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TO OUR READERS

THE CANADIAN MINING JOURNAL has made a strong and gratifying start in life. It has reached that stage where change and improvement are pre-requisite to its continued usefulness. Latterly many of our readers have sent in suggestions, embodying their personal wishes. These deal almost exclusively with our news, metal market and other departments. Nearly all of these suggestions we have gladly made use of. All of them are good; some of them, however, owing to reasons which have to do with our own facilities, are not at present practicable. It has been impossible personally to acknowledge all these kind letters. We wish, nevertheless to convey our thanks through these columns.

We also wish to request that all of our readers send us comments, suggestions and criticisms whenever THE CANADIAN MINING JOURNAL fails to supply their needs, whenever they wish to have new subjects dealt with, whenever, in fact, they feel that THE CANADIAN MINING JOURNAL is not adequately and impartially representing the mining interests of the Dominion.

But to be fair to ourselves we must touch on the other side of the shield. Our growth in usefulness and strength must be dependent upon and commensurate with the growth of Canada's mineral industries. We are in no sense the mouthpiece of any special interests. We rely for support upon the legitimate miner, the prospector, the metallurgist and upon all those directly and indirectly concerned with the actual development of Canada's superb mineral resources. It is, therefore, essential that all of our readers continue to consider this publication as their special medium, and to act upon the conviction that their interests can best be served only so long as they themselves actively help in making its columns increasingly useful. It were ungracious to conclude this homily without heartily thanking once more those of our subscribers who have of late honored us with letters commendatory and otherwise.

ONTARIO'S VISITORS

The approaching visit of the American Institute of Mining Engineers is an event of more than ordinary importance. The Institute's membership comprises distinguished technical writers, educationists, engineers, metallurgists and chemists. On another page we have reproduced an historical sketch of the Institute, written by its secretary, Dr. R. W. Raymond.

The proposed itinerary of the visitors has already been published. The first meeting in Toronto is called for July 23rd at the King Edward Hotel. THE CANADIAN MINING JOURNAL hopes that the visit to Toronto and

the subsequent tour through Cobalt, Copper Cliff and other places will be made memorable for the American Institute of Mining Engineers.

THE DISCOVERER OF KLONDYKE

Evidence has been gathered which shows fairly conclusively that to Robert Henderson, of Pictou, Nova Scotia, belongs the honor of being the discoverer of Klondyke. In 1894 Henderson was outfitted at Ogilvie by his friend, Joseph Ladue. The summers of 1894 and 1895 he spent in prospecting the streams of the Indian River Valley. During the winters of these years he mined alone on Quartz Creek. In the summer of 1896 he discovered gold in Hunker Creek Valley, or Gold Bottom, as he himself named the district. Provisions gave out in August and Henderson was forced to go to Ogilvie for fresh supplies. On his way back to Gold Bottom, by the Klondyke River, he spent a night on the present site of Dawson. It was here that he came upon Carmack. To Carmack Henderson made known his discovery, and invited him to come up to Hunker Creek and stake. Carmack followed in a few days, staked near Henderson's discovery and, returning, discovered gold in Bonanza Creek. Of this discovery Carmack did not notify Henderson, but proceeded to Forty Mile, where he spread the news. At first his story was received with incredulity, but before long the stampede began, and the new finds were staked out before Henderson had been informed of their existence.

Owing to complications, Henderson was refused a discovery claim on both Gold Bottom and Hunker branches of the river. He was, however, given the choice of staking one ordinary claim on either Gold Bottom, Hunker or Bear Creeks, or the equivalent of one out of five claims staked before others.

Carmack's ingratitude lost to Henderson the chance of controlling the richest gold deposits of the North.

A SUGGESTION

The Nova Scotia Mining Society has striven in several ways to stimulate various branches of that Province's mining industry. Within the past few years the Society has appointed committees to report upon gold mining, iron mining and the clay and cement industries. Although the work of these committees has, in some respects, been disappointing, yet, in the aggregate, very beneficial results are to be observed. Iron mining, for instance, is more actively carried on than ever before, and it is quite within bounds to state that it will very soon become a substantial and thriving industry. Gold mining, despite the Society's efforts, is not in a flourishing condition. We mentioned some time ago the causes that, in our opinion, have militated against the success of gold mining. Nova Scotia needs a practical demonstration of the benefits to be derived from the careful application of clean business principles and

economical modern methods. The Richardson gold mine, perhaps, furnishes this. Several other gold mines are in a fair way to do it.

But, to return to the Society's endeavor to promote the mining industry; while tangible results may not in every case be observable, the influence of this organization for good is distinctly traceable in the gradually increasing confidence of Nova Scotians in their own Province's resources. This, in itself, demonstrates that the Nova Scotia Mining Society has not wrought in vain.

In the methods adopted by the Nova Scotia Mining Society there lies a suggestion for the Canadian Mining Institute. There is no reason why the Institute should remain in a state of somnolence throughout those periods intervening between its annual meetings. It may well learn a lesson from its energetic Eastern sister. Committees from the Institute could without difficulty find matters of profound importance to work upon during the year. The varied interests represented by the Institute's membership would gladly support any effort to more closely identify the Institute with the onward march of the sciences of mining and metallurgy.

THE VALUE OF A MINE

It would be hard to damn more conclusively the fatuous newspaper claims, made by certain mining brokers for their undeveloped gold properties, than by recommending possible victims to read thoroughly Mr. J. B. Tyrrell's article on the value of a mine. The first installment of Mr. Tyrrell's paper was presented in our last issue. In the present number appears a second.

One paragraph is exceedingly worthy of assimilation and digestion. It enunciates a principle too often ignored or lost sight of by investors.

Alluding to rates of interest on mining investments, Mr. Tyrrell speaks to this effect: "In Canada rates of interest that would be considered fair and reasonable for a mining investment, keeping in view the many possibilities of loss, would vary from seven to twenty per cent." After characterizing as gamblers those who expect higher rates on mining shares, Mr. Tyrrell continues thus:

"In addition to the above rates of interest, the dividends must include certain sums which for a term of years should be credited to a sinking fund for the replacement of capital, and the question of how many years should be allowed for such repayment must be kept constantly and clearly in view, *or the investor will be certain to drop back into the idea that dividends are interest and nothing else.*"

The italics are our own. The sentence italicized expresses tersely and well the precise point on which the ordinary investor in mining property goes wrong. The examples with which Mr. Tyrrell illuminates his argument are typical.

COBALT LAKE

An editorial appeared in our last issue reflecting upon the large capitalization of the Cobalt Lake Mining Company. THE JOURNAL recently had an interview with a director of that company. It was suggested that, although our previous information was, in the main, correct, yet our manner of presenting its might create an unfair impression. For the benefit of all interested we publish the following details. The following statement is given in its entirety:—

"The Cobalt Lake property was purchased by a syndicate of six persons, three representing Toronto and Detroit interests, and the other three representing a large number of parties in the Ottawa Valley. Before these came together the Toronto and Detroit parties had arranged to act independently and to form a company should they get the property. Their arrangements included the allotment of certain promotion stock, the amount of which was eventually fixed at \$140,000. To the distribution of this, the Toronto and Detroit parties, represented by the three syndicate members, were agreeable. To effect this a corresponding block of \$140,000 in shares was taken by the Ottawa Valley syndicate members, and by them distributed among those whom they represented. The property was transferred by the syndicate to the company in consideration of so many fully paid up shares, each branch of the syndicate getting its proportion, plus its \$140,000. At the distribution each subscriber got three shares for each dollar paid, the respective shares of the \$140,000. Thus the shares of the Toronto and Detroit subscribers cost them 33 1-3 cents, while those of the Ottawa Valley subscribers cost them approximately 30 cents. The only promotion stock was the \$140,000 of the Toronto and Detroit syndicate. Apart from this and the customary brokerage, all the stock issued by the company went to the people who furnished the syndicate with the money for the purchase of the property, all members of each syndicate being treated alike. It is safe to say that few mining companies have been promoted on a more conservative basis.

"It may further be stated that the amalgamation of interests could not have been otherwise arranged, and that without the amalgamation it would have been difficult, if not impossible, to successfully carry out the purchase. Beyond this, the amalgamated interests were able to effect a saving to the parties represented of a sum largely in excess of the par value of the so-called promotion stock.

"As to the capitalization, it was necessary to fix upon an amount in anticipation of the purchase, in order to make a complete agreement between the different interests. The actual amount of stock issued is less than \$4,000,000, and as the company has over \$130,000 cash in hand for working capital, and over 57 tons of ore ready for shipment, with a completed plant in operation and paid for, there should be no necessity for any further issue, unless the company thinks proper to acquire further property."

We have been requested by the Copper Mining & Smelting Company of Ontario to extend a cordial invitation to the members of the American Mining Institute, during their Ontario session, to visit the company's Bruce Mines property. The officials of the company will be pleased to do all in their power to make such a visit profitable.

EDITORIAL NOTES

A new General Index is to be issued by the Geological Survey of Canada. The work of compiling this Index is under the direction of Mr. Frank J. Nicolas, editor of the Publications of the Survey. Advance sheets of this sadly needed Index display completeness, clearness and an intelligent grasp of essentials. Typographically, very little is left to be desired.

An enormous trust, whose capital reaches \$130,000,000, has been formed in Great Britain by nine large iron and steel manufacturing concerns. Vickers, Sons & Maxim organized and promoted the movement. By the absorption of thirty-six independent companies the new combine will control fully 90 per cent. of the steel produced in Great Britain. The avowed object of this organization is to fit Great Britain to cope with German and American competition.

The article on "The Gold Mining Industry of Nova Scotia," which appears in this issue, is the authoritative expression of a mining man who has had splendid facilities for observing the true inwardness of gold mining in that Province. Mr. Brown gives some rather startling facts about gold stealing. He also shows, concisely and clearly, how gold mining has suffered from the early system of granting areas covering only twenty feet along the line of the lode. To those who accept without question the statement that Nova Scotia's gold mines are worked out, we recommend Mr. Brown's thoughtful and enlightened article.

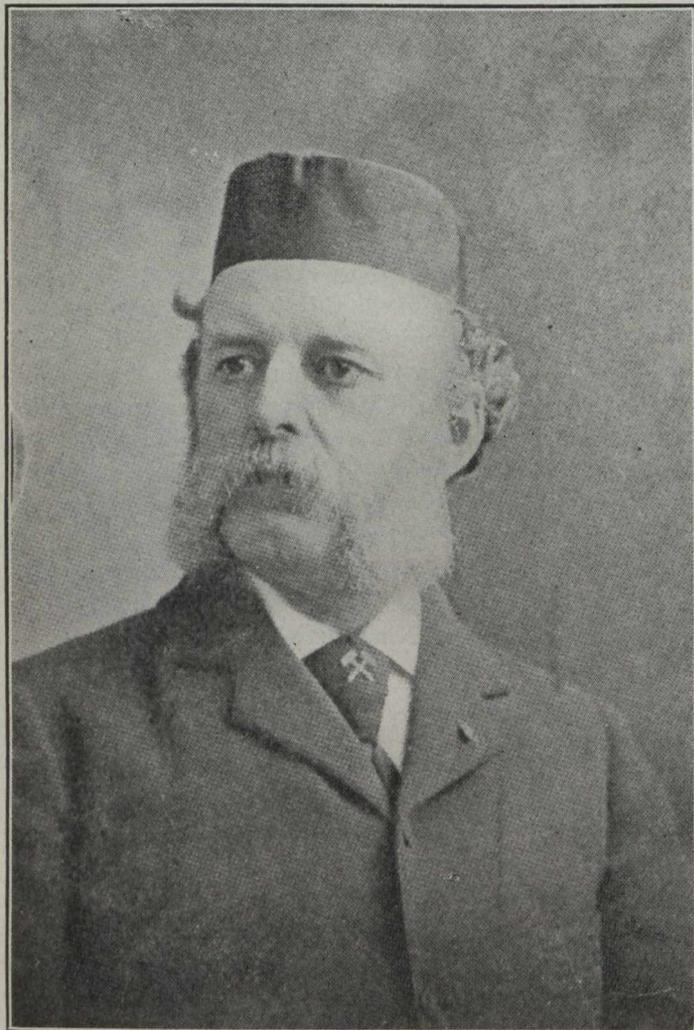
Mr. G. C. Cole, the United States Consul at Dawson, gives in a recent official report a statement of the prices of provisions and necessities at present ruling in the Yukon Territory. These generally, it may be noted, are in the neighborhood of from three to four times as high as those obtaining in Eastern centres, which, conditions considered, does not seem too exorbitant. Thus beef sells for from twenty-five to fifty cents a pound, bacon thirty-five cents, milk thirty-five cents a quart, and flour six dollars a hundred. Two dollars a dozen for fresh eggs, however, would appear somewhat stiff to the economically minded, while one would hesitate before flooring one's abode with hardwood with undressed lumber at four hundred dollars a thousand. Wages in the Yukon remain about the same as three years ago, *i.e.*, \$10 a day of ten hours for mechanics; \$4 to \$5 a day, with board, for ordinary laborers; and clerks, from \$150 to \$300 a month. The most reasonable charges seem to be for hotel accommodation, which range from \$3 to \$6 a day; but the Consul refrains from specifying the character of the accommodation offered at this price. The costs of living in the Yukon, will, of course, remain high until existing transportation facilities shall have been greatly improved.

THE AMERICAN INSTITUTE OF MINING ENGINEERS*

By R. W. RAYMOND.

Having been almost continuously an officer of this society since its organization in 1871, I may claim an intimate acquaintance with its history and administration; and I welcome the opportunity to explain in this contribution some features of its plan which are not perfectly understood by the public. Unfortunately, time is not at my command for an elaborate and complete discussion of the subject, and this sketch must necessarily be brief and fragmentary.

The period following the war for the Union was characterized by great activity in mining, and a great



Dr. Rossiter W. Raymond, Secretary of the American Institute of Mining Engineers.

demand for mining engineers. The mining industry of the Pacific States had been, ever since the discovery of gold in California, the leading factor in the settlement of the country, the improvement of communications and the establishment of civilized communities, with auxiliary agencies of commerce and manufactures, as well as education and religion. The governmental aid given to the Pacific railways, on the ground that these lines were military necessities for the handling of the Indian tribes and the maintenance of sovereign Federal authority

*A paper presented to the American Mining Congress, at Denver, Colo., October 16th, 1906.

throughout the vast Pacific slope, could have scarcely been secured, had not the mineral resources of that region given it a thrilling romantic interest and a boundless value in the eyes of the people of the East. At the same time, the exploitation of the Western mines and the rapid development of coal, iron and copper and lead mining in the other States, called for trained engineers; and successive technical schools were established in response to this demand, while technical journals flourished and became more and more devoted to problems of theory and practice, as well as records of new enterprises. Meanwhile, the actual mining engineers of the United States—those who were doing the great work of mining both East and West—could not be said to form an organized profession at all. There were a few graduates of foreign schools; many civil engineers who had turned their attention to mining; a much larger number of miners from Cornwall or Germany, who had risen to be mine captains and "experts"; and a still larger number of self-taught American miners and prospectors, ignorant and jealous of book knowledge, and over-conscious of superiority in many respects to its possessors and professors. This heterogeneous multitude had no common ground for the interchange of views and experiences, and no organized common feeling inducing them to seek and occupy such a ground. The technical journals and the technical schools alike are needed to be reinforced in their endeavors by some agency which should promote personal acquaintance and mutual esteem among the men in whose hands were the mining operations of America.

It was my realization of this feature of the situation that led me, as the editor of *The Engineering and Mining Journal*, to attend at Wilkes-Barre, in May, 1871, the meeting called by three mining engineers, Eckley B. Coxe, Richard P. Rothwell and Martin Coryell, to organize an association. As a beginning, in default of a duly elaborated scheme to suit our special case, the Rules of the North of England Institute of Mining Engineers were adopted in substance, and the name of "The American Institute of Mining Engineers" was chosen for the new society without debate, as a matter of course. The rules were subsequently re-written; but the name, though in some respects a misnomer, since it does not fully describe the scope of the Institute, has survived, and has become so dear to the members and so well known to the world, that it is not likely to be changed. A lucky misnomer is sometimes a "mascot."

At the outset, a most important question arose, the settlement of which involved the whole future of the society. Several educated engineers protested against the admission to full membership of persons not belonging to the profession, and not possessed of a certain degree of professional standing and experience. They could not insist upon the degree of M.E. or E.M. as a qualification. They did not themselves hold that degree, but they felt that C.E. or its equivalent in certified experience and knowledge ought to be required. In a word, they did not wish to recognize as fellow-members (though they would consent to admit as associates) common miners, foremen and self-educated mine captains.

There was much to be said in favor of this feeling. Professional societies usually represent professions, and membership in them is accepted as a guaranty of professional standing. Consequently, they make careful

preliminary examination into the training and achievements of candidates, and sometimes impose a period of quasi-probation as "junior" before advancement to full membership. All this is excellent, for the purpose for which it was designed. But that was not the purpose of the Wilkes-Bare meeting of 1871; and if that had been its purpose, the movement would have failed. This point is so important as to warrant further explanation.

There was at that time no such thing in the country as a distinct profession of mine engineering, numerous enough to support an active and useful society. Any attempt to create one by means of a society would have resulted in a small, select (*i.e.*, self-selected) coterie, barren of influence and outside of practical connection with the national mining industry.

The pressing need of the hour was not the segregation of a select body, but the cordial co-operation of all the representatives of a great industry or group of industries. This could only be effected by bringing together on terms of friendly equality the schoolmen and the fieldmen, and persuading the latter to do what they were naturally shy and reluctant in attempting, namely, to tell what they knew, for the benefit of all. Unquestionably the self-educated, practical mining men and furnace men at that time knew more than the school graduates about the actual facts of American ore deposits, mine workings and furnace management. It was not the nominal manager but the Cornish captain who knew the mine; it was not the chemist, but the founder who ran the furnace. If these practical men were slighted at the beginning, they would stand aloof, giving no aid in the way of fresh facts, and leaving the theorists to exchange their speculations with little profit, like the traditional boys confined in the garret, who professed to have made money by swapping jackknives, back and forth.

Again, the work of publishing and distributing useful information could only be done upon an influential scale by a society with a large income; and this would require either a select, small society supported by heavy annual dues, or a numerous membership paying small dues. Beyond question, the latter was both easier to secure and more fruitful of influence as well as revenue. The result of thirty-five years' experience has left no doubt on that head. What the Institute has given to its members in the way of publications for the annual fee of \$10 may be confidently compared in both quantity and quality with the similar publications of any society in the world, supported by annual dues of twice or thrice that sum.

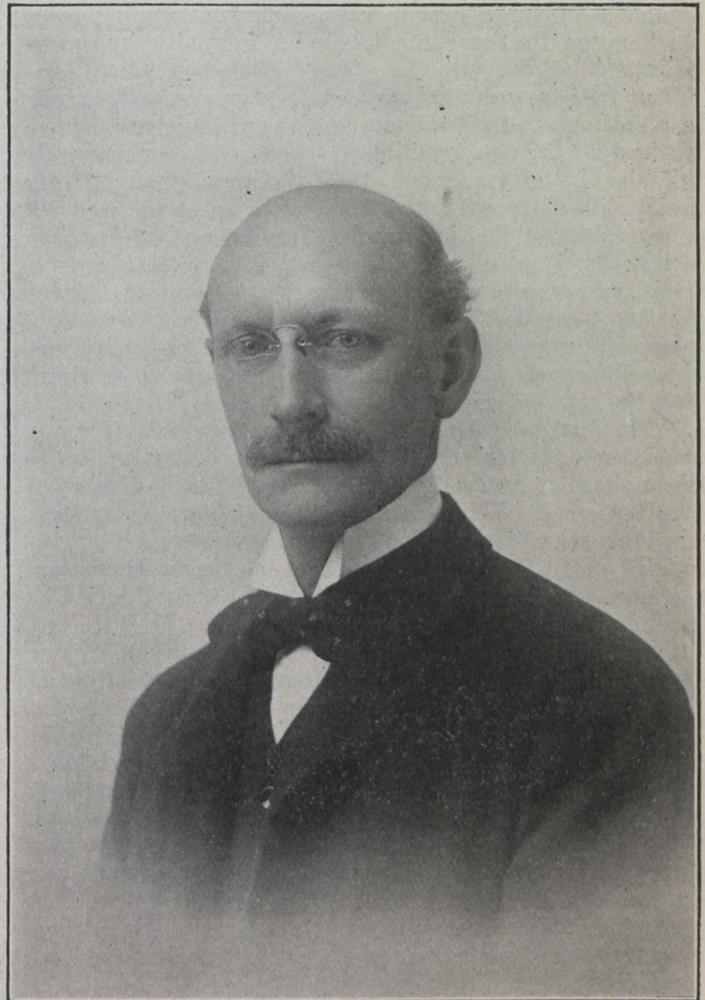
Another point is worthy of note. A large membership, even if it be not narrowly confined to men of a certain ascertained standing in a single profession, furnishes an attractive and inspiring public to ambitious authors. A famous engineer (member of several other American and foreign professional societies, as well as of our Institute) once said to me: "The Institute is an association largely composed of young men with reputations to win, instead of older men with reputations to maintain. The consequence is, that your members are eager to communicate what they know or think, instead of being afraid to 'give it away,' or reluctant to incur criticism by offering professional contributions not monumentally complete and creditable to their acknowledged professional standing."

The *Transactions* of the Institute illustrate the truth of this keen, discriminating observation. Some of their most valuable papers have come from men who could not have claimed membership in more "select" societies,

and who wrote, not because they were already known, but in order to make themselves known.

At all events, the force of circumstances dictated, and the experience of thirty-five years has approved, the decision which admitted to membership in the Institute all persons trained for, or practically connected with, the professions and industries which it represented.

But this decision involved the simultaneous adoption of another. In 1871 (and the same is true to a more limited extent to-day), the American mining engineer had to know many things besides mine engineering proper. He was expected to do, or intelligently to superintend, the work of assaying, milling, smelting and general construction and management. Moreover, a man who was running the mine to-day might be superintending the furnace to-morrow. Hence it was found both advis-



James Gayley, President of the Corporation and Past President of the Council of the A. I. of M. E.

able and practicable to include in the membership of the Institute those who were connected with geology, chemistry, and civil, mechanical or electrical engineering, as applied to mining or metallurgy.

The American Society of Mechanical Engineers and the American Institute of Electrical Engineers are both younger than our Institute, and, in some sense, its offspring. They have fields of their own, which they most creditably occupy; yet great numbers of their members still seek or retain membership in the Institute of Mining Engineers, and the Institute has had no reason to close the doors once opened to such candidates.

The original scheme of the Institute led to an unprecedented growth, both at home and abroad. The mem-

bership increased rapidly from year to year, and now numbers more than four thousand names, distributed throughout the world. This forced upon the management two additional problems: one of government; the other of policy.

The meetings of the Institute were, from the beginning, peripatetic. Nothing else could have prevented its degeneration into a local organization, or kept alive the national sympathy necessary to its success. Until its incorporation in 1905, it had no official headquarters aside from the office of its secretary, which had been located, without any official action, wherever the secretary happened to reside—first at Lambertville, N.J., then at Philadelphia, then at Easton, Pa., and finally at New York. It was manifestly impracticable to leave the decision of business questions to the vote of such members as might happen to attend a meeting in some particular locality. Consequently, almost absolute powers were given to the council, chosen annually by postal ballot.

But such a grant of absolute power demands a precise limitation of its sphere; and accordingly the council of the Institute was prohibited from any act or utterance outside of the management of the proceedings of the society itself, namely, the holding of meetings and the acceptance, publication and distribution of papers. Gradually it came to be recognized that the Institute itself, as represented by the members attending a given meeting, was still less competent than its representative council to express opinions or approve of any kind outside of its own immediate affairs; and the final result was the present rule:

“The Institute shall not assume responsibility for any statements of fact or opinion advanced in the papers or discussions at its meetings. Neither the council nor the Institute shall officially approve or disapprove any technical or scientific opinion or any proposed enterprise, outside of the management of the meetings, discussions and publications of the Institute, and the conduct of its business affairs by the board of directors.”

This policy is not only approved by our experience, but also founded in a correct theory of the relation of the Institute to its individual members.

A man who joins the society for the sake of the benefits offered by its publications and its fellowship* has a right to the assurance that neither his name, his money, nor the influence of the organization which both his name and his money have strengthened, shall be used to promote any outside cause whatever. No matter how ignorant or prejudiced he may be, he is entitled to be protected against unwilling partnership in an opinion, or a movement, or an enterprise which he has not contemplated.

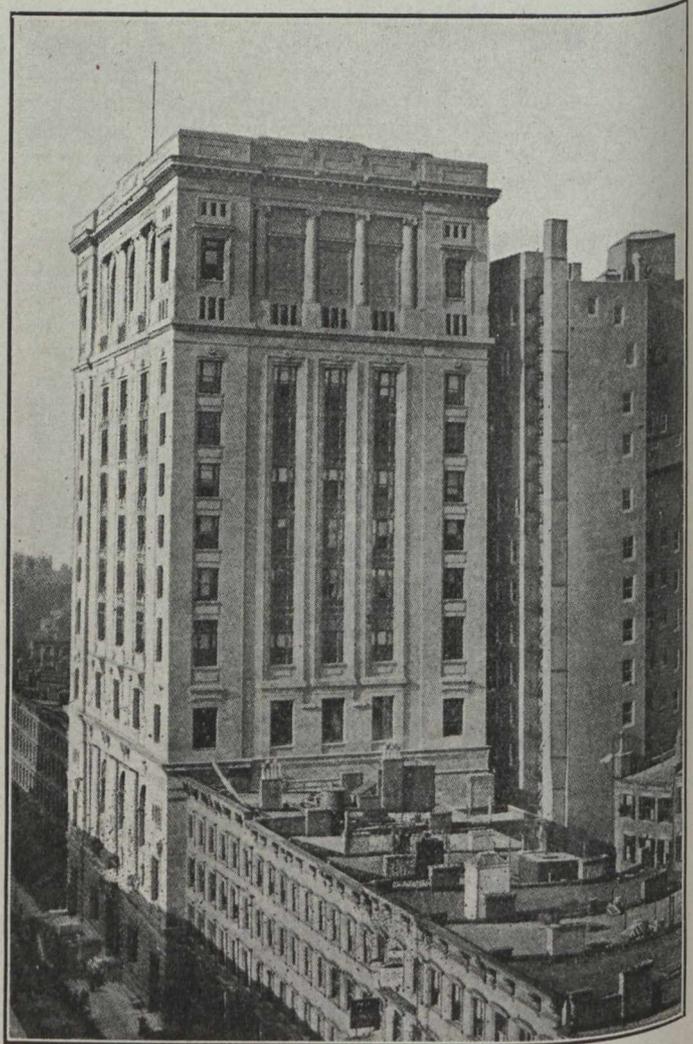
Several instances from the earlier history of the Institute will further illustrate this principle.

In the first decade there was a brilliant discussion before the Institute of the question “What is Steel?” and in 1876 an international committee of high distinction reported for our adoption a new nomenclature for the products of the iron blast furnace, the Bessemer con-

*I must be content with a mere passing notice of the advantages of this fellowship, which has proved in innumerable cases the sufficient motive for a frank interchange of information, quite outside of the formal published papers and discussions. It has been for many years my practice as secretary to refer members desiring information which I did not possess to other members who had it. And I can recall no case in which such an appeal did not meet a courteous response.

verter, the forge and the crucible. But, underneath the technical questions involved, there were important questions of tariff classification, involving, perhaps, millions of dollars; and a sweeping decision of the Institute on either side of the case would have been used in argument before the United States Treasury Department, to the injury of the business interests of many members. This result was wisely averted by a refusal to promulgate any such general decision.

Later, there was a memorable debate, concerning the metric system of weights and measures, on a resolution recommending Congressional legislation to make this system obligatory. Here, again, the proposition was passionately opposed by members whose business interests would, at least in their own opinion, be injuriously af-



United Engineering Societies Building.

ected by it, as well as by those who, on principle, disapproved it. In this case, the speeches on both sides were reported in the *Transactions*; but when the time came to vote on the resolution itself, the presiding officer declared it to be out of order, as not included in the declared purposes of the Institute, and, therefore, declined to put it to vote. This decision, sustained by the meeting, may be said to have settled, once for all, the principle which, after several similar precedents, was formally embodied in the rules already quoted.

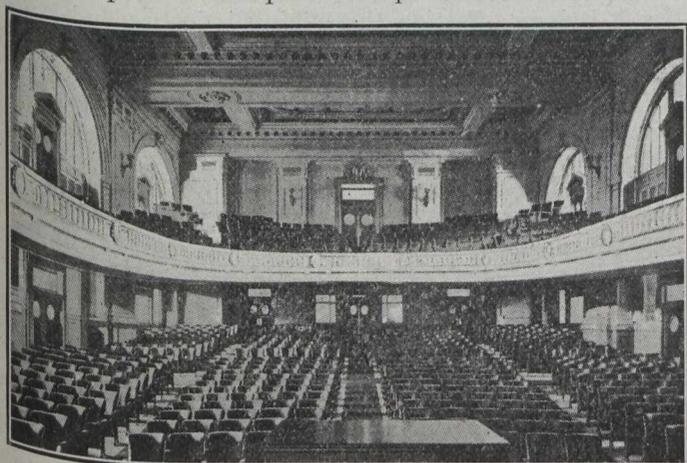
It is evident that no rule of this kind could be enforced if there were any recognized distinction as to the merit of the scheme or proposition seeking support. Such a scheme or proposition, if of such a character as, almost

beyond doubt, to command the hearty assent of all members, would surely constitute an excellent precedent and illustration for the support of the existing rule.

Ever since the Institute became successful, influential and widely known, innumerable attempts have been made in entire good faith, to secure the aid of its name and authority for propositions honestly believed to be (as, in most cases, they were) meritorious. Recommendations that Congress should make appropriation for the representation of the United States mineral industry at this or that exposition at home or abroad; that the Institute should unite with this or that society to form a joint committee on national or international standards, etc., have all been "turned down"—the more meritorious, the more promptly. It was the only way to preserve our plan and purpose.

This statement may explain why the Institute and its officers, as such, have taken no part in the successive meetings of the American Mining Congress, with the purposes of which a large number of our members are in sympathy.

I feel bound to add that the restricted policy above outlined has had somewhat unexpected and most gratifying results. The Institute has been the forum, and its *Transactions* the records, of the free discussion of nearly every important and pertinent question connected with



The Auditorium.

the progress of modern engineering. Expressing no opinions, we hear all, and furnish to the proposer of any reasonable novel view an appreciative audience. And no student of the practice of the last thirty years in any department represented by our membership can afford to overlook the authoritative and suggestive contributions made by us to the technical literature of this generation.

There are many other features of the history, tradition, and consequent present administration of the Institute, concerning which I would gladly speak, and feel myself exceptionally qualified by circumstances to speak; but I cannot thus add to the present sketch, which, I venture to hope, has explained (and even justified) the three leading peculiarities of the Institute, namely:

1. Its wide and liberal conditions of membership.
2. Its absolute government by a central body—*i.e.*, its representative, rather than purely democratic, organization.
3. Its strict limitation of the functions and powers, both of the governing body and of the Institute as a whole.

Each of these features has been often criticized, usually in perfect good nature and good faith. I shall

not now undertake to offer any further defense of them, not incidentally implied in the foregoing explanation. But I think I may fairly claim to have shown that they came into existence as the natural and necessary results of the conditions attending their origin. Even if something better might have been imagined, nothing better could have been done.

Finally, may I not modestly, but confidently, claim that the results of this enterprise, whatever may have been the defects of its plan, have been, somehow or other, such as to warrant us in "letting well enough alone?"

THE VALUE OF A MINE

BY J. B. TYRRELL, Mining Engineer, Toronto, Ont.

(Continued from June 15th.)

We have seen that investment in mining securities, if judiciously made, must allow for the redemption of the capital invested within a stated time, as well as for the payment of interest on that capital at a rate commensurate with the risk incurred.

In Canada rates of interest that would be considered fair and reasonable for a mining investment, keeping in view the many possibilities of loss, would vary from seven to twenty per cent. Many men who buy mining shares are looking to make a hundred per cent. within a few weeks, but these people are not investors, they are gamblers, some of whom will be allowed to win in order that many more may be induced to stake their money on the same gaming tables.

In addition to the above rates of interest, the dividends must include certain sums which for a term of years should be credited to a sinking fund for the repayment of capital, and the question of how many years should be allowed for such repayment must be kept constantly and clearly in view, or the investor will be certain to drop back into the idea that dividends are interest and nothing else.

In some large producing mines and more especially in the gold mines of the Transvaal, where the tonnage and value of the reef can be closely calculated, the length of time that it will take to exhaust the property and the net profit that will be realized during that time, are known. For instances, the Robinson Mine, one of the greatest gold mines of the world, is capitalized at £2,750,000, or \$13,337,500, in 550,000 shares of £5 each. This mine is stated to contain a body of ore which will yield about \$42,000,000 in dividends, and which can be extracted in twelve years, when the mine will be exhausted. In twelve years, therefore, this mine will pay back its capital of \$13,337,500, with interest at 19 per cent., 3 per cent. being credited on the dividends as they are paid from time to time. At the present price of the shares, namely, £8.5, or \$40, the actual capital is \$22,000,000, and the mine, before its exhaustion, will pay this back with interest at 9 per cent.

In most producing mines a certain quantity of ore is blocked out on three or four sides ahead of production, as much as the management expects to extract in two, three or four years, as the case may be. The quantity and value of this ore is known with a reasonable degree of certainty, while for the rest the investor must be satisfied with the best estimate that he is able to obtain. Let us assume that the mine is capitalized at one million dollars in shares of \$1 each; that after careful examination and sampling it is found to contain ore blocked out which will yield a net profit of \$900,000; that the

ore which is not blocked out is estimated to yield profits of \$1,300,000; that the estimated time in which this ore can be extracted is ten years; and that the plant at the end of this time will be of no value. During the ten years it will pay \$220,000 a year, or an annual dividend of 22 per cent. As there is such a large body of payable ore blocked out and proved, making dividends to almost the full amount of the capital certain, the investor might probably be satisfied with 8 per cent. interest. On this basis, and allowing as before 3 per cent. interest on all money paid as dividends, the present value of this mine is \$1,315,000, and the shares are therefore worth \$1.32.

If all the ore could be extracted from the above mine in five years instead of ten, it would be yielding profits of \$440,000 a year, or dividends at the rate of 44 per cent. on the capital, but still on account of the deduction of 20 per cent. each year from the dividend for the repayment of capital, the shares would only be worth \$1.64.

If on account of the installation of new plant or for other reasons the first dividend should be deferred for two years, and should then continue for ten years thereafter, the shares would be worth \$1.13.

Another mine is capitalized at \$1,000,000, in \$1 shares. It contains 4,000,000 tons of low grade ore, say of one of the baser metals, which will take twenty years to extract. At the present price of the metal a profit of \$1.50 a ton could be realized. What the price of the metal will be a few years hence it is impossible to predict; it might drop so that the mine would be unprofitable and would have to be closed down. In the case of an investment in such a mine the risk of loss would be great and a correspondingly high rate of interest should be demanded, probably 15 per cent. and possibly 20 per cent. At the former rate the shares are worth \$1.60, and at the latter rate \$1.26.

Again, a mine is capitalized at \$1,000,000 in \$1 shares. It contains ore which will yield a net profit of \$300,000 blocked out, and this ore can be extracted in two years. Beyond what has been blocked out, very little payable ore is to be seen, and though there may be much ground on the property which would seem to be worth prospecting, the possibility must be recognized that this ground may prove unproductive and at the same time part of the profits derived from the ore blocked out may be used up in prospecting it. In this case the only sure profit is the \$300,000. This, allowing interest at the rate of 10 per cent., is worth \$253,000, giving a value of 25 per cent. per share for the stock. Any price paid above this is purely speculative, paid on the chance that more payable ore will be found on the claim. The purchaser who pays, say 70 cents a share, should therefore fully understand the risk that he has taken and should not complain, or blame the mining industry, if when the mine is exhausted he finds that he has lost most of the money that he invested in it.

Examples of mine values might be multiplied indefinitely, but the above will give some idea of the principles which should guide the investor in mining stocks if he wishes to place his money with reasonable certainty of good returns.

The investor has to be taught that a proper estimate of the ore reserves—in their relation to the mine's market valuation—is the real fact to grasp. If people neglect this fact they will, in the long run, lose by buying mining shares.

As a rule every man considers himself competent to invest in mines, but it is worth recording here that pro-

fessional rather than amateur knowledge on this subject, as on all other subjects, is more likely to stand the test in the long run.

THE INSTITUTION OF MINING ENGINEERS

The forty-sixth annual meeting of the Institution of Mining Engineers opened on the 13th of June at the rooms of the Geological Society, in London. Mr. Maurice Deacon, the president, in the course of an address gave a brief history of the Institution, which was formed in the year 1889 with the object of broadening the sources of information upon matters affecting the profession of mining engineering by amalgamating the several mining institutions of Great Britain into one consolidated body. With the exception of two societies, the South Wales Institute of Engineers and the Institution of Mining and Metallurgy, which continue as independent organizations, the object of the Institution has been attained. It now has a membership of 2,972 federated and 73 non-federated members, representing an increase of membership in fifteen years of over a hundred per cent., whilst the financial showing is also satisfactory, subscriptions having increased nearly 170 per cent.

The address refers to recent legislative enactments in Great Britain affecting the mining industry, and especially deprecates the passing of the Workmen's Compensation Act, in consequence of which, it is feared, costs will be increased by the largely advanced premiums that insurance companies are demanding upon their present scale. Among other items of mining legislation promoted in Parliament, the following bills are mentioned:—The Coal Mines Regulation Bill, Engines and Boiler Bill, and two bills for limiting the period of working underground. In reference to the foregoing, Mr. Deacon points out that the proposal to again disturb the Coal Mines Regulation Act appears to be unnecessary and undesirable, and likely to introduce fresh difficulties in the management of mines, coupled with an increased cost of production. The proposals of the Eight Hour Bank to Bank Bill are fraught with danger, not only to the British industries and the public in general, but to the men in whose supposed interest the bill was introduced. At the present time few men work over eight hours a day, but by the passage of the Act the time available for coal-working would in many cases not exceed six hours a day, and in those mines where the working face is situated a long distance from the pit bottom, probably not more than five and a half hours a day. To quote Mr. Deacon: "The effect of such a serious limitation . . . would be to so seriously increase the cost of production that those industries which are of necessity large consumers of coal, especially the iron and steel trades, would be injuriously prejudiced in competition with other countries, to the grave detriment of the trade generally. . . . To what extent the price of fuel would rise it is, of course, impossible to suggest, but that a reduction of 20 to 25 per cent. in the output, which would probably accrue, would result in a great scarcity of coal, and that such a scarcity would create a considerable rise in the price cannot be questioned." Mr. Deacon stated that some years ago he made an experiment to test the practical result of a limitation of hours of working, and found that the output of a certain colliery was reduced by 27 per cent. below the output obtained on a normal day of nine hours' winding.

Allusion was also made in the address to the increased progress that has been made of late in the mechanical engineering of British collieries. Thus, in seams which

are worked to the dip, mechanical haulage has replaced the employment of horses, and in Warwickshire, where several seams are worked in conjunction with one another and brought to one main gate road, it is the custom to employ a small haulage set on every gate road, as well as on the subsidiary levels or cross-gates. Economies have also been effected by the use of steel props and girders, while electric cutting machines have been largely adopted of recent years in seams of varying thicknesses and conditions. In some thin seams conveying belts are in use along the working face to the gate ends, where the height is insufficient to permit an ordinary car to be loaded, and heading machines, by which as much as 36 yards of coal heading per week has been cut, have also played an important part in mining thick seams.

The improvement in the surface mechanical equipment of collieries is stated as being still more marked. For example, by the use of high pressure steam, coupled with more economically designed engines, by the greater use of expansion gear, and sometimes by super-heating and condensing, the steam consumption of modern collieries has been greatly reduced. Winding engines which formerly consumed 70 or 80 pounds of steam per indicated horse-power may now be found using not more than 30 pounds whilst continuously running engines and steam turbines, for fan and electric driving, are in some instances working with not more than 14 or 15 pounds of steam per indicated horse-power.

There is, perhaps, no greater necessity in connection with the working of a colliery than the provision of pure boiler water, and British colliery engineers have of late given considerable attention to the treatment of impure water to fit it for boiler use, while, too, the better utilization of the calorific value of fuels by the use of gas producers and gas engines has not been disregarded, and in the case of plants of 1,000 kw. and upwards, working costs as low as 0.25d. per kw. have been obtained.

The address concludes with the following pregnant paragraph:—

“The careful consideration of economies in fuel for colliery purposes becomes increasingly important by reason of the greater depths from which the coal of the future will of necessity be wound. The question of raising large quantities of coal from depths of 2,500 feet to 3,000 feet, which will have to be confronted on a large scale at an early date, opens up a fresh field for the exercise of the ingenuity of the mining engineer. In the case of collieries sunk to such depths, where only one workable seam is available, very large areas, probably not less than 18 to 20 square miles to each pair of pits, will be necessary, to warrant the heavy capital expenditure entailed in sinking and equipping plants of the magnitude which will be necessary to raise the large quantities of coal required to produce a low cost and enable a reasonable return to be made upon the large capital involved.”

THE NEW TILBURY AND ROMNEY OIL FIELDS OF KENT COUNTY, ONTARIO

BY EUGENE COSTE, E.M., Toronto.

(Toronto Meeting, 1907.)

Oil was first struck in the new Tilbury field in December, 1905, on the John Kerr farm in the northwest part of lot 10 of the Middle Road, North Range of the Township of Tilbury East, in the County of Kent, Ontario. The first well as drilled by the Acme Oil Company of Detroit. This company had been operating unsuccessfully in the narrow Leamington pool in the adjoining County of Essex. Before finally abandoning its venture in oil it decided to take another chance, and this time of a purely “speculative” nature, as the location selected was in an entirely new and undeveloped territory. As luck would have it, it turned out to be a winning throw. At the depth of 1,360 feet a rather strong gas vein was struck; then another at 1,375 feet; then the first oil pay with more gas at 1,385 feet; then a second oil pay at 1,410 feet and a third one at 1,430 feet. A little below that some salt water was found and the drilling was stopped at 1,450 feet. The well after the shot started to flow at the rate of 40 barrels of oil per day, the gas being quite strong, about half a million cubic feet per day.

The second well was drilled in at the end of March, 1906, on the Janes farm, about three-quarters of a mile southwest of the first well. It struck gas and oil at about the same depths, but it proved to be a small well,

not starting at better than eight or ten barrels per day after the shot.

The third well was completed on April 6th, 1906, on the J. Smith farm, half a mile southeast of the first well, and it started at the rate of sixty barrels per day after the shot; the first gas was struck at 1,363 feet and the first oil at 1,393 feet; the second oil at 1,418 feet and the third pay of oil, which was the best, with some salt water, at 1,430 feet.

A great many other wells followed rapidly thereafter, and to date not less than 150 wells have been drilled. These prove that the good oil territory of the Tilbury field extends at least over an area of two miles east and west by five miles north and south, and the limits of the field to the south and north are still unknown. Only three or four dry wells have as yet been encountered over that large area of 6,400 acres, and a number of very good wells (century wells) have been struck. The largest of these is the A. Simard well of the Central Oil & Gas Company in the northwest part of the field, as at present developed, which started to flow naturally, that is, without being shot, at the rate of 1,500 barrels per day of fluid, 1,200 barrels of which were salt water and 300 oil. This well is now over two months old and is still flowing naturally about 200 barrels of salt water and 50

barrels of oil per day. The oil, water and gas were all struck at the same time at a depth of 1,445 feet. Only about 150,000 cubic feet of gas per day having been reached at the depth of 1,436 feet.

Large gas wells have also been struck in this field, the largest being the Volcanic Oil & Gas Company's well on the David Halliday farm in the northwest part of lot 1 in the sixth concession of the Township of Raleigh, which adjoins the Township of Tilbury East to the northeast. Gas was struck at 1,417 feet, drilling being stopped at 1,421 feet in the middle of the gas pay, as the well was then measuring seven million cubic feet per day of dry gas. It was tubed with 3 inch tubing, packed with a Dresser packer and closed in on the 16th of September, 1906. The regular rock pressure of the closed-in gas was 650 lbs. to the square inch.

The gas from this well has since been piped to the City of Chatham, ten miles distant, where it would now be sold for 15 cents and 25 cents per thousand cubic feet, if, instead of facilitating the advent of such a cheap and incomparable fuel, an antiquated law known as the "Gas Inspection Act" (which declares that there should be no trace of sulphuretted hydrogen in any gas used for illuminating purposes) had not prevented its use by the people of Chatham for the greater part of this winter. Backed by the provision of this old law, some of the aldermen of the City of Chatham entertained the idea that this natural gas from the Tilbury field, which certainly contains some sulphuretted hydrogen, as evidenced by the smell of it, would poison the Chatham consumer. The writer mentions this matter here as he believes that it is the first time on record that this question of the supposed poisonous nature of natural gas has been raised on the introduction of it into a city. At the instance of the City Council of Chatham, this natural gas from the Tilbury field has just been analyzed by Prof. E. B. Shuttleworth, of Toronto, with the following results:—

Hydrocarbons, principally methane ...	92.20
Carbon dioxide	1.40
Oxygen	Trace.
Carbon monoxide	0.21
Hydrogen	4.40
Nitrogen	5.59
Sulphuretted hydrogen	0.20
	100.00

which compares as follows with the natural gas from Ohio and Indiana, according to analyses published by the late Prof. Edward Orton in his "Geology of Ohio," volume 6, page 137:—

TABLE OF ANALYSES OF NATURAL GAS FROM OHIO AND INDIANA.

Gas.	1	2	3	4	5	6	7
Hydrogen ...	1.89	1.64	1.74	2.35	1.86	1.42	1.20
Marsh gas ..	92.84	93.35	93.85	92.67	93.07	94.16	93.58
Olefiant gas	0.20	0.35	0.20	0.25	0.49	0.30	0.15
Carbonic oxide	0.55	0.41	0.44	0.45	0.73	0.55	0.60
Carbonic acid	0.20	0.25	0.23	0.25	0.26	0.29	0.30
Oxygen . . .	0.35	0.39	0.35	0.35	0.42	0.30	0.55
Nitrogen . .	3.82	3.41	2.98	3.03	3.02	2.80	3.42
Sulphuretted hydrogen .	0.15	0.20	0.21	0.15	0.15	0.18	0.20

LOCALITIES.

- | | |
|----------------------|----------------------|
| 1. Fostoria, Ohio. | 5. Anderson, Indiana |
| 2. Findlay, Ohio. | 6. Kokomo, Indiana. |
| 3. St. Mary's, Ohio. | 7. Marion, Indiana. |
| 4. Muncie, Indiana. | |

It will be seen from the above analyses that, so far as the sulphuretted hydrogen is concerned at any rate, there is absolutely no difference between the Tilbury field gas and the Ohio and Indiana gas taken at a number of places widely scattered over these two States, and where it has been used for all purposes without the slightest harm to anyone for a great many years by thousands of people. It is clear, therefore, that our gas inspection act is onerous and needs to be amended to permit in Canada the use of natural gas for domestic and other purposes, as unrestrictedly as it is used in the United States. It is clear, also, that the City Council of Chatham has been altogether too particular in its acceptance of so well and so favorably known an article as natural gas.

The oil of the Tilbury field also contains some sulphur, which gives it a strong odor peculiar to the crude oil known in the States as "Lima" oil. It is a dark green in color, of 38 to 41 degrees Baume gravity, and belongs to the same class as the Lima, Ohio, the Indiana, and the Petrolia and Oil Springs (Ontario) oils. It is bought from the producer at the present time only by the Imperial Oil Company of Sarnia, Ont. This company has established a pumping station and tankage in a central part of the field, from which it pumps the oil through a 4 inch and also through a 2 inch line owned by them to Merlin, Ont., on the Pere Marquette Road, four and a half miles distant. From there the oil is taken over that road in tank cars of the Imperial Oil Company to their large refinery at Sarnia. The oil is bought by the Imperial Oil Company at the tanks at each well, and they pay at present for it \$1.14 per barrel. After the oil has been accepted and the tank has been gauged, the oil is run by means of a donkey pump through 2 inch lines owned by the Imperial Oil Company to their tanks erected at the central station. The well tank is again gauged after the run and the difference in the two gauges gives the amount of oil sold, for which the Imperial Oil Company gives the producer a run ticket and also a vouched ticket, in order to enable him to collect the Government bounty of 52 1-2 cents per barrel. The total price, therefore, at present obtained by the producer for his oil is \$1.66 1-2 per barrel, less the royalty, generally one-eighth to the owner of the land, the oil and gas rights of which are generally only leased by the producers. Two years ago, before the Dominion Government removed the import duty protecting Canadian crude oil, the average price of it in Canada was, for the previous year, \$2.12. By the bounty system, therefore, versus the duty system, the net result is a loss to the oil producer of \$2.12 less \$1.66 1-2 or 45 1-2 cents per barrel, and another loss to the Dominion Government of 52 1-2 cents per barrel, while the refining companies make all the gain, which I am not aware that they share with the consumer. With the duty removed they can now obtain their crude oil cheaper from the States, so much so that the Canadian Oil Company, the only independent refiner now in Canada, gets all its supply of crude oil from Ohio and, the writer believes, buys no Canadian oil from any of the fields, certainly none from the Tilbury field. The price of Canadian oil is therefore governed and controlled by the American market, while the Canadian producer

operating in the deep fields is at a disadvantage in being called on to pay a heavy duty on his drilling outfits, machinery, cordage, tubing, lead lines, etc. As mentioned above, the oil in the Tilbury field is in a deep sand (about 1,400 feet), and consequently all the drilling done there is done by the American cable tool system; the Canadian pole tool system being too slow and not suitable for wells of that depth. These American cable tool outfits cannot be obtained in Canada, nor can the 1,500 pound test 2 inch tubing, and other 2 inch high pressure lines which the Tilbury field producer must have, and on all of this he must pay a heavy import duty. It is quite clear, therefore, that the Canadian deep oil producer would receive greater encouragement to test and develop deep oil fields in Canada if he had no duty to pay on his materials, which he necessarily imports from the States; and if the price of his product was protected at present receiving a bounty on his product from the by an import duty on American crude oil instead of as Dominion Government, which he practically returns in the form of duty on his equipment, while at the same time his price is slaughtered in competition with cheap American crude oil.

Geology.—The Tilbury oil and gas field lies under a flat drift-covered section of the country, the elevation of which is about 600 feet above the sea. The drift is about 150 feet thick in the south end of the field and about 100 feet in the north end, and is composed of boulder clay on the top and sands and gravels varying very much in thickness below. The first strata struck under this drift are the grey blue shales of the Hamilton or Middle Devonian formation—the so-called upper soapstone or soap of the Petrolia driller; then comes the middle lime and the lower soap of the same formation, followed by the Corniferous or big lime of the Lower Devonian, which is struck at depths ranging from 230 to 285 feet, and is about 150 feet thick. Below this are the Dolomitic limestones with flint and gypsum of the Onondaga, or Upper Silurian, a little more than 1,000 feet thick; then comes the Guelph and Niagara. Silurian dolomitic limestones in which, so far, the drilling of the wells has been stopped, but it is likely that, in future, in some parts of that field or not far from it, the wells will be drilled deeper still and will obtain their gas and oil either from the Clinton limestone immediately underlying the Guelph and Niagara, about 150 feet thick in that section of the country, or from the still deeper strata of the Trenton limestone, lying about 900 feet under the Clinton, from which it is separated by the Medina, Hudson River and Utica soft shales, which can be drilled through very quickly and cheaply.

The gas and the two upper oil pays in the southern part of the field are found in the lower brown dolomites and gypsum of the Onondaga, while the lower oil pay is struck in the upper beds of the Guelph and Niagara. In the north end of the field, north of the Michigan Central Railway, the lower beds of the Onondaga are barren of oil, which is there altogether found in the Guelph, but the gas is still found there in the lower beds of the Onondaga in the strata which form the first and second oil pays of the south end of the field. In the east middle part of the field, on the other hand, the oil is struck in the Onondaga strata which constitute the gas pays in many of the wells of the middle western part of the field, such for instance, as at the J. W. Campbell No. 1 well of the Central Oil & Gas Company, the log of which is here appended:—

LOG OF THE CENTRAL OIL & GAS COMPANY'S WELL NO. 1.

(S.E. corner of Lot 6, in the 9th Concession of the Township of Tilbury East, Kent County, Ont.) Elevation 600 feet A. T.

Formation	Description of Strata.	Thickness feet	Depth feet	Remarks
Drift	Boulder clay	95 to	95	A little gas. 10' drive pipe to 138 feet.
	Grey sand	5 to	100	
	Clay and gravel ...	28 to	128	
Hamilton.	Blue clay shoal (upper soap)	37 to	165	
	Middle lime	10 to	175	
	Blue clay shoal (lower soap)	67 to	242	
Corniferous or Big Lime	Yellow limestone..	158 to	400	8" casing to 343 ft. A show of oil at 250 ft.
Onondaga.	Grey, drab, brown and blue dolomites with gypsum and flint (shaly, series with darker shaly dolomites & more gypsum from 835 to 1185)	1020 to	1420	6 1/2" casing to 835 ft.
				Gas at
Guelph . . .	Blue white dolomitic limestone . . .	9 to	1429	1250 ft. 1362 ft. 1370 ft. 1376 ft. 1382 ft.
				Oil at 1397 to 1400 ft. and at 1416 ft.
				Oil at 1426 ft.

A little gas is also often found in this field in the sand or gravel at the bottom of the drift, also in the upper part of the Corniferous in some of the wells, while in other wells some gas and a little oil were found in the upper beds of the Onondaga between 500 and 600 feet. There is also another vein of gas in some of the wells at about 1,250 to 1,280 feet in the Onondaga, all of which shows the adventitious nature of the gas and oil in the different porous strata or reservoirs of this field, which does not in this differ from many other oil and gas fields. This fact, as I have shown in one of my papers before this Institute ("The Volcanic Origin of Natural Gas and Petroleum," Vol. 6 of the Journal of the C. M. I.), that gas and oil always impregnate the porous portions of the great thicknesses of strata from the Archean to the drift, many of which strata are very impervious, constitutes one of the very strong proofs of the volcanic nature of these products. For other proofs of the volcanic origin of oil and gas, reference may be made to the above mentioned paper, the arguments in which have not yet been successfully refuted.

The Romney oil field, or rather pool, as it is yet only about three-quarters of a mill long and only a few hundred feet wide, is situated some seven miles southwest of the Tilbury field in the north parts of lots 21, 22 and 23 in the 4th concession of the Township of Romney, Kent County, Ont. It is only a few months old and there are now seven producing wells in it, several of which came in as very large wells, making each over 1,000 barrels per day of oil. The oil is struck at the shallow depths of 200 to 270 feet, in the upper part of the Corniferous formation or Big Lime, the top of which is struck there at 180 feet. The oil is heavier than the oil of the Tilbury field, about 28 to 30 Beaumé. It is piped and shipped from Coatsworth station on the Pere Marquette to the Sarnia Refinery of the Imperial Oil Company, which now pays 84 cents per barral for it at the wells.

Five miles further southwest again, in lot 11 of the 2nd concession of Romney, oil was struck some few years ago in the Guelph formation at 1,290 feet. The wells were pumped for quite a while, but abandoned on account of their making too much salt water with the oil.

It will be seen from the facts presented above that a great many other interesting oil and gas developments are to be anticipated in the near future from this district, and in fact from many parts of the County of Kent and of several of the neighboring counties.

NOTES ON THE MINERAL FUEL SUPPLY OF CANADA

BY R. W. ELLS, LL.D.

(Abstract of paper read before the Royal Society of Canada.)

(Continued From Page 245.)

Farther west the rocks of the mountain chain belong to an older series than those which contain the coals; but the next division westward from the vicinity of Sicamous, although for the most part igneous in character, contains isolated basins, generally of Tertiary rocks, which carry coal beds often of large extent and thickness. These are found at widely separated points, such as the upper part of the Peace River, the valley of the North Thompson, the vicinity of Kamloops, the Nicola valley, and the Tulameen and Similkameen district, all with the exception of the two first being situated to the south of the Canadian Pacific Railway; while to the north are the areas along the Marble canyon at Hat Creek, a few miles northwest of Ashcroft, and the Bulkley valley deposits farther north, situated to the south of the Skeena River. Most of these coals are of the coking variety, while the lignites are of excellent quality.

On the Pacific coast the great Cretaceous deposits on Vancouver Island have been mined for nearly half a century. Farther north, on Graham Island, which is the most northerly of the Queen Charlotte group, anthracite, high grade bituminous and lignite are found. This field promises to be of great value.

The occurrence of these several varieties of coal in rocks of practically the same geological horizon is interesting, since it is probable that at one time all these newer coals existed in the form of lignite. It has been pointed out that as we approach the foothills from the plains, and thence continue westward into the mountain range at Crow's Nest and at Banff, the percentage of water in the lignite gradually diminishes and the coal passes through lignitic coals into bituminous and thence to semi and true anthracite. The alteration of the coals is due to a large extent to heat induced by pressure during the epoch of mountain-making.

Though the change in character of the coals may also, to some extent, be due to the relative position of the seams in the section, still the difference in character does not depend entirely upon the geological horizon, since in the interior basins of British Columbia many of the Tertiary coals are highly bituminous instead of lignitic, while on Queen Charlotte Island the Cretaceous coals range from high grade bituminous to broken and shatterd anthracite.

The thickness of the coal-bearing strata along the eastern side of the Rocky Mountains aggregates several thousands of feet. In a section published by Mr. J. Mc-

Evoy, the total thickness of the coal-bearing formation exposed along the Elk River amounts to 4,736 feet, and the coal seams exposed have a total thickness of 216 feet. The thickest beds in the section are 36, 46 and 46 feet respectively. Along Michel Creek, on Morrissey Creek, and near the divide between Elk and Fording Rivers, large workable seams have been found. It is evident, therefore, that the quantity of coal on the Crow's Nest basin is inexhaustible, the amount estimated by Mr. McEvoy for an area of 230 square miles, owned by the Crow's Nest Company, alone being no less than 22,595,200,000 tons.

In the Banff district, where are the Canmore and Anthracite mines, about fifteen seams have been recognized. The geological formation is Cretaceous. Beds of semi-anthracite have been opened up having thicknesses of 12 to 15 feet. These coals extend northward to the upper waters of the North Saskatchewan and Peace Rivers.

Between Crow's Nest and Banff and northward near the upper waters of the Peace River, large coal seams have been reported. So far no trace of coal has been found in sediments of Carboniferous age.

The coal areas of Vancouver Island have long furnished the Pacific coast of British Columbia and as far south as San Francisco. The coals, which occur on the east side of the Island are high grade bituminous and of Cretaceous age. The mining centres are confined to Comox, Nanaimo and Ladysmith. The seams frequently vary in thickness from three or four feet to fifteen or twenty feet.

On the mainland of British Columbia the coals are bituminous rather than lignitic, though the latter is also found both as lignite and as lignitic coal.

The Nicola coals are bituminous coals, yielding on excellent coke. These coal areas, lying about fifty miles south of Kamloops, will doubtless supply a large part of British Columbia's demand.

The high grade coking coals of the Tulameen and Similkameen districts are similarly of great importance. Good coal, both bituminous and lignitic, is found in several other districts.

Both lignite and true coals are found in Northern British Columbia, both south of the Skeena River and northward at intervals into the territory of the Yukon. Probably the most important occurrence is on the Telkwa River in the Bulkley Valley, where five seams of coal, from 2 1-2 to 20 feet in thickness and of excellent quality, have been found near the proposed line of the Grand Trunk Pacific Railway.

In the Yukon district coals of good quality have been found. There are several seams exposed on Cliff Creek on the Klondike River, and it is estimated that an area of 200 square miles is underlain by coal.

The Colliery Guardian, May 31st, makes the following comment on the Canadian Industrial Disputes Investigation Act of 1907: "As regards taking proceedings under the Act, it is at present left to any private individual to lay the necessary information. This, perhaps, explains why the miners of Fernie, B.C., recently went on strike even while a Board of Conciliation and Investigation was being constituted. Neither shall we know, without further experience, how far the Act will effect the purpose for which it is intended, for in the case of the Fernie strike an agreement was speedily arrived at. Both in New Zealand and New South Wales similar efforts to prevent strikes by force of law have given rise to grave constitutional difficulties."

THE GOLD MINING INDUSTRY OF NOVA SCOTIA

By E. PERCY BROWN, S.B.

The accompanying diagram, taken from the Report of the Department of Mines for the Province of Nova Scotia for the year 1906, is interesting as showing in a graphic way the very unsatisfactory progress of gold mining in Nova Scotia during the past forty-four years.

Many excuses have been offered for the fact that instead of a steady and healthy growth the industry has suffered severe setbacks at times, and during the past five years, when the mining industries of most countries have been booming, the gold production of Nova Scotia has steadily decreased.

One authority states that the large mines are carrying on development work only, while they are extending and enlarging their plants preparatory to increased production.

Others state that the days of the small, rich, nuggety lode with a large yield per ton, but a correspondingly large cost, are passing away and that more attention is being devoted to the low grade and larger deposits from which, though the gross yield may be less, the net return is greater.

Such excuses, though doubtless partly true and perhaps sufficient for the layman, are recognized by every mining man as but poor ways of explaining the present status of the industry.

The first discovery of gold in Nova Scotia is said to have been made at Tangier in the year 1860. There was considerable excitement over the discovery and prospectors flooded the country.

Gold was found in so many different places during the next few years that it was thought that the whole Province was auriferous.

The conditions under which mining was carried on can be realized when we read that at Tangier during the year 1860-61 no less than 100 small areas 20 by 50 feet were laid out, and that as many as six hundred men were actively engaged in prospecting. It is said that during this time twelve gold-bearing lodes were opened up in this district. Many shafts were sunk on the different veins and the rich outcrops removed in any way that seemed easiest at the time without regard to the future.

This system of granting areas only 20 feet along the line of the lode initiated a system of mining in Nova Scotia which has remained almost to the present day.

Looking over the plan of Tangier gold district, as published by the Geological Survey of Canada, we find that six different shafts were sunk on one vein within a distance of 125 feet. On another lead, not more than 50 feet south of the one above mentioned, there are shown 10 shafts within a distance of 250 feet.

Tangier was by no means exceptional in this respect, for even after the size of the area had been increased to 150 by 250 feet this remained the usual system of mining in the Province.

In Montague gold district I have counted on one vein no less than seven shafts in 300 feet. In Malaga gold district on one lode 10 shafts are found in 450 feet, and on another 7 shafts in a distance of less than 350 feet.

Many other instances might be given, but these will suffice.

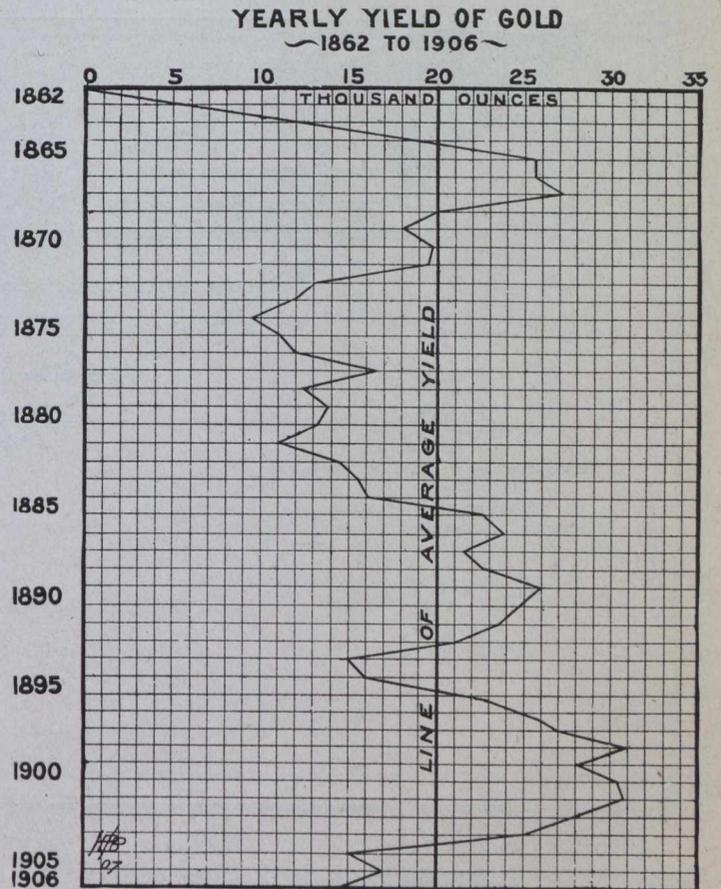
The method of mining consisted in sinking a shaft to a depth of, say 50 feet, and stoping the ore from the grass roots down on both sides of it to such a distance that the ore could be easily shovelled to the shaft. Then

two new shafts were sunk on the vein on each side of the first opening, and the operation repeated until the extent of the workings got beyond the capacity of the owners, or the supposed limit of the ore had been reached.

It is easy to see how such a system, or lack of system, would bring early disaster.

In the first place the mine would become a gutter for all the water of the region, and secondly, if the length of the outcrop were limited, the mine would speedily be condemned, as it would hardly be possible under these conditions to discover any line of "pay streak."

It speaks well for the number of rich outcrops in the Province that the production, under such circumstances, kept up as well as it did.



DIAGRAM, Showing Annual Output of Gold in Nova Scotia from 1862 to 1906.

Nor does this crooked black line in the diagram tell all the story.

Miners who have worked in some of the richest mines in Nova Scotia, have assured me that they believe that in many cases the amount of gold stolen by the miners exceeded the amount obtained by the owners.

I have every reason to believe that this is the truth; and certainly the conditions under which the mines were worked gave every opportunity for dishonesty.

The gold in the ore mined was mostly coarse and nuggety. The general belief was, as expressed by a miner, "if you can't see gold when you spit on the rock it ain't worth mining."

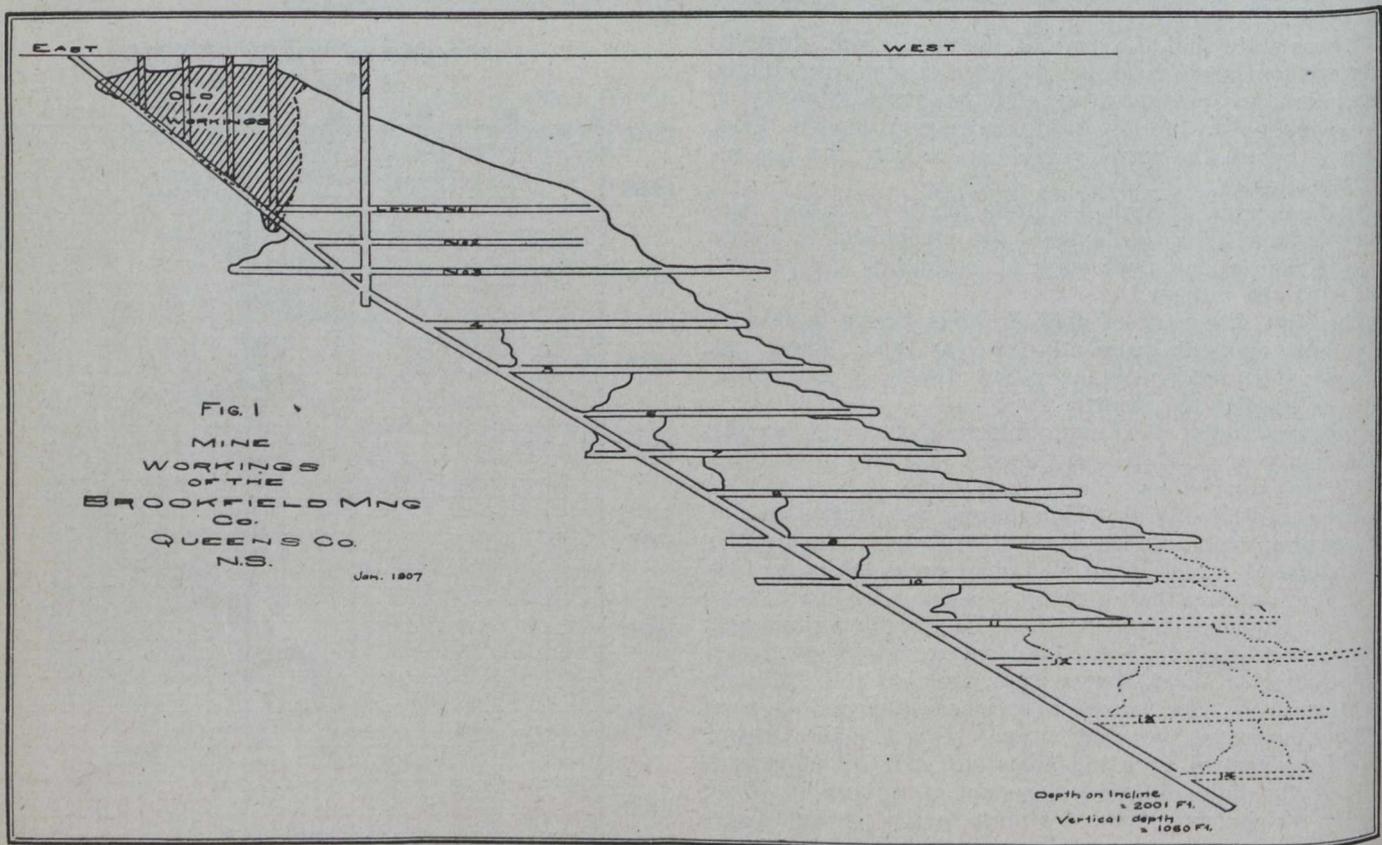
On the underhand stopes, when the ore was passed from one shoveller to another, usually in a stream of water, the glitter of gold would quickly catch the eye, and rich nuggets would find the pocket of the dishonest workman.

The ore was hoisted in small tubs up the numerous shafts to the surface, where it was washed and sorted, the idea of management being that the poor ore should be sorted out and go on the dump, whilst the good ore was sent to the mill. It can be seen that the "deckman" thus had as good opportunity to dishonestly increase his wages as his brother in the "pit." This matter of stealing gold became, in many districts, such a common affair that the miners began to consider they had a right to what they could find. Hence originated what was called "Miners' Rights," which was understood to mean that the men considered that what gold they saw belonged to them and what they did not see

way would not be large, but as the years went on another class of ore was discovered, some of which contained gold in a very fine state of division. In some cases the gold appears on the quartz or slate as though it had been laid on with a brush, in other cases where it is hardly visible to the naked eye under a magnifying glass it resembles a springling of fine salt; and yet again, particularly where the ore, quartz or slate is heavily mineralized, the presence of gold cannot be detected except by assay or by mill test.

This class of ore is most important and deserves more attention than it has received in the past.

Two cases in particular of heavy losses in tailings from the treatment of ore of this class have come under my notice. In one case the ore contained about 2 ounces of gold per ton, and the loss of gold from the end of the plates was nearly 1 ounce per ton.



belonged to the company. Indeed, as recently as two years ago I was told that the reason why some of the men were leaving a certain mine and going to another nearby, where the pay was less, was because at the latter mine they had "Miner's Rights." Of course I do not mean to say that these so-called "Rights" were recognized by the company, but it was a matter of common talk among the men.

It may thus be seen that the Mining Society of Nova Scotia has good grounds for its agitation for the enactment of rigid laws for the suppression of gold stealing.

There is also another reason why we may justly believe that more gold has been mined than is shown by our records. No one can doubt that there has been a tremendous loss of gold by means of values escaping in the tailings from our stamp mills.

On the class of ore that we have been considering, namely, that containing nuggety gold, the loss in this

Many amalgamators who read this will smile and say "impossible." That is exactly what was said by the manager of the property in whose mill this ore was treated, and he refused to be convinced until these tailings were treated chemically and a large portion of their values recovered.

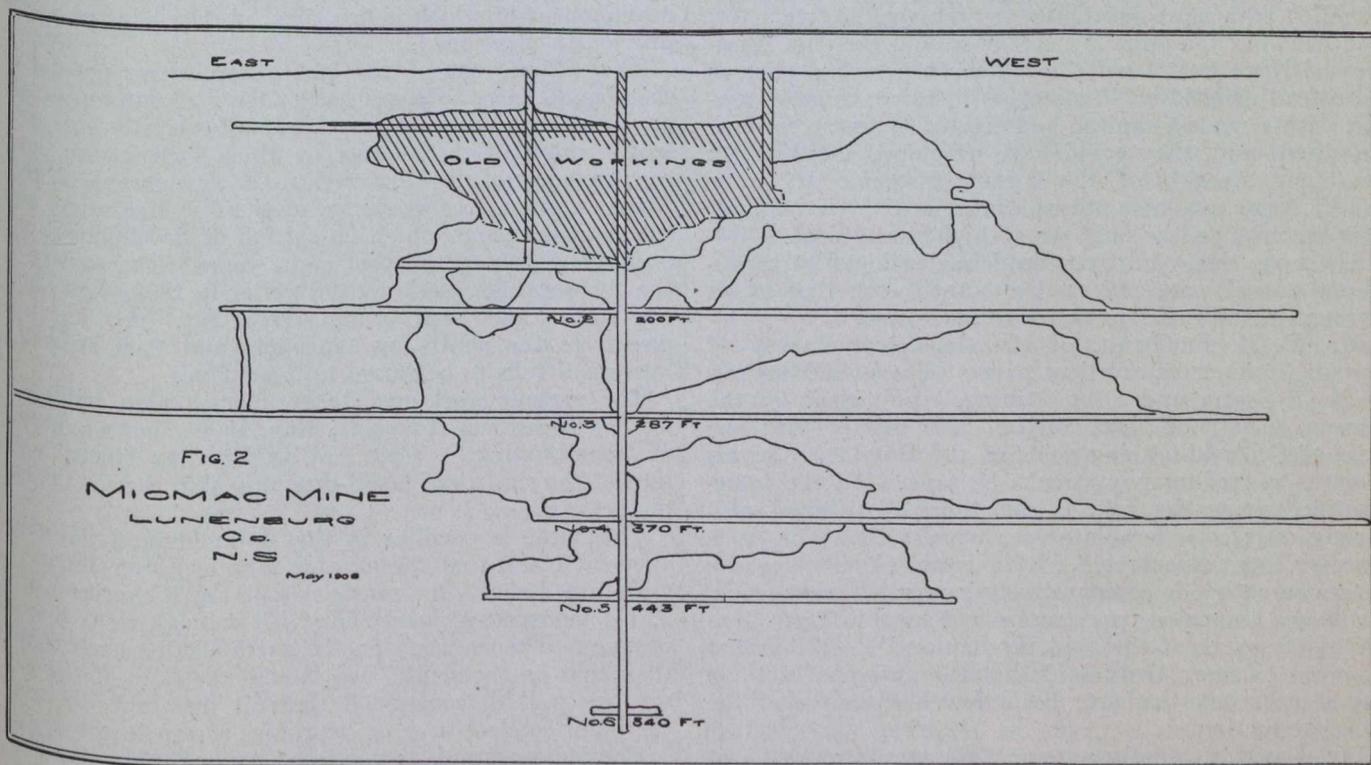
In another case a company had been operating their mill for some time and obtaining what they considered satisfactory results, for they had, like the majority of gold mining companies in the Province, no means of ascertaining the amount of gold they were losing from their mill, and did not bother about finding out, as the mine was giving them a fair return on their money. However, the yield began to fall off, and dividends ceased. The manager in an inquisitive moment found some amalgam in the sluice. This combination of circumstances made him suspect that they might be losing some gold. The next month they sent a number of tons of their ore

to a neighboring mill. They were surprised to find that, whereas the ore crushed in their own mill gave them 8 dwt. per ton, the other mill returned about 12 dwt. per ton. Thinking that perhaps this difference might be due to a difference in the values of the ore treated, they repeated the test. They took great pains in arranging the distribution of the ore so that each mill should have the same grade of material to treat. The ore was a little better in this case. Their own mill gave 10 dwt. per ton and the other mill 15 dwt. They were loth to believe these results, but they seemed to warrant further investigation. They engaged an assayer to come to them for a week and take samples from the tailings of both mills. Their bewilderment increased, and they refused to believe the assayer, when he reported that even the mill which was making th better saving was losing values at the rate of 3 dwt. per ton. A cyanide plant was erected on this property later, which amply demonstrated the facts by not only paying for itself, but almost paying for the whole mine during the first year of its operation.

the abandoned mines and that new surface deposits must be opened up.

Mr. W. H. Prest, a practical mining geologist, who has had a long experience in Nova Scotia, wrote a short article to *The Engineering and Mining Journal* some three or four years ago, in which he shows in a masterly way how very unlikely it is, from a geological point of view, that the portion of our gold veins, which happens to be exposed, at or near, the present surface of the ground, should be the limit of this pay ore.

It would indeed seem peculiar, considering the extent of erosion, which we know has taken place in this portion of the continent, if this erosion had stopped at a point just one or two hundred feet short of completely wiping out our deposits of pay ore. I do not mean to say that it is not possible that secondary enrichment may have taken place and made the surface deposits somewhat richer than the ore bodies at greater depth; but I do hold that it is unreasonable to suppose that the ore values will be lowered to such an extent as to make profitable mining impossible.



These are but two cases. We cannot doubt that throughout the whole Province there have been many others.

The saving of the values in the concentrates by the Boston Richardson Mining Company during the past year (*CANADIAN MINING JOURNAL*, June 15th, 1907) furnishes an example of what would have been lost even on a low grade proposition. But all the foregoing merely tends to show how much gold has been mined and should have been recovered from the mines of Nova Scotia.

The reader may justly say: "Well now, why, with all your improved methods of mining and milling does not the yield of gold increase instead of falling off year by year?"

One authority says, lack of prospectors to find new ore bodies; another, the high price of coal; another, the gold mines of Nova Scotia are only surface deposits and have been exhausted. What our first friend says would perhaps tend to show that he believes what our friend number three says, and that it is no good trying to work

In a contribution to the Mining Society of Nova Scotia (March meeting, 1907), the writer has endeavored to explain how the continuation of an ore body may be lost and the mine abandoned, but reopened later, the ore body found and followed to a considerable depth.

The old Nova Scotian method was so peculiarly adapted to losing a pay shoot that it is a wonder any mine passed the initial stages. As a matter of fact, the existence of pay shoots has been in the past and is even today to a great extent ignored.

The following is a brief sketch of what has been the history characteristic of many of the most promising mines of Nova Scotia.

The rich outcrop of an ore body has been opened up and near the surface, and in some cases to a considerable depth, has given very satisfactory returns. The owners, probably working it themselves, and for the good of their own pockets, have endeavored to handle only such ore as would pay them to mine.

Doubtless the method of mining has been most crude

and their eyes the chief guide as to the location of pay ore. Sooner or later the water has become troublesome, and the cost of sinking new shafts and their inability to follow the pay ore as depth increased has forced them to sell to a company with larger capital. The new company at once condemned the methods and machinery of their predecessors and completely changed the scheme of development. Perhaps they sank a vertical shaft to cut underlying ore bodies and established an elaborate system of cross-cuts and levels. The mill was quadrupled in capacity and operations started on what was termed in the prospectus "a modern scale." What was the result? The "pay streak," probably small in comparison with the outlined scheme for future development, was completely lost sight of. It had been sufficient to yield the original owners a handsome profit on their work, but not worth considering, presumably, by a company with a million dollar capital.

The new company had large quantities of so-called "ore" in sight, forgetting that vein matter though it may be quartz is not necessarily "ore," and proceeded to mill it with most unsatisfactory returns. After a few months' work the mine is condemned and the gold measures of Nova Scotia get the blame once more; whereas if, instead of a 40 or 60 stamp mill, this company, content with a modest capital, had erected at first a modern ten stamp mill, they could have developed intelligently the "pay streak" of the former owners. If water powers were available, these could have been utilized, thus eliminating the bugbear of high-priced coal.

The mine thus equipped could be developed at a profit and actual "ore" blocked out until such time as an increase in milling capacity was warranted.

Mr. E. R. Faribault, of the Geological Survey of Canada, in his most excellent paper "The Gold Measures of Nova Scotia and Deep Mining," published by the Mining Society of Nova Scotia, deals mostly with one class of the gold-bearing veins of the Province. In his remarks regarding pay streaks he says: "In the interstratified veins the gold is sometimes distributed uniformly over considerable areas; usually, however, it is more or less concentrated within certain limits, leaving spaces on each side comparatively barren. These enrichments are known as pay streaks, and have hitherto been the chief source of the gold production." I think that it might be more truly said that the outcrops of these pay streaks have hitherto been the chief source of the gold production.

Mr. Faribault further says: "The pay streaks lie at right angles to the sliding movement, that is to say, approximately parallel to the anticlinal axis." I may add that the accuracy of this statement is being demonstrated more clearly every day by the work now being done by the Boston Richardson Mining Company.

For further data regarding pay streaks the reader is referred to Mr. Faribault's valuable paper.

The direction of pay streaks on the veins cutting the stratification is not so readily determined. In the case of the Libbey mine at North Brookfield, the ore shoot followed the intersection of the "fissure" with a main or interstratified vein. In other districts the pay streaks in the veins cutting the bedding appear to be governed by the nature of the strata crossed. Yet again, in other localities the occurrence of small "feeder" veins or "angulars" appears to be the cause of the enrichment.

It is most apparent that the subject should be carefully studied and accurate records kept of all data that may help to solve the problem.

As Mr. Faribault says again: "The data necessary to explain the many peculiarities in the different gold dis-

tricts are difficult to obtain with any degree of precision, as few plans or records have been kept or are obtainable."

In a few cases in this Province such shoots or pay streaks have been successfully followed to considerable depths, in one case to a depth of over 2,000 feet along an incline of 35 degrees to the horizontal, or a vertical depth of 1,000 feet. In another case by means of a vertical shaft, levels and winzes to a vertical depth of one thousand feet. In these cases it was not because the ore body was any more promising or persistent than many that have been abandoned; but it was because the management possessed the necessary experience, pluck and perseverance that the mine was kept upon its feet.

The accompanying sketches, Figures 1, 2 and 3, will illustrate how some Nova Scotian mines have been developed from the old method of working, which has been discussed previously, to a modern method of overhand stoping.

Figure 1 shows the underground workings of the mine of the Brookfield Mining Company (Libbey Mine), the development of which is described in detail in the paper previously mentioned.

This affords one of the best examples we possess of the abandonment of a mine after the rich outcrop of the pay streak has been removed. It affords also an excellent example of the manner in which such an ore shoot can be successfully followed to a considerable depth. Figure 2 shows the workings of the Mic-Mac mine, and the radical change which its system of development has undergone during the past eight years. The survey of the old workings, made by the writer in 1899, shows how the stopes had been beaten down flat. All ore was passed to the shafts by shovellers and then shovelled into small tubs to be raised to the surface.

The present workings (taken from a plan published by *The Industrial Advocate*, May, 1906) shows a system of "backstopping." Cars are used on the levels, large bins at the shaft and a self-dumping skip carries the ore to the surface.

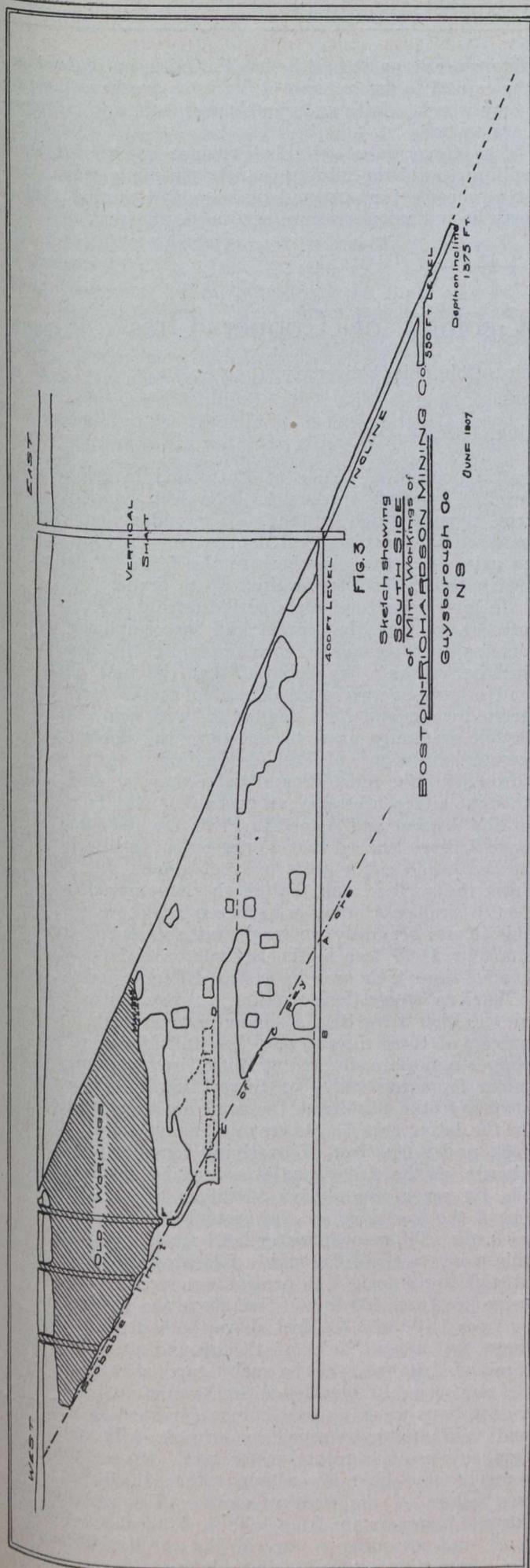
This mine is peculiar in that I understand the management claim that there is no definite "ore" shoot.

Figure 3 shows the south side of the Richardson fold and demonstrates clearly how well defined is the line of pay ore. The ore body on the north side is much larger than that on the south, and though the lines of the pay ore are well demonstrated there it does not illustrate the point so clearly as the workings shown in the figure.

The old workings were opened up in the regular way, the usual number of shafts were sunk and bottomed in the lower edge of the pay shoot, as shown. By the time this work was completed it was considered that the mine was practically done; but the Boston Richardson Company took hold of the proposition, sank the vertical shaft as shown, struck the continuation of the dome at 400 feet, and worked westward along the legs of the belt. The south level was pushed forward until at a point, marked A on the sketch, the ore values pinched out. The level was continued westward for some distance, but the values continued low. A raise was driven upward from the point B, which entered the ore body at C and was continued along it on an incline.

Again work was started at a point, D, just below the old workings, and followed westward to E, when the values again became low. A raise was put up just beyond this point, cutting the pay shoot again, as shown. An inclined raise was then driven to tap the old works at F.

I consider that this shows, in a remarkable way, the continuity of a line of pay ore. The ore body on the



400 foot level gives every indication of being better in value than at points nearer the surface.

The Boston, Richardson Company are now developing the ore body on both sides of the apex by sinking an inclined shaft on the pitch of the dome or apex, as shown. They thus avoid the mistake of sinking through and past their ore body with a vertical shaft. As to whether the value of the ore decreases with depth can be judged from the history of the mines shown in the accompany sketches.

I am told that for the past two years the average yield per ton from the Mic-Mac Mine has been over \$10 per ton, which is quite up to the average of the mine and better than the value of the ore at many places nearer the surface.

The last brick of gold from the mine of the Brookfield Mining Company was over 500 ounces, which was one of the largest in its history.

The ore of the Boston, Richardson gives every indication of becoming better with depth, and I believe that the future work of this company will give the best illustration of this point that has ever been shown in the Province of Nova Scotia.

I hold that the general disregard of pay streaks, either through losing the continuation of the same or smothering the good ore obtained from such pay streaks with thousands of tons of worthless quartz has resulted in the present idleness of so many of our mines.

It has unfortunately been the case that when a large company has started operations in the Province they have hardly ever been content to develop the mine so as to work the pay ore only. The demand has always been for tonnage. Careful sampling of the mine has been neglected, and ore from every portion of it has been put in together, so that finally, where there might have been a yield of \$5 per ton with a 20 stamp mill, and a good profit, the yield has been cut down to perhaps \$1 or \$1.50 per ton in a 60 stamp mill and the margin of profit emilinated.

It is more difficult than it might seem to right this state of affairs. As a rule no accurate maps or other data can be obtained of the abandoned mines, so that if a man wishes to open one of them he has to go to considerable expense before knowing how to start.

But this is not all. He must first get the property, and here the chief difficulty confronts him. The company holding the mine may not, and probable do not, consider the property of any real value; but when a purchaser appears they remember what it has cost them (through their own mistakes) in the past, and hope to get their money back by selling at a high figure. The consequence is that the would-be purchaser is rightly discouraged. He sees that even if the mine should pan out as he believes probable, there would be no money in it for him. There is nothing to prevent such companies holding these mines as long as they wish to, for under the present law they have only to pay 50 cents per year for each area they wish to hold and the property remains theirs.

The attitude of such non-operators is well illustrated by the following true story:

A certain American capitalist having decided to purchase a gold mining property not a thousand miles from Isaacs Harbor, was being driven to the camp by a local man. The conversation turned to mining, and the driver confessed to being a part owner of the very property his passenger was going to visit. Without revealing his identity, the gentleman asked the driver the reason why, if his property was as good as he described it, they did

not work it themselves, whereupon the driver turned to him with a smile, the embodiment of business cunning, and said: "We are waiting for some sucker to come along."

It appears to the writer that in order to relieve the present stagnation of the mining industry a radical change must be made in the laws governing the holding of mining property. If a man has not faith enough in

his property, or even if he has the faith, but cannot get the capital to demonstrate it, let some one have the property who has faith and can command the capital necessary to prove it.

The Government of this Province has shown itself willing to aid the mining industry in many ways. Let it now come forward and so help gold mining that it may be put upon a secure and permanent basis.

Some New Points in the Geology of Copper Ores

BY JAMES F. KEMP, DSc., etc., Columbia University,
New York.

(Toronto Meeting, 1907.)

During the past year or two cobalt and silver have been the metals most prominently in the foreground in Ontario; but south of the national boundary and in other parts of the world, copper has occupied the centre of the stage. The growth of electrical applications and the increasing consumption of brass have made the market well-nigh insatiable. Copper mining has greatly increased, and with the growth of new districts and with widening experience, we have found it necessary to modify some of our old-time conceptions.

Twenty-five years ago, when the classes in the mining schools were taught the mineralogy of the ores of copper, it was chalcopyrite that was esteemed the principal mineral. Of course the importance of the native metal on Keweenaw point was appreciated, but we used to define an ore as "the compound of a metal and mineralizer, such as sulphur or oxygen"—and the native form, even though abundant in one locality, was thus ruled out. Experience with the lenticular beds or veins, in the slates and schists along the Appalachian belt from Sherbrooke, Quebec, to Ducktown, Tennessee, and the historic ore bodies of the Rio Tinto district in Spain, whose geological relations are similar, gave good ground for the esteem in which chalcopyrite was held. It was considered, moreover, to be the original mineral from which the others were generally believed to have been derived. Observers of those days were perfectly familiar with the oxidized zone, and with the zone of enrichment, at the level of the ground-water. At the latter horizon the Ducktown mines had taught all of us in America that rich black ores were precipitated, but the dark mineral was for many years believed to be the oxide, tenorite or melaconite, until W. H. Weed proved it to be chalcocite. Chalcocite was esteemed to be rather uncommon, and when we students saw it at all, it was chiefly in crystals from the old copper mine at Bristol, Connecticut, an enterprise that had impressed its shareholders rather by the lack of copper than by its abundance.

To-day, on the contrary, in the United States and Mexico, chalcocite furnishes much the largest part of the copper produced, and for some years to come its relative importance bids fair to increase rather than diminish. Butte, Morenci, Bisbee, Globe, and Cananea derive most of their output from it, while Bingham and Ely will soon be concentrating the glance from the porphyries on an enormous scale.

So far is chalcopyrite from being the principal and original mineral at Butte, that on the one hand it is rather uncommon and on the other it is one of the latest of the secondary minerals, since we find it in veinlets

cutting covellite. Alike at Butte and in Arizona the original mineral appears to be a lean copper-bearing iron pyrite, which is then, by secondary enrichment, oxidized in one place and deprived of its copper, only to gain the latter elsewhere in the form of chalcocite, which brings the lean original up to grade.

In later years, and for a period lasting well up to the present, we have laid great and just emphasis on the processes of secondary enrichment by the descending surface waters. We believed that the new chalcocite and other minerals were deposited at the level of the ground-water and for a limited distance below it. That is, we gradually grew to recognize the necessity of a greater diffusion of the descending copper solution throughout the quiet ground-water than we had at first thought either necessary or probable. But in the issue of the *Mining and Scientific Press* for February 23rd, page 236, we learned that a cross-cut in the Berlin claim at Butte had cut a great body of glance, at 1,800 feet from the surface, and that in the Neversweat, at 2,400 feet, a similar occurrence had been noted. Even before this it was generally reported that a cross-cut from the shaft at 2,000 feet in the Speculator claim had intercepted these rich ores in a still different lode.

Various suggestions tending to reorganize our old views either have been made or may be made in consequence of these discoveries. The hillside on which the copper mines are situated at Butte rises gradually to the north from the valley of Silver Bow Creek, or more steeply to the west from the same creek at Meaderville. In the latter area, shafts are said to have found the bed-rock under 600 feet of overlying loose material. Obviously, as the valley was excavated by erosion, and as the former representative of Silver Bow Creek established the low point of the ground-water upon its bed-rock, the subterranean water level must have risen from this point, in the hill, roughly following the surface, but at a flatter slope. The present outcrops of the copper veins are from 500 to 700 feet above the present valley, or from 1,100 to 1,300 feet above the bed rock. To estimate the ancient level of the ground-water, we must diminish 1,100 to 1,300 by such figures as will allow for its rise, roughly parallel with the surface. Whatever assumptions we may make, however, regarding wall rock and vein matter removed by erosion, will operate to further raise the ground-water level. It certainly can scarcely have been lower than 800 to 1,000 feet below the collars of the present shafts. The recently discovered bonanzas are from 1,000 to 1,500 feet below this level, and according to our old ideas of the diffusion of the descending copper-bearing solutions, they must have

penetrated at least 1,000 to 1,500 feet of standing water. This seems unlikely.

On the other hand we may raise the question, could the ground-water have been so irregular in its distribution that no standing body of it intervened to stagnate the descending water? This seems unlikely. Again, is chalcocite necessarily a secondary mineral? May it not be of original deposition? Experience thus far leads us to think that the presumption of its secondary nature is well grounded.

Most reasonable of all would appear to be W. H. Weed's suggestion of secondary enrichment by uprising solutions of copper, set in action perhaps by the late rhyolite. From these no lean pyrite of primary deposition thus far observed would be too deep to escape, although solutions of oxidized copper salts, such as bring about enrichment by descending surface waters, are not what we associate with waters uprising from the depths. Mr. Weed applies his conclusions especially to the enargite at Butte, but as the glance is being found deeper and deeper, we may at least raise the question whether its lower deposits may not also have been introduced from the depths.

Ten years ago, or even less, great apprehension was felt about the persistence of ore in depth. The newly appreciated doctrines of secondary enrichment from above had emphasized and increased the misgivings, and much experience corroborated them. Rio Tinto was most often cited, where, in the San Domingo vein or lense, 4 to 5 per cent. of copper had been obtained at the surface; 2 per cent. at 260 feet; 1 1-2 to 1 1-4 per cent. at 425 feet. In the Dionisio, there was 4 per cent. at the surface; 2 per cent. at 650, and 2 1-2 per cent. at 1,500 feet. In the last citation there was a ray of comfort, but the general result was decidedly discouraging. At Butte, too, the general yield of the ores has gone down. A few years ago it was 5 to 6 per cent; now it is 3 to 4 per cent. In Arizona, 15 to 20 per cent. was not uncommon twenty years ago. The ores run 6 to 7 per cent. now, and the glance in the porphyries 3 per cent. as it goes to the mill. Improved transportation and milling processes are responsible for bringing lower and lower ores within the range of profit, and, as we must realize, there is the tendency steadily to reduce the general average; but if, at Butte, 40 per cent. ore occurs in great stopes at 1,800 feet, and 60 per cent. ore at 2,400 feet, we may raise the question as to whether the old-time generalization is as sweeping as we formerly thought.

Reverting again to the time-honored conceptions of the lenticular ore bodies or *Kieslager* of the slate and schist of the Appalachian belt and of Rio Tinto, many of us will recall that these were esteemed our typical deposits. But in later years developments in the South-western States, in Mexico, and in Queensland, have proved the frequent occurrence and great importance of garnet zones produced by contact metamorphism in limestone along intrusive rocks. Bisbee and Morenci, in Arizona; San Pedro, New Mexico; Aranzazu and San Jose, Mexico; Chillagoe, Queensland; and many more have shown the importance and wide distribution of this type. Garnet, vesuvianite, wollastonite, and diopside, are the associated minerals, and the ore bodies are of irregular shape. They often need secondary enrichment to bring them up to grade. They are not lenses, as are the ores at Thedford and Rio Tinto; nor veins, as at Butte; nor beds as at Mansfeld; nor impregnations of shattered rock, as at Nacosari; but are a new type when compared with our old conceptions.

One of our tendencies in earlier years was to connect ore bodies, especially of copper, with basic eruptives. Keeweenaw Point and Sudbury gave good support to these inferences. It was also natural to infer that as iron and the other bases increased in rocks, therefore copper, lead, and other metals would do the same in less degree. But recent experiences is just the opposite in the case of copper. Globe, Arizona, with its diabase, and the Nikolai and other greenstones of the northwest coast are almost the only basic ones that appear in the newer districts. On the contrary, we find quartz-bearing rocks of various kinds and more especially fairly acidic variety midway between syenite and diorite, called monzonite. Bingham, Ely, Bisbee, Morenci, Nacosari, and the granite at Butte, all afford a similar experience. The great deposits of Northern California are in rhyolite porphyries. We cannot but reflect that the acidic magmas are richest in dissolved vapors, that they probably in cooling yield relatively abundant magmatic waters; and that, being at the outset copper-bearing, the ore bodies are perhaps due to these characteristics.

But the most striking feature of the last year or two is the tendency of mines first worked for other metals to yield copper in depth. From Butte we learn that the silver mines along the Rainbow lode, in which, in the upper workings, no copper was found, are now showing as much as 3 per cent. at 1,000 feet. The old Black Rock claim, once a silver mine and a participant in the famous Black Rock-Niagara apex suit, is being revived and deepened for copper; and others are actually yielding the red metal. The Cable gold mines, farther west in Montana, now supply 3 per cent. ore to the Washoe smelter. Bingham, once a lead-silver camp, has changed to copper. From Leadville the same report has been coming for some years, that much copper was found with the unchanged sulphides in depth. At Red Mountain, where, near the surface, lead-silver was formerly the yield of the ore, now, in the 1,100 foot adit into the mountain, copper has been found. In North Carolina, some gold mines of former years have become copper mines to-day. Most striking of all, at the great Mt. Morgan gold mine of Queensland, the diamond drill, at 725 feet, has shown great bodies of copper-bearing sulphides, which now go to the furnace, as the earlier gold ores went to the mill.

We have for years known that lead above often passed into zinc below. We may perhaps now add a still deeper copper zone, when, in the uprising water that brought in the ore, copper was present with the other two. Gold above may also change to copper below, or be associated with it, and apparently not always because copper once general throughout the vein has passed downward with the atmospheric waters.

An interesting corroboration is thus afforded of views advanced by W. H. Weed in the paper already cited, of which one of the closing paragraphs is: "Ascending hot-spring waters, if metalliferous, may deposit different ores with an orderly vertical distribution. Existing veins now mined often show this arrangement of metallic sulphides."*

* Trans. Amer. Int. Min. Eng. Vol. XXXIII. p. 754, 1903.

The Department of Mines' new monograph on Canadian graphite, written and compiled by Mr. Fritz Cirkel, M.E., will be issued very shortly. We are informed that the work is of a very comprehensive nature and will form a most useful addition to the series on Canadian minerals, now being published under the auspices of the Department.

THE CONIAGAS MINE AND CONCENTRATOR

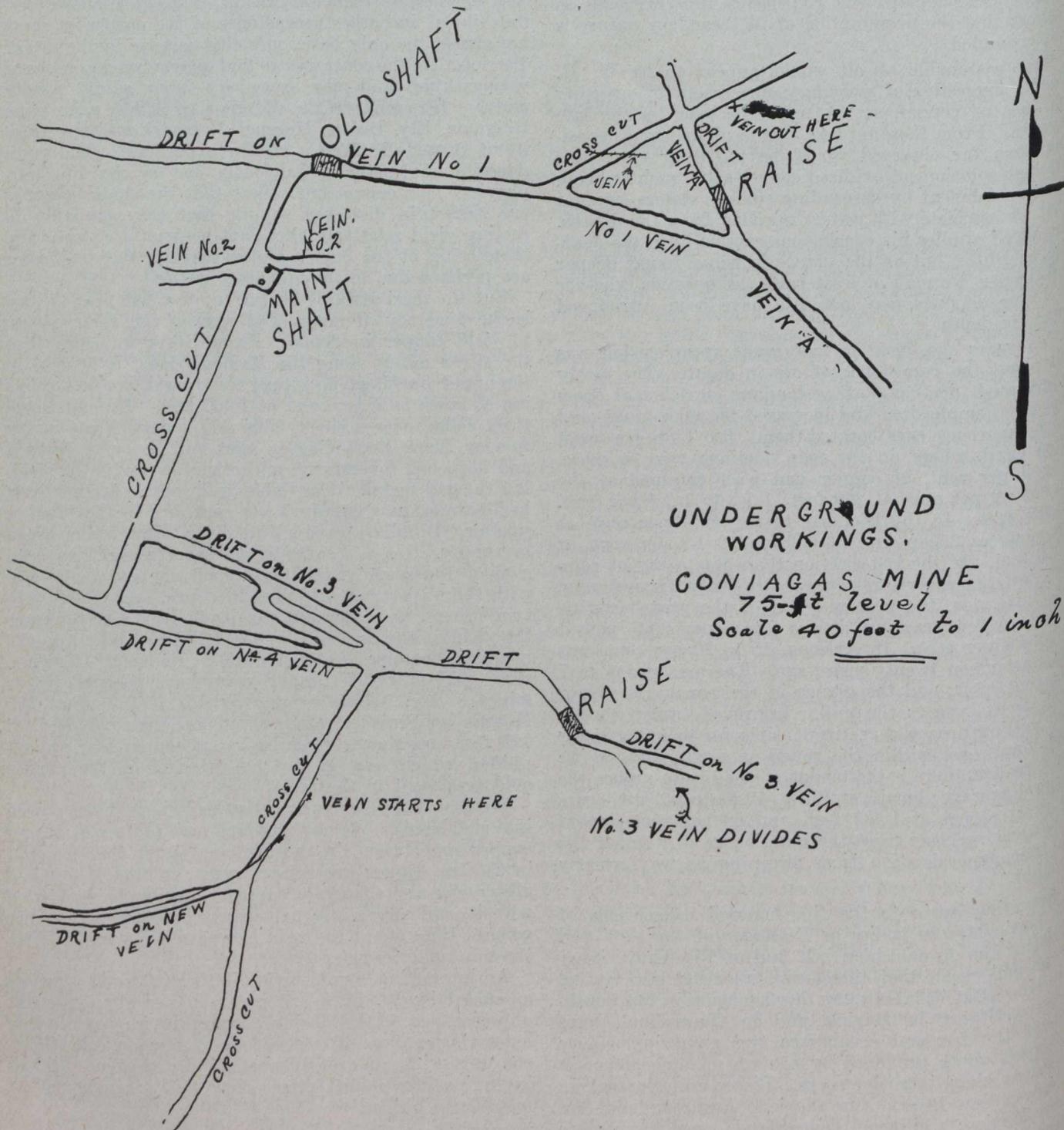
Through the courtesy of the officials of the Coniagas Mines, Limited, we are enabled to publish a plan of the underground workings and a flow-sheet showing the proposed treatment of their concentrating ore. The flow-sheet is of especial interest, as Cobalt's future will de-

Two rolls, 15 inch x 20 inch, with 8 to 12 tons capacity per hour.

Two double trommels.

Two hydraulic clasifiers.

Two jigs, one or two compartments and one of three.



PLAN OF CONIAGAS MINE, COBALT, ONT.

pend in a large degree upon concentrating ores. For the sake of comparison it may not be out of place to note roughly the equipment chosen for the Buffalo concentrator:—

Three Blake crushers, one of which is 6 inch x 20 inch, and the other two 7 inch x 9 inch.

One Huntingdon mill.

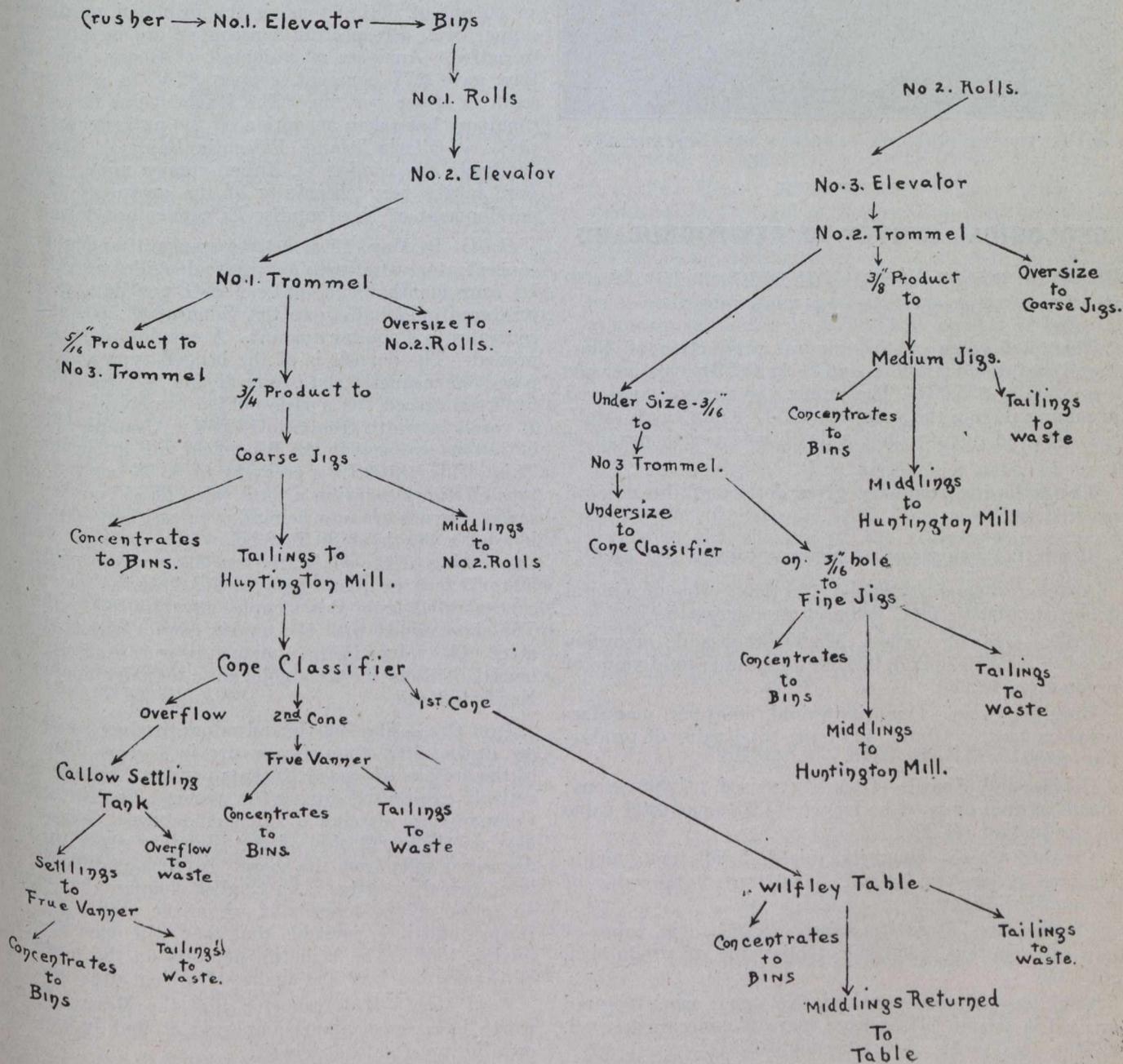
Settling tank.

Wilfley concentrating tables and Frue Vanner.

Slime tanks.

Belt elevators.

Proposed Flow Sheet.
for
The Comagas Concentrator.





CONCENTRATOR BUILDING, CONIAGAS MINE, COBALT, ONT.

GEOLOGICAL SURVEY OF NEWFOUNDLAND

REPORT UPON THE MINERAL STATISTICS OF THE ISLAND FOR THE CALENDAR YEAR 1906

The total value of the mineral production of Newfoundland during 1906 is set at \$1,462,344, an increase over 1905 of \$95,051. The number of persons employed in mining during the year was 2,271. Only three fatalities occurred during 1906, a death rate per thousand of 1.31.

The following summary gives details of the mineral production:

MINERAL PRODUCTION OF NEWFOUNDLAND FOR 1906.

Antmony—Quantity raised, 100 tons; value of mineral exported, \$4,050; total value of production, \$4,050.

Brick—Quantity raised, 906,000 thousand; manufactured or used in Island, 906,000 thousand; total value of production, \$8,260.

Building Stone—Quantity raised, 500 tons; manufactured or used in Island, 500 tons; total value of production, \$750.

Cobble and Spawls—Quantity raised, 1,000 tons; manufactured or used in Island, 1,000 tons; total value of production, \$1,000.

Crushed Stone—Quantity raised, 5,000 tons; manufactured or used in Island, 5,000 tons; total value of production, \$5,000.

Copper Ore—Quantity raised, 75,989 tons; value of mineral exported, \$360,345; total value of production, \$360,345.

Gold Ore—Quantity raised, 900 tons; manufactured or used in Island, 147 ounces; value of mineral exported, \$2,800; total value of production, \$2,800.

Iron Ore—Quantity raised, 884,986 tons; value of mineral exported, \$959,765; total value of production, \$966,625.

Limestone—Quantity raised, 1,200 tons, manufactured or used in Island, 12,600 bushels; total value of production, \$1,200.

Pyrite—Quantity raised, 28,132 tons; value of mineral exported, \$84,396; total value of production, \$84,396.

Sand and Gravel—Quantity raised, 1,000 tons; manufactured or used in Island, 1,000 bushels; total value of production, \$2,500.

Slate—Quantity raised, 2,536 tons; manufactured or used in Island, 64 1-2 bushels; total value of production, \$25,418.

Total value of minerals exported, \$1,436,129; total value of production, \$1,462,344.

Note.—Tons of 2,240 pounds.

Copper.—Exports of copper ore show a decrease of 2,731 tons, but the rise in price of metallic copper brought up the total value of the output to a figure \$1,565 in excess of 1905. The Tilt Cove Mine, with an output of 66,189 tons, is the principal producer of copper ore. Prospecting for copper ore is reported to be active. Analyses of a deposit at Goose Cove, Hare Bay, gave 6.77 per cent. copper, \$2.48 in gold and 57 cents in silver per ton. The Guggenheim Exploration Company has taken an option on the native copper property at Oderin Island, Placentia Bay. A New York syndicate has bonded St. Julien copper mine. The report speaks very cheerfully of the prospects of rapid development of Newfoundland's copper ore deposits.

Gold.—In May, 1906, a ten-stamp mill and a Wilfley concentrator were installed at Goldenville, near Ming's. In four months' run, at one shift per day, the mine produced gold bullion to the value of \$1,500, and concentrates to a similar amount. A cyanide plant is badly needed. The deposit is of the bedded type and is composed of magnetic slate, quartz and pyrite. The lode has been traced for a mile on the company's property. It varies in width from 5 to 13 feet. A sample shipment of 23 tons was sent to the Brookfield mill in Nova Scotia. This yielded \$192.72, a recovery of \$8.38 per ton. Five tons of slimes carrying a total value of \$55 could not be saved. Levels are now being driven east and west on the lode at a depth of 80 feet below the surface. During the sinking of the shaft frequent assays were made. At 50 to 69 feet the quartz assayed \$12.60 to the ton; pyrite, concentrated from this sample, gave \$50.80 to the ton. The slate mined with the quartz carries about \$1.50 in gold. The values in the quartz appear to decrease in the levels. This is the first gold mine actually operated in Newfoundland.

Iron Ore.—The Bell Island mines produced more iron ore during 1906 than in any previous year. The value of the ore has advanced 10 cents per ton. Mining is now actively prosecuted during the winter. The Nova Scotia Company are driving a submarine tunnel beneath the bay, on the north side of the island to reach their ore deposits a mile from the shore. No serious difficulty has been caused by water. An English company has secured an option on the deposits of ore on the west end of Bell Island, and it is probable that they will open workings during 1907. The hematite deposits on the north side of Conception Bay are again attracting attention.

Lead Ores.—It is reported that the Messrs. Harmsworth have some miners employed at Red Indian Lake opening up a galena deposit.

Pyrite.—During 1906 the pyrite mine at Pilley's Island produced hardly more than one-half of the previous year's output. Mining charges and all costs amount to about \$1.50 per ton, leaving a profit of about \$4.50.

Petroleum.—The Newfoundland Petroleum Company, Limited, drilled about 3,000 feet at Parson's Pond. The

first hole was a failure. The second hole gave small quantities of oil at 1,600 feet. Drilling was suspended, owing to an accident. The official report speaks very favorably of this oil field and urges the investment of more capital.

Talc.—No talc was mined during 1906. No reason is assigned for the suspension of this industry. "Possibly the absence of sufficient capital and enterprise is what is lacking."

Platinum.—Platinum, it is stated, has been discovered in chromite near Mount Cormack. It is not in quantity sufficient to repay extraction.

Coal-boring Operations.—Boring for coal was carried on during the summer of 1906 near Goose Brook. No results of a definite character were obtained.

BOOK REVIEWS

"The Subject Matter Index of Mining, Mechanical and Metallurgical Literature for the Year 1901." Published by the North of England Institute of Mining and Mechanical Engineers. Edited by the secretary, M. Walton Brown. Newcastle-upon-Tyne. Price 42s. This admirably complete work of reference comprises a list of well-nigh 1,000 technical periodicals and other publications. The "Subject Matter" index classifies their contents for the year 1901. An index of authors is also given.

"The Journal of the Mining Society of Nova Scotia, Vol. X, being the Transactions of the Society during the year 1905-6. Edited by H. Piers. This volume presents an account of the annual and semi-annual meetings. The discussions of various matters pertaining to the coal, iron and gold industries are decidedly instructive. A series of seven papers on technical subjects follows. Among these papers is a somewhat remarkable one by W. C. Milner, entitled "Reciprocity in Coal." While it is tinged with partisan feeling, it is, nevertheless, deserving of perusal. The other papers are all of an exceedingly high order. T. T. Fulton's research report on "The Lixiviation of an Auriferous Arsenopyrite Concentrate by Cyanide" shows careful preparation and systematic work.

"MINE TIMBERING," by Wilton E. Sanders, Norman W. Parlee, Bernard MacDonald, and others; New York and London; Hill Publishing Company; pp. 180, illustrated. Price \$2.

No branch of mining has received so small an amount of attention as mine timbering. And, perhaps, there is no subject upon which competent men hold such diametrically opposite ideas. *The Engineering and Mining Journal* has issued a book dealing with this important subject. The book is a compilation of articles that have appeared from time to time in the pages of the *Journal*. It is a valuable symposium of the practice of eminent engineers in the United States, Canada, Queensland and Tasmania. As the first serious attempt to present the whole subject of mine timbering in convenient book form, this volume deserves attention. Its value is enhanced by the consideration that in the principal mining districts of Canada the wasteful methods hitherto in vogue have made serious inroads upon the available resources. The book is the more valuable in that it gives a comparison of many different methods.

EXCHANGES

The West Australian Mining, Building and Engineering Journal for May 18th has been received.

In the *Transactions* of the Mining Institute of Scotland, at their annual general meeting at Hamilton, on April 11th, 1907, are papers on "A Stretcher for Use in Mines" and on "The Hanley Cape Guardian."

A surprising amount of useful information is to be found in the June number of *Technical Literature*. Besides the digest of current information on engineering and general science, several special articles appear, the most prominent being a description of Lehigh University.

In *The Mining Reporter*, June 20th, Otto Ruhl writes on the "Origin of Lead and Zinc Ore Bodies in Joplin, Missouri, District." The following excerpt is interesting: "An interesting feature of the process of ore deposition is found in constant reconcentration and enrichment below the level of ground water. As the degradation of the upper strata goes on, the waters in their downward course redissolve the minerals and carry them downward, re-depositing at lower levels."

In *The Mining Reporter*, June 27th, Arthur Lakes writes of the "Origin of Copper Impregnations in Sedimentary Rocks." Mr. Lakes concludes his paper with the following significant query: "Can it be possible that certain seas or other large bodies of water could locally be so charged with copper solutions, derived from some unknown sulphide source, as to be capable of being precipitated by organic or other agencies to such an extent as subsequently to form beds of workable copper ore?"

The Colliery Guardian, June 21st, in the course of its editorial comments upon the first report of the Royal Commission on Mines, notes that rescue appliances of the "pneumatogen" type develop a weakness in use. In these appliances oxygen is produced chemically by the action of carbonic acid upon alkaline peroxides. Owing to the choking of the regenerating cartridges there is a marked tendency to break down. This type, however, has the advantage of light weight. The compressed oxygen type, of which the Drager, Shamrock, Fleuss and Weg apparatus are the best known, give better results so far as the supply of oxygen is concerned. But their heavy weight is a drawback.

PERSONAL AND GENERAL

Mr. Cyril Knight, of the Ontario Geological Department, is in Toronto.

Mr. T. Hayes-Sheen was recently in Toronto on business connected with Bruce Mines.

Dr. Willett G. Miller, Provincial Geologist, has returned to Toronto from Cobalt district.

The autumn meeting of the Iron and Steel Institute will be held in Vienna on September 23rd, 24th and 25th.

Mr. O. N. Scott has returned to Toronto from a visit to the Lake of the Woods and Wabigoon districts. Mr. Scott will shortly leave again for the West.

The Hon. Mr. Cochrane, accompanied by Messrs. Monteith and Reaume, visited the various towns of the Nipissing district during the week beginning June 24th.

Mr. J. A. Baneroff, Assistant Professor of Geology at McGill University, has been retained for the summer by the Geological Survey of Canada to continue

the reconnaissance work commenced by Mr. O. E. Le Roy last year in the area along the British Pacific mainland coast.

Mr. T. W. Stiles, consulting engineer for the Canadian Mines Syndicate, Ottawa, has returned from an expedition north of Blind River. Mr. Stiles examined some copper properties in that district.

Mr. T. L. Gallagher, of the Hamilton Powder Company, who has been ill for some time, has left for the seaside. THE JOURNAL is glad to hear that Mr. Gallagher is on the high road to health and strength.

The resignation of Dr. G. C. Hoffman as assistant director, chemist and mineralogist of the Geological Survey of Canada, is announced. Dr. Hoffman has been a member of the staff of the Survey for thirty-five years.

Mr. J. W. Campbell has resigned the position of the Canadian General Electric Company's manager of contract sales to accept the managing directorship of the Alberta Portland Cement Company, Edmonton, Alberta.

THE CANADIAN MINING JOURNAL extends congratulations to Mr. Frederick Hobart, associate editor of *The Engineering and Mining Journal* of New York, on the occasion of his marriage to Miss Charlotte A. Clarke, of Brooklyn. The ceremony was performed on the 12th inst.

Mr. H. H. Claudet, the Elmore Company's representative at Rossland, has been recently engaged in installing new vacuum oil concentration plants at mines in Mexico and Colorado. Two similar plants, however, have been ordered for Canadian mines, and one will shortly be installed on a property in the Kootenay, and a second at an Ontario mine.

The season's work at the Bullion mine, formerly owned by the Consolidated Cariboo Hydraulic Mining Company, is now well under way, Mr. J. B. Hobson, the manager, having gone up to Quesnel from Victoria to direct operations. These properties, it will be remembered, were acquired a year or so ago, after being reported on favorably by Mr. John Hays Hammond, to the Guggenheim syndicate.

Thus *The Montreal Gazette* in a recent editorial paragraph: "The Western Federation of Miners has adopted a new constitution, which pledges all members to follow the teachings of political socialism. The federation is becoming conservative. Heretofore its militant members have been noted as following the teachings of anarchism." Which remark is wholly worthy of the *Gazette*, being, if guiltless of poetry, at least strictly accurate.

British Columbia still maintains her position as the chief source of coal supply for the Puget Sound market. Thus the imports for last year show deliveries in San Francisco as follows: From British Columbia, 310,371 tons; Australia, 70,414 tons; United Kingdom, 42,457 tons; Belgium, 3,651 tons; and other countries, 934 tons. The total being 500,655 tons. All the coal shipped from British Columbia is derived from the Vancouver Island collieries at Ladysmith, Nanaimo and Cumberland respectively, and owned by Messrs. Dunsmuir & Company and the Western Fuel Company.

In an official report, the Canadian Commercial Agent at St. John's, Newfoundland, refers to alleged discoveries of very valuable deposits of copper ore on the Exploits River, in the vicinity of Red Indian Lake, accessible to the railway, and not far distant from good shipping facilities. It is very likely that the report is true,

for it is a well-known fact that Newfoundland has great potentialities as a mineral-bearing area. Notwithstanding which fact, practically no prospecting on anything like systematic lines has ever been attempted, which is the more strange as the mining regulations are singularly liberal.

The satisfactorily rapid growth of our iron industry is shown in some statistics recently published, wherein the increase in theirteen years is given at about 1,200 per cent., or an average yearly increase during this period of 100 per cent. Thus in 1894 the total output was only 44,791 tons, while last year this had grown to over half a million. Conditions are such at present that we may look for a still more rapid rate of increase in the Dominion's production of iron; in fact, the 1906 returns, which were twice those of 1904, sufficiently indicate the generally improved conditions of industry and trade.

During the nine months ending March 31st, 1907, the Department of Trade and Commerce paid out the sum of \$266,555 on account of bounty to producers of petroleum in Canada. For the twelve months of the fiscal year, 1906, \$291,157 was disbursed by the Department for oil subsidy purposes. That, however, the bounty, is not altogether effective in stimulating Canadian production to the extent of putting a stop to the importation of foreign oil is somewhat forcibly attested by the fact that in 1906 Canada imported 30,804,575 gallons of petroleum, of which ten million gallons were refined oil for illuminating purposes.

A Government bulletin recently issued contains some interesting facts relating to capital employed in manufacturing establishments in Canada, notwithstanding that the returns are not too recent, the information applying to 1905. Nevertheless they may be used as a valuable commentary on Canadian progress, showing as they do an increase of over ninety per cent. in industrial expansion in a period of five years. To our readers the fact that the increase in the capital invested in electrical and smelting interests has, next to lumbering, been proportionately greater than in any other industry, will be especially gratifying, the capital invested in smelting in 1905 appearing as \$87,482,829, as compared with \$10,483,112 in 1900. Other important advances are shown in connection with electrical apparatus and supply industries, foundry and machine shop products, iron and steel, and Portland cement.

The secretary of the Canadian Mining Institute has received notice, at the the instance of Dr. Alfred C. Lane, of Lansing, Mich., vice-president and chairman of Section E of the American Association for the Advancement of Science, of a summer field meeting of this section of the society (Geology and Geography), to be held from July 3rd to 10th at Plattsburg (in the region between Lake Champlain and the Adirondacks). Several informal addresses will be delivered on subjects germane to the field excursions, and papers are expected from Professors Fairchild, Davis, Kemp, Cushing, Woodworth, Hudson and others. The region to be visited is most interesting from a geological standpoint, and Dr. Lane believes that some of the members of the Mining Institute may be glad of the opportunity to be present at the meeting, to which they are cordially invited. Additional information in respect to the meeting may be obtained either from the secretary of the Canadian Mining Institute or from Mr. F. P. Gulliver, secretary of Section E, American Association for the Advancement of Science, Norwich, Connecticut.

An interesting address was delivered recently in London by Mr. C. F. Just, of the Canadian Emigration Office, on "The Growth of Canadian Industries." After referring to the extraordinary development of Canadian trade in the last twenty years, Mr. Just discussed the bearing which coal and iron, water power and water transportation would have upon Canada's future as a great industrial country. It was a truism, he remarked, to say that the possession of coal and iron determined the position of a nation. The distribution and the present development of these resources left no doubt as to Canada's future. The iron industry was growing and consolidating itself at present in two divisions in Nova Scotia and Ontario, while a third, on the Pacific coast, is within the possibilities of the near future. Cape Breton, with the cost of production lower than in the States (*sic*), coupled with an unique position on the Atlantic, held the alternative of oversea markets in fee. Obviously the Ontario division was and must remain important, having a great aggregation of industries concerning iron and steel, with splendid facilities for distribution by water and rail. This view was confirmed by the decision of the United Steel Trust to establish large works at Sandwich, Lake Erie.

CORRESPONDENCE

To the Editor, CANADIAN MINING JOURNAL, Toronto:

Dear Sir,—I have received your letter of yesterday, congratulating me on the first hundred pages of the General Analytical Index to the reports of the Geological Survey. As yours is only one of several such letters, I take the opportunity of asking you to make it known, through the medium of your paper, that such congratulations are entirely unmerited.

Without the help of the officers of the Geological Survey the Index could not have been brought out in its present creditable form. Every officer to whom I have applied for information has gone out of his way to assist me. But for the Survey Palæontologists—and especially Dr. Whiteaves—the fossil references would have been a mass of errors; Professor Macoun and his son have given me the benefit of their knowledge in all things pertaining to natural history. Every reference to Nova Scotia has been carefully checked by Messrs. Fletcher and Faribault; those to Labrador, by the Director; those to Quebec, by Dr. Ellis; those to glaciation, by Dr. Chalmers, and so on, and so on.

There is scarcely an officer of the Department who has not materially assisted in the work.

I can understand your surprise at my knowledge of the geography of Canada. You will not, however, be so surprised, when you learn that Mr. James White, the chief geographer, undertook to put me straight as to any locality concerning which there was the slightest doubt, and that before the proofs are signed for press he checks every geographical reference relating to Canada.

The research work necessitated by the historical references has been, as you suggest, enormous, but here again I was aided by the Assistant Librarian, Mrs. Alexander, whose intimate knowledge of the contents of the Survey library saved me weeks of arduous toil.

Yours truly,

FRANK NICOLAS,

Editor of the Publications of the
Geological Survey of Canada.

The Quebec Mining Law

To the Editor, CANADIAN MINING JOURNAL, Toronto:

Sir,—Under the above heading I find in your edition of the 15th instant a criticism which would call for certain remarks. I, however, declare at once that we have no objection to our laws being criticized; we, on the contrary, would feel happy to see them made a point for discussion, particularly in your valuable paper. We don't contend that our mining law is perfect, but it need not be so to be worth other codes of law which have given rise to so many recriminations, contestations and costs.

For the moment you refer to three points:—

1st. That the prospecting license system favors the *speculators against the man with the pick, legitimate prospectors.*

2nd. That it constitutes a temptation for the Government employes to *show favoritism in mining permits.*

3rd. That it furnishes the occasion of realizing abnormal profits.

There may be something in the first argument, but it lacks development. The prospectors are on the same footing with other people, with the difference, if any, in their favor that, being better posted on the subject, they may come first. The list of our license-holders contains a good proportion of miners. License-holders, on the other hand, would generally be approachable on good terms by the prospectors, the usual share or interests in the discoveries being allowed to them with, in addition, the funds to face the expenses, and sometimes a salary. This has been done in some instances. Could not it be hoped, then, that should the prospectors and permit-holders agree, as we believe they will, the operations would be conducted with more method, without hurry or dispute. It is not either to be forgotten that the miners are prejudiced by the practice of a different system in other countries, and they are not inclined to deal kindly or even fairly with our mining regulations. In fact, I would esteem this discrepancy to be the strongest if not the only one argument against the Quebec laws.

The second point scarcely needs attention. After a ten or twelve days' trial, in which the defence was given a free hand, not to say the lead, you mention *one witness who swore that he had been a victim of a clerk's mistake.* This, it should be admitted, does not amount to much, and in the same circumstances we could find as bad under any code of laws, even the Dominion one, which I consider the best under the free mines license system.

As to the third allegation, I am not in a position to say that the witness referred to has not spoken the truth. But it does not matter much whether he did or not. If he did we will know some time where the happy land is situated, when the purchaser will call at the Department; in fact it is not to be set aside that the Province remains the owner of the lands under prospecting licenses. I refer you, then, to our articles 1443, 1445 and 1456 as to the apportionment to be made out of the ground covered by a permit in such a case, between the purchaser and the Department.

Another reply would be that large profits are often derived from mining speculations in any country, whatever its laws.

Believe, me, sir, your most obedient servant,

S. DUFAULT,

Deputy Minister Colonization, Mines and Fisheries.

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

Glance Bay, July 2, 1907.—Following on the drawbacks to shipping experienced in Cape Breton during the month of May, the shipping department of the Dominion Coal Company have been making exceptional efforts during the month of June to overtake their St. Lawrence requirements, and they have succeeded in breaking all their previous records. During the week ending 29th June 65,342 tons were sent to Montreal. The best previous showing for one week was 57,515 tons. The whole 65,000 tons, with the exception of about 2,000 tons shipped at Louisburg, was loaded at the International piers in Sydney, and in one day—the 28th—the piers handled 16,500 tons of coal. There are not many places where shipments are made with such despatch and in such quantity as at Sydney. The success of the Coal Company in this matter is largely due to the specialized type of self-trimming collier which their St. Lawrence trade has evolved. In addition to the “Christian Knudson,” the pioneer ship of this class, the company have chartered four others of the same type, namely, the “Borgestad,” “Fritzoe,” “Fornbo” and the “Kronprinz Olav,” of them being 7,000 tons deadweight and 6,500 tons coal cargo capacity. These huge colliers are not things of beauty, and with their tall funnels aft, and their bristling array of derrick posts, look something like a centipede on its back, but as coal carriers they are a distinct success. A shipment of 65,000 tons in one week is pretty good, but the Dominion Coal Company's officials do not regard this as the limit of their powers, and they hope for still better things.

Springhill, N.S.—The Board of Conciliation in the dispute between the Springhill management and workmen on the local stone question met for a final hearing of evidence on the 3rd July. Much was said on both sides of the question, but little added to the former evidence. The award has not been made public at this writing.

The Grand Secretary of the Provincial Workingmen's Association and many of the best thinking men are heartily in favor of this method of settling disputes and will willingly abide by the award. It is to be hoped this feeling is general among the men. The arbitrators are men of unquestioned ability and integrity, and their finding should certainly stand. The manner in which Judge Graham, as chairman of the Board, handled the undisciplined opposing forces showed that he at least was no novice at the work. Mr. Archibald, C.E., is also experienced in matters of the kind, and by his calm, gentlemanly deportment won golden opinions from both parties. Mr. R. B. Murray, the representative of the man on the Board, showed up well throughout the investigation, but was rather arbitrary when fixing the award.

The collieries are working steadily, though a number of the men are not. The holiday season has much to do with this loss of time.

Manager Hargreaves leaves for a visit to England on the 19th of July. He will visit several of the Durham collieries while there.

ONTARIO.

Bruce Mines, Ont.—The Copper Mining & Smelting Company of Ontario, Limited, property at Bruce Mines, Ontario, is greatly favored by nature. It extends for four miles along the northern shore of Lake Huron and the mineral rights cover some five miles in depth, it being composed of the two locations known as Keating and Cuthbertson, now shown on the map as Plummer Additional. The Soo and Minneapolis branch of the C. P. R. traverses the property from east to west, whilst the embryonic Bruce Mines & Algoma Railway renders the same service from south to north.

The locations were made in 1846 and titles were granted by the Crown in 1854. From 1848 to 1872 Bruce Mines were known far and near as being the most populated and well-to-do town on the north shore of Lake Huron. Sault Ste. Marie was still a struggling village, with its great waterway without a thousandth part of its present marvellous procession of steamers forever ascending and descending from the Lake Superior ports. From 1872 to 1875 the price of copper was down to eight cents, and no development work was done, the mine being gutted with the usual sequel, a “cave-in” on a Saturday night, so that fortunately no lives were lost.

Estimates made by measurement of the excavations show that some 400,000 tons of ore were mined in this period, and close upon 50,000 tons of concentrates, averaging 20 per cent., were shipped to England, where they produced about \$3,300,000.

From 1876 to 1898 the property lay dormant and was then purchased by a syndicate and the water pumped out from two sections so as to allow examination by mining engineers. Their reports being satisfactory, a company was formed in England and a large sum of money expended, principally on the surface. A fire took place and several other circumstances arising again, the place, when on the eve of showing its value, was shut down and work was not resumed until last year, when the workings were once more unwatered, and we are now at the point when we hope to reap the benefit of our work. Needless to say that if so much had not been done for us we would not be in the position we are to-day, just thirteen months after pumping started, and the extent of the workings reopened may be better estimated by the fact that we raised 27,000,000 gallons of water.

We have now about 14,000 tons of ore on the surface or lying in the stopes ready for hoisting, and we have not neglected development work, as our plans show some 30,000 tons of ore available for stoping, and by the end of this year we expect to augment this by another 40,000 tons.

The concentrating mill which we inherited was built by our immediate predecessors with a capacity of 400 tons per day. The process arranged is that after delivering the ore at the mill, distant 1 1-4 miles from the section of the mine we are working, to which the cars are taken by rail (standard gauge), they are hauled up a trestle by a specially designed cable hoist, the ore is crushed in a Gates crushed to 1 1-2 inch, then elevated and delivered by a Robins belt conveyor to the bins. It passes to the 30 inch x 10 inch rolls and is elevated to the sizing trommels, from thence to twelve Hartz jigs of three compartments. All the overflow or “chats” are returned to fine rolls and thence to another series of twelve Hartz jigs, afterwards passing to twelve Frue Vanners with 6 feet belts, the coarser particles being again crushed by a Bryan 6 foot mill and a pair of fine rolls, and the product fed at present to three double deck 14 foot concave buddles, finishing up on another series of six Frue Vanners.

We are now daily expecting delivery of a trial unit of the new Vacuum Process which is being manufactured for us in Canada. This is calculated to treat 40 tons a day, and as the preliminary tests made on our ores have shown a recovery of from 80 to 93.5 per cent., we hope to achieve a great economy, and in that case we shall remove the buddles and put in a complete installation of the Vacuum plant, our reason for doing this being that we have ascertained by measurement that we have some 120,000 tons of tailings left on the premises by the old-time workers, and as the average assay is about 1 per cent., if we only effect a saving of 80 per cent. of the contents we consider that a handsome dividend will result. Not only shall we reduce the usual percentage of loss occurring in all concentrating propositions, but we shall have a product which we propose to utilize in the manufacture of artificial stone for house building, street flagging, kerbstone and channels, etc.

With regard to the future, everything appears very promising. Negotiations are understood to be well under way for the extension of the Bruce Mines & Algoma Railway from its present terminus at Rock Lake, distant some 14 miles from Bruce, to a point on the main line of the C. P. R., and this with a view to a further extension north to meet the GrandTrunk Pacific. As a mineral field this road opens up great possibilities. Those few explorers who have been through this region assert confidently that copper and iron, both hematite and magnetite, merely await the advent of a road offering a cheap and speedy transport to a good harbor, which Bruce possesses. It is well sheltered and a lighthouse has just been erected by the Dominion Government, rendering the entrance perfectly safe, with the additional advantages of opening earlier and closing later than the ports on Lake Superior.

Again, this road is proposed to be operated by electricity, the splendid water powers on the Mississauga River being available at a minimum of cost. It is suggested that after utilizing such power as is required by the railway the surplus will be available for distribution and sale to all the countless enterprises which will spring up in the wake of this undertaking, and there seems to be no reason why the problem of electrical smelting will be amongst the least important.

The reopening of this old, historic mining centre has led to numberless properties, and also to various smelting propositions, being brought forward. Perhaps a word of warning to the investing public might be given as regards the latter, and the caution that we are adopting in not erecting a smelter of our own until such time as our development authorizes it might perhaps be adopted with advantage by those who are looking to mere prospects as a source of a steady supply of ore.

H. J. CARNEGIE WILLIAMS.

Bruce Mines, 6th July, 1907.

Wabigoon, July 5th.—It is reported from Wabigoon that the Laurentian stamp mill will operate only during the day shift. Scarcity of fuel has caused a temporary suspension of night shift work. A group of Toledo, Ohio, capitalists are working claims in the Manitou district.

Iron Bridge, July 8th.—A Toronto syndicate has established a camp on a copper property near Iron Bridge. This season will see active development of the properties. Superintendent J. Cassan is in charge, under the direction of Mr. O. N. Scott, Mining Engineer. There are several outcrops of chalcopyrite. The veins are traceable for some hundreds of feet. Stripping and prospecting are being pushed energetically.

Montreal River, Elk Lake P.O., July 1st.—On Downey's claims in the Township of James a four inch silver vein was discovered some days ago. Inspector Irwin, in looking over one of the claims, scratched up a piece of the vein. It has not yet been determined how extensively the silver is deposited in the vein. In two of the adjoining townships, Smyth to the north and Tudhope to the east, there is silver also. Your correspondent saw a vein about 1 1/4 inches wide, solid silver for about 18 inches in length, up in Smyth the other day. So far as is known, the silver seems to occur in quartz veins in the diabase, a rather different occurrence from that of the Cobalt district. It is, of course, impossible to say how rich the district will be; but the indications at present seem to point to a considerable amount of silver. The whole country up here is staked out, and most of it recorded. At Bear Creek there is a population of about 150 to 200 persons, and a post-office has just been established. There are steam and gasoline boats running up from Latchford to here. There are two intervening rapids, namely, Pork Rapids and Mountain chute, which are impassable. Thus three boats are necessary.

The newspaper reports of the fires were largely exaggerated. Considerable country was burned over, no doubt, but there is no timber up here to be burned. The best timber is the jack pine. There is very little spruce, and almost no red or white pine.

Cobalt, July 8th.—A miners' meeting is called for to-day. The situation is becoming grave and a general strike is feared. The companies have made decided concessions, and public sympathy will hardly be with the miners. Among the miners' demands is one for three shifts of eight hours each. The companies' schedule of wages was posted up on the 6th inst. It is as follows:—

“We, the undersigned mining companies, have agreed to the following scale of wages, to take effect at 7 o'clock Monday morning, July 8th, 1907:—Surface—Surface boss, \$3.25 per day; carpenter boss, \$3.25 per day; carpenter helper, \$2.50; machinists, \$3.25; pipe fitters, \$3; head blacksmith, \$3.75; blacksmith's helper, \$3.25; other blacksmith's helpers, \$2.50; engineers, 30 cents per hour; firemen, 25 cents per hour; head ore sorter, \$2.75 per day; ore sorters, \$2.75; head miner, \$2.75; teamsters, \$2.50; hoist man, \$2.75; cage or bucket tender, \$3.25; other surface labor, \$2.25.

Underground—Timbermen, \$3.25; machine men, \$3.25; helpers, \$2.75; cage or bucket tenders, \$2.50; other underground labor, \$2.50.

Board charges at the rate of \$4.20 per week, or 60 cents for every day. A working day shall consist of 10 shifts, except Saturday, when total time shall be 16 hours, nine-hour day shift and seven-hour night shift, twenty-five cents extra per day to be paid machine men and helpers sinking in wet shaft.

THE CHEMICAL SOCIETY VISITS COBALT.

Q.—What is calcite? A.—It is an arsenide of silver.

Q.—Do they blast the rock or drill it? (Answer not recorded.)

Q.—Do you think the shaft house is the air receiver?

Q.—Are the veins on the Coniagas smaltite?

Statements by Members:—(1) I am interested in argentite because it is so much like nickel. (2) Compressed air is used for the purpose of making the mines nice and cool to work in. (3) A fault plane is a joint plane, because the stratified rocks here have no bedding and the dip could belong only to a joint plane. I am interested in seeing the vein end at a joint plane.

Final Query—Are the drifts run on a regular grade so that the water can drain out?

Your correspondent submits these queries to the general mining public and to the Cobalt fraternity in particular. The culpable ignorance of men who use compressed air merely to actuate silly drills is no longer excusable. The matter of the Coniagas veins must be settled at once, and a thorough investigation should be undertaken to ascertain whether at the producing mines the shaft houses are being properly used. There are, of course, certain types of receivers to which Cobalt concerns have a painful aversion.

In answer to Query No. 2, your correspondent is sure that the rock is blasted. Mere drilling could not, in his opinion at least, account for the interchange of courtesies between the Cobalt Lake Mining Company and the railroad contractors on the other side of the lake.

Is it possible that hitherto respected members of our community have sought argentite for reasons other than its resemblance to nickel? And how many drifts have been so laid out that the drainage water is given a chance to escape? These are pointed questions. Can Cobalt miners answer them?

MINING NEWS

NOVA SCOTIA.

Glace Bay, July 2nd.—The new bankhead at Reserve is in operation to-day and coal is being hoisted from the French slope and the Emory. A temporary suspension has been caused at the East Slope by the failure of the concrete pulley supports.

Sydney Mines.—The work of production at the blast furnaces and open hearts of the Nova Scotia Steel & Coal Company has so far this month exceeded all previous records since the works were established three years ago. The immense orders constantly coming in and the excellent quality of the output has necessitated the officials increasing their staff of skilled mechanics, and the month of June will go down in record as the best ever experienced by these two branches of the above company.

As in the blast furnaces and open hearths, so also in the different collieries of the company—increasing outputs and the installation of men and modern machinery. The latest acquisition to the colliery department was the putting in of an endless haulage system in No. 5 colliery, a system which will hereafter do away with horses in this particular mine for underground work, and will mean an output double that which has heretofore been awarded the company from No. 5.

The work of laying the two and a quarter miles of railway from No. 3 to the company immensely rich coal seams at No. 4 has been begun by Contractor Sutherland, who has a large crowd of men at work, rushing the work of construction, and with this addition to the company's plant the directors look forward to a much larger amount on the right side of the ledger than the handsome balance shown for 1906.

It is expected that the Sydney Foundry Company will establish works in Glace Bay. About 150 men will be employed.

Stellarton.—General Manager C. J. Coll, of the Acadia Coal Company, has given orders that all employes of the company will stop work on Saturday at 2 p.m. during the summer months.

Pictou.—The suit of Barlett versus the Nova Scotia Steel Company was settled, on June 21st, in favor of the plaintiff. The plaintiff was restored the title to the mining leases under dispute and awarded \$2,250 for damages and costs.

The Dominion Mining & Smelting Company's copper smelters is being kept busy. The management is hopeful of solving the problem of constant ore supplies.

Glace Bay.—The Dominion Iron & Steel Company are putting in slopes at the head of Lingan Bay, between Bridgeport and Lingan Road.

Port Morien.—The North Atlantic Collieries Company are negotiating for the acquisition of about twenty square miles of coal areas held by J. R. Cowans, of Springhill. The areas adjoin the Gowrie and Blockhouse properties at Port Morien.

Halifax, July 5th.—The enormous loading pier of the Dominion Iron & Steel Company at Bell Island Iron Mine, Wabana, Newfoundland, was destroyed by fire to-day. The pier ran out 200 feet from the shore. In its superstructure was machinery for operating the loading plant. About 5,000 tons of ore were lost, some thousands of tons of coal, and all the machinery. This conflagration, although not entailing a very heavy financial loss, will cause a great deal of delay and embarrassment. It is possible that the Nova Scotia Steel & Coal Company's pier, which is quite nearby, will be put at the disposal of the Dominion people during reconstruction.

ONTARIO.

Cobalt.—The Silver Queen Mining Company is considering the advisability of erecting a smelter to treat its own ores.

The new centrifugal pump on the McKinley-Darragh copper dam was started working on June 29th. The erection of the dam is

under the supervision of Mr. H. D. Sims, of Niagara Falls. When the water is pumped out of the McKinley-Darragh's corner of Cobalt Lake it is expected that a considerable quantity of fairly rich gravel will be bagged and shipped. The McKinley-Darragh people are still open-cutting on No. 7 vein. This vein shows good value in silver and niccolite. It is about 7 inches wide.

A new spur line from Boston station on the T. & N. O. Railway to Larder Lake, 19 miles, is now under construction. The road also being built between Townstown and Windigo will be extended to Larder Lake.

Cobalt, July 5th.—The strike of the miners in the Nipissing, it is understood, is a strike of individuals and has not received the sanction of the Western Federation of Mine Workers. On July 2nd the men waited on Manger T. R. Drummond to submit a schedule of wages. Mr. Drummond promised to answer before July 7th. However, 300 out of 380 men quit work. Meanwhile, on July 4th, 165 men returned to work, and now men are being rapidly secured. On June 3rd the mine managers held a meeting and decided to adopt a uniform scale of wages.

The Nancy-Helen and Cobalt Lake compressor plants, hoists and dynamos are now in full operation. The Nancy-Helen is about to ship three cars of ore. The Cobalt Lake has three or more cars of ore on hand, but will not begin shipping until regular shipments can be guaranteed.

Sudbury.—At a meeting of the Nipissing Copper & Silver Company, held at Sturgeon Falls, it was decided to proceed at once with the development of the properties recently acquired. Mr. T. Baycroft, of Sudbury, was appointed mine manager. The company decided further to expend \$50,000 in opening its properties.

Port Arthur.—R. J. Anderson, of Minneapolis, purchased from J. W. Andrews a lead property in Dorion Township. The property covers 316 acres. Mr. Anderson has put a gang of men to work and has announced his intention of putting up a smelter.

The Tip-Top copper mine, which has been worked for some years, has been shut down temporarily. The machinery now at the mine was transported in the winter. A large portion of the smelting plant lies at Kaskabowie, where it was unloaded from the Canadian Northern more than two months ago. It is stated that this plant was ordered under the idea that the Ontario Government would build a wagon road from the railroad to the mine. As a matter of fact, the Government did appropriate \$3,000. The sum asked for was \$6,000. When the Government was informed that its appropriation was insufficient it cancelled the whole amount and dropped the matter. The Tip-Top mine is a promising property. It has a large amount of ore, mining from 4 per cent. to 6 per cent. copper, already blocked out. A great deal of money has been spent upon it. The Government is expected to come to its help in the matter of road construction at least.

Considerable excitement was aroused here by the finding of a fine sample of gold-bearing quartz on Mackeys or the old Menzie Island. Free gold is also said to have been discovered in that vicinity.

The lack of a Government assay office at Port Arthur is keenly felt. The surrounding districts are being prospected. But calamitous effects often follow the delay and trouble in securing assay returns.

The Deloro Mining & Reduction Company, of Deloro, Ont., successors to the Canadian Goldfields, Limited, will soon have their new plant for the treatment of cobalt and other arsenical ores in operation. This company is in excellent shape for handling arsenical ore of all kinds, being fully equipped for the treatment of mispickel ore, which they have been working for a number of years very successfully. The new plant when in full operation will afford great relief to shippers of cobalt ore. Its capacity is from 10 to 20 tons per day, and it is the intention of the company to largely increase this. The editor of THE CANADIAN MINING JOURNAL expects to be in a position to more fully describe this plant in the next issue of THE CANADIAN MINING JOURNAL.

ALBERTA.

The International Coal & Coke Company, of Coleman, Alta., has announced its intention of putting on a double shift. This will have the effect of almost doubling the capacity of the Coleman mine. The output will approximate 2,800 tons per day, and will mean the employment of about 550 men.

The Alberta Coal & Coke Company, whose property is two miles east of Lundbeck, began shipping coal in the latter part of June. They are raising about 400 tons of domestic coal per day. Southern British Columbia and the State of Washington will be their market. The company contemplate the erection of a plant capable of handling 6,000 tons per day.

YUKON.

Dawson, Y. T., June 27.—Records in the gold commissioner's office show the biggest placer merger the world has ever known has been perfected in Dawson, whereby the Guggenheim interests have taken over properties from the A. N. C. Treadgold, Northwest, Hydraulic Company, and Yukon Consolidated Goldfields Company, and other smaller concerns.

By the deal the Guggenheim people have absorbed all the placer properties in Klondike watershed, which have been worked by the old methods. Hundreds of claims—El Dorado, Bonanza, Hunker, Bear and their rich hillsides and tributaries—are included in the deal. It is estimated that the claims have cost the company ten million dollars, and five million dollars already has been spent for equipment.

It is said that the outlay for the equipment of the Guggenheim properties in the Yukon will represent the large sum of five million dollars. Nor does this seem an over-estimate, having regard to the extent of the area the syndicate has secured for operation. The syndicate recently paid to large holders of property a sum aggregating ten million dollars for their rights. The work meanwhile of constructing a hydro-electric plant on Little Twelve Mile River, for the purpose of supplying power for the dredges and the excavation of the big ditch, is proceeding rapidly, and it is expected that three steam shovels will be shortly in place for the expedition of excavation operations.

In all some nine or ten dredges will be operated in the Territory this season, these including three by the Guggenheim syndicate; the Canadian Klondike Mining Company's electrically driven dredge on the Boyle concession; the Lewes River Company's dredge; the Bonanza Basin Company's dredge at the mouth of Klondike River, and the Ogilvie Company's dredge on Klondike River; the Forty Mile Dredging Company's dredge on Forty Mile River; while another dredge will also be operated in this neighborhood.

BRITISH COLUMBIA.

It is reported that the Guggenheims have bonded the Big Interior mine in the Alberni district.

No. 4 Slope of the Comox coal mine has been sealed up. Water is being pumped from the remaining portions of the mine.

Victoria.—The Lenora copper mine, first opened in 1899, but for three years idle, is to be reopened by the Vancouver Copper Company. The working capital of the company is \$150,000. The Vancouver Copper Company was formed in London, England, early this year. Shares to the number of 85,000, at a par value of \$5, have been placed on the market.

Rossland.—Rich strikes of native gold are reported on the 7 inch and 11 inch levels of the Centre Star. Similar reports come from other mines operated by the Canadian Consolidated. No official confirmation of these statements has been received.

John Leveovig, skip tender at the White Bear, fell from the 300 foot level to the 1,000 foot level and was instantly killed.

General Manager Jay P. Graves of the Granby Consolidated Company, announces that plans are now under way for an increase

of another 1,000 tons in smelter capacity at Great Falls, B.C. This will give the Granby smelter a daily ore capacity of 4,000 tons, but it will require a year to complete the improvements and additions. The additions will be paid for out of earnings.

Boundary.—At the Cariboo-McKinney ten stamps are in commission. It is estimated that a year's supply of ore is in sight.

The Dominion Copper Company's Idaho mine is shipping steadily. The large double drum hoisting engine, installed last winter, is being used to good purpose.

Mr. L. H. Moffatt, of Rossland, manager of the Rathmullen Mines, Limited, is opening a large copper ore ledge on the Greyhound mine, Deadwood Camp.

At the Diamond Fraction and Texas mine, near Greenwood, an electric hoist has been installed.

For the first time in its history, the British Columbia Copper Company of Greenwood has all three of its furnaces running. This means the reduction of about 2,000 tons of copper ore in 24 hours.

The Golconda group of claims in South Deadwood Camp is being opened up by Alex. Robinson.

Achilles J. Rainville, foreman of the Eureka mine, near Nelson, B.C., fell into the water 20 feet below the 150 foot level. The exhaust steam from the pump had so heated the water that the unfortunate man was fatally scalded.

MINING NEWS OF THE WORLD

GREAT BRITAIN.

A conference of miners' organizations was held in London last month to consider a line of action for raising the standard of wages in the different districts. The standard wages paid at the present time is the standard fixed over twenty years ago, and it is contended is now below the level of a living wage. In the English Federation districts the fixed maximum is 37 1-2 above the standard, and the present wage 50 per cent. above the standard. When in December last an effort was made to arrange for a new agreement, the owners resisted any change in the wage basis, on the ground that it was a long established basis and thoroughly understood by the employees. Certain concessions were, however, made by the coal owners. The position, therefore, is that while the men are unanimously agreed as to the policy of raising the existing wage by 30 per cent., the larger number of men employed are working under signed agreements which have two years and a half to run. Notwithstanding the new wage basis wished for is below the present minimum wage, and therefore would not disturb existing contracts, a resolution was finally passed recommending that each district shall approach the employers with a view of securing a new wage standard on a basis of not less than 30 per cent. of the present percentages upon which all future advances of wages shall be calculated.

UNITED STATES.

A consular report states that cobalt has been found in quantity in Grant County, Oregon.

Seven men were killed and two badly injured by two explosions in the Johnson mine at Priceburg, Pa., on June 18th. The first explosion was caused by the carelessness of a door tender. The second was a fire-damp explosion.

The United States geological experiments in the treatment of the black sands found on the Pacific coast are said to have been successful in demonstrating that platinum, besides other valuable minerals, may be readily and profitably recovered therefrom. There are large areas of black sand deposits on the west coast of Vancouver Island, from which from time to time gold has been extracted in paying quantities.

The United States Geological Survey proposes to establish an experimental station with a view to testing explosives used in coal

mining. The establishment will include an explosive gallery, rescue room, observation house, lamp testing room and explosives laboratory. Tests will be made by the pendulum and the trawl methods.

The production of coal in the United States in 1906 was 369,678,200 tons, valued at \$512,610,744, and an increase of 5.4 per cent. in quantity and 7.5 per cent. in value over the returns for the preceding year. Pennsylvania, of course, continues to occupy the first place in point of tonnage output, the contribution of this State being 48.4 per cent. of the country's total production. The second coal-producing State of the Union is now West Virginia, which has supplanted Illinois in this respect.

According to a report from Tacoma, Wash., the Tacoma Tin Smelting Hydraulic Company has arranged to secure necessary capital for the equipment and operation of its properties in the Clarence and other districts southwest of Nome, by giving a mortgage thereon to the Milwaukee Trust Company, of Milwaukee, to secure a \$5,000,000 bond issue. Reference to this tin deposit has been made on more than one occasion by the United States Geological Survey, and there can be no doubt that the prospects for successful working are promising.

SOUTH AFRICA.

A correspondent writing to *The Colliery Guardian* describes in a very interesting manner existing labor conditions on the Rand. There is still, he remarks, a considerable shortage of cheap mine labor, although the situation has been greatly relieved by the importation of Chinese, who are paid by contract at the rate of a halfpenny an inch in the stopes, with a bonus of threepence on 36 inches, another of twopence on 48 inches and a third bonus of threepence on 73 inches, the 1-2d. an inch running all through. Unfortunately, however, the Chinese do not usually do more than 36 inches a day, as they are satisfied to earn just sufficient to provide themselves with opium and tobacco. This statement will not sound convincing to our Western readers, whose experience of Chinese is that they are indefatigable workers with the one main object in view of earning sufficient money to allow them to return to their own country on a competence. But the explanation may be that the South African coolie is of an even lower type than his fellow-countryman in Canada.

AUSTRALIA.

Canada has still some distance to go before rivalling Australia's record as a mineral-producing country. If, however, gold be excluded our showing is quite comparable; but Australia continues to produce gold to the value annually of twice that of all other minerals combined. Thus last year the Commonwealth's mineral output, exclusive of gold, was valued at £12,149,405, or rather less than that of Canada, which in round figures, gold also being excluded, was \$68,000,000, or perhaps £14,000,000. Our gold yield reached a value of \$12,000,000 only, while Australia in the last two years has contributed £30,000,000 worth of the mineral to the world's supply.

Referring to the rather slow progress of the zinc industry at Broken Hill, an Australian paper remarks:—

At present there are five wet processes on the field—the Potter, Delprat, Cattermole, De Bavay, and Elmore, with the Gillies adoption of the Potter process to swell the total. So far, except at the Broken Hill Proprietary mine, where the Delprat process is worked, production is not on a large scale. The Cattermole process is understood to be giving satisfactory results at the Sulphide Corporation works and at the Zinc Corporation plant at the British mine, and the De Bavay process is said to be doing well at the North mine. It is clear, however, that expectations as to the rapidity with which the vast heaps of tailings were to be turned to account have been far from realized. All the talk of the profits that were to come, not only from the zinc recovered, but

also from the associated lead and silver, have so far not been realized. The story that the Proprietary company were netting 40s. per ton on each ton of tails treated, therefore, is now relegated to the position it ought always to have occupied in the realms of fancy. Of course, with so many experimenters at work, advances in methods of treatment are being made, but that is about the best that can be said at the moment.

According to the official report recently issued, last year was one of exceptional activity and prosperity in the metalliferous mining industry in New South Wales, production having increased to the extent of 15 per cent. or £1,083,731 greater value than that of the 1905 production. At the same time this increase was very largely due to the rise in metal values, although an increased production is shown in copper and zinc. One interesting item in the return is in respect to precious stone output, the State having produced diamonds to the value of £2,120 and opals to the value of £56,000.

COMPANY NOTES

The bond issue of the International Coal & Coke Company, listed on the Toronto Stock Exchange, is \$300,000, instead of \$3,000,000, as reported. The capital stock of \$3,000 is divided into one dollar shares.

The directors of the Mond Nickel Company, Limited, recommend for the year to April 30th a dividend of 12 1-2 per cent. on the ordinary shares, and a dividend of 33 per cent. on the deferred shares, placing £20,000 to reserve, carrying forward £18341. For 1905-6 the ordinary shares got 10 per cent., and the deferred shares 10 per cent.

At a meeting of the directors of the Dominion Iron & Steel Company, held this afternoon, two of the three vacancies on the board, caused by the resignations of Messrs. Pearson, Wood and W. B. Ross, were filled by the appointment of Messrs. George Caverhill and W. G. Ross, of Montreal. The appointment of a successor to Mr. W. B. Ross was deferred to a later date.

The Pittsburg Testing Laboratory Company have filed a petition at Osgood Hall for the winding up of the Stanley Smelter Works of Bannockburn, Hastings County. The claim is a protested cheque for \$350. The treasurer of the company admits that it is indebted to the extent of \$40,000, and is in trouble financially. About \$70,000 of capital has been subscribed.

West Kootenay Power & Light Company, Limited (B.C.).—A meeting of the holders of the first mortgage sinking fund gold coupon bonds will be held in Montreal on July 22nd to consider, and, if deemed advisable, pass a resolution authorizing the execution of a deed to the Royal Trust Company as trustees, providing for the payment of the bonds with interest thereon in sterling or Canadian currency.

Snowshoe Gold & Copper Mines (B.C.).—A meeting of this company was held in London last month. The directors submitted a report for the year ending September 30th, 1906, to the following effect:—During the greater part of the year the Snowshoe mine was closed down pending the completion of satisfactory arrangements for dealing with the property. On June 23rd an agreement was signed leasing the mine to the Consolidated Mining & Smelting Company of Canada, Limited. Under this agreement rather more than 6,000 tons of ore had been sent to the smelters, averaging approximately .08 ounces gold, .3 ounces silver, and 1.4 per cent. copper. The total royalties received thereon amounted to £1,997. Since the close of the financial year the original lease had been cancelled by mutual consent, and a new lease substituted, the terms of which were considered to be more advantageous to the company.

At a meeting of the Foster-Cobalt Mining Company's shareholders on June 27th it was decided to issue treasury stock. The amount of the issue is left to the discretion of the directorate. The stock is to be offered for fifteen days after July 10th at a

discount of 25 per cent. on par value. If it is not then taken up it may be offered to the public. Messrs. Jackson R. Booth and W. Hamilton Fisher were added to the Board of Directors. The total salaries of the board will now aggregate \$7,000 per annum. The chairman, Mr. E. F. B. Johnston, K.C., declared that the payment of \$45,000 in dividend had been a mistake. It should undoubtedly have been left in the treasury. The report of Mr. Frank Loring was read. Mr. Loring reported \$60,000 worth of ore in sight. Mr. Adler, mine manager, said that \$96,000 worth additional had been extracted. He recommended prospecting under Glen Lake. The present net indebtedness amounts to \$11,000, plus the June accounts. All the resolutions passed with little opposition.

The annual meeting of the Dominion Iron & Steel Company, which was to have been held in Montreal on July 5th, was postponed indefinitely. The directors' annual report is given here-with:—

Before discussing the year's business your directors find it necessary to speak of the company's relations with the Dominion Coal Company, which have been seriously disturbed during the year. A memorandum covering this matter will be submitted. It may be briefly stated that in November last the Coal Company tendered large quantities of coal not in accordance with the terms of the contract, which it was impossible to use on the plant, that on the rejection of a portion of this coal the Coal Company declined to supply coal under the contract, that the company's operations have since been carried on with coal bought from various sources, including the Dominion Coal Company, Limited, but at very high prices, and that a suit is pending in the courts of Nova Scotia for the enforcement of our rights.

For greater convenience and regularity the coal used is charged against the operations at the contract price, \$1.28 per ton, as heretofore, the excess cost has been charged to a special account with the Coal Company as part of the damages for which the suit is brought. Up to 31st May this amounted to \$810,713.72, of which about \$500,000 was paid to the Dominion Coal Company. The balance represents the extra cost of coal bought from others.

On this basis our earnings for the year were \$2,247,536.45. The interest charges for the year were \$684,384.82, and the net earnings \$1,563,151.61.

From this amount we have transferred to contingent account \$810,713.72 to offset the amount charged to the Coal Company for the excess cost of coal, leaving \$752,437.89 of the earnings now available. Out of this we have written off the sinking fund of the first mortgage bonds, and the surplus has sufficed to cover the deficit carried from past years in profit and loss account and to leave a credit balance of \$318,711.41.

The aggregate earnings from November to the end of February fell off about \$250,000, as compared with the average of the preceding months of 1906.

This was due wholly to the disturbance and partial stoppage of our operations by the interruption in our coal supply. Bearing this in mind, your directors think that the year's results show satisfactory progress.

It had been hoped that a greatly improved financial position would have been shown this year as the result of surplus earnings available for the liquidation of liabilities. But even under the exceptional circumstances met with, the company's affairs have improved. The greatly increased volume of business, which increases the amount of stock to be carried, and the policy of providing reserve stocks of pig iron and billets to ensure the steady operation of the open hearth furnaces and mills, account for an increase of \$447,863.92 in liquid assets. Our current liabilities are a little higher, but the net indebtedness of the company is \$192,221.19 less than last year.

During the year \$306,335.57 was spent on capital account. The chief items under this head were the Bessemer plant, the extension and equipment of the coke ovens, new rolling stock, exten-

sion of the ore yard and its adjuncts, and extension of the plant at Wabana.

Your directors, being of opinion that the company must ultimately own or control its own coal mines, have secured options on several coal properties which are now being prospected.

Profit and loss statement May 31, 1907:—

Gross profits for 12 months	\$2,247,536.45
Charges inst. of first mortgage bonds	385,387.51
Interest on 2nd mortgage bonds ..	120,293.44
Interest on current loans	178,703.89
Total	684,384.84
Balance net profits	\$1,563,151.61

STATISTICS AND RETURNS

Shipments from the Springhill collieries of the Cumberland Railway & Coal Company, Springhill, N.S., for the month of June, were 34,310 tons.

The amount of bounties paid out on iron and steel for the nine months ending March 31st, 1907, was \$1,299,801; petroleum, \$266,533, and lead, \$1,994.

The Dominion Iron & Steel Company's production for the month of June was:—Pig iron 23,000 tons; ingots, 24,325 tons; blooms, 208,000 tons; rails, 7,400 tons; iron rods, 6,700 tons.

The output of the Crow's Nest collieries for the week ending July 5 was 17,748 tons, or a daily average for five days of 3,549 tons. In the same week last year the mines had two holidays, Dominion Day and July 4, and the output fell to 11,692 tons, of a daily average of 2,923 tons.

The Consolidated Mining & Smelting Company's plant at Trail, B.C., received the following amounts of lead ore up to the end of May, in pounds. The weight of lead extracted is also given in pounds:—

	Ore.	Lead.
January	2,873,428	860,323
February	2,685,815	823,026
March ..	4,244,551	1,620,823
April ..	4,359,928	2,178,858
May ..	2,258,114	808,649

Cobalt re statement for week ending June 30th to July 6th, 1907:—

July 1st, Buffalo Mines, 120,000; July 1st, Nipissing Mines, 102,170; July 3rd, McKinley-Darragh-Savage Mine, 48,000; July 3rd, Coniagas Mine, 86,000; July 5th, Coniagas Mine, 186,000; July 3rd, Imperial Cobalt, 37,530; July 6th, LaRose Mine, 60,115; total, 639,815.

British Columbia ore shipments, week ending June 22nd:—

Boundary shipments—week, 32,080; year, 466,331.
 Rossland shipments—Week, 6,285; year, 126,204.
 Kootenay-Sloean shipments—Week, 2,856; year, 58,861.

The total shipments from the mines in the above districts for the past week were 41,211 tons and for the year to date 651,396 tons

British Columbia ore shipments, week ending June 29th:—

The Boundary district made a new shipping record last week, the output being 36,781 tons, or 7,000 tons larger than the previous week's output.

The returns from the other districts show a distinct gain, and the whole total is well above the average for the year.

Appended will be found the ore shipments in detail for the past week and year to date in tons:—

Boundary shipments—Week, 36,781; year, 503,112.

Rossland shipments—Week, 6,791; year, 132,995.

Kootenay-Slocan shipment—Week, 2,898; year, 61,759.

The total shipments from the mines in the above districts for the past week were 46,470 tons and for the year to date 697,866 tons.

Glance Bay, July 3rd, 1907.—The approximate outputs for June, 1907, from the mines of the Dominion Coal Company was as follows:—

	June, 1907 (approx.)	June, 1906. (actual.)
No. 1	47,270	43,534
No. 2	55,960	51,887
No. 3	33,560	37,525
No. 4	46,500	52,779
No. 5	57,500	59,370
No. 6	20,200	3,460
No. 7 .....	.....	11,381
No. 8	21,720	24,934
No. 9	32,940	33,866
No. 10	8,640	3,158
	324,290	325,991

The shipments for June, 1907, were 375,938 tons, and for June, 1906, 343,169 tons.

COBALT ORE SHIPMENTS.

Following are the shipments for the week ending June 29th from Cobalt camp, and those from January 1 to date:—

	Week ending	
	June 29.	Since Jan. 1.
	Ore in lbs.	Ore in lbs.
Buffalo	60,000	993,830
Coniagas	434,000	2,901,860
Cobalt Central .....	.....	101,360
Colonial	40,000	74,250
Drummond .....	.....	44,090
Foster .....	.....	140,350
Green-Meehan .....	.....	196,780
Kerr Lake (Jacobs) .....	.....	249,000
LaRose .....	.....	689,782
McKinley .....	.....	60,000
Nipissing	63,120	2,516,183
Nova Scotia .....	.....	30,000
O'Brien .....	.....	2,159,254
Red Rock .....	.....	49,530
Right of Way	56,500	134,530
Silver Queen .....	.....	389,157
Trethewey	102,000	1,295,718
Townsite .....	.....	84,078
Temiskaming .....	.....	110,000
University .....	.....	61,383

The total shipments for the week were 755,620 pounds, or 377 tons.

The total shipments since January, 1907, are now 12,215,143 pounds, or 6,107 tons. In 1904 the camp producer 158 tons, valued at \$136,217; in 1905, 2,144 tons, valued at \$1,473,196; in 1906, 5,129 tons, valued at \$3,900,000.

ENGLISH COPPER MOVEMENTS, MAY, 1907.

A good deal of attention has been attracted in the copper trade to the reduced demand from abroad. The full statistics for May show exports of not quite £23,000,000, which are some £20,000,000 under the record of a year ago. The exports for the eleven months of the fiscal year of £373,000,000 are £51,000,000 under last year's record. At the same time, copper imports are increasing greatly, due to enlarged production in adjoining countries. During May

imports exceeded £10,000,000, or a gain of about £4,000,000, while for the eleven months' period they made the record-breaking total of £180,000,000, or nearly £30,000 more than during the preceding year.

London fortnightly copper statistics show an increase of 1,117 tons in the quantity in sight, and 817 tons in that on hand.

New Dividends

Montreal Steel Works, Limited.—Quarterly dividend of 1 3/4 per cent., payable July 8th, and in addition an interim dividend of 2 1/2 per cent.

Dominion Coal Company, Limited (N.S.).—The half yearly dividend of three and one-half per cent. has been declared on the preferred shares, payable August 1st next.

METAL, ORE AND MINERAL MARKET

- Aluminium, No. 1 grade ingots—46 cents per lb.
- Antimony—10 to 14 cents per lb.
- Arsenic, white—7 1/4 to 7 1/2 cents per lb.
- Barytes, crude—\$11.25 to \$14.50 per short ton.
- Bismuth—\$1.50 to \$1.75 per lb.
- Cadmium—\$1.40 to \$1.46 per lb.
- Carbons, for drills—\$78 to \$85 per carat.
- Carborundum, powdered—8 cents per lb.
- Chromium, metal pure—80 cents per lb.
- Cobalt, f.o.b. Cobalt, Ont., unrefined—35 to 50 cents per lb.
- Cōrundum—7 to 9 1/2 cents per lb.
- Feldspar, ground—\$12 per short ton.
- Flourspar, lump—\$10 per short ton.
- Graphite, domestic—\$50 to \$150 per short ton.
- Gypsum, lump—\$4.50 per long ton.
- Infusorial earth, ground—\$25 to \$30 per ton.
- Lead—5.25 cents per lb.
- Manganese, pure metal—75 cents per lb.
- Mica, ground—\$80 per short ton.
- Mica, scrap—\$15 per short ton.
- Molybdenum, pure—\$1.70 per lb.
- Molybdenite ore, 95 per cent. pure—\$4.50 to \$5 per unit.
- Nickel—45 to 50 cents per lb.
- Platinum, ordinary metal—\$26 per ounce.
- Platinum, scrap—\$20 to \$21 per ounce.
- Pyrite, 38 per cent. to 45 per cent. sulphur, lump, 10 1/4 to 11 1/2 cents per unit.
- Quicksilver—\$41 to \$42 per 75 lb. flask.
- Talc—\$18 to \$23.50 per ton.
- Tungsten, pure metal—\$1.25 per lb.
- Tungsten ore, 60 per cent. pure—\$400 per ton.
- Tin—42 1/2 to 42 3/4 cents per lb.

MARKET NOTES.

- Spelter.—Prices have lowered. New York, 6.27 to 6.32 cents per lb.; London, £24 per long ton.
- Lead.—The lead market has fallen. New York, 5.25 cents per lb.; London, £20 15s. for Spanish lead.
- Northern Pig Iron.—Last half delivery; No. 1, foundry, \$24.50; Bessemer, \$24.
- Tin.—The tin market is firm at 42 1/2 to 42 7/8 cents per lb.; London, £199 for spot.
- Copper.—A late despatch from New York announces a break in copper prices. Electrolytic, 22 cents per lb.; lake brands, 22 1/4 to 23 cents per lb.; London, £99 17s. for spot.
- Silver.—June 20th, 67 1/4 cents per ounce; June 21st, 67 1/8 cents per ounce; June 22nd, 67 3/8 cents per ounce; June 24th, 67 3/8 cents per ounce; June 25th, 67 3/8 cents per ounce; June 26th, 67 1/4 cents per ounce; June 27th, 67 1/8 cents per ounce; June 28th, 67 1/8 cents per ounce; June 29th, 67 1/4 cents per ounce; July 1st, 67 3/8 cents per ounce; July 2nd, 67 3/8 cents per ounce; July 3rd, 67 3/8 cents per ounce.