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THE MINING REVIEW

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B. T. A. BELL, Editor.

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The Dominion Coal Company Ltd.

Our issue this month, following upon the very interesting and enjoyable meeting of the Mining Societies of Nova Scotia and Quebec at Sydney, Cape Breton, in July, is naturally redolent of the Dominion Coal Company, at whose hospitable invitation the gathering was held there. The strongest light of criticism has for many months past been thrown upon this company, and it is indebted to the press of Canada and the United States for a great deal of gratuitous advertising. The latest and by no means the least remarkable discussion of its aims and objects was evoked the other day in the Senate at Washington, by Senator Chandler's motion to appoint a commission of enquiry into the true inwardness of the Company's connection with the movement favoring free coal for the United States. Surely no body corporate starting out to conduct an important enterprise within the limits of the Dominion, has ever been attacked and belaboured to the extent this company has been in Nova Scotia. This hostility can no doubt be attributed to two causes: 1st. The fact that there is a preponderance of foreign, *ie.*, American, capital and influence about it; and 2nd. That it came into existence under the skilful manipulation of Premier Fielding, to whom accrued therefrom much political kudos, while, at the same time, a proportionate amount of chagrin and envy filled the breasts of his political opponents. At the risk of relating a story already familiar to many of our readers, and as an introduction to our description of the meeting of the Mining Societies in Cape Breton, we propose to give a brief history of the company from its inception until the present day.

The idea of combining the various Cape Breton collieries under one management is quite an ancient one and it would be difficult to trace it back to the original source. Prior to the imposition of the American duty on coal, the Cape Breton mines did a profitable business, chiefly with the United States, albeit on what seems now-a-days a very small scale, but with the loss of the American market, the coal trade languished, and much suffering ensued locally among the laboring classes in and around the mines. Then in 1878, as all are aware, came Sir John A. Macdonald's National Policy, under which, fostered by a duty on imported coal, the business gradually revived, not with leaps and bounds, as the most sanguine had predicted, but with sufficient steadiness to restore comfort and a moderate degree of prosperity for employees and employed. The producing capacity of the mines, however, was a good deal in excess of the demand, competition was very keen, and prices, in consequence, very low. The Montreal market then indicated but a faint shadow of the substantial growth it has since attained, and with the American markets closed to everything but slack coal, the outlet for Cape Breton coal was very limited. It was in 1881, we believe, that the Cape Breton Colliery Association was instituted by the resident agents and managers of the different mines. Its formation was prompted by the aggressive attitude assumed about that time by the workmen, and as a sort of counter-move to the Provincial Workmen's Association, which had just been started. But beyond being a combination for mutual defence against the machinations of Mr. "Bobby"

Drummond—we beg his pardon—the Honorable Robert Drummond—this Association essayed to regulate the course of business, and by entering into obligations more or less solemn, sought to keep the selling price of coal at a level which would ensure a decent profit. But, as is almost invariably the result in such cases, holes were sought for and generally discovered by the wiley manager, by which escape from the solemn obligations could be compassed, without sense of dishonor to an elastic conscience; so notwithstanding that from 1887 onwards, times sensibly improved, and although, with a steadily increasing demand from the St. Lawrence markets, the mines had now pretty well as much work during the season of navigation as they could handle at the capacity to which they were developed, only one or two of the mines could show a decent margin of profit upon their workings, while the rest of them were not doing much more than make both ends meet. As each succeeding Spring saw the blind struggle for contracts at bed-rock prices, the more sagacious sighed over such short-sighted and suicidal policy and figured enviously upon the prices they could legitimately have commanded, had common sense and mutual confidence prevailed among the coal owners. Such being the state of affairs, the ground was in a favorable condition for the operations of the gentlemen who sowed the seed of the great project which culminated in the Dominion Coal Company as it is to-day. The initial step of any significance was the purchase in the winter of 1891-2, of the Ontario Colliery at Glace Bay, (which had been practically idle for some years) by Messrs. B. F. Pearson, of Halifax and J. A. Grant, of Boston, acting for Boston people. Among whom were Mr. F. S. Pearson and the gentleman whose name is better known than any other in connection with the whole transaction, Mr. Henry M. Whitney, then President of the Boston West End Street Railway Co., of which Mr. F. S. Pearson was Engineer-in-Chief. We have understood that it was through the Messrs. Pearson that Mr. Whitney's attention was first drawn to the Cape Breton coal fields and to the vast possibilities that underlay a proper development of their resources. It was no difficult matter to estimate that, with increased and cheapened production, with Louisburg equipped as a shipping port and with modern means of water transit, it would be possible to supply, in a measure at least, the markets of the New England States. Mr. Whitney was sufficiently impressed to post a large sum of money wherewith to secure options on all the working and workable properties lying within the limits of Cape Breton County. As he came to look more closely into the matter, an obstacle to the successful working of the scheme appeared in the shape of the uncertain tenure under which coal areas were leased from the Province of Nova Scotia, which could, through its Government, increase the royalty at will. Mr. Whitney at once recognised that it would be useless to attempt to enlist the assistance and capital of his countrymen in an undertaking which could be taken out of existence at any time, if the people of the country, through its Local Legislature so willed it. The royalty we may mention had just been raised from 7½ to 10 cents per ton in the teeth of strenuous and united efforts in opposition from the coal owners of the Province. At this juncture Mr. Fielding, the Premier of Nova Scotia, appeared as

the "*dens ex machina*." He was anxious to see the Whitney project carried through to a successful issue, foreseeing as he did, that, apart from any advantage his Treasury might derive from the amalgamation, introduction of millions of foreign money to work the mines to an extent impossible under the existing state of affairs, was just what was wanted by the Province in general and Cape Breton in particular. The result of negotiations between Mr. Fielding and the Whitney syndicate, as it had come to be styled, was that, in return for a 99 year lease of the areas they might acquire, the syndicate agreed to pay the Government a fixed and unalterable royalty of 12½ cents per ton, and furthermore, as an evidence of *bona fides*, and to stifle the voices of the prophets of evil who were loudly vociferating that the Philistines were upon them, and that the mines, as soon as purchased, would be closed down in the interests of Pennsylvania coal barons; they undertook to pay this rate of royalty upon the largest quantity of coal produced in any one year up to that time by all the mines they proposed to operate, as a minimum annual contribution to the Provincial coffers, no matter if they failed to ship that quantity. This legislation once agreed upon, all was comparatively plain sailing. The syndicate had purchased options upon all the principal properties, and the majority of them were taken over and paid for in the early days of 1893, to wit, the International mines, (and with them the Black Diamond line of five steamers), the Caledonia, Glace Bay, Gowrie, Gardiner and Old Bridgeport, (which, a short time before had been acquired by the International Coal Company), while the "Reserve" property was secured by means of purchasing sufficient stock on the London market to give the syndicate a control of it. The options upon the two collieries of the General Mining Association were continued throughout 1893, with the eventual result that the Victoria Colliery was taken over on the 1st January, 1894, while it was decided not to acquire the Old Sydney mines, which, therefore remains the only independent colliery of any size on the Island. Meanwhile, the syndicate legislation of Mr. Fielding had been bitterly opposed by the Conservatives, and the curious spectacle was presented of a commercial undertaking, promising results of a magnitude unparalleled in the history of the Province, being promoted and opposed on the simple lines of party politics. Mr. Fielding's guns, however, were too heavy and the legislation passed both houses. The Whitney syndicate had now broadened out into the Dominion Coal Company Ltd., with a board of directors, including Mr. Whitney, of course, as president, his brother-in-law, Mr. Dimock, the Messrs. Winsor, (representing the interests of Kidder, Peabody & Co., who acted as financial agents in floating the company), and Mr. F. S. Pearson, together with such substantial Canadian representatives as Sir Donald A. Smith, Sir W. C. Van Horne, and Mr. Hugh McLennan, of Montreal, while Mr. W. B. Ross, of Halifax, was added as the legal member of the board. Mr. John S. McLennan, who had been so conspicuously successful as the managing director of the International Coal Company, and than whom no one, if we except Mr. Whitney himself, had played a more important part in the later stages of the new company's development, became treasurer, and Mr. B. F. Pearson, who had acted from the start as Mr. Whitney's agent and political lobbyist, was rewarded with the post of secretary. Mr. F. S. Pearson, in addition to having a seat on the board of directors, was named engineer in chief, while the important appointment of resident manager was offered to and accepted by Mr. David McKeen, M.P., up to that time, and for many years past, manager of the Caledonia mines. Many people fancied and perhaps fancy still, that a younger man of modern ideas and altogether of a more pronounced "*fin de siècle*" type, might more fitly have been chosen to engineer a large concern of this kind, but it has been and still is our opinion that the choice was in many respects a wise one. Mr. McKeen is a man of remarkable originality and determined will, while the history of his past career supplies abundant evidence of shrewd ability and foresight. "*Festina lente*," might very appropriately be adopted by him as a motto, and his pronounced conservatism and distrust of new-fangled notions have acted as a very effectual and salutary brake upon younger and more ardent

spirits, who had framed a programme for his execution, calling for 10,000 ton steamers, shafts with a daily capacity of 5,000 tons, and loading dock rivalling Cardiff in cost and magnitude—all to be provided within a short space of time and before markets had been found for the boundless store of coal to be produced. When Mr. McKeen disapproves and disagrees he does so with a blunt outspoken frankness which is in the highest degree disconcerting to anyone holding and propounding views opposed to his own, and he may be trusted to drive his arguments home with a force well nigh irresistible. For him as is well known the sun has risen and set for many years at the Caledonia colliery, and it has cost him a considerable effort to enlarge his horizon and to extend a sympathetic embrace to the other, and, in some instances, larger collieries which are now under his management. But if he falls short of a thoroughly comprehensive grasp of the reins of management, he can be relied upon to discourage and frown down any rash and immature experiments, avoiding extravagant changes as much as possible, and working on and up with characteristic Scotch caution and cannieness. At the time the new company assumed control of its property, arrangements for the year's business had in many cases been already made, and it was confident that little or nothing could be done in 1893 in the way of new developments. As a matter of fact work was carried on throughout last year pretty much on the old lines, and the only new work of any importance that was undertaken, was the extension of the International Railway in the direction of Louisburg *via* Glace Bay and Cow Bay. This work was actively pushed on under the superintendence of Mr. Hiram Donkin, who had already made his mark in Cape Breton as the constructor of the I. C. R. extension from Point Tupper to Sydney, with the result that the line was opened for traffic to Glace Bay at the close of last year, when the season of navigation had terminated. Several important developments and changes were taken in hand, notably the practical re-building of the old International shipping pier on Sydney Harbor, which was to be replaced by a new structure containing the latest contrivances for shipping coal with the maximum of despatch and the minimum of breakage; the sinking of a large shaft (Dominion No. 1) on the line of the Company's railway near Bridgeport, to win coal from the popular Phelan seam, and the erection of a new heapstead, with the most up-to-date hoisting and screening arrangements, at Caledonia, and to a less important degree at Old Bridgeport also. It cannot be denied that the prosecution of these works has been attended by a considerable amount of disappointment and disillusion. The difficulties under which outdoor work is carried on in Cape Breton during the winter months, could not have been correctly gauged by the powers at Boston, and it was evident when navigation opened in 1894, that the management had attempted to do too much at one time. The new pier was still in an embryonic state, presenting difficulties which had never been experienced even in shipping from its much despised predecessor, and the two collieries, to which so much had been done and from which so much was expected, were not only ready to produce coal but remained unproductive for a considerable time after the season of active shipping had commenced. Moreover the new and elaborate hoisting and screening arrangements with which they were eventually equipped, developed the habit of running amuck at frequent intervals, and the result, therefore, has been very far from showing any advantage gained over the old methods, either in the cost of production or the quantity of coal shipped. It is not our business to surmise as to whose shoulders the blame of these failures and delays should rest upon, but we do no one an injustice in hazarding the conjecture that a great deal of the new work was somewhat too experimental in character and that the new management made the mistake of presuming that the changes they had planned could be effected with as much ease in Cape Breton as in America; and mindful of the facts that materials had to be imported from great distances, that the climate in winter renders work very difficult and uncertain, and finally that the local mechanics, good and reliable men as they undoubtedly are, could hardly be expected to adopt themselves immediately to revolutionary ideas and methods. But

serious and disappointing as these failures and drawbacks have been to the management, curtailing their supply of coal available for shipment and preventing them from taking advantage to the full of the demand for provincial coal in the States caused by the recent labor troubles there, the difficulties met with are of a kind that time and experience can remedy. At least we earnestly hope so. We saw nothing in our recent visit to warrant the fear that the mistakes that have undoubtedly been made are more than temporary in their consequences. On the contrary many difficulties had by that time been surmounted, and the general situation seemed to us to be healthy, and full of hope and promise. The new developments are good and sound in principal, and experience will no doubt, soon remedy their defects in detail.

Such then, briefly, has been the history of the rise and progress of the Dominion Coal Co. What it is destined to become, who can say? It is as yet but in its infancy, and its enemies, whose prophecies of a grinding monopoly and other attendant evils, have so far been falsified, bid us wait and see what a hydra-headed monster of tyranny it will yet develop into. It may safely be predicted that with its ample means and far-reaching influence, the Company will develop the coal business of Cape Breton within a year or two, to an extent, compared with which the old condition of affairs might be termed stagnation. Whether it will accomplish all that has been promised for it, is of course more problematical. The present crisis at Washington has been fraught with the greatest importance for those interested in the new developments in Cape Breton, and should the duty on coal be removed from the American tariff, there would appear to be no reason why, with Louisburg equipped, as it shortly will be, for shipping coal, a large and profitable trade with the eastern sea board of America should not be built up, side by side with the increasing business the company already enjoys within the limits of the Dominion.

To touch for a moment upon the evils that were foretold as the inevitable result of the Company's occupancy of the Cape Breton coal fields, the management, we hold, deserve to be congratulated upon the moderation and forbearance with which their reign has been inaugurated. That there have been individual cases of disappointment and heart-burning may be true; it was not to be expected that a turnover of so revolutionary a character could be made without them. But outside of these, any changes that have taken place, have, we imagine, been beneficial to those affected. The laborers in and around the mines have as much work as they ever had, in fact, judging by recent complaints of a falling off in the output of coal, more than they want, and the prospect in the near future of steadier employment the year round than they ever enjoyed under the old regime. Viewing the situation from the standpoint of the general public, we are not aware that any attempt has been made to unduly force up the price of coal, nor do we believe that the company's policy contemplates any move in this direction. Perhaps those interested in the coasting trade, which until recently, has been such an important business in Nova Scotia, can present a better *prima facie* case than any other body of men, against the new order of things, for they can no doubt complain with truth that they are being squeezed out of existence, but, in justice, it must be remembered that the decadence of this trade had set in long before the idea of the Dominion Coal Co. had been conceived. We cherish the confident belief that as long as men like Mr. Whitney control the Company's policy, so long will that policy be wise and moderate. It has been claimed for Mr. Whitney that his speculations have invariably been of a kind to bring not only profit to himself, and his associates, but also, benefits to the community at large, and he may be counted upon never to initiate or sanction any line of action in his business to which the epithets "grasping" or "arbitrary" can be applied. The people of Nova Scotia, and especially those whose homes are within the territory dominated by the Dominion Coal Co., can be congratulated upon the fact that the enormous powers possessed by that corporation, are in the hands of a man of his character. So long as they rest there we can feel assured that the progress of the coal trade of Cape Breton will be marked by no harsh or arbitrary treatment of those who directly or indirectly depend upon the company for their livelihood and comfort.

The Memramcook Fiasco.

During the past month many of our subscribers will have read more or less of the collapse of work on the property of the Memramcook Gold Mining Co. Ltd., in New Brunswick, a corporation which, from the local papers, was soon to pay cent per cent dividends. The moral of the whole fiasco is so important, especially as to the manner in which the property was floated and equipped, that THE REVIEW deems it expedient to review the progressive stages of the undertaking. Its history, briefly stated, is as follows: In the fall of 1892, following closely upon the excitement occasioned for a very brief period by the Brookfield conglomerates in Nova Scotia, came rumors of the existence near Memramcook, New Brunswick, of extensive beds of auriferous cement or conglomerate. This conglomerate occurred or was exposed in a cutting made by the Intercolonial Railway for ballast. So-called "mortar tests" were reported as yielding several dollars per ton, by which rumors, attention was drawn to the property, and one J. B. Neilly, a merchant of Halifax, interested himself in getting a commercial test made of the material. In January, 1893, Mr. Neilly shipped a car load of material, supposed to have come from this railway cutting, to one of the best custom mills in Nova Scotia, viz., the Oldham mill. From this car load was obtained a yield of \$1.50 per ton by the stamp mill process.

Correspondence ensued between Mr. Neilly and Mr. Hardman, the manager of the Oldham Gold Co., in which it was made clear that the test was accurately and carefully made and that \$1.50 of gold existed in each ton of that particular material composing the car load. Further, Mr. Hardman's personal opinion to Mr. Neilly was that although getting \$1.50 per ton from the sample sent, yet the deposit was not of economic value at that rate of yield, and could not be made a profitable investment. Mr. Neilly then considered (he has said) Mr. Hardman to be the highest authority in his line in Nova Scotia.

Notwithstanding this expert opinion and advice Mr. Neilly at once issued a prospectus based on this yield of \$1.50 per ton, which prospectus contained most ridiculous estimates of the cost of working the deposit, and of the margin of profit sure to be obtained. This prospectus was signed by the provisional directors of the company, (which had been incorporated in New Brunswick), some of whom were men of standing in finance and in politics, particularly so in Nova Scotia.

By the use of these names as directors tone was given to the enterprise, and many people were influenced to buy shares in the company, in the faith that these prominent men would not have endorsed the prospectus unless the scheme had been investigated by them and approved.

It is a question in Canada as to how far such directors are responsible; English law makes such officials personally financially responsible for statements issued over their signatures. It is the conviction of THE REVIEW that the sooner this is made the law in Canada the better for legitimate mining.

Once the prospectus was issued an agreement was promulgated by Mr. Neilly under which stock of the par value of \$1 was sold by him for 17½ cents, for the avowed purpose of erecting at first ten stamps for a testing mill, and secondly, to provide for the erection of forty additional stamps should the tests prove favorable. The bait was swallowed and for a time small lots of stock were sold rapidly to people who imagined the endorsement of the prospectus by some leading men of Halifax as directors, was a guarantee of genuine value.

The plant of the Coldstream Mining Co. (which included a 50 stamp mill and appliances) erected on another conglomerate bubble at Gays River, N.S., which had burst, was purchased by Mr. Neilly for about \$5,000. Ten of these stamps were at once removed to Memramcook, and in July a 50 ton lot was milled which yielded *no gold*; the amalgamator was replaced by another and a 43 ton lot was milled, again yielding *no gold*. A third and skilful amalgamator was employed, who crushed four (4) lots of 25 tons each, obtaining, as the average of the 100 tons milled, a yield of \$1.94 per ton. The gold obtained from this

test was, like that of the carload shipped to the Oldham mill, *coarse* enough to be easily saved by stamp mill work.

Meantime assays of lots sent to Mr. A. B. Browne, of Boston, had shown values ranging from \$3.72 to \$4.18, but the gold obtained in these laboratory tests was, according to Mr. Browne, *very fine*.

Here were discrepancies. Stamp mill tests on 100 tons showed *coarse* gold, stamp mill tests on 93 tons showed *absolutely no recognizable gold*, assay and laboratory tests on one ton showed *very fine gold*.

The explanation offered for finding no gold in the two lots of 50 and 43 tons milled by stamps, of organic matter in the water, and of "chemicals" used, might possibly be taken into account if the gold really was *very fine*, but when gold is coarse enough to be easily saved in the mortar, such an "explanation" fails to explain.

That these variations and discrepancies should have made the officials of the company dubious, and have induced caution, goes without saying, but apparently quite the contrary impression was produced, for on the 15th September, after a somewhat discordant meeting, Mr. Neilly and his directors got a vote deeming the erection of the remaining 40 stamps expedient and advisable, and work thereon was at once commenced. This was the beginning of the end. No competent expert, on such conflicting testimony as the company possessed, would have advised such action, yet this company with a paper capital of \$400,000 proceeded to equip the property with a large plant, while yet utterly ignorant of the extent or real average value of the deposit they imagined they possessed. No portion of the 370 acres of territory owned was opened or tested beyond the old face of the ballast pit, and the yields from that were discordant, so that absolutely no calculations as to quality, or uniformity, or continuity were possible.

The mill erected was built in a slipshod and cheap manner: no provisions for heating were made, and the power arrangements were so imperfect that the 50 heads were never able to run continuously for any length of time. Yet for this mill Mr. Neilly is said to have received from his company the sum of \$25,000—a larger sum than was paid by the Coldstream Company for the same mill when new, and for which, when they sold to Mr. Neilly, they received only the sum of about \$5,000. The profit to this gentleman is variously named at from \$10,000 to \$15,000.

Late in October, when the 50 stamp mill was under way, a man who describes himself and his business as "a cutter of ladies' coats and jackets," talks "patent electric process," "mercurial hydrate of sodium," and a lot of other senseless jargon to Mr. Neilly to such effect that that gentleman orders several car loads of conglomerate sent to this ladies' coat-cutter to be tested. Who is surprised to find this jacket-maker gets a higher yield per ton than the stamp mill tests gave? His "patented mercurial hydrate of sodium made by electricity," apparently manufactured gold. But who is *not* surprised to find the president of a mining company, with large property and large capital, so credulous and so ignorant as to be induced to make another "proposition" to his company (as a contractor or what you like) to put in one of these wonderful patent mills and to take his pay therefor in "*excess profits*," whatever they may be, and at a substantial advance upon the cost of the machine!

Truly a wonderfully pliable, credulous and most lamentably unbusiness-like "company." But from letters in the daily press of Halifax, President Neilly was afraid to have the resulting bullion from this wonderful mill tested for fineness; he preferred to treat the gross yield as fine gold because he was going to use the results of this patent process "to sell stock."

Shortly after comes the end. The mill being so imperfect cannot run in winter weather, at which time it is finished, "inspected and accepted," and paid for. Sometime in June of this year, under the guidance of an amalgamator who has no superior in stamp mill work in Nova Scotia, the big mill finally makes a start, dropping on an average between 20 and 30 head. Over 1,000 tons are milled; results: *both in patent electric mercurially-hydrated-personally-ladies'-coat-cutter-conducted-*

machine, and in the stamp mill—*nil*—or next to nothing, the magnificent sum of 3 cents per ton being realized.

The bubble has burst, bills remain unpaid for some time, and President Neilly makes an "explanation" which reads very cleverly, but doesn't "explain."

The plain obvious moral is: Don't trust a so-called business man to run a mining scheme unless he has competent expert advice from the beginning. As the Halifax *Critic* so well said in its issue of the 3rd August: "All mine investors cannot be mining experts, but before plunging their money into a venture they should avail themselves of the advice and experience of some professional man who could save them from some financial foolishness of which they might afterwards be ashamed. * * * We can only say 'you have yourselves to blame.'"

We do not hesitate, in our opinion, to say that the gentlemen who acted as provisional directors of this Meinramcook Co., are in a great measure responsible, as they took no steps to ascertain the truth or falsehood of the statements incorporated in the prospectus by competent expert mining advice. It is well known that some of the Geological Survey staff, when visiting that district, found nothing to warrant the extravagant claims made; it is also well known that no engineer of reputation ever visited the property or reported on the same. It is *surmised* that Mr. J. B. Neilly is the only individual who has profited by the deal. Who, we ask, are responsible for this state of affairs but the directors? the body of men elected by the shareholders to conserve and forward their interests!

And that such work should be held up as characteristic of Nova Scotian methods in the gold mining business is a slander and libel upon an industry which is legitimate, growing and straightforward in its characteristics.

Copper Mining in Cape Breton.

Hitherto the name of Cape Breton has been synonymous with coal. In fact few people believe that there is anything else in Cape Breton except some lakes, coal mines and enough dry ground for the miners' houses to stand on. A smile often meets the assertion that Cape Breton has a fishing and farming industry either of which is quite as important as coal mining. The number of those who believe that in metal mining there exists in this island the foundation of an industry vastly more important than all the others combined, is confined to those who view the island with experience gained in other countries. The concentration of so much capital upon the coal mines, the facility with which they can be opened, the indifferent and easily procurable skill that can readily mine coal, all have combined to withdraw attention from the more complex productions of the metallurgist's skill. So much has this been the case in Cape Breton that it is hardly known that the island is one of the most promising mineral fields of Canada.

The labors of the staff of the Canadian Geological Survey, have given us a map showing the Laurentian, Silurian, and Carboniferous districts, but as yet the metal prospector and the mineralogist have seen little of Cape Breton. The list of minerals as yet known comprise iron, copper, lead, silver, graphite, manganese, mica, feldspar, asbestos, barytes, fluor spar, strontianite, phosphates, marble, gypsum, building stones, fireclay, etc.

In the development of the gypsum and marble initiatory steps have been taken with fair promise of expansion. The future, however, so far as it relates to the material prosperity and the accumulation of capital in Cape Breton, depends on the utilisation of her coal in the varied and complex methods of the metallurgist, who smelts her ores and produces lead, copper, iron, steel, etc. The mere export of coal, practically a raw material, leaves in the country little beyond the wages paid for its extraction and shipment, in other words the equivalent of the support of the laborer. Take England as a shining example of this. Large as her



H. M. Whitney, Esq., Boston, President,
Dominion Coal Company, Ltd.

export of coal is, it is but a small percentage of the amount consumed in her thousand industrial processes. Where would England be in the scale of nations did she but mine her coal and ship it to foreign countries there to heat the furnace, drive the factory engine, etc.

So important is the connection between the home consumption of coal for industrial pursuits and the accumulation of wealth or capital in provinces like Nova Scotia and British Columbia, that it would seem to be specially the duty of Provincial Governments to take every possible step to foster the home reduction of ores. It would be better that these Governments spent annually a round grant of money in prospecting and testing mineral lands, which could then be leased to responsible parties instead of being held by persons who are without means for development, and expect the prices of mines for prospect holes.

In the list of minerals the development of which would specially benefit Cape Breton, iron and copper ores may easily take the first rank. As regards the former, the presence of numerous deposits is well known. Analysis show that some of the ores rank as the best, as "Bessemer." Outcrops are known close to shipping points, yet a few thousand dollars represent all the practical attention they have received. Their value according to the owners is immense, yet where the beds are known in some hill side, enough work has not yet been performed to show a year's output in sight. The same with a single exception may be said of the copper ore deposits of the island. At numerous points outcrops of ore are known, a few trenches have been cut, yet nothing done beyond showing a prospect more or less promising. These prospects upon which capital would readily risk the money required for a proper test are held by the owners as representing great cash values. The only attempt at a legitimate development of a mineral deposit on the island is that of the Eastern Development Co., Ltd., the owners of the Coxheath Copper Mines. Here a prospect was submitted on reasonable terms to foreign capital. The first steps showed an improvement on the surface indications, which has continued. This company owns, on the felsite rocks of Coxheath Hills, three square miles of territory in which several thousand feet of cupriferous strata outcrop. The explorations show that the comparatively scanty surface indications of copper pyrites which merited attention only for their persistence along a well defined horizon, formed the surface of a highly mineralised belt extending over a large tract of country. This point alone is of interest as showing that expenditure of money and time is needed in examining mineral deposits as the condemnation of a single exposure on the ground of the property of mineral there visible may prove an unfair prejudgment of the value of the same rock a few hundred feet away. The company encouraged by the improvement visible as they worked on the vein prepared for development work. Gradually and cautiously during the falling prices of the metal they have pushed their main shaft until it has reached a depth of 300 feet, and during the sinking have cross-cut the bed rock with the result of showing several veins carrying copper in workable quantity with decided percentages of gold and silver. The principal vein varies from six to ten feet in width carrying in the vein about six per cent. of copper readily dressing to over ten per cent. The remaining veins, of which some six have been cut and tested at the different levels as in the case of the main vein, vary in width up to five feet and promise at several points as well as the large vein. The mine is well equipped with hoisting gear, air drills, pumps, shops, houses, etc. equal to the development being carried on and to a fair daily output. The eastern shaft has been sunk about 1000 feet from the main shaft, and is down about 150 feet on the main vein which at that point presents the same characteristics as at the main shaft.

In the southern lease the company has traced for nearly one thousand feet a large vein which has been opened on at one point to a depth of one hundred feet, showing as well as the main vein at an equal depth. Further explorations may show that this vein joins the others, and experts have expressed opinions that it may prove richer than those already tested. This cross vein has over two hundred feet of backs above water level drainage. So far the work of development has shown

large quantities of ore, readily accessible, and presenting no obstacles to treatment. The fact that there are over \$50,000 worth of available ore on the dumps which has accumulated from the levels and cross-cuts in the veins certainly proves the extent of the veins and their accessibility.

As for the second part of the enterprise, the treatment of the ore, it requires a modern outfit. So far as the accessory surroundings of copper smelting are concerned in this section, they are unusually favourable. The property can be readily joined to the Government railway system by six miles of road, and at the proposed junction ample ground has been secured for furnaces on deep water in Sydney Harbor. Coal is within a few miles by rail or water, flumes can be had at the furnaces, and the best labor of the continent is a characteristic of the people of Cape Breton. Ores from all parts of the Gulf of St. Lawrence region can be collected at this point, and with smelters here the numerous prospects of copper ore in the Island will undoubtedly furnish some mines ready to supply ores. The locality as a distributing centre for the manufactured article is unrivalled, being on the seaboard instead of, as is the case with so many mines, hundreds of miles from any shipping point.

There is a marked improvement in the mica market, the demand for Canadian being steadily on the increase.

The meetings of the Ontario Institute will be held by courtesy of the Provincial Government in the Private Bills Committee Room, Parliament Buildings, Toronto, on Wednesday and Thursday, 12th and 13th September. Afternoon and evening sessions will be held on both days,

An apparatus for discovering internal flaws in iron and steel has, it is reported, been invented in Paris by a Captain de Place. Of course it is electrical, and consists of a small pneumatic tapper worked by the hand, with which the sample of steel or iron is tapped all over. With the tapper is connected a telephone with a microphone interposed in the circuit. One operation is required to apply the tapper, and the other to listen through the telephone to the sounds produced. Both are in electrical communication, and in separate apartments, so that the direct sounds of the taps may not interrupt the listener, whose duty it is to detect flaws. In applying the system, one operator places the telephone to his ear, and while the sounds produced by the taps are normal he does nothing. Directly a false sound, which is distinguishable from the normal sound, is heard, he signals for the spot to be marked, and by this means is able, not only to detect a flaw, but to fix its locality.

All silver mining companies are keenly alive to the present need for bringing down the cost of production to the "irreducible minimum." The uncertain and varying value of the metal demands this of them; and unless they face the question they will be quickly shouldered out of the ranks of profitable producers. In an article in the *New York Times*, giving the history of American silver-mining, with the growth of the production and the temporary checks from declining prices, the author concludes that as transportation facilities and the mining methods are cheapened there will be a constant decline in the cost of silver production; that if the output is checked at 60c. per ounce because a few mines pay, this is probably only temporary; and that the steady reduction in the cost of mining indicates that there is no minimum price below which silver cannot be profitably produced which can be called fixed or absolute. This minimum, in fact, constantly changes, every reduction in the cost of transport and every cent taken off the cost of food and supplies at the mines, contributing towards reducing the cost of putting silver on the market. Electricity, as yet only partly developed, may further cheapen the cost of mining, enabling America to produce silver profitably, not at 60c. per ounce, but at 50c. or 45c. "The repeated congresses gathered to help silver will always fail," says the writer, "because they try to get a certain result from uncertain facts. The only way to control the price of silver is," he adds, "to curtail the production. There is no other way."

EN PASSANT.

In order to meet a large advance sale of the present number of the REVIEW, an additional issue of two thousand copies has been printed. In order to avoid disappointment, readers desiring extra copies should forward their orders at once.

The Cape Breton meetings of the Mining Society of Nova Scotia and the General Mining Association of the Province of Quebec will be remembered as red letter days in the history of these organizations. The attendance was large and representative of the mineral industries of eastern Canada, though it was a matter for regret that the turn out of Quebec members, on account of the busy season at the asbestos mines, was not so large as the strength of the Association and the importance of the occasion warranted. Needless to say, in the hands of the representatives of these two powerful companies, the Dominion Coal Co. and the General Mining Association of London, whose guests the visitors were, the programme was of an unusually interesting and attractive character, and throughout was conducted by princely hospitality. Too much praise cannot be given to those upon whom fell the burden of so lavish an entertainment. Mr. David McKeen, M.P., the genial director of the affairs of the Dominion Coal Co. in Cape Breton, and his energetic associate, Mr. W. Blakemore, were indefatigable in their exertions to show everything worth seeing in the large territory under the control of their company, and to cater to the comfort and pleasure of everyone. Mr. R. H. Brown will be gratefully remembered for the immense trouble he took to entertain a very large party at the old Sydney mines, and the delightful associations with his charming residence at Beech Hill will remain forever green. Captain Gragg and the only Col. Grainger, Mr. Burchell, Mr. C. H. Rigby, Mr. F. C. Kimber, the officers of the Sydney Club and the Tennis Court, also deserve special mention for courtesies extended. Nor must we forget the unstinted hospitality of the fair sex, Mrs. and the Misses Blakemore, Mrs. R. H. and the Misses Brown, Mrs. Rigby and Mrs. Moseley, one and all of whom contributed in no small measure to the success of the meeting by many courtesies and kindnesses extended to the visiting ladies. Indeed, each and every one present on the occasion carry away with them many delightful memories of Cape Breton, and a lively appreciation of its hospitality, its beauty, productiveness and resources.

The Ontario Mining Institute, organized in April last, will hold its first business session at Toronto during the second week in September. Papers will be read by Mr. A. Blue, Director of Mines, Toronto, Prof. W. L. Goodwin, Kingston, Mr. J. Bawden, Kingston, Mr. W. Hamilton Merritt, Toronto, and others. Every effort is being made to make the meeting attractive. As the railways offer special inducements in reduced rates to visit Toronto during "Fair" time, the attendance from the mining districts of Ontario should be large. A full report of the proceedings will appear in our next issue.

The General Mining Association of the Province of Quebec will hold its next Quarterly General Meeting at Sherbrooke, Que., during the last week of September. So many pleasant memories are associated with the outing at Sherbrooke last year, that there is sure to be a large

attendance of members on the present occasion. We understand that an excursion to the Capelton Copper Mines, where members will be the guests of President Blue, and a run to the gold mines on the Du Loup are on the tapis.

British Columbia, the only mining province in Canada, without an association of mineral interests, is now, we are glad to see, moving towards organization, as the following excerpt from a letter from Mr. G. F. Moncton, Vancouver, will show:—

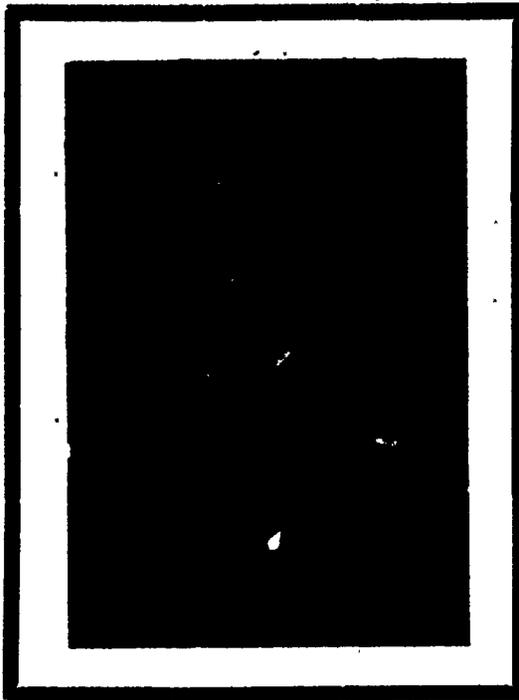
"Some of those here who are connected with mining in various ways are endeavoring to form an association. The matter is at present in a vague form, the idea only having been mooted the other day, as the enclosed letters will show. Will you kindly extend to us the support of your REVIEW which has to so great an extent influenced and assisted the formation of the other mining societies of the Dominion? We hope in two or three weeks to be so far advanced as to be able to call a meeting and form the nucleus of the society."

The Province of British Columbia is making such progress in the development of her minerals that the organization of such an association as those already established in the other provinces of Canada is not only desirable but necessary. Apart from the social advantages such an association would confer upon its members, the publication of papers on the resources and mining practice of British Columbia would be of incalculable value in directing the attention of capitalists to the undoubted field for remunerative investment there exists in the western province. Needless to say, the REVIEW will cheerfully exert itself to aid the new organization in every way possible. In the meantime, it heartily wishes success to the promoters of the organization.

While at Charlottetown, P.E.I., en route to Cape Breton, the members of the General Mining Association of Quebec were startled by the sad intelligence of the sudden death by heart disease of Col. Gustavus Lucke, an original member and Vice-President of the Association. Col. Lucke, who resided at Sherbrooke, Que., was a partner in the firm of Lucke & Mitchell, the well known hardware merchants of that town, and a director in the Beaver Asbestos Company, Ltd., operating at Thetford Mines. In all matters affecting the welfare of mining in the Province of Quebec, Col. Lucke took a lively interest. He was

foremost in the agitation to repeal Mercier's obnoxious Mining Law, and one of the first to sign the roll of the General Mining Association formed at the time. At every meeting and social reunion Col. Lucke's stalwart personality and genial countenance was a familiar figure, and his demise at a comparatively early age will be mourned by the mining men of Quebec and by a large circle of friends. The deceased gentleman was also, we believe, an officer of the Asbestos Club at Black Lake. Almost immediately after the sad announcement, a meeting of the Association was held, at which a resolution was passed expressing sorrow for the untimely death of one so universally esteemed among its members, and tendering to his widow assurances of their most tender sympathy in her bereavement.

"Asbestos," says the *Australian Mining Standard*, "has hitherto been a mineral which has enjoyed the happy, if obscure, fate of prosperity. The fluctuations have not disturbed the market, nor the inrush of huge "parcels" excited speculators. Mine owners have found no difficulty in disposing of their output at a satisfactory return upon capital. Now, however, the position seems likely to be altered, and shareholders in asbestos companies may share the lot of the ordinary mining adven-



THE LATE COL. GUSTAVUS LUCKE
Vice-President General Mining Association of Quebec,
Director Beaver Asbestos Co., Ltd.
Sherbrooke, Que.

Died Sunday, 8th July, 1894.

urer in palpitating over the relationship of supply to demand, and both to dividends. A good deal of interest—not to say jealousy—has been awakened amongst the existing companies by the formation of a private company to work newly discovered deposits of asbestos in Griqualand, Cape Colony. The leading men in this concern are connected with the De Beers Diamond Mines, and the competition of South African asbestos with the Italian and Canadian is not, therefore, likely to weaken through want of sufficient capital. Moreover, it is claimed for this new fibre that its specific gravity is quite 25 per cent. less than the other varieties. Thus, at the same figures, Cape asbestos would be a great deal cheaper than its competitors. Moreover, it does not require any heavy expenditure to mine, as the deposits are nearly denuded, and all that is required is to blast it out of the ground with dynamite and load it into trucks. The Italian and Canadian asbestos mine-owners may, however (says the *London Mining Journal*), find several crumbs of comfort against this threatening competitor. In the first place the cost of transport in South Africa is a heavy item, and then, again, the shipping charges to Europe will fall heavily on the raw material. On the other hand, the consumption of the raw material is extending in all directions. It is used nowadays, we believe, for the filaments in incandescent electric lights, and threatens almost entirely to supersede cement as a material for coating steam boilers. Asbestos mill-board, cloth, &c., also may very likely come into enormous vogue for general packing and other purposes. There ought, therefore, to be plenty of room for the addition of South Africa's production to the existing supply. The position may be changed if it is true, as we hear, that extensive and very valuable deposits have lately been discovered in Italy by persons quite independent of the large capitalists, who have hitherto practically controlled the supply of the mineral. If Italy really possesses mines equal to those of Canada for the workable qualities of the fibre, a revolution may quite possibly be impending in the position of asbestos.

But then Italy doesn't. Further the inferiority of the Cape asbestos in comparison with the Canadian product is so marked that the Canadian operator may regard its production with indifference.

Dr. David T. Day, Chief of the Division of Mining Statistics and Technology has issued his annual volume of the Mineral Statistics of the United States for the year ended 31st December last. As usual a mass of valuable information is given respecting the progress of mining and the industrial conditions affecting the production of minerals in that country. The report is one of the most valuable of the many useful publications issued by the United States Geological Survey and we, in common with a large number of our readers, who constantly refer to it, would be sorry indeed to see it stopped. We have no sympathy with the *Engineering & Mining Journal* which for reasons of its own, personal, professional and pecuniary, would, judging by recent utterances, fain see the work abandoned in favor of its own pretentious but far from reliable annual compilation. Quoting from Dr. Day's work we learn that; "The total value of the mineral products of the United States in 1893 was the smallest since 1889. It represented \$609,821,670, compared with \$688,616,954, in 1892; a decline of 11.44 per cent. In 1892 there was an increase of 30½ millions or 4.67 per cent. over 1891. The decline in value was most conspicuous in pig iron and structural materials, but most other minerals declined in the amount and the value of the product, the exceptions being gold, anthracite coal, aluminum, phosphate rock and gypsum. Bituminous coal showed a slight increase in quantity but the normal increase was checked and the total value was less than in 1891. Petroleum increased in value but decreased in quantity. Salt, quicksilver, and many smaller products increased in quantity but shared the usual decline in value. This general decline was attributed to the financial depression and the consequent decreased consumptive demands. It was only conspicuous during the last half of the year, as considerable time is necessary for affecting the mining industry, and as it is correspondingly slow in recovering, its effect will be equally pronounced in 1894."

The mica mining industry of the United States has been in an unsatisfactory condition for a number of years. In 1884 the production amounted to 147,410 lbs. valued at \$368,525. In the following year it fell off to 92,000 lbs. valued at \$161,000 and in 1893 the product was only 40,000 lbs. value \$70,000. In 1887 the production increased somewhat, but again declined, and from then until 1891 the value of the product did not exceed 75,000 lbs., valued at \$100,000. In 1893 the product is estimated by E. W. Parker (U. S. Geol. Survey) to have been

51,111 lbs of cut mica worth \$80,629, and 156 tons short scrap or waste mica worth \$8,300 making the total value of the output \$88,929. During the year ended 31st December last, mica to the value of \$147,927 was imported.

Asbestos as an industry in the United States practically does not exist, the total product for 1893 only amounting to 50 short tons valued at \$2,500 at the mines. This output was confined to the State of California. In the same period Canada produced 6,473 tons of a value of \$313,806. The exports from Canada to the United States amounted in 1891 to 7,022 tons, valued at \$513,909 and in 1892 to 7,316 tons valued at \$514,412. The value of the asbestos imports by the United States during the year ended 31st December last was of crude \$175,602 and manufactured \$9,403 or a total import of \$185,005.

In a paper on the origin of gold nuggets, read before the Royal Society of New South Wales, Mr. Liversidge gives a summary of the various theories which have been put forth to account for the existence of alluvial gold other than "the old and accepted one," that it had been set free by processes of disintegration. He also gives details of a large number of experiments made with a view to determine whether a nucleus of gold immersed in a gold solution and in the presence of such substances as would be likely to occur in nature will increase in weight, and he concludes that gold is deposited when the nucleus is in contact not only with metalliferous sulphides and arsenides which form strong galvanic couples, but also with such substances as iron oxides, charcoal, graphite, sandstone, granite, quartz, clay and marble, which form but weak galvanic couples with the gold nucleus. He questions whether the common assertion as to the greater fineness of nugget as compared with course vein gold has any foundation in fact. With fine alluvial gold there is such a difference, but this he thinks results from the removal of silver and other impurities by solution owing to the larger relative surfaces exposed. Discussing the question of solutions of gold in natural waters—although absolute chemical proof is still wanting—because it is found in recently formed pyrites, &c., where it must have come from solution. Furthermore, the author urges that large nuggets could be artificially produced by following the methods used in his experiments, and believes that gold is probably being so deposited at the present day. However he did not believe that the large nuggets have thus been formed *in situ*, although gold grains and dust may have been appreciable thus enlarged.

A recent letter from the Rainy Lake gold district, Ont., says: "The whole place is full of prospectors and claim jumpers, and one has to watch every move he makes. Prospecting is being done on a wholesale plan. There are six parties out at present who are playing the hog in every way. To give you an idea of how they work, I will describe one party, a man from U. S. A. He has two surveyors, fifteen prospectors and three or four Indians. This party has already surveyed over 50,000 acres. Although he has not paid for this, yet he holds the ground for one year, and as soon as any other party applies for any location within these 50,000 acres, buys it up and in this way really gets other men to prospect his land for him. There are five more like him—besides there are dozens of other small parties." This looks like a matter for the jurisdiction of the Director of Mines. The wholesale acquisition of lands by speculators is contrary to the letter and spirit of the Mines Act.

A mining exhibition is at present being held at Freiburg, Germany. A few days ago an interesting competitive trial took place between two types of rock drills, *i.e.*, the "Heise" and the "Thomas." The trial consisted in boring a block of sandstone 56 c.m. thick. Including the fixing of the bore frame and the changing of the drill, the "Thomas" machine is said to have occupied five minutes, while the "Heise" machine performed the work in less than four minutes.



SUMMER MEETING

OF THE

General Mining Association of the Province of Quebec.

En route to Cape Breton the members of the General Mining Association of Quebec held their summer meeting in the saloon of the steamer "Bonavista," on Monday evening, 9th July. Mr. John Blue (Eustis Mining Co.), President, in the chair.

THE DEATH OF COL. LUCKE.

THE CHAIRMAN—Before proceeding with the regular business of the meeting, I will ask your permission to make a few remarks regarding the sad event of which we received intelligence this morning. I refer to the death of our esteemed member and Vice-President, Colonel Lucke, of Sherbrooke, who was known to you all as a most active member, having been one of the first of the Association, and a member also of the Council for two or three years. He took a great and energetic interest in all our proceedings; so much so, that he never allowed himself to be absent from a meeting, this present one being the first unattended by him.

He would have come with us upon this excursion had it not been that his personal friend and fellow director in mining enterprises, Mr. Jas. Mitchell, was one of our party; and you understand that both gentlemen could not leave their business at the same time.

We are all aware of, I am heartily glad to say, the many good qualities and qualifications for which Colonel Lucke was esteemed and honored by everyone. His genial disposition, and his heartiness of manner endeared him to all who had the pleasure of coming in contact with him; and these qualities, in addition to his business abilities, make his loss felt keenly in the community in which he lived.

We shall miss him from our meetings more than I can say, and from the position which he filled with such great credit to himself and the Association for so many years. The sad news we have received has dampened the enjoyment of our trip; but we must try and be philosophical and remember that such has to be the end of all. We have to do the best we can to fill the Colonel's place, and that is said in no disparagement of whoever is elected in his stead.

Our Secretary has drawn up a resolution of condolence, which I will ask him to read.

THE SECRETARY then read the following motion which was unanimously adopted:—

"The members of the General Mining Association of the Province of Quebec having learned with profound sorrow of the untimely death of Colonel Lucke, of Sherbrooke, an original member and an esteemed vice-president of the Association, be it resolved: That a minute be entered in the proceedings of the Cape Breton meeting recording appreciation of the work and services of Colonel Lucke; and that the Secretary be instructed to convey to Mrs. Lucke an expression of sympathy and condolence in her bereavement."

THE SECRETARY then read the minutes of a meeting of the Association held on board the Steamer Bonavista on the evening of the 7th July, 1894.

ELECTION OF MEMBERS.

The following gentlemen were declared elected as members of the Association:—Mr. A. Sangster, proposed by Mr. John Blue, and seconded by Mr. Jas. Mitchell; Mr. J. W. Woodside, of Sherbrooke, proposed by Mr. Jas. Mitchell and seconded by Mr. John J. Penhale.

PAPERS READ BY TITLE.

THE SECRETARY moved: "That the papers of Mr. E. D. Ingall, on the Silver Deposits of West Kootenay, B.C., and Mr. H. J. Williams, on the Canadian Slate Industry," be read by title in the meantime, in the event of there not being sufficient time for them to be read in full at Sydney."

The motion was adopted.
THE SECRETARY then read the following motion, which was unanimously adopted:—

VOTE OF THANKS TO CAPTAIN FRASER.

"That the very hearty thanks of the Association be tendered to Captain Fraser,

the officers and men of the Steamer Bonavista, for the uniform courtesy that has characterized their unremitting endeavors to cater to the comfort and pleasure of members during their excursion to Cape Breton."

THE ILLNESS OF THE PAST PRESIDENT.

MR. JOHN J. PENHALE moved: That a telegram be sent to the Hon. George Irvine, Q.C., enquiring as to his condition of health, and expressing regret at his inability to accompany the members of the Association upon the present trip. The motion carried.

THE NEXT MEETING.

It was then unanimously adopted that the next general meeting of the Association be held in Sherbrooke on Thursday and Friday, the 27th and 28th September next, 1894. Also: That a local committee, consisting of Messrs. John Blue, John J. Penhale, James Mitchell, F. A. Halsby, F. P. Bucke, and E. B. Haycock, be constituted to make arrangements for said September meeting. The motion carried.

INVITATION FROM CARRIERE LAINE AND CO.

MR. J. T. DWYER—I may say that I was requested by Messrs. Carriere Laine & Co. to convey to the members of the Association upon the trip, an invitation to visit and lunch with them at their works at Levis, and see there, under their guidance, the various points of interest.

It was then decided that the Secretary should telegraph or write Messrs. Carriere Laine & Co. from Sydney, expressing to them the sincere thanks of the members of the Association, their regret at being unable to accept the invitation upon the present occasion, and their hope that they might be able to avail themselves of the goodness of Messrs. Carriere Laine & Co. at a future and more convenient date if the invitation of those gentlemen would then be good.

The meeting was then declared adjourned.

FEDERATION.

Representatives of the Nova Scotia, Quebec and Ontario Mining Associations Resolve to Federate — A Canadian Mining Institute to be Formed.

A united meeting of the members of the Mining Society of Nova Scotia and the General Mining Association of the Province of Quebec, was held in the Sydney Hotel, Sydney, on the evening of Thursday, July the 12th, 1894.

MR. A. W. STEVENSON, General Mining Association of the Province of Quebec, in the Chair.

MR. H. M. WYLDE, Mining Society of Nova Scotia, moved: "That the Mining Society of Nova Scotia and the Mining Association of Quebec, do hereby federate; and that a committee composed of the president and three members of the Society and Association respectively, be appointed to meet and draw up a basis of federation."

The motion was seconded by Mr. A. Drysdale and carried without a dissentient vote.

MR. JOHN J. PENHALE, Quebec Mining Association, then moved: "That the

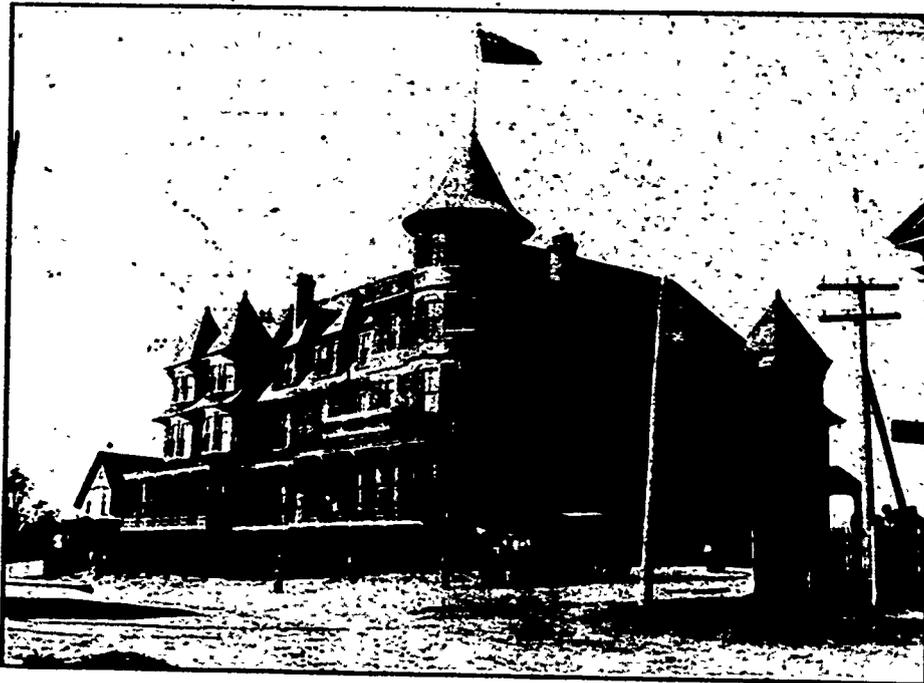
Ontario Mining Institute be invited to join in the federation, and that the federation be known as the Canadian Mining Institute; and also that they be asked to call a special meeting of their institute and appoint their president and a committee of three members to act in conjunction with the presidents and committees of the Nova Scotia Mining Society and the Mining Association of Quebec, in drafting a constitution to govern the Canadian Mining Institute."

The motion was seconded by Mr. D. W. Robb, Amherst, and carried unanimously. The meeting was then declared adjourned.

During the Convention of the National Association of Fire Engineers held recently in Montreal, Mr. Ed. Wertheim, of Chicago, one of the principals of the American Asbestos Company, read a valuable paper on the uses of asbestos for fire purposes, which we have pleasure in reproducing in another place. One of the features of the Convention was a practical demonstration of the service asbestos may be made to play in saving life from the flames. A frame building, erected at the back of the Victoria Skating Rink, was set thoroughly on fire, and Mr. Wertheim, clothed in an asbestos suit made at his works in Germany, from Canadian fibre, the eyes of which were faced with mica, entered the burning building and remained among the flames for several minutes, at the same time giving an exhibition of the practical utility of asbestos fire-proof roping for ladders, etc. The experiments were highly satisfactory and greatly pleased the large assemblage of fire chiefs.

The outlook for Canadian phosphates appears somewhat encouraging when we learn that one of the largest producers of fertilizers in the world, has given instructions to their representative on this side to be ready to resume mining at any moment.

A meeting of the Council of the Asbestos Club was held at the Club House, Black Lake, on 30th instant, when a number of delinquent subscribers were beheld.



SYDNEY HOTEL,

Headquarters of Mining Societies, Cape Breton Meeting, July, 1894.



David McKeen, Esq., M.P., Glace Bay, C. B.,
Resident Manager, Dominion Coal Co.



Quarterly Meeting of the General Mining Association of the Province of Quebec, 6th July - Proposition to Federate Discussed and Adopted.

A meeting of the Association was held on the Steamer Bonavista en route to Cape Breton on Friday evening, 6th July. Mr. John Blue, President, in the Chair.

THE SECRETARY read the minutes of the Annual General Meeting and of the Council Meeting held at Sherbrooke, Quebec, 12th April, which were confirmed.

ELECTION OF MEMBERS.

The election of Mr. Cecil H. Bowen, of Sherbrooke, to membership, was confirmed.

FEDERATION.

THE SECRETARY reported that in accordance with resolution passed at annual meeting, he had attended and submitted the views of the Association respecting a federation of existing Canadian mining organizations at the Annual Meeting of the Mining Society of Nova Scotia, held at Halifax in March, and that after favorable discussion the matter had been referred to a committee of the Society for report on a scheme. He had since received the Committee's report as follows:—

REPORT OF THE MINING SOCIETY OF NOVA SCOTIA.

"In the matter of Federation of existing mining societies or Associations, it was agreed:

1. "That in so far as the subsequent paragraphs are concerned, it is deemed desirable that all existing mining associations or societies in Canada should be invited to join;

2. "That all members of such organizations should become *ex officio* members of the proposed Canadian Mining Institute."

3. "That each organization should pay annually to the funds of the Canadian Institute a sum per head of its membership to be hereafter agreed upon;

4. "That the first and main *raison d'être* of the Canadian Mining Institute should be the printing and publishing in one volume, under one editing, of all the transactions of each such organization, thereby relieving the local organizations of this matter and expense entirely; the expense being met by the *per capita* contribution to the funds of the Canadian Mining Institute.

5. "That it is not desirable to have, or attempt to have, any large body of officials for the Canadian Mining Institute, but rather that such business as may arise should be transacted by a small body or committee, to be composed either: (a) Of the several Secretaries to the local organizations; or (b) of one specially elected delegate; or (c) of a specially elected delegation, based on one member per so many members, for each local organization;

6. "That the committee, or governing body, so constituted, should appoint or elect one individual to act as secretary-treasurer and editor of the Canadian Mining Institute;

7. "That each local organization preserve, to the utmost extent, its autonomy and individuality."

SUGGESTED AMENDMENTS.

It was then resolved that the Association recommend in addition to the report, the following amendments:—

1. That the managing board of any Federated Canadian Mining Institute, consist of the presidents of the associations in the federation, together with one member from each such association, and that these shall be empowered to appoint a chairman and a secretary-treasurer;

2. That there should be a united meeting of the whole members of the federated associations once a year.

3. That the cost of the publication of the Federated Institute's Transactions and the means of defraying the same be left in the hands of the governing board.

TREASURER'S REPORT.

The Treasurer reported that the note for \$600, made in January to defray the cost of the Association's volume of Proceedings for the years 1891-2-3, had been reduced to \$100, and that there was sufficient funds outstanding and incoming to clear the Association from debt and leave a good balance.

This being all the business the meeting adjourned.

Shipments from the Silver King—The *Times* (London, Eng.) of July 7 last, has the following: "Two trial shipments of argentiferous copper ore from the Hall mines, British Columbia, have been made. One, of first grade ore, assayed at Swansea, 146oz. silver and 12½% copper to the ton of 2,240lbs., and the other, of second grade ore, assayed at Denver, Colorado, 93'03oz. silver, 0'13 gold, and 10'9S. copper per ton of 2,000lbs. The development work at the mine is being vigorously pushed forward.

Sudbury Nickel Mining—Reports from this district indicate a better outlook. The output of the Copper Cliff, Evans, Murray and Worthington mines is over 400 tons a day, and the three smelters are going full blast the whole time, though the railway strike in the United States threatened to necessitate the temporary closing down of some of the smelters for want of coke. The Travers mine in Drury is still in liquidation, but it is reported that arrangements are being made to recommence work. The development work on the Duluth mine in Trill is progressing well, and a waggon road is being opened from Worthington station to it. This new company proposes to introduce the Emmens process, thus described in *Mineral Industry*: "To replace the ordinary roast heaps and smelters, by weathering floors, a low roasting furnace and lixiviation tanks." At the Stobie mine, which has heretofore been worked by an adit in the side of the hill, a vertical shaft is being sunk. This is the largest deposit of nickel ore so far opened up in this district.



Meeting of the Mining Society of Nova Scotia, at Sydney, C.B.

The midsummer meeting of the Mining Society of Nova Scotia was held at Sydney, Cape Breton, on Tuesday evening, 10th July. There was a large attendance including the visiting members of the Quebec and Ontario Mining Associations, and prominent citizens of the town of Sydney.

Mr. John E. Hardman, West Waverley Gold Co., president, in the Chair.

The following were elected to membership: Mr. Geo. E. Boak, Halifax, Mr. Dick, M.E., Halifax, and J. T. Burgess, Halifax.

The meeting then proceeded to consider the following papers which are fully reproduced elsewhere in this issue:—

1. "The Organization and Development of the Dominion Coal Co.," by Mr. John S. McLennan, Boston.

2. "Notes on the Geology of the Sydney Coal Field," by Hugh Fletcher, B.A., Ottawa.

3. "The Introduction of Endless Rope Haulage into Cape Breton and Method of Laying Out a New Plant," by W. Blakemore, M.E., Glace Bay.

4. "The Railroad System of the Dominion Coal Co.," by H. Donkin, C.E., Sydney.

5. "The Sinking of Dominion No. 1 Shaft," by John Johnstone, Superintendent International Colliery.

Mr. H. S. Poole, seconded by Mr. C. Fergie, moved a vote of thanks to the contributors of papers, and the meeting adjourned.

THE BANQUET AT SYDNEY.

MR. DAVID MCKEEN, M.P., ENTERTAINS THE MINING SOCIETIES AND A DISTINGUISHED COMPANY IN THE SYDNEY HOTEL.

On Wednesday evening, 11th July, Mr. David McKeen, M.P., the genial popular General Manager of the Dominion Coal Company, Ltd., entertained the members of the visiting mining societies and a distinguished company to dinner in the new Sydney Hotel.

Shortly after eight o'clock, Mr. McKeen took the chair, having on his right His Lordship, Bishop Cameron, and on his left the Hon. W. S. Fielding, Premier of the Province. At the head of the table were seated: His Honor Judge Dodd, Sydney; Senator McDonald, Mr. H. S. Poole, General Manager (Acadia Coal Co.) Stellarton; Mr. John Blue, (Eustis Mining Co.), President General Mining Association of Quebec; Dr. Smith, Canon O'Donnell, Rev. Father Quinlan, Dr. McKay, Mr. R. H. Brown, General Manager General Mining Association, Ltd., Old Sydney Mines, and Dr. E. Gilpin, Deputy Commissioner and Inspector of Mines for Nova Scotia.

At the other tables respectively, presided over by Mr. John E. Hardman, S. B., President of the Mining Society of Nova Scotia; Mr. C. H. Rigby, Sydney; and Mr. F. C. Kimber, Sydney; were: W. Blakemore, M.E., Glace Bay; Dr. Murphy, City Engineer, Halifax; Hugh Fletcher, B.A., Ottawa; W. Hamilton Merritt, F.G.S., Toronto; Graham Fraser, New Glasgow; J. D. McGregor, M.P., New Glasgow; R. E. Chambers, Ferrona; C. Starr, Halifax; Jas. Baird, Joggins Mines; F. H. Mason, Truro; John Anderson, Musquodoboit Harbor; J. Hearne, Sydney; Mr. Naismith, B.A. Sc., Supt. Railways, Dominion Coal Co.; J. R. Blackett, Glace Bay; Dr. McGillivray, Sydney; J. M. Reid, Musquodoboit; Jos. Austen, Halifax; Mr. Nissen, Halifax; Mr. McEachen, Sydney; D. Burchell, Glace Bay; A. Drysdale, Halifax; Dr. McGregor, Sydney; Dr. Dodd, Sydney; Mr. Bertram, North Sydney Herald, North Sydney; J. T. Dwyer, Montreal; Mr. Price, Halifax; A. Sangster, Sherbrooke; A. M. Evans, Cow Bay; John J. Penhale, Black Lake; Mr. Boak, Halifax; J. D. Sword, Halifax; H. M. Wylde, Halifax; G. E. Francklyn, Halifax; W. Blakemore, Glace Bay; Rev. Mr. Forbes, Sydney; Capt. Isaac P. Gragg, Boston; C. G. Rogers, Ottawa; B. C. Wilson, Waverley; J. G. S. Hudson, Glace Bay; Harry Williams, Theford Mines, Que.; D. W. Robb, Amherst; W. R. Thomas, Montagu; E. D. Ingall, A.R.S.M., Ottawa; A. W. Stevenson, Montreal; W. A. Allan, Ottawa; E. T. Moseley, Sydney; Dr. Fraser, Sydney; Rev. W. Chisholm, r. Tyler, J. Johnson, Rev. Mr. McLashen, Jas. Purvis, T. Routledge, Sydney; Chas. Fergie, Westville; J. Burchell, Sydney; Mr. Nicholson, Glace Bay; M. R. Morrow, Halifax; Chas. Archibald, Halifax; John Rutherford, Stellarton; C. Chisholm, Sydney; W. Crowe, Sydney; H. Mitchell, Bridgeport; I. McVey, Reserve Mines; Capt. Worgan, A. McDonald, H. Rigby, Dr. Johnson, J. Revere, C. E. Willis, Halifax; B. McKeen and others.

THE QUEEN, AND PRESIDENT OF THE UNITED STATES.

Her Majesty's health was drunk with a patriotic enthusiasm that would have made the old Greeks envious. The name of Captain Isaac P. Gragg, of Boston, was coupled with the toast of the President of the United States.

CAPTAIN GRAGG—It gives me indescribable pleasure to respond to the toast of President Cleveland; but to illustrate my unfitness in this regard, I shall tell a short story: In a Western camp of mining desperadoes, a quarter of a century ago, a fight broke out during an evening carousal. Revolvers were rampant, and a young man, a great favorite, was killed; and that, too, by his best friend, who had intended the deadly shot for another. The circumstance sobered the party, and they carried the body down the canyon to the little log cabin where the dead man had lived. They knocked at the door, and the widow of the victim of the brawl appearing, the leader said, "Madam, we have killed your husband. He was the wrong man. The joke's on us!" And so, gentlemen, the Chairman, in shooting around "promiscuous like" for a proper individual to respond to this toast, shot the wrong man. The joke is on you! (Laughter.)

I believe that English speaking people, whether represented by Her Majesty the Queen, or by her appointee the Governor General, or by the President of the United

States, have faith that through such representation is presented the basis of good English law, in the application and enforcement of which lie all the enjoyment of education and prosperity and progress. Therefore, in responding to this toast, I do not think that I can refer more fittingly to Mr. Cleveland and the common interests binding English speaking people together, than by referring to the fact—so far as telegrams received to-day assert—that Mr. Cleveland has risen to the occasion as the representative of law and order and their enforcement in connection with the troubles in the United States. (Applause.) Perhaps I may still further and more emphatically refer to this common interest, standing as I do upon Canadian soil and under the flag of England, by presuming to say that this province and more especially this locality is receiving to-day some co-operation and benefit, I trust from American capital, and from American energy and business men. (Applause.)

THE GOVERNOR GENERAL AND HOUSES OF PARLIAMENT.

HON. SENATOR McDONALD—In responding to the toast of the Governor General of Canada, said: I thank you very much for the manner in which you have received this toast. As the only member of the Upper House here to-night, I may say the present Governor General is one of the most popular representatives of Her Majesty we have ever had, if indeed not the most popular. His career in the Old Country and in Ireland gave warrant for anticipating his popularity with ourselves; and time has fulfilled our anticipations. With regard to the Senate it serves its purpose in the Dominion. It is composed of eighty gentlemen, many of them old men. Perhaps I am one of the youngest. It is a very healthy place; and those who get there live to a great age. I am sorry to say two of our Senators died lately, one at the age of ninety and the other at eighty-six. I think that is about the average. Regarding the House of Commons, I am sorry to say it is not so healthy a place as the Senate. You will best appreciate that truth when I say that the members of it are at present engaged in their parliamentary duties with the thermometer at about one hundred degrees in the shade. These gentlemen—as if their routine duties were not a sufficient burden—are constantly tormented by their friends from the various constituencies, who want breakwaters and bridges and things of that sort. So that the House of Commons is an unhealthy place. However, those who have good constitutions can pull through, and of course they are all desirous and hopeful of some day getting into the Senate.

THE GOVERNMENT OF NOVA SCOTIA.

THE CHAIRMAN—In proposing the health of the Local Government and of the Lieutenant Governor of Nova Scotia, said: In this connection I am glad to have the honor of being able to mention the name of the Premier, the Hon. Mr. Fielding. I am sure you are all pleased to see him here to-night. I think the name of Mr. Fielding is deserving of more than passing notice, especially on an occasion of this kind. Mr. Fielding has been obliged to take the responsibility of being instrumental in forming the Dominion Coal Company of which there are a great many representatives around this board. The Dominion Coal Company, I take it, had more or less to do with the erection of this hotel; and without the hotel I think it would have been almost impossible for us to have this gathering. No other building in Sydney would have been able to accommodate so many representatives from different parts of Canada. Hence it is, I think you will agree with me, that this gathering is due more or less to our honorable friend the Premier of Nova Scotia.

HON. W. S. FIELDING—I thank you very warmly indeed for the more than kind terms in which you have proposed this toast, and for the way it has been received. I am sure that if the Lieutenant Governor were here to-night, it would afford him great pleasure, and he would appreciate the reference made to his name. I am very glad to be able to say that in connection with the welfare of this country he is manifesting a very warm interest. The toast of the local government is of a compound nature. It is of a personal and also of a broader character. As personal, I on behalf of my colleagues and myself appreciate sincerely the very warm references made. In the broader spirit you toast the local government not because you honor the men who hold office, but because the local government represents the law and order which are the foundation of Society and represent the Anglo-Saxon race.

There is a tendency to underestimate the value of the local government and legislature. There was a time when many able men doubted whether it was wise to have other than one government and one legislature for the whole country. I rejoice to say that it was recognized that such a policy would be a mistake; and so we have a distribution of legislative power—a distribution of power that is important. And if our friends of the Dominion Parliament two of whom sit on my right to-night, are disposed to magnify the importance of their office, I am glad to say that whenever we meet the Mining Societies then the local legislature comes on top, for what could you do without the local government? (Cheers.) If you want to get down to the business of mining, you have got to come up to the local government at Halifax and take off your hat! (Hear, hear.)

Now, without underestimating the things done at Ottawa, it is a fact that within the functions of the local legislature there is room for great and good work; and I trust there will never be a time when the people will fail to take a warm interest in the affairs of the local legislature and the sending to it of proper men to discuss its questions, none of which are more important than that relating to mines and minerals.

I realize the fact that this enterprise has been like nearly everything that may arise under our system of party government; a matter of honest difference of opinion which appertains to party strife. Our party system of government has its advantages and disadvantages. One disadvantage is that when a measure of importance such as that relating to the organization of the Dominion Coal Company is presented, we are all prone to look at it in a biased way. But the advantage is that if it proves it is able to stand the test of party strife put upon it, and comes therefrom whole, there must be some good in it. I do not question the motive of any man who says the scheme was a bad one. I respect his judgment as I would ask that my own be respected. Yet every hour I spend in the County of Cape Breton confirms my judgment. I affirm this scheme was a good thing for Cape Breton. (Loud applause.) I do not imagine it is perfect. You must not expect perfection—even from such a good government as exists at Halifax. I know it is true that in matters of this character personal interests and local interests will suffer. But making an allowance for them all—and they are incidental to every great enterprise—I am persuaded that upon the whole the scheme of organization of the Company was for the benefit of Nova Scotia. It has received the approval of the government and legislature whether it deserved it or not. It has received the approval of the mass of the people of Nova Scotia, and is now arrived at a stage that is beyond any party strife.

If when you come into the County of Cape Breton and wish to see the monument of the financial promoters of this enterprise, you have but to look around you! I have faith in the enterprise, which these gentlemen undertook, for one simple reason; and that is, that from the beginning to the end I viewed it as a business enterprise. (Applause.) I never supposed that Mr. McKeen had any idea of entering the company from a spirit of benevolence or that Americans came for their health. They realize that the progress of the age is such that many things which were conducted in a small way can no longer be conducted in that way; and that if we are to keep pace with the times, we must have capital, regardless of nationality. (Applause.) We must welcome it from whatever

source it may come. And so long as it conduces to the development of the resources of Nova Scotia, let us all welcome it. Let us hope that as time rolls on we will be able to understand these things better; and that no occasion will arise in the future for making this matter one of party contention. We shall be able to see the benefits of this scheme, whatever may be said to the contrary, if we have one object in view—the benefit of Nova Scotia! (Hear, hear.) A word respecting my friends of the Mining Society. It is not the first time I have had the pleasure of being among them; but though I have had pleasant times indeed with them, on no occasion have I experienced greater delight than on the present. I have to thank you all again most cordially for the kind words you have spoken on behalf of the Lieutenant Governor the Government and the Parliament of Nova Scotia. (Loud applause.)

DR. MCKAY—As representative of this county, it affords me much pleasure to address the members of the mining societies on this their first visit to the County of Cape Breton. Cape Breton is the geologist's paradise. I think some one has said that four square miles of the earth is sufficient to employ a scientific man for the whole of his life time; and if that be true, we have in Cape Breton sufficient area of an interesting character to employ the members of the societies of the Dominion of Canada for the natural period of their lives. I think we can give you various geological forms which would employ your time during the natural period of your lives. If this is the first occasion we have had of meeting you, I trust it will not be the last. We are heartily glad to have you come to this county; and as a representative of it I am sure I express the feeling of the people when I say it is a red letter day for us. There was a time in the history of this country when our mining affairs were at a very low ebb. And there are those who will tell you that we are a people without ambition—a people incapable of improving what is within their reach. I give that a most emphatic and indignant denial. (Applause.) Our country produced men who have given you what you have seen around you. (Applause.) It has produced a McKeen—it has provided those men who have in turn produced order and prosperity out of chaos. When they saw confusion, these men at the head of mining affairs in Cape Breton took these mining institutes and built them up, and produced what you have seen through the mines. And, sir, I say that when I hear that we have no enterprise, no energy, I say you must go back to the time when mining operations were more difficult—you must look back to the men who were the backbone and sinew of the mining industries of the time and of Cape Breton!

THE QUEBEC MINING ASSOCIATION.

The next toast was that of the General Mining Association of Quebec and the Mining Institute of Ontario, coupled with it the names of Mr. John Blue, Capelton; Mr. B. T. A. Bell, Ottawa; and Mr. W. Hamilton Merritt, Toronto.

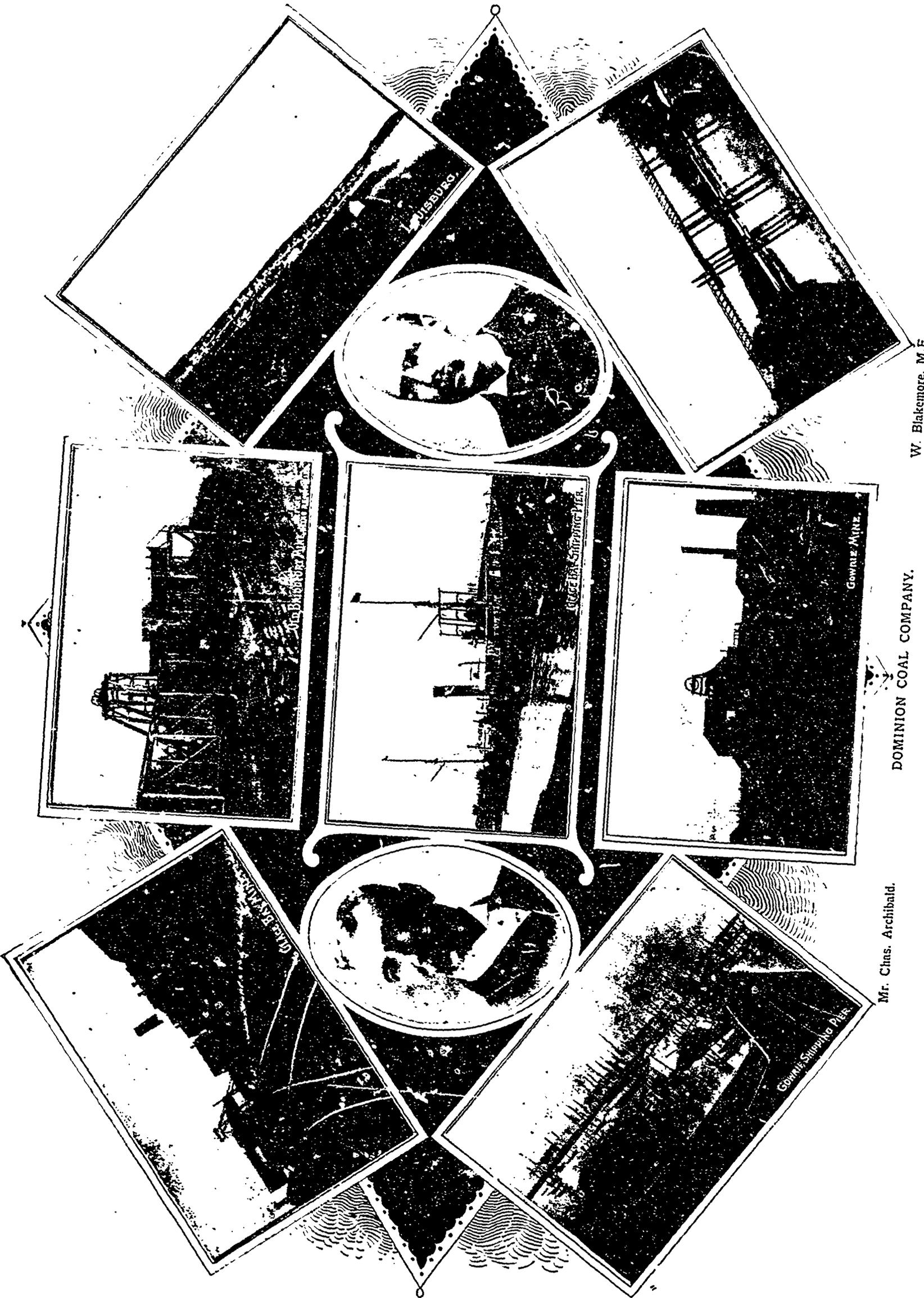
MR. JOHN BLUE—I thank you most cordially for the toast given. You have met and welcomed and treated us in a manner that it would be impossible for us to forget. You most assuredly have learned the art of entertaining, which, coupled with your warm native hospitality, is irresistible. When we come again, as you have so cordially invited us to do, we hope to be able to come in greater numbers, and that we shall enjoy ourselves literally as well as in anticipation goes without saying. As to the mining interests of our province, I regret to say they are not at the present moment in a flourishing condition. In the western part of the province the phosphate industry is practically in a state of collapse. And this, too, in the face of the fact that the Buckingham district has the richest minerals of the kind in the world. We are hopeful of better times, and that they may come soon. In the same region mica has been worked more or less on a small scale; but a little mica goes a long way. Coming farther east, the district where we mine pyrites, associated with copper and silver, the market is in very little better condition. We still keep working, but have come to the conclusion that our ore is of more value in the mine than in the market. The bright spot in the gloomy prospect is Asbestos; and in this, I am glad to be able to say, a considerable improvement has been made of late, especially regarding demand. Prices are not improving very much; but as long as the demand continues, we may hope that the prices themselves will improve shortly. In the same district there has been a new find which has created a little excitement, and which we hope may be a very profitable industry. This we have found to be chronic iron; and shipments are being sent to the United States at a good margin of profit to the operators.

As far as our Association is concerned, I am proud to say, that notwithstanding all the conditions I have referred to, we still exist; and not only do we exist, but we are growing steadily and accomplishing good work for our province. We are to-day numerically stronger than ever; and are in a better condition financially, and beginning to be known and recognised; and that means power and influence in our province. We have a good deal to thank our worthy Secretary for. We have to thank him in a great measure for our success. Mr. Bell has been indefatigable in his exertions on our behalf. I might say, too, that he and I as a combination are pretty well known, that is, wherever the English language is spoken. I do not mean to insinuate that our names are likely to go down to posterity for heroic deeds or words or works; but I venture to predict that the blue-bells of Scotland will live in song forever. (Applause.)

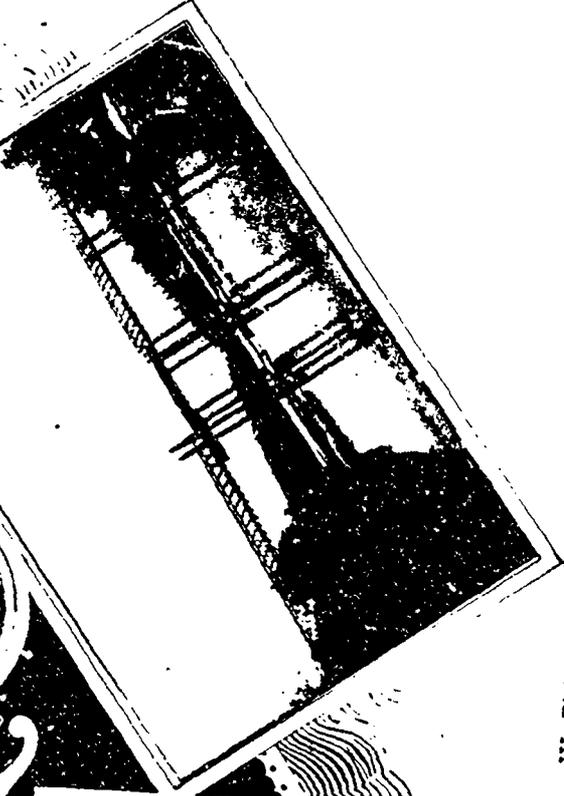
MR. B. T. A. BELL—I feel that after what has been said by our esteemed President, any further remarks from me at this hour would be presumption and a trespass upon your good nature. But I will say this: That we appreciate to the full the unbounded hospitality that has characterized the proceedings of this most interesting and enjoyable meeting, and that we are deeply sensible of the efforts which have been made so successfully to entertain us in a truly royal manner. I am sure I not only voice the sentiments of each member of our Association present, and none the less so of those who were so unfortunate as to be unable to come, when I say we hope, at no distant date, to be able to reciprocate in some measure at least, the attentions and courtesies that have been showered upon us. We will carry back with us an unyielding memory of your genial hospitality, your beautiful country, its productiveness and unbounded mineral resources.

MR. HAMILTON MERRITT—I rise with mixed feelings at this hour of the evening. After such a magnificent feast as we have partaken of, it would be difficult to rise otherwise. But the sensation which preponderates is one of gratification at the honor done me in asking me to respond to this toast. The other feeling is one of mild resentment at the annexation which has taken place between Ontario and Quebec. I am an Ontario man, and represent—so far as I can represent an institution which is the guest of another institution—the Ontario Mining Institute. And I may say I thank cordially the Quebec Mining Association for allowing me to be indirectly a guest at this banquet; and on behalf of the Ontario Mining Institute, my thanks can scarcely be put in fitting words. Our Mining Institute in Ontario, which also has been set well going chiefly through its indefatigable Secretary, Mr. B. T. A. Bell, is very young; but we hope that some day it will safely arrive at a mining of importance. We are here in a humble way to learn what we can of the mining operations, which sturdy industry and ability have brought about in this Canada of ours, and of which Canadians in all provinces are proud. Those of us who take an interest in Canada feel very proud indeed of the mining operations of Nova Scotia, which have been brought to such a high state of perfection. (Applause.)

Owing to the unavoidable absence from the room of President Hardman the toast of the Mining Society was not responded to.



LOUISBURG



W. Blakemore, M.E.

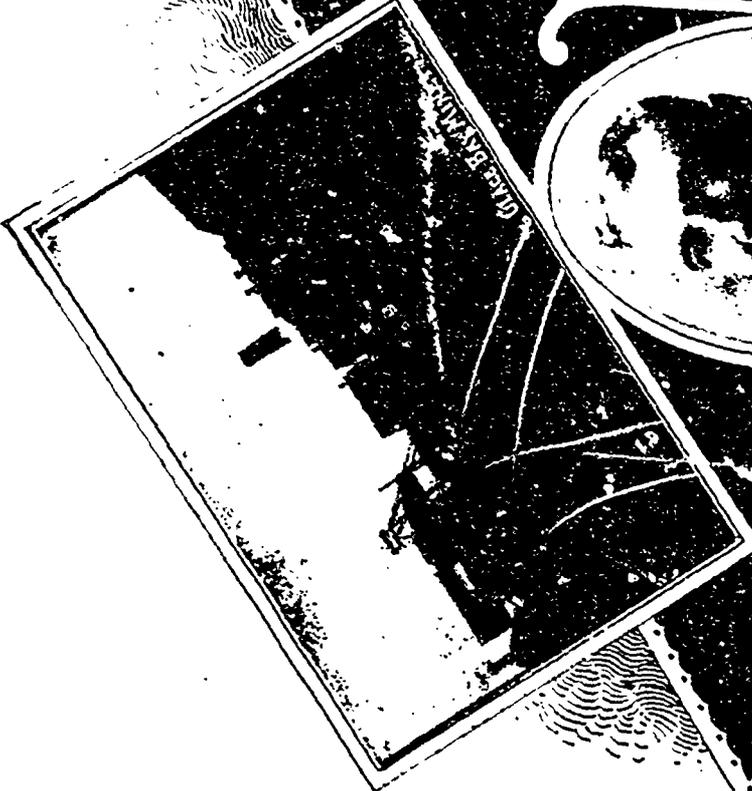


COASTAL SHIPPING PIER



GOWRIE MINE

DOMINION COAL COMPANY.



GLASSBORO

Mr. Chas. Archibald.



GOWRIE SHIPPING PIER

THE LADIES.

Mr. F. C. KIMBER, responding to the toast of the ladies said—About a month ago I was invited here to the inaugural dinner of the Sydney Hotel; and I was further and more highly honored by being called on to respond to the ladies' toast. The occasion being a festive one and unusual, I broke through my usual habit and invested a very considerable proportion of my previous month's salary in a bottle of champagne; and under its influence the barrier of my natural reserve melted away; and encouraged, moreover, by a benign and almost fatherly smile which I observed illumined the countenance of the gentleman whose honored guests we are this evening, I boldly stated that if in the exercise of that gentleman's wisdom he could not see fit to increase my salary to enable me to start a small and very modest establishment of my own, it would not be my fault if I remained for an indefinite length of time a bachelor. (Laughter.) Gentlemen, I regret to say, and you will regret to hear, that my pathetic appeal has so far not resulted in the materialization of my wishes. (Laughter.) Not because of lack of opportunity, either; for on the morning following the event I have referred to, I had the pleasure of standing side by side with the resident manager of the Dominion Coal Company. He was good enough, with that grim humor which is characteristic of the gentleman, to compliment me on what he was pleased to term my "essay on woman" of the previous evening; but he was careful, gentleman, to repress any generous impulse. (Laughter.) I have watched the mail day by day since with increasing anxiety, but with ever lessening hope; and I may add that my expectations have sunk below zero. But although, through man's inhumanity to man, I am compelled, hopelessly, to a life of miserable loneliness, I am always ready to respond to the toast of the ladies, and any other service in their behalf. (Applause.) I may say, too, that I think—as the chairman himself said, it is a matter of great rejoicing that so many ladies accompanied the gentlemen who are assembled around here to-night; and while responding for the ladies in general, I should like to thank you for those ladies who are enjoying—and I hope will continue to enjoy—their visit to Cape Breton." (Applause.)

THE CHAIRMAN.

Mr. B. T. A. BELL, having fittingly proposed the health of the Chairman, Mr. David McKeen, whose guests they were, and in response to the vocal and vociferous assertion that he was "a jolly good fellow"

Mr. DAVID McKEEN, M.P., said—I cannot, though a good deal embarrassed, let your good will pass without thanking you for the way you have received the toast of the two Societies. In bidding you here, I, as one of the Committee, felt some little hesitation as to whether we had the means or facilities at our hands for making your visit an agreeable one, more especially when we undertook to receive you here to-night and entertain you with this dinner, such as it has been. I think we all felt that possibly we might not be able to make this function as successful as we should like. But if you have enjoyed yourselves—and I judge you have from the way you have expressed yourselves—we are more than repaid. It has been a great pleasure for us to see you all, and I trust this is only the commencement of many happy meetings.

This assemblage has not been altogether disinterested on our part. You in Ontario, and more especially in Quebec, are our principal customers. You are the people who take a very great supply of coal we are annually mining, and especially up the St. Lawrence. Hence we felt it our interest to extend an invitation to the Mining Associations of Quebec and Ontario to come and see what we are doing and to offer you an opportunity of viewing our modes of work.

That your visit may be a successful and pleasant one, both to yourselves and ladies, I am sure, is the sincere wish of the committee who have the responsibility of receiving you, and also of every man holding an official position in the Dominion Coal Company."

Songs by Mr. H. J. Williams, of Thetford, Que.; Mr. Geo. Boak, of Halifax; Mr. W. R. Thomas, of Montagu; clarinet solos by Mr. E. D. Ingall, of Ottawa; and recitations by Mr. Gordon Rogers, of Ottawa, were interspersed during the evening, which was regretfully concluded by the lusty and loyal singing of God Save the Queen.

COAL MINING IN CAPE BRETON.

THE HISTORY AND ORGANIZATION OF THE COMPANIES—THE COLLIERIES OPERATED AND THEIR EQUIPMENT—STATISTICS OF OUTPUT AND SHIPMENT.

In addition to the data given elsewhere in this issue, the following notes respecting the companies engaged in mining coal in Cape Breton will be of interest:

The Dominion Coal Company, Ltd.

Incorporated by Act of the Legislature of Nova Scotia 1st February, 1893. Authorized capital, \$18,000,000; issued, \$16,500,000; common, \$15,000,000; preferred, \$1,500,000; authorized bonded indebtedness, \$3,000,000; first mortgage bonds at 6 per cent. issued, \$1,500,000.

Directors—Henry M. Whitney, Boston; Sir Donald A. Smith, Montreal; Henry F. Dimock, New York; Hugh McLennan, Montreal; F. S. Pearson, Boston; Sir W. C. Van Horne, Montreal; Robert Winsor, Boston; W. B. Ross, Q.C., Halifax; Alfred Winsor, Boston.

General Offices: 95 Milk street, Boston. Henry M. Whitney, President; Alfred Winsor, Vice-President; J. S. McLennan, Treasurer; F. S. Pearson, Chief Engineer. Canadian Office: Glace Bay, Cape Breton, N.S. David McKeen, M.P., Resident Manager; W. Blakemore, M.E., Assistant Resident Manager; J. R. Blackett, Cashier, B. F. Pearson, Halifax, Secretary. Canadian Selling Agents: Kingman, Brown & Co., 14 Place Royale, Montreal, and M. R. Mornw, 50 Bedford Row, Halifax.

This, the most important coal producing organization in Canada, operates in Cape Breton, under a lease which gives a tenure of its mining property of ninety-nine years, the royalty to the Nova Scotia Government for the whole period being fixed at a maximum of 12½ cents per ton, with a minimum gross amount for each year to be paid on at least as many tons as were in the year 1891 sold by all the collieries it acquired. The property extends over an area exceeding seventy square miles of coal lands in Cape Breton, upon which the following collieries are worked:—

Calcedonia Colliery—One mile from Little Glace Bay; Superintendent, J. G. S. Hudson; Underground Manager, George Scott; coal raised, 1893, 169,041 tons; to 30th June, 1894, 15,867 tons.

Phelan seam of 7 ft. worked; dip averages 1 ft. in 10 ft.; vertical depth of shaft, 185 ft.; length of slope, 1,600 ft.; endless haulage driven by 1-12 in. cyl. engine. Patent dumping cages and selfweighing tanks.

System of working: pillar and bord.
Ventilation by Murphy fan 12 x 6 ft., running at 120 revolutions per minute and giving 100,000 cubic ft. of air.

Naked lights.

Boilers: Babcock and Wilcox.

Pumps: one No. 7 Blake.

Hoisting engines: 1 20-in. double cylinder, 3 ft. 6 in. stroke, with 8 ft. drum; 1 double engine for hauling coal from deep, having 12 in. cylinder, 15 in. stroke.

Air compressor: One 20 x 30 piston inlet, Ingersoll make, with a capacity for 12 coal cutters; 8 Sergeant coal mining machines and necessary boilers, air receivers, piping, etc.; also one Rand Compound Air and Steam Compressor from World's Fair, Chicago.

Coal heading machines: two Stanley.

Glace Bay Colliery—Situating 14 miles from the town of Sydney, and half a mile from Glace Bay Harbor, from which shipments are made. William Adamson, Underground Manager. Total coal raised 1893, 128,316 tons; to 30th June, 1894, 62,433 tons.

Harbor seam, 6 ft.; dip averages 1 ft. in 10 ft.; vertical depth of shaft, 240 ft.

System of working: pillar and bord; coal from deep hoisted to pit bottom by a double 12 inch cylinder engine; coal from rise workings lowered to pit bottom by self-acting incline; 1 18 in. cylinder engine driving endless haulage.

Ventilation: by Murphy champion fan, 8 ft. dia., driven at a speed of 90 revolutions per minute, giving 35,000 to 40,000 ft. of air and capable of being worked up to 80,000 cubic ft.

Naked lights.

Boilers: one flue, 33 x 3 ft., 16 h.p. steaming fan engine; six plain cylindrical 33 x 3 ft., 66 h.p., at hoisting shaft for engines, pumps, etc.; two multitubular.

Hoisting engines (on surface): one double drum, 18 in. cylinder, 24 in. stroke; drums 8 ft., built by Matheson, New Glasgow; (below ground) one double 12 inch cylinder, 24 in. stroke, drums 4½ ft., built by Davis, Pictou.

Pumps: two in number—one steam (Cameron's "special"), and one double 10 in., having independent 9 in. col. (double).

Screens: ordinary plain parallel, ¼ stationery.

Air compressor: one, 20 x 20 x 24 in stroke, working two Ingersoll coal cutting machines.

International Colliery at Bridgeport, 12 miles from the town of Sydney; John Johnstone, Superintendent; Thomas Johnstone, Underground Manager. Total coal raised 1893, 126,000 tons; to 30th June, 1894, 60,333 tons.

Harbor seam worked averages 5 ft. 10 in.; dip, 1 in 12; length of slope, 2,800 ft.; vertical depth shaft, 90 ft.

System of working: pillar and room.

Ventilation: Murphy fan, 8 ft. dia.

Naked lights.

Winding engines (on surface): pair 16 x 36 in. and 14 x 30 in.; 8 ft. drum; (below ground), pair Lidgerwood, 9 in. cyl., 12 in. stroke, tandem drums, 30 in. dia.

Pumps: one Knowles, 160 ft. suction, 2,300 ft. discharge.

Boilers: five, aggregating 300 h. p.

Victoria Colliery, situate at Low Point, on the south side of Sydney Harbor; T. J. Brown, Superintendent; John Wilkinson, Underground Manager.

Ross seam: 6 ft. 7 in. worked; dip averages 25°; length of slope, 1,740 ft.

System of working: pillar and bord; bords 18 ft. wide; also one section of longwall.

Ventilation: Murphy fan 6 ft. dia.

Naked lights.

Hoisting engines: one horizontal engine, having two cylinders, each 24 in. dia by 4 ft. stroke; drum 7 ft. dia.

Pumps: one forcing pump, cyl. 18 in. dia. by 4 ft. stroke; pump dia., 8 in. one Knowles, cyl. 2 in. dia. by 1 ft. 3 in. stroke.

Boilers: three cylindrical egg-end, 30 ft. long, and four multi-tubular.

Screens: four, each 5 ft. wide by 20 ft. long.

There are also two locomotives and 120 waggons.

A borehole 8 in. dia. and 600 ft. deep is being put down for pumping water to surface.

Goverie Colliery, situated on the north side of Cow Bay, A. M. Evans, Superintendent; Alex. Macdonald, Underground Manager. Total coal raised in 1893, 117,993 tons; to 30th June, 1894, 65,000 tons.

Seam worked (MacAuley) averages 5 ft.; dip 1 in 8; Odiorne shaft, 200 ft.; New Pit, 260 ft.; two slopes from pit bottom, being West Slope, 1,400 ft.; East Slope, 2,800 ft.

System of working: pillar and room (modified, the rooms being 10 yards wide and the pillars 7 yards), and one section longwall.

Ventilation: by furnace, 7 ft. 2 in. x 6 ft., giving 40,000 cubic ft. air.

Naked lights.

Winding engines: pair, 20 in. x 3 ft. 6 in., direct acting by hoisting engines; 8 ft. drum, and pair 10 x 12 in. Lidgerwood hauling engines, geared 5-1; 4 ft. drums, also pair 9 x 12 in. tail rope hauling engine, geared 6-1; two drums, 3 ft. 6 in.

Pumps: 1 Knowles pump, 20 x 36 x 10 in., 1 Knowles pump, 14 x 24 x 8¾ in., 1 Cameron pump, 12 x 12 x 5½ in., 1 Fly Wheel pump, 10 x 12 x 5½ in., 1 V. Bob-Lift pump, 16½ x 48 x 10½ in.

Boilers: 2 30-h.p. tubular, 5 ft. 3 in. x 17 ft. 6 in.; 1 30-h.p. tubular, 5 ft. 6 in. x 17 ft. 9 in.; 6 12-h.p. shell, 3 x 30 ft.; 5 10-h.p. shell, 2 ft. 10 in. x 27 ft.

Screens: common bar (3); angle 31°; size 18 ft. x 5 ft. 9 in.

Air compressors: one 16½ x 20 x 24 in. stroke and one 20 x 20 x 24 in. stroke.

Patent fuel plant: Yeardon's; capacity five tons per hour.

Mitchell longwall machine.

Reserve Colliery, situated at Bridgeport Basin, two and one half miles from Glace Bay; James McVey, Superintendent; Norman McKenzie, Underground Manager. Coal raised to 30th June, 1894, 70,629 tons.

Phalen seam, averages 8 ft. 8 in.; dip 1 in 13; worked by two slopes, of which the "Main" is 2,500 ft., and the "French" 3,580 ft. long; vertical depth about 267 ft.

System of working: pillar and room.

Ventilation by furnace.

Naked lights.

Hoisting engines: one winding engine, 22 in. cyl., 3½ ft. stroke; geared 2-1; drum, 4 ft. dia., and one 22 in. cyl., geared 4 to 1, working endless haulage.

Pumps: one pumping engine, 15 in. cyl. 8 in. water cyl., 24 in. stroke; one Cameron pump, 14 in. steam cyl., 8 in. water cyl., 18 in. stroke; one plunger, double, 6 in. diameter, 8 in. stroke.

Boilers: nine boilers, 3 ft. dia., 30 ft. long, flash flues.

Screens: three in use, 20 ft. long.

Od Bridgeport Colliery, situate on north side of Langan Bay, ten miles from the town of Sydney; Robert Robson, Superintendent; George W. Greenwell, Underground Manager. Total coal raised in 1893, 50,363 tons; to 30th June, 1894, 9,975 tons.

Phelan seam, 6 ft. worked; dip averages 1 in 11; shaft, 120 ft.; system of working, pillar and bord.

Naked lights.

Ventilation by furnace.

Two air compressors: one 20 x 20 x 24 in. stroke; one 24 x 24 x 30 in. stroke working 2 Stanley Coal Heading machines and 4 Ingersoll cutters.

Hoisting engines: one pair Lidgerwood, 10 in. double cyl.; 5 ft. drum.
 Boilers: two 4 h.p. water-bottom, tubular, loco. type.
 Pumps: none. (Level to sea natural drainage.)
 Screen: one 3/4 mesh, 20 x 6 feet.
 Dominion No. 1 Colliery, J. Johnstone, Superintendent. Coal raised to 30th June, 1894, 6,016 tons. A new winning opened by shaft 24 ft. x 10 ft. 6 in. sunk to Phalen seam 150 feet.
 Compressors: Two Rand, Compound, each 48 x 30 capable of working 2 Stanley Headers and 20 Ingersoll Sergeant Cutters.
 Winding engine, 20 in. x 4 ft. 6 in., with 8 ft. drum for hoisting coal.
 Boilers: 3 Babcock and Wilcox.
 Pump: Cameron, 18 in. steam and 7 in. ram.
 Other engines: There are also 2 18 in. x 3 ft. engines underground for endless haulage.

Transportation and Rolling Stock—In addition to a larger number charter steamers the Company owns five cargo steamers, three steam tugs and five coal barges. It controls and operates 13 1/2 miles of narrow gauge railway and 20 miles standard gauge, while 22 miles are now under construction. The rolling stock comprises 13 locomotives and some 600 passenger and coal cars. The line of railway to Louisburg is now open for coal and passenger traffic from Sydney to Glace Bay, a distance of 14 miles, while the second section under construction is expected to be completed by October, 1894. The maximum grade is limited to eight-tenths of one per cent.; it is being laid with steel rails, 80 lbs. to the yard, and constructed in all respects in a most substantial manner.

COAL DISPOSALS, 1893.

The following are the official returns furnished by the Company of its coal disposals during the year ending 31st December, 1893:—

Distribution.	Tons.
To Nova Scotia.....	109,822
" New Brunswick.....	35,391
" Prince Edward Island.....	9,834
" Quebec.....	499,873
" Newfoundland.....	30,054
" United States.....	13,664
" St. Pierre Miquelon.....	4,220
" West Indies.....	4,325
" Colliery Employes.....	10,024
" Colliery consumption (engines, etc.).....	29,043
" Bunker steamers.....	32,195
	868,445

RETURNS OF OUTPUT AND SHIPMENT FOR SIX MONTHS ENDED 30TH JUNE, 1894.

Name of Colliery.	Coal Raised Tons.	Coal Shipped Tons.
Gowrie.....	65,000	52,290
Reserve.....	70,629	57,153
Old Bridgeport.....	9,975	8,208
Glace Bay.....	62,433	51,064
Victoria.....	48,683	41,628
Caledonia.....	15,867	11,183
International.....	60,333	45,208
Dominion No. 1.....	6,016	3,436
Total.....	338,936	270,170

COLLIERY CONSUMPTION.

	Tons.
Coal used by engines.....	19,458
" " workmen.....	7,781
Total (six months).....	27,239

DISTRIBUTION.

	Tons.
Sold in Nova Scotia.....	44,731
" to Prince Edward Island.....	2,131
" " Mexico.....	1,527
" Newfoundland.....	16,965
" Quebec.....	157,252
" West Indies.....	4,216
" Columbia.....	521
" United States.....	22,068
" New Brunswick.....	4,476
" St. Pierre.....	566
" Bunker Steamers.....	15,717
Total for six months.....	270,170

The General Mining Association of London, Ltd.

Registered 1825. The capital was £274,690 in fully paid shares of £10, but in 1874 a return of £1 per share was made, and in 1880 a further £1 per share was repaid. There is now, therefore, a capital of £219,752 in shares of £8. Accounts to December 31st, submitted in April, but an interim meeting is held in November. A dividend of 2s. 6d. per share was paid in 1877; for 1878, 4s.; for 1879, 2s. 6d.; for 1880, 4s. 6d.; for 1881 and 1882, 8s.; for 1883 a dividend of 10s. per share was paid, with a bonus of 5s. per share out of the profits derived from the sale of shares in the Spring Hill Mining Company; in 1884 a dividend of 8s.; for 1885 and 1886, 5s. each year; 1887, 7s. 6d.; 1889 and 1890, 6s.; 1891, 8s.; 1892, 10s. Reserve fund, £29,850 stg., carried forward £1,610. The company holds \$429,700 shares in the Low Point Barrasois and Lingan Company.

Directors—J. D. Hill, chairman, Sir Charles Tupper, Bart., W. S. Cunard, Col. W. C. Western.

Head Office—E. E. Bigge, secretary, Bloomfield House, London Wall, London, E.C., England.

Mines Office—R. H. Brown, General Manager, Sydney Mines, C.B.
Canadian Agents—Messrs. Cunard & Co., Halifax, N.S.

In the year 1825 this company purchased the Duke of York's right to all the mines in Nova Scotia. In 1826 it sent out the late Mr. Richard Brown, father of the

present manager, to survey and report upon the coal fields of Nova Scotia and Cape Breton. He found that the Sydney mines, first opened in 1785 and under lease to Messrs. T. S. and W. R. Brown, was not included in the grant to the Duke of York, and as their lease expired on the 31st December, 1826, and they did not care to renew it at the heavy royalty of 4s. 3d. per ton, which they had been paying, Mr. Brown took the lease from the government for the General Mining Association. The opening out of works was commenced at the beginning of 1830, when the first shaft 200 ft. deep was sunk. Iron foundry and fitting up shops were then erected, and a railway from the pits to North Sydney for a shipping port was completed in 1834. Previous to this date the coal had been shipped at a small wharf outside the Bars. In 1834 a second shaft further to the dip was sunk. In 1854 a third shaft 400 feet in depth was put into operation. A still further move to the dip was made, as the underground workings advanced in that direction, and the fourth winning was got into operation in 1876. This last is known as the Princess pit (shown in our illustration). There are two shafts each 683 feet deep to the coal, which is being brought out thence from under the sea.

In addition to their works at Sydney Mines, the General Mining Association opened a colliery at Bridgeport in 1830, which colliery was closed in 1849. They also operated a small colliery at Bras d'Or from the year 1833 to 1849. They opened a colliery at Lingan in 1854 which worked until 1886, while they opened the present Victoria mines in 1882.

Sydney Colliery—Situate on the north side of Sydney Harbor. Main seam 5 feet 4 inches worked; dip averages 1 in 12; shaft, 800 feet; system of working, pillar and bord, the latter 16 1/2 feet wide.

Lamps—Muesler and naked lights.
 Ventilation by Guibal fan, 30 feet diameter.

Hoisting engine having two cylinders, each 36 inches diameter, 5 feet stroke, drum, 18 feet diameter.

Pumps—One Cornish pump, 68 inch cylinder, with two lifts of pumps, each 20 inch diameter. One forcing set of 8 inch diameter, with 12 inch steam cylinder.

Boilers—Eleven egg-end cylindrical and three tubular.
 Screens—Five each, 5 feet wide by 24 feet long. There are also three locomotives and 220 coal wagons.

COAL SALES.

	Round.	Slack.
1890.....	143,365 1/2 tons	9,316 tons.
1891.....	136,552 "	6,740 "
1892.....	151,884 "	7,631 "
1893.....	186,615 "	8,994 "

The Cape Breton Colliery.

Organized 1893. Owners: J. T. Burchell, New Campbellton; J. E. Burchell, Sydney; managing owner, J. T. Burchell, New Campbellton, C.B. This property, upon which mining operations were carried on as far back as 1861, was acquired by the Messrs Burchell, in June, 1893. It comprises an area of three square miles, and is picturesquely situated at Kelly's Cove on the northern side of the entrance of the Bras O'Or Lake, and about thirteen miles from the celebrated Sydney Mines, which for upwards of a century have been in extensive and successful operation. There are three seams on the property averaging 2 ft. 4 in. and 6 ft. respectively, but operations to date have been entirely confined to the four foot seam, dipping at an angle of 12° and opened by a slope now in about 1,000 feet. The outcrop of the 6 foot seam occurs in a brook on the brow of the mountain some distance from the slope, and shows a bright, clean, compact bituminous coal. At date of our visit a Sullivan prospecting drill was being put down with the object of determining this seam near the present workings. About 100 persons are employed, and, while the work is mainly confined to opening out and placing the colliery on a working basis, a brisk shipping trade is being done. As an instance of this, among a number of vessels lying at the wharf, at our visit, we found, the schooner "Jeanie," loading coal for Nairn, a Moravian settlement in the 67°, the first instance, we believe, of a cargo of Cape Breton coal being sent so far north. The shipping facilities are excellent. A substantial pier capable of loading a number of vessels at one time and having a depth of water now at 18 feet, but which may be increased by a slight extension of the pier to a much greater depth, is connected with the mines by a well constructed narrow gauge line of railway running a distance of little over a mile from the present slope. The equipment of the colliery at date comprises: 3 boilers of 110, 35 and 40 h. p. respectively; one Ingersoll Sergeant 7 drill compressor, and five Ingersoll Sergeant coal cutters; one 16 ton Baldwin locomotive; one haulage engine having 4 ft. 6 in. drum; Sullivan prospecting drill, etc. The coal has been well received in upper Canada and is commended as a good steam coal by the customers of the new company. From the favorable situation of the colliery, its excellent facilities for economical extraction and shipment, and the success which this coal met with, even in competition with the other companies, the Messrs. Burchell seem justified in their expectations of a large and profitable business when their colliery is fully equipped.

Boston and Nova Scotia Coal Company, Ltd.

Incorporated by an Act of the Legislature of Nova Scotia, May, 1893. Authorized Capital, \$5,000,000, in shares of \$100, of which \$500,000 was reported to have been subscribed at the date of last report.

Directors—Hon. John W. Candler, Boston, President; John Russell Gladding, Providence, R.I.; Hon. David S. Baket, jr., Providence; John McKeen, Mabou, C.B.; John C. Cobb, Boston; W. J. Fraser, Halifax; A. C. Ross, North Sydney; R. P. Fraser, Pictou, C.B.

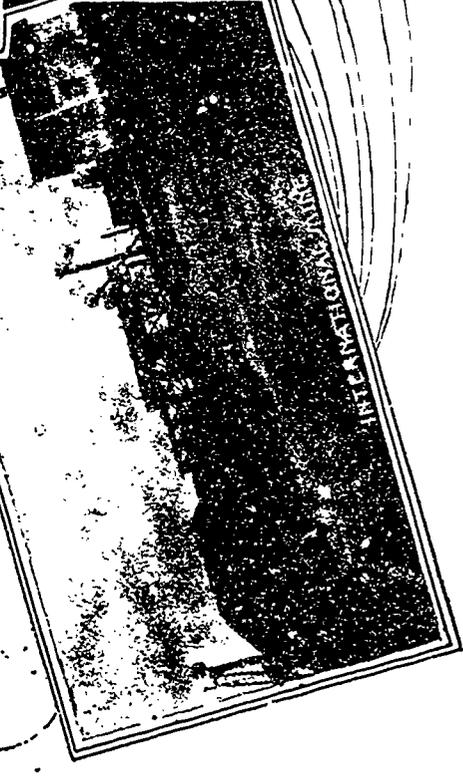
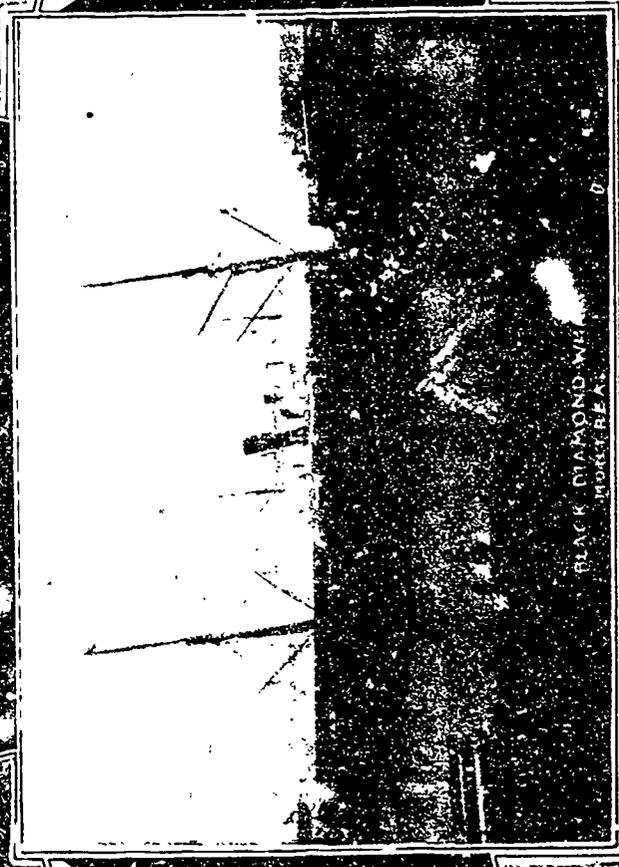
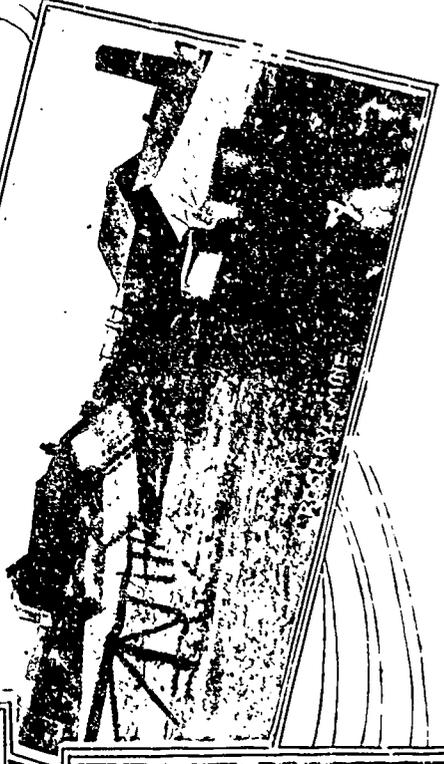
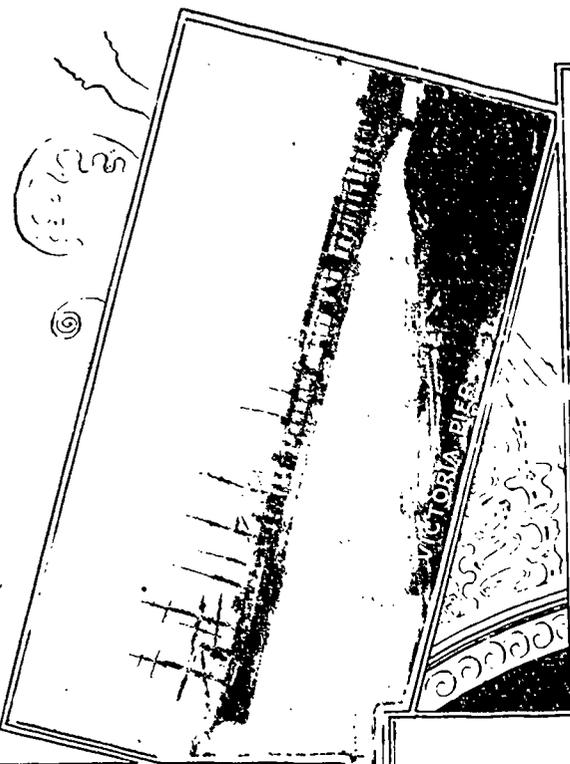
Head Office—66 State Street, Boston Mass. A. C. Ross, North Sydney, C.B., Secretary.

The property acquired is known as the Broad Cove and Chimney corner areas, containing about thirty square miles of coal lands in Inverness County, C.B. At date prospecting with the diamond drill is being carried on, and we believe it to be the intention to equip the property with a suitable working plant at an early date. A line of railway connecting the mines at Broad Cove with Orangedale station on I. C. Railway is also reported under construction.

Broad Cove Coal Company, Ltd.

Incorporated by an Act of the Legislature of Nova Scotia, 1894. Authorized Capital, \$3,000,000, divided into 30,000 shares of \$100 each.

Directors—W. Penn Hussey, Danvers, Mass.; W. H. Munroe, Edgarton, Mass.; John V. Payzant, Halifax, N.S.; Wm. H. Wiswell, Halifax; Hon. J. M. Raymond, Salem, Mass.



DOMINION COAL COMPANY.

The property is known as the Broad Cove area. The coal is of good quality, consisting of, according to analysis: Moisture 9'00; vol. matter 34'00; fixed carbon 57'00. The seam dips to the north at an angle of ten degrees, but, according to the late Mr. Richard Brown, no estimate can be made of the quantity of coal in the area, as its limits have not been defined. While there is a good deal of newspaper talk of immediate operations on an extensive scale, no work has been undertaken at date.

OUR TRIP TO CAPE BRETON.

—
BY THE JUNIOR REPORTER.
—

"I've had a real old holiday;
Things with me lately have been gay!"

Day was breaking as the good ship Bonavista stole quietly away from the wharf of the metropolis, and passing between the host of side wheelers, schooners and ocean tramps still asleep, headed down the great river.

It was a jolly party of some twenty members of the Quebec Mining Association, and ladies, bound to Sydney, Cape Breton, at the invitation of the Dominion Coal Company; and how can one feel otherwise than jolly when he knows that work and care, and all that wears heavy upon mind and matter, has been left behind, and that two whole weeks of sunshine and comparative idleness are ahead?

The Bonavista had been placed at our disposal through the kindness of Messrs. Kingman, Brown & Co., of the Black Diamond Steamship Co., of Montreal; and a good boat indeed we very soon found her to be. And when a really good boat has a really good captain, and the really good captain has a splendid lot of officers and the right sort of crew under him, what more under the blue of heaven could a mortal ask for—save it be an indefinite journey with never ending fair weather.

Fortunate indeed is he who can slip away from care for a week and spend that time peacefully amidst the beauties of the St. Lawrence, on board such a ship and with such a captain!

We were a merry lot—that is irrefutable. Indeed had there been a convenient barren island in the middle of the blue river when we were half way to the sea, it is quite probable that the captain would have set us ashore. As it happened, there was an iterated nautical threat to put the ringleaders in irons; notably one All-gall, who played so persistently and diabolically upon an instrument resembling in sound the horrors of the bagpipes and himself in attenuated appearance, that the crew threatened to mutiny unless All-gall was called off. Our first intimation, during these serene blue, dreamy days upon the big river, that any feminine and disturbing influences were doing their deadly work in the bosom of All-gall, was gathered from seeing him steal off with her to secluded corners where she would look bewitching under a cream lace parasol, and he would hug his knees and try to shave his chin on them as he gazed out over the rail with a vacuous stare toward the hills of Gaspé. Indeed, one morning, some of the crew, 'having some business'—reefing the windlass or splicing the main hatch or something—found the two in the bow reading Herrick together. The second officer is ready to take his oath it was Herrick.

Of course, after that our eyes were open. But—enough—let us draw the veil; All-gall's billings and cooings would fill a page.

And oh! those long blue days of laziness on the broad bosom of the river! "Their memory haunts me yet!" I have read somewhere that we are composed of these same elements of air and ocean and surely there is a strong sympathy between us; for every wave we bound over, and every breeze we inhale seems full of life and health and energy and hope. One lingers in memory over the wide and glorious expanse of water, the sloping shores of green, the long range of fir-clad hills! And far beyond, the blue mountains rise faintly, and farther off more faintly still; like half-forgotten memories that have grown dim in the lapse of years!

And I see, too, more clearly still, the young man with the scrupulously clean cuffs who came and rang the bell betimes; and I hear the dizzy rush of many feet upon the deck, and I see the headlong and hungry dive down the stairway that indicated the eager desire to partake of something solid! And it is nothing but a dream now!

Our pleasant outing on river and ocean lasted for four days, terminating at North Sydney on the morning of the 10th July, in time to permit us joining forces with the Mining Society of Nova Scotia in a visit to the International and Victoria coal shipping piers, the first of a series of memorable excursions arranged for our instruction and entertainment by the hospitable coal masters of Cape Breton. With a hearty good-bye to Captain Fraser and the other officers of the Bonavista, who had been so good to us, we were soon speeding in a small tug across the beautiful harbor. At the International Pier, a jolly party, including the popular premier of Nova Scotia, the Hon. W. S. Fielding, was in waiting and received us with a right royal salute of fire-crackers, that was almost as warm as the kind assurance of genuine welcome and the hand clasp that greeted us as we stepped upon the wharf. At the International Pier we took the paddle steamer Marion, (a fine boat, of which more hereafter), and steamed away and saw the Victoria Pier, another splendid structure of its kind. And at length, elated with our reception and our surroundings, and with an intuition of the good things yet to come, we reached Sydney and wended our way, hungry and happy, up to the new Sydney Hotel—and to dinner.

THE NEW SYDNEY HOTEL.

The new Sydney Hotel is located upon Surprise Soap street, and overlooks the Harbor or Spanish River to the south-west. It is a fine, large, airy building with wide balconies, one of which faces the water, and commands one of the finest prospects in the Dominion. As is the case with the new Frontenac Hotel at Quebec, the "Sydney" strikes the eye before anything else as you run up the harbor toward the town, whether you are hungry or not. The table and all the prime factors impress you as being fresh from the country—even to the girls who wait. But the new Sydney Hotel is doing a great deal for Sydney itself. Already it enables the pilgrim's attention to be drawn to the existence of the town while still approaching the latter. There is more point on the new Sydney Hotel than on all the rest of the town.

If we were appointed, in 1900, to take the census of Sydney, we would simply stay in the new Sydney Hotel. The local demand for the new Sydney Hotel tooth-picks is alarming. We have mentioned the hotel first because at first glance it impresses one as comprising the greater part of the town.

Before our arrival in Sydney, all the sidewalks of the town had been taken up and carried bodily away, for repairs. We appreciated the compliment; but so far as the Ottawa contingent was concerned, the Board of Works need not have been so very thoughtful. Speaking for our party generally, it was regrettable that the sidewalks had not been removed a little earlier than they were; for they were still being fixed up when we left. What we wanted was to have them fixed down.

But the air, and the freshness of each noon and afternoon! We know of nothing that can be compared to the matchless days of soft sunshine and serene blue waters about Sydney, and still be just. Save, indeed it be the blue eyes and the soft sunshine of the smiles that must ever make Sydney the loveliest place to linger in and the

hardest to leave. And that is only a fair comparison in one sense; for lovely as the climate proved to be, the blue eyes of Sydney are by far the bluest and the sweetest in the world!

J. R. EXPLORES THE BOWELS OF THE EARTH.

A large party ran out by special train over the finely constructed International Railway, on a short visit to the various collieries terminating with the Caledonia mine at Glace Bay.

The day was delightful, and the Cape Breton country good to see. Grand Lake, a fine sheet, lay on our left; and farther, where the blue waves of the sea made merry in the sunshine, Lingan Head—a bold and rugged promontory—seemed, as the waters washed its base, like a weather-beaten veteran who smiles grimly at the attacks upon his front of an army of prattling grand-children.

Have you ever been "down in a coal mine"? It is an experience that will linger long afterwards in the memory, and from the very essence and quality of its darkness lighten and brighten recollection.

When you go down a coal mine, in an unofficial capacity, try and have on all the clothes that you have not paid for. If you share a room at your hotel with another man, it is also well to take any clothes of his that he is not wearing at the time. Put these on under some of your own before leaving for the mine, and the balance, those belonging to your tailor, can be conveyed thither in a valise. This precaution should be taken in case your friend might be visiting the mine at the same time, in the event of which contingency the sight of his belongings in your possession might lead to embarrassing results.

Having thus surrounded yourself with the annua' output of two or three factories, you will be taken for a well fed man with a tendency to fleshify; and the gentlemanly janitor at the top will bring you a suit of yellow oilskin that may not be more than three or four sizes too big for you in your new and enlarged proportions. In any event the g. j. would insist on your losing yourself inside this Gog and Magog outfit No. 7; so that with your several layers of conglomerate clothes, you stand a one to three chance of eventually finding your way out of this buttonless bilious veneer which the gentlemanly janitor insists on putting over you.

Arrived at the slope, do not purposely avoid any substance that may strike you (except it be a pick or a cutting machine) as calculated to soil your nice new suit done in oils. Be bold, and let it come in contact with you as often as practicable. When you are tired, lean against any portion of the mine that will leave its impress upon you, first testing the capacity of the spot in this quality with your hands. By a careful application of these rules, the clothes of your tailor and your other best friend in which you are burried will absorb a great deal of opaque moisture that was only intended for the jaundiced epidermis you are wearing. As a result, neither your tailor nor your friend will insist on having his property back; and if you are not a fastidious man, you will have the opportunity for which you so often longed of paying off your tailor's balance without incurring further liabilities.

When you are in a mine, do not insist on sitting down on the wrong side of your body, even if the seat of your Turner's sunset pants appears to be there. The seat which you are sure you see there is like other modern furniture, not for use.

On returning from the mine, do not in a moment of absent-mindedness remove your friend's clothes. Even in their changed state your friend might recognize them and heap reproaches on you. Return as you came to the hotel, and at once engage a separate room.

We stood at the head of the shaft and waited for the cage. It came up with a rush, and we stepped in; and then the blue sea and the fields of wild flowers and the arching sky disappeared and we went down! down! Daylight fled swiftly from us, and we could feel speeding by, rather than see, the wall of the black abyss, which seemed like an endless throat that was swallowing us with smooth and implacable swiftness.

But more impressive than the speed, more dramatic than the darkness, was the deep-throated accompaniment to this subterranean plunge: the rattle of the cables, the roar of the descent! The sound of the voices of the miners below us and the clatter of the cars in the slope came up and met us and grew louder as we dropped toward it. It was a great and harmonious discord: the thunder wedded to the clatter of descending rocks!

Coal in the mine is like coal in the city. It's on the rise the whole time. We ran up against the bottom, as it were, at last, and stepped off into space. We were greeted by a large and general smile from the miners. We knew the miners were there all right enough, although we couldn't see them, because their smile was as visible as a procession of torches on a dark night. Their teeth and eyeballs gleamed white as new sails in the light of a full moon.

We stepped around as if we expected at any moment to put our foot through somebody's hot house in Australia. They gave us each a little lamp about the size and shape of a five o'clock teapot. It was filled with oil and had a little wick growing out of the spout. I suppose these wicks had been planted rather late in the wick season, for we had to assist their growth every now and then by poking at them with a penknife. As our penknives were all in our hip pockets, and as we were batted and braced and done up in our lemon-colored capsules as if we had intended going into visiting mines permanently as a business, we borrowed from the first unsophisticated youth who had imprudently divested himself of his daffodil suit to get at his hip. He carried the suit back on his arm.

We tramped along in Indian file, with our little lamps on our fingers, looking a good deal like a superannuated ray of sunshine that had lost its way down a blind alley. There was no sound save that given forth by our crunching and irregular tread, and the whispered prayer of some one of our party as he collided with the wall, where he had gone off to pick coal for himself.

Algernon Charles Swinburne can write his overdone eulogies to Grace Darling and other daring young women; but when we go out of paragraphs and into poetry we shall apotheosize one with whom Grace Darling could never have pulled an oar, to use Grace's own favorite metaphor.

There are not many pretty girls who would care to venture into a long, black and seemingly endless slope, with a lot of desperate men who looked as we looked in those Niagara Falls uniforms. But we had one with us who didn't care if she did, and here's to bonnie Miss Fraser of New Glasgow! As the gifted premier of the Province of Evangeline said, she was the one redeeming feature of our party. And our feminine readers may not believe it, but she looked positively charming in her pyritic costume, with its baloon sleeves and bell-tent skirts.

We filed down the slope and saw the stables, where about fifty horses that never see daylight are fed and bedded. The stalls and surrounding walls are whitewashed; and considering its subterranean location, the stable is remarkably well kept and the animals well cared for.

Poor dumb drudges! We have heard that when, if ever, these buried vassals—serving their life sentence of eternal light—are borne upward to the green earth again, they become mad and delirious with delight. In the long, long day of drudgery and darkness a thousand feet below the waving grass and the free air, memory must have become dulled if not obliterated. And yet the consciousness of a glorious life once lived must be forced upon them, after the first moments of stupefaction, by this sudden sight of the flowered meadows, and the far blue sea, and the farther and bluer heaven! Or, is it but intoxication through contact with forces that contrast so sharply with those by which they have been surrounded?

We traversed the length of the main slope of this great and prospering mine, having to stand aside every little while out of the way of the long train of coal cars, as they went thundering by with their load, or clattered back empty. And now and then a party of miners with their little lamps in their caps would glide swiftly by us, like dark spirits, toward the open air and home. A thing of our visit that impressed one as we trudged along, as being humorous and human, was the way in which the short men of our party would duck their heads in portions of the slope where men six feet high strode along erect.

Wonderful and strange and impressive is a coal mine, with its gloom and capricious glimmer of small lights that seem like "will o' the wisps" or the tapers of the gnomes themselves. And then the ceaseless rattle and roar up and down the long and busy underground thoroughfare of the cable-drawn cars, the shouts of the men, the clatter of the upward-bound elevator with its freight, and the crash as it descends voraciously for more!

We were upward-bound, too, at last: tired, it may be, and grateful for the promise of the blue sky and the green earth; but satisfied and filled with admiration for all that we had seen of the wonderful forces of nature and the marvellous ingenuity and force of man. The dark walls sped by us and the voices of men and of industry below us grew faint and fainter. Then glad dawn broke and the daylight seemed to come down, shyly at first, but with growing confidence and strength. We saw the faces of one another, and dirty as they were, they weren't bad to look at. The walls grew brighter, and we shot as if at a bound, into the arms of the broad blue day!

Then we took our monochrome in oils off its frame, and removed the large circumambient wad of granulated gloom from our fair young face.

A RUN TO OLD SYDNEY MINES.

Right honestly have the Sydney Mines of Cape Breton earned their prefix of "Old." For it is now almost three-score years and ten since the late Richard Brown—he who in 1869 gave to the youth of Cape Breton and to the world the "only complete history that has ever been written of the island"—was sent out to Cape Breton by an English syndicate, the General Mining Association, to operate the Sydney Mines, which had been opened forty years before.

Our drive from North Sydney, where we were met by his son Mr. R. H. Brown, General Manager of the colliery, with a number of comfortable vehicles, was over a hard, smooth road, and upon a matchless morning. On one side, close by, were the sparkling waters of the harbor, breaking white upon the beach; and on the other, fields of daisies and clover and wild flowers growing together, and forming a truly pastoral mosaic of nature. There were comfortable looking houses of the old school set back from the road and bordered by lawns and brightened by flowers. At intervals we passed through a natural avenue of firs, and then the country became more open. We saw the mining village, where the tiny houses lay in long regular rows, and the tall buildings of the mines; and beyond all, the sea!

The workings of the Old Sydney Mines extend for some distance below the harbor and out into the Atlantic. Of course we went below and enjoyed ourselves.

When we got out of our gamboge misfits and into our all-wool reliables again, we drove to "Beech Hill," the charming residence of Mr. R. H. Brown. We had been invited thither to lunch, and we think that lunch was the most dainty and enjoyable collation that we have ever had the gastronomic and fastidious pleasure of being collateral with. Of course, our appetites were keen and healthy after a long ride in the slope and the subsequent one in the open air; and that had a great deal to do with it. But isn't it a satisfaction, when a real feast is set before you, to have an appetite which you know will do full justice to that feast? Well, rather!

After a stroll about the flower beds and lawns adjoining the house, and viewing the coal seam where it outcrops in Mr. Brown's garden, we bade good-bye to our host and hostess and their charming daughters, and drove back to Sydney, as jolly a parcel of boys as ever were let loose upon a holiday.

OUR J. R. GOES TO LOUISBOURG AND—?

The next morning we were rattling along by rail to take the boat for Louisbourg. We boarded the "Douglas H. Thomas," placed so kindly at our disposal by the Dominion Coal Company. And what a boat that is! Powerfully built and swift, she seems the embodiment of all that is best of combined strength and speed; as indeed she is. And then, we had Blakemore with us, and jolly Revere; and were mortals ever more blessed?

We passed through the narrow channel of the Glace Bay Harbor, which presented a scene of great activity, owing to the boats loading coal from the Caledonia and Glace Bay mines; and our craft was soon steaming merrily into the bounding blue of the Atlantic.

To our left were the rugged sandstone promontories so characteristic of the Cape Breton coast, well worn by the ebb and flow of countless tides and the wild washings of a hundred thousand storms. It is a fine, strong shore; and the heart leaps to see it on a fine morning, when the sun is streaming against its red weather-beaten face.

Beyond the waters to starboard, that glistened like a burnished coat of mail in the sun, a long beach of golden sand seemed running by; and behind us, beyond Glace Bay, the high chimneys of the Caledonia and Glace Bay pits belched their streamers of dark smoke, driven by the freshly blowing westerly breeze across the serene and cloudless face of the sky.

By now the water was white, and running high; and it became painfully evident to some and delightfully apparent to others that we were to have a sea. We passed Schooner Pond, from whence coal was shipped once upon a time. The rugged coast was still clearly to be seen, and beyond it were meadows dotted here and there with white cottages and fir-clad hills that were richly dark against the azure.

Flint Island, a mere rock, standing high and boldly above the sea, was left behind. It would be a nasty thing to run up against on a dark night if the lighthouse wick happened to burn out.

By this time the sea was as heavy as the foregoing paragraphs; and Thomas—the tug—was going through it like a pewter spoon through a pot of palpitant porridge. And it was sad to see the President! He and the Parasol had been sitting aft under the awning while the ocean was sober, and were as chummy as too pins on a full cushion, chatting away and applauding Sword's capital banjo solos and funny songs. Poor President! He hadn't dreamed at starting that there could be such a thing as rough weather on a morning like this, and during a little round-the-corner excursion to Louisbourg. He started the ball rolling himself. Imagine the humiliation of having to excuse yourself from the society of a pretty girl, and then right under her very glance having to reach for the rail—and farther than that a moment later. There were others forward, too, who were passing a good deal of "condemned sustenance," as Bill Nye has aptly labelled it, overboard. Possibly they had heard that the boat needed lightning, and thought that was the best way to accomplish it.

We passed in safety the line of those who were checking off their desiccated nutriment, and found Harry W— in the bow, singing: "What are the wild waves saying?" Poor B— junior, evidently inspired with the idea that the capstan might be carried away any moment by the waves that were washing over the deck, and determined to prevent such a catastrophe at all costs, was holding that marine elevator as well as the despoiled and enervated condition of his interior would allow. His head declined upon his arms, and he was declining a good deal himself; and the big

waves that washed across his lonely and forgotten feet were being kept busy keeping the deck nice and tidy. Altogether, you never saw such a lot of wasteful people in all your life!

We had got into a bit of a fog, too; but this raised partially at last, and through the lingering mist we saw the water dashing white as milk and wild as a cataract against the faintly perceptible and inexorable coast. It was a magnificent sight; but even those who had been so anxious to land a moment before, decided to tough it out and wait until they reached Louisbourg.

Louisbourg at last!

An interesting article, from a medical point of view, might be written on how Louisbourg was successfully stormed for the third time.

It was decided that the main body of our contingent should proceed up the lane leading to the village directly from the wharf; taking along the women and the sick. The baggage was left on board the tug, which was to have steam up in readiness for retreat, in case we should be routed and come back on a hop, skip and jump with the enemy in our rear trying to sell us relics.

Those who could sprint pretty well were ordered to sneak down the beach to the right for a bit, then cut up through the fields, and, by a flank movement, take the enemy in the rear of the town where the residences of the opulent were. Strict orders, however, were given that no looting should be done.

Well, the light infantry started off down the beach, making a great deal more noise than was proper for a skirmishing party. The main body plodded up the lane, armed with parasols, walking sticks, reticules, smelling bottles and shawls. The enemy was to be seen nowhere; and the General, fearing an ambush, was for entering a neighboring house and forcing the owner to execute an order of four (fingers) deep with something mild and innocuous for the ladies. He was, however, overruled, it being asserted by our guide—a deserter from the enemy's ranks—that better "stuff" could be obtained at a certain building on the main street. We proceeded, the enemy to a man remaining invisible. Following our scout, we stormed the gate of the building to which he had referred; and by a brilliant feat of arms gained an entrance, and that, too, without the loss of a drop of blood.

But imagine our dismay, when, on bursting into the room supposed to contain the ammunition which we so much needed to replenish our flasks, we discovered there the light infantry—our own men! seated round about upon barrels, and deal chairs, and soap boxes, and perched even upon the bar itself!

The room was wreathed in clouds of smoke, that hung with a grim aspect over all, giving evidence of a fierce conflict. But these exhalations soon proved to be but the result of an unparalleled consumption of the weed nicotian—village-bar cigars, which must have been indeed weeds in the vilest sense of the word.

The light infantry greeted us hilariously from their various individual positions; and in a jocular, but injurious manner, discharged a preconcerted volley of ginger ale corks upon our front.

"Where's the enemy?" bellowed the General bravely, as he waved an umbrella of the vintage of '79 over his head, and forced his way through the smoke and debris of dead marines and corks and cigar stubs.

"Fired and fled!" shouted the captain of the party in possession. "Save this poor devil, sir!" and he indicated the bar-tender, a lean-bodied, brown-faced man of Acadian descent, who lounged upon the bar from an entrenched position and surveyed the destruction of his property, as his ancestors one hundred and forty years before had been compelled to do.

"Well, sir!" thundered the General, "what have you got to give us to drink?" The gentleman of Acadian paternity shook his head and smiled in a deprecating yet suave manner.

"We have nothing but gingare hale," he said.

The General swore an oath, a good round oath, such as Colonel Vaughan may have sworn in 1746, when he learned that there were some cases of fine old wine left behind in the storehouses which he had fired.

"Do you mean to insult us, sir?" he thundered again. "Do these—these men of mine—" indicating the Light Infantry by a contemptuous sweep of one hand—"look as if they had been drinking ginger ale?"

"Ah, no!" replied the Frenchman, who seemed rather pleased and amused at the General's ebullition of wrath than otherwise. "Ah, mon Dieu, no! Dese gentlemen, dey comb here while I was try for to get soam slee—ep; for my wife, you know, she have de leetle baby, and for tree nights I don' can get no sleep bat tall, an' I have been walk de floor hup an' down! hup an' down! An' dese gentlemen dey comb here, an' dis one"—indicating the scribe—"he say: Ello, hole chap! WAKE HUP! An' I wake hup, an' by gar! dere was more as tree hundred men want to drink hat my bar! An' dey take nothing but whiskey blanc! whiskey blanc! whiskey blanc! An' wen de whiskey blanc she's hall gone, dey take rye an' hale. I tell you, Cap'n, I have whiskey blanc,—tree bottle. Hall gone! I have rye,—deux flacon. Hall gone! I have hale,—tree duzz—en. Hall gone! Pretty near hall de gingare hale, she's gone, too! Hevryting!"

We returned to our ship in a fog—especially the Light Infantry, who followed in an irregular manner and conducted themselves in such a way that had the enemy been quartered in ambush they would have been completely annihilated. There was a good lunch awaiting us on the tug, and we rushed at it and assailed it with an enthusiasm and energy that would have been sufficient to take Quebec itself, let alone Louisbourg. And it was a pleasure to see the girls eat! Any misguided and dyspeptic pessimist laboring under the delusion that girls can't eat would have had his belief peremptorily and forever shattered upon that excursion. How intensely, pathetically human they do look, these angels upon earth, as they slap their knives across the face of a red slice of good old roast beef, and say they will take two slices in case you may forget them when you come around with the bread and butter!

But when the roll was called, four members of the main body who had trudged so bravely up the lane to storm the town, were found alas! to be missing. Had they been decoyed by some lurking prowlers of the enemy who had remained behind in secure hiding to loot the deserted houses? Oh, no! For we saw them shortly afterward on the farther end of the wharf about to drive away in a large, double-seated vehicle drawn by a stout team. They smiled sickly at us, and waved their hands as if they might not see us again, and said they would not go back to Sydney in that awful boat across that horrid sea for all the annual output of the Dominion Coal Co.

EXCURSION TO THE BRAS D'OR.

Baddeck and thereabouts is a paradise in summer time that should be better known to the world. Not the tourist world, for it is the ubiquitous tourist who mars a naturally delightful place and makes it unbearable despite its supereminence charms. But for those simple people who love nature in a quiet and sincere way, and who desire to get away for a month or so from the jarring crash of the thoroughfare, to some sylvan spot where they will be surrounded by all that is most lovely in lake and shore and hill, where the air is sweet and cool, and the sky blue—where, in fine, upon a dreamful midsummer afternoon a thousand shades of green are upon the hill-sides and meadows, and the water and the far mountain ridges and the farther heavens are soft and languorously blue—for those who seek such an arcadia, Baddeck is the place to which they should go. This is a long sentence; but that is what I should like to get if I was sent to Baddeck.

And who shall paint or tell with brush or pen the glories and azure bloom of the lake of the Golden Arm? From a thousand points of contemplation, delightful in themselves, are to be seen landscapes that hold the eye entranced, either of the dreamer or the painter; and which, if faithfully reproduced, must be the means of filling the heart of a true artist with proud delight as he gazes upon his canvas when his work is done!

We slipped away from Sydney on board the comfortable and roomy paddle boat Marion to these charming Bras d'Or Lakes, and upon a matchless morning of sunshine and breeze. The red shores of the rugged sea-facing coast were left behind, and toward noon we were gliding up the dimpled waters of the greater arm, with the long island of Boularderie upon our left hand. We had a jolly dinner, and as the afternoon wore on, we came in sight of that beautiful place, the residence of Alexander Bell, the inventor of the "Hello, Central!" The situation of Mr. Bell's fine summer house is truly magnificent, and the house itself as it shows itself beyond a fine grove of trees, seems to have risen to the occasion, as it were, for it is architecturally superb. Money talks.

The house stands some distance from the lake's edge and upon a fine expansive slope, commanding a far seeing view of the lake and country roundabout. This slope comprises about ten thousand acres of arable and timbered land, I believe, and seems to rise like a crown of prosperity and verdure from the blue lake, where it is bound by the white and perpendicular and exceedingly picturesque gypsum cliffs; that are in turn bound, like a rugged brow with a victorious wreath, by the overhanging growth of dark spruce.

There are lovely lawns and groves about the house, and beyond and to the right and left are meadows and farms and woods. Indeed, the whole ten thousand acres had been turned to good and beautiful account, and is nothing less than a great park; over all of which extends the fragile but potent telephone wire that has done all. It money talks, the telephone had the floor first in this instance.

Rounding this delightful Eden, upon which the eye feasts lingeringly until it has grown dim with distance or lost to view, we came opposite to Baddeck itself. It is a charming little village, lying whitely upon a gentle and verdant incline that runs back from the water for some distance until bounded by the spruce of the lower hills, that are in turn flanked by the blue mountains.

The view as you steam away from Baddeck, if you have the heart to leave it, is intensely lovely; that is, at least upon such a day as it was our good fortune to visit the place upon. But glorious weather is by no means rare about Baddeck; rather, anything other than fair is the exception. The village, with its white houses and steeples here and there, upon its lawn of green, seemed to smile pastorally and happily up at the higher and verdant elevation where the man of millions and unlimited connections dwells. Far away across the lake, the hills beyond the cultivated shores were blue in the summer haze, each farther range rising in more perfect and delicate loveliness, until the remotest of all seemed a part of the blue heaven itself. And blue was the lake; a slumbering sea of turquoise upon which we seemed to dream, and dreaming wonder if it all was real!

If there is a more delightful country than that of the Bras d'Or about Baddeck, and more insufficient and weak-kneed description in print of anything almost indescribable, than the foregoing, I should like to know where to find one and how to best avoid finding the other.

For an hour we ran up this Mediterranean, sunning ourselves and thanking our gods that we had not missed this opportunity of seeing Cape Breton at its best. For he who sees Cape Breton and sees not Bras d'Or, sees Cape Breton not at all, comparatively speaking, fine and picturesque as the country is. Certainly, no one viewing the coast of Cape Breton from the sea, would ever suspect that such soft loveliness of landscape and lake existed beyond those bluff, rough, tough old promontories, bless 'em!

And at length our feast of beauty drew almost to an end, and we ran up to the Narrows, which connects the arm with the great lake and is crossed by a fine iron drawbridge, across which run the trains of the I. C. R. It was evening by now, and the sun—for us—was setting gloriously beyond, and dimming in a blaze of orange and gold the summit of the blue hill. Farther we saw the great lake itself, and the distant hills, dim and pale and silvery, in the twilight and the distance.

We had to leave our steamer here, that we might take the Intercolonial Railroad train back to Sydney. We had a trifle over twenty minutes in which to take tea at the hotel at the base of the green and sloping hill near by, and we bolted down the wharf, happy and hungry. I have never enjoyed a day's outing more, and doubt if I ever will taste the like again, save it be in repetition.

THE COXHEATH COPPER MINES.

There were open, double-seated, four-wheeled rigs with phaeton tops, waiting for us early the next morning outside the hotel. It was a peerless morning; and the subsequent drive to Coxheath, in charge of genial Captain Gregg, was delightful and exhilarating. The party was merry, the teams in good fettle, the roads splendid, and the scenery and air superb and invigorating. We drove through many a delightful wood of fir and birch and maple, and over many a mile of shady road at a rattling pace, with here and there a glimpse of purling stream or still lake. As we rose with the country near Coxheath, our horizon widened; and when close upon our destination, with the Coxheath Hills before us and another range upon our other hand, the view of green and broad valley between, bright in the risen sun, that turned the foliage into a thousand shades of green, and the glimpses of lake to silver, was indeed lovely!

Arrived at the mine, we got into our primrose pants and roundabouts, so familiar to us all by this time, and armed with our little lamps, descended the shaft and paraded the tunnels. The latter were very fine to see, being splendidly high, having been blasted out or "stoped," as they call it. There was a picturesqueness and grandeur about these cross-cuts, owing to their rock formation and the bold ruggedness of their outlines, that were thrown into shadow at one moment, and at the next cast giant and flickering reflections in the light of our lamps. One fancied as he looked down the shadowy vista of one of these openings or into the cavernous gloom of the caves about, that here some mountain band of outlaws might be wont to hide their booty, as Indian Joe and his pal hid their treasure in the cave where Tom Sawyer found it.

Later, we had a stroll over the Coxheath Hills, inspected numerous outcrops and surface strippings of the ore, and then walked down to Colonel Granger's house near by.

We were not allowed to leave before we had experienced the hospitality of Mrs. Granger in the shape of wild strawberries and cream, and cakes and coffee, and other good things; to all of which, I am afraid, we did more than ample justice, as it is called.

We said good-bye at last, and then the rigs were brought up, and with our weeds going and our hearts merry, we bowled down the gravelled drive between the fine trees to the gate, and so on back to the Colonel's hotel.

PLAY CRICKET AND—?

If ever the Sydney Cricket Club forgets the drubbing it got at our inexperienced hands, it will only be because it is pleasanter to remember victory than ignominious

defeat; and also because there is a world of truth in the old saying that there's no use crying over spilt milk.

When the Secretary decked out in a pair of flannel trousers that had once been white, cricketer shoes and shirt and a peaked cap, and carrying under his arm a woollen instrument that looked like a spade whose handle had stopped growing at an early age, while the rest of it kept on—I say when the Secretary came round to fifteen or sixteen of us and said we were to play cricket, as if he were summoning a lot of men to sit as a jury, we remonstrated.

It was a glorious afternoon for an outdoor match of any lively sort; but we had just had a good dinner, and the chairs we were occupying at an angle of forty-five degrees upon the harbor balcony, were intensely comfortable. We said we didn't play cricket much, and would prefer serving as an ambulance corps or something like that with a humanitarian life-saving turn about it.

But the Secretary said he had arranged the whole thing, and if we didn't turn up the Sydney Club would claim the match by default and insinuate that we were funders and duffers.

We said we would rather be taken for cricketers even than funders; and trotted off and got into all the available flannels and chappie caps and rubber-soled shoes and red belts we could find. Then we marched down to the grounds, looking about as variegated and dangerous as Coxey's army.

There was a great crowd of people who had come from all over Cape Breton gathered there to see the game, and seated on a long grassy slope above the field. Higher up on the rise were several old and tired looking buildings known as the Old Barracks. Near the Barracks was a tent, where a serious faced-man with a score sheet in front of him was seated at a small table; and by his side was the editor—nothing less than the editor, mind you—of one of the Sydney papers. Farther, at the upper end of the field, two or three bell tents had been raised for the comfort of the ladies and those who were to provide the fun. That was us.

They had it all arranged. Everything had been done so brown that we felt our goose had been cooked in advance. We sneaked out into the field, beaten men, and blinked up at the long black and white line of patient spectators; and at the ever present small boy, and the girls with their white dresses and parasols. Then we turned and stared at one another and felt like going back to the hotel and kicking ourselves—or better still, the Secretary.

The "crease," as they called it, ran parallel with the bluff overlooking the harbor; so that the field lay between the harbor and the slope where the spectators sat. At one end was the gate, and at the other the tents. There was absolutely no chance of escape. I thought, as I looked up at that sea of faces, of the old arenas of Rome where the men and the women looked down upon the poor devils who had to scrap for their living, as it were; and here were we, to be butchered to make a Sydney holiday! All this went with my blood; and I tell you, I felt sick over it. I had never wanted to be home so much as at that moment. I looked at the faces above me, and saw no mercy there, then at the pitiless sea, and lastly at the gate where the people were still pouring in without paying anything.

Meantime, some of our fellows had commenced making exhibitions of themselves by bowling the ball up and down and trying to hit it; to kill time, they said, but really with the idea of showing the people how little they knew about it, and in the hope of being left off. But the people took a different meaning out of these antics, and thought we were burlesquing merely in the supreme confidence we entertained of being able to take the veneer off their team. They didn't like the way we acted, those people didn't, and I saw them whispering to one another with gloomy faces, as anticipated defeat settled down upon their several brows.

The crease was very near to the bluff. At the edge of the bluff, and a little below it on the incline, was a wire fence, and beyond this the beach.

The game had to start at last, of course, despite the delays we managed to create and the prayers several of us were sending up for rain. I don't think rain had ever been wanted so badly there before. The Secretary won the toss, and chose the field. Then he sprinkled us all over the premises, two of us in one place in some cases, so that if one muffed the ball the other could kick him and start a fight and so hinder the progress of the match.

The Sydney team had been practicing and training for weeks in order to stave off defeat, and were in the pink; while we had been living like a prize fighter trying to get out of shape as fast as possible. They had an imported bowler or two, and before the local team went to the bat, these two human cannon fired the ball around in a way that made our flesh creep.

They put two of their crack "bats," as they called them, in; and the way those fellows would knock the ball about when it didn't happen to go straight, was a caution. And when the ball *did* go straight, once in a while, they would jam their bats down hard into the ground, and the ball would run up fiercely against it and then roll back in a disheartened way, like a wave off a rocky coast. And at every run these chaps would make, the crowd of partisans on the hill-side would yell, and the old buildings would look as if they were on the point of tumbling down, they shook so with the noise. But they didn't applaud when we made a run (after the ball, I mean); and if one of us happened to tumble or pull up a sample of the grass grown in that region, instead of the ball, they would laugh; and those two chaps with their apoplectic shins would keep on galloping up and down the crease from wicket to wicket, and shout at each other wildly to "come on."

"Four!" their captain would shout; and the man in the tent would mark down four. "Well done, Menzies! Go it again!"

And they would "go it again."

Cricket is a good deal like croquet at a garden party when there are about ten playing. You think you are never going to get your turn; and when you do get it, it lasts about long enough for the man who comes next to gallop down to take your place as fast as his bulbous legs will let him. Cricket is not quite as exciting as croquet, because there are no pretty girls playing; and the element of danger is less than in the church social game. Cricket is played with a large brown ball, that looks about twice its natural size when coming toward you in the air; and as it gallops over the ground at a break-neck speed, in your direction, you generally manage to place your legs wide enough apart to allow it to pass between them and on its way undisturbed. Then you make a pass at the ground with your hands, pick up a large chunk of old Silurian and throw it hard at the man who struck the ball.

The wickets are three little sticks that look like the lonely and forgotten remains of a fancy fence, and there are two lots of wickets used in a match, one lot at each end of the crease. The crease is merely the ground between the wickets and upon which the ball never seems to want to strike until it reaches where you are standing. Then it either hits your leg, which they have bandaged up in advance, or runs past your bat, which you are holding firm to the ground, and goes through the forgotten remains before referred to. Then they tell you that you are out, and they come and lead you away; and you are glad of it.

We had got two of their men out, when the Sydney captain rushed wildly down the slope, where he had been building some of his team up with ginger ale, and complained that the Secretary had fourteen men on the field. So he had, but it was a little thing to make a fuss about. They said we should only have eleven men playing; and the Secretary said he didn't know that, and was sorry about it, and ordered three of us off. Then the Secretary called us back, as we were all rushing off, and there was a squabble as to who should adjourn, as each one was anxious to show how un-

selfish he was. The trouble was settled at last, and the play continued; and at length we had them all out, and went in for our innings.

But we went in confidently. For we felt that the petty technical protest the Sydney captain had entered about our having fourteen men on was made because he felt how the game was going against him; and you know, a drowning man will catch at a straw, though we never saw one idiot enough to do it. We had two of their men out, and they had only made about ninety runs between them, and as we had only eight more of their team to do up, you can easily see things were looking black for them.

When we got at the bat, the vast audience on the hill-side woke up. Williams was found using the round side of his bat; but we showed the Sydney team that we didn't intend taking any mean advantage of them, and Williams was ruled off. He said he was glad of it.

A little later on, when some of our smiters were in, they had to place a man down on the beach with a boat so that he could paddle out and get the ball when it fell into the harbor; as the wind seemed to be blowing the leather that way. But with all these artifices employed against us, we kept piling the score up; and then, when we had shewed them what we were made of, it appeared that we had yet another whole and consecutive innings. So there we had to go in again without any intervening rest out in the field. The congregation meantime had begun to file home, disgusted, I suppose, at the shewing their representative team, with its imported round-arm human Gatling guns, had made against a scrub aggregation.

Of course, the Sydney papers came out and said what a glorious victory their team had achieved, and so on, *ad nauseam*. But we had anticipated that sort of thing, and didn't mind it. It did our hearts good, too, to see our names in print without for once being connected with the police court; even if the game they were associated with was cricket instead of croquet or puss in the corner. And we all got copies of the paper containing the least unfair description of the match and mailed them home to our friends with the column in which our names blossomed forth marked with red pencil.

OUR PORTRAITS.

Mr. H. M. Whitney, President, Dominion Coal Company, Ltd.—Born at Conway, Franklin County, State of Massachusetts, 22nd. October, 1841. Educated at the public schools, supplemented by one year course at East Hampton Seminary. Commencing with a clerkship in the Conway Bank and serving some time in the Navy Agent's Office, Boston, he ultimately became interested in the shipping business in New York. In 1866, was appointed Boston Agent, and in 1879, President of the Metropolitan Steamship Co., positions which he still retains. In 1887, he became President of the West End Street Railway Co., which he organized for the purpose of developing suburban property many acres of which he owned. The railway under Mr. Whitney's presidency absorbed all the street railways companies of Boston, making, we believe, the largest street railway company in the world. Mr. Whitney was one of the first to see the commercial value of the trolley system, and the West End Railway became the pioneer road in adopting the system. In 1870, Mr. Whitney became interested in coal mining in Cape Breton, and in 1893, as mentioned elsewhere, he successfully accomplished an amalgamation of the leading collieries in that section of Nova Scotia, under the name of the Dominion Coal Co., Ltd. In the same year (1893) he resigned the Presidency of the West End Railway. Mr. Whitney is also, we understand, president of five or six smaller companies and trustee of others.

Mr. David McKeen, M.P., Resident Manager, Dominion Coal Company, Ltd.—Born at Mabou, Cape Breton, his father being the late Hon. William McKeen, M.L.C.N.S. Educated at Halifax and Boston. Commenced practice 32 years ago as Provincial Land Surveyor. Has been sub-collector of Customs, United States Consular Agent, a Municipal Councillor and Warden of the County of Cape Breton, which he now represents as a Conservative in the House of Commons. Prior to the formation of the Dominion Coal Company, he occupied the position of Treasurer and General Manager of the Caledonia Coal & Railway Company, Ltd.

Mr. W. Blakemore, M.E., Assistant Resident Manager and Engineer of the Dominion Coal Company, Ltd.—Born at Wolverhampton, England, 28th March, 1854, his father being a consulting mining engineer of large practice in the coal and iron districts of North and South Wales. Educated at Wolverhampton Grammar School, subsequently taking certificates in the Cambridge examinations. Prior to coming to Canada in 1893 and receiving his present appointment Mr. Blakemore practiced as a consulting and mining engineer in England. He was the first President of the South Staffordshire Branch of the National Association of Colliery Managers, and among other appointments held the post of Secretary to the Board of Examiners for Mining Certificates. He is a Member of the Federated Institute of Mining Engineers, (Great Britain), and takes an active interest in the work of the Mining Society of Nova Scotia.

Dr. E. Gilpin, Jr., Deputy Commissioner and Inspector of Mines for the Province of Nova Scotia.—Born in 1850, in the City of Halifax. Is the son of the Dean of Nova Scotia, and grandson of Judge Haliburton, so widely known under his *nom de plume* "Sam Slick." In 1871, he graduated from King's College, Windsor, N.S., and then served his time at the Albion mines, Pictou County. After this he spent some time in England at the collieries of Sir George Elliot and others. Upon his return to Nova Scotia he engaged in professional work and later succeeded Sir William Dawson in examining and mapping the iron ores of Pictou County. In 1879, he was appointed Inspector of Mines in Nova Scotia; in 1886, Deputy Commissioner of Public Works and Mines. Dr. Gilpin is a frequent contributor to technical literature among which may be mentioned the Transactions of the American Institute of Mining Engineers, the Royal Society of Canada, the Federated Institute of Mining Engineers, the Nova Scotia Institute of Science, and the Mining Society of Nova Scotia. He is also a valued contributor to the columns of the Review.

Mr. John E. Hardman, S.B., M.E., President of the Mining Society of Nova Scotia.—Is a graduate of the Massachusetts Institute of Technology. His first professional experience was in the Western States, where he gained an intimate acquaintance with metalliferous mining. He visited Canada in 1884, finally locating in Nova Scotia, where he is prominently identified with gold mining, being largely interested in the operations of the Oldham Gold Company, at Oldham, and the West Waverley Gold Co. (Ltd.), at Waverley. Mr. Hardman was one of the original

members of the Gold Miners' Association, and since the formation of the Mining Society has taken an active part in all its proceedings, contributing frequently to the Transactions and evincing a lively interest in local mining legislation, many important amendments to which have been due to his wide experience and professional ability.

Mr. John Blue, C.E., M.E., President, General Mining Association of the Province of Quebec.—Born and educated in the West of Scotland, where he practised as a civil engineer. His first professional work in this country was in the States, where he found scope for his ability in an important contract on a section of the celebrated Hoosac tunnel. He then became associated with the Eustis Mining Company, and for many years has had direction of the extensive mining work carried on at their productive pyrites property at Capelton, Que. He succeeded the Hon. George Irvine, Q.C., as President of the Quebec Association at the last Annual General Meeting, and is one of the most popular mining men in the Province of Quebec.

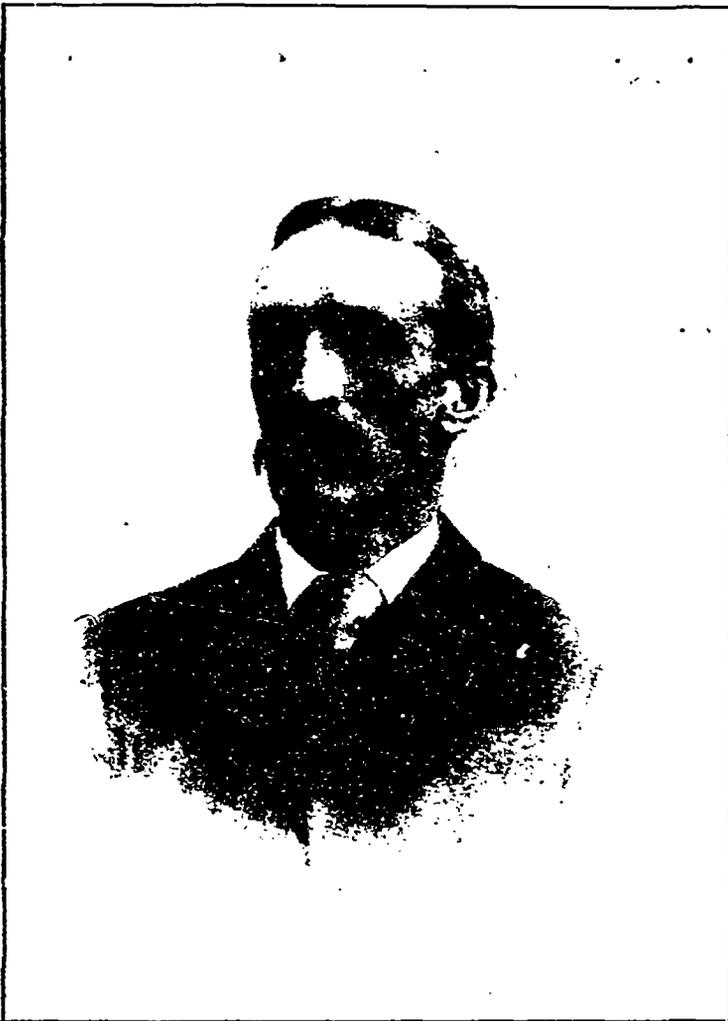
Mr. R. H. Brown, General Manager, Old Sydney Mines, C.B.—The highly popular manager of the Old Sydney Mines of the General Mining Association of London (Ltd.), is the son of the late Richard Brown, F.G.S., the first manager of the company's affairs in Canada, and the well known author of these standard works, "The Coal Fields and Coal Trade of the Island of Cape Breton," and "A History of Cape Breton." His first education was received at the Collegiate School, Windsor, N.S., and subsequently at the Engineering Department in the St. Lawrence Scientific School, Harvard University. After spending some years as assistant manager at the Lingan mines, he visited England in 1863, gaining experience at one or two of the large collieries in Northumberland, under the celebrated mining engineer, Mr. Thos. E. Forster, of Newcastle-on-Tyne. On the 1st July, 1864, Mr. Brown succeeded his father in the management of the Old Sydney Mines. In addition to this important position, Mr. Brown had also charge of the Lingan colliery from 1871 until its closing down in 1886, and of the Victoria colliery from 1882 until 31st December, 1893, when it was sold to the Dominion Coal Co. (Ltd.) Mr. Brown is, we understand, Mayor of the important community in which he resides. He is also a member of the Council of the Mining Society of Nova Scotia, to whose Transactions he is a valued contributor.

Mr. James Francis, Colliery Engineer, Old Sydney Mines.—Through an unfortunate blunder the portrait of this gentleman has in a number of copies of this issue been designated as Mr. Isaac Greenwell. Fortunately the error was discovered in time to have the correction made before the greater portion of the issue was struck off.

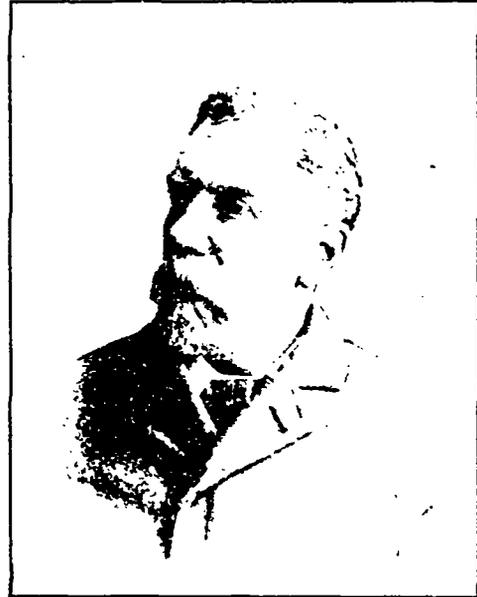
Interesting Experiments with Coal Dust.

A series of interesting experiments in shot firing and its effects upon coal dust took place at the Lower Duffryn Collieries, Wales, on August 6. The object of the experiments, which were conducted by Mr. Gwilym Jones, the manager, was to determine the behaviour of various explosives when covered with coal dust from the two-foot nine-inch and four-foot seams, both from roads and face of stalls. The first shot consisted of 1½ lb. of gunpowder covered with a small quantity of fine coal dust from the two-foot nine-inch seam roadways. The effect was a very large flame, which rose in the air to a height of about ten yards, and produced an intense heat. The same quantity of gunpowder was then tried with no coal dust, and resulted in a very much smaller and clearer flame. The next shot consisted of seven balls of compressed powder covered with some coal dust from the four-foot seam, and the same result was experienced as in the first experiment. A quantity of fine coal dust from the pit screens was tried with 1 lb. of gunpowder and two balls of compressed powder. This gave a larger flame still, accompanied with very great heat. The effect of experiments upon the dust from the face of the workings created some amount of surprise. A quantity of dust from the stalls in the four-foot seam was charged with 1 lb. of gunpowder and two balls of compressed powder, and resulted in a larger and a greater volume of flame and heat than that of the old dust. Half a pound of tourmaline (equaling 1½ lb. of gunpowder in strength) was tried in the same amount of dust. Fired electrically, it made a loud report, but there was no flame. Half a pound of ammonite fired with small coal from the face of the four-foot workings, and another charge of 1 lb. of compressed powder covered in fine dust and placed within a short distance of each other, were fired electrically. The former was fired first and the latter immediately afterwards to test the firing of dust in the air. The first shot caused no flame, but the second caused a large flame in the dust while in the air. Three-quarters of a pound of carbonite was also tried, but no flame was emitted. Mr. Jones then experimented in an arch 35 yards long, with the floor and sides constructed of crossed timber. Strips of boards were run along the sides in three rows to hold dust, so as to resemble the roadways underground, and coal dust was strewn about the floor, roofs, and sides. The first experiment was made with a charge of 1 lb. of gunpowder to resemble a volume of gas, and to see whether it would ignite the dust and produce a continuation of the flame through the arch. The powder fired in the ordinary way, but did not ignite the dust. One pound each of gun and compressed powder were tried, and ignited the dust immediately on the explosion of the powder, but, there being no current of air, the continuation of the flame did not take place. Experiments with cannon were then made, but did not cause an explosion of dust, the place proving not very suitable for the experiment. The experiments were admirably conducted, and proved very interesting to the large number of people who witnessed them. The result showed very clearly that the ordinary gunpowder, both loose and compressed, would fire the dust, whereas the high explosives made no flame.

Novel Gold Amalgamation.—A novel method of retorting small quantities of gold amalgam is announced by the Australian *Mining Standard*: We recently asked a miner, who was getting fine gold by sluicing, how he saved it. "I use quicksilver," he said, "and squeeze it through calico, and when I have got the amalgam as hard as I can—" "You retort it," we said. "No, I don't, and yet, I do—I don't as you mean, retort; but, I do, as I mean it myself. I get a potato, cut off one end, and scoop out a cavity in it large enough to take my ball of amalgam. I next take a spade or piece of flat iron, and place that over the fire, and then upon that I place the potato with the cut side down. As the amalgam gets hot the quicksilver evaporates and goes all through the potato; but it can't get through the skin, and neither can it escape by the iron, for the spade is stuck to the spade. When it is done, I take the spade off the fire and let it get cool, and then I have my gold on a button on the spade, and my quicksilver all in fine globules in the potato. I break that potato up under water and I have all my quicksilver."



Mr. R. H. Brown, General Manager, Old Sydney Mines, C. B.



Mr. James Francis, Colliery Engineer,
Old Sydney Mines

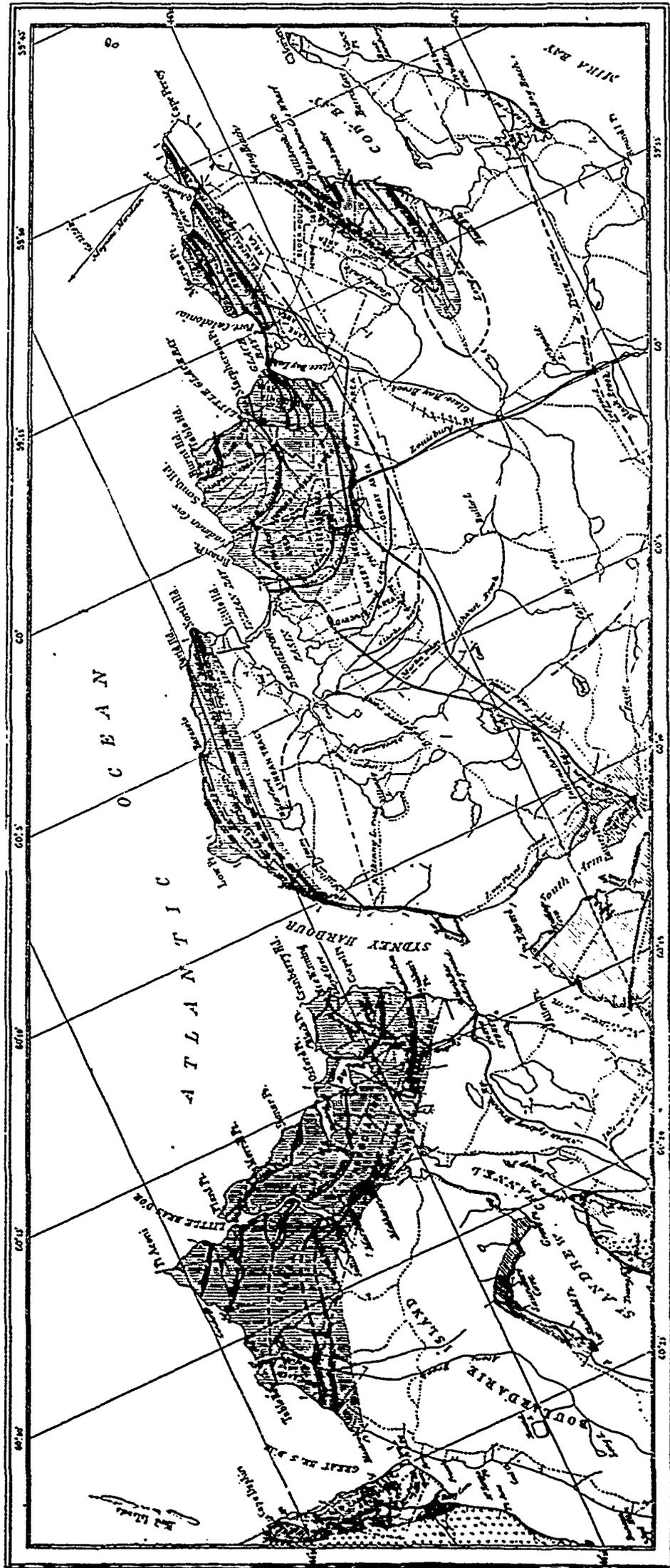


Princess Pit, Old Sydney Mines, Cape Breton. Operated by the General Mining Association of London, Ltd

THE SYDNEY COAL FIELD, CAPE BRETON, NOVA SCOTIA.

Specially prepared on a reduced scale and amended for the Canadian Mining Review, from the Map of the Geological Survey of Canada, 1875, by kind permission of Dr. A. R. C. Selwyn, C.M.G., Director.

By C. O. SENECAI, C.E., OTTAWA.



LEGEND

	Coal Measures		Co. 3 coals
	Victoria Coals		3rd class coal
	Carboniferous Limestones		Lignite
	Devonian		Direction of dip
	George River Limestones		Fault
	Laurentian		Coal area boundaries



The Sydney Coalfield.*

By HUGH FLETCHER, B.A., Ottawa.

In these notes nothing more is aimed at than to present a few facts of interest to members of the Mining Society unacquainted with the geology of the district. For fuller details reference may be made to Robb's reports for the Geological Survey from 1872 to 1875, from which they are a condensed abstract, to the "Coalfields of Cape Breton" by Mr. Richard Brown, one of the pioneer geologists of Nova Scotia, formerly manager of the Sydney mines and father of the present manager and of the Government Geologist of New South Wales, to Rutherford's "Coalfields of Nova Scotia," Dawson's "Acadian Geology," How's "Mineralogy," Gilpin's "Mines of Nova Scotia," Bell's "Mining Manual," Reports of the Department of Mines for Nova Scotia, Church's Mineral Map, and to papers in the transactions of various mining and scientific societies by Professors Lesley, Lyman, Brown, Routhledge and other observers who have described the production of coal from the yield in 1758, by the simplest appliances, of 3000 chaldrons for the use of the garrisons at Louisburg and Halifax to the complex modern process described at this meeting of the Society.

This the most valuable and most extensive coal field in Nova Scotia, known and worked for more than two hundred years, extends from Mira Bay to Cape Dauphin, a distance of thirty two miles, being bounded on the north and east by the sea; it has been estimated to contain a land area of about fifty-seven square miles, colored as coal measures and embracing the 1838 feet of Mr. Robb's maps and reports, or about two hundred square miles with the lower seams of the millstone grit, some of which are in places of workable size, and a large sea area; but there is the usual uncertainty of such estimates.

The district is intersected by bays and harbors affording fine rock sections in cliffs which rise from twenty to one hundred feet above sea level. The coal seams lie in four basins—the Cow Bay, Glace Bay, Sydney Harbor and Bras d'Or basins—separated by three anticlinals. On the east they are lost in the sea, on the west, thrust against the Laurentian rocks of St. Ann's Mountain by a great fault. The carboniferous strata in these basins have been subdivided by Mr. Brown into four distinct formations—the carboniferous conglomerate, carboniferous limestone, millstone grit and productive coal measures.

The first includes the beds of conglomerate, usually red, found along the foot of the Coxheath Hills. The carboniferous limestone, well exposed at Sydney Point, Point Edward and Kelly Cove, comprises thick beds of red and gray argillaceous shale and micaceous sandstone, beds of black and gray limestone with traces of galena and copper pyrites, and layers of gypsum here not more than five feet thick and unimportant, but largely worked in other portions of the province. On the shore of Sydney Harbor, a little above the South Bar it underlies the millstone grit and terminates at a fault near the mouth of Freshwater Creek, assumed to be a downthrow to the southwest of about 900 feet. Trunks of trees, fish-remains and shells, indicating brackish water life, are found in a three-and-a-half feet bed of calcareo-bituminous shale near Sydney Point and Point Edward. These rocks with the conglomerate are estimated by Mr. Robb to have a thickness of 4637 feet. Beneath them lie the igneous and metamorphic rocks of the Coxheath Hills; above them, the millstone grit, separated by a band of siliceous hematite.

The Millstone Grit, about 4000 feet thick, is well exposed on the roads from Sydney to Cow Bay and Mira Bay on Boulardarie Island, along the shores of Sydney Harbor and elsewhere. In the western portion of the field it consists of an almost unbroken series of beds of gray and rusty coarse sandstone, with great quantities of vegetable fossils, with occasional irregular patches of argillaceous shale and coal; whereas in the east the formation contains thicker and more regular beds of argillaceous shale, with a marked predominance of red shale and sandstone, and seams of coal, one of which at least is of workable dimensions and quality. In this eastern section are the Coal Brook seam of 1 foot 6 inches, the Tracy seam of 4 feet 1 in. and the Round Island seam of 2 feet, with smaller layers. Among these beds on the section at Mira Bay are exhibited changes both in color and in essential mineral characteristics. A stratum consisting at one place of coarse gray sandstone is frequently found when followed to no great distance, either on the strike or to the dip, to be replaced by red sandstone or by red or gray argillaceous shale. Such replacements are frequent also in the beds of the coal measures. Trunks and roots of prostrate trees are sometimes found converted into black crystalline carbonate of iron. No beds of limestone were observed in the Mira Bay section and carbonaceous shales are extremely rare and where found consist like most of the coal seams of this formation of very thin beds composed almost entirely of the matted and pyritized leaves of *Cordaites*.

At the North Head of Cow Bay, the lowest rocks exposed by the anticlinal in bold cliffs upwards of one hundred feet high, resemble the red, purple and green shales and sandstones of Mira Bay. Some of the sandstones form conspicuous features in the physical geography of the district, constituting high ridges crowned with large loose blocks. Westward from this point the millstone grit rocks are no where found on the open Atlantic coast until reaching Cape Dauphin. They form the Bird Islands of the west as they form Flint Island at the eastern end of the district. The formation appears to thin to 1800 feet at Kelly Cove, while on Mira Bay it is 5707 feet. On the west side of Sydney Harbor it includes the Ingraham seam, two feet thick; on the east side is the Fraser or Mullins seam 6 ft. 4 in. thick, and near McPhee Brook a lenticular layer of argillaceous shale and underclay, nine feet high, constituting a miniature coal basin. To the eastward there are five seams from 1 ft. 7 in. to 2 ft. thick below the Lorway seam; on the Cow Bay road at the intersection of Fitzpatrick Brook, a seam 1 ft. 10 in. thick; while another, the LeCris seam has been worked on the Mira road by the Messrs. Cossitt and others.

The Coal Measures.—The boundary line between the millstone grit and the so-called productive measures, although important in an economic point of view, is a somewhat arbitrary one and may be regarded more as a matter of convenience than as of geological importance. As the upper beds are cut off by the sea, the entire thickness is nowhere represented. The productive coal measures, as defined by Mr. Brown and Mr. Robb, include argillaceous and arenaceous shales, for the most part gray, red and green marl, sandstone, underclay, limestone, black shales and coal, a thickness of about 1840 feet, of which from forty to fifty feet are coal and fifteen feet limestone, one set of seams running through the district. The coal contains more combustible matter than the Pictou coal and a smaller proportion of ash but a greater amount of sulphur, being at most of the collieries less inclined than at the Pictou and Cumberland mines, and therefore, as stated by Mr. Poole, not subject to the same proportionate waste in working and screening.

Shales constitute more than one half of the total thickness of the coal measures. The argillaceous shales no doubt originally consisted of fine mud, the darker shades being due to the presence of carbonized vegetable remains; some of the beds contain much pyrite and nearly all are charged with clay ironstone in thin regular layers or in spherical or ellipsoidal nodules or concretions. The shales contain a vast variety of fossil plants, chiefly ferns, their most delicate and fragile fronds and stems being beautifully preserved between the laminae. Many trunks of erect and prostrate *sigillaria* with their *stigmaria* roots attached and growing into the coal seams are also found,

the largest nearly five feet in diameter, the bark being converted into coaly matter and the interior now consisting of sandstone, carbonate of iron or argillaceous shale. The fluting of the stems is often beautifully preserved and frequently the leaf scars are visible. Occasionally the change of argillaceous shale into arenaceous shale or sandstone is so sudden as to give the beds the appearance of being faulted.

The red and green marls are argillaceous, of considerable thickness, distributed throughout all parts of the carboniferous series, seldom containing fossils.

Numerous beds of sandstone constitute the most prominent, thickest and most persistent members of this series of strata and sometimes form the roof of the coal seams. They are usually of considerable thickness up to forty or fifty feet, coarse and pebbly towards their base and sometimes assume the character of conglomerates, false bedding being prevalent in the thicker and coarser grained strata which are generally charged with casts of plants and much carbonized vegetable matter in conditions which point to deposition in troubled waters, the trunks, stems and leaves having evidently been drifted from a distance, and confusedly mixed together. Many of the sandstone beds are calcareous; a bed of this description at Lloyd Cove near Sydney Mines, furnished specimens of the footprints of a land animal, proving that it was deposited in a flat tidal estuary.

Underclays occur immediately beneath every coal seam and bed of carbonaceous shale. They are for the most part aluminous and siliceous, form good fireclays and are copiously charged with the roots and innumerable rootlets of *stigmaria ficoides* which constitute the most distinctive feature of these beds; they merge by insensible gradations into the beds upon which they rest and are generally full of ironstone nodules. They vary in thickness from a few inches to eight or ten feet, but their size and richness in vegetable remains, appears to bear no proportion to the size or purity of the accompanying coal seams. The roots spread themselves horizontally in the beds and sometimes intertwine; they are often flattened and converted into sandstone. The rootlets are generally in a carbonized state and penetrate the bed in all directions, but chiefly downwards, as if to prove that they occupy the positions in which they originally grew.

The limestones are dark gray or black, vary from half an inch to two feet and aggregate about fifteen feet in thickness, are remarkably persistent but disappear or thin out towards the eastern and western extremities of the field. They occupy a definite horizon and are rich in fossils identical with those found at the Joggins, consisting of *Naiadites*, *Spirorbis*, *Cythere*, with scales, teeth, spines and coprolites of ganoid fishes. The fish remains are generally coated with and sometimes entirely replaced by iron pyrites, and the limestone shows cone-in-cone structure.

The black shales are sometimes of the nature of cannel or pass into bituminous limestone charged with fossil shells and plants; more frequently, however, they are soft and laminated, seem to be entirely made up of the matted leaves of *Cordaites* converted into mineral charcoal and may be regarded as coarse coals. Many of the workable coal seams enclose layers or bands of such shale, and also sometimes pyritous bands which tend to deteriorate the coal.

Taking the average of all the sections measured, the total number of seams in the productive measures is twenty-four, of which six are three feet or upwards in thickness; and the total average thickness of coal may be stated at forty-six feet. The similarity and persistency of the seams over great areas is very remarkable although local variations are frequent. There is, therefore, no great uncertainty in regard to the equivalency of the various seams at different points. In establishing this there have to be taken into account the quality of the coal, the position and character of the various partings or bands of shaly matter, the mineral and fossil characteristics and the thickness of the strata between the seams, as well as the manner in which the folds and undulations have affected the general structure.

In a few instances the coal seams are split by the gradual thickening of their argillaceous partings. Sometimes seams which are of workable thickness and good quality at one place become unavailable at no great distance. In the Blockhouse seam at Cow Bay and the Victoria seam at Sydney Harbor, curious wedge-shaped masses of rock similar to that overlying the coal interrupt the continuity of the coal, as described by Mr. John Rutherford.

The cleat or cleavage of the coal coincides with the joints of the accompanying sandstones and is most prominent where the strata have been subjected to the greatest pressure. The coal seams are for the most part overlaid by a stratum of argillaceous shale, very frequently characterized by the occurrence of erect stems of *Sigillaria*, often from two to three feet in diameter and in one case nearly five feet, the spreading roots of the trees resting upon the upper surface of the coal. Instead of the usual roof shales, the coal is often followed by sandstone and a bed of sandstone is almost invariably found to overlie the roof shales at no great distance above the coal. Many interesting details in regard to the occurrence of fossil trees in these strata are to be found in Mr. Brown's writings and in Dawson's Acadian Geology.

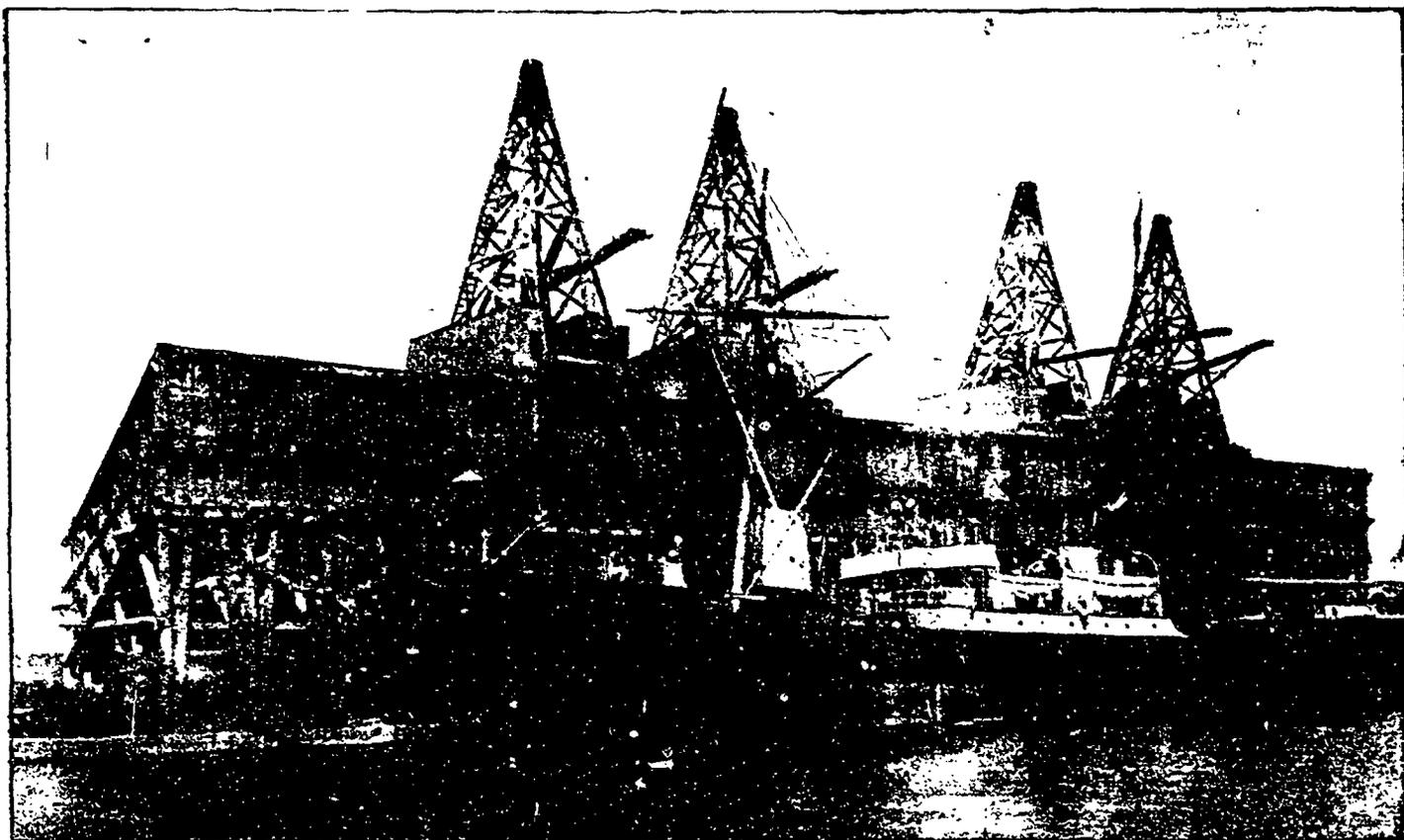
Subordinate Basins in the Coalfield.—Along the sea coast the three anticlinal and four synclinal folds are well exposed; but the upward slope of the strata from the sea causes the coal measures in the latter to rapidly run out inland, leaving large portions of the coal seams to be worked beneath the sea, as at the Sydney and Victoria mines.

The Cow Bay Basin.—The seams of this basin have been exposed both by natural and artificial means on both sides of Cow Bay. The average breadth of the basin at the shore, between the outcrops of the lowest seam, does not exceed two miles and one third and it diminishes gradually inland until it terminates at a point about six miles from the shore, as proved by several crop-pits and boreholes on the various seams. The coal seams of this and the following basins are given in the tabular view. On the South Head some of the lower seams crop out and are cut off by the ocean, thus constituting the eastern extremity of the coalfield as exposed on land. In all the sections at Cow Bay calcareous matter is very sparingly distributed, a remarkable exception to the general rule in this coalfield. On the South Head the coal seams are much more split up by clay and shale bands, yet the total quantity of coal, the approximate distances between the seams and their geographical position in relation to their strike appear to justify the equivalency noted in Mr. Robb's sections. The rocks underlying the Long Beach seam belong to the millstone grit. In the centre of the basin are the Blockhouse and Gowrie mines, on the south side the South Head colliery.

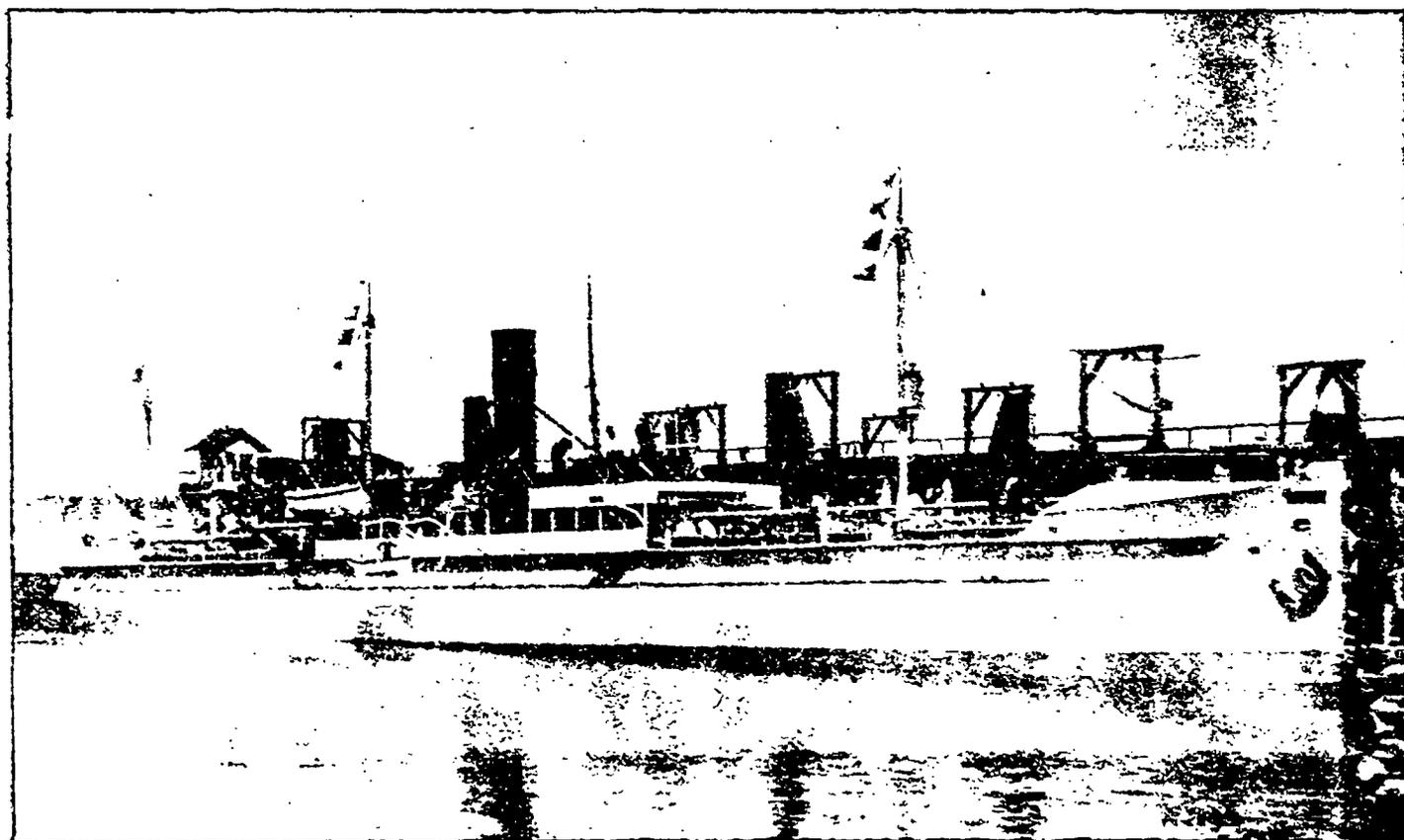
The Glace Bay Basin.—The axis separating this from the Cow Bay basin skirts the northern shore of Cow Bay at Cape Percy or North Head, the opposite dips being visible in the precipitous cliffs. In striking contrast to the Cow Bay basin that of Glace Bay is wide and has uniformly gentle dips on both sides; and includes 610 feet of strata overlying the highest beds of that basin, among which occurs the Hub seam, the highest workable coal seam in this district. The attitude of all the seams in the Glace Bay basin, extending for a length of about twelve miles, is a striking proof of the general regularity of deposit and absence of faults which characterize this district; but the section shows considerable thinning of the beds between the several coal seams as they are traced westward. The most important cannel coal found in this field lies twenty-five feet beneath the Hub seam, is 1 ft. 2 in. thick, underlined by 9 inches of ordinary bituminous coal and by 1 ft. 9 inches of coal, clay and carbonaceous shale in eleven bands; attempts have been made to work it as it contains 30.07 per cent. of volatile combustible matter, 44.42 fixed carbon and 24.68 ash. In the Pictou seam, at a distance of half a mile from the shore, in the main level of the old Bridgeport mine, a shale parting has increased to twenty-eight feet. The Ross seam at and near the Bridgeport shore is only 1 ft. 8 in. in thickness, while at the Emery mine, not quite two miles and a half to the eastward, it averages 5 ft. 3 in.

* Paper read before the Mining Society of Nova Scotia.

DOMINION COAL CO. Ltd.



New Coal Handling Towers at Point St. Charles, Montreal.



S. S. "Turret Bay" loading coal at Louisburg Pier, Sydney, C. B.

Situated in the Glace Bay basin are the Schooner Pond, Ontario, Caledonia, Glace Bay, Emery, Reserve, Lorway, Gardener, International and Bridgeport mines.

The Sydney Harbor Basin.—The next basin includes the Lingan, Barasois, Low Point and Sydney mines districts, extends from Indian Bay and Bridgeport Basin to Point Aconi and embraces all the coal seams in the field. An anticlinal axis which skirts the north shore of Bridgeport Basin and runs thence westerly, parallel with the North Head anticlinal, to a point midway between McPhee and McKay Brooks on Sydney Harbor, divides this basin from that of Glace Bay. On the north side of this axis the rocks dip at angles varying from 12 to 16° at Lingan to 40° at Victoria Mines. From Lingan to Low Point lighthouse the strike is nearly parallel to the shore and brings the entire volume of the coal measures upon the cliffs in several fine sections which show 349 feet overlying the highest strata of the Glace Bay section; and the exposures on Sydney Harbor are equally fine.

The Lingan, Victoria, Sydney and Collins mines lie in this basin.

The Bras d'Or Basin.—West of the Little Bras d'Or, a low broad anticlinal running from Point Aconi to Saunders Cove deflects the strata to the south to form this basin, which includes the Boularderie and Cape Dauphin districts. According to Brown, Hind and others, the Little Bras d'Or runs approximately on the line of a fault, of which, however, as also of a similar supposed fault on the line of the Lingan anticlinal, Mr. Robb could find no evidence.

On the northwest side of Boularderie Island the coal measures are exposed in an unbroken section, extending, in the direction of the dip, over a distance of about six miles, from Point Aconi to the mill-stone grit, which here includes two coal seams not workable. In the Boularderie district the coal has been very little developed. In the Cape Dauphin district only the lower part of the productive measures, probably as high as the horizon of the Sydney Mines main seam, is developed; the principal seam worked at the New Campbellton mine is the continuation of the Blackrock or Number Three seam of the Sydney Mines section, and that underlying, cut in a vertical attitude in the tunnel near the mountain, is the equivalent of the Collins seam of the Little Bras d'Or. The Blackrock and New Campbellton collieries are situated within this district.

Mr. Robb's table showing the equivalency of the principal seams in the various districts and basins is here appended. It will be observed that he assumes the Blockhouse, Harbor, David Head, Victoria and Sydney Mines main seams to be the same and places them on the same horizon in the table. Most of the sections summarized in his report were carefully measured in the cliffs.

Table showing the Equivalency of the Principal Coal Seams, with the Intervals between each in the several Sections.

NAMES OF THE DISTRICTS AND BASINS.

COW BAY.

NORTH SIDE.	Strata and Coal.	SOUTH SIDE.	Strata and Coal.
	Ft. in.		Ft. in.
Block House.....	9 2	Block House.....	9 2
Seam D.....	319 1	Seam D.....	235 8
Seam E.....	130 6	Seam E.....	107 0
McAulay.....	118 0	McAulay.....	160 7
Spencer?.....	7 9	Spencer (South Head).....	4 11
Long Beach.....	215 10	Spencer.....	187 9
	5 0	Long Beach.....	330 11
	338 6		3 1
	1 4		
Total thickness coal.....	27 5	Total thickness coal.....	23 5

GLACE BAY.

EAST SIDE.	Strata and Coal.	BRIDGEPORT.	Strata and Coal.
	Ft. in.		Ft. in.
Hub.....	9 10	Hub.....	9 5
Harbor.....	366 3	Harbor.....	344 4
Bouthillier.....	5 3	Bouthillier.....	6 1
Back Pit.....	299 3	Back Pit.....	238 7
Phelan.....	2 0	Phelan.....	4 0
Ross.....	74 2	Emery.....	92 1
Lorway.....	4 9	Gardiner.....	4 0
	112 9		83 3
	8 3		8 7
	188 3		168 1
	5 6		1 8
	307 7		279 2
	4 0		5 9
Total thickness coal.....	39 6	Total thickness coal.....	39 6

LINGAN TRACT.

LINGAN SIDE.	Strata and Coal.	SYDNEY HARBOR.	Strata and Coal.
	Ft. in.		Ft. in.
Seam A.....	3 0	Paint.....	13 4
Carr Seams.....	306 2	Crandall, &c.....	176 3
Barasois.....	6 5	Victoria.....	7 11
David Head.....	190 1	Willie Fraser.....	320 3
Seam D.....	12 1	Number Three.....	6 7
North Head.....	379 3	H. McGilvary.....	308 8
Lingan Main.....	8 0	D. McGilvary.....	3 6
Seam G.....	235 0	Seam H.....	83 11
Seam H.....	3 0		4 0
	78 1		116 4
	4 0		6 3
	75 11		126 6
	8 0		2 2
	95 3		362 9
	2 6		0 10
	340 5		
	1 0		
Total thickness coal.....	47 0	Total thickness coal.....	44 6

SYDNEY MINES.

SYDNEY HARBOR.	Strata and Coal.	L. BRAS D'OR.	Strata and Coal.
	Ft. in.		Ft. in.
Cranberry Head.....	3 8	Lloyd Cove.....	8 1
Lloyd Cove.....	281 4	Seam B.....	231 7
Chapel Point.....	6 4	Sydney Main.....	4 2
Sydney Main.....	269 1	Sydney Main.....	380 7
Willie Fraser.....	3 9	Bryant.....	3 0
Indian Cove.....	322 9	Edwards.....	205 0
Seam F.....	6 0	(approx).....	2 0
Stony.....	315 10	Seam F.....	78 0
	1 4	(approx).....	5 5
	117 0	Collins.....	100 0
	4 8		2 9
	87 0		100 0
	1 7		5 0
	123 9		
	3 0		
Total thickness coal.....	30 4	Total thickness coal.....	30 5

BOULARDRIE.

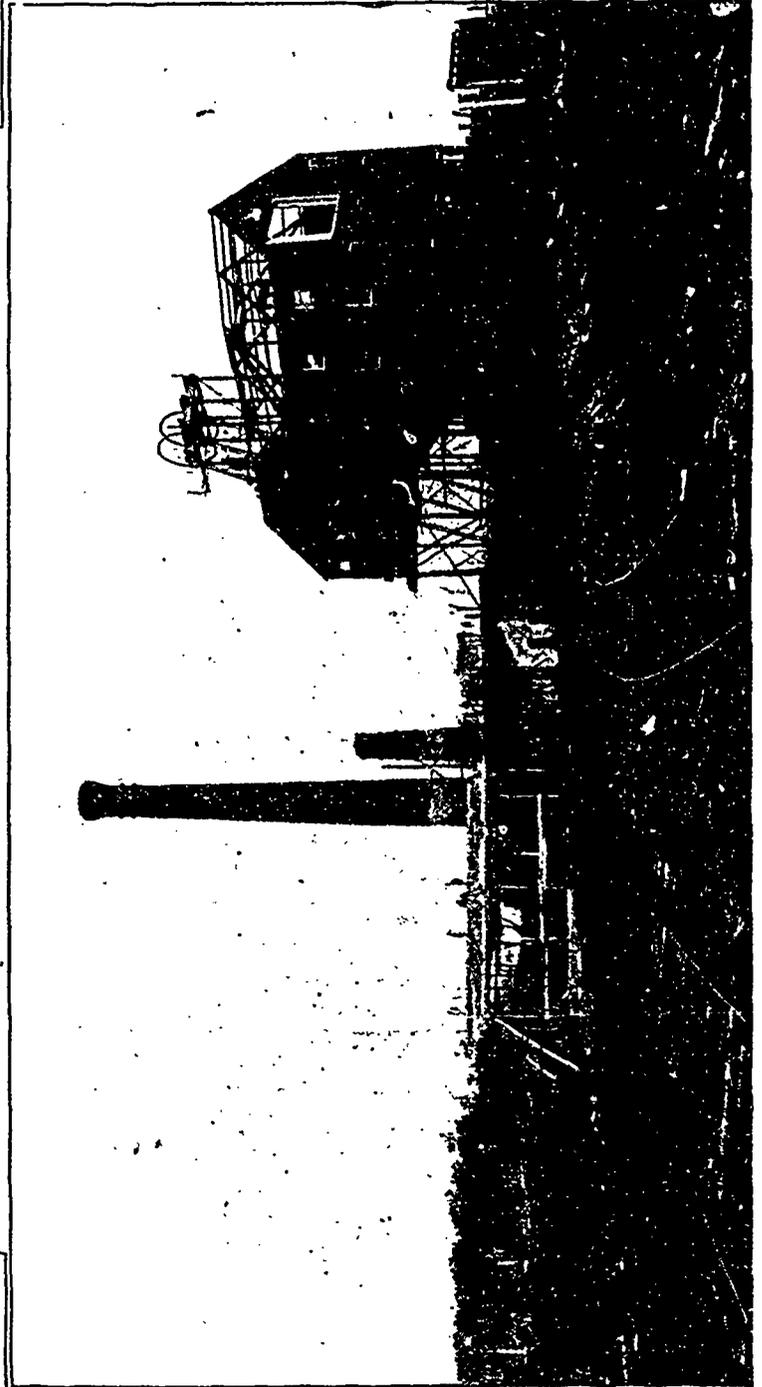
CAPE DAUPHIN.

WEST SIDE.	Strata and Coal.	MIDDLE.	Strata and Coal.
	Ft. in.		Ft. in.
Point Aconi.....	3 2	Seam D.....	1 8
Bonar.....	242 0	Four Feet.....	237 0
Stubbart.....	6 10	Seam F.....	4 0
Seam C.....	218 9	Seam G.....	53 3
Millpond.....	7 6	Six Feet.....	1 9
Blackrock.....	413 3		54 0
Seam F.....	2 9		6 0
Seam G.....	219 4		
	3 11		
	176 5		
	3 0		
	125 8		
	0 8		
	43 9		
	0 11		
Total thickness coal.....	28 9	Total thickness coal.....	13 5

DISCUSSION.

MR. R. H. BROWN—I have a doubt as to whether the Sydney Mine main seam can be regarded as identical with the Ross seam of the Victoria Mine. The Sydney Mine's seam dips North-East at an angle of seven degrees, and has been explored half way across the harbor; whereas, the Ross seam dips very steeply nearly at right angles to this direction. If identical, it would appear that the seams are separated by great dislocation.

MR. FLETCHER—I admit the possibility of the dislocation; but I think that the evidence given by Mr. Robb of the identity of the two seams is incontrovertible.



DOMINION COAL CO.—General Office Staff at Glace Bay and View of new Pit Head and Surface Works, Caledonia Colliery.

Mr. W. J. Patrick.

Mr. H. A. Nicholson.

Mr. J. R. Blackett.

Mr. J. B. Couche.

Mr. J. McKeigan.

The Organization and Development of The Dominion Coal Co. Ltd.*

By JOHN S. MCLENNAN, M.A., Boston.

The outcrops of the overlying Cape Breton coal seams still reveal in more than one place, the evidence of early working, usually attributed to the French. The character of the work as regards neatness, in some places, makes it probable that it was done by them rather than by the coal smugglers, who, under the restrictive policy more or less rigidly carried out after the cession of the Island to Britain, defied the prohibition and attacked the coal seams where they were accessible to the open sea, for the supply of the scattered inhabitants of this addition to British territory.

The French work was lawfully carried on, so far as is known by the Government, and with a shipment made to Martinique as early as 1725, Cape Breton probably leads the rest of the continent in developing an export business.

The business, however, was never continuously prosecuted until the formation of the General Mining Association in 1825. This corporation now justifies in a vigorous maturity the sound principles on which it was based, and in Mr. Brown still enjoys the benefits of hereditary administrative ability.

After the relinquishment of its monopoly of the coal and mineral lands in Nova Scotia, there grew up, with all the vicissitudes of commercial enterprises, mining company after mining company, occupying the areas to the southerly side of Sydney Harbor. Many of these were started with a view to supplying the American market. Some have continued in operation through the hardships incident to the disappearance of this market and the development of a new one in the St. Lawrence.

A few years ago there were in this area between Sydney Harbor and Cow Bay nine working collieries, operated by almost as many corporations or firms. Each was an independent entity, not only in regard to mining, but also to the transportation and marketing of its product; none of them with a shipping port open all the year round; but all of them enjoying to an almost equal degree the advantages of a situation immediately on the sea-board, of seams of coal phenomenally regular, freedom from gas and water, and an adequate supply of labor indigenous to the soil, between whom and the management long intercourse, based upon the sound principles of mutual respect and good will, had established most satisfactory relations.

Within recent years their business had been constantly increasing, which had necessitated outputs far in excess of those for which the pits had been originally designed. Remember that the great prosperity of this trade was owing to the existence of the reciprocity treaty with the United States. Unite with these conditions the belief existing in New England in many minds that coal areas so situated were the natural source of supply for the north-eastern United States, and that sooner or later, natural tendencies would overcome obstacles placed in the way of their development by fiscal legislation, and it is obvious that the advisability of uniting these various properties under one management must have presented itself to every mind interested in or familiar with the industry of this locality.

Those familiar with the local history will recall more than one attempt in this direction; and at least one pleasant gentleman, (who was represented by his local sponsor as having the requisite number of millions of dollars in his pocket), who paid us a visit, and departed, with no other material result than the postponement of the addition of a bathroom to the house of one too-confiding manager.

A somewhat settled scepticism took possession of those locally interested as to whether such a scheme, desirable as it might be in the abstract, would ever be consummated, although the game of "collieries" and their relative value was the regulation amusement whenever the mine managers gathered about the hospitable board of their Dean. This was from time to time varied by discussion of the possibilities of advancement in the working of the mines, and the marketing of their product, which this project afforded.

It is only fair to say in reference to those in charge of the properties which have since been amalgamated under the ownership of the Dominion Coal Company that they were by no means ignorant of the advantages of consolidation. It was seen that one company could afford to make outlays in seeking new markets, could establish improved loading and discharging plants, could obtain concessions, which were not within the reach of any one of some eight companies. More than this, even had any one of these companies been disposed to make the necessary outlay, the volume of its business was not sufficient to give a remunerative return. Moreover, in Cape Breton, as elsewhere, the possibility of an opening of the American markets from time to time recurred, and whenever the game of the "collieries" above referred to did not afford a sufficient scope for the post-prandial activities of the managers, a more than satisfactory warmth was invariably imported into their meetings by a discussion of the effect of "Free Coal."

It was seen by one camp that whatever might be the effect of an opening of the United States market, that effect would be very different if the New England market was to be competed for by a number of small companies rather than by one large company with local affiliations of value; for in the United States, Cape Breton would meet in competition southern coal operators already in possession of a market of large consumption, for the satisfactory supply of which adequate and expensive facilities had been provided.

Such was the condition of affairs in 1891, when rumors of a new syndicate aroused the somewhat sated curiosity of the operators, then in the enjoyment of a very prosperous season, although somewhat disturbed by an active controversy with the Local Government in reference to tenure of their properties.

It is unnecessary to go into personal details of the way in which these beginnings proceeded to consummation in the formation of the Dominion Coal Company Limited. The more picturesque personal aspect of the matter was fully exploited in the press.

This matter was brought to the attention of Mr. Henry M. Whitney of Boston. His turn of mind, his previous successful experience in similar enterprises and his connections were such as to commend this enterprise to him, and to ensure success in the precarious and difficult task of organizing and getting into operation a new company. It was favourably considered by him to the extent that he had taken some definite steps in the matter when he learned of the controversy with the Local Government, and the short and uncertain tenure, at all events as regarded rental, under which mining properties in Nova Scotia were held. The objection was fatal. He considered it unwise to invest in property so held, and it was evident that his point of view would be universal among capitalists.

The state of the case was presented to Mr. Fielding the leader of the Local Government, who, looking at the matter in a broad and businesslike way, introduced into a mining act then before the Legislature, in the Session of 1892, a clause enabling the Government to alter the tenure of mining leases,—so that this objection was removed,—and it is now possible to hold mining property in Nova Scotia for a reasonably long term at a fixed rental.

Mr. Whitney then proceeded to carry on the enterprise. He associated with himself the banking firm of Kidder, Peabody & Company; the property was examined by experts, and satisfactorily reported upon; options on the properties were obtained, and in due course closed; a special charter, based on the legislation before referred to, was obtained; and on the eve of a period of great financial stringency,

which unfortunately still obtains in the United States, the Dominion Coal Company was organized, and all its securities disposed of to the public, the number of Canadian, and particularly Nova Scotian, shareholders being an additional guarantee to the promoters of the soundness of the enterprise on which they had embarked.

So much for the organization of the Company. As for its development, the only safe way is to leave this to time. This much may be said for the aims of its management:

Already we have approaching completion, or under contemplation, a railway and piers looking to the concentration of its shipping business, the building of central workshops which will increase the efficiency of the various subsidiary industrial operations, which, in an isolated locality, such as Cape Breton, are unfortunately inseparable from coal mining. We are building dwelling houses of a good type at our new openings, which should make the conditions surrounding employment with the Company desirable.

The value of local labor is fully recognized, and this labor will, we trust, be adequate to provide for the output which development of the trade will make necessary. For a part at least of this increase in business, we shall have to meet in competition coal produced by the most approved modern methods, and we are therefore introducing machinery which will render greater the economic value of each miner, and thus enable us to meet the demands of an increasing trade without going beyond our natural territory for the supply of labor.

The advantages of consolidation have been seen in enabling us to deal more effectively with the transportation question and the marketing of our coal. Opinions have varied considerably as to the economic value of Cape Breton coal. This much is certain;—extremes on both sides are incorrect. What we believe, and what all our experience of the last year tends to prove, is that it is a good fuel; and those in New England who have tried it within the past twelve months seem in every case to be satisfied with the result.

Almost every form of administrative and economic error has been illustrated in the history of coal mining in Cape Breton. So too have been illustrated, with equal vividness, in the same little field, the principles which lead to success. To keep abreast of the progress of the art, to satisfy one's customers, and to establish relations of mutual confidence and goodwill with one's working men, are, beyond a doubt, the aims of all the enterprises represented in this room; and it lends color to a hopeful view of the future of the Mining Societies here assembled that their members may not immodestly congratulate themselves that what they have in the past achieved is the best guarantee of the attainment of these ends.

The Introduction of Endless Haulage into Cape Breton.*

By W. BLAKEMORE, M.E., Glace Bay, C.B.

The three methods of mechanical haulage which have been introduced into mines and used in connection with cables or wire ropes are:

1st. Plain rope haulage—in which the load only requires to be hauled, the empties running back by gravitation and taking the cable with them.

This is of course the simplest and most economical so long as it satisfies the requirements of the mine, and is able to deal with the tonnage raised in a given time; but it is clear to any one acquainted with mining that as the workings proceed farther from the shaft or other exit, the rope must continue to travel faster in order to cope with its work, and finally the speed required to maintain the output will of necessity be greater than is either safe or practicable. It is probable that this safe limit is reached at about 8 to 10 miles per hour on any average mining road.

2nd. The next system in vogue is the main and tail rope, by means of which the full journey is hauled out and the empty journey is hauled in. This was devised to meet the difficulty presented by a varying grade, and can be adapted to work over alternating grades perhaps better than any other system. It further possesses the advantage of only requiring a single track the same as plain haulage. Its limitations are, however, precisely the same as in that system, it breaks down when the distance becomes so great that the rope requires to run more than about 10 miles per hour.

3rd. The third system, "Endless Haulage," succeeds just where the other two fail,—distance presents no difficulty, of course within reasonable limits, and so far as practical working is concerned it is as easy to haul 1000 tons of coal per day along a road 5 miles by this system, as it would be to haul the same tonnage a distance of $\frac{1}{4}$ of a mile by either of the other systems, assuming the grade to be the same as the average of our Cape Breton mines, viz:—3 inches in the yard, or 1 in 12.

This brings us to the essential difference between endless haulage proper and every other system—whereas they haul a full trip or journey at a time, consisting of from ten to twelve trams, direct from a given station to the shaft, and then take a corresponding trip of empties back. The former knows nothing of trips or journeys, but continues to travel perpetually as its title indicates, and the trams are attached and detached singly at any point required to facilitate the constant delivery of coal to the shaft. The advantages of this are obvious—instead of being all hurry and skurry to handle the journey when it arrives and start the empties back, necessitating a larger staff of men just at the moment of its arrival than are required again until the next trip comes in, the endless rope keeps delivering constantly and uniformly one tub at a time, never varying its speed or rate of delivery so long as the workings supply the coal.

My experience leads me to the conclusion that any stated tonnage of coal can be handled at its destination by half the number of men on this system, as compared with any other system of haulage I am acquainted with.

The next great advantage is that the speed of the rope (which in practical working I limit to 2 miles an hour) is so slow that the wear and tear is reduced to a minimum, and the liability to accidents arising from the trams jumping the rails, knocking out timber, and otherwise damaging the road which is so prevalent with high speeds is practically done away with, as it is possible if the signals are perfect to stop the rope at any point in a travel of 3 to 5 feet.

The third principal advantage of endless haulage is that so slow a speed is required only a small engine is necessary with high gearing—say 1 to 7, or even 1 to 8. With this gearing I have hauled 1000 tons a day with a 12 in. diameter cylinder single engine up a slope dipping 2 inches in the yard a distance of 4200 feet.

The disadvantages are:—

1st. That a double track is an absolute necessity to work the system efficiently, and if the roof is bad this means much timbering and increased cost of maintenance—and:—

2nd. Greater attention to detail in the working. I do not mean to create the impression that this system is impracticable with a bad roof—it is all a question of cost—but I do argue that where the roof is good it is unquestionably the best system known.

The greatest objection to its use comes from those who have not mastered my second requirement "attention to details" that is the whole secret of its success or

*Paper read before the Mining Society of Nova Scotia.

*Paper read before the Mining Society of Nova Scotia.

THE INTRODUCTION OF ENDLESS HAULAGE INTO CAPE BRETON.

Plate I.—Illustrating Mr. W. Blakemore's Paper.

PLAN

—OF—
FITTINGS FOR ENDLESS HAULAGE

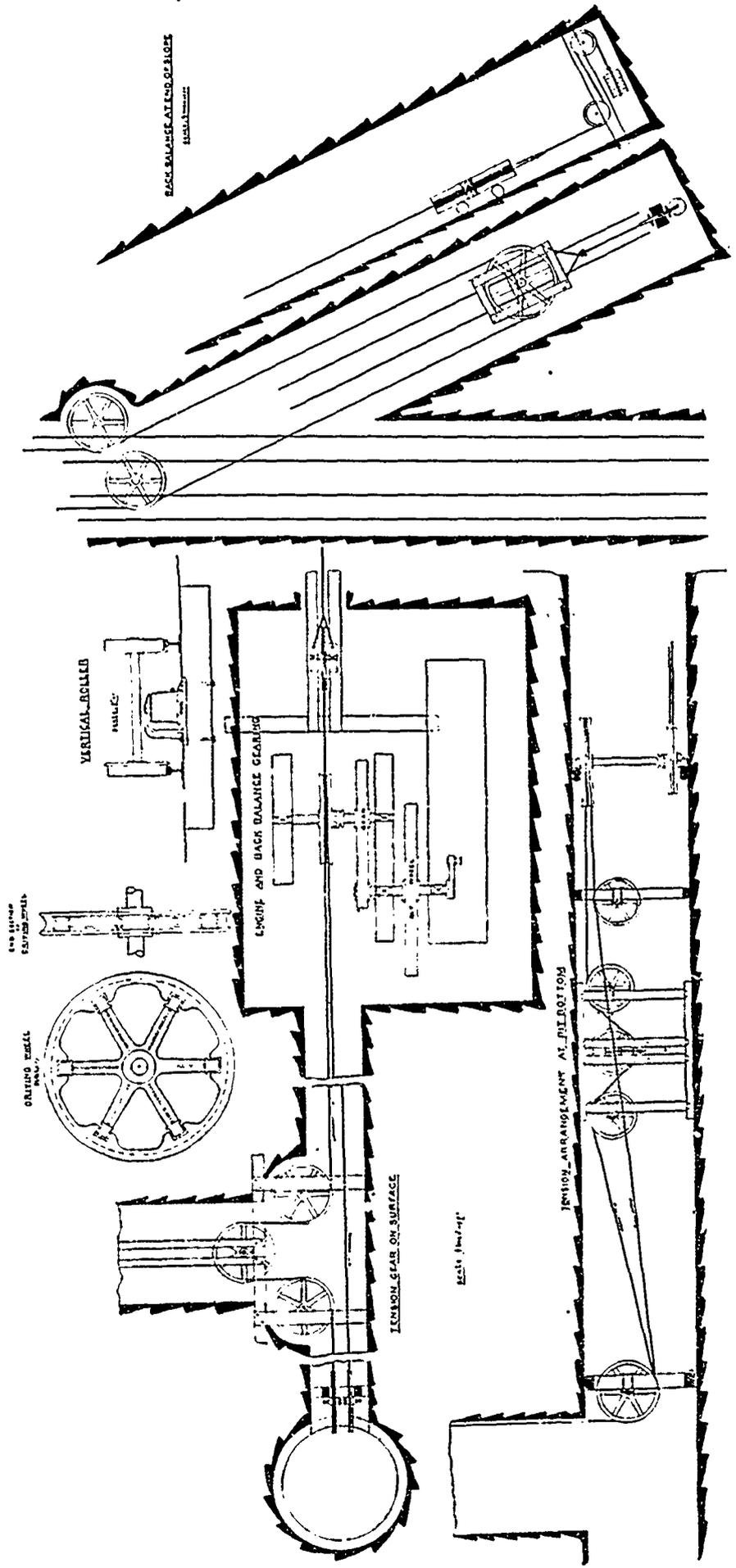
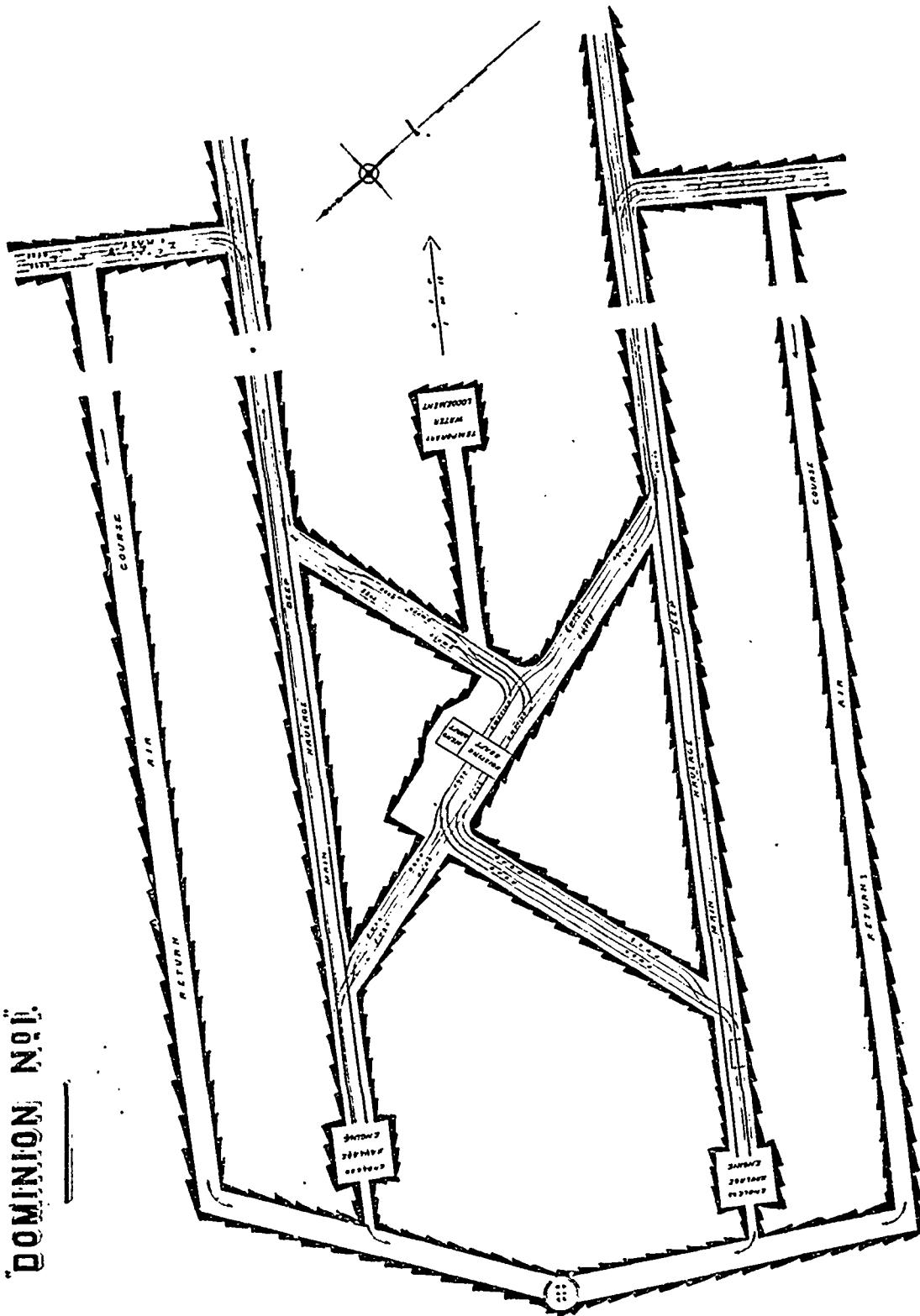


Plate II.—Illustrating Mr. W. Blakemore's Paper.

PLAN
OF
DOMINION No. 1.



NOTE.—

THIS PLAN IS THE PROPERTY OF MR. W. BLAKEMORE, AND IS NOT TO BE REPRODUCED OR USED IN ANY MANNER WITHOUT HIS PERMISSION. THE AUTHOR IS NOT RESPONSIBLE FOR ANY ERRORS OR OMISSIONS IN THIS PLAN.

SCALE: ONE INCH = 100 FEET.

failure. You must commence by putting in permanent tracks with heavy rails and sleepers upon carefully graded roads with no abrupt bends—but as many easy curves as you like—follow on by fixing a horizontal roller every 24 feet, whether it appears to be required or not, fix vertical rollers round your curves and well into the straight lead both ways, these should never be more than 6 and often as little as 3 feet apart according to the radius of the curve. Use large pulleys for your turns not less than 3 ft. 6 dia. for a 1/2 in. dia. rope, and 4 ft. 6 for a 3/4 in. rope. I need not say buy the best steel ropes—but I do say be certain to get them properly spliced, for a bad splice will spoil all the rest of your work. On a 3/4 in. rope the overlap should not be less than 35 to 40 feet, and mind that the ends are well tucked in or they will soon "catch" and the rope will inevitably be stranded.

I will now briefly explain how these ideas have been reduced to practice in Cape Breton and the first instalment of endless haulage. I think I may say successfully made.

At the Reserve Mine of the Dominion Coal Company, the Phalen seam lying at a grade of 1 in 12 is being worked. There are two slopes from the surface the "Main" and the "French" the former is down about 3000 feet and the latter 4000. Each slope has an independent single engine with cylinder 23 in. dia., and 3 ft. 6 in. stroke, the steam pressure is 50 lbs. to the square inch. Last year 500 to 600 tons a day were being raised from the French slope (which had the bulk of the working places) in the following manner: First, one engine hauled the journey of 10 to 12 tubs half way up the slope, then the second engine took hold of it and hauled it the other half, whilst the first ran the empties down to the bottom and got ready for another trip. Between times engine number two hauled an occasional trip from the Main slope which however under this arrangement only yielded 150 to 200 tons a day. The reason of all this is clear, the French slope had passed the limit at which it was possible for a single haul to fetch out the required quantity of coal. To obviate this complication as well as to increase the output, endless haulage was introduced in the following manner:—

1st. The slope was widened and a double track laid throughout with rails weighing 50 lbs. to the yard. (It must be remembered that our tubs loaded weigh from 2 tons to 2 tons 10 cwt.)

2nd. Electric signals with No. 12 copper wire and Leclanché cells were put in for instantaneous communication, which is an important point.

3rd. A driving drum (see Fig. 1.) 6 ft. in dia., was keyed on the drum shaft of the existing engine as shown in Fig. 2. I wish to point out a special feature in this wheel. It differs from the driving drums used in Canada and the States in being perfectly plain, that is, having no grooves. The power is gained by having 3 laps or turns of the rope round the drum and the special advantages are:—

(a.) That it is much simpler and cheaper.

(b.) That it furnishes an element of safety inasmuch as the rope will slip on the drum in the event of any obstacle or breakdown in the mine instead of continuing to haul and so cause a breakage either of rope or machinery as in the case of grooved or clip wheels.

4th. The gearing of the engine remained nearly the same, viz., 1 to 4, although to allow the engine to work efficiently it is contemplated to increase it 1 to 6. The engine is at present only making 50 revs. a minute instead of 70 to 80.

5th. To keep the incoming rope tight tension gearing was provided on the surface as shown in Fig. 3, and at the far end of the slope underground as in Figures 4 to 5.

6th. 4 ft. 6 dia. pulleys were used for all main turns as giving the minimum of friction and not straining the rope unduly.

7th. Vertical sheaves as shown on Fig. 6, were placed at all slight turns in the slope, but especially round the main curve approaching the bank which is one of the most difficult I have ever had to deal with in any system of haulage, being a radius of 1 in 5 and 105 in length. It should also be noted that the engine stands not in the line, but at right angles with the slope, so that the conditions as to the direction are about as awkward as can be imagined. Thus a straight lead from the engine 80 feet, a lead at right angles along the bank 100 feet, round a curve with a radius 1 in 5 of 105 feet, then down the slope dipping 1 in 12, 4000 feet. The rope rises from the drum to the bank 50 feet, then runs level 100 feet, then down the slope. In spite of these conditions the full and empty ropes work quite smoothly, which I attribute mainly to the fact that all round the curve the vertical rollers are only 3 to 4 feet apart on both tracks, and by this means the side pressure is equalized. The first day the haulage was started (2 months ago) between 200 and 300 tons were raised, to-day over 700 tons a day and this quantity is limited not by the haulage but on other grounds. It was laid down to haul 1000 tons a day and can do it easily, having raised at a busy time over 90 tons in half an hour, being at the rate of 1500 tons a day.

By putting another hauling drum on the same engine it is intended to work the main slope on the same system and thus do away altogether with one engine and battery of boilers; this work will be done during next winter. I may remark that the present output of Reserve mine is as high as 1300 tons a day as against 900 last season, and as far as I know the difference is entirely due to the new system of haulage.

As to the cost it is estimated that in enlarging the slope, equipping with machinery, ropes and appliances about \$3000 were spent. The result has been to increase the output already 300 to 400 tons a day, to give up the half use of another engine and battery of boilers, and to reduce the number of men handling coal on the surface by 6 or 7. At the present moment 4 men handle the 700 tons a day from the French slope on the endless rope, whilst it takes 10 on the main slope which still works on the old system.

Having tested its suitability in its mines the Dominion Coal Company has decided to extend its use, and at present it is being laid down in the Company's Caledonia and Little Glace Bay mines, and has been determined on for the new and important Dominion No. 1 Plant, with respect to the layout of which I had intended to make some remarks in this paper, but finding it has already reached such a length, refrain from doing so. I cannot, however, conclude without on my own behalf as a mining engineer and on behalf of the profession to which I belong and which is so honorably represented by the two societies gathered here, thanking Mr. David MacKeen, the General Manager of the Dominion Coal Company, for furnishing me with the opportunity of introducing the first instalment of this important and efficient system of haulage into Cape Breton, and I venture to think that the result will fully vindicate his foresight and sagacity.

The Railway System of the Dominion Coal Company, Limited.*

By H. DONKIN, C.E., Sydney, C.B.

The railway system acquired by the Dominion Coal Company, Limited, at the time they came into possession of their coal property in Cape Breton, consisted of the International, a standard gauge railway 12 miles in length, with a branch to Old Bridgeport mines 1/2 mile in length, and a branch 1 1/2 miles in length connecting with the Canadian Government railway at Sydney; a standard gauge railway from New

Victoria mines to shipping pier, Sydney Harbor, in length 5 miles; a standard gauge railway 1 mile in length, from Caledonia mines to shipping pier Glace Bay; a standard gauge railway 1/2 mile in length, from Glace Bay mines to its shipping pier; the Sydney and Louisbourg Railway, (so called), a narrow gauge extending from the harbor of Sydney to the harbor of Louisbourg, in length 34 miles, with a branch to Schooner Pond of 10 miles additional; and a narrow gauge railway 1 3/4 miles in length between Gowrie Mines and the Shipping Pier, Cow Bay.

The aggregate length of these railways, not including length of sidings and yard accommodation, amounts to 64 1/2 miles. Of these railways, the International carried the outputs of the mines of that name, the Old Bridgeport and the Gardener mines and was also carrying a passenger and freight traffic. The Sydney and Louisbourg railway carried the outputs of the Reserve and Emery mines to the Shipping Pier, Sydney Harbor, a distance of 12 miles, but was not in use for traffic from Reserve mines in the direction of Louisbourg or Schooner Pond. The Victoria, Glace Bay, Caledonia and Gowrie Railways carried the output of their respective collieries.

In addition to the railways enumerated and in view of the increased facilities for transportation which would be required to meet an enormously increased output of coal, the Dominion Coal Co., Ltd., decided to build a standard gauge railway from Sydney to the winter port of Louisbourg, and which should connect with the collieries in operation.

To this end survey parties were organized and took the field in the spring of 1893. The question of modifying the gradients and curvature of the existing Sydney and Louisbourg railway (so called), substituting structures intended to carry a heavier class of rolling stock, and adopting a standard gauge was first taken up and after due consideration (in which the remoteness of the so called Sydney and Louisbourg railway from the collieries in operation in the Glace Bay and Cow Bay basins formed the most important factor) was abandoned in favor of extending the railway existing between Sydney and Bridgeport, hitherto known as the International railway, on to Louisbourg.

The instructions given to the officer in charge of the survey parties were to find a line having no grades opposed to the traffic greater than one half per cent. or 26.4 feet per mile, and no curves with a less radius than 1,433 feet.

Such a line was found, but in order to obtain it a structure 3/4 of a mile in length and of 70 feet average height would have to be built across the valley of the Catalone Brook, and as all structures were to be of the most permanent character, the cost of this one was considered serious.

The question then of introducing a steeper grade at this point, with an auxiliary engine was considered and compared with the enormous cost of the structure mentioned would have been the more economical if adopted.

In completing the necessary exploratory survey for a line of railway between the International mines at Bridgeport and the Harbor of Louisbourg, limited to the grades and curves above described, it was found the length could not be brought below 31 1/2 miles and the company took up the matter of slightly increasing the grades with a view to materially decreasing the length.

Careful surveys were made with the result of obtaining a line having a maximum grade opposed to the traffic of 8 or 42 feet to the mile, reducing the distance to 27 miles and at the same time connecting with or coming within easy distance of the collieries of the Glace Bay and Cow Bay basins.

This is the line, all things considered, which the company decided to build and which is now approaching completion.

The railway now under construction between Sydney and Louisbourg differs in some respects from railways intended for general traffic, inasmuch as, for the present at least, its heavy traffic will be in one direction only, therefore, in adjusting the grades, advantage has been taken of this peculiarity in order to reduce the cost of construction and to economize distance.

The total length of the line from Sydney to Louisbourg when completed will be 37 miles in length. The maximum gradient opposed to the traffic will not exceed 42 1/2 feet to the mile on tangents, and is equated for curve resistance. The sharpest curve on the main line has a radius of 1,433 feet, and even this curve has been sparingly used. The width of the road-bed in cuttings is 22 feet, on embankments 16 feet; there will have to be moved in the formation of it about 600,000 cubic yards of material, of which a large percentage is rock. For the passage of streams and proper drainage of the road-bed there will be required about 7,000 cubic yards masonry of a class not surpassed by any on this continent. The important structures on the line, taken in their order from Bridgeport to Louisbourg, are as follows: Little Glace Bay Brook, Big Glace Bay Brook and Black Brook steel trestles 150 feet in length each, and in heights from 25 to 30 feet; Mira River bridge, three spans of steel and iron of 100 feet each, of which one is a serving span; outlet of Catalone Lake, a span of 50 feet and a steel trestle between the crossing of Catalone Lake and the Summit, 360 feet in length and having an average height of 50 feet.

There will be over 3,000 cubic yards of ballast per mile, the rails are of steel, weighing 80 lbs. per lineal yard, and these will be supported on cedar ties placed two feet centres.

The joint fastenings are of the latest, heaviest and most approved type, and steel "Servis" tie plates will be used throughout the whole length of the line. With the class of locomotive engines now in use hauling coal for the Dominion Coal Company, Ltd., the average train load of coal need not be below 600 tons to Louisbourg, but the permanent way and structures are designed and intended for a heavier class of engine, so that the train load can be materially increased if desired. The design proposed shipping pier at Louisbourg Harbor will be 600 feet in length and 90 feet in width, will have 26 feet of water at inner and 30 feet at outer end at low water, will be built of hard pine resting upon creosoted piles and will be approached by a trestle 450 feet in length.

In addition to the roads now in use and under construction, the writer has received instructions to extend the Victoria Mines Railway a distance of one mile, and also to make surveys for and to report upon the best location for a railway to serve the Low Point coal fields.

Whilst the railway from Sydney to Louisbourg is essentially a railway for the cheap transportation of coal, and has been located solely with that object in view, it will not be without interest to the travelling public.

The beautiful scenery in the vicinity of Mira Bay and Catalone Lake is unsurpassed in this country; as for historic Louisbourg—the Atlantic terminus of the line—which has been the theme of able writers and historians, it would be presumptuous on my part attempting to add anything to what has already been said and written about that royal town, which under modern conditions, though on different lines, is certainly destined to resume something at least of its former glory.

The Production of Silver and Lead in New South Wales.—The value of the silver and lead output in New South Wales during 1893 was £3,031,720, which was only exceeded once—in 1891—since the opening of the silver mines. The silver mines at Broken Hill, on the Barrier Ranges, contributed nearly the whole of the output, and approximately the quantity of silver produced from these mines during 1893 was little short of 16,000,000 ounces. This would probably be considerably increased should the companies be successful in devising a mode of treating their low grade sulphide ores at a profit.

*Paper read before the Mining Society of Nova Scotia.



Mr. John Blue, C.E., M.E., Capelon, Que.,
President Quebec Mining Association.



Mr. John Hardman, S.B., M.E., Oldham, N.S.,
President Mining Society of Nova Scotia.

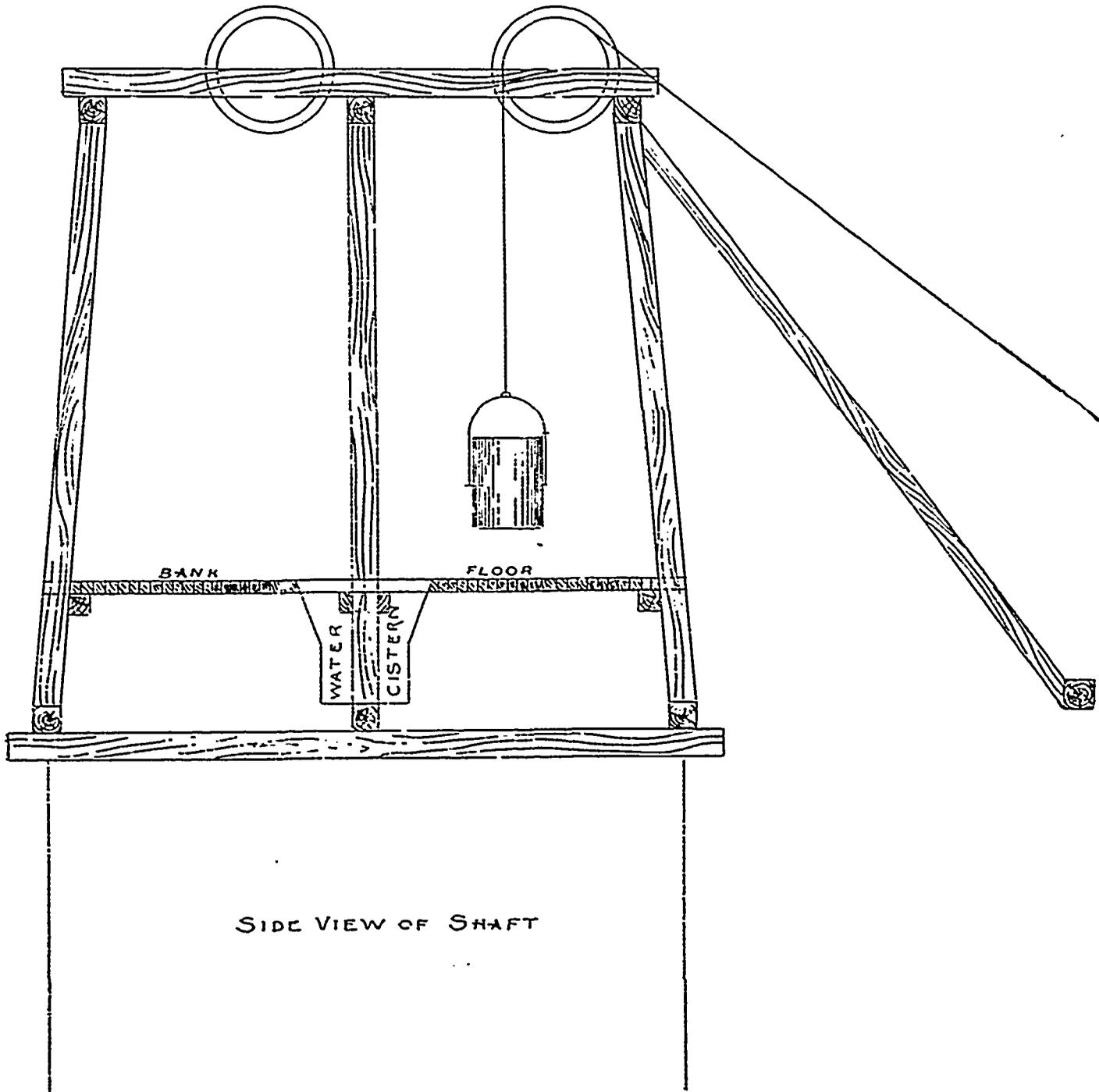


Mr. P. Neville, Deputy Inspector of Mines for
Cape Breton.



Mr. J. E. Burchall, Sydney, C. B., Owner
Cape Breton Colliery.

DOMINION COAL COMPANY, Ltd.



SIDE VIEW OF SHAFT

The Sinking of Dominion No. 1. Pit.—Plate Illustrating Mr. J. Johnstone's Paper.

Notes on Coal Cutting Machinery at the Collieries of the Dominion Coal Company.*

By J. G. HUDSON, M.E., Glace Bay, C.B.

The introduction of coal cutting by machinery into the collieries of Cape Breton was watched with much interest by all parties concerned in the production of coal, as it was acknowledged by the management of the collieries and the representatives of the different companies who had this class of machinery to sell, that the coal fields of Cape Breton presented very favorable opportunities for testing their capacity on account of the even nature of the pavement, the flatness of the seams, and their freedom from faults and impurities.

The Ingersoll Rock Drill Company of Canada accepted an offer of the Sydney and Louisbourg Coal Co. to try their Ingersoll-Sergeant machine at their Emery colliery, and on the 27th June, 1891, an invitation was sent to the managers and engineers of the different collieries then working to witness the test at the above colliery.

The machine used weighed 500 lbs., and the air was supplied by two Westinghouse air brake engines attached to a locomotive on the surface, and conveyed down the pit in two-inch pipes with the necessary hose and connections.

The room selected for the test was 21 ft. 6 in. wide and height of coal 5 ft. This room was undercut a depth of 4 ft. in 1 hour and 10 minutes.

The next test was in a level adjacent to the room already mined, and was 9 ft. wide, 4 ft. deep, and was undercut in 40 minutes. The undercut, or low wheels on the machine were then changed, and the machine placed on high wheels to enable it to shear the coal from top to bottom. The changing of the wheels occupied 15 minutes, and the level was sheared 5 ft. high, 4 ft. in depth, in 25 minutes, ready for the holes to be bored for blasting. It was estimated that each machine should mine and work 45 tons of coal in one shift.

During the summer of 1892, Mr. MacKeen, of the Caledonia Coal Co., contracted with the Ingersoll Rock Drill Company of Canada to put in an air compressing plant at the Caledonia colliery, to run eight machines, and also the necessary pipes for the air. They put down one of their 20 x 30 air compressors and eight Ingersoll-Sergeant coal cutting machines. The following figures will show work performed by their own men before the plant was accepted.

A room 18 ft. 6 in. wide was undercut in 1 hour and 50 minutes, moving wheels from undercutting to shearing, 8 minutes. Shearing 4 ft. deep, 6 ft., by 10 in. high, 25 minutes. Total time to be ready to bore the holes for the shot, 2 hours 23 minutes; estimated quantity of coal, 20 tons.

In level work the machine sheared to good advantage. The level selected was 9 ft. wide and was undercut 4 ft. deep in 1 hour and 43 minutes; sheared 4 ft. deep, 6 ft. 10 in. high in 55 minutes; shifting wheels from undercut to shearing, 16 minutes. The machine was then moved to the next level 250 feet away in 21 minutes, when the same man mined a level 9 ft. wide, 4 ft. deep in 1 hour and 30 minutes; preparing to shear and changing wheels, 14 minutes; shearing 4 ft. deep, 6 ft. 10 in. high, 59 minutes.

From the foregoing figures it will be seen that the time occupied in performing the various operations was very much less than by the ordinary methods of mining. As far as I am able to judge, about one-sixth of the time, apart altogether from the question of actual cost, it will be seen that this is a great advantage in the production of the largest possible output in a limited period, as well as enabling the mine owner to produce a larger tonnage of coal with the same number of men. The facility with which the machines can be adapted to the different processes is also worthy of notice.

During the shipping season of 1893 the following rates were paid at Caledonia colliery for hand picks in rooms 18 ft. wide and 6 ft. by 10 in. high, 35½ and 41 cents per ton. The machine men received 30 cents per ton for rooms the same height, the coal mined from the machines being loaded into the tubs under the same conditions as the hand picks, the company finding the machines and oil, and also running and laying up the pipes to within 50 feet of the working face.

The following figures will show the amount of coal mined from some of the Ingersoll-Sergeant machines working at Caledonia colliery during this period.

Pit worked 11 days.

Two rooms to each machine.

Gillis and Casey, the machine runners, employing two loaders to fill their coal, received 30 cents per ton of 2,240 lbs., sent up 416 tons.

McIntyre and Pass, employing two loaders, 427 tons.

Campbell and McDonald, employing two loaders, 463 tons.

In all cases it was found that men with machines made better wages than those men who were employed with the small picks, but coal had to be taken away from them quickly so that it did not accumulate and prevent the easy running and shifting of their platforms, and the machines could be worked to the best advantage by having two rooms to work in, so that when one was undercut the machine could be removed through the cross cut into the next room, ready for working again, whilst the loaders were filling the coal in the first room, and so on, alternately working one room after another.

In driving levels the machines were found to work to good advantage both in reducing the cost of yardage and the increasing amount of work in a given time.

It has always been a mooted point whether the coal produced by machine mining is of as good quality and size as that obtained by the ordinary method.

This question is one to which I have given very careful attention and observation, having day after day examined coal in rooms adjacent to each other, worked by the two methods, and I am of opinion that as good round coal can be produced from machine coal cutters as by hand, and in reference to slack, while there may be a certain percentage of very fine dust made at the very back of the undercutting, yet a much better slack coal is made from the first part of the undercutting than by hand work.

The machines were not difficult to keep in order, and the amount of leakage comparatively small, the parts most liable to injury being those easy to duplicate, and a man who had been running a machine for a few months, could easily make all the connections necessary; the only parts of the machine which wear out quickly being the rubber cushions at the back of the piston.

The Harrison Coal Cutting Machine manufactured by the Canadian Rand Drill Company of Sherbrooke, Que., was also tried and worked satisfactorily, the only difference between the machines being in the mechanical construction of the air valves.

The Stanley Heading Machine was also introduced and worked both at Old Bridgeport and Caledonia. The description of a machine of this class would require a separate paper in itself, but briefly it may be described as boring a tunnel out of the solid coal 6 feet in diameter, making a perfect circle, and leaving a centre core which has to be blasted out. The advantages of this machine are that in a very short time levels would be driven, and a large area opened out, as the following measurement will show: In No. 4 East level at Caledonia Colliery, from 6 p.m. to 4 a.m. the level was extended 32 feet 6 inches, being 15 cuts of 26 inches each.

For airways and water levels, it is a most excellent machine.

The boring will in most instances give a sufficient size without further enlargements to the smooth round tunnel which offers the least resistance to the passage of

the air current, and also forms the strongest natural arch to resist super-incumbent pressure.

From the foregoing facts it will be noted that coal cutting machines of the most improved modern types can be used with advantage both on the score of economy and efficiency in the mines of Cape Breton, and that in all probability the advantages considerably outweigh the disadvantages. There can be no question that the difficulties of manipulation have been overcome, and that any miner of average intelligence can manage the machine and earn larger wages than by the drudgery of hand labor, in fact it is with this class of machinery, as with all labor saving appliances, more a question of skill than strength on the part of the user, and intelligence is afforded an opportunity to supersede mere physical force. For this reason, if for no other, the miners should hail its advent with satisfaction, and I have no doubt that they will in the near future, regard it as their best friend.

The disadvantages tell mainly against the capitalist, and consist chiefly in the heavy outlay required to put down the necessary plant and machinery to set the cutters in operation. The only motive power at present recognised to any extent is compressed air, steam being impracticable for obvious reasons, and electricity immature. The cost both of installing and maintaining compressed air appliances is necessarily high, and the working parts of the machinery apt to get out of order.

There is the further difficulty of contending with the conveyance of this motive power for long distances, as the effective air current becomes attenuated, and to retain the necessary power, increasing by large pipes have to be used as the working progresses. I have no doubt, however, that the advancing cost as well as the wide spread difficulties which have recently arisen in the labor market of so many mining districts will have the effect of stimulating scientific research and practical experiment, until the present crude appliances of electricity are perfected, when compressed air as a motive power in mines will become a thing of the past, and the most powerful and efficient force which Nature has given us, will enable all classes of mining machinery to be utilized under favourable and profitable conditions.

Sinking of Dominion No. 1 Shaft.*

By J. JOHNSTONE, Superintendent, International Colliery.

During the summer of 1893, the Dominion Coal Company decided to sink a shaft 24 feet long by ten feet six inches wide on their property, known as the Old Bridgeport, to the Phelan Seam, which was found to be eight feet six inches in thickness.

Work began on the 25th of October 1893, and by the end of the month the earth and clay were all removed, by the usual method of shovelling into dump cars, and carried some 300 feet to the railway dump. The earth and clay being about eight feet to rock, we continued about six feet into same to enable us to decide where crib bed was to be made, which was done by the sixth of November. Sinking was then stopped to allow the cribbing to be put in, thus to prevent the sides from falling in. It had been previously decided to crib the shaft with concrete made of one part cement, two parts sand and four parts broken free-stone. The cement and sand were thoroughly mixed together, wetted with water, and worked until in a pasty condition, when it was placed upon the broken free-stone, and the whole turned over four times, so that every stone became coated with the cement, and was then put directly into the casing prepared for the same.

The concrete wall was carried up from two to three feet all around the shaft to the height of ten feet from the crib bed. At four feet from crib bed there were also four additional buttresses on each side of shaft carried up with the wall, which projects out five feet by three feet wide, for the purpose of strengthening the wall, all of which was raised one foot three inches above surface line, to prevent water from flowing over and into the pit while sinking operations were going on. The wall and buttresses were completed in eight days of ten hours each, and contained 114 cubic yards of concrete, 178 barrels of cement being used.

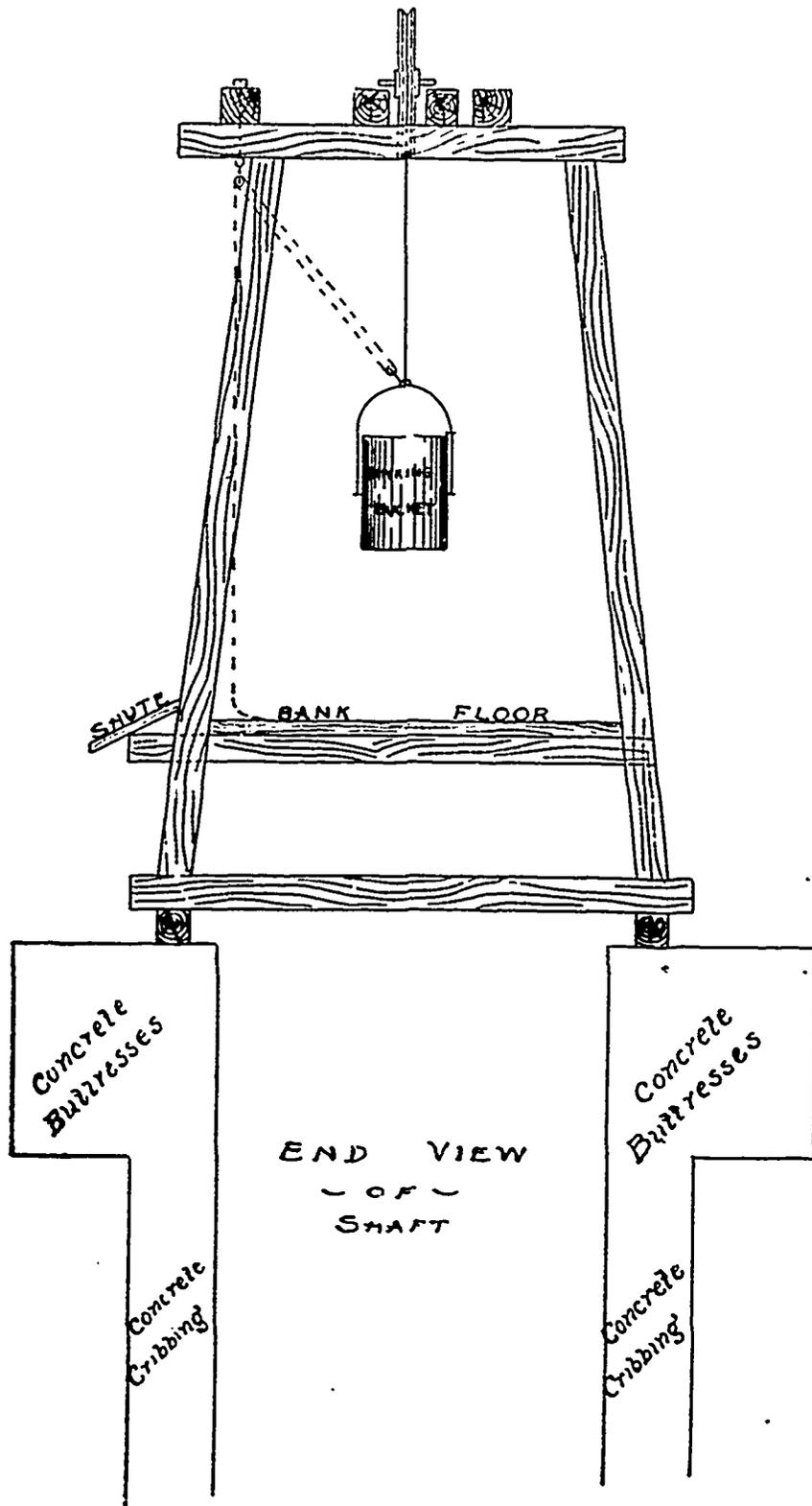
To make it clear with regard to cribbing and buttresses see annexed section "A," which shows ground plan and cross-section of same.

The concrete was allowed to stand for 12 days, during which time the necessary pulley-wheel and heap-stand were put in position for the purpose of raising the material and water, when sinking properly would begin. As soon as engine, boiler and heap-stand, with the necessary appliances were in readiness, sinking in rock began on December the first, and continued without interruption, (except by the usual delays caused by ice forming on the sides of the shaft from frosty weather.) It was finally completed on February the 17th, 1894, at the depth of 161 feet from the top of concrete. The shaft was sunk six feet below the main seam for the purpose of holding water which is continually running from the small coal seams and strata passed through in the course of sinking. The whole work of sinking was completed with but one accident, which was caused by the carelessness of the engine driver. After raising a tub of rock from the bottom of the shaft, he allowed the reversing handle of the engine to misplace, the tub returned to the bottom, striking one of the sinkers, and injuring his leg. Section "B" shows the surface line, also height of concrete above same, and down to crib bed, continuing down and showing the strata and small seams of coal sunk through to the bottom of the shaft. Being aware of the importance of keeping the material away from the sinkers, and also the removal of unknown quantities of water, which always has to be contended with in the course of sinking, buckets made of iron were provided with a carrying capacity of one ton for rock, two of which were constantly kept at work, one on the bottom while the other was being hoisted and emptied. There were also two water buckets provided, with a carrying capacity of 100 gallons each, one of which was kept on the bottom to receive the water from a ring which was cut round the shaft, at the bottom of the second coal seam, fifty feet from the surface to prevent the necessity of hauling by manual labor. The other bucket was used for taking the water from the bottom. At a depth of 25 feet the shaft was making 600 gallons of water per hour, from that to 50 feet it increased to 800 gallons, at 80 feet it increased to 1000, and at 100 feet it was 1200, until the bottom was reached, when it had increased to 1500 gallons per hour, all of which was hoisted to the bank in addition to the rock, by the buckets, and sinking was completed without the use of a pump in the shaft. Owing to the buckets being made so large, with a carrying capacity of one ton, it was quite evident that the usual method of dumping rock at the pit's mouth would neither be advisable nor safe. So as to dump the rock within as little time as possible, and not make the work laborious for the banksman, there was a pulley placed six feet from the centre of shaft with a rope over same, and hook attached so that when loaded bucket came up to the bank-floor, the hook was attached to the handle, and the bucket was hoisted about seven feet above bank-floor, the other end of the rope had a short chain attached, which was placed into a catch on post of bank-frame.

The engine was then reversed, and the bucket swung out from the shaft-mouth the distance of six feet, when the link which held the bucket in a perpendicular position was removed, and the rock dumped into a chute, provided for the purpose of conveying the rock into the dump-car.

* Paper read before the Mining Society of Nova Scotia.

* Paper read before the Mining Society of Nova Scotia.



DOMINION COAL COMPANY, Ltd.
The Sinking of Dominion No. 1. Pit.—Plate Illustrating
Mr. J. Johnstone's Paper.

The above arrangement will be better understood by referring to section "C" It also shows that it prevents the falling of rock from the bucket into the pit when the sinkers are at work, as it is not over the mouth of the pit when emptied. It also does away with the necessity of having an extra bucket on the bank, as the bucket is not detached from the rope until it returns to the bottom of the shaft again. The water was disposed of by placing the cistern beneath the floor of the bank, so that when the bucket came up, and the centre was in line with the floor, the link was removed, the bucket turned over, and the water was emptied into the cistern. From thence it was conveyed to a drain by pipes, so that it did not get back into the shaft. The water buckets were hung from the centre while the stone buckets were hung three inches below the centre, so that they would empty without any effort on the part of the bank top man. The following is a statement of labor and supplies for the sinking of shaft.

STATEMENT.

Sinking from surface to rock 8 feet	\$ 108.10
Cribbing shaft	188.26
Sinking in rock	3994.01
Other labor performed for shaft	254.35
Erecting bank-top and pulley-frame	87.29
	<hr/>
	\$4632.01
Supplies for sinking, including cement, dynamite and oil and sundry material	1710 06
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	\$6342.07
Sinking labor cost per foot	\$ 28.77
Sinking material " "	7.58
Cribbing " "	3.04
	<hr/>
	\$ 39.39

The S. S. "Turret Bay"—Novel Type of Coal Steamers employed by the Dominion Coal Company.

Among our illustrations this month we reproduce a photograph of the S. S. "Turret Bay," one of the three new type of cargo steamers employed by the Dominion Coal Company in handling their extensive St. Lawrence trade. These vessels are of an entirely novel type of construction, and have been designed, patented and built by Doxford & Sons, Ltd., Sunderland. The new design is essentially adapted for cargo steamers, and it is therefore with vessels of that kind that she may most profitably be compared. The chief virtue of the design from a commercial point of view is the large deadweight and measurement capacity it gives in terms of the registered tonnage.

If the same deadweight capacity, draught of water, and co-efficient of displacement that are embodied in the design of the "Turret Bay" were adopted in a partial awning deck steamer of the usual type, the net register tonnage would be about 20 per cent. greater. It is needless to point out what this would mean, as the working expenses of a cargo steamer may be said to vary with the register tonnage, and the one-fifth additional cargo carried would therefore be clear gain to this extent, a fact which would mean a handsome profit to a vessel of the Turret design, whilst an ordinary well decker would be working possibly at a loss. It should be stated, however, that the internal capacity for measurement of cargoes is 7 per cent. less in the Turret design than in the partial awning deck vessel.

Perhaps a closer comparison can be made between this new type of vessel and spar deck vessels. In this case also the Turret design shows an advantage in the matter of register tonnage over that of spar deck vessels, the tonnage in the latter case being 13.3 per cent. greater than in the former, whilst the cubical measurement would be 7.5 per cent. less than with the Turret type. It is claimed by the inventors that there are no special disadvantages in their new arrangement to set off against the advantages gained in this manner.

In the matter of strength it is doubtless unnecessary that we should say much, for the superiority in this respect is apparent at a glance; for the want of continuity in well deck steamers is naturally a great source of weakness in regard to provision for hogging and sagging strains, and this is well illustrated by the insistence of the classification associations upon local strengthening in the parts most affected. In Messrs. Doxford's design, what are known as the weather decks—i.e. the side decks—are continuous from stem to stern of the vessel. These decks are made of plating, of the same thickness as the shell of the vessel, and are in a straight line throughout, there being no sheer. The sides of the Turret Bay also afford a continuous line of plating, lying practically in the same vertical plane. We have, therefore, what may be described as a pair of continuous "angles" on each side of the ship, running for her whole length, and adding enormously to the strength of the structure. The turret deck extends at one level from the bow to a point considerably abaft amidships, where it is raised, and so continues to the after end, in order to provide sufficient storage capacity for cargo, so that the vessel may trim by the stern.

The dimensions of the "Turret Bay" are: Length between perpendiculars, 297 feet; extreme breadth, 40 feet; depth moulded ordinary deck line, 24 feet; depth in centre from keel to turret deck, 29 feet 11 inches; freeboard, 10 feet 4 inches; gross register, 2,198 tons; net register about 1,375 tons; register, horse power, 250 h.p.; dimensions of turret, 16 ft. 6 in. wide, 5 ft. high; dead weight capacity about 3,800 tons; cubical contents of hold about 180,000 cubic feet; capacity of main bunkers, about 250 tons.

The question of trim is an important point in the new design. The tendency of the partial awning deck steamers, which, it may be remarked, are the popular cargo carrying vessels of the day, is to trim by the bow when loaded with a homogeneous cargo. In order to meet this, they are invariably loaded leaving an empty space in the fore 'tween decks. With the Turret design the vessel can be filled up from the collision bulkhead to the machinery space, and she will yet be several inches by stern. This trimming by the stern is gained by the additional trunk space, due to the raising of the turret deck. The space thus gained is not large, but it is sufficient for the purpose. It will be understood that the raising of the turret deck involves a very different problem to the broken fore-and-aft line of the upper flange of the girder, which is entailed by the ordinary quarter deck in a cargo steamer of the usual type. As already stated, the weather decks of each side are continuous from bow to stern, and therefore the raising of the turret deck only necessitates provision for strengthening being made over one-third of the breadth of the vessel. The problem is, therefore, much simpler, and the danger of local weakness far removed. The main sheer strake, and main stringer, though not continuous in level, are continuous in regard to strength, the web of the girder being carried throughout at the turret deck level. A spar deck vessel, of the same general design

as that illustrated, would have from 15 to 20 per cent. less depth of girder than a vessel of the Turret type; the exact percentage depending on the trade for which the Turret vessel was designed.

In the matter of taking in and discharging cargo, the Turret has the usual facilities. In the matter of steering gear some modifications have been introduced. A quadrant is keyed to the rudder stock, and this quadrant is actuated by a worm, it being geared for the purpose. In order to meet the shocks of the sea on the rudder, the worm is fitted on a feathered shaft, so that it has motion in line with the axis of the shaft, but this motion is restrained by powerful springs on each side. The shaft is actuated by an ordinary steering engine, fitted in the engine room, and thus near the steam supply. The Turret design affords exceptional facilities for the carrying of boats. It will be seen that the boats are at any time available for launching in a very simple manner. Access to the vessel is easily obtained by the usual ladder, operated in a manner similar to that adopted for the boats. An interesting detail in the design of this vessel is the arrangement for discharging ashes overboard. The usual ash hoisting arrangements have been abandoned. The apparatus consists of a flap discharge valve, upon the ship's side, above the water line. Leading from this to the hopper is a strong cast iron pipe. The ashes are placed into the hopper, which is connected with the cast iron pipe referred to, in the manner shown. There is also a branch connection from the ballast pump. When the apparatus is operated, the water is directed into the pipe, and the velocity with which it enters carries it up the pipe and overboard, the ashes being drawn in from the hopper by the induced current caused by the passage of the water. The lid of the hopper need not be closed when the apparatus is in use, as the velocity with which the water is discharged carries it directly up the iron pipe. The comfort to all hands obtained by this apparatus is very great, and the saving in labor is considerable.

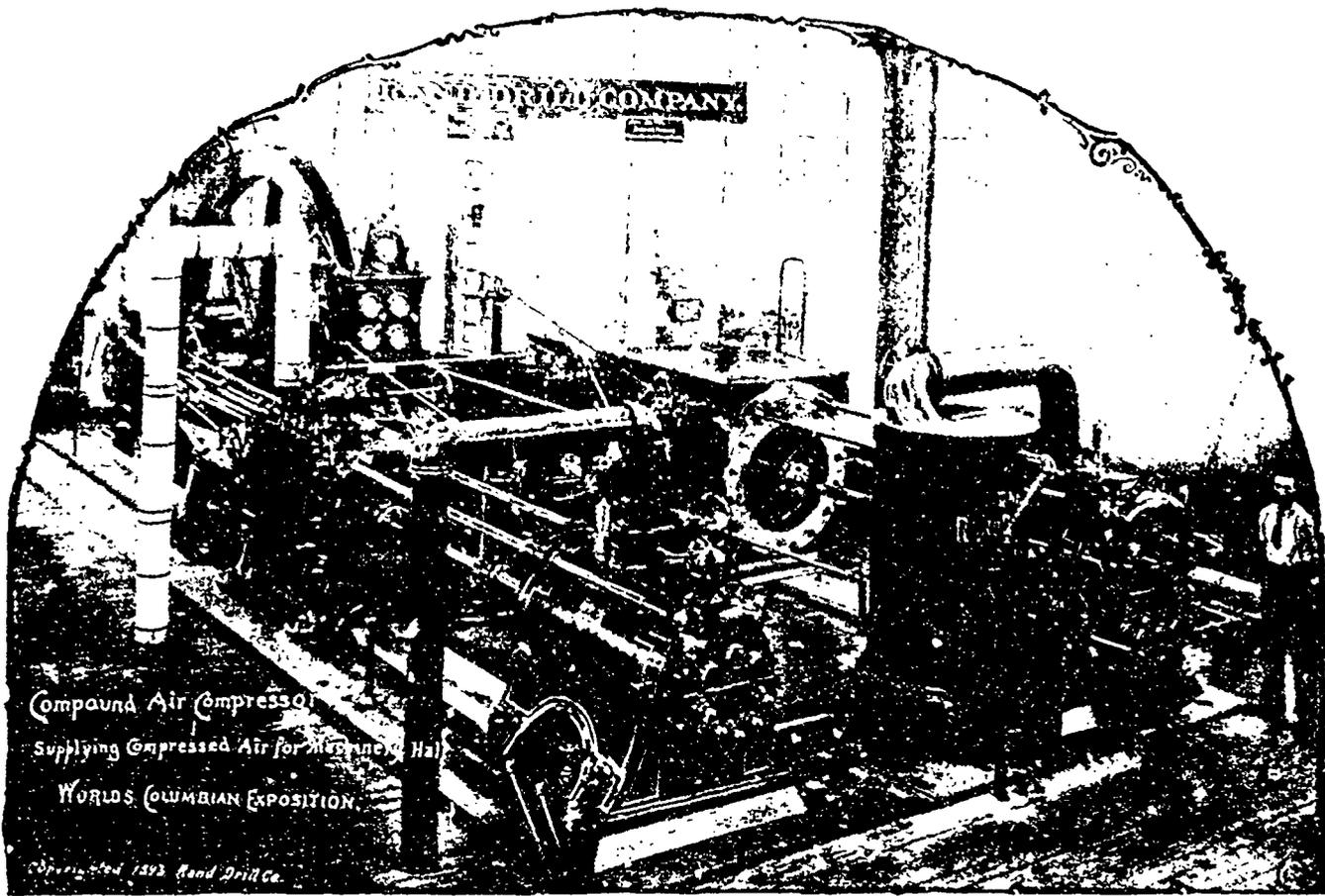
Dominion Coal Company—Notable Introduction of Improved Air Compressor Plants at the Caledonia and Old Bridgeport Collieries.

Formerly, when the applications of compressed air were more or less tentative, and the whole system was little more than experimental, engines of a comparatively cheap type were naturally employed for driving the compressors, at the expense of course of economy of fuel. With the rapid development of recent years in the various uses of compressed air, the point was reached where users began to inquire carefully into the cost of production and a demand arose for compressors embodying the highest and most advanced construction, both as regards the compressors themselves and the engines for driving them.

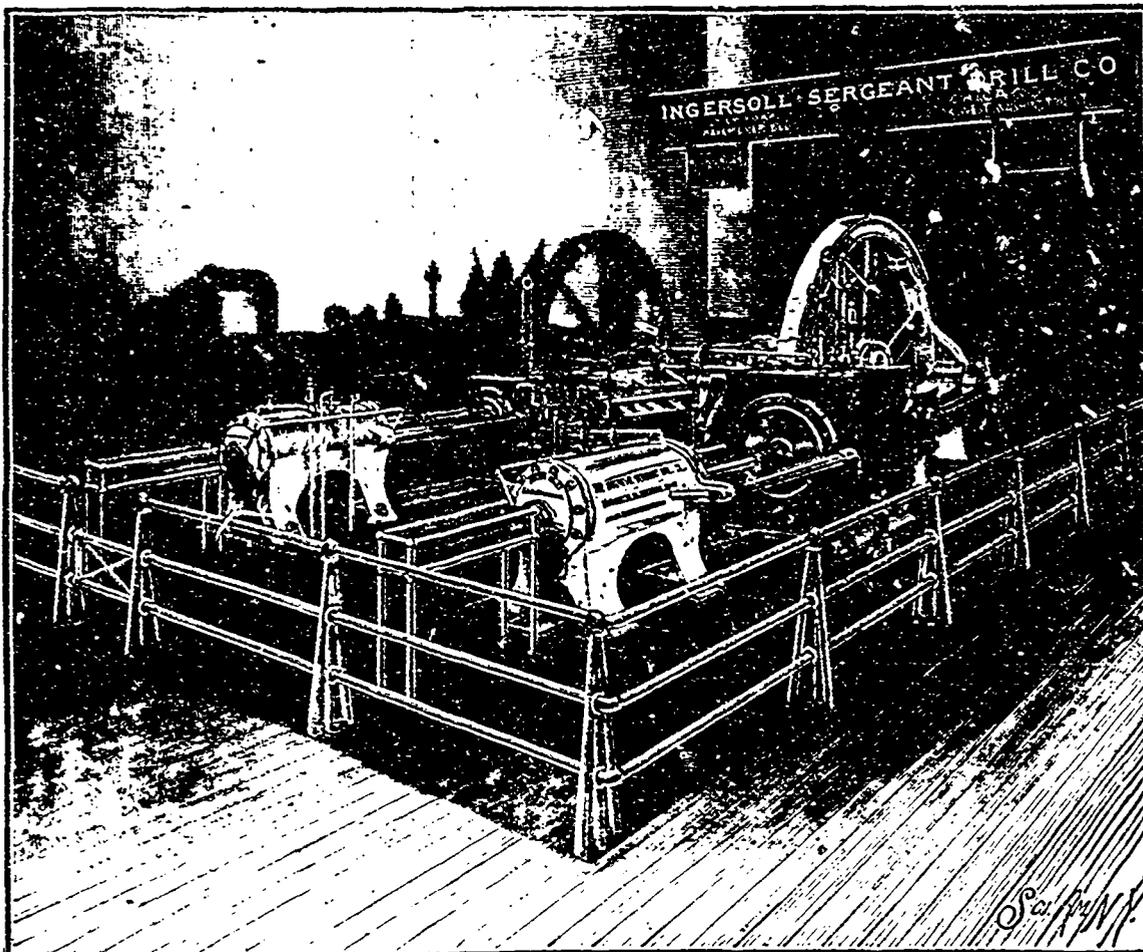
The Rand Drill Company, New York, have been pioneers in meeting this demand for machinery of the most advanced type. An example of their latest construction has been supplied the Dominion Coal Co., and is here illustrated. This machine is driven by a Corliss engine of the cross compound condensing type. The air cylinders are compounded in order to make the compression in two stages, and between the two cylinders is an inter-cooler through which the air must pass in its progress from the low pressure to the high pressure cylinder. This inter-cooler has a function analogous to the intermediate receiver of compound steam engines, but in addition to that, it has a more important function, which is the chief reason for the compound system as a whole, viz., the cooling of the air at the middle of its compression. As is well known, the compression of air develops a large amount of heat, which by expanding the air consumes a portion of the power which is subsequently lost, in consequence of the air becoming cooled before use. The purpose of the compound system is to diminish this loss by taking the air from the first cylinder when partly compressed, and hence heated to a moderate degree only, and cooling the same down to its original temperature by means of a water jacket, after which it is discharged into the second cylinder and the compression completed. There are thus two stages of compression, the second of which is begun with cold air, whereas in the usual single cylinder system the compression is continuous, the latter half being done on air already heated during the first half.

If the indicator cards from the two cylinders be combined in the manner common with compound steam engines, the result would be to show a break in the compression line, that portion which represents the completion of the compression being set back nearer the end of the card, the results indicating a considerable saving in power.

The air end of this machine is fitted with the Rand Drill Company's well known mechanically moved air valves, which constitute a marked advance on the regulation spring valves heretofore almost exclusively used. The mechanical attachment to these valves operates upon the springs with which the valves are fitted. The ordinary style of compressor valve is in principle the same as the valves of pumps, being opened by the pressure of the air and closed by springs which constantly press upon their backs. In use, such valves, as is well known, have a chattering action due to the constant conflict between the air which is trying to open them and the springs which try to close them. The action of the mechanical gear is to retract the pressure of the springs from the valves, during the period when the valves are required to be open, thus leaving the valves under the influence of the air only and doing away with the chattering. The final result, however, is much more far-reaching than this description would at first indicate. The chattering of the valves necessitates a small lift, in order to limit the violence of the action, and this by reason of the accompanying small opening, necessitates a large number of valves to give the required total opening. With large compressors this multiplicity of valves becomes formidable and complicated. The action of the mechanical gear stops the chattering, as before mentioned, and the necessity for a small lift no longer remains. Consequently, the valves are given a high lift, so as to give a free and unobstructed opening, and the total number of valves is, consequently, very largely reduced. The machine is also fitted with the Rand Drill Company's differential pressure regulator, the operation of which attracts the attention of the mechanical eye. This regulator operates upon the knock-off blocks of the Corliss gear, much after the manner of the usual ball governor, with which the compressor is also supplied, and it is the combination of these two governors acting upon the same set of knock-off blocks which forms the interesting feature referred to. When the machine is started without pressure in the air pipes, the throttle valve is thrown wide open, and the machine runs up to the highest limit of its speed until checked and controlled by the ball governor, after the manner of ordinary Corliss engines for motive power. As the pressure rises, it soon reaches a point to which the plunger of the regulator is loaded; this plunger then rising shortens the cut-off and slackens the speed, when the ball governor drops, and the compressor remains under the control of the pressure regulator, which shortens or lengthens the cut-off as may be necessary to give the speed which shall maintain the air pressure, any drop of pressure being accompanied by an increase of speed, and any rise of pressure with a diminution of speed. Should, however, the demand for air exceed the capacity of the machine, the pressure will drop below that to which the regulator is set, when it will go out of action, and the speed will increase until the ball governor acts as at the start. At times, when the demand for air approximates the capacity of the machine, this interchange of action between the two regulators is constantly taking place.



New Rand Compound Steam and Air Compressor, at the Caledonia Colliery of the Dominion Coal Company.



The Ingersoll Cross Compound Duplex Piston Inlet Air Compressor, at Dominion Coal Co's Old Bridgeport Mine.

The diameters of the air cylinders of this machine are 22 inches and 34 inches, and the diameters of the steam cylinders 22 and 40 inches, while the stroke of 48 inches is common to all.

This machine proved the chieftain of the Rand Drill Co's exhibit at last year's Chicago fair, where it received marked attention. The Dominion Coal Co. is to be congratulated upon securing so excellent a compressor.

The following is a synopsis of the features of the fine new air compressing machinery being erected for the Dominion Coal Company, by the Ingersoll Rock Drill Co. of Canada:—

High pressure cylinder 22 in. bore, 48 in. stroke. Low pressure cylinder 36 in. bore, 48 in. stroke. 2 air cylinders 22½ in. bore, 48 in. stroke. The valve gear of the engine is of the well known Corliss type, simple in construction, with all parts easily accessible and adjustable. The bed plates are of the girder type, of tasteful outline and of ample proportions and strength. The cranks are of the disc pattern balanced. The guides are circular shaped. The governor is provided with an automatic stop, which will shut off the steam and stop the engine in case the governor belt should break or come off the pulley. The cross heads, all pins and rods, are of steel and of ample proportions for severe service. The main pillow blocks are provided with removable shell boxes. The fly wheel is constructed in the most substantial manner, having oval shaped arms, the sections being held together by turned bolts in reamed holes.

In the Air Cylinders.—Free air is under thorough control. Air cylinders are completely filled at every stroke. Valves open and close by natural momentum. Cooling by water jackets and complete jacketing of heads. The new patent unloading device for air cylinders. The cylinders are driven direct from the piston rods of the engine.

All pins, including crank, cross head and valve gear pins, are made of steel, accurately turned and polished. All bearings about these pins are made of phosphor bronze, except that of the crank pin, which has brass boxes lined with genuine babbit metal, scraped to fit. The shaft in the bearing is half the diameter of the cylinder. The main bearing has an upper and a lower shell, also quarter boxes lined with genuine babbit metal scraped to fit and provided for taking up wear. The hack pillow blocks are made extra heavy. As to the polished or bright work, the ends of the cylinders, cylinder head and steam chests, together with all turned parts about the valve motion and connecting rod are beautifully polished. The cylinders are lagged, the spaces between the lagging and the cylinder are filled in with the best known non-conductor.

The compressors are of the latest and most perfect device invented for the compression of air. The free air, before admission into the cylinders, is under thorough control, and may be taken from that point which is most favourable in its dryness, reduced temperature, and freedom from dust and other foreign matter. The free air is admitted into the air cylinder through a tube (which also acts as a piston guide rod) creating a uniform draft of air in one direction only, this uniform movement giving a certain momentum to the air, causing it to fill the cylinders to their fullest capacity at each stroke.

The air inlet valves are large wrought iron rings which open and close by the natural momentum caused by the movement of the piston admitting of a large area of the inlet with but a small throw of the valve.

Cooling is effected by means of a new form of water jacket, the construction of the air cylinder admitting of complete jacketing of the heads and discharge valves, thus presenting a large cooling surface to the compressor at the end of each stroke, where the air is hottest. Another important feature is the unloading device, maintaining a uniform pressure in the receiver and a uniform speed of the engine by means of connections with a discharge valve on each end of the air cylinder. The discharge valves on the compressors are of the most approved design, and the result of many years experience.

These machines are being built at the shops of the Ingersoll Company in Montreal.

Gold Mining in Nova Scotia—a Review of Operations in the Various Localities.*

By JOHN RUTHERFORD, M.E., Stellarton.

When it occurred to the writer that he might be able to extract from the records of gold mining in Nova Scotia, something that might be worth while bringing to your notice, he placed before him, in the first instance, as the prominent question to be dealt with, the query—Is gold mining in Nova Scotia worth carrying on? and the more he reflected on this query, the stronger was the feeling that if the idea prevailing in his mind had truth for its basis, the inquiry might not be without advantage. If, on the other hand, an examination of all the circumstances in connection with the practical operations and the position of the auriferous lodes should lead to the conclusion that gold mining in this province is a failure, then a frank avowal of this cannot be considered inimical to the interests of the province. Better far that capital should be placed in less highly remunerative operations, but which have the essentials of durability and steadiness of return, than to explode it with the result only of a flash *et præterea nihil*.

The writer is sensible that in stating the preceding premiss he may be thought to be adventuring boldly, for while to some it may occur that all is not gold that glitters, this inquiry is entered on with the hope that it may be shown that there is more gold than glitters.

It is not intended on this occasion to deal with the subject from a scientific point of view, so far as that bears a geological aspect. The writer is not desirous to arouse a discussion on the formation of gold or the character and position of the matrix, but rather to treat the matter in this sense: Gold has been found here, there, over a widely spread portion of the province; it is there, in situ, and it is wanted; how can it best be got and when got, is it worth the candle?

Now, this how can it be got query is of prime importance. There lies before us a portion of ground containing veins of quartz in which is embedded, sometimes conspicuously, sometimes almost invisible, the precious metal, a metal that in its intrinsic value varies very slightly so that its profitable abstraction depends entirely on the means adopted to bring it into a marketable condition. Progress as regards the skillful application of methods of mining and the scientific treatment of minerals like every other pursuit, is gradual and we should look therefore with less wonder at the crude adaptation of mechanical appliances in the early mining operations. This remark applies very forcibly to the early stage of gold mining in Nova Scotia; though with the knowledge that had been gained in California and Australia, it might have been expected that a more rapid application of that experience would have taken place.

The writer in his position of Inspector of Mines, to which he was appointed in 1865, became acquainted with these early operations; and with regard both to the means of mining and raising to the surface, and the subsequent treatment of the quartz

* Read before the Mining Society Nova Scotia.

or rock containing the ore, it has frequently occurred to him since, that but for the fact, that sufficient gold was obtained to render the operator easy as to the question whether he was getting all the lode would yield or not, such comparatively simple appliances as were then in vogue seemed to give marvellous results.

From various sources, however—from the general manager, from the underground foreman, and from the intelligent workman's statement of wages made and the show of the lode, he gathered the prevailing opinion in those days that a field of gold of ten dwts. to the ton of quartz crushed, paid. Let this be noted as a starting point; it will be referred to subsequently.

What the writer now proposes to do is this: To briefly, and as summarily as possible state the result of the operations in the different localities, as regards the yield of gold; dividing the inquiry into decennial periods, beginning with the year 1862, to make such remarks as occur to him in the course of the inquiry and to adduce the opinions of others, competent to form them, on the causes of unsteadiness in the operations which have occasionally occurred. It is hoped that this course, without elaboration, will in its results justify the ultimate opinion arrived at in reply to the inquiry with which the subject is started.

In the report of the Chief Commissioner of Mines for 1862, the localities named in which gold mining is being carried on are Tangier, Waverley, Oldham, Lawrence-ton, Wine Harbour, Sherbrooke, Stormont, Ovens and Renfrew. In the course of the ten years forming the first of the decennial periods embraced in the review, the following localities were also brought into operation, viz., Uniacke, Gold River, Cochran Hill, Fifteen Mile Stream, Gays River, Musquodoboit and Caribou; and it may here be noted that with the exception of the Ovens at Lunenburg and Gold River near Chester, these localities are in the eastern part of the province and extend over a tract of country that may be roughly estimated at 1500 square miles.

Mining was more or less steadily carried on at all these places and the records of yield in the period now referred to—1862-1871, gave the following results:—

Average yield of gold per ton (of 2,000 lbs.) of quartz crushed:

	Oz.	Dwts.	Grs.
Tangier	—	17	10
Wine Harbour	—	14	10
Sherbrooke	1	4	14
Stormont	1	6	12
Renfrew	—	18	7
Oldham	—	17	16
Waverley	—	10	4
Montague	2	4	22
Caribou	—	16	16
Uniacke	—	18	12
Other districts	1	8	14

and an average yield from all localities of 1 oz., 1 dwt., 14 grs.

Now, this must surely be considered a very remunerative yield, and it calls for special attention in connection with the remarks that occur in the reports of the Chief Commissioner of Mines on the varying energy with which mining was carried on, and the general conduction of the operations. As instances, the following may be quoted. In the report for the year 1865 it is remarked of the Waverley district, "the great productiveness of this district for the past year is due less to any exceptional richness in the auriferous quartz lodes than to the enterprise and energy with which mining operations have there been carried on." In the report for 1867 it is stated, "leads are now operated upon profitably which at the commencement of mining operations could not have been worked except at a loss, and there is no doubt that with the increased experience in mining, and in separating the gold from the ores, many leads, now deemed worthless, will be worked; and though under the present system of manipulation the profits are large, yet it is well known that a large percentage of the gold contained in the quartz is not saved;" and in the report for 1868 the following sentences indicate the character of the operations at that time: "A number of well paying mines have been abandoned at a depth when manual and horse labor could not perform the hoisting and pumping required, the profits having been divided as made and no working capital set aside to meet emergencies and provide necessary machinery. Commencing mines on a small area of ground has also proved detrimental to the gold mining interest, and sinking shafts seems to be a mania. We give as an instance, 30 shafts sunk on one lead, in a distance of eighteen hundred feet, and 23 shafts in a distance of sixteen hundred and fifty feet on a lead not more than fifty feet from the first named. There is also a great want of appliances and skill in saving the fine gold; it is computed by good authority that at least 30 per cent. of this gold is lost in the tailings."

Again in the report for 1869 it is remarked: "In a review of the business of gold mining for the past year it is proper to state that the results have not been as large as anticipated, partly, no doubt, owing to the depression of business generally, but largely to the want of skill in management, expensive modes of mining, heavy works engaged in without an adequate object, and the utter absence of any but the most simple appliances for saving pyrites, mercury and fine gold, compared with the appliances used in other quartz mining countries."

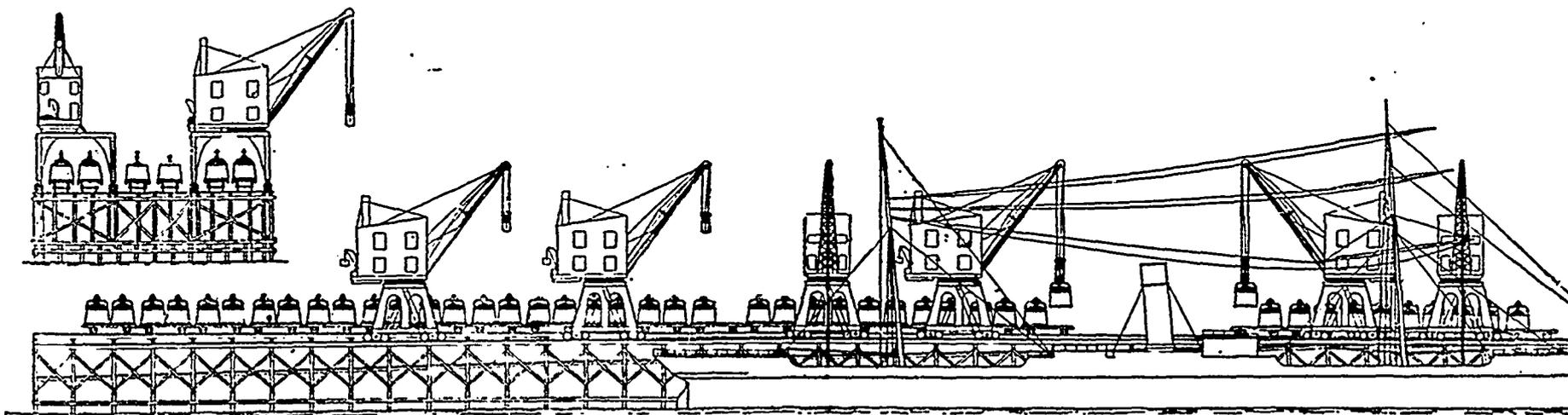
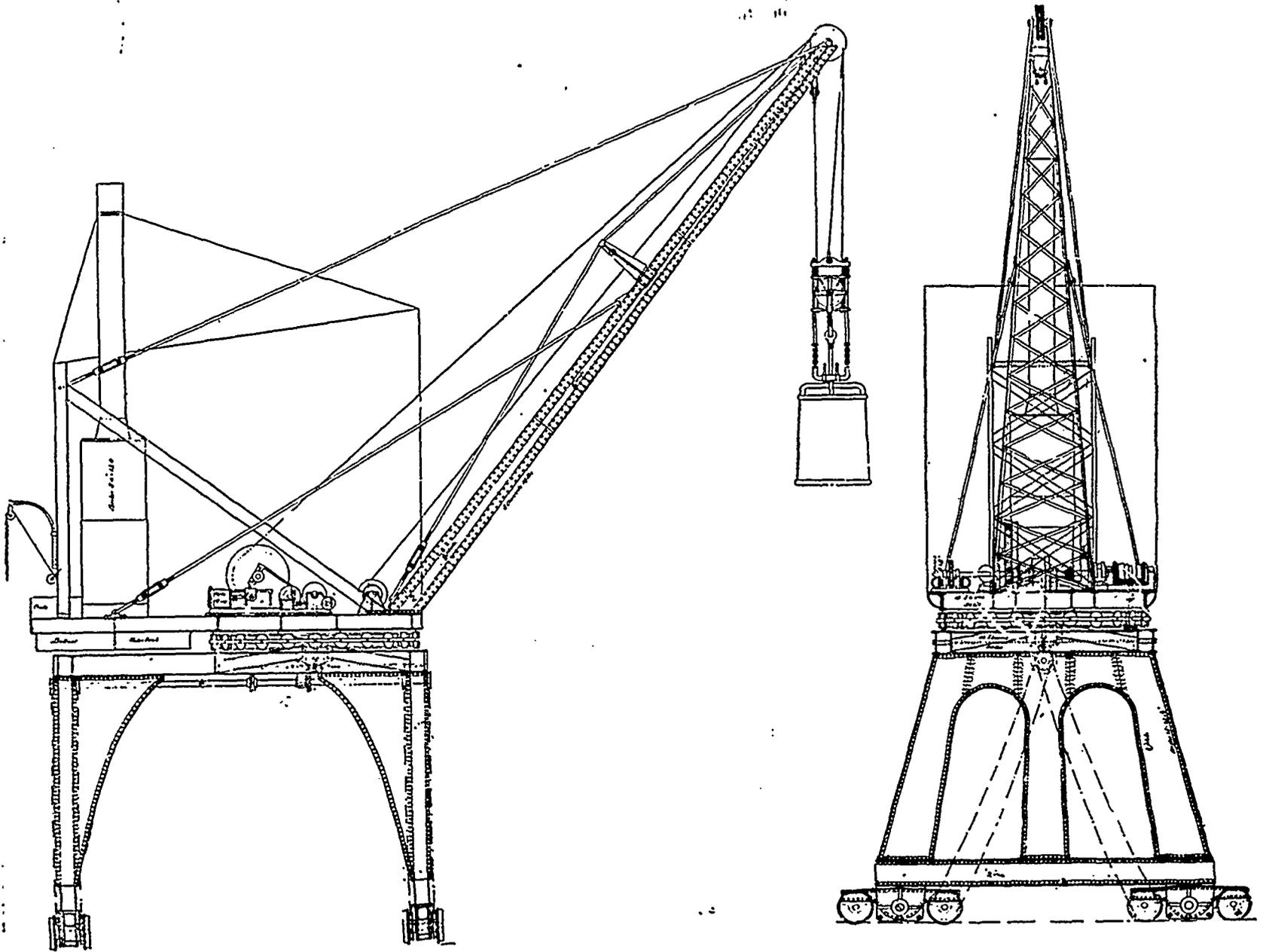
Another very trenchant explanation of the cause of suspension of working in some localities is given in the report for 1870. "Speculation," it is said, "has also been very detrimental to the mining interests, as now there is a number of paying mines (judging from returns), that are not working from the want of means to put up necessary machinery, etc., there having been so many worthless properties sold that capitalists are afraid to have anything to do with them."

It may be permitted here to refer to the discontinuance of the personal report of the Chief Commissioner of Mines. Up to the end of the year 1872 this report was a distinct feature in the general report issued from his department, and it frequently contained information of much interest, inasmuch as from his position he was able to give statements explanatory of the difficulties appertaining to the opening of new districts, and to causes of suspension of operations (such as have been referred to), during financial depression; or, until a change of ownership was effected. In most cases coming under the first head, difficulty of access to the various localities has been very considerably lessened, and the transportation of machinery and the necessary supplies of a general character is not now the hindrance that formerly existed.

But apart from this, the writer cannot but think that the Chief Commissioner's review of each year's proceedings with remarks on the special bearing of the various clauses of the Mines' Act as circumstances occur in connection therewith, would not by any means be the least interesting portion of the annual report.

In the report for 1872, the first year of the second decennial period, there is a noteworthy reference to a change of system of working that was prevailing largely at that time, that is, the adoption of the "tribute system," and in connection with this the following extract from the report of the Inspector of Mines for that year, having a bearing on the object of this paper, is submitted.

"Much has been written on the general want of method attending gold mining in Nova Scotia, and sweeping condemnations of the management and want of skill shown while working the mines have been published. Much, doubtless, most justly, and yet somewhat hasty comparisons would seem to have been drawn between the wide and comparatively easily wrought leads of other districts and the thin leads of this Province enclosed in hard and tough country rocks.



Dominion Coal Co. Ltd., International Pier.—The above illustrations show the improved coal-handling appliances now under construction by the Ludlow Manufacturing Co., Cleveland, Ohio. The pier is of following dimensions: Length, 605 feet; width, 92 feet; height, 27 feet. The derricks—12 in number—are of new design, 6 on each side of pier, and are built entirely of steel and iron, including the house, which makes them strictly fire proof. The main engine which does the hoisting and rotating are double 12 x 14 cylinders. For propelling a separate pair of engines, 6 x 8 cylinders are used. The lifting capacity of these machines is 15 tons. The buckets used are of the latest patent bottom dump, 100 inches in diameter and 64 inches high, and are tripped or discharged by the engineer at such depth in the vessel as he may desire. The buckets are placed upon flat cars and taken to the mines where they are loaded from the tippie. The cars are moved upon the track by gravity. This is the largest and most complete bucket plant in the world.

"The great expense attendant on the moving of the quartz has had as much if not more to do with the failures that have hitherto, with but few exceptions, followed all ventures in the gold fields.

"No manner of doubt, however, can be entertained that the treatment of the quartz after extraction is still crude and imperfect, and the results obtained in our mills are far behind those of other countries."

With this premonitory hint of amendment being required, the results in the respective localities during the ten years ending 1881, may now be examined.

Average yield of gold per ton (of 2,000 lbs.) of quartz crushed.

	Oz.	Dwts.	Grs.
Tangier	—	12	5
Wine Harbor	—	15	2
Sherbrooke	—	15	6
Stormont	1	5	4
Renfrew	—	7	21
Oldham	1	2	3
Waverley	—	13	10
Montague	2	2	2
Caribou	1	—	9
Uniacke	—	15	13
Other districts	—	11	2

and an average yield from all localities of 18 dwts., 4 grs.

It may be here remarked that in the course of the ten years 1871-81, gold was discovered in several localities separated in some cases by a considerable distance, and these are of much interest in this respect, they give a large extension to the field of operations of much importance.

Although the average yield in the last named period shows a falling off in the yield of 3 dwts., 10 grs., still it cannot but be considered a high average.

As it is not the intention of the writer to deal minutely with each particular district in explanation of the cause of this difference of yield, but rather to treat the subject in the general sense, the production of gold in the next decennial period, viz., 1881-91, will now be given.

Average yield of gold per ton (of 2,000 lbs.) of quartz crushed

	Oz.	Dwts.	Grs.
Tangier	—	10	12
Wine Harbor	—	11	16
Sherbrooke	—	7	15
Stormont	1	7	15
Renfrew	—	12	17
Oldham	1	8	9
Waverley	—	11	5
Montague	1	8	7
Caribou	—	8	18
Uniacke	—	12	14
Other districts	—	18	16

and an average yield from all localities of 16 dwts., 4 grs.

This statement shows a further decline in the yield of 2 dwts.

The following aggregate statement may now be added, which shows the average yield over the entire period under review, 30 years, in each locality.

Average yield of gold per ton (of 2,000 lbs.) of quartz crushed:

	Oz.	Dwts.	Grs.
Tangier	—	13	9
Wine Harbor	—	13	17
Sherbrooke	—	15	20
Stormont	1	6	10
Renfrew	—	12	23
Oldham	1	2	17
Waverley	—	11	14
Montague	1	18	8
Caribou	—	15	6
Uniacke	—	15	13
Other districts	—	19	11

A general statement of the average annual yield of gold, embracing all localities, for the 30 years 1862-91, is given in the report of the Department of Mines for the year 1891, which shows an average yield over that period of 15 dwts. 73 1/2 grs.

A further extension of gold mining occurred in this last period on which it may be remarked as noteworthy with respect to the localities, not only their geographical position, but also the average yield up to the end of the third decennial period.

In Queen's County, for instance, distant from the western range of operations in the eastern part of the province, about 75 miles, Whiteburn, one of the localities gives an average yield in the five years ending 1891, of 1 oz. 10 dwts. 12 grs., and Malaga, in the three years '89, '90, '91, gives an average of 16 dwts. 11 grs. In this connection, as indicative of the range westward of the auriferous rocks, mention may be made of the operations at Kemptville in Yarmouth Co., about 50 miles farther west. Of this locality, it is stated in the report of the Department of Mines for the year 1885, that 133 tons of quartz yielded 624 ozs. of gold.

In another locality, Rawdon, situated to the north of Renfrew, gives not only expansion to the width of gold country, if the term may be used, but also shows a satisfactory average yield during the five years ending 1891 of 18 dwts. 11 grs.

One more statement may be added to this array of figures, which it is thought, cannot lessen, but, on the contrary, should intensify the value of the preceding statements. An examination of these figures shows that the lowest average yield in the three decennial periods is as follows, the same classification being maintained:—

Minimum average yield of gold per ton (2,000 lbs.) of quartz crushed.

	Oz.	Dwts.	Grs.
Tangier	—	6	22
Wine Harbor	—	6	18
Sherbrooke	—	7	09
Stormont	—	6	06
Renfrew	—	6	03
Oldham	—	10	21
Waverley	—	4	18
Montague	1	0	07
Caribou	—	9	13
Uniacke	—	6	00
Other Districts	—	5	05
And a general minimum average of	—	8	04

This inquiry may now enter on that stage of the investigation which bears on the other side, i.e., the cost of getting. It is shown in the preceding statements what has been the yield of gold, and it has been mentioned that during the first period of ten years, it was generally admitted that 10 dwts. of gold to the ton of quartz crushed, paid. Attention has been drawn to the inadequate means of extracting and treating

the gold; and, in most cases, to a general want of skill in those conducting the operations. It will not be out of place now to adduce some evidence regarding the cost of production in order to place the yield given in the statements at its fair value.

The circumstances of size of lode and its envelop, and the character of the quartz as regards the manner in which the gold is contained therein, have doubtless their corresponding variation in the cost of mining and treating; but as these circumstances prevail more or less in all gold mining localities, it may be permitted to refer to cost of production without special reference to conditions of position.

The writer is unable to give detailed figures in this connection from personal knowledge, and he quotes therefore from published statements which bear the stamp of authority.

One of the earliest references in this connection is made in the Chief Commissioner's report for the year 1869, in which it is stated that a lode at Laurencetown that yielded 16 dwts. per ton, was raised and crushed at a cost of \$4.

In other official reports it is stated that one lode at Tangier of mixed quartz and slate could be raised and crushed at a cost of \$2.50 per ton; and in another case, a yield of gold of 4 1/2 dwts. "will pay all expenses." (a). In another locality the cost is placed at from \$ to 12 dwts. (b). These quotations refer chiefly to the first decennial period.

Inasmuch as there is considerable resemblance in all gold mining countries, it cannot be considered unfair to contrast the preceding statements of cost, due consideration being given to difference in cost of labor, materials, etc., with figures supplied from like sources as have been mentioned, of the cost in other gold fields.

It is stated in the case of two gold mines in Australia, with reference to the cost, as it may be inferred from the payable yield of gold, that at one of them 2 dwts. 21 grs. per ton proved sufficient to pay the proprietors ten per cent.; and at the other the average yield in 1870 was only 4 dwts. 20 3/4 grs., in connection with which it is remarked that the quantity of gold lost in the early stage of gold mining in Nova Scotia "sufficed," in Australia, "under careful management to give a fair profit to the adventurer." (c). And it is added: "These results are due to the practical and intelligent application of the lessons taught by experience; and if this experience is utilized and as intelligently applied in Canada as it has been in Australia, there is no reason why equally satisfactory results should not be achieved."

Further quotations in this connection would but show an equally striking contrast as regards the yield of gold in other countries, which has more than met the cost of production.

There has now been placed before you such a representation of the circumstances of yield of gold and comparative cost of mining and treating as the writer has been able to abstract from authentic records, as regards the yield, and, as he believes, from very reliable sources of information as regards the cost of production. It remains to assert the conclusion to which the inquiry has led. What are the facts that have been adduced? Do they or not permit a positive answer to the query stated at the beginning of this paper viz., "Is Gold Mining in Nova Scotia worth carrying on?" In every locality in which gold mining has been carried on in Nova Scotia the average yield of gold has been from a minimum of —oz., 8 dwts., .04 grs. to a general average of —oz., 15 dwts., .07 grs. over the extent of country in which the various localities are situated; the area of auriferous rocks covering this extent being estimated as probably over 3000 square miles.

A large field of inquiry is open for tillage in connection with the auriferous rocks of Nova Scotia; numerous very interesting and important features are worthy of study and development, but, as has been stated, it was not the writer's intention to treat the subject from that point of view. No reference has been made to the number and variety of composition of the lodes in the respective localities, no suggestions have been made respecting the pay streaks and their probably profitable extension downward, no speculative ideas have been ventured with regard to the alluvial auriferous deposits that may exist of which a very competent authority has recorded his opinion that at several localities there appeared "all the conditions required for the occurrence of rich alluvial diggings." (d.)

Enough, has, it is hoped, been advanced to warrant the assertion that gold mining in Nova Scotia is destined to be an expanding and remunerative industry. The application of higher scientific and mechanical knowledge cannot fail to bring its own reward, and over the seemingly scattered localities, that are at present but the indices of extent of auriferous rocks it may be confidently anticipated that the joint efforts of the enlightend capitalist and the skilled operator will ere long thoroughly establish, as one of the permanent industries, this branch of the valuable mineral resources of Nova Scotia. The writer in conclusion desires to express the very earnest hope and belief that the Mining Society of Nova Scotia will be the means of contributing very materially to the association above referred to.

DISCUSSION.

On the conclusion of the reading of the last named paper, the Chairman said he considered it the most debatable paper of the evening, and called upon Dr. Gilpin to say a few words in regard to the condition of gold mining in Nova Scotia.

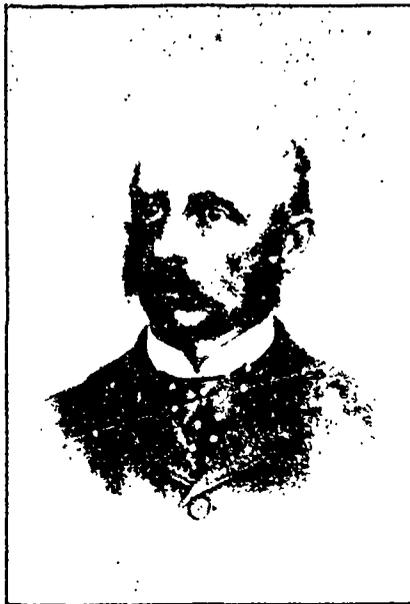
DR. GILPIN—Unfortunately, I did not hear all of Mr. Rutherford's paper. There is one point, however, regarding the question of averages to which I would like to draw the attention of the Society and those here interested in the matter, and that is: That the annual average for any particular district may be misleading. For while it may be fairly true for the whole province, in a given district a small amount of quartz crushed may yield a very large average, and upon the following year a large amount of quartz may be crushed and give a very small yield. Consequently, the average for that district for a number of years is vitiated. Mr. Rutherford spoke of the yield as being from a maximum of eight pennyweights and upwards. I would only remark that there are a great many gold miners I know of who would be very pleased to have eight pennyweights as a maximum, and go a great deal below that point. In my opinion, the statistics show that the prospect of an increased output from the small rich leads is not very encouraging. In the future the greatest returns must be sought for in the mining and milling of low grade ores and by paying greater attention to the tailings.

THE CHAIRMAN—The paper which Mr. Rutherford has just read, possesses, as I have already remarked, perhaps more debatable points than any other which has been presented this evening. It is too late to permit of a lengthy and detailed discussion, but I would like to call attention to one or two points the discussion of which could be elaborated at a future meeting. The first point has reference to the statement that the early milling was crude and that probably 30 per cent. of the gold in the quartz was lost. In the course of ten years' experience, I have never found a dump of tailings that it would pay to work over, nor which probably contained 30 per cent. of the original value of the quartz. I think this statement of the large early loss of gold should be stamped out, as it would lead to the influx of patent process men who guarantee to take out 100 per cent. of the assay value. The gold ores of Nova Scotia are of such an easy-free-milling character, that even with the crude appliances of 30 years ago, it would have been impossible to lose so large a percentage unless

(a.) Hind's Report on Uniacke, Renfrew and Oldham, 1872, pp. 53-56.
 (b.) Hind's Sherbrooke Report, p. 58.
 (c.) Selwyn's Report on Gold Fields of Nova Scotia, Geological Survey of Canada, 1870-71, p. 281
 (d.) Selwyn, ante, p. 16.



Col. Granger, C.E., Sydney, Manager
Coxheath Mines.



Dr. E. Gilpin, F.G.S., Halifax, Deputy
Commr. and Inspector of Mines.



Capt. Isaac Gragg, Boston, President
Eastern Development Co.



Coxheath Copper Mines, Coxheath, Cape Breton. Operated by the Eastern Development Co. Ltd.

the sulphurets; and my experience has been that the sulphurets in most of the veins are of too low grade even when concentrated to be payable. The average value of the concentrates or clean sulphurets in Renfrew, Cariboo, Chertcook, Beaver Dam and Waverley, that have come under my notice would not exceed \$20 per ton; and with the prices of chemicals at present ruling in Nova Scotia this grade could not be profitably worked. Another point, and one which I would mention with hearty endorsement, is the reference to the personal report of the Chief Commissioner in early Mines Reports. The position of the Chief Commissioner permits a reference to many points which could not be individualized in the tables of the reports and to suggestions and criticisms which I am sure have due weight among the miners.

The Uses of Asbestos for Fire Departments.*

By E. WERTHEIM, Chicago.

Much has been said and written about asbestos, the wonderful fibrous mineral, which will stand heat and fire to a most surprising degree.

It gives me particular pleasure to be in a position to speak on the subject to an assemblage like the one at present gathered to discuss the methods and new designs and inventions, all destined to fight the fire, to reduce its occurrence and to protect us against it. I consider it an honor to be permitted to address a body of sturdy heroes who have made the fighting of fires the noble object of their lives, all of whom know the dangers connected with their occupation, all of whom have risked their health and life in order to protect their brethren from the common fiend.

It is also particularly satisfactory that I have been given an opportunity to address you on the subject of asbestos in this province of Quebec, the very home of the mineral, in a country which I have learned to love, in a city which I have always admired.

I am no stranger in this section of the country, having been engaged in the mining of asbestos for a number of years at a distance of less than 200 miles from Montreal.

Down where picturesque mountains border the Canadian territory, and are visible far across the line of the United States; down where the clear, cold mountain streams form the abodes of the swift brook trout, where the country is covered with innumerable lakes and immense forests, where cariboo and moose still reign in almost inaccessible regions; there is the home of the wonderful mineral which for many years has invited the study of mineralogists, geologists and other scientists.

Very little was known about Canadian asbestos until a railroad (the Quebec Central) was built across that portion of the province of Quebec which lies between Quebec and Sherbrooke.

Many a sturdy fisherman, who had penetrated the forests to reach the lakes in the county of Megantic, had seen the mineral and wondered what it was. Some had carried small pieces with them, but none of them ever expected to find an industry in that section, which gives work to 2,000 men, which is turning over millions of dollars a year and which has now attained an importance never dreamed of.

The uses to which the mineral has been adopted are very numerous, and I will not take up your time describing them, in as far as they are not closely connected with your own profession.

I will limit myself to the uses which interest you mostly, and which are liable to be regarded by you as something worth seeing and worth knowing.

I am referring to the inventions which have recently been made and which consist of safety appliances against accidents from heat and fire.

Asbestos as a non-combustible, flexible fibre, which can be spun into threads and woven into cloth, naturally suggests its use as a protection against heat. Fireproof canvas, if it can be made light and strong enough, must surely command a place amongst the numerous designs and plans destined to protect a fireman's body.

Asbestos has been known for a great many years, and you will naturally be wondering why it has not been used for so many years. My answer is simply that not until recently have we succeeded in spinning an asbestos thread fine enough, and to weave a cloth fine and strong enough to allow us to make a suit which will allow a fair amount of rough wear.

Asbestos fibre is so fine, so delicate and so difficult to manipulate that experts, not more than ten years ago, would not have believed that it ever would be possible to spin a single strand which weighs less than an ounce to 100 yards, or a cloth which weighs less than 8 ounces to the square yard, and yet we have accomplished it at our works in Germany. It was not an easy job, I assure you, and many attempts have turned out unsuccessful, until shortly before the World's Fair opened, and we were in position at Chicago to exhibit samples of the goods which I have just described.

Of course such fine cloth is not very strong, and we do not recommend it for fire departments' uses—we only prove that it is possible to spin a thread and to weave a cloth of asbestos almost as fine as a cotton cloth. The thicker we spin the thread the stronger the cloth, and by doubling a number of fairly strong threads, we produce a cloth which will stand a fairly large amount of rough handling. We make an asbestos cloth now, and we have it on exhibition ready for your careful inspection, which will satisfy any reasonable expectations regarding its strength. The cloth is strong enough to be worn by a fireman, when it is a question of saving human lives and valuable property.

I will show you, by entering a burning shed which we have erected back of the Skating Rink, that it is possible, with such a suit to get near the flames and if necessary to pass through them.

I will also show you that the cloth is flexible and soft enough to allow me to walk and work in it. You will also convince yourselves that it is by no means too heavy.

You must not think for a moment that we suggest asbestos suits to be used by firemen on duty altogether instead of their present uniforms. We have not got quite that far yet, and when we have we will let you know. But what we mean to offer you is a life protecting arrangement, which will allow you to venture in dangerous places, which, without such an arrangement, you are unable to reach.

We mean to suggest that such asbestos suits should be worn by one or two men of each company, at every fire, and when there is need to enter a burning building, they are ready to do so without the amount of danger which they would enter into, were they not provided with such suits.

As you will convince yourselves, the asbestos suit covers every part of the body, and we have constructed a mask for the face which will enable a man to wear underneath one of the Smoke Respirators, which the Loeb Respirator Company of New York is exhibiting in connection with our fire-proof suits, and which will be practically demonstrated by the inventor, Mr. Loeb, of Germany, who is here amongst us. I will also wear one of his apparatus, especially constructed for the purpose of entering heat and fire. The apparatus is protected from the heat by asbestos and is as safe as the body of the man. This apparatus which will thus be shown consists of two main parts. The function of the one part is to purify and cool the smoky and hot air; the other part is to enable the inhaling of the purified air, and exhaling the consumed air in such a manner that both cannot mix. Both parts are connected by a

flexible hose. The apparatus is consequently perfectly independent of air pump and air supplying hose. Eyes as well as nose are protected independently by separate devices.

Such apparatus have been in use for a number of years in the English and Imperial German Navies, and are now being adopted in a good many European fire departments and large factories.

I would draw your attention to the practical tests which will be made with these respirators in your presence, and which will show surprising results.

For further details I would politely refer you to Mr. Loeb, as also to the catalogues which he will be pleased to hand to you.

Our asbestos suit consists of a pair of strong boots, protected by an iron sole; asbestos pants and gaiters, asbestos jacket, asbestos apron, gloves, mask and headgear.

There is no part of the whole outfit which is liable to be damaged in a fire—it is fire-proof in every sense of the word. When exposed to the heat long enough, of course, the suit will get quite hot, but it is one of the valuable qualities of asbestos that it is not only fire-proof, but also a non-conductor of heat. On that account asbestos will not suddenly become hot, but very slowly, and a man will notice the heat before it becomes unbearable and it will be a warning to him to leave the fire when he finds the suit to be getting warm.

Water will not hurt it. On the contrary, if a suit is becoming warm the water will cool it and will allow the man to stay longer in the heat.

Asbestos suits in their present perfection, such as we put before you, I am sure will give you the impression that they are worth your consideration.

Amongst other important inventions for the use of fire departments, I would like to draw your attention to fire-proof asbestos ropes, such as we also have on exhibition. We manufacture two kinds of such rope, one is pure asbestos, the other has a core of steel wire and is naturally much stronger. We have had such ropes with a wire centre tested by the German Government, and I have here with me, subject to your inspection, the official certificate, according to which a $\frac{3}{4}$ in. asbestos rope with a steel wire centre carried almost 2000 lbs. and then only one of the seventy odd strands of which the rope consists broke.

The tests made by the German Government are also interesting regarding the stretching of the asbestos ropes. With a weight of 100 kilos (220 lbs.) attached, the $\frac{3}{4}$ in. rope only stretched $\frac{1}{8}$ per cent.—with a weight of 400 lbs. it stretched less than one per cent.

The asbestos rope without the steel wire core is sufficiently strong for ordinary firemen's purposes. A $\frac{1}{2}$ in. rope will carry fully 200 lbs.—a $\frac{3}{4}$ in. rope over 300, and a 1 in. rope is safe for 500 lbs.

The weights of these ropes run as follows:—

$\frac{1}{2}$ in. rope	weighs about	10 lbs.	to	100 feet.
$\frac{3}{4}$ " "	" "	20 " "	" "	" "
1 " "	" "	40 " "	" "	" "
1 $\frac{1}{4}$ " "	" "	70 " "	" "	" "

The wire centre does not materially increase their weights.

By this you will see the ropes are by no means heavy and very strong, and can be conveniently used as life lines. They are not slippery and will not suffer by water.

We have also on exhibition a 30 feet asbestos fire escape or rope ladder, which is tested to carry 500 lbs. I request you to kindly inspect it.

We have, further, on exhibition two lengths of fire hose, both covered with asbestos. One cover on one is braided closely by machinery, and seamless; the other is covered with an asbestos cloth, which is sewn together with asbestos thread. Both covers are absolutely fire-proof and burning cinders falling on such hose will not injure it.

We also exhibit various kinds of asbestos cloth, which can conveniently be used for extinguishing small fires, for drawing partitions between rooms and buildings, and to cover valuable property during fires.

Asbestos cloth is already extensively used for theatre curtains and side-scenes, as also is asbestos paper for fire-proofing buildings. We have a collection of such goods on exhibition, and I shall cheerfully give you any further information which you may desire.

I will now close my address, and if I have succeeded in convincing you that there is some importance in asbestos goods in their present perfection for fire departments, I have filled the task which I have undertaken.

Gentlemen I thank you very much for your attention.

Silver Mines of West Kootenay, B. C.*

By E. D. INGALL, M. E., Chief of Mining Statistics, Ottawa.

Until a comparatively recent period the mineral production of the Province of British Columbia was almost entirely confined to coal and gold the latter chiefly obtained by washing the shallow auriferous gravels distributed widely throughout the province.

The discovery and working of veins yielding silver ores was all, with the exception of a few scattering discoveries, subsequent to 1830.

It is not the intention, in this paper, to go into any details as to the history of the silver mines of the province which are so admirably dealt with in the report of Dr. G. M. Dawson on the Mineral Wealth of British Columbia, issued with the Annual Report of the Geological Survey for 1887.

A few items may, however, not be amiss as prefacing the more immediate subject of this paper viz. the more newly discovered silver veins of the West Kootenay District.

According to Dr. Dawson the large deposit of galena now known as the Blue Bell Mine and situated on the east shore of Kootenay Lake was discovered as early as 1825 by the botanist Douglas and amongst the earlier discoveries of this class of ores is that in the Coast Range of Mountains at Hope on the Fraser River in 1871. The ore discovered there was described as "argentiferous grey copper" containing lead, copper, antimony and iron.

In 1882 a number of claims were located on discoveries at Stump Lake in Yale District, of veins, carrying ores rich in gold and silver and from that date to 1889 various camps came into greater or less prominence in that district and in those of East and West Kootenay constituting together the S. E. corner of the Province.

At the time of the writing of Dr. Dawson's report in 1888, argentiferous ores had been reported also from various points in the Northern districts; in Cariboo, Omineca, Cassiar and further north in the Yukon country but none of these have come into any prominence so far, doubtless on account of the numerous drawbacks due to lack of good communications with the outer world.

Before passing then to the subject proper of this paper, it may be well to point

* Paper read before Montreal Convention National Association of Fire Engineers, August, 1894.

* Paper read before the General Mining Association of Quebec.

out on the map here, the various other districts in the province where veins carrying argentiferous ores have been found and more or less worked.

It is noticeable that at most of these points the ores are mixed carrying much copper sulphurets and are often antimonial and arsenical, differing in this respect from the prevalent ore of the Ainsworth, Hendryx, Slocan and Illecillewaet districts where argentiferous galenas and the products of their decomposition take precedence over all others.

The points to which it is desired to draw special attention in this paper, are the results of studies made by the writer in 1892 when in British Columbia for the Geological Survey.

The time at disposal allowed only of the study of the Illecillewaet, Ainsworth and Slocan, sub-districts of West Kootenay where, however, a large number of claims were visited and examined with a view to getting the general features of the veins.

Illecillewaet—Beginning then with the district tributary to Illecillewaet on the Canadian Pacific Railway we have within a radius of from 5 to 10 miles, a number of claims upon which more or less work has been done, among which are the Lanark and Maple Leaf, with the Isabella, the Jumbo, the Sanquahar, the Cariboo and others all lying north of the C. P. Railway station and all within five miles of it.

Some eight miles north-east of the same place lie the Gold Hill and Copper Hill groups of claims whilst about ten miles south-east from the headquarters of the district at Illecillewaet lie the Fish River group among which are the Dunvegan, Elizabeth, Edinboro and Fishburn's claims. These are reached by a trail of some fifteen miles in length passing over the divide between the waters tributary to the Illecillewaet River and those of the Fish River which runs southerly into the north-west arm of the Upper Arrow Lake.

All the above mentioned groups excepting those of Gold Hill and Copper Mountain are staked out on fissure veins which cut a formation consisting of shale rocks generally dark in color and often quite black and carrying a large percentage of carbonaceous matter. These are accompanied by grey bands of a calcareous nature and often of considerable width whilst in many places throughout the district the presence of intrusive igneous rocks is evidenced by tongues and dykes of the same cutting the sedimentary rocks and a little east of the Fish River group the main body of one of these intrusive areas is reached.

The enclosing rocks of the Gold Hill and Copper Mountain groups are in general chloritic and talcose schists, with intercolated calcareous belts which, however, are distinctly different in appearance from those of the last mentioned, effecting rather a greenish grey hue with a somewhat rusty weathered surface. The schistose rocks of the series are generally greenish and yellowish grey, so that the general color of this formation contrasts plainly with the darker greys and blacks of the last mentioned.

In the first mentioned or black shale series, the ores are mostly galena, or galena and zincblende mixed, whilst in the schistose formation galena veins are found, but others have also been located carrying rich copper sulphurets assaying well in silver, and said also to carry some gold. At Copper Hill, for instance, is a vein cutting the schists and carrying copper glance and yellow sulphuret in a gangue which is sometimes white translucent quartz, and sometimes seems to be ferruginous dolomite. The ore is said to assay 61% copper, and \$20 gold and \$8 silver. All the rocks of the district, as might be expected in a mountain range, are folded and contorted, and the detail of their distribution would take a long time to work out.

The veins cutting the black shale series, shew very similar characteristics to those described later as occurring in the Slocan district. They carry galena as the chief ore in ribs and masses, in a gangue which is generally ferruginous. At places much zinc blende is intermixed, especially where larger bodies of ore occur in connection with the lime belts.

Some few veins have been located in which the gangue is quartz with galena and pyrites disseminated; ore in pockets in the vein.

The detailed description of the Slocan district following, serves equally well for this district.

Passing south we come to the well-known Slocan camps, the position and details of which are well shewn on the map.

Late in the Fall of 1891, a party of discouraged prospectors were making their way over the mountains towards Ainsworth, and being very short of provisions, were making the best time possible, when, in descending a gully to the east fork of Carpenter Creek, which runs into Slocan Lake, they lighted upon an extensive outcrop of ore. Without loss of time, claims were staked out and specimens secured which, when assayed, gave such encouraging returns as to cause a rush to the district in the following spring, and the consequent discovery of a large number of rich veins, covering an area about ten miles by seventeen, along the valley of the Kaslo river and between its headwaters at Bear Lake and the east shore of Slocan Lake. The rocks of this district present the same general features as those in the vicinity of Illecillewaet.

The bulk of the claims of the district have been staked out on veins cutting rocks of the black, shale series with their associated calcareous bands. They show the same variations in character, being soft and highly graphitic at places, and harder and more compact at others, generally from the proximity of intrusive igneous rocks and are thus often highly altered, showing chistolite, etc. These intrusive rocks are found throughout the district, showing as dykes of various thicknesses. They are light in color, with a preponderance of the acidic mineral constituents, orthoclase felspar and quartz constituting, as a rule, the bulk of their substance. This association of rocks in general, occupy the southern side of the valley of the Kaslo River, and extend some miles to the south, where they are said to abut on a large area of granite.

On the north side of the valley of the same river, the schistose series of rocks is largely developed, being in many places serpentinous. In this series of rocks a number of veins have been located. They show as fissures varying in thickness from a few inches to two or three feet, carrying the ore which is galena in solid ribs. These ore ribs are generally imbedded in a soft ochery gangue, sometimes of a pasty consistency. The thickness of the ribs varies from a few inches up to a foot or two. Occasionally the walls of the fissure are lined with quartz crystals and the enclosing rock is rusted some few inches in from the walls of the vein.

Veins of solid quartz also occur occasionally, but those seen carried very little mineral. The veins in this schistose series of rocks are apt to be free from some of the irregularities occasionally shown by those in the black shale series. The veins in the shale series present similar features to those already described, as occurring in the same series in the Illecillewaet district. Whilst they frequently run for long distances with the formation, they are also constantly found cutting across it.

Where a vein is found cutting across, or in the proximity of one of the calcareous bands previously mentioned, they are apt to show some interesting features, widening out or forming large pockets of ore in connection with the vein. Some of the big shows of the district have been of this nature and have proved very disappointing, their pockety nature being shown on development. When, however, the parent vein has been located, it has been found to be persistent, which will be found to be true for most of the fissures proper. Where they cut the slates, the veins at places show a considerable width of brecciated vein stone, angular pieces of the enclosing rock being cemented together by quartz and other gangue and ore minerals. The commonest occurrence, however, is to find veins of from a few inches to two or three feet in width, carrying galena in solid ribs, nuggets, and boulders in a rusty ochreous and sometimes clayey filling.

The galena varies in grain; from large cubes down to that with a fine steely fracture as shewn by these specimens. It is sometimes enriched by the presence of ruby silver and the richer silver minerals scattered through it. What is known as "carbonated" ore occurs with the galena, but this is not really carbonate of lead, as one might suppose, but is the ochreous gangue material in which the silver occurs disseminated in the metallic or native condition and in the condition of the richer silver minerals with doubtless some carbonate of lead. The whole probably results from the decomposition of the gangue and of the silver-bearing galena of the vein.

Other minerals are associated with the galena in places and in varying quantities. Of these, zinc-blende is the most prominent; iron pyrites occurring in fair quantity, and other metallic minerals being only occasional.

The pure galena in solid ribs seem to affect more particularly the narrower veins, cutting the shales, whereas the big developments in the calcareous parts carry generally a large proportion of zinc blende which lessens their value, this mineral being objected to by the smelters, when its percentage is large. Another class of the veins found, show various rich arsenical and antimonial silver minerals in a gangue composed principally of quartz.

Development work on these veins has in a number of cases opened up most promising exposures of ore. In one case a tunnel was seen on a new prospect where for all its length of about 75 feet, it was estimated that the ground broken had been from 50 to 60 per cent., pure galena assaying 125 ounces, to the ton. Or again, at another place, a prospect pit was seen showing a 2 foot rib of absolutely pure steel galena with ruby silver, the ore assaying 860 ounces to the ton. When one sees such exposures of ore as these, at a number of places in the district as the result of merely preliminary development work by the prospectors themselves, and taking into account the many other veins found in the district, having good, if not quite so extensive, shows of ore, one cannot help feeling that the district has a very hopeful future before it.

These ores are rich in silver as shown by the results of some 50 assays made in the chemical branch of the Geological Survey, of specimens of galena collected by myself which run from 50 ounces to 360 ounces, the majority from the black shale series in the Slocan district averaging perhaps 100 to 125 ounces per ton. Some specimens of so-called "carbonate" gave little or no silver, whilst two specimens of this class of ore from different claims gave 700 ounces and 1630 ounces, respectively. The galena from the veins on the schistose formation seems to average lower in silver than that occurring in the shale formation.

The other districts of West Kootenay now prominent in respect of their silver ores are Ainsworth, Hendryx and Toad Mountain districts, all of which have been well described by Dr. G. M. Dawson, of the Survey, in his report of West Kootenay. The ores of the latter district, however, are more mixed, copper and the richer silver minerals occurring with the galena. They also carry a little gold. Other camps which have come into prominent notice of late are those of Goat River and Trail Creek.

Three smelters have been erected in the district, one at Golden, one at Revelstoke (now washed away by the flood,) and one at Pilot Bay on Kootenay Lake. The latter, however, has not been completed owing to some disagreement amongst the capitalists concerned.

The two former works consisted each of a single water jacket furnace with roaster and appurtenances, but the Pilot Bay works have been projected upon a more extensive scale. The plan includes:

Concentrator Building.....	85 x 100
Sampling Works	100 x 108
Roaster	100 x 170
Smelter	58 x 98
Refinery	120 x 245
Assay Office.....	25 x 80
Boiler House.....	40 x 48
Blacksmith Shop.....	20 x 40
Machine Shop.....	20 x 40
Office	30 x 45
Boarding House.....	25 x 60

As none of these works have so far been running all the ore produced has been shipped to smelters in the United States at Tacoma and San Francisco.

Pack trails traverse the country and some few wagon roads connect the chief camps with steamer navigation on the lakes and rivers, whereby connection can be made with the Canadian Pacific Railway and the American railway to the south, whilst other projected connecting railways now being built will give a still better chance of success.

To a certain extent the mines are waiting the completion of these better means of communication, which are rendered the more necessary by the present low price of silver, but notwithstanding this discouraging feature and the existing commercial depression, the amount of discovery and development work prosecuted has been quite considerable, and we can, I think, still feel very hopeful for the future of silver mining in British Columbia.

COMPANIES.

The Golden Era Mining Company—Registered at Vancouver 16th July. Authorised capital \$8,000. Formed to carry on placer mining in the Province of British Columbia, with headquarters at Vancouver. Directors: George L. Allan, H. Rhodes and Robert Hamilton.

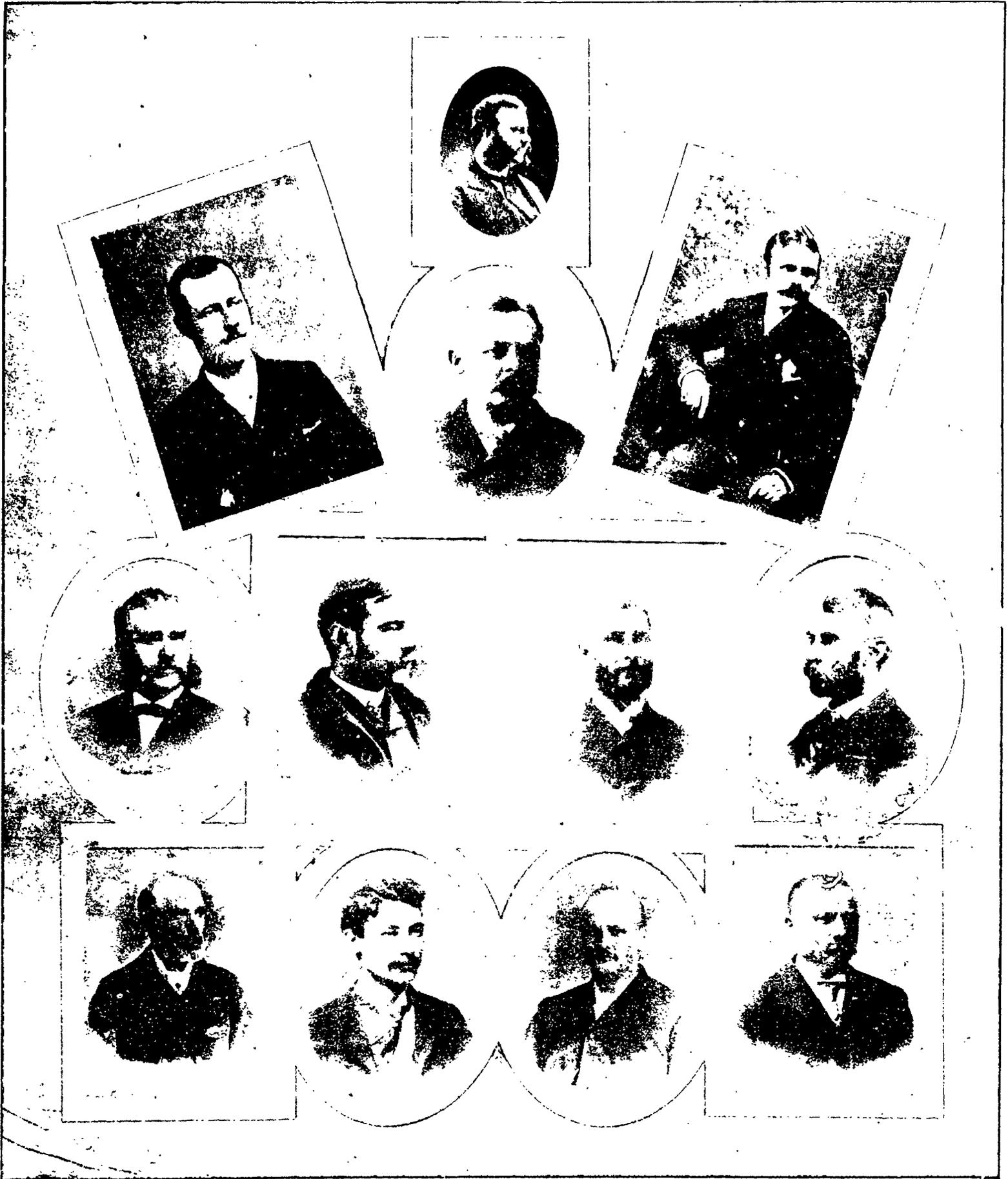
Fraser River Mining and Dredging Company Ltd.—Registered 13th June 1894. Authorised capital \$2,500,000 in shares of \$10,00. Head office: Vancouver B. C. Directors: W. H. Gallagher, Jas. A. Wood and Chas. E. Crockett of Vancouver; and C. A. Duncan and Marshall H. Alworth, Duluth, Minn. Formed to work placer ground on the Fraser River B. C.

The Quesnelle River Hydraulic Gold Mining Co. Ltd.—Registered 14th August, 1894. Authorised capital \$600,000 in shares of \$100,00. Head office: New Westminster B. C. Directors: J. Barnett McLaren, New Westminster and F. S. Reynolds and W. C. Fry of Quesnelle B. C. Formed to take over mining leases on Quesnelle river British Columbia, now held by J Barnett McLaren and F. S. Reynolds.

Georgian Bay Portland Cement Co. Ltd.—Authorised capital \$95,000 in shares of \$100. Head office at Owen Sound Ont. Directors: H. B. Harrison W. Taylor, N. P. Horton, A. E. L. Malone, W. Masson, John Lemón and A. J. Frost. The undertaking will be the manufacture and sale of Portland cement, putty, whitening, bricks, drain and other tiles, fuels and fertilizers, barrels and boxes or such.

DOMINION COAL COMPANY.

COLLIERY MANAGERS AND OTHER OFFICIALS OF THE COMPANY.



		H. Donkin, C.E. (Engineer Int'l R. R.)	
P. L. Naismith, B.A. Sc. (Supt. Int'l R. R.)		J. W. Revere (Purchasing Agent.)	A. M. Evans (Supt. Gowrie Colliery.)
Jas. McVey (Supt. Reserve Colliery.)	F. C. Kimber (Asst. Shipping Supt., Int'l Pier.)	C. H. Rigby (Supt. Shipping, Int'l Pier.)	J. G. S. Hudson (Supt. Glace Bay Colliery.)
Robt. Robson (Supt. Old Bridgeport Colliery.)	T. J. Brown (Supt. Victoria Colliery.)	D. M. Burchall (Superintendent of Stores.)	John Johnstone (Supt. Dominion No. 1 Colliery.)

other packages as may be required for the shipment or storage of their products, and also such other articles of commerce the manufacture of which shall be decided upon from time to time by the company.

The Ledyard Gold Mines Ltd.—The prospectus of this Ontario company has been issued to the public. The authorized capital is \$1,000,000 in shares of \$10.00 each; of which \$150,000 is reserved for working capital. The officers are T. D. Ledyard, Toronto, *President*; T. H. Yeoman, Toronto, *Vice-President*; Head office: 57 Colborne St., Toronto. The mines are situated in Belmont Township, Peterboro county, Ont., and are located on the east ½ Lot 19, 1st Con. Belmont, containing 100 acres. The machinery at date comprises 40 h. p. engine and boiler, Dodge Rock Breaker, Huntington Mill and equipment and Golden Gate Concentrator.

The ore supplies are contained in several veins which have all the appearance of being true fissure veins, and in a large knoll or small hill which appears to be the junction of the several veins, from whence the ore can be quarried very cheaply. Shaft No. 1, which is well timbered and has a good derrick hoist, is sunk to a depth of 60 ft. on an E. and W. vein, which is from 4 to 6 ft. wide, with well defined walls of talcose schist and a dip of about 70°. At a depth of about 30 ft. a drift has been run east from the shaft for 30 ft. on the vein. Both shaft and drift contain ore showing some free gold, but carrying considerable quantities of sulphurets which assay richly in gold. The average of seven assays of sulphurets from Shaft No. 1, was \$325 in gold per ton. There was no visible gold in any of these samples assayed. Sulphurets from the knoll, 200 yards W. of Shaft No. 1, showing no visible gold, assayed \$47, \$96, \$127 and \$210 respectively in gold per ton. The sulphurets from another vein 10 ft. wide, 80 yards further W., assayed \$102 gold per ton. A mill test of 3 tons of ore taken from Shaft No. 1, about a month after it was started, gave \$25.40 per ton, or 92% of the assay value.

The Silver Wolverine Co. Ltd.—The first and final dividend of this Port Arthur silver company is to be declared at an early date. The liabilities amount to £772, and the assets available for dividend £80. The liquidator is Mr. C. J. Stewart, 33 Carey street, London, W.C.

Lake Opinicon Phosphate Co. Ltd., has made application for Ontario charter, to acquire and work phosphate lands in that province. Capital, \$50,000, in shares of \$100. Head office: Kingston, Ont. The directors are: Jas. Swift, Kingston; D. H. Johnson, W. S. Johnson, John Kelderhouse, C. B. Armstrong, W. H. Davis, Buffalo, N.Y.; and O. S. Johnson, Scranton, Pa.

Nova Scotia Gypsum Company Ltd., has been incorporated with an authorized capital of \$2,000,000 in shares of \$20. Head office: Parrsboro, N.S. Directors: Vincent C. King, New York; J. E. Peters, Port Greville, N.S.; and James Taggart, Parrsboro. Formed to quarry gypsum in the Province of Nova Scotia.

Wine Harbor Gold Mining Co. Ltd., has been incorporated with a capital of \$160,000, to acquire and work gold mining areas at Wine Harbor or elsewhere in Nova Scotia. The incorporators are: T. G. McMullen, C. A. Kent, A. S. Archibald, A. T. Dalrymple, H. T. Harding, all of Truro; A. Kirkpatrick and J. A. Kirkpatrick, Shubenacadie; J. P. Chipman, W. P. Shaffner, of Kentville; W. H. Knowles and Frederick Knowles, Avondale, N.S.

Kootenay Mining and Smelting Co.—This company with a paid up capital of \$2,250,000 is now rapidly pushing forward to completion the new smelting works at Pilot Bay. Pilot Bay is the geographical centre of the Kootenay country, commanding on the one hand the rich Slocan with its high grade silver lead ores, and on the other the copper, silver, and lead of Ainsworth and Nelson, with all their intermediate points. At Pilot Bay, and owned by the company, is the Blue Bell mine, one of the largest and most valuable deposits of fluxing ores in America. Such is the favorable location which the company has selected as the base of their operations. The plant as designed will accommodate four stacks each of 100 tons capacity. Seven large buildings have already been completed for the works and three others are under way. Over 200 tons of the most modern machinery has been received and is now being put into place, while several carloads more are on the way from the East. The plant will be the most modern and complete that money can buy. Extensive wharves are being erected along the water front, and apparatus will be placed for the handling of ores in large quantities. The works will be in operation before the first of October next, with one 100 ton stack in full blast for the reduction of silver lead ores. The three other stacks will be added as fast as the district develops, and it is designed to give the treatment of copper ores the same attention as lead ores. In fact, all ores that can be handled to profit and advantage will be purchased and treated by the company. In addition to the smelter proper, the works will include a 300-ton sampling plant, a 200-ton concentrator, a refinery capable of treating all the bullion produced, and the finest laboratory and assay office in the west. The Company has been promoted by Mr. A. H. Hendryx of New Haven, Conn., and consists of: E. W. Herrick, a Minneapolis capitalist; R. P. Rithet, of Victoria, B.C.; is the Vice-President, and Joshua Davis, E. Crow Baker, W. H. Ellis, W. P. Sayward, W. J. Macaulay, James Hutchinson and H. Chapman are directors, and all of whom are well known in British Columbia.

Crystal Gold Mining Company of Rathburn Ltd. is applying for Ontario Charter to carry on Gold Mining operations in the Township of Rathburn, in the district of Nipissing, Ontario. Authorized Capital, \$1,000,000, in shares of \$100. Head Office: Mattawa, Ont. Directors: Hon. Peter White, Pembroke Ont.; John L. Caverhill, Montreal; Thos. Hale, Pembroke; Wm. Anderson, Ottawa; Kinah's McConnell, Mattawa, Ontario.

GOLD MINING NOTES.

(FROM OUR CORRESPONDENTS)

Nova Scotia.

Caribou District—The consolidation of various properties in this district has been effected with the aid of St. John, N.B. capital, and partial payments made. It is rumored that Mr. Geo. W. Stuart has been offered the management, but has declined.

The Lake Lode Company has prepared plans for a new 15 stamp mill, which will be built by the Truro Foundry Co.

Cochrane Hill—The management hopes to have the 20 stamp mill in commission by the 1st of October. Work is pushing in the mines, and milling material is fast accumulating.

Goldenville—It is reported that old workings east of the Wentworth have shown some rich samples and specimens from a lode left in the foot-wall. The district is livelier than it has been for many years.

Country Harbor—The excitement caused in the early part of July by the finding of gold bearing lodes about 6 miles back from the shore, has somewhat abated, the lucky finder being apparently unwilling to work the lodes for fear of losing the showing already made. From an excellent authority who has visited the district we learn that the promise is very good for a permanent district. The lack of a road and the exorbitant price at which properties are held, will, however, probably retard the development of this promising field until next year.

Chester Basin—Mr. T. N. Baker who has been diligently prospecting a large block of areas on the north side of Gold River district, has cut several promising lodes, one of which measures from 30 inches to 4 feet in width and shows gold freely.

Waverley—The Nova Scotia Gold Mines, Ltd., have sold their property in this district to Mr. Frederick Taylor of Lowell, Mass.

The West Waverley Gold Company, Ltd., will transfer all its property and rights to the Tudor Gold Mining Co., Ltd., a newly organized corporation.

Quebec.

DuLoup—Mr. E. B. Haycock has a good working force developing his quartz and placer claims on the DuLoup. Mr. Haycock reports that the work done has given satisfactory results.

Ontario.

Rainy Lake—A dispatch under date of 23rd says: "The steamer Dixon bought in a 5 stamp mill this morning to be shipped to Ward Bros. It will be put in a mine near Rainy Lake City. The little American vein is now 25 feet wide and the owners propose building a 30 stamp mill on the Island on which the mine is located. The present mill on the mainland is to be used as a custom mill."

The first clean up of the Little American mine is reported to have been \$750 gold from forty-eight hours crushing in the 10 stamp mill.

A private advice reports the sale of a quarter interest in a location taken up by a man named Wiggins for \$55,000.

Lake Wahnapiatae—Mr. R. McConnell of Mattawa, was in Ottawa the other day with some fine samples of quartz carrying free gold from a recent find in this section.

British Columbia.

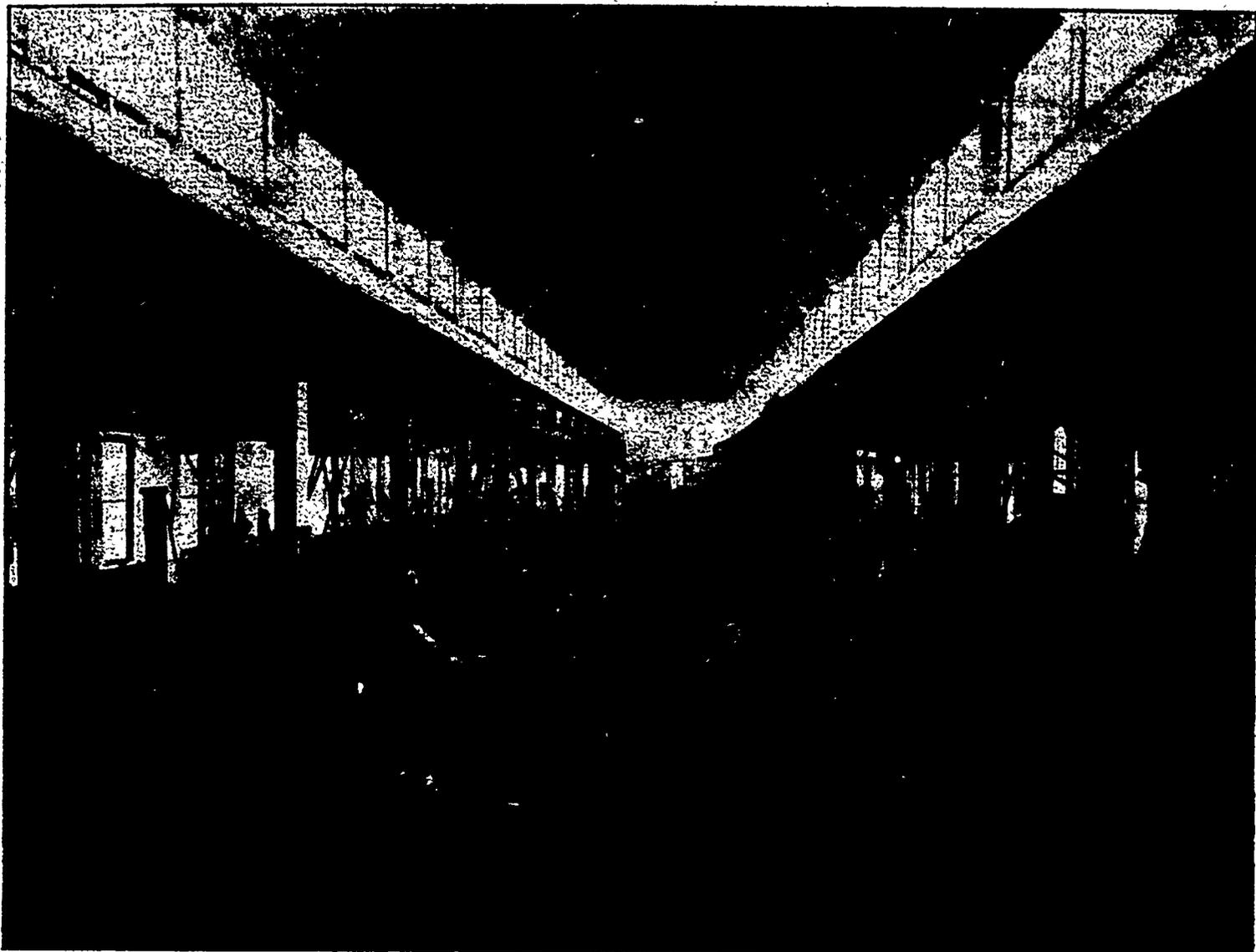
Cariboo—During the month two bricks were received by the Bank of British Columbia from the Cariboo country, which have stimulated an interest in the famous diggings of this section. The largest one weighs 302½ ounces, and is from the Cariboo hydraulic mine. It is valued at \$5,142, and is the result of 47 hours washing gravel. The other is from the claims of the Horsefly Hydraulic Mining Co., and weighs 287 ounces, valued at \$4,879, and is the product of 106 hours washing gravel, with an average of 921 miners' inches of water.

The Kootenay Hydraulic Mining Company last month completed an important clean up. Their operations have been directed to ascertain precisely the value of their property on the north bank of the Pend d'Oreille river. To this end they collected all the water from the Seven Mile and Nine Mile creeks and directed it into their main ditch with a head of 250 feet above the monitors at the level of the Pend d'Oreille river. They sent through their sluices 2,200 yards of gravel, and the weight of the quicksilver amalgam shows a yield of \$35 in gold, equal to nearly 24 cents per cubic yard, some of the nuggets being of a good size, the largest being worth \$5.85. When it is remembered that 3 cents per yard is regarded as enormous, and that many of the great placers in California are worked at high profit even at 3 and 4 cents per yard, this result must be regarded as most encouraging.

The reports of recent discoveries of rich gravel at Cariboo creek has resulted in a rush of prospectors to the new field, which is located about 20 miles from Kakusp.

Early last fall a party of four went into that section prospecting and struck colors, but nothing more was done until a short time ago, when the men again went in, taking with them abundant supplies and tools for the construction of sluice boxes. Operations were speedily commenced by panning, with the result that coarse gold was found in abundance, each pan running from 25 cents to \$1.25 per pan. The gold has apparently not travelled far, as points can be discovered on it with the naked eye, clearly showing that ledge croppings of great richness must be in close proximity. While some of the men are getting the ground in shape for working, others are endeavoring to locate the ledge proper. The news of the discovery could not be kept a secret long, and soon prospectors were on their way to the ground. Their numbers will be speedily increased as numerous applications have been sent in for miners' licenses. Applications have also been made by various parties to the government for the privilege of staking out land, one man asking for half a mile. Gold was found in Trout creek early this spring, and it was surmised more would be found further up. It was the intention of a number of prospectors to have followed this lead up later on, but they have been forestalled.

Respecting this excitement, the Nakusp *Leader* writes: "It has been a great surprise to the Recorder at New Denver where all the money is coming from that he is receiving for licenses and record fees. Last week he took in upwards of \$200, all resultant upon the gold excitement. Every descending boat has conveyed a new detachment from Nakusp and other points to Trout creek, particularly so on Tuesday. Last Friday morning the Illecillewaet specially chartered for the occasion, conveyed



Works of the Northey Manufacturing Co. Ltd. at Toronto.—Interior of Pump Works.

to the new town, Burton city, that is springing up at the Narrows, several thousand feet of lumber and tons of supplies, besides having a passenger list of 18. At the gold fields proper, everything is in the initial stage at present, although preparations are rapidly prosecuting towards development. The bulk of the prospectors form themselves into companies, and in this way work more expeditiously and cheaply. The principal claims thus formed, apart from the Discovery mentioned last week, are the Crown and Sceptre, located by a party of eight from Waneta, and the Lady Sampson, owned by a local company, with which H. Madden, W. C. Sampson, L. Dansereau, C. H. Oiler, and others are identified. On the Crown and Sceptre the most work has been done, and the owners being experienced men they hope to be able to commence sluicing in a few days, and thus obtain results setting at rest all fears as to the permanency of the camp. So far as indications go there is no reason to doubt but that the strike is a very rich one. Washings have been made over an extent of country covering 28 miles, and in each instance colors were obtained. This was the case even to the mouth of Trout creek. The bed rock of Cariboo creek inclines away from the current and thus serves to catch all particles that wash down. In the crevices along high water mark, small nuggets, sometimes as large as a finger nail and about as thin, have been pinched out, while from the sediment on the rock shelves, the colors have been freely extracted. In several places trial shafts have been sunk in the gravel and the same returns continue. At the mouth of Grouse creek is believed to be the best ground."

The Waneta Company has been sluicing for some time and have secured some coarse gold from the cement gravel. It is reported that they are averaging \$7 a day to the man. Not long ago they offered a half interest in six of their claims for \$100, but suddenly raised the price to \$1400. This company do not want to be bothered by visitors, and prefer to surround their operations with air of mystery.

The Pembroke hydraulic property at Thompson Siding, near Lytton, will be operated for the present by a powerful duplex pump, capable of elevating an eight-inch stream 200 feet high. If this should be a success it will redeem thousands of acres of good hydraulic claims not available for want of water. Col. Underwood, representing this company, has just secured Letters Patent from the Dominion government on a novel dredging machine for mining on the Fraser and other gold bearing streams. The machine consists of a combination of the suction process with a dredge. It is shaped like a plough and of heavy steel bars terminating in a plough point, far enough apart to admit only such boulders as will readily pass through the suction pipe and thence to the sluice boxes. This device is attached to the end of a beam, similar to the ordinary steam shovel or dredge; and is to be operated in the same manner. The colonel is of the opinion that this machine will practically dispose of the question of handling the 60 to 80 per cent. dead work to be overcome in subsequent mining on the Fraser. A machine of this kind will be put to work on the Quesnelle river at an early date.

The Nelson Hydraulic Mining Company, is in a fair way to prove the value of its

ground on Forty-nine creek. About \$15,000 have been expended in flumes, ditches, wasteways, pipes, monitors and sluice boxes. The flume and ditch is over a mile long, and the head of water is upwards of 300 feet. At present about 300 inches runs through the flume, which is barely enough to fill the pipe when a three-inch nozzle is used on the monitor. The ground is favorably located for working, but as it contains more boulders than gravel, it cannot be moved as rapidly as was expected. Fred Rice is acting as superintendent, and enough bedrock will be cleaned within the next two weeks to prove the value of the property.

Mr. A. N. Beaton one of the partners in the Vandall mine on French Creek, reports the mine as paying handsomely, over \$100 having been taken out in one day by four men. Mr. Beaton says: "On our claim we took out \$250 in the last two days before I left, and since spring the total output has been several thousand."

The wing dam on the Consolation property is in, and by the end of the month they will be drifting again. As they were on the pay streak when the flood struck them, they will soon be producing bullion after the old rate of \$100 a day.

"Some splendid specimens," says the *Kootenay Mail*, "of free-milling gold quartz were brought down by Laforme's pack train on Monday from two minerals claims located by Harry S. Howard on McCulloch Creek last week. The gold could be seen in large patches all over the quartz, and it was estimated that if the ledge at all equals the samples shown, the ore would assay \$500 to the ton. It was not necessary to use a glass, as the gold stood out encrusted on the ore in rich clusters. These claims were recorded the same day by Mr. John Burke, of the Senate Hotel, who has a part interest in the claim. One of the claims is the Monarch, located on the 1st of August at the head of McCulloch Creek, on the divide between that creek and Camp Creek, and adjoining the Gold Hill claim on the north. The other claim is the Eureka, located on the 2nd of August on the divide between Camp and McCulloch Creeks, about a mile below the divide between French and McCulloch Creeks, and adjoins the Panhandle on the east. Both claims are 1500 feet square. If the ledges are similar to the specimens brought down, Mr. Howard has a bonanza."

Mr. W. Hamilton Merritt, M.E., A.R.S.M., Toronto, has been appointed engineer to the Strathyre Mining Company, operating at Fairview, in the Okanagan country.

From the number at work, the placer ground on Hall creek must be paying fair wages to the men. At the canyon Eugene Montreuil and his two partners have dammed the creek and utilize water power to work their ground. The gravel is hoisted to the sluice boxes by a Chinese pump; the small boulders are carried to the waste dump in cars; and the heavy boulders are yanked out of the way by a windless. All this is done by power developed by an overshot wheel. The scene of operations is less than a mile from Hall Creek siding on the Nelson & Fort Shepard railway, and about eleven miles from Nelson.



Exterior View of the Northey Manufacturing Co's Works.

MINE PUMPS.

Their Manufacture in Canada at the Works of the Northey Manufacturing Company at Toronto.

With the steady and persistent growth of mining in Canada has sprung up in the various provinces, notably, in Nova Scotia, Quebec and Ontario, a corresponding extension of the home manufactures of mining machinery. Among these may be mentioned the manufacture of special lines of air compressors and drills by the Ingersoll and Rand Companies at Montreal and Sherbrooke, hoisting engines, coal mining machines, and a general line of mining machinery by the Jenckes Machine Co.; stamp mills and a complete line of gold mining machinery by the Truro Foundry and Machine Co., at Truro; and the Messrs. Matheson, at New Glasgow; and by no means the least important, the large establishment operated by the Northey Manufacturing Co., Ltd., at Toronto, for the production of mine and quarry pumps, two excellent views of which are reproduced in this number. The Messrs. Northey commenced business in Hamilton, as far back as 1842, and in 1882 the works were removed to Toronto. The rapid extension and success of the business, however, necessitated its incorporation into a stock company, and this was accomplished in 1892, under the name of the Northey Manufacturing Company, Ltd.

The machine shop, 250 feet long and 75 feet wide, is divided into three bays, the centre one of which is used for travelling crane, surface railway and heavy tools. The two outer bays are equipped with special and general tools for the manufacture of pumping and general hydraulic machinery. The tools used are all modern, and include duplex boring machines, gang millers, horizontal and vertical boring machines for large work, heavy planers, milling machines, lathes and the usual complement of tools used in modern machine work. At one end of the main shop is the tool room, where a number of hands are constantly employed in the production of special tools, jigs, gauges, etc., required for the purposes of the business.

The engine supplying power is located at end of centre bay in machine shop, and drives two shafts running entire length of each side bay, leaving centre clear of shafts and belting, and free for the erection of machinery, and the operation of overhead crane.

Testing tanks are conveniently located below floor level, and are supplied with cold and hot water, to allow of thorough tests of pumps for the various duties required. A test pressure is put on all pumps very much in excess of that which they are required to work under, and each machine is shipped in perfect working order, and requiring no further adjustment.

The building shown in left foreground of engraving, is the pattern shop, which is thoroughly equipped with power machinery for wood working. Adjoining the pattern shop are the public and private offices, and draughting room, the latter is fitted with drawing tables, cabinets for finished drawings, and for supplies, and complete equipment for the making of blue prints. The main and private offices are spacious rooms, handsomely furnished, and finished in natural woods. The main office is provided

with a large plate glass window, with cut glass heading, which commands a view of the entire length of machine shop.

At the further end of main building is the boiler house, smithy and brass foundry, all specially adapted to their purpose.

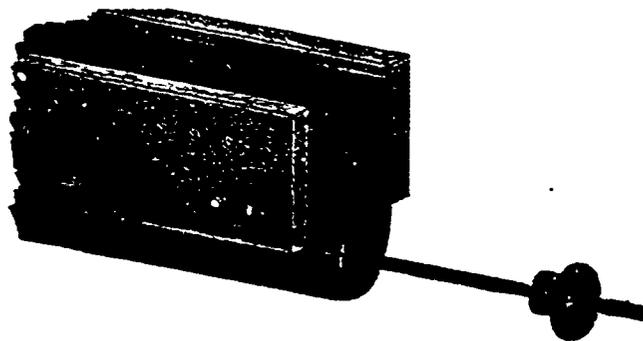
A very marked characteristic of the works is the ample light obtained at all points by the judicious arrangement of skylights and windows, and the shops being lofty and well ventilated, present a contrast to the old-fashioned, dingy and crowded quarters, so frequently considered quite suitable for machine shop premises.

The Northey Manufacturing Company's shops were erected from special designs, prepared by Mr. E. J. Lennox, of Toronto, and are consequently very fully adapted to the requirements of the business. The firm's trade has experienced a healthy and continuous growth, their pumping and other machinery being universally recognized as quite equal to standard English or American makes.

We are pleased to note that they have lately been entrusted with orders for important pumping machinery for some of the large Canadian mines. They make a specialty of mining pumps of all classes, and up to the largest sizes.

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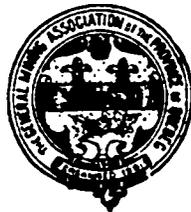
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JAMES CONMEE, B. T. A. BELL,
President. Secretary.



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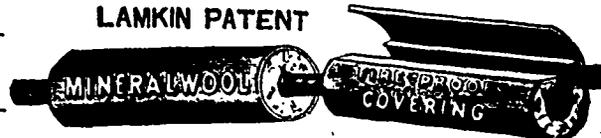
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ARCHIBALD BLUE,
Director Bureau of Mines.

TORONTO, May 25th, 1894.

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Something unique even in these days of mammoth premium offers, is the latest effort of Stafford's Magazine, a New York monthly of home and general reading.

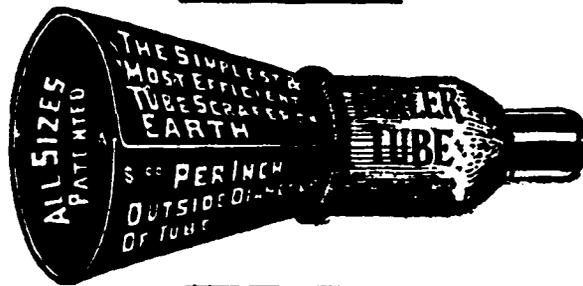
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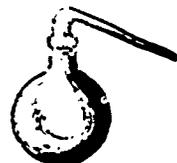
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