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#### THE PASSING OF NICKEL.

We remember the horrid joy that was ours in reading long ago a novel writ by a talented female. The hero was a mining engineer. He was a strange compound of self-abnegation, silent sentiment, and improbable genius. He led the maiden that he loved through parlous stopes, winzes, and sumps with no regard at all for the law of gravitation. Unless our memory fails, the progress of the two was equally easy in all the workings of the mine. They walked down a ladderless winze as readily as they sauntered up an almost vertical stope. This is mining from the viewpoint of fiction.

Not less entrancing is fiction from the viewpoint of mining. And our exhibit was warm from the press but a few weeks ago. It is a short, all too short, phantasy in the American Review of Reviews, January, 1911. The artist is Dr. David T. Day, of the U. S. Geological Survey. The title is prosaic enough. It suggests nothing of the tingling inwardness of this tabloid romance. Who would or could imagine that under the caption "The Platinum and Nickel Industries" a staid geologist would have cavorted through the iridescent realm of dreamland! But Dr. Day has thus cavorted. Let us gambol after him for a space.

Dr. Day's word etching is elegiac; it is the funeral-song of the nickel industry. Platinum also provides a presumptive corpse, but platinum's untimely demise brings no tears to our eyes.

The first picture upon Dr. Day's small canvas is almost pastoral in effect. "For thirty years one strong personality, Joseph Wharton, a Quaker merchant of Philadelphia, ruled the nickel market in peace and prosperity. . . Wharton ruled partly by being a great metallurgist, . . . but chiefly by his untiring vigilance as a merchant. He ruled until foreign ores of New Caledonia and of Canada pressed their demands."

Despite Wharton's "vigorous protest," the obstreperous foreign ores knocked a hole in the tariff. United States citizens proceeded to operate the Canadian nickel mines, on the plea that their country called for armour plate. Wharton, with Christian resignation, "closed the only considerable nickel mine in the United States and submissively [mark the word!] changed his activity from mining and smelting nickel ores to making government nickel steel at his Bethlehem Iron Works. His reign passed to the International Nickel Company, which controls the nickel supply of the world, and, lacking Wharton's shrewd knowledge of trade principles, has tried to force a great supply upon a market that does not exist." Briefly, the nickel trade is moribund, the trust is an aggregation of visionaries, and there is no balm in Gilead.



That our readers may be able to appreciate fully the playful inversion of fact in the foregoing obituary, we shall skim lightly over the early and actual history of Mr. Wharton's connection with nickel. This is what truly befel. In the year 1863, Mr. Wharton purchased the Lancaster Gap nickel mine. The ore was exceedingly low grade, carrying only 1½ per cent. nickel. In the same year he started his nickel works at Camden. When, in 1887, the Canadian Copper Company put their ores on the market, Mr. Wharton immediately and naturally purchased these in preference to his own. Consequently the output from Lancaster Gap diminished.

Two years later, Mr. Wharton commenced to purchase matte from the Canadian Copper Company. As this was by far the cheapest way for him to obtain raw material, he decided, in 1891, to close the Lancaster Gap mine. Mr. Wharton's "vigorous protest" is, therefore, hardly visible to the naked eye. We may add that, when the International Nickel Company was organized in 1902, Mr. Wharton was one of the active promoters. And we are not credibly informed that he ever saw grave conflict between duty and pleasure, in accepting additions to his bank account from the corporation.

So much for Dr. Day's Quaker patriot. As for the International Nickel Company, we regret to state that, notwithstanding the crass stupidity of its directors, it has increased its business by 40 per cent. within the last twelve months. We hardly know whom to blame, but we fear mightily that one funeral at least will have to be postponed *sine die*.

#### RECIPROCITY ONCE MORE.

On another page will be found a letter from Mr. G. H. Gillespie commenting upon our attitude towards reciprocity. Mr. Gillespie, being vitally interested in better trade relations with the United States, is an out and out free-trader. Against heavy handicaps he has built up a considerable business in one mineral commodity. Like many other ambitious operators, he is anxiously waiting for the chance to get into the United States markets on equal footing with United States operators. Mr. Gillespie's opinions are coloured by his business interests. This does not in the least detract from their value; in fact, it lends force and sincerity to his argument.

Before touching upon our correspondent's letter, it is appropriate to make a few remarks upon the question of reciprocity as a national issue. And, since our newspapers are the prime moulders of public sentiment, we must here and now express our extreme distaste for the kind of childish twaddle that is being circulated by the partizan elements of the daily press. The worst offenders are in the ranks of the opposition. The silly fiction that United States politicians are conspiring to wrest our heritage from us is as baseless as it is absurd. As well might Diaz have designs upon the

throne of England. The equally febrile fancies that a modicum of free trade corrodes our loyalty to the Empire and implies commercial ruin, are not worthy of serious consideration. Loyalty and nationhood are not functions of tariffs. Neither is a tentative measure of reciprocity a menace—it is merely a political lever for opening new channels of trade. The men who have brought it about are not traitors—they are merely much harassed politicians, who are doing their utmost to mend an exceeding bad tariff. And, in so far as the mining industry is affected, they have mended and not marred. That there is anything sinister in this we cannot believe.

Canada's total trade with the United States amounts to about \$355,000,000 per annum. Of this amount, exports to the States from Canada total \$115,000,000; whilst imports from the States run up to \$245,000,000. Contrasting this with our trade with the whole British Empire, we find that the total imports and exports are only \$277,000,000. Imports from the British Empire amount to \$112,000,000; and exports from Canada to all other parts of the Empire are put at \$165,000,000. Thus our total trade with the United States is 22 per cent. larger than our trade with the whole of the British Empire. And it is to be noted that as regards the States there is a balance of trade against us of \$130,000,000; whilst within the Empire the balance to our credit is \$53,000,000.

In view of these facts it appears that, under existing tariff arrangements, we are certainly not on a satisfactory basis with our largest customer. Reciprocity, *per se*, is obviously to be desired. Reciprocity, as arranged at Washington, may or may not give us the worst of the bargain. That is a matter to be determined by the passage of time, and by the statesmanship of our ministers.

Meanwhile, the point made by Mr. Gillespie is strong. If too few concessions have been made to the mining industries, we have ourselves to blame. What concessions have been granted may be credited to a few active individuals who are enterprising enough to see when and how their bread is buttered.

#### UNDERGROUND VISITORS.

By no means unmixed blessings are visitors in mining camps. Especially during booms, mine managers and superintendents are too frequently pestered by a horde of persons who wish to go underground. In this country the rule practically is either to have the mine open to everyone, or to admit no one underground. This arrangement does not work well. While a manager cannot be blamed for declining to waste the time of himself or his staff in showing through the mine numerous visitors, many of whom are entirely ignorant of mining and are influenced merely by idle curiosity, still professional etiquette requires that men having a knowledge of mining or of ore deposits should be afforded facilities for visiting the underground



workings. This is best for science and best for the company. Yet the casual visitor is an unmitigated nuisance. Something must be done to exclude him. But is there not a middle road between indiscriminate admission and total exclusion?

One apparently workable scheme suggests itself. Would not the charging of a small fee, say one dollar for each visitor, tend to keep out those who are influenced merely by idle curiosity? Fees collected could be devoted to the miners' hospital, or to a benevolent or accident fund. Before going underground each visitor would be required to purchase at the mine's office a ticket of admission. Idle curiosity would hardly survive this cold touch, while no trifling levy would deter the responsible inquirer.

Some years ago the subject was dealt with by the President of the Institution of Mining and Metallurgy as follows:

"When dealing with this subject, I should like to make a vigorous protest against the system, now happily becoming more and more rare, of closing mines to the public. No doubt in each case where it is being done, or has been done, plausible reason can be given. I think, however, there is a great deal of sound common sense in the old, but somewhat homely, saying that the 'proof of the pudding lies in the eating,' and in this sense the result has, in the majority of cases, been unfortunate for the general public. If a mine is owned by an individual, or a few large shareholders, there is, no doubt, a perfect right to close it against visitors. In the case, however, of a mine which is owned by a public company, the shares of which are actively dealt in, and which the public are invited to buy and sell freely, the same argument, I maintain, does not apply.

"Personally, I always regard a mine which makes great difficulty about letting visitors go underground, and will not give information freely about the workings, and so on, with the very greatest suspicion, and have found that events usually justify that view. In the last four or five years three mines have come under my notice which were subsequently the cause of a so-called mining scandal, and it is worth noting that in each case great mystery was made about giving any information concerning the workings to visitors, and difficulty was made in regard to going underground.

"It would appear that if anything is kept concealed about a mine, some astute individual is pretty sure sooner or later to turn it to his own advantage at the expense of the public.

"A system which seems to have a great deal to recommend it, is for the manager to be empowered to regard all information regarding his mine as open to the public, after it has been reported to the head office, and sufficient time has elapsed to allow for its publication. This system is being acted on in some of the best-managed mines, and I have not heard the managers complain about it, while the protection thereby afforded to the public is very considerable."

Without a doubt we suffer from both extremes in Canada. The wide-open mine is too often burdened with giggling "trippers"; the mine that is sealed to the public is made the object of false and injurious rumours. Examples of the latter are not far to seek. Both extremes are costly; both are unfair and unwise.

The imposition of an admission fee would place the visitor in a better position. It would remove from his mind, in part at least, the feeling that he is getting something for nothing. It might also, as suggested above, do something to ameliorate the hardships that miners too often have to tolerate.

#### THE STANDARDIZATION OF MINE ACCOUNTS.

Following up its excellent work in the direction of standardizing, the Institution of Mining and Metallurgy now publishes the report of a special committee on mine accounts and cost sheets.

The report mainly deals with the allocation and grouping of expenditure, and lays down certain principles, adherence to which will, amongst other advantages, facilitate the comparison of costs at different mines. It is frankly acknowledged that absolute uniformity is not to be hoped for; but the same general plan can be followed by all operators.

Capital account, profit and loss; working accounts and cost sheets, are the heads under which the report is divided.

Under capital account fall all expenditures before the producing stage is reached. It is recommended that all main shafts or adits be charged direct to capital. Incline shafts that develop ore, subsidiary shafts, winzes or other workings that have assisted ore development, should be charged to underground development, and may remain chargeable to capital or be treated as a temporary development account. All other expenditure before production is attained should be placed in a "general expenditure account"; after the producing stage is reached these should be distributed proportionately after deducting any revenue that may have been received.

After the producing stage is reached, only large special items should be charged to capital account. Purchase of additional property, sinking of new main shafts, the erection of new building, and the purchase of new plant, are the items specified here. All repairs, minor replacements, and all maintenance are to be charged to working costs. The report strongly condemns the charging to capital account items that should be included in working costs.

When production has commenced, all underground work should be charged to development account; or, as an alternative, all development may be treated as a temporary account, in which case this temporary account is to be gradually extinguished by progressive transference to the working account.

Bullion, concentrates, and other marketable products should be shown as assets in the balance sheet and



credited to revenue account at net valuation. Unfinished products should be reckoned only at cost, provided such cost does not exceed market value.

Depreciation, as regards the mine, should be covered by special reserve funds, accumulated out of revenue. As regards machinery, plant, etc., suitable provision also should be made from revenue. The percentage written off should be based on original cost, and not on the balance standing in the books at any subsequent date.

Eight main heads are recommended for classifying all expenditure. These are:—1. Development. 2. Extraction of ore. 3. Sorting at surface, preliminary crushing, and transport. 4. Reduction costs. 5. Administration charges and general charges at mine. 6. Realization charges on products. 7. Taxes and royalties of all kinds, shown separately. 8. Head office charges. Each of these heads is discussed separately. There follows a lengthy memorandum covering each item exhaustively. This, together with the general report, will be reprinted in a later issue of the CANADIAN MINING JOURNAL.

Comparison of the annual reports of Canadian mining companies proves at once the fact that few such companies follow any rational system of accounting. In fact, the whole responsibility is usually left on the shoulders of an accountant at the head office who may never have seen a mine in his life. Not only is the result grievous to the shareholder, but all possibility of arriving at actual costs is precluded. Capital account is handled in surprisingly various ways. Working costs are frequently artificially reduced by padding capital charges. In divers other ways the annual statement is robbed of meaning and value.

A careful perusal of the report will go far towards removing the misconceptions that now mar the work of mine accountants. But the most important conclusion that can be reached is that the engineer in charge must concern himself in the allocation of expenditure much more than he does at present.

### THREE COMPANIES.

To satisfy many inquirers we present here a few facts relating to three of the large mining corporations that have displayed practical interest in the Porcupine gold district.

The Anglo-French Exploration Company, Limited, was organized in 1889. The authorized capital is £1,000,000, in 500,000 preference and 500,000 ordinary shares of £1 each. The dividends paid on ordinary shares, since 1893, have ranged from 8 per cent. to 50 per cent. For three years, 1905, 1906, and 1907, no dividends were declared. In 1908, 10 per cent., and in 1909, 12½ per cent. dividends were distributed. Profits for the calendar year 1910 amounted to £242,333. Mr. William Frecheville, who visited Porcupine last autumn, is a director. Mr. J. B. Tyrrell, Toronto, is

retained by the company to look after its Canadian interests.

One of the early purchasers was the Consolidated Gold Fields of South Africa, Ltd. This company was organized in 1892. Its authorized capital is £3,250,000, divided into 1,250,000 six per cent., cumulative preference shares of £1 each, and 2,000,000 ordinary shares of £1 each. Dividends on the common have ranged from 12½ per cent. to 125 per cent. The last three annual distributions were respectively, 20 per cent., 35 per cent., and 35 per cent. The net profits for the year ending June 30, 1910, were £993,382. Mr. H. H. Webb, the company's consulting engineer, was its representative in Porcupine.

The third of the trinity is the International Nickel Company, whose property, the Dome, has been much in the public eye. The International's authorized capital is \$24,000,000, in 120,000 six per cent., non-cumulative preferred, and 120,000 ordinary shares of \$100 each. There are also \$8,912,836 five per cent. debentures, part of an issue of \$10,000,000. Since September, 1909, one 1 per cent., and five 1½ per cent. dividends, together with an extra declaration of 25 per cent. last July, have been paid on the common. The last annual report shows a profit of \$2,067,528 for the year.

There is something extremely impressive about the history and standing of such companies. The fact that they are taking Porcupine seriously is worth more than numberless pages of newspaper touting. If the investments of the two British companies are successful, it is to be hoped that other Canadian districts will attract their attention. Distinctly it is this class of investor that we should encourage.

### GOWGANDA'S GRIEVANCE.

The large delegation that waited upon the Premier of Ontario and his Ministers a few days ago, presented forcibly the claims of the Gowganda mining region for a government railway. The powers, though impressed, were not inclined to give immediate consent. It was decided that full investigation would be made. High hopes are entertained that Gowganda will be connected by rail with the outer world.

The Ontario Government in this instance is wise in taking its time. Some of the claims put forward by the delegation were unwarranted, and some of the statements made had little basis in fact. Gowganda does need transportation facilities. There is no doubt whatever of this. But calm deliberation brings us to the conclusion that a well built wagon road would meet all present requirements.

It is to be regretted that the Government wasted so much money on the road as it now stands. We are confident that, had the appropriation been carefully expended, the whole road from Charlton to Gowganda would now have been in excellent shape. Instead of this, there are long stretches of bare corduroy and only a minimum of good road. The Government is morally



bound, both for its own sake and because of its duty to the country, to retrieve this blunder.

Whether the Government is or is not called upon to build a railway remains yet to be demonstrated. The delegation's representations were vehement rather than convincing.

### NOVA SCOTIA STEEL AND COAL.

If we may accept the annual report of the Nova Scotia Steel and Coal Company at its face value that corporation has had a really successful year. For the calendar year ending December 31st, 1910, a profit of \$1,140,504.37 is shown. Reduction in fixed charges will now put the company in a position to bring its dividend on common up to 6 per cent. During the year additional capital to the extent of \$1,500,000 was secured, but fixed charges were reduced by \$50,000.

The financial statement sets at rest many adverse street rumours. The company is apparently sound financially. There is no question as to the value of its physical assets.

### EDITORIAL NOTES.

Mr. John Hays Hammond has been appointed special ambassador for the United States at the coronation of King George. At that function Mr. Hammond will renew some warm South African friendships.

A two-page advertisement of the Encyclopædia Britannica will be noticed in this issue of the Canadian Mining Journal. It is well worth study. The mechanical exploit of reducing these volumes to easily portable size is a triumph of modern book-making. Particularly interesting to mining and metallurgical engineers is the list of contributors on subjects touching their professions. Dr. J. S. Kemp, Dr. H. M. Howe, Dr. H. S. Munroe, Prof. R. Peele, Mr. Walter Hunter, and many others write on technical topics. As the Encyclopædia is also a compendium of nearly all human knowledge, and as the price set is well within the means of the majority of professional men, it should decorate many libraries.

## Correspondence

Editor CANADIAN MINING JOURNAL:

Sir,—I have read your editorial in Feb. 15th issue of the CANADIAN MINING JOURNAL with a good deal of disappointment. The action of the Government, so far as it affects the mining industry, in my opinion calls for approval rather than for somewhat cryptic comment.

I have reason to believe that your statements in the first part of your editorial concerning sulphite pulp are hardly correct. Are you aware that a good deal of sulphite pulp is at present made in Canada, and that not a pound of sulphuric acid is used for this purpose?

When you speak of genuine reciprocity, what do you mean, or has this sentence any meaning? Here I may instance the following mineral industries:—Canadian talc has free entry to the United States; so also have

feldspar, fluorspar, and ground and crude mica. It is possible that with these concessions important new industries can be built up in Canada. Talc and feldspar which are exported largely in crude form, can now be ground in Canada. Fluorspar, which was practically worthless by reason of the inaccessibility of the Canadian market, can now be mined, milled, and shipped to Buffalo and Pittsburg, the natural market on a short rail haul. The Canadian industries that use fluorspar are not handicapped by having to pay a duty, and can now obtain their supply from British and American sources that are nearer them.

Are you aware that the real effect of the proposed measure of reciprocity is that we get free entry to half a continent on equal terms with American producers, and in that territory get the same protection from European competition as do United States producers themselves? The United States tariff on ground talc is \$20 per ton, on fluorspar \$3 per ton, on feldspar 20 per cent. ad valorem, and on mica some \$120 per ton. These are to be removed. In return for this the United States gets entry into our limited market, where it has to compete with European products that are not protected. European talc, fluorspar, mica, and feldspar have free entry into Canada.

Does this look like bad business from a mining standpoint? In your editorial you appear to be under the impression that the concessions made in favour of the mineral industry are too few. This is true, but who is to blame for it? Not the responsible minister, but those interested in the mineral industry, who were so indifferent that they made no representations at Ottawa, nor did they indicate what they desired. Had the whole field of the mineral industry been represented, I venture to say you would have seen a free list that would have covered all economic minerals.

Why blame the "temporizing politician" for what is obviously the fault of the industry? You can hardly expect people to negotiate if they are not supplied with data to negotiate on. You cite the case of gypsum. I believe this is a case where there is no urgent need for change. There is now a sufficient home market to justify the construction and operation of a plant to supply the home market without the necessity of looking to a foreign market.

In my own experience the production of Canadian economic minerals suffers from the fact that there is no developed home market. It is difficult, if not impossible, to establish a new industry if dependent upon a foreign market entirely. A business, to be successful, must have a substantial nucleus in its home market; the more so as all reduction or refining processes produce large quantities of by-products, which will not stand transportation. The solution of this difficulty in Canada is the free entry of such products into the United States market, which as it fills most of the requirements of a home market since it is easily accessible and is analagous in many respects to our own. It appears to me that, as the organ of the mining interests, your policy would be to endorse a bargain and the Government that made such a bargain, when that bargain aids some sections of the industry and harms none.

In due course of time I have no doubt that the limited reciprocity of the present arrangement will be extended to cover the full mineral industry to the great advantage of all concerned. Why not come out solidly for or against?

Yours, etc.,

G. H. GILLESPIE,  
Madoc, Ont.

February 20th, 1911.



## BOOK REVIEWS

DESCRIPTIVE MINERALOGY — WITH ESPECIAL REFERENCE TO THE OCCURRENCES AND USES OF MINERALS—BY EDWARD HENRY KRAUS, PH.D., PROFESSOR OF MINERALOGY, ETC., UNIVERSITY OF MICHIGAN—334 PAGES—BLANK INTERLEAVES THROUGHOUT TEXT—PRICE \$2.75—PUBLISHED BY GEORGE WAHR—ANN ARBOR, MICHIGAN, U.S.A., 1911.

Doctor Kraus has departed from the lines followed by Dana, and has followed the classification suggested by Groth, in which the simplest minerals are discussed first and the more complex, especially the silicates and allied compounds, last. No attempt is made to cover either optical mineralogy or rock minerals. The inclusion of information as to uses of minerals and statistics of production lends little value to the text.

The minerals are grouped according to their chemical composition and to the important principle of isomorphism. Ten classes are made:—

1. Elements.
2. Sulphides and analogous compounds.
2. Sulphides and analogous compounds of selenium, tellurium, arsenic, antimony, and bismuth.
3. Oxides, hydroxides, etc.
4. Haloids.
5. Nitrates, carbonates, etc.
6. Sulphates, chromates, molybdates, tungstates, and uranates.
7. Borates, aluminates, etc.
8. Phosphates, arsenates, etc.
9. Silicates, titanates, etc.
10. Organic compounds.

Dr. Kraus' book has merit. Typographically its arrangement is clear. It gives evidence of careful preparation. We hardly approve, however, of the attempt to convey economic facts by means of statistics that apply only to the United States.

In all probability the volume before us will be found quite as useful (and perhaps more so) for class-room instruction as the heretofore incomparable Dana.

THE MINING MANUAL FOR 1911—BY WALTER R. SKINNER—A RECORD OF INFORMATION CONCERNING MINING COMPANIES—TWENTY-FIFTH YEAR OF PUBLICATION—1372 PAGES—PRICE \$5—FOR SALE BY THE BOOK DEPARTMENT, CANADIAN MINING JOURNAL—17-23 MANNING ARCADE ANNEX, TORONTO, ONT.

Mr. Skinner's Mining Manual has frequently received notice in these columns. The 1911 edition, which has just reached us, is even more complete than its predecessors. And this is not faint praise.

As British and foreign capital is now coming into Canada at an unprecedented rate, and as numerous investors, promoters, engineers, and others are constantly in need of information concerning outside mining corporations, the Mining Manual supplies exactly what is needed. For instance, when newspaper despatches mention that prominent English investors are *en route* to Poreupine, or to Portland Canal, or to Cape Breton, the standing of these investors, or the history of their corporation can be discovered at once.

Within the volume are given particulars of 3,120 mining companies operating in all parts of the world. These particulars are concise and inclusive. The promoters, vendors, purchase consideration, and other such items are specified. Lengthy lists of directors and mining secretaries, and names and addresses of mining engineers, are also included.

We have no hesitation in warmly commending the Mining Manual to all our readers. Not only is it a convenience, but it is also highly educative.

## Western Branch C.M.I.

The ninth general meeting of the Western Branch of the Canadian Mining Institute was held at Nanaimo, Vancouver Island, B.C., on February 16th. Two sessions were held—afternoon and evening—and these were well attended, and the proceedings proved of much interest.

Mr. W. F. Robertson, provincial mineralogist for British Columbia, chairman of the branch, presided. At the afternoon session the visitors were cordially welcomed by Ald. John Shaw (in the temporary absence from the city of Mayor Planta).

The chairman suitably acknowledged the cordiality of the welcome extended to the visitors. Mr. E. W. Parker, statistician in charge, Division of Mineral Resources, U.S. Geological Survey, responded to the chairman's request that he say a few words.

The first paper read was by Mr. Chas. Graham, superintendent of the Middlesboro Colliery, Nicola Valley, on "First Aid; Its Relation to Coal Mining." Mr. C. F. J. Galloway, B.Sc., next gave a synopsis of a lengthy compilation of reports on "Coal Mining in British Columbia."

In the evening the attendance included a number of coal miners desirous of hearing an address, by Mr. F. Napier Denison, F.R.M.S., of the Meteorological Office, Victoria, B.C., on "Earthquake Strains and Stresses in Relation to Coal Mine Explosions." This address was illustrated by lantern-slide views and diagrams.

During the evening the chairman presented five certificates courteously sent by the Director of the U. S. Bureau of Mines, to the Provincial Department of Mines for men from British Columbia who had successfully taken the prescribed course of training in mine-rescue work at the U. S. Mine-Rescue Training Station, Seattle, Wash.

The secretary read from the CANADIAN MINING JOURNAL the particulars published in its issue of February 1st relative to the late Fred Alderson, who heroically gave up his life to save an Italian miner at the Bellevue Colliery, Alberta, last October, and a resolution was adopted expressive of appreciation of the action of the Government of British Columbia in contributing \$500 to the fund for the benefit of the late Mr. Alderson's widow and orphans. On a lantern-slide picture of Mr. Alderson being thrown on the screen, all present stood as a mark of respect to the memory of a brave man. Mr. Thos. R. Stockett, manager of the Western Fuel Company, informed the meeting that \$600 had just been remitted as the contribution of the miners and officials of the local mines to the Alderson benefit fund.

On Friday a demonstration of the use of the Draeger oxygen breathing apparatus by men working in a chamber filled with irrespirable gases, was made at the Western Fuel Company's No. 1 mine. Afterwards a visit was paid to the Malaspina gallery, on Gabriola Island, near Nanaimo, which interesting phenomenon, formed by the action of the waves of the sea on the sandstone cliffs, near the entrance to Nanaimo harbour, was discovered in 1792 by Spanish naval officers, Galiano and Valdez.

Saturday morning's train and steamer took the visitors away from Nanaimo *en route* to their respective homes, after one of the most pleasant and instructive meetings the branch has held.

At the Mount Bischoff mine, Australia, 19,000 tons of tin ore are treated per month. The average tin content is less than one per cent. The extraction is 90 per cent. By Cornwall practice only about 60 per cent. of the contained tin is recovered.



# The Advance Made in the Manufacture of Peat Fuel in 1910

(Written for the CANADIAN MINING JOURNAL by ERNEST V. MOORE.)\*

Much has been written from time to time, in Canada, on the subject of peat fuel manufacture. Outside of what is found in promotion literature, which is always interesting, some of the articles have been both interesting and constructive; but many of them have been simply a re-hash of peat platitudes accompanying descriptions of old machines in new words. The purpose of this article is to give some idea of what has been accomplished in 1910 that is new, in Sweden, but more particularly in Canada, and from an analysis of this work to make an attempt to overcome the suspicion and prejudice with which the investing public view anything connected with peat products, and to establish, if possible, instead, the feeling of confidence which the present conditions warrant.

After much pioneer work and extravagant experiment the practically unanimous consensus of opinion of those who are in a position to know, is, that it is folly to attempt to make peat fuel by any method other than what is known as the manufacture of machine peat. Owing to a natural peculiarity of the raw material, peat, if it is excavated and, while still containing 85 per cent. to 90 per cent. water, thoroughly macerated and pugged into a homogeneous plastic mass, and then moulded into convenient pieces and left out in the weather to dry, it dries and condenses into a piece of fuel, harder, tougher, and of higher specific gravity than the same raw material will make by any of the well-known and well-tried methods of artificial drying and briquetting. Further, peat so made differs from these briquettes in that the dry mass of machine peat is practically non-hydroscopic and will weather in a pile quite as well as coal. The operation, then, simply consists in excavating the raw peat, putting it through a machine that will macerate and grind it up, and then spreading it out in a layer of proper thickness to dry. Next, the layer is cut in two directions at right angles to each other into blocks of convenient size. Provision is made to leave the mass so spread exposed to the summer weather for from three weeks to two months, depending on the time of year and the dryness of the season. During this time these blocks may or may not be turned over and piled in little heaps as is found necessary. When dried down to about 25 per cent. to 18 per cent. water content, the peat is harvested into a storehouse, directly onto the railway cars, or built up in stacks on the drying field a finished fuel ready for the consumer.

All these operations are very simple, being little different from those almost any large contractor successfully performs almost every day in the year, and the problem, if problem there be, is simply how these operations may be carried out most cheaply. The question to answer is: With the methods available at present can these operations be carried out at such a cost as to make a commercial profit?

The experience of the Department of Mines would go to show that machine peat fuel will sell readily at \$3.25 per ton at Ottawa, where the prices of ordinary fuels may be taken as about average. The writer found, in selling about 1,000 tons, that there is a brisk demand for this fuel for domestic purposes and more particularly for cooking, for the grate, and as a kindling for the fur-

nace, at \$4.00, but taking the lower figure the above question becomes a definite one. Can machine peat be manufactured to sell at \$3.25 per ton and afford the manufacturer such profit as to make the operation an attractive one?

There are a number of conditions which enter into the answer to this question that it is not intended to consider here, as the peat surveys of the Government, already made, show that there are a number of peat bogs where the quality of the raw material, the drainage possibilities, the condition of the surface, and the shipping facilities are all satisfactory and these bogs are located within say a fifty cent freight rate of centres of population and therefore of consumption, and so these elements will not be considered at present.

The phrase "cost of manufacture" requires a word of explanation here. It has been used in two senses without any intention to mislead, and yet this has caused many discrepancies in figures apparently very hard to reconcile. Many peat operators speak of "cost of manufacture" and have in mind only the cost for labour, power, and supplies necessary to produce a ton of peat fuel. This is the net cost of the manufacturing process, the total cost to the man or company intending to make money out of the operation must include a number of overhead charges such as management and superintendence, office expenses, depreciation, interest on the capital investment, taxes, insurance, etc., all of which must be charged up proportionately to each ton of output. These items make up a very different figure from the first one spoken of. In a small plant these elements may be equal to, or even greater than the first; and hence, in considering a small installation like that operated at Alfred, Ont., this year by the Department of Mines, the most unfavourable conditions are present.

However, this Government plant at Alfred illustrates the general plan that seems most desirable for carrying out the before mentioned series of operations to make fuel; and while the figures of 1910 give an unfair impression as to the success of the industry, nevertheless they are a basis to work from, and any fair-minded man will see for the reasons hereafter given, that they do not represent anything like the returns which may be obtained with this same plant, which is situated on the C. P. Railway short line between Montreal and Ottawa, about a mile east of Alfred station.

The Government bog consists of about 300 acres of raw material classified as fairly good. Before peat manufacture was commenced development work was done. The bog was drained, and about 25 acres cleared of shrubs and bushes and to an extent levelled down to form a drying ground.

The manufacturing plant consists of a complete peat mill, made up of a platform about 8 feet x 24 feet mounted on wheels, which, in turn, rest on 30-pound steel rails supported by 6 or 8 wooden ties, 12 feet long. The rails are in short sections, which permit of their being moved ahead conveniently from time to time as desired. The platform supports a locomotive boiler with special grate and ash pan on which is mounted a 34 h.p. steam engine. This is connected by a belt to an Anrep macerating mill, a device which is essentially a number of knives fixed spirally on a horizontal shaft mounted in a cast iron case. Each knife has a forward pitch to force the peat

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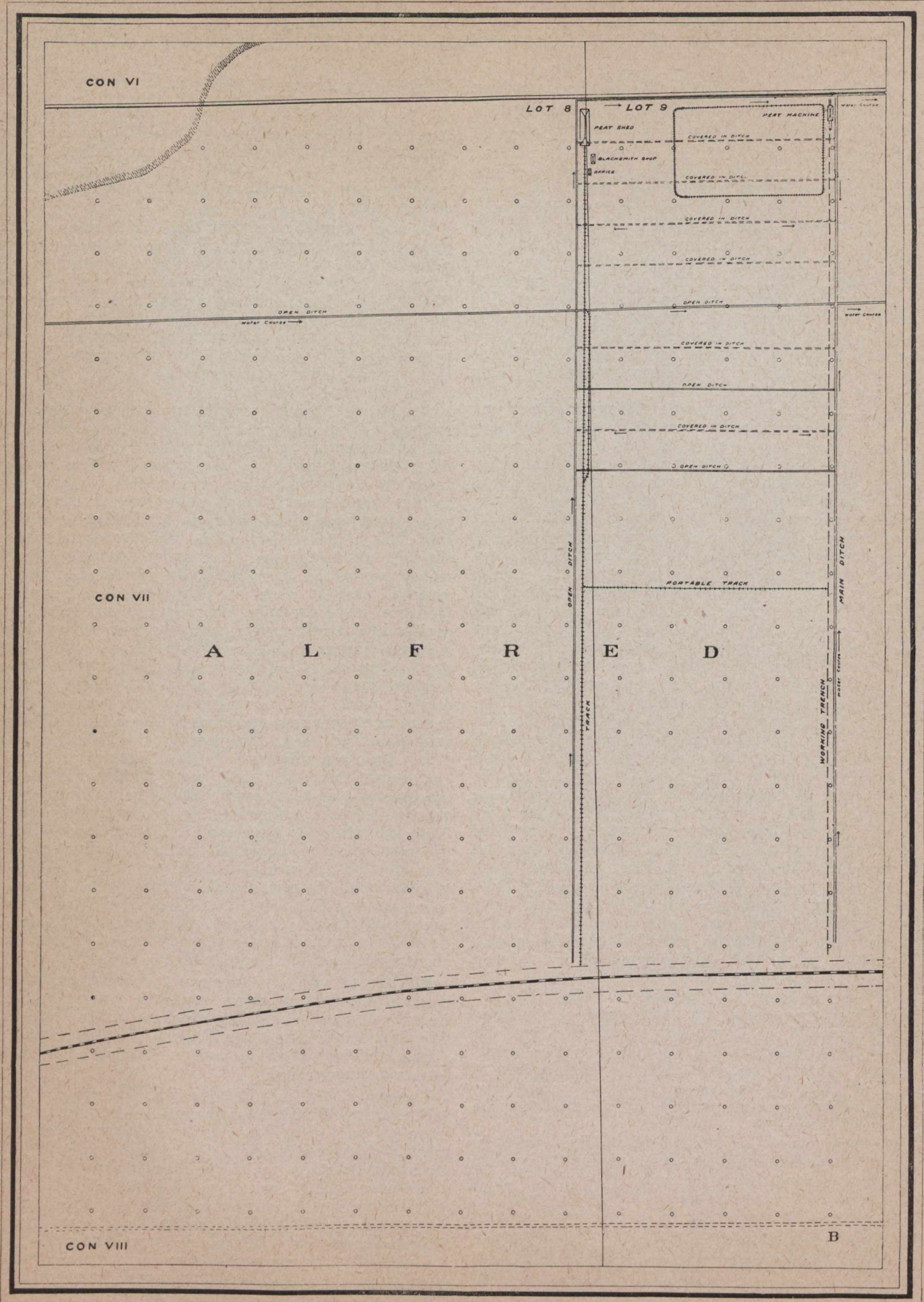


Fig 1

Plan of Government Peat Bog, Alfred, Ont.



pulp out of a delivery spout, and works against a fixed knife so as to cut up any small roots or fibres remaining undecomposed in the peat, and also to perform a kneading operation. To this mill is attached an elevator extending in a downward sloping position for about 35 feet behind the platform where it is convenient for the shovellers to load into. The platform also supports a number of driving spools to give motion to a cable used to haul the cars which take out the peat pulp, to pull by another cable the device used to spread the pulp, and to pull the whole mill ahead from time to time, which is done by anchoring a cable out ahead and winding in.

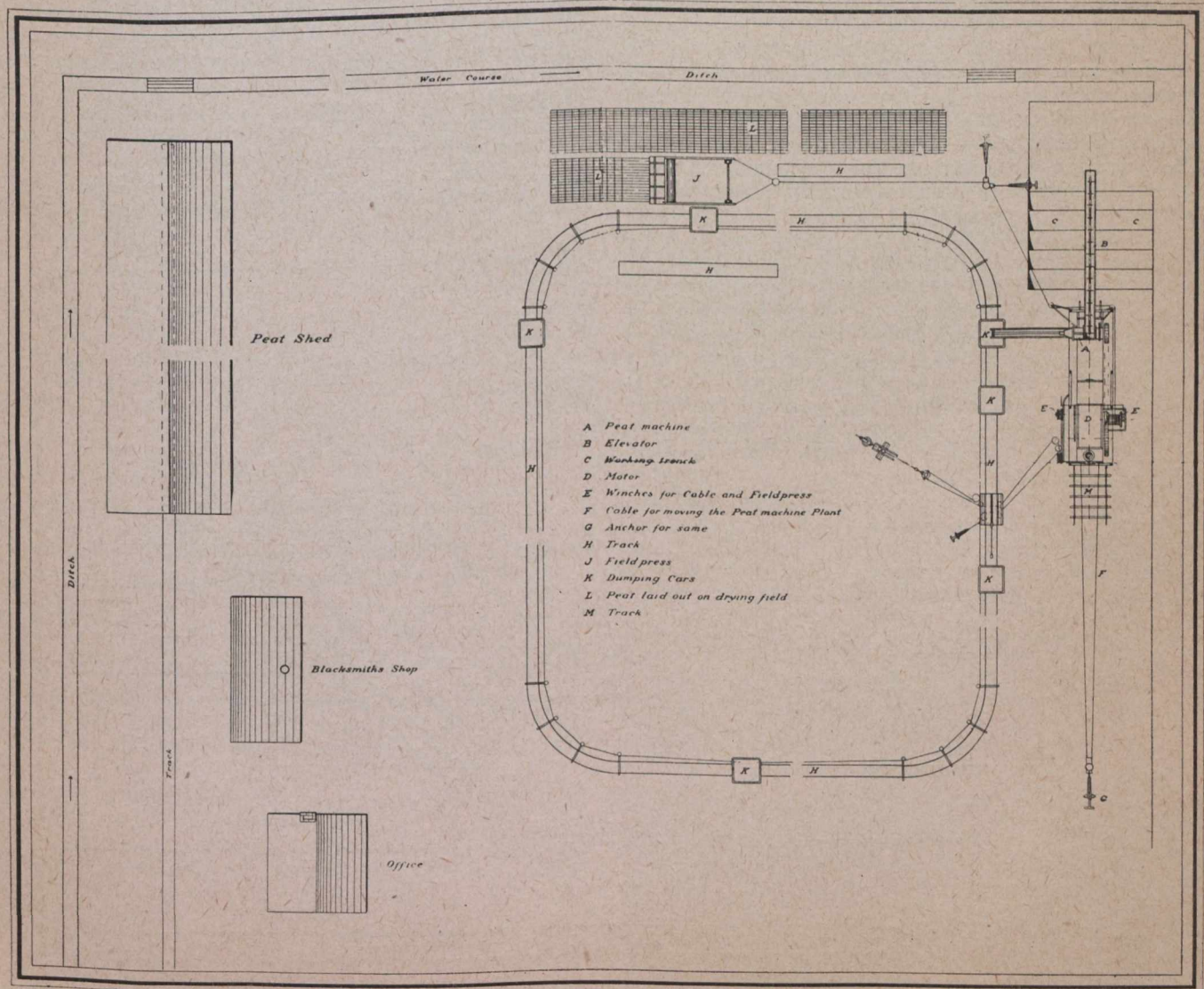
A belt conveyor is arranged to carry the peat pulp from the mouth of the macerating mill to a convenient place to load the pulp cars, and the whole mill is protected from the weather by a light housing.

Besides the mill proper there are 8 side-dumping steel cars about  $\frac{3}{4}$  cubic yards capacity, mounted through roller bearings, on double flanged wheels. There is also sufficient 24-inch gauge 12-pound rail portable steel track with steel ties to make a rectangle about 600 feet square and have 600 feet to spare. Quarter-turn curves, mounted so as to be complete in themselves, are used for corners, the whole track being in sections easily moved. Around this rectangle is stretched a small cable which is carried around the corners on pulleys, as is done in many

other systems of cable haulage. A device is provided that automatically takes up the slack and keeps the tension right as the tracks are moved.

Finally a spreading device, called a Jakobson Field Press, is provided. It is a simple contrivance made of wood and composed of a front part which receives the peat pulp direct from the dump cars, a middle part which smoothes it down into a uniform layer, and a rear part which, by means of wooden knives weighted to cut through the peat, divides it into longitudinal strips. The press is provided with a cable leading in to the mill, which passes through a snatch block held in place by anchors, so that the press may move parallel to the track along which the cars of pulp come. To complete the equipment a tool is provided, made of three metal disks supported on an axle about 10 inches apart, and attached to a handle so that an operator, by dragging it across the peat laid out by the press, cuts the longitudinal rows crosswise into bricks, the length of which is determined by the distance apart of the disks.

Outside of this equipment five cars to transport the dried peat into the storehouse or to the railway siding, and nearly a mile of narrow gauge track (24-inch), two storehouses 160 feet x 22 feet, a blacksmith shop and tool room, and a small building for an office, have been provided. This covers the entire equipment.



Plan of Government Peat Plant, Alfred, Ont.



The operation during the 1910 season was as follows: A working area about 700 feet wide was chosen parallel to a main ditch which runs north and south. The peat mill put in place at the north end of this area, immediately adjacent to the ditch; so that the working trench excavated simply widened it out. Seven men began the excavation, which was approximately 20 feet wide and up to 9 feet deep, with spades, shovelling into the elevator which conveyed the raw material to the macerating mill, which in turn delivered it thoroughly pulped into a homogeneous mass, about the consistency of fresh mortar, into the dump cars. The boiler and engine were looked after by an engineer, and peat was used for fuel, about 8.8 pounds being used per h.p. hour. Two boys were used to gather this fuel and carry it to the boiler in baskets (a very costly operation). Two attendants watched the cars being loaded, clamped them to the moving cable, and put empty cars in place. These loaded cars then moved out automatically to the field press where a third attendant disconnected the cable and dumped the pulp into the field press and in his spare time cut the peat crosswise. One man attended the field press, and a boy at the mill attended to levers operating it while one other man was provided to assist in moving track and other work as necessary.

The 600-foot rectangle was laid out immediately adjacent to the mill, one side being parallel to the working trench and just far enough away so that the cars came under the delivery end of the conveyor carrying the pulped peat. The field press was at first placed at the northwest corner of this rectangle and just north of it so that in working it moved from west to east, parallel to the track, and such distance from it that the peat pulp was dumped directly into the front part.

The operation continued in this way until the row, i.e., the full length of the north side of the rectangle, was

completed. In the meantime another track was laid parallel to the side along which spreading was going on, and just the width of the field press from it, so that as soon as the first row was complete, all that was necessary was to move the corner curves, tighten up the cable, and having brought the field press back to the west side again, the operation was repeated. The track used for the first row was taken out of the way of the field press as it moved along, and placed again inside the now working track. While the tracks were being shifted it was arranged to shift the main mill also to keep it a convenient distance from the working face.

When in the course of the operation the north track approached too close to the south side, the whole rectangle was reconstructed again to the south, this work being preferably done on a rainy day or during some delay.

After the peat was so put out to dry all that was necessary was to turn it over in about three or four days. This was done by contract at 7 cents per ton, and later it was piled in small piles (cubed), for a further 10 cents per ton. From these cubes the finished fuel was taken to the storehouse, or to the railway cars, by the other portable track and cars provided for that purpose.

About four strips, 600 feet long, were laid out per day, and each strip represented 8 tons of finished fuel. Fifteen to twenty minutes were taken to shift the tracks, and couple up complete for another row.

- An analysis of a day's work shows the following:
- 1 Engineer, at \$1.75 per day .....\$ 1.75
  - 7 Diggers, at \$1.75 per day .....12.25
  - 3 Attending cars, at \$1.75 per day ..... 5.25
  - 1 Attending field press and cutting peat crosswise, at \$1.75 per day ..... 1.75
  - 1 Moving track etc., at \$1.75 per day .... 1.75

Fig. 2.

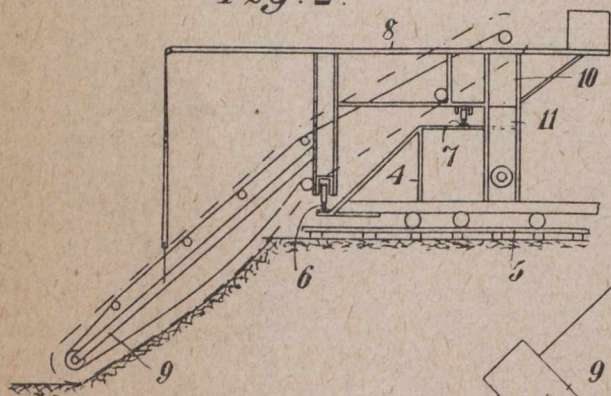
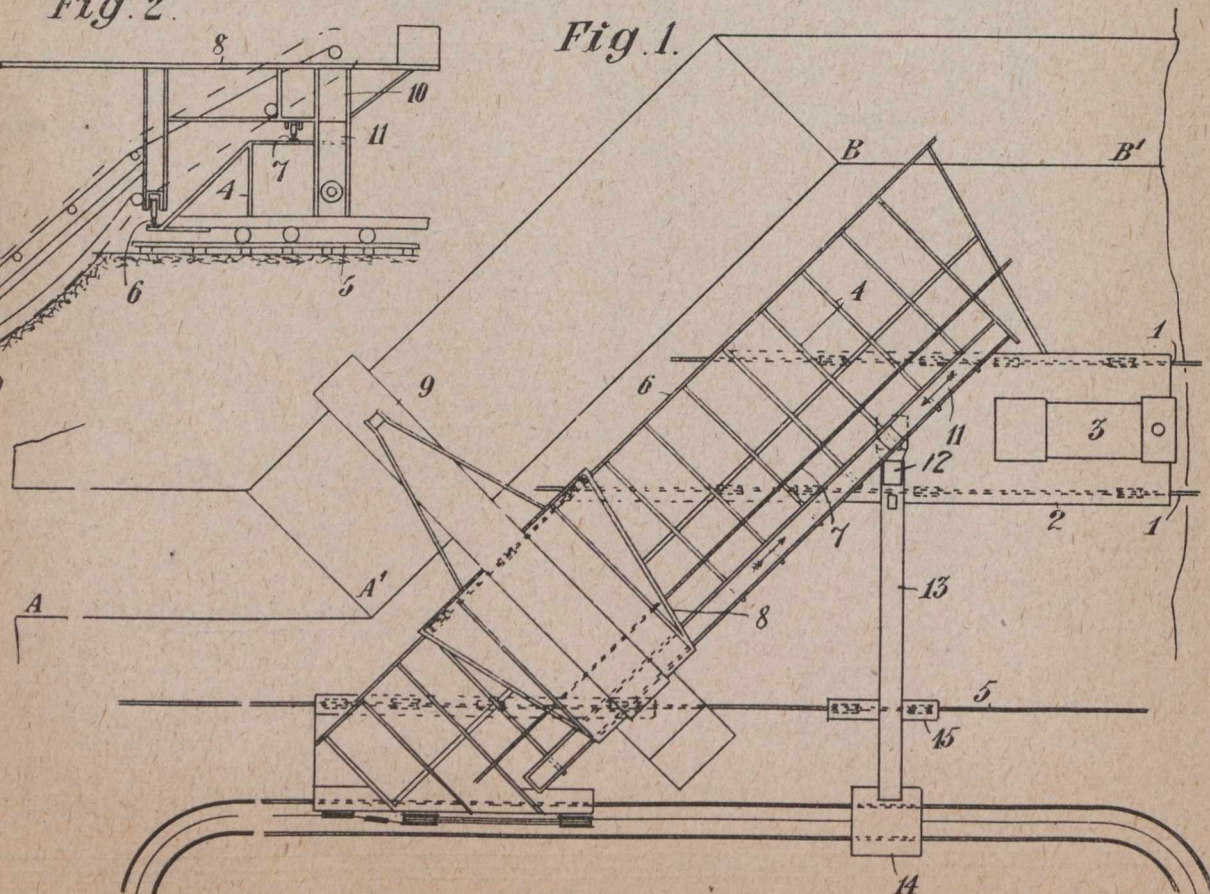


Fig. 1.



Anrep's Excavating Machine, Patent Sketch.



1 Attending field press (boy), at \$1.00 per day ..... 1.00  
 \$23.75

Fuel, 34 h.p. at 8.8 lbs. per h.p. hour, 10 hrs. per day. 34x10x8.8 equals 3,000, or 1½ tons per day.

The actual capacity of the plant was such as to provide sufficient extra fuel to supply this amount. Fuel damaged in moulding or otherwise was used mainly, and as it would otherwise be waste, it is taken as costing only the labour to collect it, i.e.,

2 Boys, at \$1.00 per day ..... 2.00  
 Oil and supplies, per day ..... .50

Total outlay for labour, fuel and supplies for one day ..... \$26.25

Tons peat fuel made, 32.

Actual manufacturing cost to put fuel on the ground to dry ..... .83  
 Add actual cost per ton to turn ..... .07  
 And actual cost to pile in small piles (cubing) ..... .10

Actual cost per ton, exclusive of overhead charges, to manufacture a ton of peat ready for consumer ..... \$1.00

For an estimate for commercial purposes there must be added to this a number of other items, and it is due to these items that much misconception and confusion as to the cost of manufacture has arisen. These items are superintendence and management, depreciation, interest, taxes, and such other fixed charges as go on whether peat is being manufactured or not.

At the Government bog, an estimate of these items would be based on a total investment by the Department of Mines of about \$16,000.00, made up of

Cost of bog, draining same, and preparing drying area ..... \$4,000.00  
 Cost of plant, machinery ..... 7,500.00  
 Cost of buildings and railway siding ..... 2,500.00  
 Engineering and superintendence of installation ..... 1,500.00  
 Sundries ..... 500.00  
 Total ..... \$16,000.00

The overhead items are:

Management, 3 months, at \$150 per month.. \$ 450.00  
 Depreciation, 5 per cent. on total capital investment, paying it back in 20 years .... 800.00  
 Interest, supposing capital borrowed at 5 per cent. .... 800.00  
 Other charges ..... 200.00

Total overhead charges ..... \$2,250.00

If 110 days, the average season's work, had been accomplished, there would have been 3,500 tons available over which to spread this sum, in which case there would be:

Overhead charges per ton ..... .65  
 Add cost of manufacturing operations ..... 1.00

Cost of finished fuel on the ground ..... \$1.65  
 Add to put in storehouse, per ton, and ..... .15  
 From storehouse to railway cars ..... .10

Total cost per ton, on cars ..... \$1.90

Only 50 days' work, however, or 1,600 tons, were available at Alfred in 1910 over which to divide this amount, and therefore:

Overhead charges per ton were ..... \$1.41  
 Add cost of manufacturing operations ..... 1.00

Cost of finished fuel on the ground..... \$2.41  
 Cost of finished fuel in storehouse ..... 2.56  
 Cost of finished fuel on cars ..... 2.66

This estimate is probably a little high, but is not far from the actual expenditure for the first year's work.

There are a number of reasons why these figures will be made much more attractive in 1911. Last year the plant was new and until it became properly tuned up there were many stoppages. The weather in 1910 was exceptionally wet, heavy rains fell on an abnormal number of days, and work was not carried on as late in the season as is ordinarily possible. The drying field was new and comparatively rough, a condition which will not exist in 1911, and a better showing even in the first element of the cost will be made.

Now, just so surely as it is possible for a contractor to move 100,000 cubic yards, say, of gravel, more cheaply per yard than if he had only 10,000 to move, because it pays him to use a different and more efficient plant, just so surely in the operation of manufacturing machine peat fuel the cost necessarily decreases as the output goes up. There are two reasons: first, because the overhead charges do not increase in proportion to the output and are therefore divided over a greater number of tons, and, second, because, as the output increases, it is possible to introduce mechanical excavating and other improved equipment to advantage. This was actually done in Sweden last year.

Lieutenant Ekelund, at his plant at Baek, using essentially the same process as is illustrated at Alfred, but introducing mechanical excavating, was able to put his fuel in the storehouse for 92 cents per ton including all charges. Because of his exceptional bog, the bottom being of hard gravel and easily drained practically dry, he installed there (on the bottom) a heavy electrically operated bucket excavator on which he had mounted an Anrep macerator. With this device he was able to do away with all shovellers, which, for his capacity, 80 to 90 cubic yards per hour, would have required up to 24 men. He used the same portable track method of spreading, but used gasoline locomotives to take out the peat pulp in trains of several cars, which was probably more expensive than the cable haulage, both in labour and in fuel. He also introduced spreading apparatus suitable to the increased output.

This improved showing was not due to any new process, but mainly to larger output, and also to mechanical excavation. The only condition in Canada that is not equally or even more favourable than the conditions in



Anrep Machine in Operation at Alfred, Ont.



Sweden, is the cost of labour; but as Ekelund only uses eight men and two boys, an increase of 50 per cent. in wages would increase his cost only 7 cents per ton, so that he would still be under the \$1 mark. His excavator is an adaptation of a device designed to handle much heavier materials, and on this account weighs so much as to be suitable only to bogs with a comparatively hard bottom and capable of being very completely drained; but this objection seems to have been overcome entirely in a mechanical excavator for peat designed for this purpose by Mr. A. Anrep, Sr., of Helsingborg, Sweden, the inventor of the machines and of the process used at Alfred.

This device consists essentially in replacing the elevator taking the raw material to the macerating mill on the platform of the plant at Alfred by a bucket excavator mounted on a carriage that automatically moves backwards and forwards on tracks fastened diagonally across the back end of the platform and moving with it. These superimposed tracks project 10 to 15 feet on either side of the platform proper and are supported at their outside ends by wheels moving on extra single rails placed there for the purpose. The excavating apparatus can be raised or lowered at will, and hence the excavation is made up to 40 feet wide and as deep as is desired. In operation the excavator carriage moves all across the working face, and then the whole device, including the main platform, is automatically moved ahead a small distance and the next cut is made on the return trip.

In this way, using light but strong structural steel construction, a large capacity is obtained with comparatively small weight and this weight is distributed over a large area. Besides this, and perhaps the most unique feature of this device, is the part of its design that causes it to leave all the walls round the excavated part

with a natural slope, avoiding all tendency to cave in or break away.

Mr. Anrep has also improved his cable transportation to meet the increased output and has introduced a plan whereby a larger spreading device works in both directions, thereby avoiding the lifting and taking back to a starting point as is done at Alfred. The new spreading device also cuts the peat crosswise automatically.

With this new plant the following conditions approximately will exist: According to precedent established in Sweden, the plant will run 20 to 24 hours per day, and as the plant has a capacity of 8 tons per hour a maximum of 192 tons of finished fuel may be put out in 24 hours. Only 150 per day, however, are used for this estimate, and 100 days as the working time. Thus the season's output is estimated as 15,000 tons.

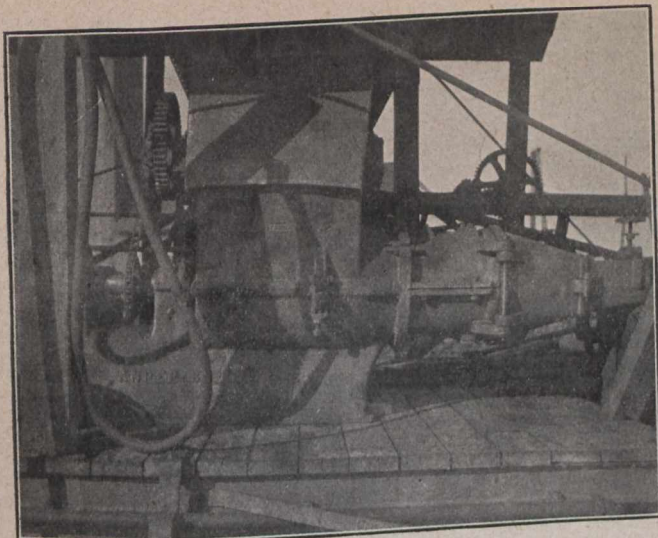
The plant is operated by:

- 1 Engineer.
  - 1 Man who operates the excavator.
  - 3 Men operating the cars.
  - 1 Man attending the field press.
  - 2 Men picking out roots and stumps (for which a winch is provided on the mill), and moving track ahead for the main mill.
  - 2 Men moving track.
- 
- 10 Men in all, in place of 13 men and 1 boy.
- Wages at an average of \$1.75 per day, equal, per day ..... \$17.50
- Estimate for oil and supplies, per day ..... 1.00
- Fuel, as before, labour collecting ..... 2.00
- 
- Making the cost of putting on the ground of 1/2-day's work, i.e., 75 tons ..... \$20.50
- Or, per ton ..... .28



Machine Peat Stack.





Anrep Mill.



Small Peat Stacks.

Anrep Mill .....	.07
Add for turning, and .....	.10
For piling .....	_____
Cost of fuel ready for storehouse exclusive of overhead charges .....	\$0.45
Overhead charges in this case may be figured on a capital expenditure of:	
Bog investment, drainage, and preparation ..	\$ 4,000.00
Plant .....	12,000.00
Buildings, etc. ....	4,000.00
Working capital .....	5,000.00
	_____
Total investment .....	\$25,000.00
Yearly charges to fuel output:	
Depreciation, 5 per cent. of \$20,000.00 .....	\$ 1,000.00
Interest on whole investment at 5 per cent. ....	1,250.00
Management and superintendence .....	1,800.00
Office, etc. ....	1,200.00
Repairs .....	500.00
Other expenses .....	750.00
	_____
Total .....	\$ 6,500.00
Or, per ton on season's output .....	\$0.45
Making cost on the field .....	0.90
Add to put in storehouse or on cars .....	.15
	_____
Cost in storehouse .....	\$1.50

This is a conservative estimate of what may be done with this new machinery, and at this figure the manufacturer may safely figure on a net profit of \$1.00 per ton on his output, a return that should be very satisfactory.

Until such time as there is a reserve supply of peat fuel on hand it will be difficult to get a commercial demonstration in this country of the production of power by producer gas, from peat fuel, excepting what may be done by the Department of Mines. Two plants installed in Sweden, and running continuously, are described by Mr. Nystrom in his report to the Government in 1908.

The question of the use of peat as a powder is also in its infancy. Small experiments have been made in Canada in burning cement and also in raising steam, with very promising results; but as the peat must first be dried to such water content as to be available for fuel, it would seem well to develop this part of the industry first.

The foregoing figures with regard to the Ottawa Government plant are made up from the writer's observations during a number of visits to Alfred. Some

reference has also been made to one or two statements made by Dr. Haanel in his address before the Canadian Club in Toronto. The description of the new Anrep plant is from plans and information received direct from Mr. A. Anrep, Sr., Sweden. The operations, however, are so simple that the interested reader can verify almost every figure for himself with very little trouble.

There is no doubt that both Mr. Anrep's and Lieut. Ekelund's plants will be improved upon from time to time; but even with the machines at hand and with the information and demonstrations available, it seems safe to say that the uncertain element has been largely removed from the manufacture of peat into fuel. Beginning in 1911 it is hoped the peat fuel industry in Canada may turn over a new leaf and begin on a profitable page.

In conclusion, attention is drawn to two things: first, that processes by which the manufacture of peat fuel has been attempted, particularly in this country, have been so modified that no longer is a complicated and very expensive plant, involving many difficult operations, required; the simple problem of handling so much material so many times remains, an operation the cost of which may be fairly accurately and reliably estimated; and, second, that while the figures given herein are mainly estimates, they are based on actual work in 1910, much of which has come under the writer's personal observation. It is hoped that prejudice born of ignorance, or of the mistakes of some years ago may be to an extent dispelled, and this industry, than which there are few others more important, given a chance to get on its feet.

The United States production of coal during 1910 amounted to the vast total of 480,000,000 short tons, which almost equals the highest previous record in 1907.

From a Canadian point of view it is significant to note that the tide-water shipments from West Virginia have been materially enlarged. The strong position that this State is taking in the Atlantic seaboard trade affects Nova Scotian collieries. The contention that Nova Scotia can capture a considerable part of the New England market becomes weaker every year.

On the west coast, the production is still small, the State of Washington being credited with about 4,750,000 tons. California, Alaska, and Oregon, between them, produced only 100,000 tons. But California's oil is equivalent to a yearly output of nearly 20,000,000 tons of coal.



# A GEOLOGICAL TRIP IN SCOTLAND

(By W. G. MILLER.)

(Continued from Feb. 1st issue.)

## GRENVILLE AND KEEWATIN.

The following quotations, taken from different pages of the Memoir, will bring out more clearly the resemblance of the sedimentary material in the Lewisian gneiss to the Grenville series of Canada. Moreover, it will be seen that the sedimentary material is associated with hornblende or chlorite schist, some of which may be altered basic lava. Associated with the hornblende schists are "quartz-magnetite granulites resembling the rocks of the Penokee iron-bearing series described by Irving and Van Hise." The hornblende schist, in so far as the writer knows, has not been proved to be intrusive into the crystalline limestone and associated sediments, but it is said that it "appears to have been injected along the margins" of the sedimentary bands. Since the hornblende schist is not known to be intrusive, one might be pardoned for hazarding the opinion that the relationship between at least some of the hornblende or chlorite schist on the one hand, and the crystalline limestone, iron-formation and other sedimentary material, on the other, is like that between the Keewatin and the iron formation and other sedimentary material in Ontario and the Lake Superior region in general. In any case it may be said that the Scottish rocks, in character and in their association, are strikingly like those of the last mentioned region.

"In Gairloch the chief belt of these altered sediments extends for seven or eight miles . . . Its width is about a mile and a quarter, half of which is occupied by bands of hornblende-schist or hornblende chlorite schist. Consisting for the most part of a fine-grained brown mica-schist, it contains also various bands of limestone, graphite-schist and quartz-schist or quartz-magnetite-schist."

"There is no proof of the intrusion of the gneissose rocks of the Fundamental Complex into the supposed sediments, nor yet of the unconformability of the latter on the former. In certain places bands of marble and of kyanite-gneiss lie within gneisses of common type in the complex, and pass gradually into them."

"Great intrusions of igneous material, most of them now in the form of hornblende-schist, appear also to have been injected along the margins." And further: "Their (the hornblende schists) general uniformity of composition and texture and the rarity of inclusions in them which can be regarded as detached fragments of other rocks, or distorted amygdules, are hardly consistent with the supposition that they are altered contemporaneous lavas, but, on the other hand, they have nowhere been observed to transgress the sediments in any clear section. In general they are more finely foliated than most of the dykes either near them or elsewhere."

"On the southeast side of Shildaig a band of micaceous schist, 120 yards broad at its greatest width, often calcareous and with outcrops of marble, emerges from beneath the Torridon rocks."

"It is interesting to compare the rocks of this and the preceding group (quartz-schists) with certain rocks found in the Penokee iron-bearing series. . . The rocks of this series include (1) cherty carbonates; (2) ferruginous slates and cherts; and (3) actinolitic and magnetitic slates. The quartz-hornblende rocks and the quartz-magnetite rocks from the Loch Maree area have

decided affinities with the actinolitic and magnetitic slates of Van Hise. Both groups of rocks contain the same minerals and possess to a certain extent the same structures."

The altered sediments on the north-east side of Loch Maree "are associated with broad outcrops of hornblende-schist, and consist for the most part of mica-schist, graphite-schist and limestone, with bands which may represent altered quartzite and chert. The broadest development of these rocks stretches from Letterewe to Fasagh and may be called the Furnes belt. Its length from north-west to south-east is about five miles, and its greatest breadth, including various outcrops of hornblende-schist, nearly three-quarters of a mile."

"Near Kerrysdale chloritic schists occur on both sides of the more north-westerly of the two hornblende-schists.

. . . . These schists merge into hornblende-schists. . . . small crystals of magnetite and calcareous spots and streaks appear more commonly in the chloritic than in the hornblendic schists. The chloritic schists usually effervesce freely with hydrochloric acid, even when no carbonate can be recognized macroscopically, and one of the calcareous streaks near Auchtercairn is a good limestone."

"A quartz-magnetite-schist, mixed with limestone and calcareous chlorite-schist, is seen in various places at the north-east side of the thick hornblende-schist which runs north-west from a point 300 yards south-west of the outlet of Loch Bad an Sgalaig in the Gairloch district.

The quartz-schists in both districts may possibly represent altered schists, but the present resemblance of certain portions of them to cherts is perhaps rather the result of deformation. In some exposures north-east of Loch Maree more than 30 thin laminae may be counted in the thickness of a quarter of an inch. Each of them was not improbably broader originally but has been dragged out and thinned."

It may be that some of the Canadian banded gneisses which have been called Laurentian are in reality older than the Keewatin. If this is the case, then these gneisses represent the surface over which the Keewatin rocks have flowed, and the crystalline limestones and other sediments have been deposited on the surface of the lavas or interbedded with them. If such be the case in Canada and the Lewisian gneiss is not intrusive into the crystalline limestones and schists of the Highlands, then the relationships and resemblance between the oldest rocks of Canada and the Highlands is similar.

On the other hand, if the Lewisian is intrusive into the crystalline limestones and associated schists, the relationship is exactly like, in so far as is known, that which the Laurentian granite and gneiss bears to the Keewatin and Grenville rocks of Canada.

## GROUP (2) OF THE LEWISIAN.

Group (2), the igneous rocks intrusive into group (1), corresponds in a general way with certain post-Laurentian intrusive rocks of Canada, viz., certain granites and so forth which are pre-Keweenawan in age.

## THE TORRIDONIAN.

There is no means of definitely determining whether the Torridonian of Scotland corresponds to the Huronian or to the Keweenawan of Canada. It has been correlated with the Keweenawan by some writers on ac-



count of its reddish or brownish colour and degree of consolidation. But rocks that look alike, especially in the pre-Cambrian, are frequently quite different in age. Moreover, in the writer's opinion, much of the Keweenaw shows as great a degree of consolidation as does some of the Huronian. In fact, in certain localities, the Torridonian has a schistose structure.

"The great bulk of the formation consists of more or less coarse-grained arenaceous sediments in the form of felspathic grits and sandstones (arkose), with occasional thin intercalations of fine-grained micaceous shale and sandstone. Coarse angular breccia occurs as a local base, and numerous bands of pebbly grit, conglomerate, and scattered pebbles are found at different horizons, while the whole series is characterized by false bedding and other signs of current action." The prevalent features of the series are the uniformity of composition and fresh appearance, and the regularity and generally undisturbed character of their disposition.

"The base of the Torridonian series is usually formed of a conglomerate or breccia, sometimes exceedingly coarse in texture, and derived from the Lewisian rocks in the immediate vicinity."

"The pebbles that occur so abundantly throughout the arkose series afford, however, the strongest proof of the foreign origin of most of the Torridonian sediments. . . . it may be sufficient to state here that they (the pebbles) include examples of sedimentary, metamorphic and igneous rocks which are not found within the Lewisian area, and suggest the existence of a pre-Torridonian sedimentary and eruptive series as the source of the coarser materials of the Torridonian formation."

While the writer does not think that the lithological resemblance of the Torridonian to the Keweenawan is sufficient evidence on which to base the correlation of the one with the other, there is other evidence to the effect that the two series should probably be correlated. (a) On a preceding page it has been shown that certain pebbles, quartzite and so forth, in the Torridon conglomerate, prove that a sedimentary series has been removed before the deposition of the Torridonian. This series that has been eroded may correspond to the Huronian of America. If so, then the Torridonian may be considered to correspond to the youngest of the pre-Cambrian sedimentary series of America, the Keweenawan. (b) The intrusive rocks of group (2) of the Lewisian do not cut the Torridonian. They bear a relationship to the latter like that which certain granites, and so forth, of America, which cut the Huronian, bear to the Keweenawan.

The following table will make clear the suggested relationships:

1. Canada—
  - A. Keweenawan.
  - B. Huronian with intrusives.
  - C. Keewatin-Laurentian Complex (Laurentian granite and gneiss, Keewatin greenstones, etc., together with crystalline limestone, iron-formation, etc.)
2. North-West Highlands.
  - A. Torridonian.
  - B. Intrusives (of group (2) of Lewisian). A fragmental series consisting of quartzite, etc., has been removed by denudation prior to deposition of Torridonian.
  - C. Lewisian, Fundamental Complex (gneiss, hornblende and chlorite-schists, crystalline limestone, iron-formation, etc.)

After the eruption of the dykes and sills of group (2) of the Lewisian, and long before the deposition of the Torridonian rocks, the whole region of northwest Scotland was subjected to terrestrial stresses which affected

both the Fundamental Complex and the intrusive masses that penetrate it.

#### GLACIAL ORIGIN OF CONGLOMERATE.

It is interesting to note that a glacial origin was suggested formerly for the Torridon conglomerate, as it has been suggested in late years for Huronian conglomerate of Ontario. "The mammilated contour so characteristic of the plateau of Lewisian gneiss was attributed by Sir A. Geikie in 1880 to the action of land-ice, and he compared the overlying breccia of Torridon sandstone age, that fills up the hollows and buries the rounded domes of rock near Gairlock, to moraine stuff." In the final memoir by the Geological Survey on the Northwest Highlands, 1907, the theory of the glacial origin of the Torridon conglomerate is dropped. "The basal breccias which often flank the buried mountains (Lewisian below Torridonian), are, as already explained, of the nature of scree material. They consist of fragments of the local rocks embedded in a sandstone matrix. The conglomerates, on the other hand, are probably torrential deposits brought down from a district very different in geological structure from that of the area in which Lewisian gneiss occurs."

The fragments of rock in the Torridon conglomerate and breccia have frequently come from a considerable distance. "In one instance, on the north side of Loch Maree, it has been observed that blocks in the conglomerate have come from the hornblende-schist ridge of Ben Lair, and may have travelled a distance of three miles."

#### ABSENCE OF ORE DEPOSITS IN HIGHLANDS.

Considering the importance of the ore deposits in the pre-Cambrian of the Lakes Huron-Superior region, the absence of valuable deposits in the Highlands at first seems remarkable. If we bring to mind, however, the difference between the pre-Cambrian of the two regions, the non-economic importance of the Highland rocks is not so much to be wondered at. The Keewatin series is not known to occur in the Highlands, and, if it does, the outcrops are comparatively insignificant. In this series in America are found the Vermilion and other important iron ranges. The Animikie or Upper Huronian is likewise absent in Scotland, while in the Lake Superior region the great Mesabi iron deposits occur in it. Moreover, if there are rocks in Scotland similar to the quartz-diorite of Cobalt or the norite of Sudbury, which have been the ore bearers in these two important mineral areas, they are of small volume. The copper deposits of Michigan are found in the Keweenawan but the Torridonian has not been rendered of similar economic importance by basic igneous rocks.

#### CAMBRIAN AND EASTERN SCHISTS.

Little need be said concerning the Cambrian except that it rests unconformably on the Torridonian and its lower beds represent the *Olenellus* zone. One of the most puzzling points that the early workers in the field had to deal with was the relation of the Cambrian to what are known as the Eastern or Moine Schists, the fourth great group of the Highlands. Later work has shown that the superposition of the highly metamorphosed rocks on the Cambrian has been brought about, as has been said on a preceding page, by thrust.

The character of the Eastern Schists and the knowledge possessed of their age relationships will be understood from the following: "Only a brief reference need be made here to the Eastern Schists that appear to the east of the Moine Thrust-plane. Excluding the belt of mylonized rocks (ground-up rocks), usually found in association with that displacement, this group comprises flaggy, quartzose schists with muscovite, quartz-biotite, granulites, and garnetiferous muscovite-biotite-schists, which together evidently represent an altered sediment-



ary series . . . . These rocks have been the subject of much discussion. They were once regarded as portions of the oldest or Azoic architecture of the country. Murchison considered them to be a metamorphic series of mainly sedimentary formations, later in date than the Lower Silurian (Cambrian) limestones and quartz-rocks which underlie them, and into which they seemed to pass downward in a conformable succession. The detailed study of them by the Geological Survey has thrown considerable light on their composition and structure, but the problem of their age and origin has not yet been completely solved. . . . When the rest of the Highlands lying to the east of that belt has been surveyed, it may be possible to offer some more definite opinion as to the stratigraphical relations and history of these rocks."

While rocks of diverse age and origin are included under the name Moine Schists, "which together evidently represent an altered sedimentary series," a person familiar with the pre-Cambrian of Canada will be inclined to ask himself whether much of this altered sedimentary series does not represent a group of rocks that, in age, lies between the Lewisian and the Torridonian. If this is the age relation of some of the schists, they occupy a place in the geological column similar to that of the Huronian of Canada, which lies between the older Laurentian-Keewatin complex and the younger Keweenawan. In the description, given above, of the Torridonian, it was said that the pebbles of quartzite and other rocks, "derived from formations that are not now visible anywhere in the western part of the counties of Sutherland and Ross," are found in the conglomerates of the series, showing that an older sedimentary series has been removed before the deposition of the Torridonian. Similarly in Canada it is found in some localities that the Huronian has been removed before the deposition of the Keweenawan on the Laurentian-Keewatin complex.

The relationship that has been observed to exist, in two or three localities, between the Lewisian and the Eastern Schists, will be seen from the following: "More recent work, however, between Stromeferry and Loch Alsh has led Dr. Peach to the belief that the Moine-Schists in that district rest unconformably on gneisses of Lewisian type. He has found what he regards as a conglomerate locally developed at the base of the Moine-Schists and overlain by a definite order of succession among the schists analogous to that in the Diabaig group of the Torridon sandstone. . . . It would thus appear that at least some of these rocks existed as crystalline schists before they had reached their present position." Schists in one locality in Skye possess characteristics from which it might be inferred that they represent a sedimentary series older than the Torridonian. "These schists represent what were originally false-bedded grits and sandy and gritty shales."

#### GENERAL NOTES.

In addition to their highly interesting stratigraphy and structure the Northwest Highlands have a charm for the traveller or tourist. At times the region has very changeable weather with much rain, but during the ten days of my visit the conditions were ideal. To me the region was something new and entrancing. The high, ordinarily rounded hills or mountains, practically bare of trees, have a somewhat strange appearance to one from the wooded regions of Canada. Were it not that the surface is clothed with grass and heather, one would be inclined to compare it in a general way with the arid or semi-arid parts of the southwestern United States. The moist climate of the Highlands, however, is conducive to a rich growth of grass. Peat is found well up the hillsides and not merely in low swampy areas as

with us. The supply of it seems to be inexhaustible. It has served as a fuel supply for countless generations and is still being used by the dwindling population. Much of the surface of the Highlands seems to have been well wooded in past ages, judging from the remains of trees found in peat deposits. The timber has been destroyed and its growth has not been encouraged in later times. Small plantations here and there in the valleys show that timber trees will grow well in this climate. Probably if afforestation were taken up in earnest, by first setting out trees in the valleys and gradually working the growth up the hillsides, the greater part of the surface could be turned into a forest region. To the writer it seemed that afforestation is the most important economic subject that can be dealt with in the region. The small areas of arable land that in past generations, when people's wants and desires were more simple, supported isolated groups of families, cannot under modern conditions retain the population. Many of even the more productive localities have now less than half of the number of people that they formerly supported.

One cannot but feel that a spirit of melancholy pervades the Highlands, due to the fact that the population is decreasing. The young people are emigrating in large numbers, leaving the old.

Comparatively little attempt has been made at afforestation. Most of the surface is devoted to deer "forests" and a tree-covered surface is not considered good stalking ground. The term forest as applied to these areas is a misnomer. There is often scarcely a tree in a square mile of "forest." Rentals for hunting rights are probably as great or greater than they would be if the surface were devoted to any other purpose.

It would seem that the Highlands will soon be monopolized as a field for tourists and holiday seekers. The Macs, and all people with clannish cognomens, are going to the Highlands in increasing numbers each year. Many of them are three generations or more removed from Scottish soil, but they all wish to see something of their ancestral abodes. The Macs, especially the American girls and their "mas," from the four quarters of the globe, are to be found in great numbers looking up the seats of their clans. The sellers of tartans are kept busy.

The ease and speed of travel across the ocean now-a-days has done much to make a kindlier feeling towards Britain than existed in parts of North America, at least, fifty or even twenty-five years ago. "Tail-twisting," which was a common spectacle in the United States during election campaigns not many years ago, owes its decadence as much to summer travel as to any other cause. The English speaking people are getting closer and closer together, and in the years to come one of Britain's chief industries will be catering to the visitors from among the two hundred million or more overseas Anglo-Saxons.

In one of its issues last summer a London newspaper had an item to the effect that a reporter on its staff took a stroll up the Strand in the morning and saw only one Englishman. There were crowds of Americans. This is an exaggeration, but it shows the impression that summer visitors make even on the population of London.

Travelling in the Highlands is now pleasant and easy compared with what it was a few years ago. The automobile has done wonders. Motor stages run on many of the main roads. The little hotels scattered here and there, especially where holiday fishermen congregate, are good.

Since the Lloyd George taxes were imposed the national beverage is not taken on faith. It is claimed that



there is now a tendency to substitute inferior brands or dilutions for the genuine old time stuff. It is a common sight to see a man first sniff his glass to get the "bouquet," then take a sip before venturing on a swallow. Although this paper is intended to deal with solids rather than with liquids, since we have mentioned the latter we may add that many of the clubs in Britain have not increased their prices but they have substituted a "pony" for the former larger volume. Thus does the budget restrain the bibulous!

## The Companies Act and Suggested Amendments

(Written for the CANADIAN MINING JOURNAL by  
JAMES E. DAY.)\*

My remarks at a recent luncheon of the Toronto Branch of the Canadian Mining Institute, as to the danger of unskilled amendments to the Companies Acts led the Editor of the CANADIAN MINING JOURNAL to ask for an article thereon, and also on the unwisdom of so many of the proposed amendments makes a discussion from the point of view of the lawyer not untimely. The mining man devotes his life to increasing the nation's wealth and resources, and to bringing to light the hidden treasures nature has for those who have persistence and skill to discover them, and knowledge and experience enough to make the development not a gamble but a manufacturing and commercial proposition. When he finds, however, that investors and bankers look on mining as gambling pure and simple, he naturally calls for some means to be taken to remove from the mining industry the bad name imposed by those who with worthless stock mine the public instead of the ground. With all deference, however, to the good intentions of the reformers it is well to point out that remedies should be carefully thought out before being administered. Had there never been any mining companies, and had all the money that has gone into mining experiments in Ontario been raised by private partnerships, there would be now an equally loud clamour for the Government to protect the public against their errors of judgment, in sinking their shafts in the wrong locations. In Cobalt, inspection of properties was to be the panacea that would prevent money being lost; instead, inspection merely proved another bait for the hook the unscrupulous promoter dangled before the suckers.

This much is plain—that some disreputable promoters, and many more unwise ones have hurt the mining industry, but it has not been all an unmixed evil. The public learns much by experience, and is also learning the need of sufficient money in the treasury, the unfairness of over issue of stock to promoters, the necessity of business management, and the distinction between promoters' stock and treasury stock. A little examination of the various suggestions made by way of amendments to the Companies Act shows us two things: First, that in our present craze for the law to do everything we are forgetting the prime importance of leaving grown men free to make their own bargains; and, second, that those most free with suggestions of improvement have not always taken the trouble to know what the law is

which they seek to amend, or to study out the effect of their amendments.

A bill aimed to prevent over capitalization is now being introduced in the Ontario House by Mr. Johnston. The intent is good; the real effect would be awful. It provides that companies dealing in commodities that will be offered to the public (and what commodity is not?) may issue stock only for cash and at par. The law at present is, that only mining companies can issue stock at less than par. Why the need of this change? And if stock can be issued only for cash, then the merchant who converts his business into a company must somehow get the cash and can not take stock.

It has been suggested that the number of shares of all mining companies be fixed at the same number, limited, for example, to 100,000 or 1,000,000 shares, having no fixed value except what the company chooses to impose and the public is willing from time to time to pay. This has many merits. A buyer knows that he has an aliquot part of a mine, say, for example, seventy one-hundred-thousandths, instead of having a certificate of 700 shares of a value of one dollar each in a company, which shares on their face purport to be worth \$1.00 each, but may, in fact, be worth not ten cents each. But what would happen to such a company if its shares were all issued and further money were needed? There would be no new shares to be issued, no more could be created, and concerns that would be in absolute need of money for further development would either have to issue bonds, which is not always possible and is seldom desirable, or go out of business. Money for further development would be raised by subsidiary power companies, milling companies, transportation companies, selling companies, each absorbing its share, and a little more, of the profits legitimately belonging to the company, and each a fertile source of graft.

The company's directors would of necessity have to fix the value at which its shares would be sold. The shares of a Nipissing would be worth more than of a Little Nipissing. Once that is allowed, every clever promoter would see that in the beginning the shares were put low enough for him to be able to get most of them without being open to any charge of over valuing the property. And, while the legitimate company would be hampered, the promoter seeking a cheap stock would simply pool a controlling number of shares and issue trust certificates against them at seven cents per share.

If a mining company can not sell its stock at less than par, then a company that had started with good prospects and had sold some stock, yet found its values depleted, might as well go out of business and let its shareholders lose their investments, for, while a man would buy shares at par at the start of a promising proposition, he could not fairly be expected to do so later on when its condition had turned out to be not as good as expected. The experience of the Mixado mine in the Rainy River district, which, after being shut down for years is now being re-opened, shows what it is possible to do if the men who are now willing to risk some money have not to be asked to put up as much as those who bought stock in its first flush of prosperity. Experience shows also that, in order to get the first investors (in Canada, at least), to take the chance there always must be in any mine, at least until after much development, he must have not only a prospect of dividends but also a chance of increase of stock value which can only be got by getting stock cheaper than it can be expected to sell after the mine is producing steadily.

It has been suggested that a fixed percentage of the total capital must be subscribed before the stock be

\*Barrister, etc., Day, Ferguson & O'Sullivan, Toronto, Ont.



issued to the public. But that is the law to-day. To avoid the certain disaster awaiting the company, which, though it might be prosperous with sufficient capital, must be a failure if it starts out with insufficient funds, the law stipulates that a prospectus must be filed stating what amount of stock must be subscribed before the subscriptions to its capital stock are binding. If the public has not learned this what hope of their learning still more laws? How can a man be protected who will not protect himself? One can hardly imagine an English investor signing an application for stock without seeing what is the minimum subscription on which the company will go to allotment. All the investor has to do is to inquire for himself. He would not buy other things without some inquiry, and if he does not know that capital is needed in a company—as in an unincorporated business—making a new law will not help him. But even this beneficial law shows how difficult it is to frame a law that will meet every case. While the law calls for the prospectus, the investor does not. If he does, he finds often, either that the company has issued all its stock as is the custom in the United States and is raising money from the proceeds of stock held by a trustee for it, or that the prospectus stipulates that on application for and allotment of, one share, all future subscriptions are binding.

This last is legal, and in some cases is wise. How can it be prevented unless the Government undertakes to devise some machinery to investigate each case, and tell each company how much stock it must sell? Such a condition would be intolerable, would be certain to be abused. The company would at first proceed with some proposition calling only for a small capital, and, having gone to allotment, would take up the large scheme with perhaps insufficient funds. Any attempt to prevent this by providing for fixing a new minimum allotment on the making of each new contract would mean that the Government would have to supervise every contract made by every company that may at any time want to sell any stock, and would lead to an intolerable and unjustifiable handing over of the reputation of private business to the Governmental department in the hope of doing what has never been and never will successfully be done, namely, preventing men from making foolish bargains.

Unwise and unconsidered legislation will mean an unworkable law, will mean that companies instead of coming under Government control will be altogether beyond it. For, while the operating companies might remain Ontario companies, the stock of these companies would be held by means of pools or arrangements or other forms varying from time to time, by American companies. You can not prevent a man buying stock in an American company, nor the owner of a mining prospect from selling his interest to an American company, either directly or by means of selling to the American company—or to a trustee—the stock he has got from an Ontario company. Nor can a sane and satisfactory law be devised to prevent an individual selling his own shares in a company on any terms that he chooses, so long as he commits no fraud. Hasty and ill-considered legislation will only lead to consequences never thought of by its proposers.

Yet the facts remain that conditions are not what they should be and that the Government, which gives to corporations their existence, has a right to regulate them so long as the regulations do not defeat their object. It is for the mining, commercial and legal fraternity to help by education and by suggestions. If we once definitely locate the weak points and defects in the system it will be possible to better it, though never to attain perfection. We need more common sense and less law making, more publishing and advertising of changes in the law, more investigating into what the law really is, more backbone in refusing to buy stock in the concerns that in one guise or another have their stock put out without telling the public what is the price paid for the property, what amount is required for its operation, and what guarantee there is that this money will be raised. And when a panacea is proposed that is to remedy all the wrongs we might first investigate to see whether older countries, which have had the same experiences as we, have tried this remedy and if not why not. Away back a century and a half ago Blackstone said, "What kind of an interpretation can he be enabled to give who is a stranger to text on which he comments! It is perfectly amazing that there should be no other state of life, no other occupation, art, or science in which some method of instruction is not looked upon as requisite except only the science of legislation, the noblest and most difficult of any."

## MINE ACCOUNTS AND COST SHEETS

(From the Bulletin of the Institution of Mining and Metallurgy.)

The dissimilarity of conditions in mines renders uniformity in accounts impracticable; nevertheless the committee have arrived at the conclusion that as regards the allocation and grouping of expenditure certain general principles may be laid down. The following principles are therefore put forward as of general applicability, and it is recommended that they be adhered to, so far as circumstances may permit. If the procedure recommended in this Report be adopted, in addition to securing many other advantages, it would facilitate a comparison of costs at different mines.

### Capital Account.

Before the producing stage is reached, all expenditure should be charged to Capital Account and may be grouped under the following heads: (1) Property; (2)

Main Shafts or Main Adits; (3) Machinery and Plant; (4) Buildings; (5) Surface Works (Reservoirs, Water Service, Railway Sidings, Roads, etc); (6) Underground Development.

Main shafts or adits to reach orebodies should be charged direct to capital. Incline shafts which develop ore, subsidiary shafts, winzes or other workings which have assisted development of ore during progress, should be charged to "Underground Development," which either may be subsequently treated as a Temporary "Development" Account, or may remain a Capital charge.

All other expenditure should be carried to a "General Expenditure Account," to be distributed proportionately, as soon as possible after the mine enters the producing stage, over the remaining heads of expendi-



ture, after deducting any revenue which may have been received.

After the producing stage is reached, no expenditure should be charged to Capital Account except large special items, such as (1) Purchase of additional property; (2) Sinking of new main shafts to reach orebodies; (3) Erection of additional buildings, machinery, plant, or surface works which may be necessary either to increase output, to improve recovery, or to decrease costs. Such items of capital expenditure should bear their proportion of the administration and general charges. If any existing shafts, machinery, plant or buildings should be entirely superseded and replaced, the cost of the old items should be written off Capital to Profit and Loss, either at once (if small) or in the case of large items, by instalments spread over as short a period as the responsible engineer may recommend. All repairs, maintenance, and replacements of minor machinery and plant should be charged to Working Costs.

In the interest of shareholders, the Committee desire to express their strong disapproval of the practice, which is sometimes resorted to, of charging to Capital, items of expenditure that should properly be included in Working Costs, thus exhibiting a fictitious statement of profit.

#### Profit and Loss Account, Etc.

**DEVELOPMENT.**—After the producing stage is reached, all deepening of main shafts after they have reached the ore-body, sinking of interior shafts, as well as all driving, cross-cutting, raising, winze-sinking and plat-cutting, should be charged to Development Account, which may be treated as a main head of Working Costs, or the whole of the development before and after reaching the producing stage may be treated as a Temporary Account. In the latter case the Working Account should be debited with an average rate of Development Redemption slightly in excess of the average cost at which the payable ore-reserves have been developed, reckoned on a milling basis; with the object of gradually extinguishing the Temporary Account, or of providing funds for securing a gradual and automatic increase in the ore-reserves. After such temporary account is extinguished all development should be charged direct to Working Costs.

**TEMPORARY OR DISTRIBUTION ACCOUNTS.**—With the object of distributing costs as evenly as possible, it may be desirable to open other temporary accounts in order to spread the cost of considerable items of machinery or plant replacement, or payments which recur annually or at somewhat long intervals, over the monthly costs; the multiplication of such accounts is, however, undesirable, and they should be rigorously extinguished.

**VALUATIONS FOR BALANCE SHEET AND PROFIT AND LOSS ACCOUNT.**—Bullion, concentrates or other marketable products ready for shipment should be shown as assets in the Balance Sheet and credited to Revenue Account at net valuation after deducting all possible reduction charges. Unfinished products when taken into account should be reckoned only at cost, provided such cost does not exceed market value.

**DEPRECIATION** may be considered as it affects the principal heads of Capital expenditure, viz.:—(1) Property; (2) Main Shafts or Adits; (3) Machinery, Plant, Buildings and Surface Works.

As regards property, systematic depreciation is theoretically correct, and especially so in the case of mines with ore-bodies of limited and definitely determinable extent, but is seldom or never carried out. In such cases, however, special reserve funds may be accumu-

lated out of revenue with the full knowledge and assent of the shareholders.

In the case of some mines, the probability that existing main shafts will sooner or later require to be superseded by new ones is so great, that it becomes desirable to write down gradually and systematically the cost of existing main shafts, or to accumulate otherwise an equivalent cash reserve sufficient to cover the cost of a new shaft when required.

As regards machinery, plant, buildings and surface plant, it is clear that although maintained out of Revenue in perfect repair and efficiency all such items are liable to become obsolete and have to be superseded. The Committee are therefore of opinion that suitable financial provision should be made gradually out of revenue in the case of every mine for new machinery and plant, buildings and surface works, all of which will probably be needed before the mine is worked out.

Such provision is generally made, (often, however, to an insufficient extent), by means of depreciation charged annually or semi-annually to Profit and Loss Account on the original cost of the plant, buildings, etc., the amount written off being fixed accordingly to a conservatively estimated "life" of each item. This method not only accumulates a fund for new plant, but also gradually reduces the assets shown in the Balance Sheet to something more nearly approaching their real value.

Another method which attains the desired end of making provision for contingencies in an equally effective way, without depreciation, is to include regularly in Working Costs an allowance of a certain sum per month, or per ton, under a separate main heading of "Provision for Additions to Machinery and Plant," or to appropriate each year a certain porportion of the profit to a special reserve fund.

This method simplifies accounts, and, where ample cash reserves are kept in hand, it seems to work well in the case of ore deposits with a determinable life which is ascertained from year to year.

The method of depreciation, however, appears to be generally considered preferable; but care should be taken that the percentage written off is based on the original cost, and not on a balance standing in the books at any subsequent date.

The above recommendations should be carried out as soon as there is an available balance at the credit of Profit and Loss.

#### Working Accounts and Cost Sheets.

The Committee recommend that for the sake of convenient comparison, both in working accounts and cost sheets, all expenditure should be classified under the following main heads, viz.:—

1. Development.
2. Extraction of ore (i.e. mining).
3. Sorting at surface, preliminary crushing and transport.
4. Reduction costs (i.e. ore treatment).
5. Administration charges and general charges at mine.
6. Realization charges on products.
7. Taxes and royalties of all kinds, shown separately.
8. Head office charges.

The total Capital Expenditure should also be shown on all General Expenditure Sheets.

The sub-division of these main heads into sub-heads must necessarily depend somewhat upon the conditions, but the advantages of adhering as closely as possible to one form, and departing from it only where necessary,



are manifest. The following may be suggested as desirable sub-divisions:—

1. DEVELOPMENT COSTS need only appear in the general cost sheet in one total, but a detailed sheet should be prepared showing the total expenditure and cost per foot in shaft-sinking, driving, cross-cutting, raising, winzing, and plat (or station) cutting separately, as well as the proportions of these expenditures which are for labour and for materials respectively.

2. EXTRACTION OF ORE may be usefully divided into:—

- (a) Stopping or breaking of ore, including under sub-heads: compressed air and rock-drill costs, labour and supplies, shovelling, etc.
- (b) Timbering, filling excavations and sorting of ore in stopes (if any).
- (c) Hoisting.
- (d) Pumping.

NOTE.—Where the cost of pumping is exceptionally heavy, it may be convenient to make this item a main head. The same remark applies to the removal of overburden when a deposit requires to be stripped.

- (e) Underground tramping.
- (f) Sampling, assaying and surveying.
- (g) General underground maintenance.

It is suggested that these sub-divisions of the main head, Mining or Extraction of Ore, should be set out in detail in the general cost sheet, because mining is at once the principal item of working cost and offers the greatest scope for economies.

4. REDUCTION COSTS must be sub-divided according to the treatment undergone by the ore, as, e.g., crushing, amalgamation, concentration, fine grinding, cyaniding sands, slimes treatment, roasting, smelting, converting, leaching, precipitation, etc.; for each of which a detail sheet should be prepared in such form as circumstances may dictate.

5. ADMINISTRATION may be divided into salaries (general resident manager and clerical staff on the spot), stationery and office general expenses, travelling expenses, insurance and legal expenses, accidents, medical, sanitary and hospital expenses, stabling and sundry transport, etc.

8. HEAD OFFICE CHARGES, besides ordinary central office expenses, will include a great variety of items such as agency expenses, directors', consulting engineers' and auditors' fees, bank charges, etc., also interest on debentures (if any).

NOTE.—The individual items under (5) and (8) are liable at times to merge one into the other.

The Committee recommend that all statements as to the quantities and values of stores, ores and products on hand should be certified by the responsible officials, countersigned by the manager of the mine. An independent audit of stores, etc., is advisable from time to time.

The Committee append to this Report a supplementary memorandum amplifying their conclusions and explaining the grounds upon which these conclusions have been based.

(Sgd.) A. G. CHARLETON,  
Chairman of Sectional Committee "E"—  
Mine Accounts and Cost Sheets.

### STANDARDIZATION.

Memorandum accompanying the Report of the Mine Accounts and Cost Sheets Committee.

The Sectional Committee have carefully considered

the views elicited in reply to the circular issued by the Council on April 30th, 1908.

As a result they have come to the conclusion, after thoroughly considering the various aspects of the subject, that uniformity in all the details of Mine Accounts and Cost Sheets, so as to co-ordinate them on precisely the same lines in different districts, is impossible of attainment in practice. This is due to the fact that mines are frequently operated under entirely different conditions, and have, besides, to deal with dissimilar metals, sometimes alone, but frequently in association, necessitating different metallurgical treatment, which naturally involves keeping accounts and cost sheets, adapted to meet special requirements of this kind, on somewhat different lines; hence it follows that methods that are applicable in some cases do not always suit others equally well.

They think, however, that a great deal might be done in the direction of standardizing mine accounts and forms by local committees or associations representing groups of mines on each field.

### General Principles.

It must be recollected that mine accounts have to fill several different primary functions, and are not merely confined to one object; for instance, whilst serving as records for guidance in the distribution of expenditure and the collection of revenue, they must also show the profit and loss, or the financial condition of the undertaking; but this does not exhaust their aims, as they should be properly designed to supply the management with the statistical data necessary to check the efficiency of the administration, and to point out the direction in which useless expenses may be cut down, or revenue may be increased.

It should also be remembered that the presentation of Working Costs is of little service, unless given in a form that is useful for comparative purposes, and, if due care is not exercised in their preparation, "Cost Sheets" may in some cases be worse than useless, through being absolutely misleading. In fact, as a prominent mining engineer has well stated the case:—"The wide variations in physical and economic environment are so likely to vitiate conclusions from comparison of statistics from two mines, or from two detailed works on the same mine, or even from two different months on the same work, that the greatest care and discrimination are demanded in their application."

The Committee feel, however, that a recognized broad common basis of arrangement, and agreement of details in presenting accounts and cost sheets furnished by mines in different parts of the world, would be of great benefit to the mining profession, as well as to the public who are concerned in the advancement of the mining industry.

There are certain bounds, of course, beyond which segregation and division of working-costs and accounts cannot be carried with advantage in any case, and the value of working costs largely depends, (1) upon their being spread over a considerable length of time, so as to represent true average rates of expenditure; and (2) upon the interest and care taken by managers and heads of departments in securing as far as possible accurate data upon which to base such calculations. It is also of great importance that all items which recur regularly should appear in working costs and always under the same headings, and (3) that all items not clearly chargeable to Capital Account should be included in working costs.

(Continued Next Issue.)



## TERRY SHOT DRILLS

(By P. H. MOORE, Consulting Engineer for the McKiernan-Terry Drill Company.)

It has been our experience in the core drill business to find but comparatively few mining, railroad, and civil engineers, contractors, and quarry men who realize the practical and numerous ways a core drill of the shot variety can be used.

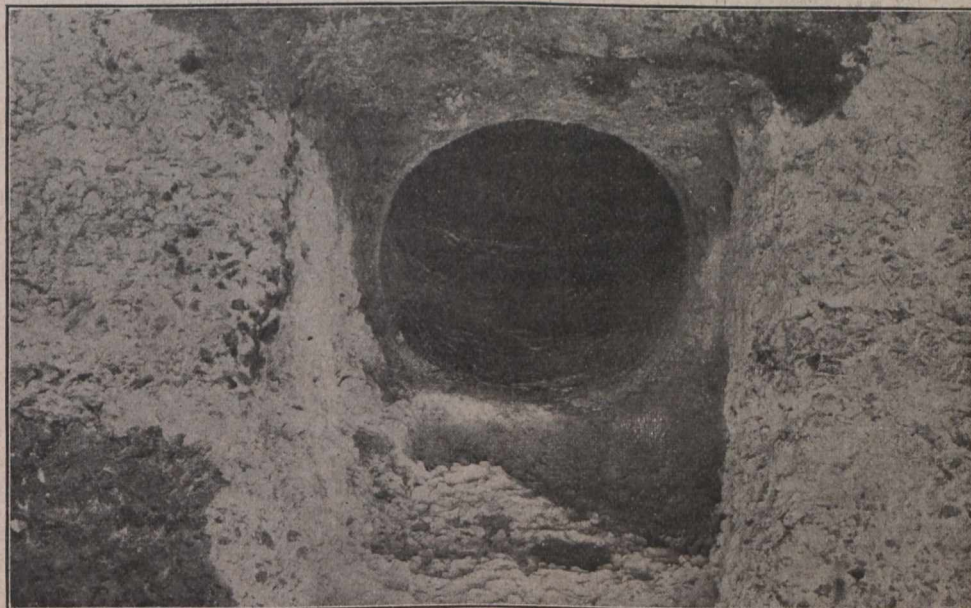
In mining exploratory work you can drill a hole to practically any depth, and, depending on the size of

hour and much faster in favourable formations. As the machines are entirely portable and self contained it is almost as quick to put down a dozen 100-foot holes as it is to put down one 1,200-foot hole.

Climatic conditions do not seriously hinder core-drill work when the drill is properly rigged. The ease, economy, and speed, with which a mining property can



Cores from a 29 inch bore hole. Note water-pipe and eye beam cut clean through.



A 29 inch bore hole drilled in the side of a trap rock concrete embankment.

machine used, can take out any size core from one inch to three feet. A hole can be put down at any angle less than 45 deg. from the vertical, and even a flatter angle can be bored providing the speed of the bit is sufficient so that the centrifugal force will keep the shot evenly distributed around the cutting edge. You can put a hole down through hard rock at a speed of twenty inches per

be thoroughly tested is surprising to the every-day miner. The core drill is particularly valuable to the tentative investor in mining properties, who may have obtained a short option on a promising property, but who would like to make sure of just what he is getting before making the final and heavier payments. Sixty and ninety days is long enough to prove up any pro-



perty if a prospective purchaser would put the proper number of core drills to work, depending, of course, upon the area to be tested, and get a perfect sample of the underlying formation.

The advantage of large cores in mining, say up to 20 or 30 inches, is that the cost of drilling the hole is but little more than a two or three-inch hole, and the core obtained gives a better horizontal sample of the formation.

Then in case the core from some particular hole is sufficiently interesting and the operators deem it wiser to put a working shaft at that point, the core hole of say 20 or 30 inches serves as a sump and a cut to blast to in sinking the shaft. The work thus carried on is in the nature of underhand stoping (always breaking the rock to the large core hole) instead of being obliged to take out sinks and cuts before breaking the bottom of the shaft out to its full size. The large core hole also acts as a sump, and no water can impede the progress of sinking.

For the bare purpose of proving up a prospect where the speed is essential, the Terry Class A drill is big

of different sections of any country through which it might pay to build a line.

The shot-drill is of the utmost benefit to the civil engineer in testing formations for foundations for heavy buildings. Many costly mistakes can be avoided by a perfect knowledge of the underlying formation upon which a building is going to rest.

Contractors and builders use the shot-drills in many ways—boring holes for blasting heavy rock, for elevator plungers, for artesian wells, for oil and gas. The quarry man can use this shot drill for boring deep holes for blasting, for testing the depth of their marketable formation, and last but not least it is perfectly feasible to use a large drill and take out marble or granite columns up to 36 inches in diameter, or even larger, in one solid piece and as long as the natural fractures in the formation will allow, providing the grain of the rock runs the right way.

#### Advantages Over Diamond Drills.

We perhaps owe more to the diamond drills (and to the intelligent class of men that have operated them) than to any other agents for the disclosure of the min-



Part of 80 tons of Granite and Quartz taken from a 10-inch Bore Hole 2,000 feet deep by a Terry Class C. Drill. Some of the Cores are in solid pieces 18 feet long.

enough, taking out a 1 3/4 inch core to depth of 500 feet. In coal mining the large cores are particularly advantageous as the cores do not break up so badly in friable rock and a more perfect sample is obtained.

The large core holes are also the cheapest way to ventilate a mine. At the Stella mine in Herman, N.Y., numerous 20-inch holes were bored with a Terry drill in place of winzes and raises. It was the experience at this mine also that using a small shot drill, a larger per cent. of perfect core was obtained with the shot drills than with the diamond drills—the shot drill cores being 1 3/4 inches in diameter, and the diamond drill core being 7-8 inch.

For railroad engineers the shot core drills are particularly useful in testing river and lake bottoms, or in seeking solid formation for piers and bridges, also to prospect for iron, coal, etc., on the railroad lands, or in prospecting to determine the mineral possibilities

eral wealth of the world. But the shot drill has several advantages over its honoured and rightly respected rival, namely:—

(1) Cost.—The whole shot drill outfit costing barely as much as a single diamond bit. Hence less installation cost. The cost for shot and the wear on bits per foot is about half the cost for wear on diamond.

(2) Speed.—The shot drill cuts a two-inch core at about the same speed as a diamond bit cuts a 7/8-inch core.

(3) Results.—The shot drill gives a larger per cent. of perfect core, of larger size, at less cost, at same speed.

A Class D Terry Drill was lately purchased by the United States Government, for drilling 30-inch holes in a diabase concrete embankment reinforced with steel I beams and drain pipes. The illustration shows how the shot bit bored cleanly through this peculiar formation



leaving the steel beams and pipe imbedded in the core. In summing up the many practical ways a core drill can be used to great advantage, I would call attention to the fact that after their invaluable services to the prospector, their greatest value should be to the

coal miner—in rescue work. A few 30-inch holes put down in strategic positions from the surface into the lower workings of coal mines, and equipped with ladders, would give ready egress and good ventilation at all times.

## Reciprocity in Zinc and Lead Ores and Products.

The thirteenth annual convention of the Associated Boards of Trade of Eastern British Columbia was held at Creston, B.C., in January. It was attended by delegates from the respective Boards of Trade of the following towns: Nelson, Trail, Rossland, Kaslo, Creston, Moyie, and Fort Steele. Among many subjects affecting the commercial and industrial interests of the Kootenay district discussed was that of reciprocity between Canada and the United States in zinc ores and zinc in all its forms, the latter including zinc manufactures.

A resolution of the Kaslo Board of Trade, submitted by the delegates from that Board, H. Giegerich and J. W. Cockle, and adopted by the convention, was as follows:

“Resolved, That the Associated Boards of Trade hereby approve and endorse a certain memorial, a copy of which is attached and made a part of this resolution, dated November 28th, 1910, addressed by J. L. Retalack, on behalf of a majority of actual and potential producers of zinc ore in this province to the Hon. the Minister of Finance, Ottawa, requesting that ‘in case of negotiations toward a measure of reciprocal trade between Canada and the United States being entered into in the near future, an attempt should be made to secure the free interchange of zinc ore and zinc in all its forms.’”

### MEMORIAL TO MINISTER OF FINANCE.

The memorial thus endorsed was as follows:

“The Hon. W. S. Fielding, Minister of Finance, Ottawa:

“Sir,—After consultation with the majority of present and potential producers of zinc ore from these districts, I beg to respectfully submit that in case of negotiations toward a measure of reciprocal trade between Canada and the United States being entered into in the near future, an attempt should be made to secure the free interchange of zinc ore and zinc in all its forms.

“According to recent announcements, it would appear that the principle upon which the United States tariff has been to some extent framed in recent years, and upon which it will be framed, is the protection of American industries to an extent equal to the difference between the cost of American labour in the exporting countries, whose products compete.

“Under the Dingley tariff, zinc ore was admitted free into the United States, and, on the authority of the ‘Mineral Industry,’ the total imports of such ores from all sources were for the years hereunder stated as follows:

	1906.	1907.	1908.
	Tons.	Tons.	Tons.
Mexico .....	88,900	108,800	68,383
British Columbia .....	600	1,157	6,157

...“This in comparison with the domestic production in the United States of:

1906 .....	905,175 tons.
1907 .....	902,923 tons.
1908 .....	838,277 tons.

“At the hearing of the Ways and Means Committee at Washington in 1908, which resulted in the Payne-Aldrich tariff of 1909, considerable attention was given to zinc. Representatives of the producers of such ore from the mining districts of the west laid much stress

upon the low wages paid in Mexico, stating that the peon miner received only 37½ to 50 cents per day (United States currency), whereas the United States miner was paid six or seven times that amount. Not a word, however, was said about low wages in British Columbia, for the sufficient reason, no doubt, that miners’ wages here are generally higher than in the productive districts of the United States. They are certainly higher than in New Jersey or the Joplin district of Missouri, which jointly account for more than two-thirds of the production of zinc ore in the United States, or in Oklahoma, and are as high as Wisconsin, Colorado, Montana, Idaho, or any other productive state.

“It would appear, therefore, that the whole argument for the present high zinc duties in the United States was based upon the low wages in Mexico, and that the representations of the United States producers to the Ways and Means Committee in 1908 were that they could not compete with Mexico on even terms. Accordingly, the Payne-Aldrich tariff imposed a duty on zinc-bearing ore carrying 25 per cent. metallic zinc or over of one cent per pound on the zinc in the ore. Certain reductions were provided for ores carrying less than 25 per cent. zinc, but such low-grade ores cannot be handled from this province, and we are concerned, therefore, only with the aforesaid maximum rate.

“This tariff has proved a serious blow to the producers of British Columbia zinc ores and concentrates, and to the production of lead, which in our deposits is usually found associated with zinc. A falling off in the production of one consequently entails a similar condition as to the other.

“As there are no works for the reduction of zinc ores in operation in Canada, and as distance and consequent high freight rates prohibit exportation to Europe, British Columbia producers have now either to ship to the United States for smelting in bond (the granting of such privilege resting with and being dependent upon the arrangements of the American smelters), the resulting product being sold in cheap foreign markets, or to the United States with payment of said onerous duties.

“These duties have prohibited business, except from exceptionally high-grade properties and one or two where a high-grade zinc concentrate is produced as a by-product in the milling of zinc-lead ores.

“Meanwhile Canada imports a considerable quantity of zinc and its products from the United States, so that while the producer of zinc ore in British Columbia has to sell at an exceedingly low figure, the products of his ore are returned to Canada as finished articles at a high figure, an anomaly which it would seem can best be removed through reciprocity.

“The effect of a reciprocal arrangement in regard to zinc may well be that for the present the smelting of our zinc ores will be carried on in the United States. Following the stimulation of a profitable market to production and development, should come such assured increased production as will justify the construction and operation of works in Canada. With a free market for their products, the advantage of reducing existing high



freight rates on ore should provide an incentive for such works.

"Reference has already been made to the indirect benefit which will be conferred on the established lead industry by the increased production of zinc ores.

"I have the honour to be, sir, your obedient servant,  
" (Signed) J. L. RETALLACK."

#### OPINIONS OF DELEGATES.

T. G. Proctor strongly urged the passage of the resolution, as of the utmost importance to the zinc resources of the Kootenay.

H. Giegerich said the Dominion Government, in negotiating a reciprocity treaty, would have in view all the facts thus far presented, and particularly the fact that it had appropriated \$50,000 for experimentation in reducing zinc ores, and would safeguard Canada's zinc interests. But this might take three years, and was nothing to be done in the meantime?

G. O. Buchanan said the resolution named not zinc ore merely, but zinc products, and those behind it would insist on that. If the processes were successful, and reciprocity of this kind were obtained, the American market would be absolutely open to the zinc products of the Kootenay.

#### PRODUCERS OF ZINC ORES.

Mr. Buchanan read from a memo. of Mr. Retallack's as follows: "In addition to the companies and interests represented by J. L. Retallack, viz., the Deep Mine, Limited, Whitewater; John L. Retallack & Co., Whitewater, and the Washington Mine, McGuigan, the memorial had been submitted to and approved by the following: A. J. Becker, for the Lucky Jim Zinc Mines, Limited; the Van Roi Mining Co., per Ernest Levy; the Consolidated Mining & Smelting Company of Canada, Limited, W. H. Aldridge, managing director; the Aurora Mining & Milling Co., of Moyie, per its manager; S. S. Fowler, for the New Canadian Metal Co., Limited; the Enterprise Mine, Limited; the Whitewater Mines, Limited, and other interests; Byron N. White, for the Slocan Star, etc.; A. Fournier, for the Selkirk Mines, Limited; James Anderson, for the Ruth Mines, Limited; the Jackson Mines, Limited; the Ferguson Mines, Limited; Alex. Smith, for the Surprise mine; H. Giegerich, for the Province Mine, etc.; John A. Thomson, managing director of the Mount Stephen Mining Syndicate, Field; and George Aylard, for the Standard Mine, Silverton." Mr. Retallack had received the assurance of the Ministers that if reciprocal arrangements were made, zinc products would be included.

#### RECIPROCITY IN LEAD.

Reciprocity in lead ores and manufactures was also discussed, and the following resolution, which was submitted by R. Campbell and J. W. Fitch, of the Moyie Board of Trade, was unanimously adopted by the convention:

"Whereas any measure of reciprocal trade with the United States which would permit the free entry of lead ores into that country without also providing for the free admission of pig lead and lead bullion, would, because of the higher price of lead products in the United States, draw away British Columbia lead ores to that country, thereby extinguishing within Canada the industries of smelting, refining, and manufacturing lead, which the Government of Canada has done so much to encourage; and whereas the ultimate effect of this would be to leave our producers of lead ores wholly at the mercy of the American Lead Trust: Therefore, be it resolved that the Associated Boards of Trade of Eastern British Columbia petition the Dominion Government that should they grant reciprocity to lead ores, they will

insist that this reciprocal arrangement shall be extended to cover the entire lead schedule."

#### RESOLUTIONS PASSED IN BRITISH COLUMBIA.

In addition to resolutions relating to reciprocity in lead and zinc ores and manufactures, information concerning which is given separately, discussed by the recently-held annual convention of the Associated Boards of Trade of Eastern British Columbia, the following were adopted:

(1)—"Whereas there are large bodies of complex ores in British Columbia and elsewhere in Canada that cannot be economically treated by any known method; and whereas there is no public establishment in Canada for experimenting with or testing the treatment of such ores; and whereas this convention considers such work to legitimately belong to the Dominion of Canada: Therefore, be it resolved that the Associated Boards of Trade petition the Dominion Government to establish in connection with its Department of Mines a well equipped metallurgical laboratory and testing works, to be properly officered by qualified men, for solving the problems presented by the discovery of various complex ores, which cannot be treated economically at the present time."

(2)—"Resolved, that the resolution regarding the establishment of a Government assay office for the purchase of gold and silver bullion, passed at previous conventions, be re-affirmed, as follows: 'Whereas the only refinery in Canada producing gold and silver is located at Trail, British Columbia; Therefore, be it resolved that, in order that Canadian gold and silver may be used for coining purposes, the Dominion Government be requested to purchase gold and silver at Trail, B.C., on the same basis as the United States purchases these metals through its assay offices situated at Seattle, Wash.; Helena, Mont., and other places, and thereby prevent the exportation of Canadian gold and silver to the United States.'"

(3)—"Resolved, that we, the Associated Boards of Trade of Eastern British Columbia, desire to record our appreciation of Mr. W. H. Aldridge, who for many years has been managing director of the Consolidated Mining and Smelting Company of Canada, Limited, operating within our territory. Ever since the inception of this association, Mr. Aldridge has been one of its active members. He has been present at nearly all of its meetings, and has always manifested a lively interest, not only in matters pertaining to the mining and smelting industries with which he was identified, but also in all other matters affecting the general welfare of the country. We recognize Mr. Aldridge as a man of extraordinary ability in mining and metallurgy, and we deeply regret his removal from the province. We wish him great prosperity in his new sphere of action." (The secretary was instructed to forward to Mr. Aldridge a copy of this resolution.)

A resolution, submitted by Nelson delegates, providing that the Associated Boards shall petition the Provincial Government "to establish the mining school to be attached to the new University of British Columbia, or a branch of said school, in the Kootenays, and that this school be well-equipped and properly officered by qualified men," was withdrawn upon its becoming evident that a majority of the delegates agreed with G. O. Buchanan, of Kaslo, who expressed the opinion that the "mining school should be at the university, near the city of Vancouver, the Government having a large enough task to get the university started, without having a separate mining school, and dividing the faculty, thus decreasing its effectiveness."



A letter was received from a mine operator, suggesting that the Dominion Government when negotiating a reciprocity treaty with the United States, shall endeavour to have placed on the free list various mine supplies. It was decided to reply to the effect that the Associated Boards did not feel that they could agree upon a resolution that would embody their correspondent's views on this subject.

It was decided that the next annual convention shall be held at Rossland, B.C.

#### RAMBLER-CARIBOO MINE, SLOCAN, BRITISH COLUMBIA.

An important development in the Slocan district, British Columbia, was the recent opening on the 1050-foot level of the Rambler-Cariboo mine of a shoot of high-grade galena ore four to five feet in thickness. This has renewed interest in this mine, concerning which the following information is believed to be dependable:

The company, incorporated on July 31, 1899, as the Rambler-Cariboo Mines, Limited, has its head office in Spokane, Washington, U.S.A., and its British Columbia office at Kaslo, the Kootenay Lake terminus of the Kaslo & Slocan Railway. Mr. W. E. Zwicky is manager. The company's property embraces five mineral claims having a total area of 175 acres, situated in McGuigan Basin, Slocan mining division, and distant about three miles from the K. & S. Railway at McGuigan.

#### EARLIER DEVELOPMENT OF THE MINE.

Prior to 1904 development work consisted chiefly of a shaft with levels opened from it. This shaft was sunk from what is known as the 300-foot level, the original workings down to 300 feet having been adits driven in the mountain-side above. The shaft was sunk 500 feet and levels were opened at 100-foot intervals down to what is called the 800-foot level, below which depth it was not practicable to work the mine with the power plant then possessed, for in the spring of each year pumping, especially, would have been too heavy for the available power. By that time much ore had been extracted and from the profits earned \$230,000 in dividends had been paid to stockholders. At the beginning of 1904 the directors found themselves in this position: they had to choose between (1) buying and putting in a larger power plant, (2) driving a long adit to cut the vein at a deeper level and at the same time provide for the drainage of the mine at little or no cost after the vein should have been intersected by such deep-level working, or (3) abandoning the mine. Another serious consideration was the altitude of the surface works—concentrating mill, mine buildings, etc.—situated at about 6,000 feet above sea-level, at which height snowslides were troublesome.

#### A DEEP-LEVEL ADIT.

In the foregoing circumstances Mr. Zwicky strongly recommended that a deep-level adit be driven. Eventually he was authorized by the directors to proceed with this important work, which was commenced on July 9, 1904, and completed on April 16, 1906. The portal of the adit is at an altitude 1,450 feet lower than that of the lowest outcrop of the vein, 2,400 feet below the apex outcrop on the summit of the mountain, and 650 feet lower than the eighth or former bottom level of the mine. At 4,523 feet from the portal of this adit driving was discontinued. The requisite grade having been maintained for draining off the water, the face of the adit is about 1,425 feet below the lowest outcrop of the vein. The writer has stood at the face of the adit and from there seen daylight at the portal distant nearly seven-eighths of a mile. The excellence of the engineering and workmanship in driving this adit, which is 7 feet by 7 feet 6 inches in the clear, was therefore plainly evident.

#### AN OFFICIAL DESCRIPTION.

Writing of conditions as he found them about the close of 1907, Mr. Robert R. Hedley, in his description for the Dominion Department of Mines' "Report on the Mining and Metallurgical Industries of Canada, 1907-8," observed: "The manager of the Rambler-Cariboo mine states that owing to some disturbance, or fault, at or about the point to which the vein had been projected on this level, the vein was not found, though the tunnel was driven some 90 feet beyond that point. He, consequently, decided to cut the vein at the nearest possible point under the main shaft. A diagonal drift was then run, and from this a raise was made to connect with the upper workings. In about 200 feet of raise the 1,250-foot level was reached and a cross-cut started. At 47 feet from the raise the vein was cut; it was found to be 8 feet wide and contained several streaks of clean galena. Raising was continued, and some driving done at the 1,150-foot level. Stations were established at the 9 and 10 levels. After connection had been made with the old workings some stoping was done in the upper levels, and the work of connecting with the tunnel by a suitable shaft was proceeded with. The necessary equipment was installed at the portal of the tunnel, and suitable cottages, bunkhouse, etc., for the new camp were erected near this lower entrance to the mine."

#### LATER DEVELOPMENTS.

The further exploration of the mine has been in continuous progress ever since the completion of the above-described development and equipment, except for a few weeks following a fire last summer. Old levels were extended and new levels driven, with the satisfactory result that orebodies were found on these down to the 1,050-foot level. By last summer everything was in readiness for regularly making comparatively large shipments of ore; but the fire came, destroyed mine buildings and all accessories to the compressor plant (though the compressor itself was not much damaged), took away transportation facilities by burning trestles and bridges along five or six miles of the railway, and left the undertaking temporarily at a standstill just when the outlook for large production and a return for years of plucky enterprise seemed within reach. However, the best was made of the position, and steps were promptly taken to overcome the fresh difficulties that had so unexpectedly beset the company. New buildings were erected at the mine, the compressor plant was restored to working order, wagon road communication was (with the assistance of the Provincial Government and the Lucky Jim Zinc Mines, Limited,) established with the C.P.R. Company's Sandon-Nakusp railway at Three Forks, distant about seven miles from the mine, and teams and sleighs were purchased for winter hauling. Snow was late in coming this winter, consequently it was not for some time practicable to haul ore all the way to Three Forks, but by the middle of December 4,000 sacks of ore and concentrate (for the mill was not destroyed by the fire) were hauled half-way to Three Forks, and later it was taken to the railway and shipped thence to the smeltery. It was estimated that while the sleighing should continue good shipments would total about 200 tons a month. The year's shipments prior to July 16, the date of the fire, totalled 601 tons of crude ore and 63 tons of concentrate. The smeltery returns for 1910 show a total of 802 tons received from this mine. Shipments in 1909 aggregated about 1,020 tons, this quantity including 340 tons of concentrate. No information is possessed relative to 1907 and 1908, but it is known that during the period 1893-1906, inclusive, the aggregate output was about 14,500 tons of ore and concentrate, with the following average metal contents: Lead, 37 per



cent.; zinc, 14 per cent., and silver, 127 oz. per ton. It would appear, therefore, that to date between 16,000 and 17,000 tons of ore has been shipped from this mine, which now has an excellent prospect of adding substantially to this comparatively large output tonnage.

#### A BRIGHT OUTLOOK.

The following comment, written last year, may be quoted as an appropriate conclusion to the foregoing information concerning the Rambler-Cariboo mine: "There is no doubt that the Rambler-Cariboo is now in better condition to return substantial profits above operating costs than at any other time for years. The successful outcome of the enterprise planned six years ago by Mr. Zwicky, whose wise foresight was not at that time generally recognized, is of much moment to the Slocan district as a whole. Recognition of the pluck of the directors of the Rambler-Cariboo company, themselves large stockholders, in financing what at first seemed a somewhat hazardous as well as costly undertaking, is also merited. They had faith, though, in their manager's skill and good judgment, and the sequel has proved that it was well grounded."

It may be added that there are now eight or ten mines in the Slocan district at which development in the deep has been carried out, and in most of them is being continued. The results are generally satisfactory, so that there seems to be good reason to think mining in the Slocan will be productive and profitable for years, and particularly so if it shall be found practicable to turn to profitable account the zinc contents of the ores as well as the silver and lead.

## An English Compressed Air Mine Haulage Engine

By FRANK C. PERKINS.

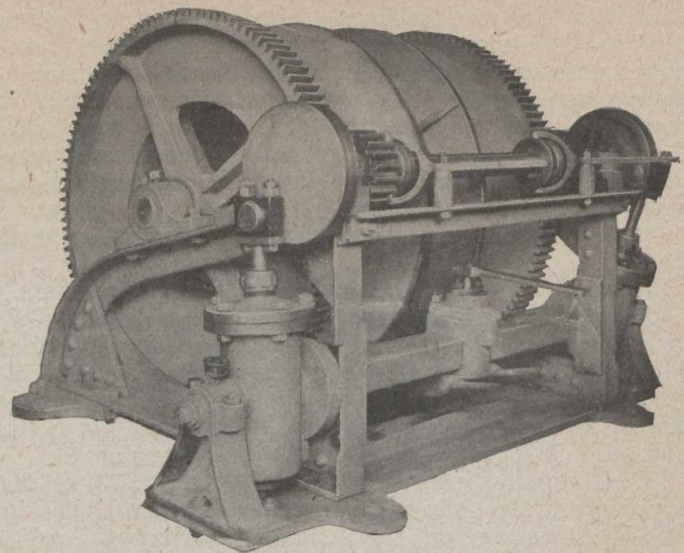
An English compressed air haulage engine of unique design is shown in the accompanying illustration, designed and built at Park Sheffield, England. It will be noted that the machine is constructed for lightness, combined with strength, and is portable, being quickly dismantled and installed in another part of the mine.

It will be seen that the drums, of which there are two, are easily rolled into their places, no lifting being necessary, and each drum is capable of containing 500 yards of  $\frac{1}{2}$ -inch wire rope, which lead off in either direction, top or bottom. The gear is cast, the pinion being of cast steel, with double keys solid with the shaft, sliding in or out of gear as desired.

It is stated that the cylinders, although oscillating, give no trouble, as they are well supported on large trunnions and not fitted with glands, as the air does not pass through them, but through separately arranged ports upon a flat face. The faces are held together by a spring saucer washer, and a ball thrust ring, so that friction is reduced to a minimum, whilst the faces are light, so that no dust can get in.

It is claimed that the piston rods are the only working parts exposed to dust, and they are fitted with metallic packing, a white metal bush filling the stuffing box and the cylinders are placed behind the drums on the hoists of large size.

In this English air hoist the controlling valve is the leading feature. It is said to start, stop, reverse and regulate the speed to the greatest nicety with one lever, dispensing with all link motions, eccentrics, sliding valves and rod pins, which are liable to come loose and cause trouble.



It is maintained that freezing is impossible as the inlet and outlet passages are close together and the temperature is equalized. Powerful brakes are fitted to each drum, and the machines are so simple and accessible that they can be taken to pieces in 20 minutes and put together again in 40 minutes by two men without difficulty.

In some mines where there are dangerous gases there is a desire to dispense with ponies and at the same time avoid the dangerous use of electricity in the mines. This has led to the introduction of this new and exceedingly simple form of haulage gear and engine driven by compressed air.

## Personal and General

Mr. P. Kirkegaard, managing director The Deloro Mining & Reduction Co., Ltd., has resigned that position in order to devote his whole time to his other interests. Mr. Kirkegaard and his associates, Messrs. MacKechnie and Hughes, recently bought the Belmont gold mine at Cordova, and it is their intention to start active work in the spring. Mr. Kirkegaard will act as managing director. His duties in this capacity will occupy only a part of his time, and he will be able to direct operations on various properties in Cobalt, Gowganda, Porcupine, and elsewhere. Mr. S. B. Wright has been appointed manager at Deloro, and Mr. T. Melvar, chief chemist, assumes the added duties of superintendent.

Mr. R. B. Lamb, mining engineer, Toronto, is in Porcupine on professional business.

Mr. Alexander Grant, manager of the Marble Bay gold-copper mine, near Van Anda, Texada Island, B.C., is convalescent and has resumed his duties at the mine after having been ill at Victoria nearly all the winter.

Mr. W. H. Trewartha-James, of Victoria, B.C., general manager of the Tye Copper Company, Limited, was in New York early in February. He contemplated going thence to England on a business visit, before returning to British Columbia.

Among the Cariboo district hydraulic placer-gold mining men who have been spending the winter in one or other of the Coast cities, are Mr. John B. Hobson, who has been at his home in Victoria; Mr. John Hopp, whose Coast home is in Seattle, Washington, and Mr. Mel-



bourne Bailey, whose family residence is in Tacoma, Washington.

Mr. Thomas Kiddie, of Vancouver, B.C., has again been superintending trials of oil as fuel for smelting copper ores, at the Van Anda smeltery, Texada Island, B.C. The demonstrations made at those works during recent months have attracted the attention of several other metallurgists, who are also much interested in the considerable measure of success that has been achieved.

Late movements of British Columbia mining engineers or managers include the following: Mr. J. W. Bryant, the Tyee Copper Company's senior field mining engineer, is in charge of the development work that company is engaged in at the Cornell gold-copper mine on Texada Island; Mr. Lewis Hind, of Hind & Cane, mining engineers, Victoria, has returned from a professional visit to Mexico and southern California; Mr. Louis Pratt, formerly manager of silver-lead mines in the Slocan district, has again gone to England in connection with Messrs. P. Burns & Company's mining business.

Arrangements were made during the early part of February by a number of men prominently associated with the industrial, commercial, and financial interests of the Kootenay district of British Columbia, to entertain at a valedictory banquet, Mr. W. H. Aldridge, late managing director of the Consolidated Mining & Smelting Company of Canada, Limited, who recently retired

from the general management of the company's big mining and smelting business. The date of the banquet was to be dependent on Mr. Aldridge's convenience—probably late in February, when he was expected to return to Trail, B.C., on a brief visit.

There have been several recent changes in connection with western coal mines; among them the following: Mr. F. W. Guernsey, formerly of Trail, B.C., is now manager of the Bankhead colliery, Alberta; Mr. J. Robertson has been appointed manager for the Head Syndicate, Ltd., which is developing a valuable coal property adjoining on the south that of the International Coal & Coke Co., Ltd., in southwestern Alberta; Mr. Jas. Holden has succeeded Mr. Chas. Graham as superintendent of the Princeton Coal & Land Company's colliery at Princeton, Similkameen, B.C.; Mr. Andrew Bryden, for years manager of the Dunsmuir's Extension colliery, Vancouver Island, is superintending the development of the Coal Hill Syndicate's property in Nicola Valley; Mr. Edward Hodgson, of Victoria, and associate capitalists resident in New York, are stated to have obtained control of the Pacific Coast Coal Company, operating on Vancouver Island, and will shortly assume full charge of the company's mines and offices. It is reported that Mr. W. R. Wilson, who some years ago was with the Crow's Nest Pass Coal Company, is expected to again become connected with the operation of that company's coal mines in southeast Kootenay.

## SPECIAL CORRESPONDENCE

### ONTARIO.

#### COBALT AND OTHER SILVER AREAS.

The pressure from the Hydraulic power plant is still low though the plant at Ragged Chutes has now been completely repaired. There is a shortage of water but the tributary dams on the Montreal should give all the pressure desired in a few days.

The Nova Scotia ran into a very rich but short ore shoot on the 79-foot level. For ten to twelve feet the vein was extremely rich and about five inches wide. Some beautiful leaf silver was also taken out of the diabase wall rock.

On the T. & H. B. claims in the Hangingstone section of Gowganda three shafts have been put down on separate veins. One, down 80 feet, still shows excellent high grade silver ore and another at 50 feet is also rich, while in the third shaft there is heavy smaltite. A bigger plant is being taken in.

The thawing house at the Beaver mine was destroyed, and an Austrian, George Ranik, killed instantly, by the explosion of 300 pounds of dynamite in the early part of last week. Some of the camp buildings were wrecked.

In the Gowganda section the Bartlett and Reeves Dobie have both shipped high grade ore. The Reeves Dobie has sent out about four tons of concentrates from its mill, which at the present time is not operating. The Bartlett despatched five tons from an open cut.

The Welsh property, in which the Farmers Bank is stated to have an interest, is to open up operations very shortly with power from the Bartlett. A very considerable amount of development work has been done to date.

The Wettlaufer has just shipped another 30-ton car of high grade ore which will run between 3,000 and 4,000 ounces to the ton. The shaft at this South Lorrain property is down 240 feet, with a winze 60 feet deeper and still in ore.

In the Gowganda district the Miller Lake O'Brien to date has shipped 54 tons of ore, containing 150,000 ounces of silver, and it is now producing at the rate of \$15,000 per month. There is an ore body 275 feet long at the 90-foot level and 80 feet long at the 140-foot level, with excellent high grade in the heading of

the south drift. It is stated that there are two years' reserves now in sight.

In the Lost Lake section of the Montreal River Company the Calcite Lake Mining Company has recently run into a vein of good ore at the 125-foot level. It has been opened up for twelve feet from two to three inches wide and will run about two thousand ounces.

The Nipissing report for January shows that the company mined ore of an estimated value of \$200,821 net, and shipped ore worth \$165,768. The principal development was at shaft 64, where an ore body 40 feet long has been extended for another 54 feet, and for that distance is eight inches wide of very rich ore. The drift of 54 feet yielded at the rate of \$960 per foot.

At the present time the Beaver has in its No. 5 vein at the 300-foot level one of the most spectacular showings in the camp. At the top of a small stope there is 21 inches of 6,000 or 7,000 ounce ore and the average for ten to fifteen feet will be 18 inches. The Beaver has two exposures of high grade ore on No. 5 vein at the 300-foot and is still stoping on ore at the 200-foot level. No. 3 vein is also showing up well.

The revelation of over-issue of capital at Little Nipissing has temporarily closed down the mine till after the meeting when the financial matters have been straightened out. The Little Nipissing has had some rich pockets of ore, but they were very short. There is still some high grade unstoped in the mine.

#### PORCUPINE AND OTHER GOLD AREAS.

A drift has now been opened on one vein of the Hollinger at the 100-foot level for 1,200 feet. A winze has been sunk another 100 feet, and is still in ore. All the stamps and mortars for the 30-stamp customs mill have arrived and it is believed will be in operation by July at latest.

A diamond drill core from the 200-foot level of the Rea Mines, the Goldfields Consolidated holding in Porcupine, shows considerable values in free gold. Thus another property has proven values at depth.

Since it is believed that there will be an early break-up many properties are rushing in small plants. The Preston East Dome,



the Tisdale, and the Armstrong Booth have all ordered small plants to be delivered at once.

After working for almost three years the Swastika mine in Otto township has now got excellent gold values in a winze 25 feet below the 100-foot level. The little mill has produced 50 ounces. A new stamp mill has been erected and will be running in a few days. The property is located in a section that has generally been discredited as a mining area.

The first gold brick from the little Nissen mill at the Vipond property has just been sent to the company's offices in New York. The brick weighs 92 ounces and is stated to be worth \$1,700.

The English house of Bewick, Moreing & Co. is stated to have taken up on option the 50 undeveloped claims of the Timmins McMartin Dunlap syndicate and an immediate expenditure of half a million dollars to open them up is guaranteed.

Mr. F. Augustus Heinze, who has had an option on the Foster property, is going to test the formation at depth with two shot drills. Mr. Bob Weiss is in charge of the property.

W. S. Edwards, one of the stakers of the Dome property, has taken an option on the Smith veteran, upon which a good find was made recently. He has sampled and examined it thoroughly.

An extremely good find in the Cripple Creek district is recorded on the Carleton claims. Free gold in the blue quartz was discovered at the bottom of a 12-foot shaft. The assays are uniform, but specimens are not as spectacular as in Porcupine itself.

The discovery of excellent free gold values at the Swastika mine in Otto township may put new life into the Larder Lake field. The values first became good at the 100-foot level and spectacular in the winze 25 feet below. The persistence of values to depth has caused a rush of prospectors to take up expired claims. The property has been operated by a Tavistock, Ont., syndicate for almost three years now. A small three-stamp mill will be replaced shortly by a new five-stamp mill. The little property has already produced 50 ounces of gold.

Many properties are now ordering small plants before the break up and the consequent demoralization of the roads. Among these are the Tisdale Mining Company, the Booth Armstrong, and the Imperial Porcupine.

The Standard Gold Mines in Deloro township will let a contract for a thousand feet of diamond drilling on its claims. A small plant will also be shipped directly the railroad reaches Porcupine. The company owns what are known as the Silver properties.

The magic word "tellurides" has again precipitated a rush directly south to the Bartlett township and the Sudbury division directly south of it. So far the statement of the prospectors, who declare they found telluride ore down there, has not been corroborated. A Cobalt firm of assayers made the declaration of gold in the ore.

## GENERAL MINING NEWS.

### NOVA SCOTIA.

GLACE BAY.—All of the collieries of the Dominion Coal Company are working actively and an exceptionally large tonnage is being banked in preparation for the present year's expected record output and shipments. About 12,000 tons a day is now being hoisted.

SYDNEY.—Malcolm Beaton, former manager of the Inverness and Richmond Coal Company, has taken a position with the Dominion Coal Company, and has entered on his duties as manager of No. 16 colliery.

### NEW BRUNSWICK.

ST. JOHN, N.B., Feb. 13.—What is declared to be probably the most valuable cargo ever sent from a Canadian port is on board the C.P.R. liner Empress of Ireland, sailing from this port Friday for Liverpool. The value is \$393,000. Included are two tons of Cobalt bar silver and 250 tons of nickel copper matte, the latter for British navy armour plate.

### QUEBEC.

MONTREAL.—Following is an abstract of the report of Mr. Edward Slade, managing director of the Black Lake Consolidated Asbestos Company:

The mill is designed to operate as two independent units, each unit producing identically the same grades.

It will be interesting to know that the mill will handle, without crowding, one thousand tons of rock per day of 20 hours, an actual run of over 600 tons having been made with one-half the mill on several occasions.

With a view to testing out thoroughly the new process of treatment adopted in order to produce the most marketable grades, the work during a considerable portion of last season was largely experimental and we purposely delayed the completion of the second unit until the end of the year.

The mill is now complete in every detail and the grades thoroughly established so that now the mill is ready to operate at full capacity as soon as weather conditions permit. During this period the company produced 3,046 tons of asbestos of various grades. Of this, 837 tons have been shipped. Owing to the satisfactory character of our grading, contracts have already been closed for 2,400 tons additional and negotiations are pending for

over 3,000 tons more, so that the sale of our entire output is now fairly well assured.

It is gratifying to be able to state that the pits, which have been developed to date, have more than realized our expectations. The quantities of high grade asbestos are steadily increasing as the pits are enlarged, so that with the addition of the extra hoists referred to above we can be assured of a continuous supply of mill rock, the quantities of which in sight and proven are practically inexhaustible.

I can safely state that the property is now in a position to earn all its fixed charges, and a substantial surplus.

### ONTARIO.

COBALT, Feb. 18.—The Wettlaufer mine of South Lorrain is making a shipment of high-grade ore through Haileybury.

SAULT STE. MARIE, Feb. 23.—J. J. Byrne, who has been interested in gold and silver discoveries at Cobalt, Porcupine, and Gowganda, returned to the Soo yesterday afternoon from Hobon, the new gold field discovered by Wm. Noquist, of the Soo, last November. Mr. Byrne, with Mr. J. Hollinger, have staked 16 claims at Hobon, adjoining the Noquist claims, and all show rich values. Assays made on ore run from \$6.60 to \$400 to the ton. It is expected that with the advent of spring a rush will be made to Hobon.

COPPER CLIFF.—Mr. A. P. Turner, president of the Canadian Copper Company, has gone south on account of his health, and expects to remain in Florida for a couple of months. He has always been a vigorous worker and has well earned a rest. Mr. John Lawson, who has been his right hand man, is also unfortunately ill, and is on a course among the islands of the West Indies. He is rapidly recovering and is expected in Copper Cliff again early next month. Meantime, Mr. D. H. Browne, Chief Metallurgist, has charge of operations.

PORCUPINE CITY, Feb. 13.—Messrs. Pope and Kuehn, in the employ of Bewick-Moreing, have been here three weeks sampling veins on the Feldon properties which were sold to P. Kirkegaard, of Deloro, Ont., and the John Gray properties in Ogden.

To date, a total of 72 claims in the townships of Whitney, Tisdale, Deloro, Shaw, Carman, Munro, and Langmuir, have been placed in the hands of Mr. McConrad, of Montreal.



## BRITISH COLUMBIA.

NELSON.—The Molly Gibson mine has again commenced to ship ore to the smelter, a number of sleigh loads having been brought from the end of the tramway to the landing at Kokanee during the past few days. The ore is being left at the landing pending the arrival of a barge when it will be shipped to the smelter at Trail.

The new tramway, which contains one of the longest spans in the province, is working smoothly. It is a trifle over four and a half miles in length and the long span is over a mile long. The successful building of this tramway, which was for the purpose of carrying the ore from the mine over the portion of the road frequently impassable in the winter and spring owing to snowslides, is considered a fine piece of engineering work, the construction of the long span having presented exceptional difficulties.

With the new tramway in working order and with a large supply of ore on hand in the mine, the Molly Gibson is expected to be a regular shipper from now onwards.

NEW DENVER, Feb. 16.—The Sweet Grass lessees have struck a good vein of high grade ore in their No. 2 tunnel.

Three carloads of machinery for the Van Roi mine at Silverton, arrived last week.

With the opening of the Van Roi new mill and a large staff

of men at the mine, the working of the Standard mine on a larger scale, whether Patsy Clarke takes up his option or not, the operating of the Enterprize, Slocan Star, Ruth, Hope, Evening, McAllister, Reco, Richmond-Eureka, Sweet Grass, Molly Hughes, Neglected, Jo-Jo, etc., the spring outlook for mining in the Slocan district and New Denver and Silverton is of the brightest.

The Noble Five mine at Cody shipped a car of high grade silver galena ore this week, the first in ten years. Development work will be kept up all winter. T. L. McAllister, of Cody, is in charge.

New Denver merchants complain bitterly of Nelson and coast wholesalers selling to the mines in this vicinity at wholesale prices.

NELSON, Feb. 18.—The Phoenix Amalgamated, Ottawa, Knob Mill, and Noble Five mines joined the shipping list the past week. The Phoenix Amalgamated is the property of the Consolidated Mining & Smelting Company, on which work was recently resumed. The Ottawa is a silver-lead mine at Slocan City, and was a shipper last year. The Noble Five is a silver-lead property that has long been off the shipping list, and is one of the Cody mines. The Knob Hill is in the Republic camp in Washington.

## MINING NEWS OF THE WORLD.

## UNITED STATES.

BAKERSFIELD, CAL., Feb. 21.—During January there was a decline of 119,497 barrels in the production of oil in California, compared with the production of December. The January output amounted to 5,993,300 barrels, and that of December to 6,111,807. The daily average of January production was 193,300 barrels and that of December 197,155.

CRIPPLE CREEK, COLO., Feb. 20.—The project for a third deep drainage tunnel is still to be considered after Engineer T. R. Countryman has made his report, according to President Frank G. Peck, of the Cripple Creek Drainage & Tunnel Company, who was one of the committee to visit the district and inspected the Roosevelt tunnel.

BUTTE, MONT., Feb. 14.—A company with a capital of \$1,500,000 is being organized by capitalists of this city and the East for the purpose of constructing an electric railway for the hauling of ore from the Silver Lake district to Anaconda. In this district is located the celebrated Southern Cross mine, which eastern men inspected about one year ago and on which they had an option and afterwards relinquished. That property has now 75 men at work and is shipping its ore to the Washoe smelter, necessitating a waggon haul of 12 miles.

SPOKANE, WASH., Feb. 18.—Bunker Hill and Sullivan Mining & Concentrating Company, operating at Kellogg, Idaho, brought its total disbursements to date to \$12,456,000 by the payment of divi-

dend No. 161, amounting to \$81,750, a few days ago. One hundred and sixty-three thousand five hundred dollars has been paid so far this year. The Bunker Hill property is declared by experts to be the greatest dividend-paying silver-lead property in the United States, if not in the world.

## MEXICO.

PARRAL, Feb. 21.—Another big strike has been made at the Santa Ines property of silver ore running 20 kilos. The engineer advises that values are increasing with depth. The depth reached so far is 125 metres.

CANANEA, SONORA, Feb. 21.—While there is nothing of the sensationalism in development among the mines of the State of Sonora, there is, however, a widespread development of old and new properties unattended by excitement that is accomplishing more substantial good than has yet been vouchsafed the industry. All work is systematic and is being conducted by strong financial interests.

## SOUTH AFRICA.

JOHANNESBURG, Feb. 7th.—Three hundred out of the Randfontein Central's full mill of 600 stamps are to be dropped on Wednesday.

At the meeting of the Randfontein Estates the chairman announced that henceforward profits would be devoted to dividends.

The Langlaagte Estates has acquired mining rights on a bewaarplaatsen area.

## COMPANY NOTES

## CROWN RESERVE.

The Crown Reserve directors met Feb. 13th and declared the second of the monthly dividends of 5 per cent. It is payable March 15 to shareholders of February 28. The finances are still in fine shape, and after paying the dividend and all other charges \$20,000 will be added to the reserve.

## RIGHT OF WAY.

The report of the Right of Way Mines, Limited, for 1910, shows that the ore sales amounted to \$233,838. Four quarterly dividends of two per cent., at the rate of eight per cent. per annum, were paid, amounting to \$134,840. A balance of \$45,027

remains to the credit of profit and loss account. At the end of the year the company had cash on hand and due from smelters, \$76,361. The total assets of the company, including mine property, plant, etc., amount to \$1,784,388, and the issued capital stock is \$1,685,500. The old board of directors was re-elected.

## BAILEY.

At the annual meeting of the Bailey Cobalt is was shown that the company had a surplus of \$26,529 in addition to 413 pounds of bullion and seven bars of silver, as well as a car of ore about ready to ship, expected to return about \$20,000.



N. S. STEEL & COAL CO.

The Nova Scotia Steel & Coal financial report for year ending December 31, 1910, shows profits of \$1,140,504.37, which, with reductions in fixed charges, enabled the directors to declare an increase in dividend to 6 per cent. President Harris says the dividend has not been increased without careful consideration.

In 1909 profits were \$907,949, and at that time were about \$200,000 in excess of 1908.

The following is taken from the president's report:

The balance carried forward to credit of Profit and Loss, January 1st, 1910, was \$336,807.38, which, added to the profits for the year, gives a sum of \$1,477,311.75, at the credit of this account.

The sum of \$79,371 has been transferred to Reserve Fund, and \$6,344 to Fire Insurance Fund; \$218,104.80 written off, which includes the entire amount paid for discount and expense on the new bonds issued during the year, as well as a considerable sum paid for improvements and betterments.

After fixed charges and dividends there remains a balance to the credit of profit and loss account of \$500,602.95. The sum of \$908,362.63 has been expended during the year on capital account.

TEMISKAMING.

At the annual meeting of shareholders on Feb. 18th, the statement for the eleven months to Dec. 31, 1910, was presented. Formerly the company's year ended Jan. 31, but last year it was changed to the calendar year so that the period covered is for only eleven months.

The income for the eleven months amounted in all to \$1,022,390.52 and the expenditure to \$308,071.01, leaving a profit of

\$714,319.51, which amounts to some 35 per cent. of the capitalization. The income of the previous year amounted to \$345,306.60.

"It is gratifying to be able to report that high-grade ore is now being encountered at a depth of 540 feet from the surface," said President Cartwright in his address. "The formation is here found to be unchanged."

"Our ore still maintains its high silver values. The average of the 1,029 tons of all grades produced during the year was 1,819 ounces to the ton, and that of the 359 tons produced from the sorting tables and shipped was 3,715 ounces to the ton. We believe these to be the highest averages in the camp, which is interesting from the fact that it is won from Cobalt's deepest workings."

WESTERN COKE & COAL.

The Western Coke & Coal Company, at its annual meeting at Montreal, heard the reports of the various officers who told that by August of this year it is expected that the company will be able to produce from its coal fields about 1,000 tons of coal per day. The company has a paid-up capital of \$2,300,000, and is engaged in coal mining thirteen miles from Pincher Creek, near the Crow's Nest Pass. The directors re-elected are: Messrs. E. B. Greenshields, Hon. Robert Mackay, J. W. McConnell, H. A. Lovett, K.C., Charles Fergie, and Nathaniel Curry.

AMALGAMATED ASBESTOS.

The annual general meeting of the Amalgamated Asbestos Corporation will be held on March 8. It is understood that the shareholders will be told of the greatly improved circumstances financial and physical.

## STATISTICS AND RETURNS

TORONTO MARKETS.

Feb. 24. (Quotations from Canada Metal Co., Toronto):

- Spelter, 5.60 cents per lb.
- Lead, 3.65 cents per lb.
- Antimony, 8 to 8½ cents per lb.
- Tin, 44 cents per lb.
- Copper, casting, 13.25 cents per lb.
- Electrolytic, 13.25 cents per lb.
- Ingot brass, 8 to 12½ cents per lb.

Feb. 24—Pig Iron.—(Quotations from Drummond, McCall Co., Toronto):

- Summerlee No. 1, \$23.00 (f.o.b. Toronto).
- Summerlee No. 2, \$22.50 (f.o.b. Toronto).
- Midland No. 1, \$20.00 (f.o.b. Toronto).
- Midland No. 2, \$19.50 (f.o.b. Toronto).
- Hamilton No. 1, \$18.50 (f.o.b. Hamilton).
- Hamilton No. 2, \$18.00 (f.o.b. Hamilton).
- Clarence, \$20.00 (f.o.b. Toronto).
- Cleveland, \$20.00 (f.o.b. Toronto).

GENERAL MARKETS.

- Coal, anthracite, \$5.50 to \$6.75.
- Coal, bituminous, \$3.50 to \$4.50 for 1¼-inch lump.

COKE.

- Feb. 21.—Connellsville Coke (f.o.b. ovens).
- Furnace Coke, prompt, \$1.50 to \$1.60 per ton.
- Foundry Coke, prompt, \$2.00 to \$2.15 per ton.

Feb. 21.—Tin (Straits), 44.25 cents.

- Copper, Prime Lake, 12.75 cents.
- Electrolytic copper, 12.50 cents.
- Copper wire, 14.00 cents.
- Lead, 4.50 cents.
- Spelter, 5.75 cents.
- Sheet zinc (f.o.b. smelter), 7.50 cents.
- Antimony, Cookson's, 8.50 cents.
- Aluminium, 21.00 to 21.50 cents.

- Nickel, 40.00 to 45.00 cents.
- Platinum, ordinary, \$38.50 per ounce.
- Platinum, hard, \$41.00 per ounce.
- Bismuth, \$2.00 to \$2.10 per lb.
- Quicksilver, \$48.00 per 75-lb. flask.

SILVER PRICES.

		New York.	London.
		cents.	pence.
February	8.....	51¾	23 7/8
"	9.....	51¾	23 7/8
"	10.....	51¾	23 7/8
"	11.....	51¾	23 7/8
"	13.....	Holiday	23 7/8
"	14.....	51¾	23 7/8
"	15.....	51¾	23 7/8
"	16.....	51¾	23 7/8
"	17.....	52 1/8	24 1/8
"	18.....	52 1/8	24 1/8
"	20.....	52 3/8	24 1/8
"	21.....	52 1/2	24 1/8

SHARE MARKET.

(Courtesy of Warren, Gzowski & Co.)

MISCELLANEOUS.

February 23, 1911.

	Bid.	Ask.
Amalgamated Asbestos .....	10 1/2	12
Black Lake .....	15	17
Dominion Coal .....	..	..
Dominion Steel .....	..	..
Dominion Steel Corp. ....	57 1/4	58 1/2
Granby .....	34	35
Consolidated Mining .....	43	50
Nova Scotia Steel .....	95	96
Crow's Nest Pass .....	..	77



COBALT STOCKS.

Amalgamated	.01	.02
Bailey	.06¼	.06¼
Beaver Consolidated	.40	.40¼
Buffalo	2.15	2.35
Chambers-Ferland	.13¾	.15
City of Cobalt	.17	.19
Cobalt Central	.08	.10
Cobalt Lake	.19¾	.20½
Coniagas	6.90	7.15
Crown Reserve	2.71	2.73
Foster	.05½	.07
Gifford	.02½	.03¼
Great Northern	.10¾	.11
Green Meehan	.02	.02½
Hargraves	.24¾	.25¼
Hudson Bay	1.00	1.05
John Black	.01½	.02½
Kerr Lake	6.83	6.90
La Rose	4.88	4.94
Little Nipissing	.05	.05¼
McKinley	1.77½	1.78
Nancy Helen	.02	.05
Nipissing	10.80	11.25
Nova Scotia	.16	.16½
Ophir	.13¼	.20
Otisse	.01¼	.01½
Peterson Lake	.14¾	.15½
Right of Way	.13	.14
Rochester	.04½	.04¾
Silver Leaf	.05	.05¾
Silver Bar	...	...
Silver Queen	.03	.05
Temiskaming	.87	.87½
Trethewey	1.05	1.06½
Watts	4 sellers	
Wettlaufer	1.01½	1.03
Hollinger	5.80	5.85

NEW YORK CURB.

	Bid.	Ask.
Brit. Col. Copper	06½	06¾
Butte Coalition	18½	19½
Chino Copper	21¾	21¾
Davis-Daly Copper	01¼	01½
Ely Consolidated	30	31
Giroux Mining	01½	01¾
Goldfield Consolidated	06¾	06¾
Greene-Canadian	06½	06¾
Harcuvar Copper	...	...
Inspiration Copper	08¾	08¾
Miami Copper	20	20¼
New Baltic Copper	...	...
Nevada Con. Copper	19¾	19¾
Ohio Copper	01½	01¾
Rawhide Coalition	03	04
Ray Central	01¾	01¾
Ray Consolidated	17½	17¾
Union Mines	00¼	00½
Yukon Gold	04	04½

COBALT ORE SHIPMENTS.

Following are the shipments from the Cobalt camp for the week ending Feb. 17, and those from Jan. 1, 1911, to date:

	Feb. 17	Since Jan. 1
	Ore in lbs.	Ore in lbs.
Beaver	53,060	310,520
Buffalo	60,110	368,130
Chambers-Ferland	...	128,900
City of Cobalt	...	126,280

Cobalt Lake	60,000	380,540
Cobalt Townsite	...	249,740
Coniagas	...	504,450
Crown Reserve	56,800	276,540
Hudson Bay	61,110	122,350
La Rose	226,090	807,420
Kerr Lake	60,040	661,419
King Edward	40,000	40,000
McKinley-Dar-Savage	59,800	753,070
Nipissing	186,890	1,323,120
O'Brien	60,000	205,210
Peterson Lake (Little Nip.)	...	58,430
Right of Way	...	193,550
Silver Cliff	...	47,920
Temiskaming	...	283,195
Trethewey	...	139,250

The shipments for the week were 933,960 pounds, or 466 tons. The shipments from Jan. 1 to Feb. 17 were 6,980,034 pounds, or 3,490 tons.

BRITISH COLUMBIA ORE SHIPMENTS.

The following are the returns of the ore production and movement for the week ending February 11th:

BOUNDARY SHIPMENTS.

Granby	25,507	137,172
Mother Lode	5,892	38,004
Snowshoe	3,162	12,977
Rawhide	4,101	26,944
Jack Pot	633	2,894
Number Seven	31	411
Other mines	...	240
Total	39,326	218,642

ROSSLAND SHIPMENTS.

Centre Star	3,100	20,377
Le Roi No. 2	787	3,160
Le Roi No. 2, milled	300	1,800
Le Roi	299	1,621
I. X. L.	7	14
Nickle Plate	30	124
Other mines	...	22
Total	4,523	27,118

SLOCAN-KOOTENAY SHIPMENTS.

Sullivan	824	3,920
St. Eugene, milled	2,775	16,650
Richmond-Eureka	95	413
Ruth	32	132
Rambler-Cariboo	63	298
Hewitt	20	111
Queen, milled	315	2,310
Granite-Poorman, milled	250	1,500
Nugget, milled	110	660
Wilcox, milled	75	450
Emerald	124	428
Society Girl	60	174
Eastmont	29	58
Yankee Girl	143	213
Mollie Hughes	4	4
Other mines	...	934
Total	4,919	28,255

The total shipments, including the estimated milling, were for the week, 48,768 tons, and for the year to date 274,015 tons.



## B. C. COPPER COMPANY'S RECEIPTS.

## GREENWOOD, B. C.

Mother Lode .....	5,892	38,004
Rawhide .....	4,101	26,944
Jack Pot .....	633	2,894
Other mines .....		240
Total .....	10,626	68,082

## GRANBY SMELTER RECEIPTS.

## GRAND FORKS, B. C.

Granby .....	25,507	137,172
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## CONSOLIDATED COMPANY'S RECEIPTS.

## TRAIL, B. C.

Centre Star .....	3,100	20,377
Snowshoe .....	3,162	12,977
Sullivan .....	824	3,920
Le Roi No. 2 .....	787	3,160
Le Roi .....	299	1,621
Number Seven .....	31	411
Richmond-Eureka .....	95	413
St. Eugene .....	155	757
Ruth .....	32	132
Rambler-Cariboo .....	63	298
Hewitt .....	20	111
Emerald .....	124	428
Society Girl .....	60	174
Eastmont .....	29	58
I. X. L. ....	7	14
Nickle Plate .....	30	124
Queen .....	40	192
Yankee Girl .....	143	213
Mollie Hughes .....	4	4
Other mines .....		1,029
Total .....	9,005	46,413

The total receipts at the smelters, including concentrates, were, for the week, 45,138 tons, and for the year to date, 251,667 tons.

The following are the returns of the ore production and movement for the past week, ending Feb. 18th, and for the year to date:—

## BOUNDARY SHIPMENTS.

Granby .....	23,110	160,282
Mother Lode .....	5,173	43,177
Snowshoe .....	2,313	15,290
Rawhide .....	1,930	28,874
Jack Pot .....	528	3,422
Number Seven .....	91	502
Phoenix Amalgamated .....	303	303
Other mines .....		240
Total .....	33,448	252,090

## ROSSLAND SHIPMENTS.

Centre Star .....	3,423	23,800
Le Roi No. 2 .....	575	3,735
Le Roi No. 2, milled .....	300	2,100
Le Roi .....	371	1,992
Other mines .....		160
Total .....	4,669	31,787

## SLOCAN-KOOTENAY SHIPMENTS.

Sullivan .....	683	4,603
St. Eugene, milled .....	2,775	19,425
Richmond-Eureka .....	33	446

Rambler-Cariboo .....	27	325
Hewitt .....	21	132
Queen, milled .....	420	2,730
Granite-Poorman, milled .....	250	1,750
Nugget, milled .....	110	770
Wilcox, milled .....	75	525
Emerald .....	82	510
Society Girl .....	37	211
Hope .....	36	205
Yankee Girl .....	245	458
Mollie Hughes .....	4	8
Knob Hill .....	43	43
Noble Five .....	31	31
Phoenix Amalgamated .....	303	303
Ottawa .....	20	20
Other mines .....		955
Total .....	5,195	33,450

The total shipments for the week, including the estimated milling, were 43,009 tons, and for the year to date, 317,024 tons.

## B. C. COPPER COMPANY'S RECEIPTS.

## GREENWOOD, B. C.

Mother Lode .....	5,173	43,177
Rawhide .....	1,930	28,874
Jack Pot .....	528	3,422
Other mines .....		240
Total .....	7,631	75,713

## GRANBY SMELTER RECEIPTS.

## GRAND FORKS, B. C.

Granby .....	23,110	160,282
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## CONSOLIDATED COMPANY'S RECEIPTS.

## TRAIL, B. C.

Centre Star .....	3,423	23,800
Snowshoe .....	2,313	15,290
Sullivan .....	683	4,603
Le Roi No. 2 .....	575	3,735
Le Roi .....	371	1,992
Number Seven .....	91	502
Richmond-Eureka .....	33	446
St. Eugene .....	198	955
Rambler-Cariboo .....	27	325
Hewitt .....	21	132
Emerald .....	82	510
Society Girl .....	37	211
Hope .....	36	205
Queen .....	38	230
Granite-Poorman .....	29	71
Yankee Girl .....	245	458
Mollie Hughes .....	4	8
Knob Hill .....	43	43
Noble Five .....	31	31
Phoenix Amalgamated .....	303	303
Ottawa .....	20	20
Other mines .....		1,146
Total .....	8,603	55,016

The total receipts at the smelters, including concentrates, were, for the week, 39,334 tons, and for the year to date, 291,011 tons.

## LA ROSE.

In January the La Rose production was 318,197 ounces, gross value \$168,468. Operating profits were \$118,497.