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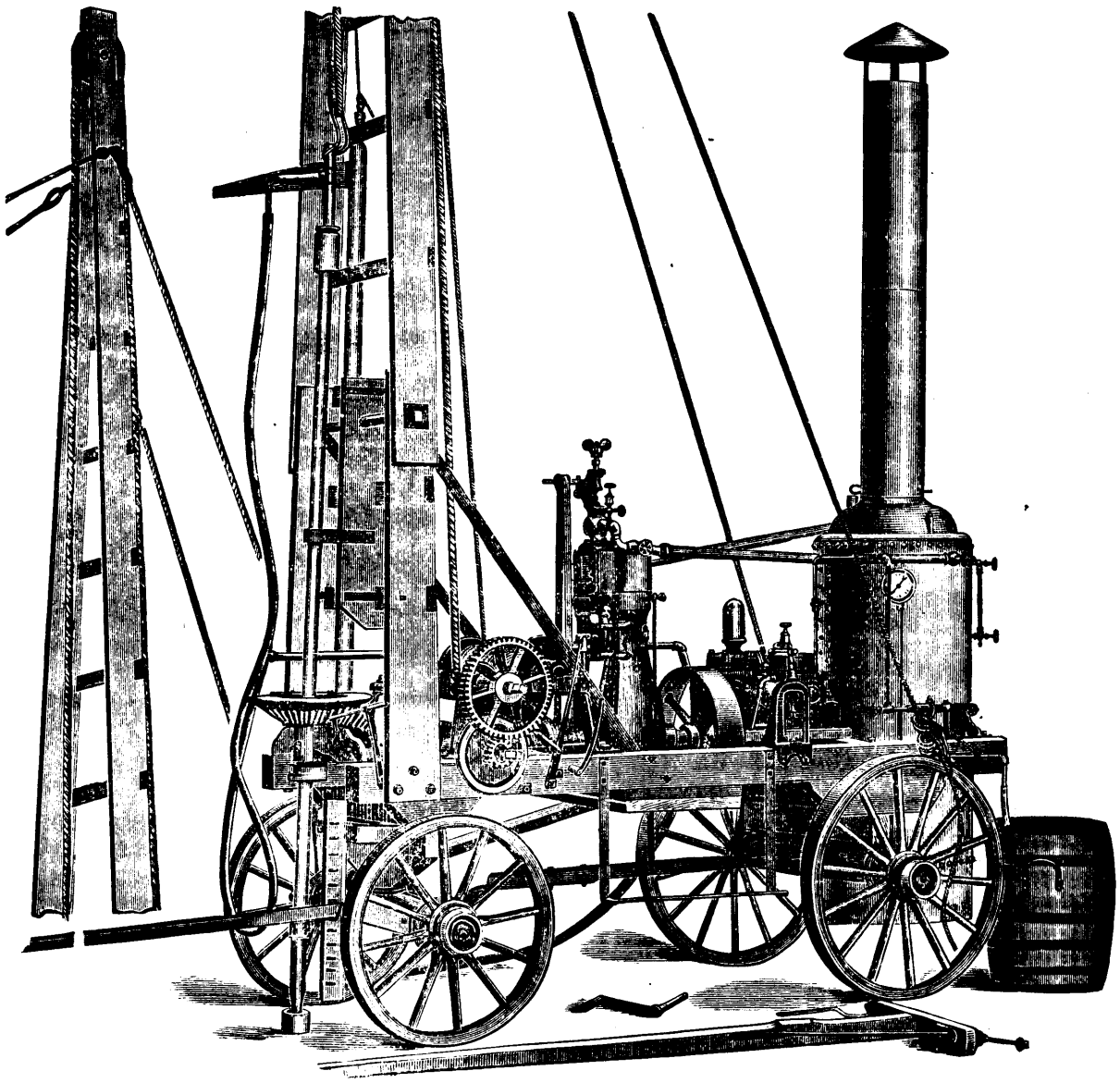
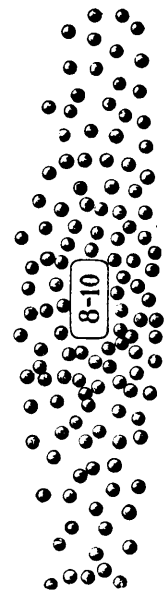
THE Canadian MINING REVIEW
Established 1882

Vol. XIV.—No 3 | 1895—OTTAWA, MARCH—1895. | Vol. XIV.—No. 3.

Beal's Patent Core Drill

DOES THE WORK WITHOUT THE USE OF DIAMONDS.





THIS DRILL does the work without the use of Diamonds, using as a substitute Chilled Steel Globules, or as they are commonly called, shot. These are inexpensive, costing in actual work about ten cents per day; whereas, diamonds are very expensive, a single one often costing from $80 to $100, thus showing the difference in cost in case of loss of tools. It is THE BEST, CHEAPEST, and MOST EFFECTIVE CORE DRILL made for Prospecting Quarries, Coal Lands, Sinking Wells and the like.

Owners of undeveloped Mineral and Quarry Lands can, with one of these machines, at a small outlay, bring them into a marketable condition. This Drill has been thoroughly tested in California Quartz Rock, Granite, Marble, Lime, Flint, Iron Ore, Sand Rock and everything in that formation, cutting the hardest as well as the softest material with great rapidity. It has also been very successfully used in Hard and Soft Coal, Shales, Slate, Clay, etc., taking out a core from 2in. to 6in. in diameter. It is an excellent machine for sinking air holes for Mines, Sounding Foundations for large Buildings, Bridges, etc.

This Machine has been in practical use in the United States for several years, and was awarded the gold medal at the World's Columbian Exposition at Chicago, in 1893, in preference to all other core drills.

Length of machine, eleven feet; weight, mounted on truck as shown in cut, 5,000lbs. It can be easily loaded in a box car.

The Patentee, MOSES BEAL, ELYRIA, OHIO, U.S.A., would like to correspond with responsible parties with reference to the formation of a stock company for its manufacture in Canada, or would prefer to sell entire Canadian Patent.

The Patentee gives for reference any bank or business house in Elyria. Address him for full particulars. All letters will receive prompt attention.

For Full Information Apply to the
PATENTEE and SOLE MANUFACTURER,

MOSES BEAL, Elyria, Ohio, U.S.A.

MINING LAWS OF ONTARIO.

ANY person may explore Crown Lands for minerals. Mining lands may be taken up as surveyed locations or staked claims.

Locations range from 40 to 320 acres.

Claims range from 10 to 20 acres on vein or lode.

Locations may be acquired in fee or under leasehold.

Price of locations north of French River, $2 to $3 per acre, and south of it, $2 to $1.50, according to distance from railway.

Rent of locations first year 60c. to $1 per acre, and subsequent years 15c. to 25c. per acre.

Rent of claims, $1 per acre each year.

Claims must be worked continuously.

Royalty on ores specified in the Act, 2 per cent. of value at pit's mouth less cost of labor and explosives.

Royalty not charged until seven years from date of patent or lease, nor (as provided in s. 4 (3) of the Mines' Act, 1892), until fifteen years in the case of an original discovery of ore or mineral.

Original discoverer of ore or mineral on claim entitled to stake out a second claim.

Crown Lands sold under provisions of mining laws in force prior to 4th May, 1891, exempt from royalty.

Copies of the Mines Act, 1892, Amendment Act, 1894, may be had on application to

ARCHIBALD BLUE,
Director Bureau of Mines

TORONTO, May 25th, 1894.

CONDITIONS

OF

Obtaining Government Drill to Explore Mines or Mineral Lands.

Owners or lessees of mines or mineral lands in Ontario may procure the use of a Government Diamond Drill, subject to the provisions of the Rules and Regulations relating thereto, upon giving a bond for payment to the Treasurer of the Province, of costs and charges for (1) freight to location, (2) working expenses of drill, including labor, fuel and water, (3) loss or breakage of bits, core lifters and core shells, (4) wear or loss of diamonds, (5) other repairs of breakages and wear and tear of machinery at a rate per month to be estimated, and (6) an additional charge of $50 per month after the mine or land has been shown, through use of the drill, to be a valuable mineral property.

Of the aggregate of costs and charges above enumerated, excepting the sixth item, forty per cent. will be borne by the Bureau of Mines in 1894, thirty-five per cent. in 1895, thirty per cent. in 1896, and twenty-five per cent. in each year thereafter until the end of 1900. All accounts payable monthly.

For Rules and Regulations *in extenso* governing the use by companies and mine owners of Diamond Drills, or other information referring to their employment, application may be made to ARCHIBALD BLUE, Director of the Bureau of Mines, Toronto.

A. S. HARDY,
Commissioner of Crown Lands.

Toronto, October 17, 1894.

The Canadian Mining Review

Established 1882

Official Organ of The Mining Society of Nova Scotia; The General Mining Association of the Province of Quebec The Asbestos Club; and the Representative Exponent of the Mineral Industries of Canada.

B. T. A. BELL, Editor. Published Monthly. OFFICES: Victoria Chambers, Ottawa.

VOL. XIV., No. 3 MARCH, 1895. VOL. XIV., No. 3

Our Gold Mines.

For some months past our English and foreign exchanges have been filled with accounts of the boom which South African and Western Australian gold mines have enjoyed upon the London and Paris markets.

Since the decline of silver every mine must have a golden lustre before it is acceptable to the promoter, and it appears extremely probable that the coming summer will see a development of the world's gold fields quite unprecedented.

In this attraction of capital to gold mine investments it is altogether certain that the gold fields of the Dominion will share. Those of British Columbia, for a year or more, have attracted much attention and are now in a most promising state of development. Nova Scotia, from recent reliable reports, has developed a more lasting attraction for capital than her rich narrow veins have hitherto possessed, and we are informed, on good authority, that British capital is now investigating that province's resources in the line of low grade gold ores. But we hear nothing of any new attempt to open the resources of Quebec, although the vexing matter of titles has now been straightened out and no obstacle is apparent to the systematic exploration and exploitation of the many alluvions and quartz reefs of that province.

Much fruitless (because ignorant and incompetent and misdirected) work was done in the valley of the Chaudiere and tributaries some twenty to thirty years ago; yet hardly fruitless either, as the report of Mr. Obalski, Government Inspector of Mines, shows that over $2,000,000 has been obtained from a very small area in the district mentioned.

We have heard several competent engineers, who have made short trips through the County of Beauce, express very favorable opinions as to the probability of very remunerative mines, both of quartz and of gravel, being found there. The views of these engineers have of necessity been usually confined to the particular properties professionally examined, and leave room for a comprehensive and thorough report upon the field as a whole. While thoroughly appreciating the accuracy and value of the work performed in early days by Dr. Sterry Hunt and M. Michel we think that what is needed for the development of Quebec's gold industry is the examination of her gold fields, from an economic point of view, by a thoroughly practical as well as scientific mining engineer, who could report as to the remunerative character, or otherwise of the various gravels and quartz reefs which have been more or less developed since the time of Messrs. Hunt and Michel. The provincial government could not bring its gold fields to the attention of capitalists in a better manner than through the report of such an engineer

Ontario's gold fields are yet young, with the exception of the Madoc and Marmora field, which has proved so far too refractory to extract a profit. Considerable attention has been directed to the Lake of the Woods and later to the Rainy River district, and what we have said of a report for Quebec will apply, in a measure, to Ontario, although the latter province, as yet, stands in no such crying need of thoroughly competent advice as does Quebec.

EN PASSANT.

The second annual meeting of the Ontario Mining Institute will be held in the School of Practical Science, Toronto, on Wednesday and Thursday, 10th and 11th April. A number of interesting papers are on the syllabus for discussion, in addition to the election of office bearers, and other proceedings incidental to an annual gathering.

Now that Federation has been approved of on lines agreeable to all the Canadian mining organizations, a united meeting at Quebec in July is in order. Doubtless this will receive full consideration at an early meeting of the council of the General Mining Association of the Province of Quebec.

There is a slight improvement in the demand for Canadian phosphate and So has gone up a penny, last quotations being at eight pence.

Our last issue had gone to press before the announcement was received of the sudden demise of Mr. William Routledge, mining engineer, of Sydney. Mr. Routledge was a member of the Board of Examiners of Cape Breton, and with his associates, Messrs. Henry Mitchell, of Old Bridgeport, and A. B. McGillivary, of Little Glace Bay, was en route for Stellarton, where they were to attend a meeting of the board. When the train was approaching the Grand Narrows, where a stoppage of twenty minutes is made for breakfast, the three gentlemen were sitting in the smoker of the "sleeper," when Mr. Mitchell noticed Mr. Routledge falling from his seat, apparently in a faint. Mr. Mitchell leaned forward and caught him in his arms, and with assistance laid him on the lounge, when it was found that life was even then extinct. Mr. Routledge has for some years suffered from heart disease, which was undoubtedly the immediate cause of death. Mr. Routledge was a brother of Mr Walton Routledge, of Alton, Ill., late State Inspector of Mines for the Fourth District of Illinois. He was born at Durham, England, in 1829, and was, therefore, in the 66th year of his age. He was a graduate of the School of Mines, England, and went to Nova Scotia about thirty years ago as manager of the General Mining Association's Colliery at Lingan and continued in that position for ten years when he removed to the Gardiner mine: he was afterwards manager at the International, and later at the Reserve collieries. For several years he has lived at his private residence, "Colby," a beautiful villa in the suburbs of Sydney. Mr. Routledge leaves a wife and five sons, and of the latter, two are in the employ of Dominion Coal Company, one is engaged in mercantile pursuits at the mines, a fourth is inspector of the mounted police at Regina, N.W.T., and another is in Chicago

Mr. M. Davys has been appointed manager of the Silver King mine operated by The Hall Mines, Ltd, vice Jordan resigned.

Mr. A. Dick, manager of the Canada Coals and Railway Co., Ltd.,

has the heart-felt sympathy of a wide circle of mining associates in the sore bereavement of his young wife, which occurred somewhat suddenly on 14th instant.

Mr. E. Gilman, secretary and manager of the Ingersoll Rock Drill Co. of Canada, has returned somewhat benefitted in health from a brief sojourn in the Southern States.

Mr. David McKeen, M.P., resident manager of the Dominion Coal Co., Ltd., and Mr. H. S. Poole, general manager of the Acadia Coal Co., are expected home this month, both we trust, rejuvenated and generally improved in health by their holiday on the Mediterranean.

The report for the past year of the Illinois Steel Company affords convincing proof of the hardness of the times in the United States. The net cost of the Illinois Steel Company's works, plant, &c., is $17,459,794, and its total capital $31,943,648, or about £6,388,020. The net profit on the year's trading after paying interest on bonds, was $30,607 : deducting which amount from the previous year's deficit, there is left a net deficit of $318,865. The convertible assets of the company are set down at $11,643,126, which is in addition to the company's five plants and their railway securities. The company "received during the year 2,339 370 tons of raw material; shipped during the year 563,446 tons of finished product: total number of cars of material handled was 88,793 : paid in wages and salaries, $3,071,394.95 ; employed an average number of men per day of 5,069 ; purchases of miscellaneous stores and supplies, other than raw material, amounted to $695,794.28." These are big figures, but the result shows that in 1894 the game certainly was not worth the candle.

It is recorded that a police constable on duty in a public museum was once overheard making zealous reply to a visitor of an enquiring turn of mind, who had asked the meaning of the word corundum, conspicuous upon a case of minerals : "Oh, that be the place where they put all them stones as they can't guess at." Though inaccurate as an indication of the habits of museum curators, this definition might well refer to the riddle relating to this very mineral which museum curators and others will, unless we are greatly mistaken, be soon called upon to read.

The artificial rubies made in Paris a few years ago by Messrs Frémy and Feil were regarded as scientific curiosities. But, says *Natural Science*, stones are now being largely sold (it would be very interesting to know how largely) in London and elsewhere which, while closely resembling in all essential respects the rubies of Burma, are undoubtedly of artificial origin. Tried for hardness, specific gravity, lustre, and subjected to all the tests which are usually applied to precious stones, they cannot be distinguished from the natural ruby ; this is not surprising, for they are not, like other artificial stones, different from what they profess to be, but are actually crystallized red allumina, only differing from the natural ruby in the process by which they have been produced. Examined with the microscope they betray their origin by the glassy enclosures which they contain and sometimes by a streaky appearance.

Yet, adds our contemporary, it would be difficult to assert that these are not rubies, unless, indeed, the definition of a ruby be understood to include of necessity a natural origin. Considering, however, the enormous prices paid for Burmese rubies, it is certainly not fair that mere imitations should pass as such. If their beauty as jewels be equal to that of the true ruby, let them by all means fetch as high a price as they deserve on their own merits; but we cannot refrain from speculating as to their market value if they were labelled "Made in Paris." According to French law it has been decided, we believe, that a ruby is certainly not a ruby when it is made in a crucible.

The annual meeting of the Asbestus club for the election of officers and other business will be held at an early date; probably next month.

FOURTH ANNUAL MEETING

OF THE

Mining Society of Nova Scotia.

New Members. Federation ammendments adopted. Valuable papers read and discussed.

The fourth annual meeting of the members of the Mining Society of Nova Scotia was held in the rooms of the Society, Halifax, on Wednesday 13th instant. The proceedings opened at 10 a. m., the President Mr. John E. Hardman, S. B., M. E. in the chair. Among others present were noticed :—

Mr. R. H. Brown, Gen. Min. Ass'n., Old Sydney Mines C. B.
Mr. Wm. Blakemore, Dominion Coal Co. Ltd., Glace Bay C. B.
Mr. J. T. Burchell, Cape Breton Colliery, New Campbellton C. B.
Mr. Chas. Fergie M. E., Intercolonial Coal Co., Westville N. S.
Mr. F. S. Andrews, Richardson Gold Mining Co., Country Harbor N. S
Mr. M. R. Morrow, Dominion Coal Co., Halifax.
Mr. B. C. Wilson, East Waverly Tunnel Co., Waverly N. S.
Mr. Graham Fraser, Nova Scotia Steel Co. Ltd., New Glasgow.
Mr. Duncan McDonald, Truro F. & Machine Co., Truro.
Mr. Geoff. Morrow, Stairs Sons & Morrow, Halifax.
Mr. A. C. Ross, Boston & Nova Scotia Coal Co., North Sydney C. B.
Mr. R. G. E. Leckie, Torbrook Iron Co., Torbrook.
Mr. J. Leckie, Torbrook Iron Co., Torbrook.
Mr. George Stuart, M.E., Truro.
Mr. W. A. Smith, Windsor Foundry & Machine Co., Windsor.
Mr. J. D. Sword, Ingersoll Rock Drill Co., Halifax.
Mr. C. E. Willis, Canadian Rand Drill Co., Halifax.
Mr. Joseph Austin, Austin Bros., Halifax.
Mr. F. H. Mason F. C. S., Truro.
Mr. A. Dick C. and M. E., *The Critic*, Halifax.
Mr. W. G. Matheson, Matheson & Co., New Glasgow.
Mr. James Baird, Joggins Mines, N. S.
Mr. John Anderson, Musquodoboit Harbor, N. S.
Dr. E. Gilpin, Jr., Deputy Commissioner and Inspector of Mines, Halifax.
Dr. Martin Murphy, C.E., Halifax.
Mr. A. McQuarrie, Cochran Hill Gold Mining Co., Halifax.
Mr. A. A. Hayward, Golden Lode Mining Co., Mount Uniacke.
Mr. Chas. Starr, Halifax.
Mr. H. W. Johnstone, Halifax.
Mr. H. M. Wylde, Halifax, Secretary-Treasurer.
Mr. B. T. A. Bell, Ottawa, Hon. Secretary.

The minutes of the previous meeting having been read and confirmed,

New Members.

The following members were elected :

Mr. A. C. Ross, Boston and Nova Scotia Coal Co., North Sydney,
Mr. W. A. Saunders, Lake Lode Gold Mine, Caribou.
Mr. W. B. Ross, Q.C., Halifax.
Mr. John W. Stairs, Halifax.
Mr. H. W. Johnstone, Jr. Halifax.
Mr. Hugh D. McKenzie, Intercolonial Coal Co., Halifax.
Mr. W. C. Brine, Halifax.
Mr. E. G. Kenny, Halifax.
Mr. Wilbur L. Libbey, North Brookfield.
Mr. George A. Pyke, Halifax.
Mr. A. M. Evans, Manager Gowrie Colliery, Port Morien, C.B.
Mr. C. C. Starr, Halifax.
Mr. E. Musgrave, Halifax.
Mr. Wm. Hargreave, Halifax,
Mr. B. M. Davidson, Wine Harbor.

Federation Amendments Approved.

MR. H. M. WYLDE read communications from the Ontario Mining Institute and the General Mining Association of the Province of Quebec, suggesting a few amendments to the scheme of federation as reported on by the Society at its November meeting.

MR. B. T. A. BELL.—These suggested amendments practically endorse the Society's recommendations, the only differences being, (1) that while the contribution from each of the societies in the federation shall at no time exceed $3.00 per capita annually, it has not been deemed expedient to interfere with the amount of the yearly subscriptions paid by the members to their respective societies. (2) That the council of the federation shall have power to vote any renumeration it may deem necessary or expedient to the secretary-treasurer. The other recommendation respecting publications is immaterial. As stated before such a federation should be in a position to seek some assistance from the Dominion Government taking the Royal Society's annual grant of $5,000 as a precedent, and if this was secured the cost of publication to the society would be *nil*. In any event the cost would not be much greater than it is at present, the members would benefit by a larger volume of proceedings, and the federation would be well equipped to deal with legislation and other matters of federal importance. The scheme is a good one, it has been endorsed by the other societies and, I trust, will be approved and finally adopted at this meeting.

The Mining Society of Nova Scotia.

Mr. R. H. BROWN, M. E.,

General Manager, General Mining Association of London, Ltd.,

PRESIDENT, 1895-6.

MR. C. F. WILLIS—Mr. Bell's view of a Dominion grant is a good one, but in view of the elections would it not be better to let it stand over until our next meeting. If the federation should not succeed in securing this grant, we should have to contribute as our share $300. Our income is only in the neighborhood of $1,000; we pay Mr. Bell $200 for the REVIEW.

MR. B. T. A. BELL—No; $150.

MR. C. E. WILLIS—After this meeting the amount will be $200; our secretary's grant is $250; altogether $750, leaving a very small balance for operating expenses. I think, therefore, it would be better to leave the matter over.

MR. A. A. HAYWARD—I second that.

THE PRESIDENT—I think we had better settle the matter now.

MR. W. BLAKEMORE—Being conversant with the advantages federation has brought to the mining societies in England, I am heartily in favor of this proposition, I am pleased to find that the gentlemen who have thought that the time has not arrived for it, have nothing to say against the principle. The gentleman opposing it does so only on a financial ground. In that case we should ascertain if federation would increase financial liability. If to a great extent, I would vote against it, but if only to a limited extent, I do not think we should go against federation and cut down a principle which we are all agreed is a desirable one. Mr. Willis said we would lay ourselves open to a total liability of $300 per annum. That could not be exceeded. We have heard that we pay from $200 to $250 for publication at present. I would put it to Mr. Willis whether I am not right in assuming that for the sake of $50 or $100 he will oppose a principle which he would like to see carried out at a future time. We don't want to make ourselves a laughing stock. This matter has been in hand for twelve months. The committee has thrashed out all the details. Upon what ground can we honestly go to the other societies and say: "It is true we are agreed upon the principle of federation, and upon the details, but please let it stand over for twelve months longer." If we have to be at the beck and call of any government, we may possibly never get the grant. To save time, I move in amendment; "That having previously expressed its approval of the principle of federation and having through its committee negotiated a basis of federation with the mining societies of Ontario and Quebec, this meeting agrees to the proposals now submitted by the latter associations, and authorises its committee to carry this resolution into effect as from the first of January, 1896."

MR. B. T. A. BELL—I have very great pleasure in seconding the resolution.

This amendment on being put to the meeting was carried unanimously and without further discussion.

Report of the Council, 1894-5.

The Council has again the pleasure of reporting the continued success of the Society during the past year. Though the number of members has not increased since the last annual meeting, still it has not decreased, and after electing the candidates whose names come before the meeting to-day, the Society will be enabled to begin its fourth year with a membership close on one hundred. The following is a synopsis of the finances of the Society:-

STATEMENT RECEIPTS AND EXPENDITURE FOR YEAR 1894-5.

Receipts.

Subscriptions collected 1894	$812 70
do due and uncollected	130 00
To balance	71 38
	$1,014 18

Expenditure.

Balance owing, brought forward from 1893 account	$273 08
Subscriptions to Canadian Mining Review	148 23
Operating expenses, holding meetings, guests, postages, typewriting, etc., including Sydney meeting	215 45
Reporting meetings	46 50
Printing Transactions, etc	72 87
Stationary	8 05
Secretary-Treasurer, 1894	250 00
	$1,014 18

Meetings—Three general meetings have been held during the past year, the annual meeting in March and the meeting in November being held in Halifax. The July meeting in response to the kind invitation of the officers of the Dominion Coal Co., Ltd., and the General Mining Association of London, Ltd., was held in Sydney, C.B. About fifty of the members availed themselves of this kind invitation, and a most enjoyable week was spent in inspecting the workings above and below ground, of the Dominion Coal Co., Ltd., and the General Mining Association of London, Ltd., and in joining the various excursions provided by the local committee, for our entertainment, and not for our entertainment only, but also for that of our twin sister, the General Mining Association of the Province of Quebec. The Council here desire to record on behalf of the members, their great appreciation of the manner in which the party was entertained during its visit.

Transactions—The Transactions for the year are now ready. They have been published in one bound volume, and will be issued to members immediately.

Exchanges—Complete fyles of the exchanges mentioned last March can be found in the Society's rooms; a few important additions have been made.

Committees—A deputation, upon invitation of the Institute of Natural Science, again waited upon the Premier, in conjunction with the School of Art, the Historical Society and the Institute of Natural Science. The Premier, in replying, stated that any appropriation for such purpose would probably have to be a matter of legislation, and, admitting the necessity of a better housing for the Provincial Museum and Legislative Library, thought that in planning such a building, provision for accommodating the libraries and other wants of the institutions represented, might properly be considered.

The report of the Committee on Federation, appointed at the last annual meeting to consider this question, has already been submitted.

The Committee on Mining Legislation, appointed at the last meeting, are to report to-day.

The President's Address.

MR. JOHN E. HARDMAN—Following upon the precedent established by the first president of this Society, it is incumbent upon me upon retiring from the office with which you have honored me for the year past, to deliver an address.

I cannot perhaps do better than to review in a cursory manner the events of the year now closed, drawing your attention more particularly to such points as have seemed to me to be beacons of hope for the advancement of our mining industries or sign posts of hidden danger to our future prosperity.

From the report of the Council which has just been read, and from the goodly number of new members we have just elected, (and whom I desire to take this opportunity of congratulating), you will gather that we are, as a Society, in a very prosperous and healthy condition. With a membership numbering 100 embracing not only men directly interested in our mineral products, but also men of commerce more or less connected with the development of Nova Scotia's mines, it has seemed to me that the time was ripe for incorporation, and I desire to submit for your serious consideration the question of the advisability of this Society obtaining a charter that will permit it to hold property, and will make it a legally constituted body. It will be evident to all of you present today, or at any of the meetings which have been held for the last year or more, that our accomodations are entirely insufficient for our rapidly increasing library and collection, and for the increasing number of members present at every meeting. While we are under extreme obligations to the gentleman by whose courtesy we have been enabled to use these rooms for the past three years, yet, it is evident that the requirements of the Society have completely outgrown the accomodations which Mr. Gue's generosity has hitherto provided. I wonld suggest to the in-coming president and council the advisability of action on this matter.

In regard to the action of the Government upon the importation of mining machinery, the extension of the clause permitting free entry of mining machinery partially met the demands, but there is still a great lack of clearness and uniformity in the rulings of the various collectors of the Department,

In regard to the requests made of the late Hon. Premier and Sir Hibbert Tupper, in December, 1893, for the transportation of explosives over government railways and for a reduction in the duty on explosives, I am glad to say that the Government has met us in the latter request, and that we all now are enjoying the benefits therefrom, in the shape of much cheaper ammunition than formerly. I regret, however, that the Government at Ottawa have not seen fit to give us transportation of explosives over the I.C.R. In view of the rapidly approaching election the time would seem opportune for a further movement in this direction, if the Society deem it advisable.

The report of the Council deals fully with the successful inauguration of a united midsummer meeting with our great sister association, the General Mining Association of the Province of Quebec, and also touches upon the matter of federation, which has again come up to-day for your further consideration, and, I am happy to say, favorable termination.

In respect to legislation during the year, I am most happy to say that we have had nothing to meet, consider, or disapprove of; but in this connection I cannot overlook two cases which, now in court, are liable to cause serious damage to our gold mining interests if permitted to recur. In the cases of Attorney-General vs. Sheraton and Attorney-General vs. Temple, the fiat of the Attorney-General has been allowed to overide the law, practice and records of the Mines Department, and to stand as a menace against three-fourths of the titles now held in gold mining areas in this province. The certification of titles by responsible attorneys to intending purchasers is now a farce, inasmuch as a fiat from the office of the Attorney-General may upset all such certificates and put the titles into court upon the plea of any discontented person who may chance to skilfully convince the Attorney-General that he thinks he has been imposed upon.

Nor can I let this opportunity pass of alluding to what I consider one of the most important developments our gold mining industry has seen in the 30 years of its existence.

Most of you have seen, but perhaps not all of yon have grasped the full significance of the figures which are contained in the report of the Mines Department for 1894, as regards the gold industry. The average value of the 40,000 tons milled last year was only $7 per ton, and the bulk of all the rock milled was from three or four mines whose average ranged from $4.00 to $6.00 per ton and *all of which earned dividends*. Gentlemen, the true significence of these figures is that the gold mining industry of Nova Scotia has settled down to a low grade basis; that we have proved the remunerative character of these low grade mines, and that the difference between South African and Nova Scotian gold mines is a difference (economically speaking) of *degree* rather than of *kind*. No longer can the capitalist point his finger at Nova Scotia and say "It has only small veins of high grade ores". The developments in Guysboro and Halifax county mines give an effectual denial, and I regard this change as one of the most hopeful and important that the industry in this province has ever seen.

I commend this Mines Report for 1894 not only to the consideration of those of our members interested in gold, but also to our coal men, who, I think, could contribute a paper or two to onr transactions to explain to us why in one coal mine only 51 per cent. of all the labor underground is *skilled*, while in another the percentage is 87; and why in the same district, these percentages vary by 25 per cent. to 26 per cent., being 51 in one case and 77 in another.

Also, why is it that one colliery requires to burn 14 tons in order to produce 100, whereas in another colliery 100 tons are raised by burning 5 tons.

To the uninitiated either inferior quality of coal or inferior economy of plant at once is suggested as the reason, but he may be wrong, and I merely mention these figures as those which have appealed very strongly to my curiosity, and I therefore would urge the desirability of incorporating into our transactions papers representing individual practice at our collieries.

Officers and Council, 1895-6.

The Officers and Council for the ensuing year were elected as follows:—

PAST PRESIDENTS:

Mr. H. S. Poole, M.A., A.R.S.M., (Acadia Coal Co.), Stellarton, N.S.
Mr. John. E. Hardman, S.B, M.E., (West Waverly Gold Co.), Halifax.

PRESIDENT:

Mr. R. H. Brown, M.E., (Gen. Mining Ass'n of London), Old Sydney Mines, C.B.

VICE-PRESIDENTS:

Mr. Graham Fraser, (Nova Scotia Steel Co. Ltd.), New Glasgow.
Mr. Wm. Blakemore, M.E., (Dominion Coal Co. Ltd.), Glace Bay, C.B.
Mr. Chas. Fergie, M.E., (Intercolonial Co. Ltd.) Westville.

HON. SECRETARY:

Mr. B. T. A. Bell, Editor Canadian Mining Review, Ottawa.

SECRETARY-TREASURER:

Mr. H. M. Wylde, 129 Hollis Street, Halifax.

COUNCIL:

Mr. George W. Stuart, Truro,
Mr. J. D. Sword, Ingersoll Rock Drill Co., Halifax.

Mr. C. E. Willis, (Canadian Rand Drill Co.), Sherbrooke.
Mr. B. F. Pearson, Halifax.
Mr. A. Dick, Halifax.
Mr. Geoffrey Morrow, Halifax.
Mr. F. H. Mason, F.C.S., Truro.
Mr. W. G. Matheson, New Glasgow.
Mr. R. E. Chambers, Ferrona.

The Summer Meeting.

MR. B. T. A. BELL.—The members of the Quebec Mining Association have arranged to hold their summer meeting at Quebec in July, when an attractive outing on the St. Lawrence is promised. Now that federation has been agreed upon, the occasion might be utilized agreeably by a united meeting, and I am quite sure our association would very heartily welcome the members of the Mining Society of Nova Scotia. I simply offer this as a suggestion for the consideration of Council.

A Curious Old Rail.

MR. BLAKEMORE.—I have brought here a piece of old cast iron rail taken out of a Cape Breton mine closed for twenty three years. There is very little iron in it. It is so light that it becomes a curiosity. I will leave it for the Society's collection, and will have a portion analyzed, and also the water which has produced such an effect. I may say that all the iron in this mine has been affected similarly. It is an extraordinary effect to be produced by water.

The members re-assembled at three o'clock, the first paper being

On Surface Surveys and the Necessity of Contour Surveys the in Gold Districts of Nova Scotia.

DR. M. MURPHY.—The surface surveys in the gold mining districts of Nova Scotia have been, so far, confined to the running of, or projection of lines over the surface to determine the boundaries of gold mining areas, or blocks of areas, as they are called. When the discovery is of sufficient magnitude to warrant a survey of the blocks, or of the areas within a district being made, the Commissioner of Public Works and Mines, under whose general supervision and guidance, the laws relating to mines and minerals are observed, will send a surveyor to run lines, showing the meetes and bounds of the properties of the respective prospectors or lessees, as the case may be.

The blocks, or their subdivision into rectangular areas of 250 feet by 150 feet, are run off from a line arbitrarily selected to follow the general direction or strike of the lead or lode, as it may appear at the surface outcrop. Such has been the practice in laying off the principal gold districts. Recently, however, this practice has been altered in laying out new districts, and the line of the magnetic meridian has been adopted instead, the general strike of the auriferous slate belt along our Atlantic border, being nearly east and west, magnetic.

It is not the purpose of this paper to offer any remarks touching the present practice, so far as the adoption of base lines or the subdivision of properties is concerned. The object in view, is to point out the desirability of extendikg the work of such surveys, not beyond the district boundaries, but within them, by utilizing the work already being performed towards the greater object in making a topographical survey over each of our gold mining districts.

All mining engineers will agree that topographical maps, if properly made to represent the configuration of the surface, are of the greatest convenience and of much value in mining work where so frequently the problem occurs to follow a strike or vein over a rough undulating or broken surface, perhaps covered by drift or boulder clay, and dipping at a high angle. In locating roads, planning drainage works, utilization of water power and some other purposes, they are also of much value.

The operations of a topographical survey are two-fold namely,—to first project a system of points upon such a tangent plane; and, secondly,—to find the distance of the same above or below the plane, or in other words, as the *Engineering Magazine* expresses it "to measure the lengths of the projecting normals." The first process is ordinary surveying, the second, levelling.

Now, in our gold mining districts, the first process has been, or is being (from time to time as occasion demands) performed, and it covers full three fourths of the entire operation and expense. Assuming the lines are run and the stakes are in place, the remainder of the work, that of levelling and marking the reduced levels on the plot of survey, is the easier and cheaper part of the operation.

Provided these operations are carried out with all possible care, the work would be a very exact one. The first and not the least desirable part of the survey, would be to connect each mining district with a common level; the sea level at half tide, for instance. This may appear difficult and expensive, but it would not be so much as it may seem to be at first sight. Many of our gold districts are within easy distance of tidal waters, others are quite contiguous to railways or railway lines of survey where levels reduced from the datum of normal tidal waters can be obtained at any convenient point. Other places more remote should be connected by instrumental surveys.

We may, considering the limited extent of our gold districts in Nova Scotia, reject the sphericity of the globe, and establish a datum level at half tide which can be easily obtained in any of the sheltered harbors that indent our sea coast. For half tide (no matter whether the tides are normal as along the coast, or abnormal, as along the littoral waters of the Bay of Fundy) the half tide level is almost the same tangental level everywhere. If then, we start from half tide, the cost of connecting the most distant district by instrumental survey, would not be more than $50.00 and most of the gold fields to be so connected would not cost half that amount.

Calling half tide level zero, and ascending *gradatum* to a convenient "bench mark" or to two or three of them, as the extent of the district may warrant, their respective elevations should be marked by painting on an exposed outcrop of rock, or on the stump of a tree or other fixed point, "B.M." in feet and decimals of a foot, such as their elevations above half tide may be.

As all sections or profiles of railway location in Nova Scotia, is in like manner connected with levels of tidal water, and changes of gradients noted thereon by "reduced levels" and by what is termed "formation level" of the finished surfacing to receive the ballast bed and also by bench marks placed by the engineers for their use and convenience and as these profiles are on file in the provincial engineer's office or in the case of lines surveyed by the engineers of the Federal Government in the offices at Moncton and at Ottawa, elevations above tide level can be readily obtained at points easily accessible, and easily found at every change of gradient on lines of railway touching or being within easy distance of the gold mining operations. For instance, the profile of the recent location of the Nova Scotia Southern Railway touches the Molega gold district. A mere glance at the profile would give the elevation on any stake (the stakes are placed 100 feet apart) above the tide level at Shelburne. Two or three hours work would extend the levels from present line of railway survey to any desirable point within that district.

Assuming the levels above tidal water to be established and noted on the plan or survey as well as on the bench marks within each district, the next course to adopt would be, to instruct any party sent to extend boundary lines to connect the levels on every boundary, or dividing point, at which he would set or place a stake, and to mark on the stake and on the plan of survey the reduced level of that stake, showing the height in feet and decimals of a foot that their position would be above tidal water. In the interests of all concerned it might be deemed advisable to place levels at every stake within the gold mining district, where lines of survey have been run and where stakes have been already placed, or at least in such districts as the mining operation now being carried on might warrant the expenditure of having it done.

Now, with respect to the expenditure that would be required to carry out the work suggested by this paper to successful completion. Any ordinary engineer, or fairly educated land surveyor should with the assistance of one man to hold the levelling rod, run three miles of levels each working day, and if he would not be capable of performing this service in a reliable manner, he should not be employed. There are men connected with the Mines and Works Office, with the Crown Land Office and with the Provincial Engineer's Office, quite capable of performing such work. If we place the rate of progress (for levelling over lines already cleared, chained and marked by stakes) at two miles per day, and the wages of the surveyor and his assistant at seven dollars per day, the cost per mile for running levels would be three dollars and fifty cents, say four dollars per mile. The extent to be levelled over in each district, can be readily and quickly ascertained by the mining engineer, conversant with the surveys already made, or by inspection from the map of the district, so that, if we take the data given as factors of cost,—and we know from long experience the figures are ample—one can easily estimate the outlay required to develop from the ordinary surveys at present customary in our gold fields, to the more desirable and modern method of topographical surveying. The system proposed, would, as before stated, be a very correct one—the work would check itself.

Firstly, because the boundary lines of property and their sub-division into rectangular areas, must necessarily check at the point of departure.

Secondly, because the levels repeated from stake to stake and closing on the completion of the circuit, must also check, and, because long distances cannot with the same degree of accuracy, be taken by a transit with the so-called stadia wires, and a telemeter or stadia rod. The errors, by this stadia method, may be estimated by feet, whilst by the method proposed by this paper the error could not with any degree of care be computed by so many inches.

Although the new stradia methods of topographical work, such as described by Mr. George J. Specht, C.E., Prof. A. S. Hardy and others in the "Van Nostrand Science Series," have found much favor and is the best known system, where the configuration of the ground over extensive surface areas is required for examination and research. Nevertheless, taking into account what work, from ordinary line surveying, is at present available in our gold fields, and that the method suggested by these remarks would more directly connect and could more conveniently be adapted to local requirements, being less expensive and more expedient than the stadia method, we might be led to infer it would be the more advisable to adopt.

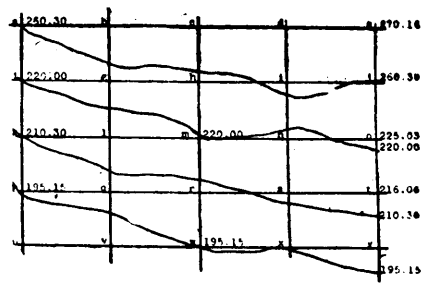
A good example of this form of stadia surveying may be seen in the Mines and Works Office here, by a plan of survey made by Mr. W. B. Dawson, west of Halifax, under the direction of Dr. Gilpin in 1882. The map is only 18 miles by 12, its only fault being that there is not more of it. Since then it has been frequently consulted by the author of this paper, for estimating the area of water-shed, receiving rain fall, for water supply, and in selecting the most suitable lines of railway location. It has recently been a guide to the engineers of the Intercolonial Railway, in finding the most desirable location of the line of railway now being constructed between Halifax and Windsor Junction, and if consulted by the mining engineer it may be found no less useful. One can truly say, its use has already well warranted its cost.

Within and around the city of Halifax, contour lines of level at elevation of 25 feet, have been carefully embodied in a map, by the survey corps of Royal Engineers for defensive purposes, with such precision, that without previous reconnoissance I was able by mere inspection of the topography to make a plan and profile in the office and with the data thus obtained to walk over an ascending line of gradient and railway location from Richmond station to the cotton factory. The instrumental railway survey that followed, showed no perceptible deviation on the ground. These lines of contour are projected in the same manner as suggested by this paper; their connection would, however, be more convenient having stakes, as fixed points, marking the respective elevations in the gold mining districts.

If the lines of survey pass over such hilly or undulating ground, that considerable differences of level are necessarily encountered in its path, valuable aid may be derived from a pocket aneroid barometer. This instrument consists of a flat cylindrical box exhausted of air, the top of which is thin metal corrugated in concentric circles, so as to render it quite elastic. As the atmosphere pressure increases, the elastic top of the box is forced in or down, and as it decreases it is forced out or up. This movement in the top of the box (due to changes in the atmospheric pressure) is conveyed by multiplying levers and a small chain, to an index needle, moving over a circular scale, graduated to correspond with the standard mercurial barometer. The spiral spring by its tension raises the long arm of the lever when the pressure on the top of the box is lessened, thus keeping the short arm of the lever constantly in contact with the fulcrum. The aneroid is used by the following rule: The sum of the reading at two stations, is to their difference, as 55,000 (or twice the height of the atmosphere in feet) is to the elevation required. Thus, if the reading at the foot of a hill is 30.05, and at the top 29.44, we have the following: 59.49; 0.61; 55,000 feet; 564 feet. Generally speaking, the fall of one inch in the barometer indicates a rise of about 900 feet in elevation, and the intermediate tenths and sub-divisions of tenths, are in proportion to the rise.

917	feet above sea level the barometer falls			1 inch.
1860	"	"	"	2 inches.
2830	"	"	"	3 "

By the intelligent use of this barometer, the scope of enquiry may frequently be much narrowed at the outset, and labor and expense greatly abridged. If, as we have so far considered the blocks of areas are marked by stakes on their respective corner boundaries (according to the present practice) and their elevations above the sea level also indicated thereon and referred to on the plan of survey, so that these data can be readily ascertained by inspection, contour lines may be run between them by the barometer with a sufficient degree of accuracy for all practical purposes. Suppose, for example, that stakes have been so fixed at the points a, b, c, d, e, etc., etc.

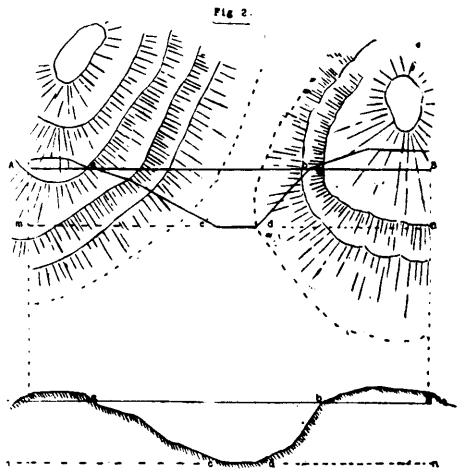


Assuming the strike of the vain, if taken at the plane or level of the dotted line m, n, to have a straight direction, all veins no matter whether vertical or inclined, would have the same bearing.

If the dip is vertical, the inequalities of the surface will not interfere with the course or bearing, no matter on what rugged or undulating surface it is taken.

If the veins or beds dip at any angle of inclination from the surface, the true bearing of the veins can only be correctly taken on the level planes, or if taken on ascending or decending ground, they must be reduced to a level plane to obtain the true bearing.

Fig. 2 shows the deviation from a straight line, a dip of 45° from the vertical would assume along the surface in crossing such a ravine as represented by the profile. 45° being half a right angle, the dip would be one foot horizontal to one foot vertical.



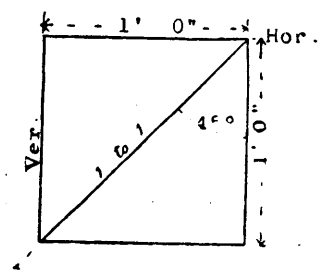
From the stake a, one could carry the barometer in their hand and by moving over the sinuosities of the surface in a path having the same reading, could follow closely a contour line passing between the stakes b and g, c and h, i and n, to j where the line should check on j, it being the same elevation 260.30 feet above the sea level as the stake a, from which the line started. Again by commencing at b, one could follow in like manner passing between stakes g and l, and touching m, where a check could be also affected, and so on. These contours could be plotted on the map by measuring the distance on the ground from the nearest stake to the point at which the line would cross each ordinate and plotting that point on the map for the projection of the line of contour. If these sinuous lines were followed and marked by small stakes as the barometric path would proceed, these lines of level could be conveniently projected along the ground.

The error due to barometric measurements would be reduced to a minimum in these instances, the distance being so short between the boundary stakes where the altitudes would be so correctly noted.

This is not submitted to the Mining Society of Nova Scotia as a geological paper. I may, howerer, Mr. President, be permitted to refer to some principles of rudimentary geology, so far only as may be necessary to illustrate my paper on topography and its use.

The auriferous belt of quartzites and slate bordering the Atlantic shore, present in many places a considerable uniformity of strike, generally, between West and South, N. E. and S. W. is about the average prevailing course. The beds undulate in synclinal and anticlinal folds, often of no great magnitude, as in the neighbourhood of Halifax and its vicinity. In other places such as Goldenville and its neighborhood, there is much more uniform dip. The country is generally low, rugged and broken or boldly undulating. The course of the glacial movement has been tranverse to the line of strike and has furrowed the valleys forming the beds of the principal streams, evidences of which may be observed at the falls of the Port Medway, Liverpool and Jordan rivers. Frequently along the sea coast, and occasionally inland, granite bosses, varying from miles to a few acres in extent, protrude through the slate, so that, in endeavoring to discover the limits of successive beds of sedimentary deposits, other planes are met with, and it is often difficult to decide which is the true plane of stratification and which is the plane of cleavage. All these causes and others, such as faults denudations, etc., tend to create a diversified hilly or rolling surface sometimes bare, and often covered with drift or boulder clay. However, when these disturbing forces are studied by the mining expert in his own special line of research, the mechanical effects must be better understood, and in these respects, surface surveys may be of some service.

Fig 3.



Supposing a mineral vein run across a depression, cropping to the surface on the higher ground, each side, but lost in the low ground being covered with drift.

Let a, b represent the higher ground and c, d the lower, thus :—

Thus in an altitude of 75 feet, the deviation from a straight line, would be 75 feet.

In like manner if any party prospecting or searching for the extension of a quartz lead was in possession of :—

I. A table giving the horizontal unit measurement for each degree and fraction of a degree of dip.

II. A clinometer to take the dip and,—

III. A barometer to take the altitude.

Much assistance might be rendered in finding the local deviation of a dipping lead over rough ground, from a straight surface line.

In a topographical map, the configuration of the ground is reduced to an image, which represents to the eye a large area at one glance. which in nature could not be viewed but by many separate inspections ; therefore, the judgment about the relation of the different parts of the work, will be a clearer and more intelligent one, and this refers more especially to mining work where frequently the problem occurs to strike a vein in a certain level.

Notes on the Behaviour of some Gold Solvents.

MR. F. H. MASON, F.C.S. (Truro) : This paper I wish to say at the outset is, as the title implies, a few notes made on experiments I have been carrying out in my laboratory, and is intended purely as a preliminary to a later paper dealing more fully with the subject. It will serve the purpose of showing you the lines on which I am working and will thus I hope bring about a lively discussion when I read my next paper on the same subject. My experiments are not sufficiently advanced for me to draw many conclusions from them as yet, so I intend mainly to give you just the results of the experiments, drawing only a few hypotheses on them. Secondly, I should like it to be clearly understood that with regard to the experiments I have made on the action of potassium cyanide on gold, I had not the slightest idea at the time that Mr. J. S. MacClaurin, B.Sc., of Auckland University, New Zealand. has been and is also working on the same subject. I received the Journal of the Chemical Society towards the latter part of last month, and I find that in some respects our experiments have been identical.

"Train up a child in the way he should go," is an exceeding good old proverb. I have been taught from my earliest experiences with regard to the treatment of tailings and concentrates with potassic cyanide, to exclude as much air as possible, and that sufficient was safe to get in to complete the solution of the gold ; while an excess of air was likely to reprecipitate the gold in the ore, owing to the carbonic acid gas it contained, and owing also to its power of oxidyzing potassium cyanide to a cyanate. I should probably not have departed from this idea but for an accident. I proposed making some experiments on the precipitation of gold from its solution in potassic cyanide as a double cyanide of gold and potassium. To do this I decided to dissolve some pure gold foil prepared for me by Messrs. Johnston & Mattley, of London, in a solution of potassic cyanide. As luck had it, part of the gold foil was not immersed in the liquid and I noticed after two or three days that on the surface of the liquid action was going on much more rapidly than in the liquid itself, while in another day the gold foil was completely cut off at the surface of the solution and that part which had previously been outside now fell into the liquid. I made a mental note of the fact and left the gold to go on dissolving for over a week. As the gold was still undesolved I decided to see if I could hasten matters by passing a stream of air through the liquid and this brought about the solution of the gold rapidly, at the same time a slight precipitate was formed of a white gelatinous character, looking much like either aluminum hydrate or silica. I may say the air was drawn through the liquid with a filter pump and the air of a laboratory, as you all know, is liable to contamination from many sources, with a view to eliminating this source of error as much as possible in all subsequent experiments, I first passed the air through a strong solution of caustic potash. In 1846, Elsner, I believe, for the first time enunciated the equation representing the reaction which takes place when gold is dissolved in potassic cyanide.

$An_2 + 4\,K\,C\,N + O + H_2\,O = 2\,K\,An\,(C\,N)_2 + 2\,K\,H\,O$, and in the face of that equation which we believe to-day represents the reaction, and the fact that the cyanide process has been running for some years under patents, the validity of which I do not propose to discuss, as I consider comment needless, it does seem strange that up to now everyone appears in working the process to have left the supply of oxygen entirely to chance. My next experiment was a comparative one. I took two pieces of gold foil each weighing ·1 gramme, one piece I placed in a stoppered bottle with an eighth of a litre of a ·2% solution of potassic cyanide. the stopper was removed from time to time and the bottle shaken. The other piece of gold was placed in a flask with a similar amount of cyanide solution and of the same strength, and air was first drawn through a solution of caustic soda and then through the solution into which the gold was placed. I must here state that the arrangements of my laboratory are such that it is not safe to allow water to run on very frosty nights so the filter pump which was asperating the air through the solution had on some occasions to be stopped at night. The gold in the flask was completely dissolved in 72 hours, out of which air was passing through the solution for 45 hours. The gold in the stoppered bottle was now removed, washed, heated to redness and weighed, the weight being ·0770, showing a loss of ·023 grammes or 23%. In the next experiment I took the same quantities of gold and in fact in every way repeated the previous experiment only using a a one-half instead of a two-tenths per cent. solution of potassic cyanide.

The gold became completely dissolved in the flask in 74 hours of which air was passed for 64 hours, while in the same time the piece of gold in the stoppered bottle lost ·0252 grammes. It will be noticed here that the half per cent. solution appeared to be more active than the two-tenths per cent. solution without the air and less active with the air ; this difference I account for by the fact that the gold became more broken up in the early stages of the process in the second case and becoming distributed over the bottom of the flask the air was longer in reaching it. To prove this I started another experiment in which the tube delivering the air was bent round and drawn out to a point, a piece of gold was suspended close to this point by iron wire soaked in boiled oil to prevent corrosion and precipitation of the gold on the iron, thus a stream of air was allowed to pinge against the gold plate, while suspended in a two-tenths per cent. solution of potassic cyanide, the result was that the plate was completely pierced where the air pinged against it, and was grooved where the air went up the sides, thus clearly showing that the presence of air coming actually in contact with the plate of gold while suspended in potassic cyanide solution considerably increased its rate of solution.

The fourth experiment which I intend to bring to your notice was made with a a plate of gold which had been previously coated with mercury. A two-tenths per cent. solution of potassic cyanide was used, and air passed through for twenty-four hours, the plate was then removed, washed and heated at a white heat for several minutes, and weighed ; it lost ·1888% clearly showing that mercury protected gold from the action of potassic cyanide, and this, I assume, may account for the failure of the process in some concentrates, which contain amalgamated gold.

I have also made experiments with cor. ntrates and find that air increases the rate of solution of the gold contained in them, while in contact with cyanide of potassium. Difficulties have been met with which will have to be overcome before I can place any results before you. The air has a tendancy to come up the sides of the vessel containing the concentrates, on account of the reduced friction there, and also when it does find its way through the centre of the concentrates it all comes up in one channel and thus the air never reaches part of concentrates, this of course prevents results from being concordant. These difficulties I hope to overcome before I bring the matter to your notice again.

The experiments have not been as yet sufficiently elaborated to draw any very definite conclusions as to the rates of solution but they clearly show us three things of importance.

1st. That air passing through solutions of potassic cyanide considerably increases the rate of solubility for gold.

2nd. That air coming into direct contact with the gold increases its rate of solubility in potassic cyanide solutions.

3rd. That amalgam on the surfaces of gold protects it to an enormous extent from the solvent action of potassic cyanide

I am now going to tell you some experiments I have made with another solvent for gold with which you will probably be more familiar, namely, mercury. That gold combines chemically with mercury we all know, the composition of the amalgam appears to vary considerably, Roscoe states that a crystalline amalgam containing two molecules of gold to from 3 to 16 molecules of mercury may be obtained. That such amalgam must be difficult to analyse will be at once obvious owing to the tenacity with which mercury adhers to the amalgam.

I was anxious to see what proportion of gold remained in solution in the mercury and whether the proportion was constant, so I made the following experiment. 97½ grammes of pure mercury and 2½ grammes of pure gold were placed in a bulb tube, a horn was drawn out from the glass tube just above the bulb, and the tube was kept at a temperature of from 90° to 100° C for a week, it was then allowed to cool gradually in the oil bath, and then to stand for 24 hours, at the end of that time the point of the horn was broken off and the mercury was tapped into another bulb tube from which six horns had been drawn out, at approximately equal distances from each other; in this tube the mercury was allowed to stand for 24 hours. By beginning with the top one, and breaking off the points of these horns the mercury was withdrawn a section at a time. These quantities of mercury were dissolved in nitric acid and the gold weighed. I should say that the mercury was drawn off at a temperature of 60° F. They gave the following results.

	Grammes.
No. 1.—Weight of mercury	12·1917
" gold.	·0116
Equal to	·0951%
No. 2.—Weight of mercury	7·0710
" gold	·0068
Equal to....	·0961%
No. 3.—Weight of mercury	7·5883
" gold	·0073
Equal to.....	·0961%
No. 4.—Weight of mercury..	7·4340
" gold	·0071
Equal to.....	·0953%
No. 5.—Weight of mercury.....	7·1165
" gold	0069
Equal to	·0962%
No. 6.—Weight of mercury	6·2140
" gold	·0059
Equal to....	·0965%

From these results it is clear that mercury becomes saturated with about ·096% of gold at a temperature of 60° F.

The amalgam in the bulb tube was next dealt with, this was of a crystalline nature with mercury adhering to it. I took a quantity of this and ran it over clean silver foil to get as much mercury as I could away. I took a weighed quantity of this and placed it in boiling nitric acid; when action ceased the mercuric nitrate was decanted off and the gold placed in a porcelain crucible and heated to a bright red heat for a considerable time, it was then weighed the result being that the amalgam contained 19·964% of gold. The gold thus obtained was of a semi-crystalline nature, and viewed through a microscope is extremely beautiful. From their appearances I should judge that they are not crystals, but the skeletons of a crystalline amalgam from which the mercury has been dissolved. This amalgam appears to nearly agree with the compound $An_2 Hy_4$ which contains 19 78% of gold.

Now, it appears to me that what really happens is, that first of all the mercury chemically combines with the gold and then this compound dissolves in the excess of the mercury.

The question which now arises is: Are the chemical properties which exist in mercury with regard to gold, sufficient to explain its power of collecting gold in our stamp batteries? I think not. I think we must look at its physical properties too. As most of you know on the surface of all liquids there exists a kind of elastic skin, if a drop of liquid be placed on a support it does not "wet" and if there are also placed on the same support, small particles of substances, some of which it will "wet" and some of which it will not wet, it will select those which it has the power of wetting and enclose them within its elastic skin, while it will leave untouched those particles which it has not the power of wetting. If the drop of liquid be now moved it will carry off those substances which it has wetted (provided they are not too heavy to break the skin) and leave behind those which it did not wet. Now this, I think, is what really happens with mercury and assists it to an enormous extent, in its power of collecting gold.

Notes on the Collection of Nova Scotia Minerals being prepared for the Imperial Institute, London, by the Government of Nova Scotia.

DR. GILPIN—Mr. President—I find that my promise to give your society a paper on the above subject has landed me in a very big contract, if I am to attempt to do justice to the minerals. I shall therefore not attempt to do more than convey to you in a general way the amount of work that has been done and what remains to do.

As you are all aware the Imperial Institute in London is an ambitious scheme. No other country but England however could undertake it, as it is to be devoted to the exhibition of the resources of the Colonial Empire. In this vast building it is proposed to make an economic exhibition of everything that each colony can offer to the investor, the experimenter and the capitalist; to bring together under one roof the products of the Indies, and of the islands of the south as well as those of the colonies lying nearer the north pole. By degrees each colony is accumulating there samples of its flora, new woods, grasses, etc., all its varieties of food fish, its minerals, in brief reproducing itself in everything that assists man in accumulating wealth, or ministers to his comfort. The Canadian Government has been engaged in forwarding the necessary samples to enable this country to make a proper showing. The Government of Nova Scotia, desirious of maintaining as far as possible the identity of the province which would under ordinary systems of exhibition become lost in the representation of the great territorial area of Canada, undertook to make an exhibit in the line in which it was most directly interested. The subjects most directly appertaining to Nova Scotia in connection with the Institute are fish, minerals and lumber. The fish resources of Nova Scotia are, as you know, varied and extremely valuable. No study of the present day is perhaps, equally fascinating, and few researches are more directly profitable to a government and a nation than those directed toward the propagation, protection and marketing of the harvest of the deep. This subject has hitherto received only a fair attention from the Dominion Government, and it is to be hoped that a comparison with the efforts of other countries as viewed at the Imperial Institute, will lead to a more vivid interest in this great source of wealth. Of the lumber industry it may be said that while it is more directly connected with the local government its representation at the Institute will form part of the general Canadian collection. It is expected, however, that before long arrangements will be made for a small but complete exhibit of our woods and their products.

The minerals of Nova Scotia have, owing to their retention by the Crown, proved an important and increasing source of revenue, and are naturally that resource in which the Government is directly interested. This obviously led to the selection of a mineral exhibit as a means of giving the Province of Nova Scotia a distinctive position at the Institute.

I have been engaged for some time past in collecting samples of our ores and minerals for the space allotted to the Province. Naturally the collection sent to Chicago was utilized as far as it went, but I have fortunately been able to supplement it, and to replace some of the material by better specimens. No system has been followed in forwarding the minerals. They have been boxed as collected and sent to the provincial agent. Much yet remains to be done, and as soon as the spring opens further attention will be given to the work. It will be understood that, as this collecting process is in addition to my regular departmental work, I am unable to do it either quickly or as satisfactorily as I could if left free to give it undivided attention for a short time.

I am not going to give you the geological history of each sample or its composition, etc., as that would lead me into a mineralogy of Nova Scotia, and I would be repeating much that is well known to all of you, and many of your members are experts in all that I would refer to, and much better qualified to instruct you than I am.

A prominent place in the exhibit is taken by the iron ores. This may be explained by the considerable interest which has been taken in iron making during the past few years. There are about seventy-five specimens of limonite, bog ore, magnetite, specular, red hematite, and various carbonates representing the principal deposits. This is added to by specimens of the slack washed, and unwashed, and coked, used at Ferrona, and by the fluxes used at this place and at Londonderry. The Pictou Charcoal Iron Company contribute a complete set of specimens in a neat case, showing their ores, fluxes, fuel, and manufactured product Samples of Bessemer, forge and foundry pig are included, as well as a finely finished set of samples of steel shafting, rails, angles, etc., made by the Nova Scotia Steel Company.

It is interesting to note here the fact which I believe to be correct, that Nova Scotia is the first of the English colonies to make commercially steel from native ores. Of course steel was made from charcoal pig a number of years ago at Londonderry, but the process was discontinued some years before the starting of the New Glasgow steel works.

Samples of coal are shown from various mines in Nova Scotia proper, and it is expected that the Cape Breton coals will shortly be represented. A few samples of marble are shown, but the East Bay stone will be included as soon as rock is available away from the surface.

The samples of building stone number 22, and comprise several varieties of granite, sandstone and freestone. These samples are nearly all cubes of from 6 to 12 inches, polished, dressed, etc. Several ochres are shown from Halifax county. The large number of deposits of "mineral paint" in Nova Scotia invite investigation. While a poor paint brings hardly any price permitting of its elaboration, search may show that our carboniferous limestones may yield some of those valuable umbers which bring a good price. In this connection fineness of texture and clearness of color are, I believe, important requisites. Two samples of barytes are shown. I have no sample of the Cape Breton barytes, which occurs at several places.

The collection of samples illustrating the gypsum of Nova Scotia is not yet complete. I have forwarded 11 samples, illustrating the various fibrous, crystallised and other forms. I have yet to get samples of the mineral as it occurs in the Windsor and other quarries, so as to show it from its economic standpoint.

There are 12 samples of manganese, principally from Hants county, although Halifax, Colchester and Cape Breton are represented. The ores as shown by the samples are high grade. It is probable that we have here deposits of this mineral adapted for the steel makers' processes, and their mining would probably prove quite as profitable as that of the higher grades.

Several samples of ordinary brick clays are shown, and the Acadia Coal Company contributes samples of fireclay, raw, ground, and made into firebrick.

There are also samples of the Rawdon antimony, of lead ore and other less important minerals. Mr. Mason has kindly given me samples of copper ores, notably of the sulphides and carbonates from Waugh's river, Colchester County. The ores of Ohio and Polsons lake and of Coxheath are represented. I have also sent, more as a curiosity than as an indication of economic value, seven samples of native copper from the North Mountain trap, the largest weighing about five pounds. I regret to say I was unable to lay my hands on some large and very interesting native copper samples, holding notable amounts of silver from the College lake, Antigonishe County, I had some years ago.

I have also secured about 30 specimens of the agates and other trap minerals, some of which are polished. Several boxes with views of Nova Scotia scenery have been forwarded.

There remains yet the gold exhibit; for this I have the small but rich samples now in the possession of the department, and hope to purchase a few more, so as to have a small but rich set of gold samples that can be shown under a glass case. The gypsum exhibit requires to be completed, and there are a number of miscellaneous minerals, such as pyrites, fluor spar, molybdenite, etc., which I hope to gather up as opportunity offers.

I would feel under great obligations for any assistance that could be given in this matter by the society as a body, or by its members; as well as for any advice that may help the work. I have already stated that I am not advancing as rapidly as I would wish, but have to make the most of my opportunities.

A Novelty in Mine Ventilation.

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MR. ALEXANDER DICK.—It is almost impossible to say anything on the theory of the ventilation of coal mines which could consistently be called a novelty, as writers by the dozen have so thrashed out the subject since the days of Atkinson that one is almost inclined to endorse the old saying that there is "nothing new under the sun."

The particular point which I wish to make at present has, however, nothing to do with *theory*, but is a description of a new departure in the practical ventilation of a coal mine, which I hope may be of interest to all mining men who have fans at work at their colliery.

We Nova Scotians know that in winter considerable trouble is caused by the hoisting shaft—which is commonly the downcast—becoming sludged up with ice. And all over the world this ice difficulty has been one of the greatest inducements to mining men to prefer a blowing to an exhaust fan.

There are many arguments pro and con which have from time to time been presented in the technical press, and before learned societies, as to which type of fan was preferable, and I do not intend to trouble you with a recital of them. It is sufficient for the purpose of my paper to say that I think the choice of fan—either blowing or exhaust—depends greatly on the climatic conditions of the mine. If an exhaust fan is adopted, the hoisting shaft is used for a downcast, and the fresh air on entering the mine travels first along the main haulage roads where naked lights are used, if anywhere, and the fouled air passes through some return airway where travel is *nil*, and danger of explosion is minimized. If, however, the mine is situated in a locality where frosts are frequent and severe, the cold, frost-laden air in going down the hoisting shaft often impedes work and commonly stops operations altogether. The remedy for this has been hitherto to reverse the air, and instead of sucking it down the hoisting shaft to blow it down the fan shaft and up the hoisting shaft. By so doing the warm air in going up the hoisting shaft has kept it free of ice, and thus advantaged the working of the colliery.

This reversal of air has, however its disadvantages, as follows:

(1) The fouled or impure air is turned into the main haulage roads, where all the traffic of the mine is concentrated, and where naked lights are almost invariably used.

(2) All the doors which were used to obstruct the air when travelling in one direction are utterly inoperative when the air current is reversed, and either duplicate doors have to be supplied or those in use have to be re-hung so as to shut in the opposite direction.

(3) The free gasses which in fiery mines are constantly being exuded from the coal face are kept back by the pressure of the ventilative current, and, far fetched as the argument may seem, it is nevertheless perfectly understandable that at the moment of reversal there will be a cessation of pressure which will permit large bodies of free gas to obtrude into the airways and general workings, and when the current again begins this gas will be carried through the workings and afford excellent opportunities for an explosion.

Suppose then we have a colliery where we are troubled with ice in the winter, but we are in favor of exhaust ventilation. Is there no way by which we could combine the merits of the two systems? I say there is, and I will now present to you a method by which the air can be allowed to travel through the workings in a given direction by an exhausting fan, yet if it be suddenly changed to a blowing fan, the air while it is reversed in the shafts and their immediate vicinity, will not be altered in direction in the general workings. By this means the hoisting shaft will be kept warm in winter, and the three objections which I have just cited will be overcome, namely:

(1) The main haulage roads will be almost entirely in the fresh air as before the change.

(2) The same doors will do for either an exhaust or a blowing fan.

(3) There will be no cessation of ventilative pressure.

For the purpose of explaining this method I have prepared a plan of a mine consisting of four sections worked by two shafts. The hoisting shaft "H" is sunk on the main level, while the fan shaft "F" is situated to the rise of the shaft's pillar.

The coal is worked simultaneously from four districts, one of which is situated on the main level on each side of the hoisting shaft, while the other two are similarly situated on an upper level which is approached by parallel headings driven from the hoisting shaft. Each of these four districts is ventilated by a separate split of the air current.

I may say that in presenting this plan I am not presenting any particular system of mining. For my present purpose such is entirely unnecessary, and I only ask you to look at the plan from a ventilation point of view.

Suppose that the fan at "F" is acting as an exhausting fan, the air will go down the shaft "H" and will take the following course. I will only describe the course of the current in sections 1 and 3, as section 2 is ventilated in the same way as 1, and 4 as 3. Let us take section 1 first.

The air leaving the bottom of the shaft "H" travels to the left along the main level. You will observe two roads in the first pillar in the form of a St. Andrews cross. One of these roads crosses the other at the point *a* by an air-bridge. In each of these roads, both of which communicate directly with the fan shaft "F," are doors *b b* opening towards the hoisting shaft. These doors prevent the air from getting to the fan shaft directly without first circulating through the entire district. You will also observe that there are two doors *c c* on the main haulage road which open readily *with* the current. There are also doors *d d d d* at the foot of each gate road leading to the working stalls. The air, therefore, coming down the hoisting shaft "H" travels along the main haulage road and following the course indicated by the arrows, arrives at the point *e* close to the fan shaft "F," and crossing the haulage heading by the air-bridge at *f*, reaches the fan shaft up which it is exhausted.

We will now consider section 3.

The air when it leaves the hoisting shaft "H" is split at *g*, and the portion of the current in which we are now interested travels up the heading to *h*, part of it going straightforward to ventilate the headings to the rise, while the balance turns to the left along the level road in section 3. From this point it follows the course of the arrows until it reaches the centre heading at *i*, where it joints other splits on its way to the fan shaft "F."

These are the courses which the air takes in the case of a fan acting as an exhaust.

We will now suppose that the fan has been suddenly reversed, and is now acting as a blowing fan, remembering, that while this is so, we do not wish to change the direction of the current in the general workings. As the fan is blowing the air down the shaft "F" we will start from the bottom of that opening and follow the current until it reaches the hoisting shaft "H." Here it is that the St. Andrews cross roads come into play.

Take section 1 again. The air leaving the fan shaft crosses the air bridge at *f*, and its course to the workings is stopped by the door at *e*. It is obliged, therefore, to turn down the only available opening *k*, by which it reaches the main haulage level at *l*. Its passage to the hoisting shaft "H" is impeded by the two doors *c c*, and the only course left for it is to take the old journey around the workings as shown by the arrows, until it reaches *e*, there it turns to our left to *m*, and thence by the over bridge to the hoisting shaft and thence to daylight.

Now let us take section 3. The air leaving the fan shaft "F" passes by the overbridge *a* to the main haulage heading. It is prevented from making its way to the hoisting shaft by reason of the doors *c c*, and therefore travels as before, around the workings as indicated by the arrows, until it reaches the point *n*. From there it goes by the under bridge at *a*, and the other under bridge at *f*, to the hoisting shaft.

Having described the arrangements underground, let me now show you how the change is effected at the fan. And here let me say that the whole thing is done without requiring the fan to be even stopped for one instant.

I present here a plan and sectional elevation of the fan arrangements. The fan is of the ordinary Guibal type. You will observe that the fan is placed close to the shaft, and that the circular casing is projected by means of an epicycloidal curve to embrace the top of the shaft on the one side, and the évaseé chimney on the other. There are two shutters marked "A" and "B." These shutters run in channel-ways similar to a roll-top desk. The shutter "A" is raised to open a passage by means of a similar balance weight, and it retreats, on being lowered, into a close compartment in the side of the shaft, as shown in the drawing. This type of fan receives its air at the side as at "D" on the plan, and discharges it at the tips of the blades.

Suppose the fan is intended to act as an exhaust fan. The shutter "A" is opened and "B" is closed. The doors "E" and "E" are closed, as shown on the plan. The air coming up the shaft comes around the side of the fan to "D," and is then exhausted up the evaseé chimney.

If it is decided to change the fan to a blowing fan, the following operations are all that are necessary. First see that reliable men are placed at each set of St. Andrews cross roads to open and shut the necessary doors at a given hour. At the same hour open the shutter "B" at the fan and close "A." Throw open the doors "E" and "E." The latter will then close up the opening to the shaft, and the fresh air going in at the opening "D" will be blown down the shaft into the workings.

DISCUSSION.

MR. R. H. BROWN—We have at the Sydney mine such a fan as Mr. Dick describes. We have the Guibal fan, 30 feet in diameter and ten feet in width, and we have also the Murphy fan. It has a revolving head and you can alter the ventilation in the mine in five minutes. We have not operated it because we use the exhaust.

MR. A. DICK—At the Uniontown, Pa., mine there is quite a distance between the two shafts, and they found it an advantage because one set of cross roads did for the five splits of the mine. The Murphy fan is favorable to this reversing idea. There is nothing original in it. It is a home made system of shutters.

MR. HAYWARD—Why is it necessary to change the air from upcast to downcast?

MR. DICK—Ice forms in the downcast shaft in winter time.

MR. HAYWARD—Would you advocate it in a mine worked for years?

MR. DICK—I would not reverse the air through the workings. This saves you from doing that. It would not be advisable to do it where there is a large distance between the shafts.

DR. GILPIN—If you had shafts a mile apart you would have to have two miles of airway.

MR. DICK—I don't want a discussion as to whether it is necessary to reverse the air, because I personally would prefer exhaust. It is only on account of difficulty from ice that I would change the air. If you require to make the hoist shaft an upcast in the winter time you have to reverse the air and in this way you don't reverse the air in the general workings. I certainly would object to changing the air if it could be avoided, but it cannot be avoided in some places. In Pennsylvania they have the reverse fans.

MR. BLAKEMORE—It is absolutely necessary to reverse the air in our shallow pits in Cape Breton. There is a great difficulty in maintaining a temperature a little over freezing point. We used the Bond system but it did not succeed. This winter we applied this frame system not exactly in the way sketched there. In the Caledonia mine, an old one, we made a cross over one hundred feet from the shaft on either side and reversed the air only between the shafts. It was successful. I should say with Mr. Dick that there is the greatest possible objection to reversing the air current throughout the mines but there is no danger in reversing it for 100 feet or so near the shaft. It would not be advisable, however, to do it in deep shafts. I call to mind a case six or seven years ago where we decided to reverse the air current and make the downcast an upcast. We had everything outside the mine, men, horses, etc. The shaft was twelve hundred feet deep It took us an hour before we could get the air reversed in the two shafts and roads connecting them. I don't think any man would care to take that risk. You cannot afford to suspend the ventilation for an hour. The reversing of air should be confined to shallow mines. There is no danger if you reverse the current just in the immediate vicinity of the shaft.

MR. DICK—You had a Waddle fan at Caledonia?

MR. BLAKEMORE—We had no fan in before that. The fan we are using in the Caledonia is a Murphy fan twelve feet in diameter.

MR. DICK—I am glad to hear that Mr. Blakemore has had some experience in this matter. I did not know that such a thing was in operation in Cape Breton. I only heard of one case in Uniontown, Penn. I should like to repeat that it is not a question for one moment as to the advisibility of reversing the air either in the shafts or in the workings, but it is a question of fans operated on this principle. They change the direction of the air all through the workings and when the change is made they have to have duplicate doors opening in opposite directions. In this case you do not require duplicate doors, you may have to change the air and it is a question which is the best way to do it. If you reverse the air right through the mine and bring your foul air along the main haulage ways it is a great mistake. Under this system you don't have to do that.

MR. BAIRD—I think your plan is a saving and could be carried out in certain places.

MR. DICK—In old mines where there is a considerable distance between the shafts it would be a difficult matter to adopt it. Where it is put in there are only some hundreds of yards. The idea is simply to save the expense of duplicate doors, and do away with the reversing of the air current in the working places.

MR. BROWN—If the shaft is making ice, why not heat the air going down? Would that be objectionable?

MR. DICK—I suppose there would be no serious objection. Heating might retard ventilation.

DR. GILPIN—They had steam pipes at the Foord pit, Albion mines, and the air passed through them.

MR. DICK—Raising the temperature would not have an appreciable effect on the ventilation. In Pennsylvania they have a fad for reversing the air.

MR. FERGIE—The mines are shallow, are they not?

MR. DICK—Yes, at an easier inclination.

MR. FERGIE—I think that ought to be taken into consideration and also as to whether they are gassy mines or not. I whould not like to reverse the air in some of the Pictou mines. —*To be continued.*

An Evening with the Ferro-Manganese Auriferous-Carbon Variety Troupe.

By the Junior Reporter.

Subsequent reflection in company with a large over-dose of sombre thought has made me arrive at the conclusion that the "subsequent proceedings" of the banquet of the Mining Society in the Halifax Hotel on the 13th March were such in their iniquity as to necessitate their being laid before the public in their awful bareness. There!

The Melancholy Middle-aged Man from Joggins with the roan outcroppings on his chin, showing where he had been shaved last, who sat next to me at the convivial board turned a deprecating eye upon me.

"Is your name coupled with any of the toasts?" he gurgled, as he put pepper on his pie; and then, after a mouthful, put his plate gently away with a *penseroso* sigh.

"Oh! *that's* what's the matter, is it?" I said cheerily, as I fished my napkin up from the floor with my fork and helped myself to a little *consommé* of intermittent hash with a fine gravy background, for I had come in late and was several laps behind the Melancholy Man. "So you're down for a *speech*, eh?"

"I am to make a few remarks upon SUDDEN DEATH ON THE UNEXPECTED ACCUMULATION OF WEALTH THROUGH GOLD MINING," answered the Melancholy Man in tones that had not left off their mourning yet. And he drew out by main force a MSS from his breast pocket about the heft of the *Federal Budget*; and I noticed that his chest measurement shrank visibly.

"Thank God! you won't have a chance!" I murmured with fervent and irrelevant thoughtlessness. "There's a new order of things in vogue to-night. See!"

As I spoke the company rose and filed out of the banquet hall, each one being handed a card bearing the terse and ominous inscription:

ADMIT BEARER

TO

CHAMBER OF HORRORS!!

D.T.—Gold Cure Graduates enter at their own risk.

Then I knew that I had been absorbing too much champagne in quartz, and prepared to do business at the old stand.

We were escorted to a spacious apartment, at the farther end of which was a sort of stage, with all the accessory paraphernalia of curtain, entrances, footlights, etc. Some men were fiddling a sort of Tannhauser-like dirge in the orchestra row, and I heard a dog far off howl at the moon.

Everyone seemed possessed of the desire to leave the place; but there was a weird, uncanny fascination about it, and we stayed.

The curtain was the first to rise; quickly followed by several bald politicians with depraved countenances, who pressed down to the front and fought one another for the first seats.

I turned my eyes away, while chaste blushes chased each other round the circumference of my collar. I saw that the Melancholy Man had seated himself upon his few remarks, in order to get a *higher* view, and was gazing with wrapped attention towards the stage awaiting the opening number of the

FIRST AND ONLY APPEARANCE

OF THE GRAND

FERRO-MANGANESE AURIFEROUS CARBON VARIETY TROUPE

In a Glittering Coruscation of Specialties.

IN TWO ACTS.

The siren meantime sang with considerable *sang fraw*, abandon, and several other things, some verses; one or two of which, to show the depravity of the gentlemen who were responsible for their perpetration, I am constrained to reproduce:

"A living picture here you see,
As artless as high art can be;
A lady, too, of high degree,
The Countess of *Clamcarty*!
A model of the Paris school,
I set my net to catch a fool,
In some ancestral hall to rule
An eligible party!"

"My *lines* I'm sure you will agree
Are classical exceedingly.
Just listen to my song, and see
If Sappho's 'hims' could beat 'em!
My curves are most 'correct' in swell;
I'm aphrodite on the shell!
I'll leave it to the boys, and—well,
If *they* say no, I'll treat 'em."

Then a bold-faced person sheltering himself under the assumed name of *Boak*, with a voice that would have done eternal credit to the contrabasso rumblings of a suppressed earthquake, came brazenly forward. This was the *tenor* of *his* debased unmusical muse:

"Oh, drearful are the luckless moans
Of him who plays in chipless luck;
Bewailing loud in laughless tones
The cards that potless ran amuck!
And dourly doth he greet the morn
That followeth such *change-less* chance,
The while he finds with brow forlorn
No silver lining to his pants."

Mr. A. S. S. Wylde filed a plaintive ditty entitled "The dynamiter's lame end," the plaint whereof in halting stanzas recorded that:

"I blew a hole in a safe,
Which was an unsafe venture,
But I wanted to unsafe that safe,
And make my own indent 'yer!
My pal said: 'Ere's a mine!'
But his tongue struck a vein of bunkum,
For the owner his ducats that day
Into a mine had sunk 'em."

"I blew a hole in the ground,
I thought sure I'd struck suthin',
For there they said *brass* had been found,
But blow *me*, I struck nothin'.
So I struck an old gent for his tin,
And blew myself while it lasted,
And now I'm blastin' rock
In a quarry, worse luck, blast it!"

Another "living picture," and I placed one hand over my flushed brow, and with the other endeavored to hastily pull down my undiscovered locks to cover my intense emotion and some of my face. A creature from Torbrook grossly misrepresenting a fair and innocent heroine of fairy fiction, came brassily forward and struck a pose. It also struck the bald parties on the left and right—*i.e.* in the front row—for they applauded the female's action and called her "Birdie." This creature who had the carriage of an American heiress—without the groom—held by a string a small affair, which upon close and careful inspection—through the crevices between my fingers—I discovered to represent the titled and tottering heir to the throne of some Teutonic state. The living picture next raised one bare foot, displaying upon the sole thereof the word "Trilby" and the numerals "99." This was grossly opposed to biblical tradition, for the scriptures expressly state that the lost *sole* was the other *one*. Then the wretched type of degenerated aristocracy knelt and placed a small glass slipper upon the largest toe of said foot. The latter, with the assistance of its mate, ambled down to the *foot*lights, in order that we might more critically examine this terrible product of current fiction, and their owner trill(by)ed:

I'm Trilby, as you all can see;
For short I'm Cinderella,
My escort here is named Billee,
I got 'im in Vienna.
They call him William over there,
And Emperor of Germany.
He's kind of shrunk and got quite spare
Since he came to Amerikee.

Perhaps I'll tie to him some day,
And Empress, then, dad says I'd be.
This one is quite a nob, they say,
But I love my land—and liberty.
I'll pose as that come presently,
In bronze, like them that Byrnes is runnin',
I was a model in Paree,
And so of course I do it stunnin'.

(NOTE:—The Nabob of the "Golden Lode" was at this stage expected to give an acrobatic performance, but owing to the depth of the shaft, he was unable to crawl out of his hole in time.)

The next item embraced "A few remarks from Brother Gardiner"—a gentleman, by the way, whose appearance was suggestive of a recent excursion to a coal pit or an encounter with the opaque night—for the dog had by now "howled down the moon." He wore a northerly and semi-circular demarcation line, painted white, about his neck, a pale pink bertha with lager beer trimmings, and some underclothing that had been left to air on the dog kennel, as the wearer hitched himself regularly every five seconds during his delivery.

"Gem'lem," said this worthy, "we stan' hyar tonight to discuss federation!—No, no!—to dessicate upon the hypersqualateral insignification ob de glorious umpossibility ob Repairs to de Rock Drill, as proposed to the antithetical diagnosis ob de analysis ob gold solvents! Feller fellers and odder fellers, you has all seen de disgustin' and highly elevatin' disquisition ob de enraptured females who has stood befo' you heah dis ebenin' in all the glory ob deir pristine pristiveness, for de eddyfication ob your intellectual and odder degradation. In de languige ob de Remejial Order on de price ob school books an slate pencils in Alaska in de case ob a fall in de manufacture ob seal, or on de odder hand in de sweet words ob Decameron's Horn,—whar are we at? We stan' heah, you miserbel ole bal' heads, an' ebery mudder's son ob us, and all de time de price ob coal is risin', Gould is being dixcovered by de French in Noo Yawk, de niggers is smokin' de bes' Havana cigaroots at de expense ob de Government, de Mickadoo he am habin' his shirts cum home widout any laundry bill, an' dese bootiful shemales has pandered to your immoral prejudices, an' is now fixin' demselves up wid bronze paint out ob an ole tin can for de next turn. In de words ob de poet Spokeshave I will close my perambulatin' discursion:

"Lives dere a man wid soul so dead,
What nebber to hisself has said:
I'll get drunk 'fore I go to bed,
An' get up in de morn wid an achin' head?"

Upon the retirement of this ebon effigy, which was hastened by a sudden shower of vegetable diet not down in the 'probabilities,' a female in evening dress came forward. Her countenance was utterly depraved, and her clothes were cut shocking low; which was accounted for however when she announced in a brazen voice that she was a vision of judgment by the name of Mrs. Own-the-town Chant. During her vocal rendering she cast amorous glances at the older and more hardened men, and seemed to take an unwholesome pleasure in staring at the younger and modest portion of her audience, including myself. A verse or two of her vicious jingle will show the depths of vileness to which this woman by strict attention to other people's business had descended:—

You've heard me chanted far and wide,
My fame it is quite settled ;
Of County Council I'm the pride,
Tho' several I've nettled.
But *those* are only folk, you ken,
Who hate hypocrisy ;
Whose pride is they are Englishmen,
With British liberty.

To purge the *Empire* of all crime,
The girls ! Oh ! how I chased 'em !
Nor stayed until in joy sublime
Upon the street I placed 'em !
I bribed the old men at the board
With amorous sly advances ;
And to suborn a dean or lord,
I gave 'em all their chan(t)ces !

The master of ceremonies announced that the Black Nugget of Dartmouth would scrap four rounds to a finish with the White Diamond of Mosquodoboit. These celebrities came forward, the time-keepers, sponge-holders, referee and backers took their places, including "the man from Boston," and at the magic word 'time' the Nugget and the Diamond joined forces, so to speak—something anomalous in mineralogical history,—and the battle was on.

Round 1. The Black Nugget led carefully with his left foot, and succeeded very carefully in planting some corn in the most arable portion of the Diamond's cerebellyum. Elated with this success, the Nugget made a wild pass, a sort of an Afghan curve, at his opponent, and laid open the Diamond's nose, making it a cut diamond. The latter, however, still somewhat in the rough, by hastily swallowing something from a black bottle handed him by the man from Boston, contrived to walk on the Nugget's feet and claw the Nugget's wool. During this onslaught the Nugget gave a magnificent exposition of his want of science by biting large helps out of the most tasty portion of the Diamond.

Round 2. This round was rather tame, as during it only one eye was totally destroyed and one ear completely obliterated. It was nevertheless enlivened by a fistic altercation between a corpulent anti-Federationist named Willis and a piratical looking individual named Sword, who carried a banjo. The banjo was somewhat mutilated before these two opposed and enthusiastic supporters of the principals were prevailed upon to retire to the buffet.

Round 3. In this round the audience was somewhat augmented by the presence of several clerical gentlemen and the mayor and chief of police—the last named disguised as a man—of a neighboring town. This party entered the hall by main force, and complained bitterly at not having been the recipients of proper invitation cards. In this round the Nugget contrived artfully to get behind the Diamond and butt him in the kidneys with his bullet-like and bullet-proof head ; while the Diamond managed to retort with his spiked heels upon the shins of his plucky assailant. Honors and the pieces were about evenly divided when the gong rang.

Round 4, and last. The Diamond did not wait for his opponent to leave his corner, and proceeded thither at the instigation of the man from Boston and hit the Nugget upon the chin in an uncalled for manner with a piece of ore from the Coxheath copper mines. Thereupon the supporters of the Nugget claimed a foul and proceeded to "polish" of the Diamond and make him ready for the market, so to speak. The man from Boston with his old time agility sprang to the Diamond's aid ; and in the *melee* which immediately followed all of those directly interested in the combat and a great many non-official onlookers took part. When quiet had been restored, and the "stiffs" had been, to use Colonel's John Hay's beautiful language, "piled outside the door," it was discovered that two disipated looking persons hight Hardone and Scarr had taken their places before the failing footlights for the avowed purpose of warbling "Louisburg," a concerto in P flat.

"Ye gentlemen of England,
That live at home at ease,
Ah ! little do you think upon
The dangers of the seas."

Whereupon a great number who had no ear for music left the building abruptly among them the faithful chronicler of these events.

Seriously, the programme of entertainment provided for the members of the Society by Messrs. C. E. Willis and Geoff. Morrow was of a decidedly unique and highly amusing character, and must have entailed an immense amount of labor to these gentlemen in its preparation. The tableaux were one and all original, well made up, excellently staged, and carried through in a manner that showed careful rehearsal. A word of praise is also due to Messrs A. S. Wylde, George Boak, the brothers Leckie, G. W. Sword, and J. P. Lithgow, for the very fine programme of vocal and instrumental selections rendered during the evening. Mr. R. P. Greenwood made an efficient stage manager, and Mr. Willis was in great form as master of ceremonies, particularly during the amusing boxing tourney between the niggers of Dartmouth. The programme was a work of art and will be cherished by one and all present as a souvenir of one of the most diverting of the many thoroughly enjoyable re-unions for which the Mining Society is famous. Mr. George E. Drummond, Vice-President of the General Mining Association of Quebec, thoughtfully purveyed a case of his celebrated "Radnor" water, which was much appreciated at the refreshment buffet. Mr. John M. Reid, of the Oxford Gold Mines, at present in California recuperating, also forwarded a case of very fine vintage from that country, but unfortunately it arrived just too late for the majority to drink a glass to his speedy recovery and return to the province.

Remarkable Reef Discovery.—Advices from Kimberley state that while the Rand Mines, Ltd., was busy constructing a large dam on its property immediately to the south of the Goldfields Deep, on the farm Elandfontein, the ground was scratched a little to the east of the dam, and at a depth of 2½ ft. a reef was struck showing visible gold, though at the surface there was no outcrop to indicate the presence of reef matter. The reef turns out to be of rich banket, and pans up to 4 ozs. or 5 ozs. Operations being continued, the reef was easily traced, and at a depth of 17 ft. a body of 5 ft. ore was encountered, also carrying visible gold. The find has naturally caused considerable commotion amongst claim holders in the neighborhood, and the point where struck is within 2 ft. or 3 ft. of the boundary. The ground into which it dips belongs to a Mr. Hartman. The demand for claims has in several instances resulted in business, and it is reported that Mr. Wagner has since purchased thirty claims for the sum of £4,500. The question is to what series the reef belongs. It has been decided that it is not of the Kimberley series, or of the Black Reef series, and it has yet to be proved that it is not merely a "blow," although experts say that to all appearance the samples brought into Johannesburg suggest a permanent and payable banket proposition.

FAN VENTILATION.

Plates Illustrating Paper read by Mr. A. Dick, before the Members of the Mining Society of Nova Scotia.

Fig. I.

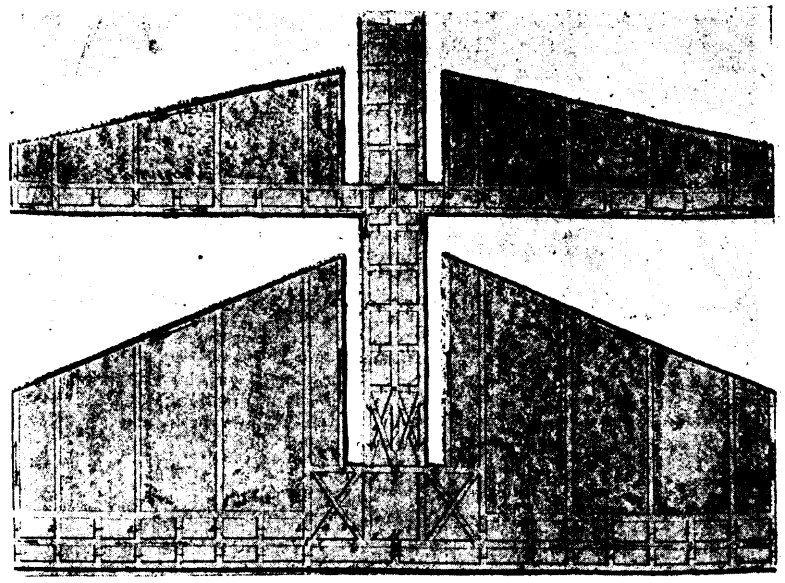


Fig. II.

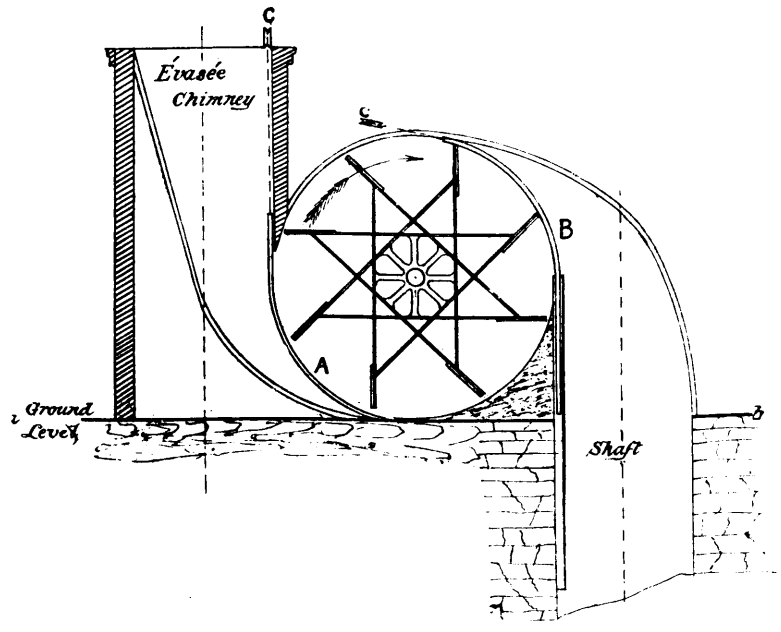
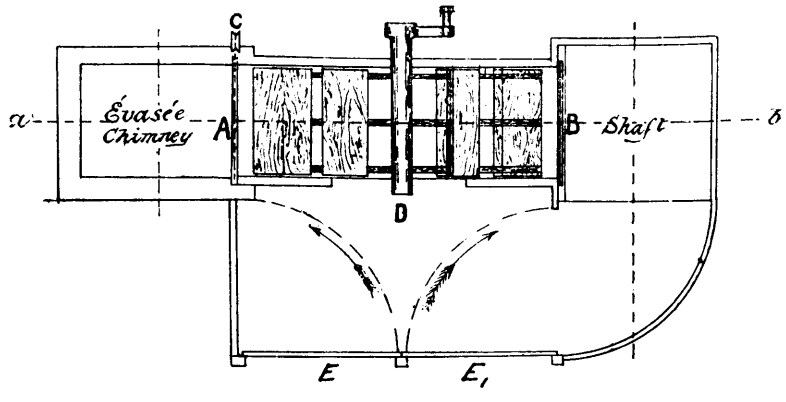


Fig. III.



CORRESPONDENCE.

The Geological Survey and Its Mining Statistics.

To the Editor:

Sir,—On page 6 of your issue for January of this year a statement is made which calls for notice and correction.

Mr. John J. Penhale in his paper on the Asbestos Industry in 1894, read before the Quebec Mining Association, criticizes the figures of production of this mineral issued by the Geological Survey, apparently finding a discrepancy of some 12,531 tons in our figures from 1882 to 1892 as compared with the shipments of the mineral from points on the Quebec Central Railway during the same period. This matter was explained by myself fully at the meeting, but as the discussion was not reported I beg leave to repeat here the statement then made, as follows:—

First—Mr. Penhale takes shipments over the Quebec Central only, whereas he should have obtained also the Grand Trunk shipments from Danville, where one of the largest operators is located, also the small amount shipped from Templeton on the Canadian Pacific Railway.

Second—The table in our report to which he refers distinctly shows that for the years 1880 to 1886, previous to the issuance of mining statistics by the Survey, only Customs figures of exports are available. By reference to the explanatory notes on the first page of the report it will be seen that we claim no great accuracy for figures not obtained by ourselves, which are simply given for lack of any others and for what they are worth. In the nature of things export figures, being collected as a rule by men unacquainted with the technicalities of mining, are apt to be in error. Of this we have frequent evidence whilst checking them as far as we can from our own knowledge of Canada's mineral industries.

Third—We have for years used railroad shipment returns as a guide in checking our totals. After many conversations with railroad men, we have found that these also are admittedly only approximate, and in almost every case not likely to be so accurate as direct returns.

Fourth—The suggestion made at the meeting that we should get railway returns to correct our other figures is therefore superfluous.

In conclusion I would assure our critics that every possible means is taken to check our figures in many different ways. I will not take up your space in detailing these here, but could they know the amount of time necessarily consumed in doing this for all the organized and unorganized mineral industries of the whole Dominion, they would, I think, understand some of the causes for delay in issuance of the reports and conclude that, taken all in all, the figures given are as accurate as it is possible to have them.

With apologies for taking so much of your space,

I am, Sir, yours, &c.,

ELFRIC DREW INGALL.

Geological Survey of Canada,
Division of Mineral Statistics and Mines,
February 18th, 1895.

LEGAL.

Chatham National Bank vs. Lewis McKeen and The Eastern Trust Company, Liquidator of the Mabou Coal and Gypsum Company, Ltd.

In this appeal to the Supreme Court of Canada the questions involved arose in the winding up of the Mabou Coal and Gypsum Company, Limited, under Chapter 129 of the Revised Statutes of Canada and the Winding-up Amendment Act of 1889. An order was duly made by the Supreme Court of Nova Scotia under the provisions of the Acts to wind up this company, and appointing the Eastern Trust Company liquidators. This court subsequently ordered the liquidators to sell *en bloc* at public auction, at Mabou Harbor, C.B., all the real and personal, portable and moveable property and effects of the company, excepting the steamer "Eldon," and on 20th June, 1894, the property was sold to the respondent, Lewis McKeen, for $1,100. It is claimed that McKeen, being a director of the company, and therefore in a fiduciary position towards the company whose property he bought, was disqualified from becoming the purchaser and they appeal to nullify the sale.

COMPANIES.

Mabou Coal and Gypsum Co., Ltd., (in Liquidation.)—The total amount of money realized from the property and assets of this company is $2,510.53 (including $1200 received from the sale of the steamer Eldon.) The total amount of claims filed with the liquidator by creditors amounts to $59,949.71, and of these the preferred claims figure $12,524.01. The Chatham National Bank of New York is a creditor to the extent of $4,938.51, with interest at 6% from 5th February, 1894. At a sale of the property last summer the leases and rights to quarry and ship plaster and gypsum, together with a steam grinding mill, wharves, scows and other property, and the rights to work certain coal areas were knocked down to Lewis McKeen, Sec.-Treas. of the Company, for $1,100. An appeal is now before the Supreme Court of Canada to annul the sale on the grounds (1) that the price was grossly inadequate. (2) The order for sale fixed no upset price. (3) The advertisement was insufficient. (4) That the purchaser (McKeen) was a person who, if not in such a fiduciary position as would render the sale void, was in a position which, under the the decisions, gave him an advantage over other bidders, and which gave him an opportunity to conceal his information respecting the value of the property which he had gained as a trustee, and which it was his duty to disclose to others.

Lillooet, Fraser River and Cariboo Gold Fields, Ltd.—Letters of allotment had been posted, as per advices by last English mails.

Bell's Asbestos Company, Ltd.—The directors propose a dividend for the year ended 31st December, 1894, of 10% per annum together with a bonus of two per cent., placing £5,000 to the reserve fund and carrying £3,592 15s 5d forward. The dividend for 1893 was 5 per cent., and for 1892 7½ per cent. The result of the year's operations was a net profit of £21,261.10; to which has to be added amount brought forward £1,731.5.6, from which after deducting £5,000 for reserve there remained for appropriation as above, £17,992.15.6

Danville Asbestos and Slate Co., Ltd.—This company is being incorporated under Dominion Charter with an authorized capital of $250,000 in shares of $100. Directors: F. Boas and M. Boas, St. Hyacinthe, Que.; J. N. Greenshields, Q.C., Montreal; Wm. Sclater, Montreal; B. Sheppard, Montreal; and W. T. Costigan, St. James St., Montreal, Managing Director. The company, which at present operates under certain conditions the well known Jeffrey asbestos mine at Danville and owns and operates a slate quarry and other property in the same neighborhood, is preparing to engage still more extensively in these enterprises.

Intercolonial Coal Co., Ltd.—The annual meeting of the shareholders was held at the office of the company at Montreal on 6th instant, when the old board and officers were re-elected.

Dominion Coal Co., Ltd.—Mr. F. S. Pearson, engineer of this company, will shortly take residence at the Canadian headquarters of the company at Glace Bay, C.B., for the season. Messrs. Kingman, Brown & Co., agents of the company at Montreal, have completed arrangements for the St. Lawrence shipping trade. While several of the boats are no strangers to the port of Montreal there will be several new boats added to the fleet, including the steamships Mucia and Huelva, which are now on the shipbuilder's stocks. These boats will make their maiden trips to this port soon after the opening of navigation. The other boats chartered are the steamships Coban, Bonavista, Cacouna, Louisburg, Cape Breton, Abbeymoor, Ipsden, Sunshine, Daylight, Sunrise, Turret Bay, Turret Age and Turret Bell. Messrs. William Doxford & Sons (ltd.) of Pallion yard, Sunderland, Eng., are building for Messrs. Peterson, Tate & Co., two new turret boats to run on the St. Lawrence route this season. The two latter boats are specially designed to enable them to go through the canal with a cargo of 3,000 tons.

Black Creek Hydraulic Mining Co. of Cariboo, Ltd.—Has been incorporated in B.C., to take over and acquire mining leases of lands or mining claims in any part of the province, and in particular nine tracts of 160 acres each, on Black Creek, Cariboo District, for which tracts of lands application has been made for mining leases, and a mining lease granted 15th February, 1893, of a tract of land on said Black Creek to the Black Creek Hydraulic Mining Company, and to acquire all the rights and interests of all parties interested in any mining claims on Black Creek and Club Creek, and the water privileges in connection therewith. Authorized capital, $300,000, in shares of $5.00. Head office: Vancouver. The trustees are: W. F. Salsbury, Johann Wullfshon and Edward Mahon.

War Eagle Gold Mining Co., Ltd.—Registered at Victoria, B.C., under the Foreign Companies Act, 18th February. Authorized capital, $500,000. Head office: Spokane, Wash.

Northup Gold Mining Co., Ltd.—Has been incorporated by an Act passed during the present session of the Nova Scotia Legislature. The principals are Clarence H. Dimock, Windsor; Joshua H. Smith, and E. Norman Dimock, Windsor. Authorized capital, $100,000, in shares of $100. Head office: Windsor, N.S.

Consolidated Gold Mining Co., Ltd.—Incorporated by an Act of the Legislature of Nova Scotia, 1895. Authorized capital, $400,000, in shares of $1.00. The principals are Henry C. Walker, Dartmouth; James Reeves, Halifax; G. W. Crease, Halifax; W. A. Temple, Waverley Mines, and J. B. Neily, Halifax.

New Glasgow Coal Mining Co., Ltd.—Incorporated by an Act of the Legislature of Nova Scotia, 1895. The opening clauses of the bill specify that whereas John McIntosh and Robert Drummond, of Stellarton; Angus Chisholm, Harvey Graham, John Fraser, Thomas Fraser, James F. McLean, A. C. Bell, Evan Kennedy and Jeffrey McColl, all of New Glasgow; John W. Sutherland, of Thorburn, and Wm. J. Stairs, of Halifax, have been conducting the business of gold mining under the name of the New Glasgow Gold Mining Company, Ltd., at Goldenville, in the County of Guysborough, and the property now owned by them, consisting of mining areas, buildings, machinery and plant, has cost the company upwards of $12,000, they are desirous of obtaining an act of incorporation. The said Angus Chisholm, John McIntosh, and Jas. A. Fraser, their associates and successors, are created a body corporate by the name of the New Glasgow Gold Mining Company, Ltd., with head office at New Glasgow. Authorized capital, $20,000.

Nova Scotia Coal and Gypsum Co.—By an Act of the Legislature of Nova Scotia the Inverness Mining and Transportation Co. has acquired power to change its designation to Nova Scotia Coal and Gypsum Co.

Nova Scotia Steel Co., Ltd.—The directors of this company (an amalgamation of the New Glasgow Iron, Coal and Railway Co. and the Nova Scotia Steel and Forge Co., Ltd.) are Graham Fraser, New Glasgow, President; Frank Ross, Quebec; John F. Stairs, M.P., Halifax, Vice-President; Adam Burns, John McNab, J. W. Allison, J. D. McGregor, J. M. Carmichael, and E. F. McKay, directors. Mr. Thos. Cantley, New Glasgow, has been appointed secretary of the amalgamation. A bill confirming the sale and transfer of the properties to the new company was passed at the last meeting of the Nova Scotia Legislature.

The Cape Breton Coal, Iron and Railway Co., Ltd.—Incorporated by an Act of the Legislature of Nova Scotia, 1895. The principals are Henry Mitchell, Old Bridgeport, C.B., John A McKenzie, Donald Matheson, John D. McVicar and Walter Crowe, all of Sydney, C.B. Authorized capital, $250,000 in $10 shares.

The North Sydney Mining and Transportation Co., Ltd.—Incorporated by an Act of the Legislature of Nova Scotia, 1895. Principals, William Maury, St. Louis, Missouri, John Greener of North Sydney, and Mytton Maury of Cambridge, Mass. Authorized capital, $200,000, in shares of $100.

Montreal Quarry Co., Ltd.—A prospectus of a company under this designation has been issued. It is proposed to acquire for $152,000 certain quarry properties in St. Denis Ward, Montreal, and to carry on the business of quarrying and selling stone. The properties consist of 2,170,000 feet superficial, more or less, upon which quarrying operations are now being carried on, and from which has been taken much of the beautiful grey limestone used in the construction of the finest buildings in

Montreal. The quarries are fully opened up and have a working face of 2,000 ft. and are well equipped with plant. The authorized capital is placed at $200,000 in shares of $100. The provisional board comprises Ald. Peter Lyall, P. A. Peterson, C.E., D. G. McCaskill, W. G. Reid, George McDougall.

Bras D'Or Marble Co., Ltd.—The officers of this company for the ensuing year are Rod. Macdonald, Halifax, *President* and Messrs. G. E. Franklyn, R. Uniacke H. Saunders, S. Mosher and G. Hattie, all of Halifax.

Barachois Gold Mining Co.—The directors of this Nova Scotia company are: Steven Davidson, Rod. Macdonald, B. M. Davidson, and W. A. Adams. The mine is at Wine Harbor, N. S., and 40 persons are at present employed.

British Columbia Goldfields Exploration and Concessions Company, Ltd.—Registered in Victoria, B.C., 13th March, 1895. Authorized capital, $500,000, in shares of $5.00. Directors: J. M. Browning, Harry Abbott, A. G. Ferguson, Charles Wilson, and J. M. Buxton, all of Vancouver, B.C. The objects for which the company is to be formed are—

(*a.*) To acquire, by subscription, purchase, exchange, or otherwise, any approved shares in companies operating or about to operate any mining claims in the Province; also to acquire, by purchase, lease, exchange or otherwise, any gold or other mining claims, whether developed or not, in the Province of British Columbia:

(*b.*) To acquire, by purchase, lease, or otherwise, any water rights, lands, or property, either real or personal, that it may be found necessary to acquire for the proper working, operating, and developing of any gold or other mining claims in the Province that the company may acquire or have an interest in:

(*c.*) To make sales of, or dispose of in exchange or otherwise, any shares in mining companies operating or about to operate, or of gold or other mining claims, water rights or property, either real or personal, connected therewith, in the Province of British Columbia to any person, persons, body or bodies corporate:

(*d.*) To promote and form companies having for their object the purchase and development of any gold or other mining claims in the Province of British Columbia, and to subscribe for shares in the same:

(*e.*) To employ prospectors to ascertain the value, position and locality of any claims, and to acquire the same, when duly ascertained, by purchase, lease, or otherwise.

Trail Mining Co., Ltd.—Has been registered under the Foreign Companies Act, B.C., with a capital of $250,000, in shares of $100. Head office, Chicago. The objects for which the company is established are:—To engage in, operate and manage the business of mining, milling, smelting, and refining ores, metals, and minerals; to buy, sell, and deal in ores, metals, and minerals of all kinds, and to acquire so much real and personal property as may be necessary to carry out the above objects—said objects and business to be carried out, conducted and performed in the State of Illinois, in the Province of British Columbia, Canada, and elsewhere.

Lake Lode Gold Mine.—One of the most notable advances in gold mining operations, and one distinctly creditable to the owner and to the province, is the completion of the fine milling and mining plant installed at the Lake Lode Gold Mine, Caribou, Halifax County, Nova Scotia, owned by W. A. Sanders. The mill building is commodious and strongly built on solid concrete foundations. The power is furnished by a 50 h.p. Robb Armstrong engine and 80 h.p. Economic boiler, built by the Robb Engineering Co., of Amherst. The stamps weigh 875 lbs. drop 100 to the m., and the cams, shoes and dies are of the finest chrome steel, specially imported for the purpose. The mill has been built by Messrs. Matheson & Co., the well known engineers of New Glasgow. The other equipment includes a Hendy Challenge feeder, a Blake ore-breaker (built by the Jenckes Machine Co.), a 30 light dynamo, and an Eclipse steam pump for fire purposes. The mill bins have a capacity of 200 tons. A new hoisting engine (Bacon double drum, link motion, 10 x 15 cylinder, 4 ft. drum) has also been supplied by the Jenckes Machine Co. The pumps have been supplied by the Truro Foundry and Machine Co. The gallows frame is 75 ft. high and connected with the mill building by a 300 ft. trestle. Below ground a new feature in Nova Scotia gold mining is the ore bins, having a capacity of 200 tons. It is a notable fact that this property, from which Mr. Sanders is securing a remunerative investment on a yield of something like $5.00 to the ton, was abandoned by the former owners as worthless and was ultimately disposed of at sheriff's sale for a song. A force of 30 men are at present employed.

Le Roi Mining and Smelting Co.—At the annnual meeting held at Spokane, Wash., this month, the old board was re-elected as follows:—G. W. Forster, G. Turner, W. D. Turner, D. W. Henley, W. M. Redpath, L. F. Williams, J. W. Binkley, I. N. Peyton and W. J. Harris. The Le Roi is opened to a greater depth than any other mine in Kootenay. The working shaft is 360 feet deep. The 50-foot level extends 30 feet west, and is being extended to connect with an air-shaft that is being sunk 50 feet west of the working shaft. The 200-foot level extends east 100 feet and west 75 feet. A raise of 50 feet is made from the west drift. The 250-foot level extends west 50 feet, from which a raise runs to the 200-foot level. The 300-foot level extends west 100 feet and east 70 feet. From the west drift is a 25-foot raise. The 350 level extends 20 feet west and 20 feet east. The bottom of the shaft is in ore the full width.

Bell's Asbestos Company, Ltd.—The seventh ordinary meeting of shareholders held in London on 7th instant. Mr. Henry Heywood, who presided, said: I have now, gentlemen, to propose the adoption of the report and balance sheet, and as "good wine needs no bush," very little labor is required on my part to-day to commend so satisfactory a report to your approval. It is, I am sure, a great pleasure for us to meet you here under very different circumstances from those which have prevailed since you did me the honor of electing me on the board. We have had falling dividends for the last three years; but I think we have reached the bottom, and are now on the first rung of the ladder which, I hope, will lead to greater prosperity. The accounts are so clearly put before you that it is scarcely necessary for me to make comparisons, and I doubt not you have already compared this year's balance-sheet with the previous one. The accounts have been audited with the usual severity by Messrs. Cooper Bros. & Co., and you may therefore rely on the strict accuracy of the figures in every respect. The first item, I think, which will have attracted your notice will be the very satisfactory one of £28,443 by profit at London and branches and asbestos estates, Canada. The explanation of this is very simple, and for the purpose of such explanation I might divide it into three parts—Firstly, that of the increased sales which have been effected both in this country and the colonies. We have certainly done a very greatly enlarged business, and are endeavoring to extend the advantages we have already secured in the colonies and elsewhere. In whatever places we see an opportunity of doing a profitable business, in such a place you may expect to find an agent of Bell's Asbestos Company, Limited. I have also been pleased to learn, and I am glad to tell you, that many of our old customers, who left us some years ago for reasons I need not enter upon, are returning to us. (Applause.) Whether it is due to the very careful selections at the mines, by hand-picking of the fibre, in the first instance, or to the greater care in every process of manipulation in Southwark Street, in my opinion, and certain it is, the manufactures of Bell's Asbestos Company are the best of their kind made in this country or anywhere else. Further, gentlemen, we find that those of our customers who were sparing in their orders have now larger accounts with us, and I attribute this fact—and it is confirmed by experience—to the superior quality of our manufactured article, to which I have just alluded. The second point I wish to refer to as having enabled us to show higher profits than hitherto is on the question of the stock. It is common knowledge to you, I think, that some years ago, when prices were very high, it was thought to be to the advantage of the company to make very extensive purchases of manufactured asbestos. As prices have fallen from that high figure, we have, in taking stock, religiously written down the value to the lowest point of the time, and in doing so have necessarily been obliged to take away a very large sum—some thousands of pounds—from the profits of each year. I want this to be quite clear. Naturally, when you write down the value of a large stock to the extent of some thousands of pounds, you take away a considerable sum from the profits you have earned. At the end of 1893 we appeared to have got to rock bottom, and it has not been necessary during 1894, I am very pleased to say, although the stock has been valued with the greatest severity, to write down any portion of our profits on account of that asbestos loss. That stock has now been considerably reduced, and this, in itself, is, I think, very satisfactory. Then, again, the severe times have taught us a strict lesson with regard to economy. With regard to the mines, what I said last year will apply to-day. The reports we receive from them are perfectly satisfactory; I cannot say they look any better or any worse. The managing director made his usual visit during the early part of last year, and he was accompanied by Mr. Lightfoot. He reported to us on his return all that we expected he would say; that is to say, he simply confirmed what I have previously told you. He is good enough to tell me that if any shareholders cares to ask any questions with reference to the mines, he, personally, will be very glad to answer them. You will notice an item here that has not appeared before—£750 for machinery reserve fund. We have written down the machinery to its correct value, and we have spent a considerable amount out of revenue in putting it into first rate order. There is not a machine on your works that is not thoroughly and efficaciously employed. Still, the conservative policy which has guided us somewhat from the first suggested that we should provide a fund in case of any new discovery being made or new machinery invented which we might find it profitable to employ either here or at the mines, and, therefore, instead of probably withdrawing a large sum either from revenue account or from the larger reserve fund, we thought it advisable to set aside, as a beginning, £750 for the purpose of providing new machinery, should it ever be required. Naturally it will be. At the same time we write off also each year and take a valuation of the machinery, just as we value the stock, with strict and great severity. Now, gentlemen, one word with regard to the suggestion that the dividend should be 10s. per share, together with a bonus. Upon this point your board had a very long discussion. I, personally, may be too conservative in my views. As you know, I have maintained all along that our first duty here is to put the works in a very strong position—(applause)—and I take it from you, by the applause, that you approve of that course, inasmuch as you wish us to write off the goodwill, and you would also, I daresay, like something written off the mines. So should I. But it was argued, on the other hand, that many who are shareholders to-day will not be to-morrow, or at the end of the year; and that the proprietors at the present time who have been with us during the course of the year are entitled to such reasonable profits as we have made, after setting aside a reasonable sum to reserve fund. I think probably what had more weight with me was this—that we have done very well, while the prospects are equally buoyant, and that as we have had to pay smaller dividends in the past two or three years than we hoped to, we might on this occasion pay 2 per cent. by way of bonus. Therefore it is that we have come to the decision to recommend to you the payment of 10s. a share and 2 per cent. bonus. With these remarks I beg to move: "That the report of the board of directors and of the auditors, and the financial statement submitted to this meeting for the year ended December 31st, 1894, be, and the same are hereby, approved, adopted, and confirmed." (Applause.)

Mr. T. B. Lightfoot seconded the motion, which was duly carried, and the dividend and bonus were declared. The retiring directors and auditors were reappointed, and the proceedings closed with the usual vote of thanks to the chairman and directors.

Londonderry Iron Co., Ltd.—The following were elected to the board at the last meeting of shareholders: Lord Mount-Stephen; Sir Charles Tennant, Bart.; Messrs. A. S. McClelland, James J. Greenshields, A. T. Paterson, John Turnbull, L. Macl). Paterson. At a subsequent meeting of the board, Mr. A. T. Paterson was re-elected president and managing director, and Mr. John Turnbull vice-president.

Alterations in a Pumping Plant.

Discussion on Mr. McMurtrie's paper before South Wales Institute of Engineers.

MR. G. E. J. MCMURTRIE said that with regard to Professor Elliott's remarks at p. 434, vol. xviii., as to its being better to estimate the efficiency of the engine by the consumption of feed water and coal, in place of taking out the units of heat in the steam from the indicator diagrams, he would observe that on account of the whole of the colliery boilers being coupled up, it was difficult to do so. An attempt was, however, made on two occasions to get at the consumption of coal on an idle day, but the quantity of water being pumped at the time was very small, and although one boiler only was used, and the consumption of fuel carefully weighed, yet the smaller quantity pumped consumed the more coal, due doubtless to want of judgment on the stoker's part. Consequently the experiments were not reliable. The results obtained, however, were as follows:

Feb. 8th, 1893, Coal used 5 tons 19 cwt. in 24 hours, 122,400 gals. pumped.
April 27th, 1893, " 6 " 15 " " " 108,000 " "

It had been found more convenient, therefore to base the efficiency on the heat units obtained from the indicator diagrams.

In reply to Mr. Vaughan's remarks, on pp. 434 and 435, he wished to say that an engine placed at the pit bottom and pumping to land, would have prevented any inter-

ference with coal winding, and might possibly have enabled the pump work to be completed earlier. It would, however, have been a very difficult matter to carry the water pipes up the shaft, and the steam pipes down it, without greatly interfering with the work in the shaft, as the new pump work, compact though it was, entirely filled all available space left in the shaft by the cage. In addition, the introduction of steam pipes into a downcast shaft would have interfered with the ventilation.

The actual labor cost of winding the water during the operations was £92 10s., or roughly £100, and the cost of any pump placed underground to pump a possible 300 to 400 gallons per minute to land—which quantity might, at any time, have had to be dealt with, had it been a wet winter—together with the cost of water and steam pipes, and the labor cost of fixing them, would have greatly exceeded that amonnt. It was quite possible, too, that the time taken up in fixing the pipes, &c., would have exceeded the time taken up in water winding, and that there would have been no saving in time. It would probably have taken two single 30 inch engines, with 5 ft. stroke and 10 inch plungers, one placed in the pit bottom and the other half-way up the pit, with steam at 50 lbs. pressure, and each delivering to a height of 450 feet, through 8 or 9 inch pipes, to raise some 20,000 gallons per hour, at a speed of 20 strokes per minute.

The water holes were not driven in order to deal with the water during the alterations, although utilised for that purpose. It had been long felt and proved that the holes were quite inadequate in case of accident to the pumps, and consequently additional water holdage was driven. No part of that cost of that work could, therefore, be charged to the alteration of the pumps.

In regard to the efficiency of the new engine, compared with the old, there could be no doubt that the old one was very badly balanced, but what economy would have been effected by simply improving the balance it was now impossible to say.

In regard to diagram No. 2, plate 25, Mr. Vaughan was probably correct in his supposition that the large reduction in pressure, when the equilibrium valve was opened, was due to excessive bottom clearance, there being a considerable depth in the cylinders below where the piston travelled, due to its formerly being open at the bottom. That, however, was immaterial, as the steam had already done its work before the equilibrium valve was opened. The slight error in the exhaust line in the diagram above the piston, was probably due to the atmospheric line not being in proper position, owing to leakage of steam in the cock at the time the line was taken, or to too much pressure being placed on the pencil at the one time, and too little at the other. Apparently Mr. Vaughan based his estimate of the steam used, per horse-power per hour, on the pump horse-power, which for six strokes = 80, and 6·98 lbs. of steam per stroke × 6 × 60 = 2513, and $\frac{2513}{80}$ = 31·4 lbs. But would it not be fairer to take the indicated horse-power, which would probably be 100 horse-power, giving $\frac{2513}{100}$, or 25·13 lbs. per indicated horse-power per hour. A good result from a single cylinder jet condensing pumping engine, at 50 lbs. pressure, and under ordinary conditions, was 2½ lbs. of good steam coal per indicated horse-power per hour. If the coal evaporated 9 lbs. of water per lb. of coal, it would give 22½ lbs. of water or steam per indicated horse-power per hour. A compound engine working at 100 lbs. steam, carefully jacketed throughout, at a high rate of expansion, might give 16, though 17 to 18 lbs. were more probable. He would ask whether Mr. Vaughan could name a Cornish condensing pumping engine, with a low rate of expansion, and with 50 lbs. boiler pressure, giving 16 lbs. of steam per indicated horse-power per hour? Or was Mr. Vaughan not comparing a Cornish condensing engine at 50 lbs. pressure, and a late cut-off, with a compound condensing Davey differential engine at 100 or 120 lbs. pressure, and a comparatively early cut-off?

THE PRESIDENT said he had read Mr. McMurtrie's paper with a great deal of attention, and the whole question, as it seemed to him, which it raised was, whether it was quite wise to alter the pumps at this colliery at all, or whether it would not have been cheaper, both in the outlay of capital and also in the working expenses, to have substituted a direct acting engine at the bottom of the shaft. The writer admitted in his paper that there was no danger of the pit being drowned; and it always seemed to him that the danger of a pit being drowned was the only justification for a Cornish pumping engine at all. Some figures would show this rather strikingly. Take the maximum duty which the writer suggested, namely, 400 gallons per minute, to be raised a height of 247 yards. The drawings showed the great paraphernalia there was in the pit to pump that quantity of water; yet that maximum duty could have easily been attained with a 9 in. three-throw pump, with 2 ft. stroke, which was a comparatively small affair. The three-throw pump, allowing a very large margin of loss of efficiency, could be driven on the spot. That was to say, assuming steam was taken down the pit, it could be driven easily with 50 lbs. steam, 20 in. cylinder, and 400 ft. piston speed. But to show how disproportionate the pumping plant which had been adopted seemed to be to the work done, let more modern conditions be considered, and with 150 lbs. steam, a high pressure compound engine of 14 in. diameter high-pressure cylinder, and the same piston speed, would be amply sufficient for raising the whole of that water.

To go a step further. Supposing that steam pipes could not be taken down the pit, as, of course it might be a great objection in a downcast pit, and the pumps were to be driven electrically, placing an electrical plant with high-pressure compound engines at the surface, the capital expenditure, even then, would not have exceeded, or at any rate by very little, the cost of making the alterations to the pumps which had been carried out at Foxes Bridge Colliery.

It seemed to him that the great advantages of a direct acting pump would have been specially shown in that particular case, as it would have got rid of all the rods working in the pit, and of all the subsequent repairs to the rods; and there would have been only the rising main in the pit, and either the steam pipe going down, or an electric cable.

With regard to Mr. McMurtrie's remarks as to the consumption of steam, he thought the expectation of working such an engine on 16 lbs. of steam must be a mistake, as no engine, of that class, could be expected to work with such a consumption of steam or anything like it, but with the high pressure and working as he, the president, had suggested, the consumption of steam would very likely be kept down to, say, 18 lbs. per I. H. P.; and, in his opinion, that would have made a cheaper job, and a more efficient one than the mode described in the paper.

MR. T. H. BAILEY said that Cornish pumps were difficult to keep in order, especially in shafts. When they were in order, however, no doubt they worked economically as regarded the consumption of fuel and water. He had just had experience of the way in which Cornish pumps could be kept going. The large one at the South Duffryn Colliery had an 85 in. cylinder, and worked three 22 in. rams, 9 ft. stroke, lifting a height of 210 yards: and they had only changed one clack since February 1893. The engines had been fitted with Davey's differential gear, which was most useful in regulating the working of the engines and pumps; and if those who had Cornish engines wished to get rid of a great deal of the vibration, and the difficulty of keeping their rods in order in the shaft, they could not do better than put the differential gear on to the engines. He quite agreed with the President with regard to electrical pumping, and also, where it was possible, the use of direct-acting pumps at the pit bottom. His experience indicated that the pumping of the future, for simplicity and economy, would be electrically worked.

MR. J. BARROW said the economy of electrical pumping must depend very considerably upon the quantity of water which had to be lifted. He might mention that quite recently there had been a set of pumps put in upon the hydraulic principle, which had had the effect of reducing the consumption of coal a little below one-half what it was with the old arrangement of pumping. In the old arrangements, there had been an old Cornish beam engine, also three special pumps of Haywood & Tylor, and two ordinary plunger pumps; and the steam was taken down a total distance of 900 yards from the boilers. In lieu of those pumps, three sets of hydraulic pumps had been put in, and they had had the effect, as he had said, of reducing the consumption of coal at the boilers to a little below one-half what it was a few months ago. The arrangement of three sets of pipes (one rising main and two tower pipes) down the returns for a distance of something like 300 yards to the first pump, 550 yards to the next, and 800 yards to the bottom pump, appeared to be a little complicated, but the three sets of pumps were working very satisfactorily, the power being conveyed from a compound high-pressure condensing engine placed at the surface, working with a steam pressure of 100 lbs. in the high-pressure cylinder, and in the low-pressure at about 50 lbs. In his view it was a most efficient mode of pumping from great depths, having regard to the quantity of water to be dealt with. As to expense in labor, no fewer than sixteen men and boys had been removed by the application of the three sets of hydraulic pumps. Of course it was a very large scheme, as the water had to be raised some 530 yards perpendicular. Some day, he would have pleasure in preparing a paper upon the installation and working of those pumps.

MR. W. BLAKEMORE would like to say a word or two in reference to pumping by electricity, and in favor of that mode. He had two pumps at work, but prior to the application of electricity, had employed steam, which had proved the greatest nuisance he ever met with in all his experience of pumping underground. The places were so hot that the men could scarcely work; and in consequence of the constant leakages and stoppages he decided to substitute electricity. The arrangement had been at work for some eighteen months, and there had not been an hour's stoppage for anything whatever. He quite agreed with Mr. Bailey that electricity would be the motive power of the future. Having a surplusage of power, he had taken off current for a number of lamps along the main roads, and for the pit bank and engine house; and whilst they only obtained from steam something like an effective power of 40 per cent., they were utilizing from 65 to 70 per cent. with electricity.

MR. GEORGE BEITH said the efficiency of an electrical pumping plant, which he had recently put down, was about 65 per cent. The engines were of the latest high pressure type. The highest lift they had been throwing was 1,000 feet. Previously they were constantly stopped by the steam, but since the change they had been able to get at the bottom of the drifts, and were now driving ahead.

MR. D. J. ARTHUR REES said it was hardly fair to compare electricity with the previous method in the instance just quoted, because there were matters which interfered with making a fair comparison. At present, the electrical pumps had hardly had a fair test, because it had not a quarter enough work. The plant was started in the first week of August last, and was working remarkably well. It had thrown about 6,000 gallons an hour, up a drift, pitching from 20 inches up to 47 inches per yard, for one thousand feet vertical, with a six inch plunger, and the effect so far was highly satisfactory.

MR. T. H. RICHES said Mr. Bailey had referred to the application of electricity to pumping but he did not tell them what was the ultimate efficiency as compared with a pound of coal at one end and water delivered at the other. He was sure it would be interesting to know what that was. Then Mr. Barrow had informed them that he had substituted hydraulic pumps for a previous arrangement of steam pumps; that he put the water under pressure at the surface and transmitted it through pipes to reach his pumps at the face, or wherever he had to pump from. That naturally brought them back to the ordinary use of high-pressure water. Then it would be interesting to know what was the efficiency which was obtained from the pumps as compared with the power put into the water at the surface. He (Mr. Riches) had had something to do with hydraulic mains, and every man who had to deal with them would know that the friction in the pipes was a very serious item. He generally found it most efficient to establish an accumulator in close proximity to the point where the power was taken off. It occurred to him at the moment, that if the work to be done by the pumps was absolutely constant, but little advantage could arise from the existence of the accumulator. In that case the flow of water must be constant through the mains, and whether it was at all influenced by the accumulator, or not, seemed to him of very little importance. But if the work was at all intermittent, it certainly would appear desirable to accumulate the power close to the work. Probably Mr Barrow would kindly give them some information as to what experiments he had tried, and the efficiency which he derived from the hydraulic supply at the pumps, as compared with the power he put into the water on the surface. He also hoped that Mr. Bailey would give them that information as to the efficiency of the electrical pumps. Electricity was, of course, coming into great prominence, not only for pumping, but as a motive power for all manner of driving machinery, hoists, cranes, and so forth. He had been taking little interest in the subject lately, and it seemed to him that there was a very considerable loss which had yet to be accounted for. He noticed there was a large number of overhead traveling cranes in some of the large works in the country, and he had been rather surprised to find the enormous amount of power which was wasted in transmission from the original motor, that was to say, from the steam engines, to the ultimate motor. Information on this point was wanted equally with regard to pumping and non-traversing machinery; and he hoped the gentlemen who had given them some outlined remarks on that occasion would favor them with more details, to enable them to compare the efficiency of the various pumps alluded to.

MR. T. H. BAILEY said in order to get reliable results, they require separate boiler power, whereas the difficulty in that respect was that in colliery electrical plant the steam was supplied from the usual range of boilers.

THE PRESIDENT said they were all very much indebted to Mr. McMurtrie for his Paper, which had led to an interesting discussion. It was true the discussion had rather wandered from the original subject matter of the Paper; and as a question with regard to efficiency had been raised, he was afraid that members might be tempted to engage in experiments which would not compare with one another, unless they all worked on the same basis. In collieries it was impossible to get at the coal consumption, for a pump or anything else, for all the engines were as a rule supplied from the same range of boilers, while pipes very often leaked, and sometimes there was a very long lead of pipe and considerable condensation. He thought the simplest way was for every one to start with the indicated horse-power of the prime motor on the surface. It did not so much matter whether the engine was a good one or a bad one. They wanted to know the loss of power between the engine at the surface and the motor, where the power was used underground, whether for pumping, hauling, or any other work. It was immaterial for that purpose whether the prime motor was a compound engine of a highly economic type, or an engine which had been picked up at the colliery and been utilized for the purpose; they only wanted to know the I.H.P. put into the work on the surface, so as to be able to arrive at the useful result of the electrical appliances underground. They could then make the necessary deductions for themselves as to what the improvement would be if they had a high-class engine on the surface. For the present purpose, it seemed that that was the right direction to take.

MR. G. E. J. McMURTRIE, in replying to the President's remarks, pointed out that the depth of the pit was 300 yards, and that it would consequently require a

larger engine than he had described. As had been stated in the Paper, what largely led to the Cornish system being retained, was the fact that there was already a very good engine at the pit if certain improvements were made to it. In addition, the owners preferred the Cornish system of pumping, and consequently thought it best to consult the well-known Cornish firm of Messrs. Harvey, of Hayle, whose advice they absolutely followed.

As he admitted in his opening remarks, at the commencement of the meeting, it was doubtful whether the Cornish engine could compare in economy with a compound or triple expansion condensing engine of the best type, on account of their greater expansion and earlier cut-off. If a direct-acting compound or triple expansion engine had been put down to pump direct to land, at a boiler pressure of 100 lbs., it would have been necessary to provide a couple of boilers, at least, additional, whilst a good Cornish engine would have been practically thrown away. In his opinion, the cost of such an arrangement would have exceeded that of the pump work put down. The expense of putting rods and plungers, &c.. into the shaft is always great, and the progress very slow, which greatly adds to the cost of any engine placed at land. Some reference had been made to the life of the clacks; the four they had in were put in with the rods, and, so far, had lasted one year and nine months. It was believed they were made of elephants' hide.

A cordial vote of thanks was accorded Mr. McMurtrie for his Paper and the discussion closed.

Dominion Coal Company.

Sydney and Louisburg Railway, Total Length of Line from Bridgeport to Louisburg, 27 Miles.

The work done at the close of 1893 consisted in grading and masonry over the first five miles from Bridgeport towards Louisburg, of which three miles were opened for traffic. From the 5th to the 14th mile work had been broken into but only a small percentage of the grading had been done and scarcely any masonry. During the year ending 1894, the whole of the line to Louisburg, with the exception of the sloping of the large cutting near Catalone lake, has been completed; track has been laid to Louisburg; 17 miles of the line has been fully ballasted, and portions of the remaining 10 done. All masonry and superstructure have been completed and fencing throughout two-thirds of the length of the line completed.

The important structures on the railway built during the year are as follows:

Big Glace Bay Brook, steel trestle 150 ft. in length and 25 ft. high.

Black Brook trestle, 150 ft. in length and 25 ft. high.

Mira River bridge, three spans of 100 ft., of which one is a swing span.

Catalone lake outlet, a span of 54 ft.

Catalone trestle, 360 ft. in length, average height of 50 ft.

In addition to the above work on the main line, a branch line 2½ miles in length has been completed, joining the Reserve mines with the main line near Bridgeport. A branch line one mile in length, connecting the Roost mine with the main line near Glace Bay colliery, and also yard accommodation at the Roost mine has been completed during the year. Yard accommodation at Dominion No. 1 mine, sufficient to hold 7,000 tons of coal in cars has been graded, and tracks partly laid. The main line from Bridgeport to International Pier, a distance of 13 miles has been re-laid with 80 lb. rails in place of the 56 lbs., and this portion of the line has also been fenced. The yard approach to International Pier has been completed, and is sufficiently large to hold 5,000 tons of coal in cars. A branch line has been extended to the Gowrie mines, a distances of 1½ miles, and that portion of the line from Bridgeport to Gowrie mines has been opened for traffic, and has passed the inspection of the officials of the Local and Federal Governments. Extensive yard accomodation has also been completed at Glace Bay, where the central buildings are located, consisting of machine shop, engine house, station house, warehouse, freight shed and oil house. A large combined station and freight house has also been completed at Bridgeport. Temporary station and engine houses have been erected at Gowrie mines.

It is the present intention of the company to have the whole road completed and ready for traffic by the middle of June.

A coal shipping pier 1,400 ft. in length with approaches, and in height 45 ft. over the water, was well under way towards completion at the end of the year. There is no doubt this will be finished before, or as soon as the road is ready for traffic.

New Coal Cutting Machine.

We take pleasure in illustrating a new coal cutter that has recently been placed upon the market by the Jeffrey Manufacturing Company of Columbus, Ohio. This Company, as is well known, has, ever since the advent of coal mining machinery, taken the lead in the manufacture and designing of this class of machinery. As will be seen from the illustration, this machine is excellently constructed; its strength, lightness and compactness appealing to the observer at once.

Many attempts have been made to design and build a successful coal mining machine to work on the principle that this one does, that is, with an endless chain or belt, carrying the knives or cutters mounted on a travelling frame, but it had been left to the Jeffrey Manufacturing Company to place on the market a machine that has proved by long and hard experience that it has all the qualities that are necessary to perfect success. As will be noticed, the chain on this machine is inside the stationary bed frame, affording the greatest protection to any one that is working around the machine. The chain belt runs in a perfectly fitting guide which prevents any undue vibration or side motion, which, in turn, insures freedom from breakages or fouling of the cutters in the stationary parts of the machine. It will also be noticed that this machine has a peculiarity that is not common to any other machine and which the Jeffrey Manufacturing Company has taken great care to protect. The chain belt travels on a perfectly horizontal plane, so that only the cutters on the front of the cutter-head are attacking the coal.

The motor of this machine has been designed especially for mine service; the fields form a perfectly tight and dust proof case for the working parts of the motor. Access is obtained to the commutator and brushes by raising a lid in the top of the motor casing. This lid in itself being part of the magnetic circuit, and when the machine is at work, is held down tightly by the magnetism of the field. The switch is also enclosed in an air-tight box so that any sparks from the breaking of the circuit will not be able to reach any dust or gas that may be in the vicinity of the machine at the time. The switch itself is so arranged that the man in starting the machine must move gradually and slowly to the point where the full current is put on the machine. He can not leave it at any point half-way; if he does so, it will immediately fly back and break the circuit. At the end of the fut the man breaks the circuit by pressing a large button which frees the starting wheel and lets it fly back rapidly, breaking the circuit at once without producing excessive sparking The armature of this machine is so designed that any coil can be replaced inside of half an hour at the mine. This is a great advantage to mine operators, as it saves them the necessity of sending the armature back to the factory to be repaired and the accompanying delays and expense. It may be stated in passing that, with the exception of four or five pounds, all the material used in the construction of this machine is either hammered wrought iron, cast steel or bronze.

The use of such material is expensive, but the Jeffrey Manufacturing Company have learned by long and extensive experience of the work that such machinery is called upon to do, requires the very best quality of material that money can buy and the highest class of workmanship that can be procured. This machine is considerably lighter than the cutter-bar machine, which has met with such great success in the coal mining districts of Ohio and Pennsylvania. The motor will weigh seven hundred (700) pounds less, which will give a good idea of the relative proportions in regard to the weight of the two machines. The Jeffrey Manufacturing Company are turning out these machines equipped with electric motors as well as compressed air engines.

Electric Haulage.

So many articles and papers have been written and published from time to time during the last few years on the various systems of haulage for mines, that it is hardly necessary to commence again and give in detail a description of the various systems and their advantages. It will be sufficient to mention briefly the advantages possessed by electric haulage over other systems. Like all other improvements and innovations the application of electricity for power purpose in mines, has met with much opposition, resulting, as it always does, in bringing to a greater degree of perfection, the machinery, and to-day it may be said that the question of electric haulage for mine service being a success is no longer discussed, but is an accepted fact. This is shown by the large number of plants that are being installed throughout the various mining fields, both in this country and in Europe.

The accompanying illustration is of a new type of electric locomotive, recently brought out by the Jeffrey Manufacturing Company, of Columbus, Ohio. The locomotive, it is said, possesses all the requirements that have been shown to be necessary during the long experience of this company in the designing and manufacture of mining apparatus. Its appearance appeals to the practical mine operator at once as being in all respects just what is necessary for mine service, it is compact, strong, simple in arrangement and accessible, with very few parts that can get out of order, reducing the liability to delays and shut downs, which has been the great trouble with many of the locomotives designed in the past. One of the greatest advantages obtained by the construction adopted by the Jeffrey Manufacturing Company, is the interchangeability of parts on the locomotive; everything is in duplicate, or in other words, there are two locomotives combined in one, giving twice the power and requiring a very small number of supply parts for repairs.

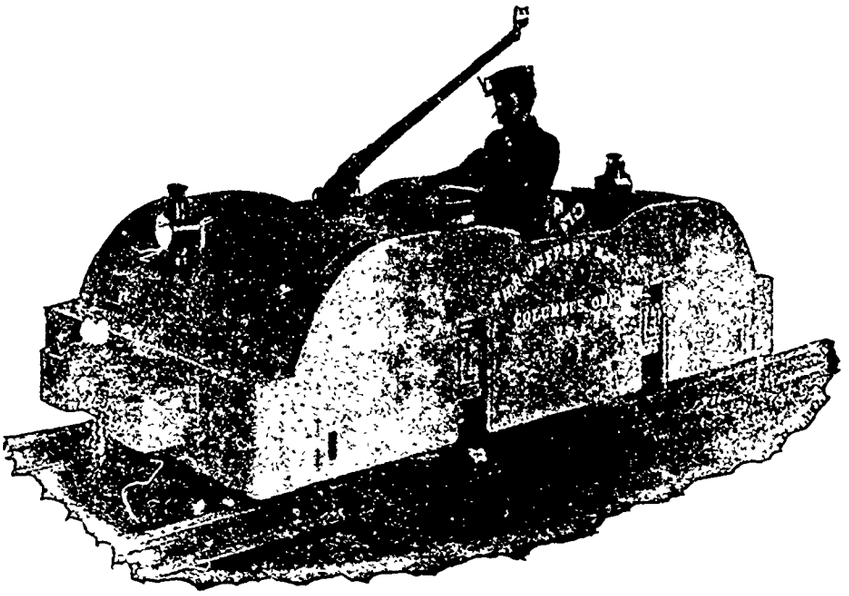
This locomotive is built in three sizes—40, 60 and 80 horsepower; the latter size is the one illustrated. The weight of this locomotive is 19,000 lbs.; length over all, 10 ft. 6 in.; width, 64 in. for a 42 in. guage; height from rail, 32 in. It can run on a 30 lb. rail without excessive wear on the track, as 80 per cent. of the weight is supported on good flexible springs, making it impossible to hammer the track, as is the case where no springs are used or where connection rods are used between the axles. The comparative small dimensions of this locomotive enable it to be used where any ordinary mine car can be used. It is short and has a small wheels base, enabling it to go around sharp curves without excessive friction on the rail. The height of the locomotive being only 32 in., a man can pass without cramping through places 42 in. high. This is one of the most important features, as in low seams a large amount of the roof has to be taken down to admit mules for hauling. Where the roof is of sand rock this is very expensive; instances have been cited where a saving of $3 per yard has been made by using locomotives. The locomotive can pick up the trip from any part by simply throwing the switch leading to it, and if necessary it can be used for switching and delivering any car, irrespective of its place on the trip, to any branch. An extension of the haulage system can be made by simply carrying out the wire, without interfering with the rest of the system. There are no sheaves to be taken care of; no constantly increasing dead load to carry.

The locomotive illustrated is rated at 3,000 pounds draw bar pull at 8 miles per hour, but has been tested on a dry rail and showed a draw bar pull of 5,000 pounds, with sand this can be raised to 6,500 pounds draw bar pull, giving a very powerful starting locomotive, enabling the operator to get his trip up to speed very quickly and without any jarring or throwing the coal off the cars. It is stated that on the level this locomotive has pulled, at a speed of 8 miles per hour, 65 cars, each car containing 3,000 pounds of coal and weighing 12,000 pounds, making in all a trip of 136 tons. At this mine the coal is being hauled for 1¼c. per ton per mile; before the haulage system was put in, counting in dead work necessary to admit mules, the cost was 7½c. per ton per mile. This plant paid for itself the first 14 months. The Jeffrey Manufacturing Company have orders for a number of these locomotives, both for the anthracite coal district as well as the bituminous district.

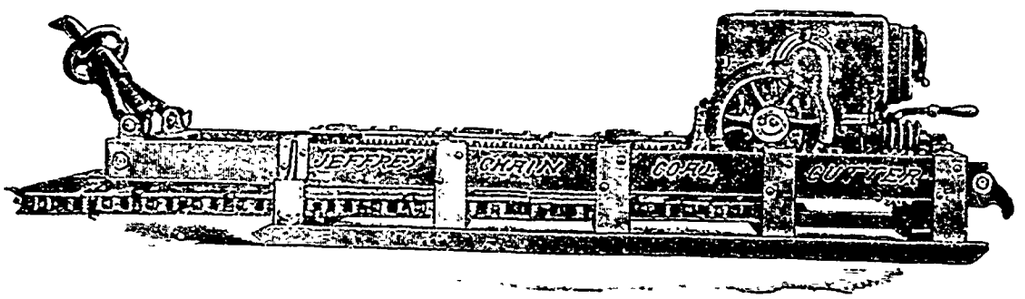
Elliott's Patent Coal Washer.

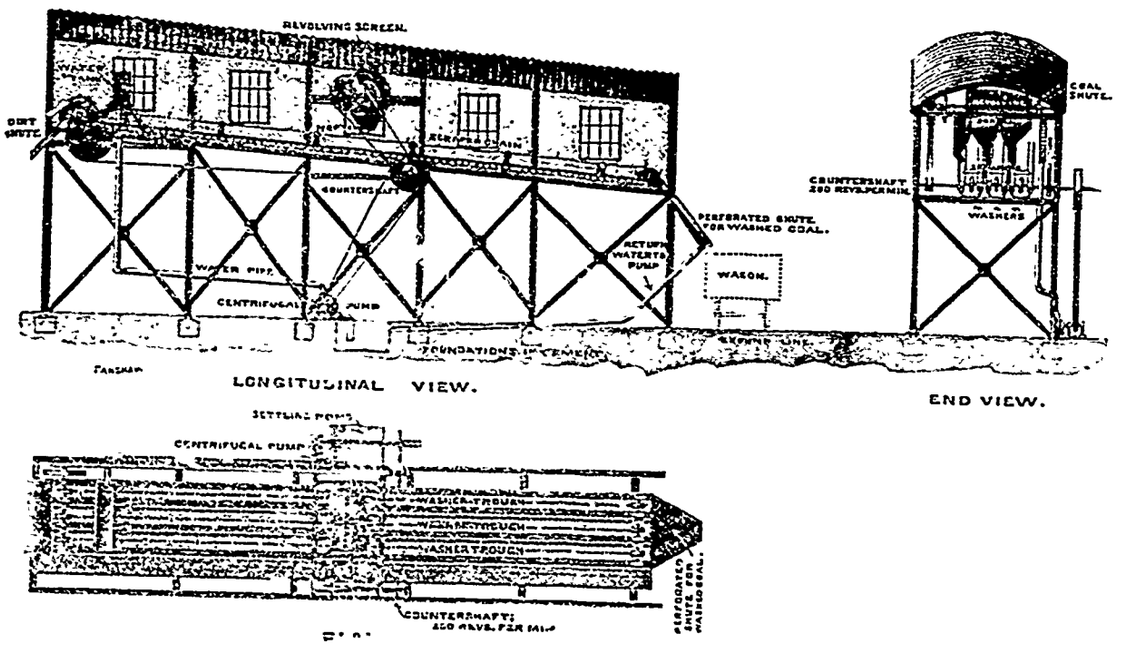
We take pleasure in furnishing our readers with a description of a new coal washing machine now being pushed by the well known English manufacturers, the Hardy Patent Pick Co. of Sheffield.

This machine has been designed on the lines of the old trough washer which has long been a favorite with many colliery engineers on account of its simplicity and its efficiency when in the hands of an intelligent, trustworthy attendant. But in addition to the difficulty of always obtaining the necessary skill and attention, there was also in the old troughs the necessity of changing the flow of coal and water into a second trough while the dirt was being washed off and removed from the first when the stops had become charged with it; for if this was not done at the proper time some of the dirt became mixed with the coal and the result was not satisfactory. The Elliott Washer is automatic in its action and retains all the advantages of economy and efficiency of the old trough, without any of its disadvantages, and is independent of the skill or attention of the attendant, the operation of washing proceeding without interruption as long as required, the coal being delivered at one end of the trough with the water, and the dirt at the opposite end. The washer is constructed with a wrought iron or steel trough about 18 in. wide, having sloping sides, being widest apart at the top and narrowest at the bottom. At each end of this trough a sprocket wheel is fixed, on which a chain rides, and attached to the chain at suitable distances are scrapers at right angles to it, and which correspond with the inside shape of the trough. The scrapers form moveable stops or dams which are slowly moved by the



Jeffrey Electric Mine Locomotive.





Elliott's Patent Coal Washing Plant.

chain along the trough in the opposite direction to the way the water runs. The trough is fixed at a suitable inclination, and the coal is admitted at the centre of its length and the water at its highest end or thereabouts, and as it runs to the lowest end it carries with it the coal, which is lighter than the dirt, and the dirt settles in the scrapers and is conveyed by them against the stream of water and delivered at the opposite end to that which the coal escapes. The speed of the scrapers and quantity of water regulated to suit the material washed. The result is equal to that of any washer known, without exception, and has been described by users as the perfection of simplicity and efficiency. The water is circulated and used continuously, so that the waste is that only which is carried away by the dirt and coal after drainage. A centrifugal or other pump is used for elevating the water to the washer. One man can attend to as many troughs as may be required for any output.

Enormous quantities of small coal have to be disposed of at a very small or nominal price on account of the large percentage of shale and dirt which is mixed with it either in its formation or in the process of getting, the coal itself being of good and useful quality either as a fuel or for the manufacture of coke. The usual and most efficient mode of separating the coal from the dirt is by washing. In all washing arrangements the difference of the specific gravity of the coal and the dirt is taken advantage of to effect a separation. The coal being the lightest is carried away by the water and the dirt collects at the bottom of the washing apparatus and is afterwards removed by some suitable device. In the manufacture of coke it is essential that the coal should be as pure as possible, so that the ash may not exceed, say 5% to 6%. In addition to this, the shale or dirt having no coking qualities, but the reverse, it prevents the coal from forming a strong homogeneous mass or, in other words, it causes the coke to be unable to support much weight of iron in the furnace, instead of being strong and hard. Instances have occurred where the coke made from unwashed coal has been so tender and contained so much ash (15 to 20%) that it was quite unsaleable, and after washing and grinding the ash was reduced to 5% and the coke commanded a ready sale, being equal to any other in the market. In the manufacture of briquettes also, it sometimes happens that colliery proprietors turn to this means of trying to dispose of their slack at a profit, and doubtless are disappointed at the prices obtainable chiefly on account of the large amount of ash contained in the briquettes and the dirty and sluggish fire made with them, whereas if the coal had the dirt separated from it, the result would be very different. The necessity of this separation of dirt from coal is evident, but many colliery proprietors prefer to struggle on as best they can rather than be saddled with one of the expensive or ineffective plants that are in use at some pits. The enormous first cost, the cost of repairs, the unsightly mses that is often seen, as well as the necessity of preventing the pollution of streams, are enough to prevent many firms from availing themselves of the advantages of a washing plant. But when these objections are removed, as they are in the Elliott washer, quite a different light is thrown upon the question. By using this washer, the first cost is the smallest possible. The repairs are practically *nil*, the water is not allowed to escape, being used over and over again, and the cost of washing is reduced to about 2d. per ton, including loss in weight. The coke produced by this machine is greatly improved in quality and structure, and, from being unsaleable, commands good prices; and in some cases the value of coal has been increased from 2s. 6d. to 3s. 6d. per ton. Briquettes can be made of washed slack to sell at the same price as best coal from the same seam. Steam coal slack can be made into small blocks to give as good results as the best large coal from the same seam, and in each case leave a good margin for profit.

A Rocking Granite Boulder.

Rocking stones are not as uncommon as most people think. A number of them have been referred to as existing in this country, but they have been mostly boulders of sandstone, limestone or gypsum. We do not remember having heard of a granite "rocker" before. The erosion caused by wind, water and sand on the softer stones has left many of these natural curiosities, but these elements have not often shown their effect on granite boulders in this remarkable manner. We are indebted to Mr. John Kline, Jr., of Halifax, N.S., for photograph of the illustration herewith shown, and for the description of the curiosity. The boulder is on the property of A. Kidston, Esq., near Spryfield, N.S., about five miles west of Halifax. The boulder is estimated to weigh 464 tons. When first discovered it would rock in the wind, but since it has worn on its bed it takes a strong push to start it. It was found by a fisherman, who when a heavy storm came up on the lake near by, sought shelter beneath its projection on the lea side. Its rocking under the pressure of the wind caused him to seek a safer retreat. After the storm blew over he investigated the phenomenon and himself easily moved the mass in any direction. The rock is one of the objects of interest to visitors to Halifax.

Electrical Mining Machinery.

Electrical mining machinery will be to some, perhaps, who five or six years ago were venturesome enough to equip their mines or quarries with complete installations, an unpleasant topic because of its failing to do then what they expected, meaning in many cases a severe monetary loss and rough set-back to their ambition to have the most up to date appliances; their disappointments, too, being increased when part of the installation is remembered as a success and was desirable, but owing to the failures of the remaining parts, too expensive to operate.

The manufacturers, too, who sank vast amounts of their capital in striving to construct apparatus that would stand side by side with steam or compressed air apparatus and prove itself even of greater value, went unrewarded, almost before trial, yet knowing that these latter rival forces had not been perfected in one or two years but had taken thirty or more, and adding this knowledge to their slight success they plodded on, meeting with more encouragement each time owing to better construction of apparatus and the employment of men capable and willing to work for their employer's success. With success came competition, and such companies in the United States as the Edison, Thomson-Houston, Westinghouse, Jeffrey, and Sperry, zealously guarded the methods they adopted in the construction of their apparatus, one company going as far as to keep an able superintendent and seven or eight skilful mechanics working in entire seclusion from the rest of their employees, supplying them with every requisite in the form of tools and material; huge blocks of sandstone, lime, granite, rocks and coal being given them on which to make experimental tests, careful records of all being taken, proving a most valuable reference and aid.

On the completion of a mining machine it was sent out under the care of one of the men who had assisted in building it, put in operation in some mine or quarry by a pre-arrangement with the owners, and there operated until its defects were exposed, when it would be again returned to the works with a careful record of its failures and success.

The amalgamation of the Edison and the Thomson-Houston Companies, now known as the General Electric Co., and the arrangement of this latter with the Sperry and Jeffery Companies has resulted in the rapid development of electric mining apparatus to such an important extent that the mines and quarries in Canada and the United States are being rapidly equipped, some operated by water power many miles distant, transmission of 20 or 30 miles being secured with economy. The Canadian General Electric Co., being closely connected with the General Electric Co. of the United States, are thus enabled to supply any type of mining machine made by the latter, and with their own successful installations now in operation they rightly feel that the success of electricity in mining is no longer an experiment but an assured fact. When a huge electric street car 45 feet in length, loaded vastly beyond its capacity, is seen rushing past and it is realized that the source of energy comes from a copper trolley wire about ⅜ in. diameter and conveyed to the motors through the medium of a 4 inch trolley wheel, the successful operation of every form of mining machine can no longer be doubted, for the strain upon street railway apparatus is as severe if not more so than in mining.

The precautions of looking out for pin hole leaks in compressed air pipes can now be avoided by the adoption of electrical energy conveyed through wires or cables. The necessity of shingles and packing to keep the steam pump going, overcome by motor driven pumps; cruelty to horses and mules by their barbarous boy drivers done away with by the use of powerful electric locomotives of 70 or 80 h. p. that can be operated in entries as low as four feet high, drawing as many as 30 cars and all under the operation of one man. Again, in place of tedious hand drilling in coal or coal or gypsum, electrical auger drills can be had, small and compact, total weight with jacking frame being about 100 lbs. These drills can penetrate, with a 1½ inch auger bit, ordinary bituminous coal at the rate of 6 feet per minute. Two small insulated plugs of 1½ inch diameter attached to a flexible ¾ inch armoured cable leading from the two main wires furnishes the required energy. Should unyielding substances be encountered a friction band encircling the feed screw nut, allows the nut to revolve which in turn prevents the auger feeding forward, although it may still be revolving. For under cutting coal, an electric chain cutter, cutting 3 feet wide and 4½ feet deep, its motor designed for quick reversing and made to withstand the rough usage too often met with in mines.

In rock drilling the steam and air drills have a worthy rival in the electric percussion drill which, though somewhat heavier, can claim the merit of being much simpler in construction, requiring no packing about its piston of solid forged, plainly finished steel. A similar rifle bar to that of the Ingersoll Sergeant drill is used, and similar also is the manner of protecting the front head by buffer springs fixed at the back head. The reciprocating motion is controlled at the generator, length of stroke of drill being regulated by feed handle. A valuable point in this drill's favor is its strong up pull, an excellent feature in mud holes.

Like the auger drill, an armoured cable 1½ in. diameter furnishes the energy, and the substantial gun metal insulated contact piece at the drill end of cable makes the contact and is so constructed that it will remain in place when drill is stopped and if desired can be readily withdrawn and thrown down or handled with impunity. With no exhausting of steam or air, the electric drill merits for this reason alone special attention, though sometimes exhaust air is desirable in tunnel work.

Motors are so well known that to mention their usefulness would be superfluous yet the latter types called induction motors demand attention inasmuch as they lack brushes or commutators, two valuable features, are dust proof and self oiling, extremely powerful to start under full load and are at all times absolutely without spark. When it is known that a motor can be used to operate a small repair shop many hundred feet under ground and save taking a machine apart to get it to the surface for repairs and that the required energy to operate the motor can be furnished by means of a pair of insulated wires flexible and safe; this with the many other purposes that motors may be used for, and, adding to the useful machines already mentioned, ought surely to release electricity from the time worn statement that it is yet in its infancy, and that electricity in mining and quarrying can claim truly repaid progress.

Electric Percussion and Rotary Drills.

Electric rock drills have been introduced at various mines in Canada, the latest and most improved installation being the type of portable electric percussion and rotary drills put in at the Windsor Gypsum Quarries, N.S., by the Canadian General Electric Co. of Toronto.

The percussion drill in general external appearance conformes very closely to the regular type of steam and air drill; in fact the tripod and shelf are of the standard steam drill form. Electrically, it is arranged in the form of a solid piston reciprocating in a magnetic field and controlled thereby. The piston is provided with a standard air drill rotating rifle-bar and the usual form of springs to protect the front head of the drill from blows. The drill has a piston diameter of 3¾ in., a length of stroke of from 6½ in. 8½ in., length of feed 24 in., number of blows per minute, 360 to 380.

The first of these drills was installed on the Canadian "Soo" canal last winter, when the contractors, Messrs. Hugh Ryan & Co., were greatly pleased with its performance. On these works the performance was equal to that of a 3 in. steam drill, and the facility with which the drill could be moved, owing to the complete flexibility of the connections, was especially remarked. As far as economy goes, it far surpasses any other drill on the works. The cost for operating including power for operating the generator and labor of the attendant at the power house, was somewhat under the average operating expenses of the steam drills. In the Windsor Gypsum Quarries, Windsor, N.S., where one of these drills is in operation, every satisfaction is given by it. The best days work of one drill on record is ten 10 ft. holes in nine hours and twenty minutes. This was in glow lime stone.

The rotary drill is designed especially for use in coal mining, but has also been used with great success in the gypsum quarries of the Windsor Gypsum Co., where the clayey nature of the material tends to clog the drill and imposes the severest test on the capability of the machine. The drill is similar to the well known Howell's drill with an electric motor geared to it in such a way as to form a light and efficient tool. The control of the motor is effected by a small plug switch. No rheostat is used, and power may be taken from the same wire supplying current for lighting, pumping or haulage.

Feed screws of different pitch are furnished for varying the speed of boring and a friction clutch protects the motor should any particularly hard obstacles be struck suddenly. The columns are made in different lengths and each is adjustable for about two feet variation. The constrnction of the drill and its method of mounting enable the operator to drill close to the roof, floors or wall, as well as in any direction. The drill weighs with post complete only about 160 lbs., the drill itself weighing 100 lbs. In bituminous coal this drill shows a speed of drilling of 7 to 10 ft. per minute.

Long Spans in Screening Structures.*

WALTER H. MUNGALL, B. Sc.

To all who are practically interested in the screening and loading of coal into waggons it must be evident how great a source of danger, and unfortunately occasionally of accident, are intermediate supports between the several lines of railway. The old-fashioned square wooden posts have in many cases been superseded by iron columns of smaller dimensions, this leaving greater clearance between them and the passing waggons, and in a few instances intermediate supports have been entirely discarded.

To avoid intermediate supports necessitates the adoption of long spans, and as we increase the load that a given beam will safely carry, or, in other words, for a equal load we must increase the dimensions of the beam. In all screening structures not only is sufficiency of strength of the various parts of the highest importance, but strength must be accompanied by a certain amount of rigidity. With simple beams the span that can be attained is necessarily limited to short distances, not merely because the load a given beam will carry with safety varies inversely as the distance between the supports, but more especially because the rigidity of a beam varies inversely as the *cube* of the distance between the supports. Thus a beam with a given span has a certain strength and a certain stiffness, while if we double the span the same beam, similarly loaded, will carry with equal safety, half the load, but the rigidity will be only one eighth of what it was with the shorter span. From this it is evident that to increase the span even by a small amount necessitates, with a simple beam, a considerable increase in the dimensions of the beam. The stiffness of a beam may, however, be increased beyond that of its natural state by exercising its own elasticity. For example, in the case of a beam to be fixed between the walls of a building, its stiffness may be increased by firmly propping it in the centre a little above the normal position it is to occupy when loaded, and then bending the ends down to the proper level, when being built into the walls. Its elasticity will thus be partially used up and its stiffness considerably increased when the central prop is removed. It is only in very few instances, however, that this method can be applied in screening structures. When longer spans are required than can be readily attained by simple beams, trussed beams are usually employed. With fixed bar screens, loading direct into waggons, spans of about thirty feet with trussed beams are common.

The same system has been adopted in some modern plants, and in one instance, with which the writer is familiar, there is a clear span of sixty feet over the lines of railway. The plant referred to consists of a series of fixed bar screens, with relative distributing bands, picking bands and conveyors. The platform on which the picking bands and conveyors are built is suspended by iron rods from trussed beams overhead; and by suitable bracing the whole structure is rendered perfectly rigid. Those overhead beams are supported at one end on a brick building, and at the other on columns formed of old 60 pound rails. The beams, which are of pitch pine, fifteen inches deep and seven inches broad, are laid in pairs and trussed as one with a space of 2½ inches between. Through this space of 2½ inches the suspending rods already referred to are passed, being fitted to suitable castings, fitted on the top of the beams.

It is not necessary here to go into the methods of calculation of the different stresses in the various parts of trussed beams, the object being rather to indicate how the danger of intermediate supports between the lines of railway may be avoided.

*British Society of Mining Students.

A New Blasting Tool.—In blasting coal and rock the explosive should be so placed that its full force may be expended in forcing out the greatest amount of material possible. To effect this result it is often difficult, and sometimes impossible, to drill the shot hole in the right position. This difficulty occurs in blasting coal and in driving tunnels, where the holes drilled are mostly breast holes. To overcome this difficulty, and enable all the explosive to be got behind its work, the patent excavator or chambering tool has been designed, and its value for breast holes in tunnelling and in blasting coal will be evident to those accustomed to this work. It is used as follows: —After the hole has been drilled by means of one of the ordinary hand-boring machines now almost universally used in mining, the excavator or chambering tool is inserted and used in the same way as a drill, but with a slower advance feed, and the pressure on the two loose cutters causes them to open and cut out a chamber. The cartridge of powder is then inserted, rammed home, and burst in the chamber where the powder lodges. The tamping is done in the usual way. It will be seen that this chamber enables all the powder to be put behind the material to be blown out, and also offers the largest area for the gases of the powder to act upon in a direction at right angles to the direction in which the hole is drilled, as well as a large surface in a line with the hole. It is claimed that in blasting coal with this system from two to four times more coal can be dislodged by the same quantity of powder employed in an ordinary hole in a breast shot. The hole is drilled as deep as the coal is holed, and the full force of the blast acts at the back and spreads for a long way parallel to the face of the coal, thus pushing it off towards the face. The Hardy Patent Pick Company Limited, of Sheffield, England, are introducing the tool.

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Lecturers are sent to any mining centre where a sufficient number of students is guaranteed, to conduct SHORT COURSES in Blowpipe Analysis, Chemistry, Mineralogy, Geology, Prospecting and Mining.

The different courses are made thoroughly practical by work in the well-equipped Chemical, Assay, Mineralogical and Petrographical Laboratories. A Mining Laboratory furnished with Mills, Separators, Concentrators, etc., is in course of construction. It will be open for work in Session 1894-5. Surveying is practised in the field during the warmer months of the Session.

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PROVINCE OF NOVA SCOTIA.

Leases for Mines of Gold, Silver, Coal, Iron, Copper, Lead, Tin

—AND—

PRECIOUS STONES.

TITLES GIVEN DIRECT FROM THE CROWN, ROYALTIES AND RENTALS MODERATE.

GOLD AND SILVER.

Under the provisions of chap. 1, **Acts of 1892**, of Mines and Minerals, **Licenses are issued** for prospecting Gold and Silver for a term of twelve months. Mines of Gold and Silver are laid off in areas of 150 by 250 feet, any number of which up to one hundred can be included in one License, provided that the length of the block does not exceed twice its width. The cost is 50 cents per area. Leases of any number of areas are granted for a term of 40 years at $2.00 per area. These leases are forfeitable if not worked, but advantage can be taken of a recent Act by which on payment of 50 cents annually for each area contained in the lease it becomes non-forfeitable if the labor be not performed.

Licenses are issued to owners of quartz crushing mills who are required to pay Royalty on all the Gold they extract at the rate of two per cent. on smelted Gold valued at $19 an ounce, and on smelted gold valued at $18 an ounce.

Applications for Licenses or Leases are receivable at the office of the Commissioner of Public Works and Mines each week day from 10 a.m. to 4 p.m., except Saturday, when the hours are from 10 to 1. Licenses are issued in the order of application according to priority. If a person discovers Gold in any part of the Province, he may stake out the boundaries of the areas he desires to obtain, and this gives him one week and twenty-four hours for every 15 miles from Halifax in which to make application at the Department for his ground.

MINES OTHER THAN GOLD AND SILVER.

Licenses to search for eighteen months are issued, at a cost of thirty dollars, for minerals other than Gold and Silver, out of which areas can be selected for mining under lease. These leases are for four renewable terms of twenty years each. The cost for the first year is fifty dollars, and an annual rental of thirty dollars secures each lease from liability to forfeiture for non-working.

All rentals are refunded if afterwards the areas are worked and pay royalties. All titles, transfers, etc., of minerals are registered by the Mines Department for a nominal fee, and provision is made for lessees and licensees whereby they can acquire promptly either by arrangement with the owner or by arbitration all land required for their mining works.

The Government as a security for the payment of royalties, makes the royalties first lien on the plant and fixtures of the mine.

The unusually generous conditions under which the Government of Nova Scotia grants its minerals have introduced many outside capitalists, who have always stated that the Mining laws of the Province were the best they had had experience of.

The royalties on the remaining minerals are: Copper, four cents on every unit; Lead, two cents upon every unit; Iron, five cents on every ton; Tin and Precious Stones; five per cent.; Coal, 10 cents on every ton sold.

The Gold district of the Province extends along its entire Atlantic coast, and varies in width from 10 to 40 miles, and embraces an area of over three thousand miles, and is traversed by good roads and accessible at all points by water. Coal is known in the Counties of Cumberland, Colchester, Pictou and Antigonish, and at numerous points in the Island of Cape Breton. The ores of Iron, Copper, etc., are met at numerous points, and are being rapidly secured by miners and investors.

Copies of the Mining Law and any information can be had on application to

THE HON. C. E. CHURCH,

Commissioner Public Works and Mines,

HALIFAX, NOVA SCOTIA.