and milling machinery as may be necessary.

NEW COMPANIES.

THE GRAND PRIZE MINING & MILLING CO. seeks incorporation under the Foreign Companies Act with the following objects: To purchase, hold, own work and operate mines of gold, silver, lead and other metals, in the Province of British Columbia and in the United States. Capital: \$1,000,000 divided into 1,000,000 shares of a value of \$1 each. Chief place of business, Spokane, Wash.

KOOTENAY SALMON GOLD MINING CO. LTD. seeks incorporation with the following objects: To purchase the mineral claims, situated in the Nelson Mining Division of West Kootenay District, Province of British Columbia and to carry on mining operations elsewhere in the Province of British Columbia and the Dominion of Canada. Capital: \$600,000 divided into 600,000 shares of a value of \$1 each. Directors: Louis Beaupre, Patrick J. Shiels, John F. Martin, Jas. K. Clark, all of Rossland, B. C. Chief place of business, Rossland, B. C.

PACIFIC CONSOLIDATED GOLD MINING CO., LTD., seeks incorporation with the following objects: The acquisition of the mineral claims situated within the Alberni Mining Division of Alberni District on Vancouver Islands, and known as the "Minerva Casad" and "Happy Day" Mineral Claims and to carry on mining operations elsewhere in the Province of British Columbia and the Dominion of Canada. Capital: \$500,000 divided into 500,000 shares of a value of \$1 each. Directors: Geo. M. Perdue, Josiah Hemans and Charles N. Gowen, all of Victoria. Chief place of business, Victoria, B. C.

THE SILVER BELLE MINING CO. LTD. seeks incorporation with the object of mining in the Province of British Columbia and elsewhere in the Dominion of Canada. Capital, \$1,000,000 divided into 1,000,000 shares of a value of \$1 each. Directors: Geo. A. Pounder, Rossland, J. J. Henager, Rossland, Milton O. Tibbits, Rossland. Head Office, Rossland, B. C.

THE RECO MINING & MILLING CO., LTD. seeks incorporation with the following objects: To take over and acquire in any lawful manner mining leases or mining claims or any other mining property in any part of the Province of British Columbia or elsewhere, and in particular to acquire from the owners thereof the mineral claims Buecau, Texas, New Denver, Clifton, and Ephraim, situated in the Slovan Mining Division in the Province of British Columbia and to carry on mining operations elsewhere, in said Province and in the Dominion of Canada. Capital: \$1,000,000 divided into 1,000,000 shares of a value of \$1 each. Directors: J. M. Harris, F. T. Kelly, Sandon, B. C.; S. M. Wharton, Spokane, Wash.; E. R. Etherton, Sandon, B. C. Principal place of business, Sandon, B. C.

BIG VALLEY GREEK GOLD MINES, LTD. seeks incorporation under the Foreign Companies Act with the object of carrying on mining operations in the Province of British Columbia and the United States. Capital: £125,000 divided into 125,000 shares of a value of £1 each. Head Office, 6 Great St. Helens, London, Eng.

COLUMBIA & ONTARIO GOLD MINING CO. seeks incorporation with the object of carrying on mining operations in the Province of British Columbia and elsewhere in the Dominion of Canada. Capital: \$750,000 divided into 750,000 shares of a value of \$1 each. Directors: J. B. Miller, R. R. Gamey, J. Y. Cole, J. White, all of Rossland, B. C. Head Office, Rossland, B. C.

ATHABASCA GOLD MINING CO., LTD. seeks incorporation with the following objects: To acquire the Athabasca, Alberta, Algoma and Manitoba Mineral Claims and adjoining claims and carrying on mining operations elsewhere in the Province of British Columbia and in the Dominion of Canada. Capital: \$1,000,000 divided into 1,000,000 shares of a value of \$1 each. Directors: B. W. Shiels, Jas. B. Kennedy, and G. O. M. Dockrill. Head Office, New Westminster, B. C.

IDA QUEEN GOLD MINING CO., LTD. seeks incorporation with the following objects: To purchase the "Ida" Mineral Claim situated in the Trail Creek Camp, West Kootenay District, B. C., to carry on mining operations elsewhere in the Province of British Columbia and the Dominion of Canada. Capital: \$1,000,000 divided into 1,000,000 shares of a value of \$1 each. Directors: Jas. Leddy, Seattle, Wash.; George Nelson, Rossland, B. C.; E. J. McCune and A. E. Lyford, of Rossland, B. C.; Head office, Rossland, B. C.

THE DELAWARE MINING & MILLING CO. seeks incorporation under the Foreign Companies Act with the object of carrying on mining operations in the United States, the Province of British Columbia and elsewhere in the Dominion of Canada. Capital: \$1,000,000 divided into 1,000,000 shares of a value of \$1 each. Head Office: Spokane, Wash.

LA REGINA GOLD MINING CO., LTD. seeks incorporation with the following objects: The acquisition of the mineral claim situated in the Trail Creek Mining Division of the District of West Kootenay, B. C., and known as the "La Regina" Mineral Claim, and to carry on mining operations elsewhere in the Province of British Columbia and the Dominion of Canada. Capital: \$750,000 divided into 750,000 shares of a value of \$1 each. Directors: Hugh McQuade, Wm. Taylor, J. St. Clair Blackett, of Rossland and F. H. Hewlings, R. L. Drury, Victoria, B. C.: Head Office, Rossland, B. C.

ELKHORN SILVER MINING CO., LTD. seeks incorporation under the Foreign Companies Act with the object of carrying on mining operations in the United

States and in the Province of British Columbia. Capital: \$1,000,000 divided into 1,000,000 shares of a value of \$1 each. Head Office: Spokane, Wash.

THE ALF GOLD MINING CO., LTD., has applied for incorporation with the following objects: To purchase the "Alf" Mineral Claim situated in the Trail Creek Mining Division of the District of West Kootenay, B. C., and carrying on mining operations elsewhere in the Province of British Columbia and the Dominion of Canada. Capital: \$1,000,000 divided into 1,000,000 shares of a value of \$1 each. Directors: W. G. Elliott, W. E. Phin, H. A. King, all of Rossland, B. C. Head Office: Rossland, B. C.

OLIVE MINING & SMELTING CO., seeks incorporation under the Foreign Companies Act with the object of carrying on mining operations in the United States and the Province of British Columbia. Capital: \$20,000,000 divided into 20,000,000 shares of a value of \$1 each. Head Office: Spokane, Wash.

THE SILVER KING GOLD MINING CO., applies for incorporation under the Foreign Companies Act for the purpose of carrying on mining operations in the United States and the Province of British Columbia. Capital: \$750,000 divided into 750,000 shares of a value of \$1 each. Head Office, Spokane, Wash.

ENGLISH & FRENCH GOLD MINING CO., LTD., applies for incorporation with the following objects: To acquire by purchase or otherwise the following mineral claims:—"Napoleon Bonaparte," "Cleopatra," "Mark Anthony," "May Flower," "Grand Forks Belle," "Bonanza" and "Bess," all of which are situated in Brown's Camp, on the North Fork of Kettle River, in the Kettle River Mining Division of Yale District in the Province of British Columbia and to carry on mining operations elsewhere in said province and in the Dominion of Canada. Capital: \$2,000,000 divided into 2,000,000 shares of a value of \$1 each. Directors: A. Omon, H. P. Toronto, J. Gellinas, A. Dorais, Wm. O'Neill, F. A. Proebstel, Chas. Hay, N. McCallum, all of Grand Forks, B. C. Head Office: Grand Forks, B. C.

PRICE-EATON CO. seeks incorporation under the Foreign Companies Act to deal in mines, metals, minerals and precious metals, and in mining and mineral claims of every kind within the State of California, the United States, and in the Province of British Columbia. Capital: \$500,000, divided into 100,000 shares of a value of \$5.00 each. Head Office, San Francisco, Cal.

THE LARDEAU MINING & DEVELOPMENT CO. seeks incorporation with the object of mining in the Province of British Columbia and elsewhere in the Dominion of Canada: Capital, \$500,000 divided into 500,000 shares of a value of \$1.00 each. Directors: F. B. Wells, John Abrahamson, and E. L. Kinman, all of Revelstoke, B. C. Head Office, Revelstoke, B. C.

CONSOLIDATED GOLD MINING CO. seeks incorporation for the following objects:—To purchase the "B. C." mineral claim, situated in the Trail Creek mining division of the District of West Kootenay, B. C., and to carry on mining operations elsewhere in the Province of British Columbia. Capital \$1,000,000 divided into 1,000,000 shares of a value of \$1.00 each. Directors: R. Hunter, J. H. Adams, Duncan Campbell, C. Grant, H. M. Lister, C. M. Carpenter, all of Rossland, B. C. Head Office, Rossland, B. C.

THE CONSOLIDATED SABLE CREEK MINING CO. LTD. seeks incorporation for the purpose of mining in the Province of British Columbia. Capital: \$1,500,000 divided into 1,500,000 shares of \$1.00 each. Directors: G. D. Scott, Vancouver; Fred. Cope, Vancouver; R. E. McKechnie, of Nanaimo, B. C. Head Office, Vancouver, B. C.

KOOTENAY CONSOLIDATED MINING CO. seeks incorporation under the Foreign Companies Act, with the object of carrying on mining in the United States and in the Province of British Columbia. Capital: \$1,000,000 divided into 1,000,000 shares of a value of \$1.00 each. Head Office: Everett, Wash.

THE YALE GOLD-COPPER MINING CO. LTD. seeks incorporation with the following objects: To purchase the "Yale" Mineral Claims situated in the Trail Creek Mining Division, B. C. and to carrying on mining operations elsewhere in the Province of British Columbia. Capital: \$1,000,000 divided into 1,000,000 shares of a value of \$1.00 each. Directors: T. C. Gray, Rossland; G. Talbot, Rossland; E. Terzick, Rossland. Head Office, Rossland, B. C.

STANDARD GOLD MINING CO. LTD. seeks incorporation for the purpose of carrying on mining operations in the Province of British Columbia. Capital: \$1,000,000 divided into 1,000,000 shares of a value of \$1.00 each. Directors: F. S. Timberlake, H. Heffering and S. I. Timberlake, all of Vancouver, and F. R. Blochberger, Portland, Oregon.

MOUNT MABEL MINING & SMELTING CO., LTD. seeks incorporation with the following objects: The acquisition by purchase or otherwise, of the mineral claims known as the "Glenwood," "New Brunswick," "St. George," "Mabel May" and "Star of Hope," situated on the Divide between Finnell and Ten Mile Creeks, in the Slocan Mining Division of West Kootenay. Capital: \$1,500,000 divided into 1,500,000 shares of a value of \$1 each. Directors: A. J. Hughes, A. St. Clair Brindle, New Denver, B. C., A. R. Code, Souris, Man.

THE HAWK BAY GOLD MINING CO., LTD. seeks incorporation with the object of carrying on mining operations in the Province of Ontario. Capital: \$150,000 divided into 150,000 shares of a value of \$1 each. Directors: F. C. Bruce, Hamilton; H. C. Maclean, Toronto; H. N. Kitson, Hamilton; J. H. Tilden, Hamilton; H. A. Wiley, Port Arthur; S. C. Mewburn, Hamilton; H. C. Beckett, Hamilton; F. S. Wiley, Port Arthur; Geo. T. Marks, Port Arthur. Head Office: Hamilton, Ont.

KING SOLOMON'S MINES, LTD., seeks incorporation with the following objects: To prospect, search for, examine and explore mineral bearing property of every description and tenure, including mines, mineral locations and leaseholds and lands supposed to contain metal, etc., in the Province of British Columbia and elsewhere in the Dominion of Canada. Capital: \$500,000 divided into 500,000 shares of a value of \$1 each. Directors: Z. G. Goldberg and A. Wheeler, Vancouver, B. C.; I. A. Yerex, of Los Angeles, Cal., and R. L. Reid, of New Westminster, B. C. Head Office: Vancouver, B. C.

THE DELAWARE MINING & MILLING CO., seeks incorporation under the Foreign Companies Act, with the object of carrying on mining operations in the United States and in the Province of British Columbia. Capital: \$1,000,000 divided into 1,000,000 shares of a value of \$1 each. Head Office, Spokane, Wash.

OLD GLORY MINING CO., seeks incorporation under the Foreign Companies Act, with the object of carrying on mining operations in the State of Washington, U.S.A. and in the Province of British Columbia, Canada. Capital: \$1,000,000 divided into 1,000,000 shares of a value of \$1 each. Head Office: Seattle, Wash.

THE BRITISH COLUMBIA MINING CO., LTD., seeks incorporation with the object of carrying on mining operations in the United States and in the Province of British Columbia. Capital: £20,000, divided into 2,000 shares of a value of £10 each. Head Office: Suffolk House, Lawrence Pountney Hill, London, Eng.

THE HERCULES GOLD MINING CO. LTD. seeks incorporation with the object of carrying on mining operations in the Province of British Columbia. Capital \$2,000,000 divided into 2,000,000 shares of a value of \$1 each. Directors: W. G. Elliott, Henry A. King, W. J. Green, all of Rossland, B. C. Head Office, Rossland, B. C.

ALBERTA GOLD MINING CO. seeks incorporation under the Foreign Companies Act with the object of carrying on mining operations in the United States and in the Province of British Columbia. Capital: \$1,000,000 divided into 1,000,000 shares of a value of \$1 each. Head Office: Spokane, Wash.

CHICAGO GOLD MINING CO. seeks incorporation under the Foreign Companies Act with the object of carrying on mining operations in the United States and in the Province of British Columbia. Capital: \$500,000 divided into 500,000 shares of a value of \$1 each. Head Office: Spokane, Wash.

THE EXCHEQUER GOLD MINING CO. LTD. seeks incorporation with the following objects: To purchase the "Exchequer" and "Cleopatra" mineral claims situated on Toad Mountain in the Nelson Mining Division, in the District of West Kootenay, B. C., and to carrying on mining operations elsewhere in the Province of British Columbia and the Dominion of Canada. Capital: \$1,000,000 divided into 1,000,000 shares of a value of \$1 each. Directors: J. C. Drewry, J. S. Clute and W. J. Nelson, all of Rossland, B. C.

NORTHERN LIGHT GOLD MINING CO. LTD. seeks incorporation with the following objects: To purchase the "Northern Light" Mineral Claim situated on Goat Mountain, in the Goat River District, West Kootenay, B. C., and to carry on mining operations elsewhere in the Province of British Columbia and the Dominion of Canada. Capital: \$251,000 divided into 250,000 shares of a value of \$1 each. Directors: E. Hall, John Jardine, A. McCrimmon, J. L. Forrester, J. Freel, J. Maynard and John McRobbie, all of Victoria, B. C. Head Office, Victoria, B. C.

THE B. C. EXPLORING SYNDICATE LTD. seeks incorporation under the Foreign Companies' Act with the object of exploring mines, mineral properties, etc., in the Province of British Columbia or in any part of the world. Capital: £20,000 divided into 20,000 shares of a value of £1 each. Head Office: 103 Cannon St., London, England.

BLOCK HOUSE GOLD MINING CO. LTD. seeks incorporation under the Nova Scotia Joint Stock Companies' Act with the object of carrying on gold mining operations in the Province of Nova Scotia. Capital: \$8,000 divided into 800 shares of a value of \$10 each. Directors: G. Smith, Bridgewater, N.S.; W. H. Prest, Block House; J. K. Dawson, Bridgewater; D. Stewart, A. K. MacLean of Lunenburg, N. S. Head Office: Lunenburg, N. S.

BOTHWELL OIL & GAS CO. seeks incorporation with the following objects: To drill and operate for petroleum oil and gas; and to manufacture and dispose of the same by sale or otherwise. Capital: \$250,000 divided into 50,000 shares of a value of \$5.00 each. Directors: H. A. Walker, Walkerville; H. C. Walker, Walkerville; W. T. DeGraf, Detroit, Mich.; Isaac DeGraf, Detroit, Mich.; and Hiram Walker, of Isle aux Peche, Ont. Head Office: Walkerville, Ont.

THE HOPEWELL GOLD MINING CO. LTD. seeks incorporation with the object of carrying on gold mining operations in the Province of Nova Scotia. Capital: \$15,000 divided into three hundred shares of a value of \$50.00 each. Directors: J. G. McQuarrie, Sherbrooke, N. S. A.; F. Grant, Riverton, N. S.; Hugh Gray, Hopewell, N. S.; Robt. McLeod, Hopewell, N. S.; J. R. Porter, Stellarton, N. S.; J. M. Dunbar, Hopewell; Wm. Macdonald, Westville, N.S. Head Office: Hopewell, Pictou County, N.S.

THE LITTLE LISCOMB GOLD MINING CO. LTD. seeks incorporation with the object of carrying on gold mining operations in the Province of Nova Scotia. Capital: \$12,000 divided into 120,000 shares of a value of \$100.00 each. Directors: John Power, Stellarton; C. E. Davies, Stellarton; E. Falconer, Stellarton; D. W. Culton, Stellarton; R. W. McDonald, Stellarton; Wm. Power, of Lonvay Mines, Cape Breton; and A. D. Morrison, of Big Pond, Cape Breton.

CANADIAN MINING & SMELTING CO. seeks incorporation with a capital of \$200,000 divided into 40,000 shares of \$5 each. The object for which incorporation is sought is to mine and explore mines and mineral lands in the Province of British Columbia and elsewhere in the Dominion of Canada. Directors: Hon. Hugh John Macdonald, Q. C.; J. H. Brock, W. J. Christie, Thos. Kelly, F. H. Phippen, D. E. Sprague, J. H. Brown, all of Winnipeg, Man.; and G. A. Cox and Geo. Broughall, of Toronto, Ont.

HEATHER BELL GOLD MINING CO. OF TORONTO LTD. seeks incorporation with the object of carrying on in all its branches the business of mining and reducing and refining of ores in the Province of Ontario. Capital: \$100,000 divided into 100,000 shares of a value of \$1 each. Directors: J. J. Withrow, E. Nerlich, A. F. Webster, I. E. Suckling, N. McCrimmon, all of Toronto, Ont.

ONTARIO GOLD MINES CO., LTD. seeks incorporation with the object of carrying on gold mining operations in the Province of Ontario. Capital: \$1,000,000 divided into 200,000 shares of a value of \$5 each. Directors: R. A. Demme, Detroit, Mich.; T. J. Hinley, Brooklyn, N.Y.; C. N. King, Jersey City, N.J.; Henry Weston, N.Y.; A. St. George Ellis, Windsor, Ont.; F. G. Corning, New York and H. C. Berlin, New York. Head Office, Windsor, Ont.

SUDBURY GOLD MINING CO., LTD., seeks incorporation with a capital of \$100,000 divided into 100,000 shares of a value of \$1 each. The objects for which incorporation is sought are to carry on mining operations in the Districts of Nipissing and Algoma, in the Province of Ontario. Directors: H. N. Kitson, H. C. Beckett, F. C. Bruce, G. C. Newburn, all of Hamilton, Ont.; H. A. Wiley, G. T. Marks and S. F. Wiley, Port Arthur and H. C. McLean, Toronto.

THE VICTORIA MINING CO., LTD., seeks incorporation with the object of carrying on mining operations in the Districts of Algoma, Parry Sound, Thunder Bay and Rainy River, Province of Ontario. Capital: \$500,000 divided into 500,000 shares, of a value of \$1 each. Directors: C. S. Botsford, J. A. Meldrum, Thos. D. Law, A. Mackenzie, and Jas. S. Lowell, all of Toronto.

THE COLCLEUGH GOLD MINING CO., OF RAT PORTAGE, LTD., seeks incorporation with the object of carrying on in all its branches the business of a gold mining and reduction company. The operations of the Company are to be carried on in the Province of Ontario. Capital: \$1,000,000 divided into 1,000,000 shares of a value of \$1 each. Directors: J. W. COLCLEUGH, G. Dreweys, J. M. Savage, D. L. Mather, all of Rat Portage, Ont.; J. A. McRae, Niagara Falls, and J. A. Arbutnot, of Winnipeg, Man.

LILLY MAY GOLD MINING CO., seeks incorporation under the Foreign Companies Act with the object of carrying on mining operations in the United States and in the Province of British Columbia. Capital: \$1,000,000 divided into 1,000,000 shares of a value of \$1 each. Head Office, Spokane, Wash.

THE VANCOUVER & BRITISH COLUMBIA GENERAL EXPLORATION CO., LTD., seeks incorporation under the Foreign Companies Act with the object of mining in the Province of British Columbia and elsewhere. Capital: £25,000 divided into 25,000 shares of a value of £1 each. Head Office, 20 Threadneedle Street, London, Eng.

KOOTENAY & ALGOMA GOLD MINING CO., LTD., seeks incorporation with the object of carrying on mining operations in the Province of British Columbia. Capital: \$1,000,000 divided into 1,000,000 shares of a value of \$1 each. Directors: E. C. Jackson, H. Currie, E. L. Brazenor, John Leask, R. E. Gamey, Jas. McGregor, W. J. Nelson, and J. S. Clute, all of Rossland, B. C. Head Office, Rossland, B. C.

SEATTLE MINING & SMELTING CO., seeks incorporation under the Foreign Companies Act with the object of carrying on mining operations in the United States and in the Province of British Columbia. Capital: \$6,000,000 divided into 6,000,000 shares of a value of \$1 each. Head Office, Spokane, Wash.

KOHINOOR GOLD MINING CO., seeks incorporation under the Foreign Companies Act with the object of carrying on mining operations in the United States and in the Province of British Columbia. Capital: \$1,000,000 divided into 1,000,000 shares of a value of \$1 each. Head Office, Spokane, Wash.

CELTIC QUEEN GOLD MINING CO., seeks incorporation under the Foreign Companies Act for the purpose of mining in the United States and the Dominion of

Canada. Capital: \$750,000 divided into 750,000 shares of a value of \$1 each. Head Office, Spokane, Wash.

STAR MINING & MILLING CO., seeks incorporation with the following objects: To purchase the "Rabbit Paw" Mineral Claim situated on the South Fork of Carpenter Creek, in the Slocan Mining Division, B.C., and to mine elsewhere in the Province of British Columbia. Capital: \$1,000,000 divided into 1,000,000 shares of a value of \$1 each. Directors: J. M. Harris, F. T. Kelly, M. L. Grimmett, all of Sandon, B.C., and R. T. Riley, Winnipeg. Head Office, Sandon, B.C.

BRITISH COLUMBIA SMELTING & REFINING CO. seeks incorporation under the Foreign Companies Act with the object of carrying on mining operations in the United States and in the Dominion of Canada. Capital: \$2,500,000 divided into 100,000 shares of a value of \$25 each. Head Office, Jersey City, N.J.

BLUE BIRD MINING CO. seeks incorporation under the Foreign Companies Act with the object of carrying on mining operations in the States of Washington and Idaho and in the Province of British Columbia. Capital: \$30,000 divided into 300,000 shares of a value of \$1 each. Head Office, Spokane, Wash.

THE ELECTRICAL REDUCTION & REFINING CO., LTD. seeks incorporation with the object of carrying on mining operations in the Province of British Columbia. Capital: \$25,000 divided into 5,000 shares of a value of \$5 each. Directors: Wm. Bennison, Everett Wash.; J. S. Patterson, Rossland, B.C.; W. G. Campbell, Rossland, B.C.; J. W. Cover, Rossland, B.C.; A. P. Van Somen, Souris, Man. Head Office, Rossland, B.C.

THE SILVER BAND MINING CO., LTD. applies for incorporation with the following objects: The acquisition by purchase or otherwise of the mineral claim known as the "Silver Band Mining Claim" situated on Eight Mile Creek, on the east side of Slocan Lake, in the district of Kootenay and to carry on mining operations elsewhere in the Province of British Columbia. Capital: \$250,000 divided into 1,000,000 shares at twenty-five cents each (25c.) Directors: E. B. Marvin, J. G. Cox, C. J. Kelly, J. L. Forrester, F. F. Hedges, F. W. Adams, of the City of Victoria, and E. F. Smith, of Kaslo, B.C. Head Office, 74 Wharf St., Victoria, B.C.

THE PRINCESS GOLD MINING CO., OF ONTARIO, (instead of the Mackenzie Lake of the Woods Gold Mining Co., Ltd., as heretofore advertised) seeks incorporation with the object of carrying on mining operations in the Rainy River and Lake of the Woods districts Ontario. Capital: \$500,000 divided into 50,000 shares of \$10 each. Directors: E. Mackenzie, Thos. Shortliss, John Flett, Henry Lowndes, Henry O'Brien, all of Toronto, Ont.

THE COTTONWOOD RIVER (B.C.) ALLUVIAL GOLD MINING CO. LTD. seeks incorporation under the Foreign Companies' Act, with the object of carrying on mining operations in the Province of British Columbia and elsewhere. Capital: £65,000 divided into 65,000 shares of a value of £1 each. The Head Office of the Company is situated in England.

THE CANADIAN GOLD MINING CO. LTD. seeks incorporation with the object of carrying on mining operations in the Province of British Columbia and elsewhere. Capital: \$1,000,000 divided into 1,000,000 shares of a value of \$1 each. Directors: John A. Smith, Robt. Scott and Edward Hewett, all of Rossland, B.C. Head Office: Rossland, B.C.

CAMBRIDGE GOLD MINING CO. LTD. seeks incorporation with the following objects: To purchase the mineral claim situated in the Trail Creek Mining Division of West Kootenay District, Province of British Columbia, and known as the "Cambridge" Mineral Claim and to mine elsewhere in said Province and in the Dominion of Canada. Capital: \$1,000,000 divided into 1,000,000 shares of a value of \$1 each. Directors: H. S. Wallace, R. J. Bealey, D. B. Bogle. Head Office: Rossland, B.C.

BIG THREE GOLD MINING CO. LTD. seeks incorporation under the Foreign Companies Act for the purpose of mining in the United States and in the Province of British Columbia. Capital: \$3,500,000 divided into 3,500,000 shares of a value of \$1 each. Head Office: Spokane, Wash.

THE IRON COLT GOLD MINING CO. LTD. seeks incorporation with the following objects: To purchase the "Iron Colt" Mineral Claim, situate in the Trail Creek Division of the District of West Kootenay, in the Province of British Columbia. Capital: \$1,000,000 divided into 1,000,000 shares of a value of \$1 each. Directors: W. A. Campbell, J. F. McRae, John J. Moynaham, all of Rossland.

RODERICK DHU GOLD MINING CO. LTD. seeks incorporation with the following objects: To purchase the "Roderick Dhu" mineral claim, situate on Deer Park Mountain in the Trail Creek Mining Division of West Kootenay, in the Province of British Columbia. Capital: \$1,000,000 divided into 1,000,000 shares of \$1 each. Directors: F. J. Walker, Geo. H. Bayne, D. M. Linnard, Rossland, B.C.

THE TEXADA ISLAND MINING & LAND CO. LTD. seeks incorporation with the object of mining in British Columbia. Capital: \$80,000 divided into 8,000 of \$10 each. Directors: J. W. Stirton, Thos. D. Jones, Thos. Morgan, Alfred Raper, Elijah Priest, Wm. E. Webb, David Jones, J. H. Pleace, all of Nanaimo, B.C. Head Office, Nanaimo, B.C.

ANGLO-AMERICAN GOLD MINING & MILLING CO. LTD. seeks incorporation with the following objects: To purchase the "Rainbow," the "Cayotte," the "Cottonwood" and the "McCormick" mineral claims situated in Wanaucoot mining district, Okanagan County, in the State of Washington, and known as the Rainbow group of mines and to mine elsewhere in the said state and in the Province of British Columbia. Capital: \$1,500,000 divided into 1,500,000 shares of a value of \$1 each. Directors: G. Winehill, Rossland; G. F. Dorr, Loomiston, Wash.; Fayette Harris, Loomiston, Wash.; Thos. L. Brophy, Rossland; Henry Marymont, Rossland, B.C. Head Office: Rossland, B.C.

THE GIBSON MINING & MILLING CO. seeks incorporation under the Foreign Companies' Act with the object of carrying on mining operations in the United States and in the Province of British Columbia. Capital: \$650,000 divided into 650,000 shares of a value of \$1 each. Head Office: Spokane, Wash.

THE BIG CHIEF MINING COMPANY, LTD. seeks incorporation with the object of carrying on mining operations in the Province of British Columbia. Capital: \$1,000,000 divided into 1,000,000 shares of a value of \$1 each. Directors: T. H. Tracy, J. J. Banfield, A. Williams, and A. D. Hossack, all of Vancouver, B.C.

THE COTTONWOOD RIVER (B.C.) ALLUVIAL GOLD MINING CO., LTD. seeks incorporation under the Foreign Companies Act with the object of carrying on mining operations in the Province of British Columbia or elsewhere. Capital: £65,000 divided into 65,000 shares of £1 each. Head Office, situated in England.

LLOYD GOLD MINING & DEVELOPMENT CO., seeks incorporation with the following objects:—To purchase, take or lease, locate or otherwise acquire and prospect, explore, work, operate, exercise, develop, deal in, hold and turn to account, any mines, mineral claim, mineral lands and properties within the Province of British Columbia or elsewhere. Directors: J. J. Withrow, Toronto; A. F. Webster, Toronto; I. E. Suckling, Toronto; H. J. Duffy, Rossland, B.C.; F. Kettner, Rossland, B.C.; W. J. Nelson, and John S. Clute, jr., of Rossland. Capital: \$1,000,000, divided into 1,000,000 shares of a value of \$1 each. Head Office, Rossland, B.C.

THE INTERNATIONAL GOLD & COPPER MINING CO., LTD., seeks incorporation with the following objects:—To obtain by purchase, lease, hire, exchange, development, discovery, location, assignment or otherwise, and to hold in the districts of East Kootenay and West Kootenay and elsewhere in the Province of British Columbia, mines and minerals, claims or prospects, mining lands and mining rights,

etc. Capital: \$1,000,000 divided into 1,000,000 shares of a value of \$1 each. Directors: A.C. Sinclair, R. C. Macdonald and J. S. Paterson, of Rossland, B.C.

HATTIE GOLD MINING CO., LTD., seeks incorporation with the object of carrying on mining operations in the Province of British Columbia. Capital: \$1,000,000 divided into 1,000,000 shares of a value of \$1 each. Directors: M. Smith, W. A. Campbell, and R. Scott, all of Rossland, B.C.

MASCOT GOLD MINING CO., LTD., seeks incorporation with the following objects:—To purchase the Mascot Fractional Mining Claim, situated in the Trail Creek Mining Division of the District of West Kootenay, British Columbia, and to prospect, work, exercise, develop and turn to account the said mineral claim. Capital: \$1,000,000 divided into 1,000,000 shares of a value of \$1 each. Directors: C. M. Carpenter, E. M. Shupee and Duncan Campbell, all of Rossland, B.C.

THE PICK UP MINING & SMELTING CO., seeks incorporation with the following objects:—To purchase the "Pick Up" Mineral Claim, situated in the Trail Creek Mining Division, in the district of West Kootenay, B.C., and any other mineral claims in the said camp or elsewhere in the Province of British Columbia, and to prospect, work, explore, develop, and turn into account the said mineral claims. Capital: \$1,000,000 divided into 1,000,000 shares of a value of \$1 each. Directors: Frank J. Walker, Joseph Coleman and T. C. Gray, all of Rossland, B.C.

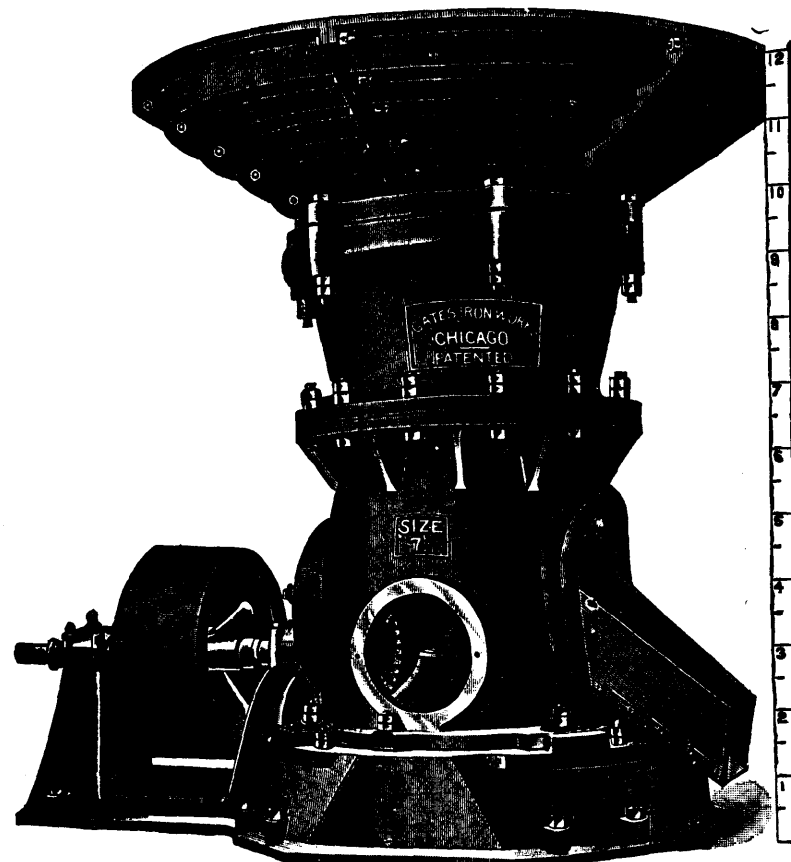
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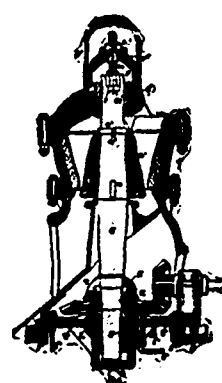
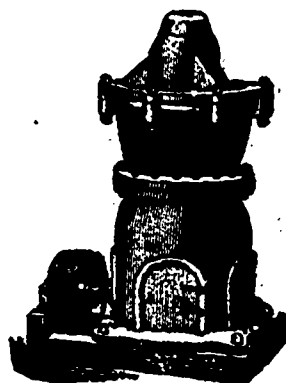
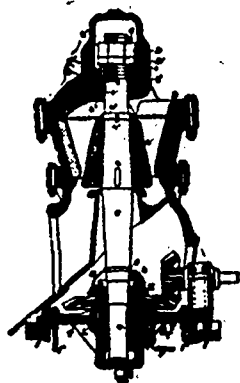
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BY

B. T. A. BELLSec'y Canadian Mining Institute,
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MARKETS
SALES
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CHAPTER X.—Graphite.

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