Technical and Bibliographic Notes / Notes techniques et bibliographiques

The Institute has attempted to obtain the best original copy available for filming. Features of this copy which may be bibliographically unique, which may alter any of the images in the reproduction, or which may significantly change the usual method of filming, are checked below.

L'Institut a microfilmé le meilleur exemplaire qu'il lui a été possible de se procurer. Les détails de cet exemplaire qui sont peut-être uniques du point de vue bibliographique, qui peuvent modifier une image reproduite, ou qui peuvent exiger une modification dans la méthode normale de filmage sont indiqués ci-dessous.

- [X] Coloured covers/ Couverture de couleur
- [ ] Covers damaged/ Couverture endommagée
- [ ] Covers restored and/or laminated/ Couverture restaurée et/ou pelliculée
- [ ] Cover title missing/ Le titre de couverture manque
- [ ] Coloured maps/ Cartes géographiques en couleur
- [ ] Coloured ink (i.e. other than blue or black)/ Encre de couleur (i.e. autre que bleue ou noire)
- [ ] Coloured plates and/or illustrations/ Planches et/ou illustrations en couleur
- [X] Bound with other material/ Relié avec d'autres documents
- [X] Tight binding may cause shadows or distortion along interior margin/ La reliure serrée peut causer de l'ombre ou de la distorsion le long de la marge intérieure
- [ ] Blank leaves added during restoration may appear within the text. Whenever possible, these have been omitted from filming/ Il se peut que certaines pages blanches ajoutées lors d'une restauration apparaissent dans le texte, mais, lorsque cela était possible, ces pages n'ont pas été filmées.
- [ ] Additional comments:/ Commentaires supplémentaires:

- [X] Coloured pages/ Pages de couleur
- [ ] Pages damaged/ Pages endommagées
- [ ] Pages restored and/or laminated/ Pages restaurées et/ou pelliculées
- [X] Pages discoloured, stained or foxed/ Pages décolorées, tachetées ou piquées
- [ ] Pages detached/ Pages détachées
- [ ] Showthrough/ Transparence
- [X] Quality of print varies/ Qualité inégale de l'impression
- [X] Continuous pagination/ Pagination continue
- [ ] Includes index(es)/ Comprend un (des) index

Title on header taken from:/ Le titre de l'en-tête provient:

- [ ] Title page of issue/ Page de titre de la livraison
- [ ] Caption of issue/ Titre de départ de la livraison
- [ ] Masthead/ Générique (périodiques) de la livraison

This item is filmed at the reduction ratio checked below/
Ce document est filmé au taux de réduction indiqué ci-dessous.

10X 12X 14X 16X 18X 20X 22X 24X 26X 28X 30X 32X

TWENTIETH YEAR OF PUBLICATION

CANADIAN MINING REVIEW

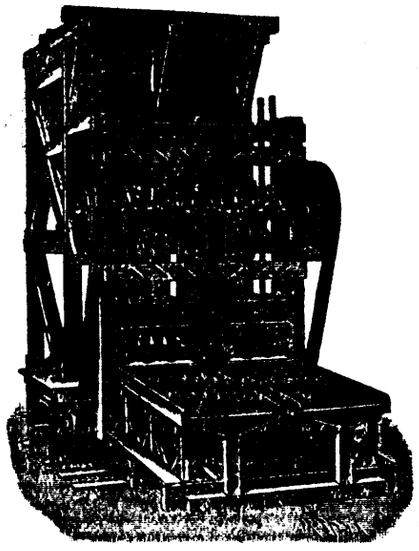
Established 1882

Vol. XXI—No. XII. OTTAWA, DECEMBER 31st, 1902. Vol. XXI--No. XII.

FRIED. KRUPP GRUSONWERK

Magdeburg-Buckau (Germany)

MINING MACHINERY



ORE CRUSHING:

Stone Breakers of specially strong construction, **Roller Mills, Chilian Mills.**

BALL MILLS

for dry and wet crushing, more than 1,800 at work.

STAMP BATTERIES

Shoes and Dies of Krupp's Special Steel.

AMALGAMATION:

Amalgamation Tables and Pans, Larslo's Gold Amalgamators, Settlers, etc.

SEPARATION and CONCENTRATION:

Separators, Exhaustors, Hydraulic Classifiers, Percussion Tables, Jiggers, Rotating Round Tables.

LEACHING PLANT.

Complete Gold Ore Dressing Plant

a. For treating by the Wet Method with Stamp Batteries, Amalgamation and Concentration.
b. For Dry Crushing by Ball Mills Dust Extraction, and Leaching.

COAL WASHING PLANT

Large Testing Station for Crushing and Dressing Ores at the Works.

Agents:

For Canada: JAS. W. PYKE & Co., Merchants Bank Building, MONTREAL.
For the United States: THOS. PROSSER & SON, 15 Gold Street, NEW YORK.
For Mexico: PABLO BERGNER, Apartado 549, MEXICO.
For South Africa: UNITED ENGINEERING CO., Ltd., P.O. Box 1082, JOHANNESBURG, S.A.R.

RAILS

NEW AND SECOND HAND

For Railways, Tramways, Etc.

JOHN J. GARTSHORE, 83 Front Street West

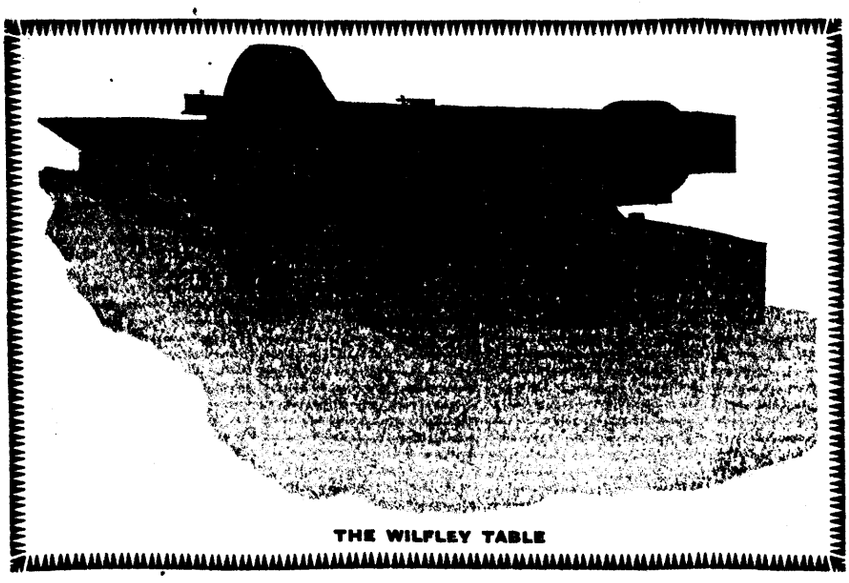
Opposite Queen's Hotel TORONTO, ONT.

MINING EQUIPMENT, Etc.

THE WM. HAMILTON MANUFACTURING CO. LIMITED

ENGINEERS AND CONTRACTORS

PETERBOROUGH NELSON VANCOUVER



THE WILFLEY TABLE

We are...

Sole Agents and Manufacturers in Canada for this Table.

Infringers will be prosecuted

We contract for the Design and Construction of Complete Stamp Mills, Concentration, Chlorination, Cyanide and Smelter Equipments.

WIRE ROPE

We carry a Large Stock.

W. H. C. MUSSEN & CO.

MONTREAL.

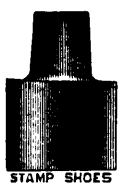
Obtain our Prices.

MINE RAILS

THOS. FIRTH & SONS, Ltd., Sheffield,

Tool Steel and Rock Drill Steel

ALWAYS CARRIED IN STOCK.

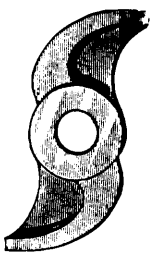


STAMP SHOES

STAMP DIES.

SHOES AND DIES.

CAMS, TAPPETS, BOSSES, ROLL SHELLS, CRUSHER PLATES.

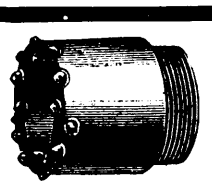


H. W. DeCOURTENAY & CO.

86 and 88 McGILL STREET

Agents for Canada.

MONTREAL.

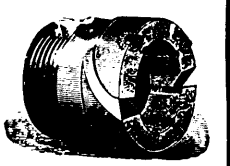


BERNARD BANDLER

IMPORTER OF

CARBONS AND BORTS

For Diamond Drills and all Mechanical Purposes



GOODS SENT SUBJECT TO APPROVAL

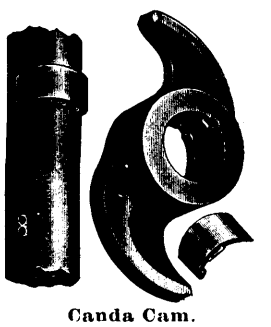
65 Nassau Street, NEW YORK, N.Y.

ADAMANTINE SHOES & DIES ALSO CHROME CAST STEEL.

THE CANDA PATENT SELF-LOCKING CAM

TAPPETS, BOSSES, ROLL SHELL and CRUSHER PLATES. Also Rolled Parts for Huntington and other Mills.

These castings are extensively used in all the Mining States and Territories throughout the World. Guaranteed to prove better and cheaper than any others. Orders solicited subject to above conditions. When ordering send sketch with exact dimensions. Send for Illustrated Catalogue to



Canda Cam.

CHROME STEEL WORKS,

KENT AVENUE, KEAP AND HOOPER STREETS.

BROOKLYN, N.Y., U.S.A.

F. E. CANDA, President. C. J. CANDA, Vice-President. F. MORA CANDA, Secretary. T. I. JONES, Treasurer.

HADFIELD'S PATENT

MANGANESE STEEL

Sole Representative in Canada **FRANCIS T. PEACOCK, M. E.** 44 Canada Life Bldg., MONTREAL

DIRECTORY OF MINING ENGINEERS, CHEMISTS, ASSAYERS, ETC.

JOHN E. HARDMAN, S.B.
CONSULTING
MINING ENGINEER

Room 2, Windsor Hotel **Montreal.**

20 years' experience in the Mining and Reduction of Gold, Silver, Lead and Copper.

13 years as a Specialist in Gold Mining and Milling.

JOHN B. HOBSON
CONSULTING MINING ENGINEER
Manager Con. Cariboo Hyd. Mining Co., Limited
BULLION, BRITISH COLUMBIA.

28 years' experience in the equipment and operation of large Hydraulic, Deep Gravel, Drift and Gold Quartz Mines, in California and British Columbia.

Telegraphic and Cable Address:
"HOBSON," ASCHROFT, B.C.

J. B. TYRRELL
Late of the Geological Survey of Canada.

MINING ENGINEER

DAWSON . . . YUKON.

Telegraphic Address—Tyrrell, Dawson.
Code used—Bedford McNeil's.

MONTREAL TESTING LABORATORY.
MILTON L. HERSEY, M.A.Sc. (McGill)
CONSULTING CHEMIST OF THE
CANADIAN PACIFIC RAILWAY COMPANY.
146 St. James Street MONTREAL

ASSAYS OF ORES

ANALYSES of all materials made with greatest accuracy.
SAMPLES BY MAIL—1 cent per 4 ozs.; limit 24 ozs.
INSTRUCTION IN ASSAYING, Etc., to Prospectors and others.

MINERAL PROPERTIES EXAMINED.

J. BURLEY SMITH
CIVIL AND MINING ENGINEER
30 Years Experience.
RAT PORTAGE . . . ONTARIO.

Undertakes the Prospecting of Mines and Mineral Lands.

Diamond Drill Borings made by contract for all minerals (earthy and metalliferous), Artesian Wells and Oil Springs, also Deep Soundings for Harbors, Rivers, Canals, Tunnels and Bridge Foundations. Quarry Sites and Clay Fields tested.

Plans and Sections made showing result of Borings—Gold Drifts tested to Ledge by the new Pneumatic and Hydraulic Tube System and the yield ascertained—Flumes, Ditches, Monitors and Placer Mining Plant generally designed and constructed. Properties Examined and Reported on, Assays made.

F. HILLE
MINING ENGINEER.

Mines and Mineral Lands examined and reported on. Plans and Estimates on Concentrating Mills after the Krupp-Bilharz system.

PORT ARTHUR, ONT.
CANADA.

J. T. DONALD
ASSAYER AND MINING GEOLOGIST.
112 St. Francois-Xavier St.,
MONTREAL.

Analyses and Assays of Ores, Fuels, Furnace Products, Waters, etc. Mines and Mining Properties examined and valued.

FRANK B. SMITH, B.Sc.
CIVIL AND
MINING ENGINEER

Certificated Colliery Manager Great Britain and British Columbia.

REPORTS ON MINING PROPERTIES.

CALGARY, ALTA.

FRANK C. LORING
MINING
ENGINEER

No. 45 Broadway NEW YORK
Office, Room 83.

JOHN ASHWORTH
CONSULTING MINING ENGINEER
Of the firm of
ASHWORTH & MORRIS
Civil and Mining Engineers. Surveyors and Valuers.
8—KING STREET—8
MANCHESTER, ENGLAND.

J. H. CHEWETT, B.A. Sc.
(Honor Graduate in Applied Science, Toronto University)
Asso. Mem. Can. Soc. C.E.
MINING ENGINEER

Consultation. Reports. Development.

87 YORK ST., ROSSIN BLOCK,
TORONTO.

CHAS. BRENT
MINING ENGINEER AND METALLURGIST
Rat Portage, Ont.

Examines and reports on Mining Properties.
Superintends the erection of Mining and Milling Plants.

J. C. GWILLIM, B.Sc.
MINING
ENGINEER
NELSON, B.C.

JOHN McAREE, B.A. Sc.
MINING
ENGINEER

Ontario and Dominion Land Surveyor.

RAT PORTAGE . . ONTARIO.

DeMOREST & SILVESTER
CIVIL AND MINING ENGINEERS.
ONTARIO LAND SURVEYORS.

Surveys. Reports. Development. Installation.

Cable address, "DEMORSIL, SUDBURY."
Codes, Lieber's and Bedford McNeil's.

SUDBURY, ONTARIO.

WM. BLAKEMORE
MINING ENGINEER.

Consultation. Reports. Development.

Montreal.

A. W. ROBINSON, M. Am. Soc. C.E., M. Am. Soc. M.E.
MECHANICAL ENGINEER

DREDGING MACHINERY. PLANT FOR PUBLIC WORKS. GOLD DREDGES.

879 DORCHESTER STREET, MONTREAL
CANADA.

20th YEAR OF PUBLICATION.

The Canadian Mining Review

Established 1882

THE OLDEST AND ONLY OFFICIAL MINING AND ENGINEERING JOURNAL PUBLISHED IN THE DOMINION OF CANADA.

B. T. A BELL, Editor and Proprietor. Secretary, Canadian Mining Institute, etc.

Published Monthly.

OFFICES {Orme's Building, Ottawa; Windsor Hotel, Montreal.

VOL. XXI., No. 12. DECEMBER, 1902. VOL. XXI., No. 12.

Mica Munchausen.

The prospectus of the Empire Mica Company has come into our hands. It informs us that 'how to found a fortune that will make him independent is the dream of every man's life' and that 'his dreams seldom comes true because he chases rainbows rather than realities.' This introduction suggests the advisibility of examining further into this mica proposition to test *its* realty or *its* rainbow character. As the capital stock is only $500,000 ('forever non-assessable') we must not expect too much. It might have been $5,000,000. But evidently we are not dealing with an ordinary prospectus or an ordinary company. The word *forever* used in describing the character of the stock is evidently no idle word. The eternal verities are here foreshadowed; and a little further on the unique sources of information possessed by this company are plainly declared. We are informed that 'when the Creator made mica he made nothing else that can ever take its place.' Doubtless this was for the especial benefit of the Empire Mica Company. Is it any wonder that a company with such connections benevolently advises prospective investors 'not to wait until the price of one share (at present one dollar) is beyond their reach'? Could they do less than warn their less favored fellow beings that a golden opportunity now present might be lost by delay? But the golden visions of this company have inspired them to a pitch of eloquence rarely reached even in a prospectus. 'All the gold of the Rand, the gems of the diamond fields of South Africa, the precious metals of the Pacific Slope, the wealth that brave men wrench from the frozen fields of the Arctic Circle in a year heaped in one glittering pile.' This is magnificent, and is surely a prelude to a declaration of the incorruptibility of the Empire Mica Co. or of the high esteem in which its officers and directors hold the principles of truth and rectitude! But no! 'This glittering pile would not buy the pig iron production of the world for the same space of time; Pig Iron is dear at $10 to $12 a ton. Mica, like iron, also is a public necessity, and sells in sheets at from $1,700 to $26,000 a ton.' Shades of the immortal Pegleg Bumgarten! Mica and pig iron! The prospectus reminds us, doubtless by way of extenuation, that the word *mica* is derived from a Latin word meaning *to glitter*. That we are correct in this surmise is evident from the next sentence. 'It comes in "books" which split into thin elastic plates. They can be split so thin,'—as to be like the baseless fabric of a dream and vanish into airy nothingness,—but we have been carried away by the spirit of this marvellous prospectus.

The writer of the Empire Mica Company's prospectus has accomplished a task left for him by the great minds of past centuries, the reconciliation of science and theology. He has already shown his familiarity with the latter and that he is equally at home in science will be plain from the following quotations.—'It (mica) is found between granite and flint formations.'—'Between the slate formation and flint and quartz rocks lie the kidneys or "books" of mica surrounded by disintegrated talc spar.'—That 'disintegrated talc spar' is a fine touch. We are evidently in the presence of an artist. This sentence is the masterly introduction to a climax which should take its place with such *chefs d'œuvres* as the prospectuses of The Prodigious Horn Blower Syndicate, The Great Aurora Borealis Gold Dredging and Pearl Diving Company, and the Terahooligan Ananias-Sapphira Corundum Co. Our artist now unveils,—'This formation makes the Empire Mica Company's mines the cheapest in the world to operate. No expensive mining machinery is needed. No money has to be spent blasting out worthless granite as in other mines. (In this phraseology there is a suggestion of the story of the Pharisee and the publican) 'Picks and shovels in the hands of unskilled laborers do the whole work. The mine is so rich that every stroke of the pick pays. Every dollar spent in operating brings a least $10 in return. Shares backed by such assets are safe and sure as Government Bonds and many times as remunerative.'

But our friend's scientific knowledge is by no means exhausted. He is a great mathematician,—revelling in figures. Hear him? "You have the figures of Alexander M. Womble, the expert, that the total cost of producing first class mica in our mines and delivering it in New York is $50 a ton. The selling price he quotes is from 40 cents to $8 per pound. This means that you can sell at from $800 to $16,000 a ton a commodity that costs you exactly $50 to produce,—not a cent more. (Here is management! Here is book-keeping for you!)—These prices are for mica now in sight. The veins are richer further down. (They always are, in companies like the Empire Mica!) "We have mica that will sell for $26,000 a ton, earning for the Company a profit of $25,950 on 2000 pounds of product." (!!!). "Such are the profits of this protected industry." He then proceeds to figure out 28 per cent. in dividends the first year on the par value of the $500,000 stock, and promises an output per month of 24,000 pounds of mica of an average value of $3 per pound and 12,000 pounds worth 50 cents a pound, i. e. an annual output of 148,000 pounds of merchantable mica, not including waste. 'Within a few years the output will be increased twenty times, (3,960,000 lbs.!) making the market value of each ten shares $1,120, to say nothing of the dividends you will have drawn in that space of time.'

'Such figures may sound incredible (Oh, no! Not at all!) yet

they have been surpassed (we doubt it!) by many other mining and manufacturing companies that had prospects (misprint evidently for prospectuses?) far less brilliant than the Empire Mica Co. The Carnegie Steel Company was started with a few million dollars. In the latter part of the eighties it had grown so that it was capitalized at $25,000,000, yet it was taken into the Steel Trust at a valuation of $500,000,000, because it paid dividends on that amount of money. Mica is a better paymaster than iron.' This is not arithmetic it is magic! Mica is a better paymaster than iron! Womble *versus* Carnegie! Iron has no chance! But let the Empire Mica champion speak for himself.

"As per your request I have visited and examined the mica property located near the railroad town of Madison, N.C. I found the property to be about 202 acres in extent.

INDICATIONS. The mica indications or croppings show in quite a number of places on this tract of land. It has been mined in two places with open pits. One of these pits is 30 feet by 60 feet, and in one place is 60 feet 60 feet in depth.

FORMATION. The formation in which the mica occurs is from 30 feet to 80 feet in width, and is composed of a disintegrated talcspar (sic!). The mica is found in kidneys or "books" weighing from 5 to 600 pounds each. The foot wall is a quartzite dike and the hanging wall a mica-schist.

At present the mine is in position to produce one ton of first-class mica per month, and from five to six tons of seconds per month. The market price of this mica is from 40 cents to $8 per pound.

DEPTH. There is every indication of this formation going down to a great depth."

This is part of the statement of the Empire Mica Company's consulting engineer, whose name appears on the prospectus, and from whom the writer of the prospectus has evidently drawn deep inspiration. This engineer assures the investing public that the property is *at present* in position to produce $11,650 worth of mica per month from two holes worked with pick and shovel!

But this prospectus is like the Empire Mica Company's property,—a mine of untold wealth,—a Golconda of humour!

Again let us quote:—

"MICA

NOT AN OUNCE IS WASTED.

"P. D. Armour once boasted that on every pig he killed he made a profit on everything except the squeal. Mica is as profitable. Every ounce taken out of the ground can be sold." (!!) [Here let us pause to advise Messrs. Munsell, Blackburn, Wallingford, Kent, and all the other Canadian mica producers that they are away behind the times. Here is news for them.] "Portions that are trimmed off the sheet are worth $20 a ton f. o. b. at the mines or can be ground to powder and sold at from $80 to $120 a ton. The demand for ground mica is unlimited. It is used extensively by wall-paper manufacturers. They cannot obtain the same glitter from any other substance. As a base for fireproof paints it has no equal, nor is it surpassed as a base for lubricants. Another use has been found for it in green houses and conservatories. It is better for that purpose than glass because it does not focus the sun's rays. The supply is still far less than the demand, and were it not so there would be even more uses for this precious mineral.'

This is rich, when considered in the light of the facts that not more than 10 or 15 per cent. of the mica mined can be cut into plates and that all the rest is scrap. When it is remembered, too, that a mica vein yields only an average of about 10 per cent. of mica, and that large quantities of other minerals must be removed along with it, the humour of this prospectus is apparent.

We have another warning to give. Another Canadian industry is in danger. Let our asbestos mining friends take heed. When George Smith reads these lines let him tremble and look for another hole in the ground! Thetford is doomed! 'Mica is woven into cloth, twisted into ropes, and even rolled into paper.'

A few more quotations to show to what heights the imagination soars when attracted by the unexampled glitter of mica.

'Hidden away on Sandy Ridge, a spur of the Blue Ridge Mountains, this priceless treasure of precious mineral has lain for years. Years ago two farmers from Danbury, the county seat, opened up the Joel Hawkins mine and carted the product in rough blocks to Danbury, where they sold $50,000 worth of mica in that State. With the death of these men operations ceased, and the mine was forgotten until an electrical engineer discovered it again in 1898. He re-opened one of the drifts, and took out blocks of mica weighing as much as 600 lbs. On account of his methods *he was compelled to flee the State*, (the italics are ours) but the secret of the rich deposits was out, and this most valuable mica mine was acquired by the Empire Mica Company.'

It is unfortunate that it is very difficult, if not sometimes impossible, under existing laws, to make companies responsible for statements in prospectuses issued by them. Otherwise the Empire Mica Company promoters might have to follow the example of the electrical engineer.

'Our experts prospected the field thoroughly, [How thoroughly appears from the extracts already given.—ED.] with the result that we acquired the entire 202 acres which covers the cream of the district. Every stroke of the pick revealed new richness. Even the experts were astounded by the great, glittering hoard of richness (!!!) nature had stored there for the use of man. It waits only the hand of man to be turned into coin. Everywhere over this immense tract [202 acres!] there are outcroppings of mica which grow richer as it goes down, [When *will* the people get on to this? The very fact of its repeated use in this precious document shows that it can be relied on to bring down unwary birds.], and the depth of mica beds has never been reached. Our mica comes out of the ground ready for the market, clear as crystal, tough and firm.' (!!).

We did injustice to this prospectus at the beginning of this review. It had been only cursorily examined. We put it in the same class with the Terahooligan Ananias-Sapphira Corundum Company's prospectus. An apology is due Messrs. Spotswood, Breese, Bright, Womble & Co. After a more careful perusal, we see that their prospectus is not to be named in the same breath with the nevertheless remarkable flight of the Sapphira Company. The latter is distanced—out of the race. It must now hide its diminished head. But let the Sapphira promoters not be discouraged. Corundum is a dull subject compared with "the great glittering hoard of richness" which nature provided for the inspiration of the Empire mica man.

How long are these things to be suffered? So long as there are fools to be caught by such bait as is thrown out in this Empire mica prospectus. The statements we have quoted do not mislead anyone who already knows or takes pains to learn the facts concerning mica mining and the mica market; and it seems incredible that any man can be caught by such trash. But the whole thing is an appeal to cupidity, and the desire to get something for nothing is very common and very powerful. It is probably not unfelt even in the ranks of the officers and directors of the Empire Mica Company, whose "shafts show $134,333.33 worth of mica in sight," "getting richer as it goes down," "no salaries to pay," &c., &c.

Such companies are parasites on legitimate mining enterprises, and this brazen attempt to induce "small investors" to buy shares so that "the poor man may get the use of the capitalists' business training and acumen free," is on a par with the rest. These promoters ask for money to develop and equip a mine which they state *at present*

to be in position to produce $12,000 worth of mica per month! And in the same breath they state that this mine needs no machinery—pick and shovel do it all!

Mica mining is a legitimate business yielding good profits; but everyone who has engaged in it knows how uncertain the deposits are. The value of the mica depends to a great extent on a clean and perfect crystallisation. This is so often absent, that it is quite exceptional to find continuous masses of good mica, and even when the mica taken out is merchantable, only a very small proportion of it cuts to the larger sizes. The proportion bringing $5 or $6 a pound is quite insignificent, and indeed the demand for the larger sizes is quite limited. The vein or dike matter, too, is quite complex. The mica is only one of several chief constituents, and its distribution is uncertain and irregular. These causes account for the huge dumps of waste mica and other rock to be seen about mica mines and trimming works which have been in operation for any length of time. The Empire Mica Company's 80 foot dike might contain 10 per cent. of mica, and of this 10 or 15 per cent. might be merchantable, although the percentage might be much less. There is a demand for a small quantity of the waste, (quite trifling in comparison with the quantity produced), for boiler covering and grinding. But the waste suitable for these purposes must itself be selected, and it brings only a few dollars a ton at the mine. The chief factor in the big figures quoted by the Empire Company is in the manufacture.

These are a few of the cold facts to be set over against this most amazing attempt to bleed the unsuspecting public. But they are hardly necessary. The prospectus speaks for itself.

The Centre Star Report.

We are indebted to the courtesy of the Secretary of the Centre Star Mining Company for a glance at the fourth annual report of the Company submitted to the Annual Meeting of Shareholders on the 25th ultimo.

In its general form and in the amount of explicit information (?) afforded to shareholders this document conforms to previous reports and is notable chiefly for the statement with which the General Manager opens his annual account of the condition of the property, viz:—"The condition of the Centre Star mine has much improved during the past year."

The accounts submitted show, on their face, a loss for the year just closed of $77,560.54; the Profit and Loss Account gives some details from which on one learns that the actual loss for the year amounted to $107,981. The total costs for the year were $225,776.43 from which the amount of deprecation written off ($29,836.53), and the net sum realized from Ore Sales ($87,957 91), if subtracted would leave a debit balance of $107,981.99. In addition the sum of $60,128 which was the cash balance remaining on October 1st 1901, has also disappeared. Against this very poor financial showing we have the assurance of the General Manager that the condition of the mine has much improved.

From Mr. Kirby's report, the only source of information available to the public, it appears that all payable reserves above the 4th. level have been taken out; that between the 4th. and 5th. levels the ore averages (from assays given) rather below, than above, $9.00 per ton; that between the 5th. and 6th. levels values are not over $5.00 per ton; that between the 6th. and 7th. levels there is a length of about 30 ft. with a width of about 7 ft. that will assay $5.80; and on the 8th. level there is a suspicion of $16.00 ore somewhere near, although the detailed account shows only $3.80 value. This occurs at the depth of 1077 ft. and below this depth to the bottom of the shaft (1289.6 ft.) no values are reported, but the grade is said to be "low."

As a guide to the values reported above we may state that the costs of mining are given at $3.00 per ton ($2.93) and the freight and smelting charges at $5.22 per ton; a total cost of $8.15 per ton.

The only inference to be drawn from the facts the Report gives is that values decrease rapidly below that 5th level, and that the last *600 ft. in depth on the vein are not productive of payable ore.* This inference is in harmony with the information recently received by THE REVIEW from a gentleman who has been resident in Rossland for five or six years. The better informed local authorities have, for some time, known that the payable portion of the Centre Star Chute was dipping into Le Roi ground, and Mr. Kirby's published figures appear to sustain their views.

The dip of ore chutes in the plane of an ore deposit is, of course, well known and always expected by mining men. The diminution of values in the Centre Star vein below the 5th. level, and for a distance of at least 600 feet, show that the second pay chute (if there is a second) is a very considerable distance from the first, and that expensive and extensive exploration work may be expected by Centre Star Shareholders until it is discovered,

The favorable feature of the report is contained in Mr. Kirby's positive statements of the success he has had in concentrating the lower grades of ore. That a successful method of treating low grade ores has been devised, that the difficulties of such treatment have been overcome, and that a regular tonnage of these low grade ores will soon be under treatment, are cheering items to shareholders; let us hope that Mr. Kirby has not deceived himself. We have long been of the opinion that the permanent future of Rossland Camp depended on the successful solving of the concentration problem, and we heartily hope that Mr. Kirby has solved it; but lest undue exaggeration should arise from mis-conception of *all* of the facts, THE REVIEW may be permitted *to remind speculators that the cost of mining alone ($3.00) will inhibit* the revival of many old local companies, and that, taking into account all costs, with the uncertainty of water supply and high transportation rates, it is altogether unlikely that ore, of a less net assay value than $4 00 per ton, can be available for concentration; a less value would make a deficit rather than a surplus.

Is Liquid Pig Iron Pig Iron?

On 5th instant an important judgment of the greatest interest to the Canadian iron and steel industries was tendered by Judge Burbridge, in the Exchequer Court of Canada, in the matter of the Petition of Right of the Dominion Iron and Steel Company, Limited and His Majesty the King. The action was to secure from the Dominion Government the sum of $196,967.15 for bounties on pig iron and steel ingots manufactured by the Steel Co., which it claimed to be entitled to by virtue of the provisions of the Acts of Parliament 60-61 Victoria, Chapter 6 and 62 63 Victoria, Chapter 8, and of the regulations made under such Acts. The defence of the Government was that a portion of the iron on which the bounty was claimed was used in a molten or liquid state for the manufacture of steel ingots, and that in this form it was not pig iron within the meaning of the statutes referred to. In his judgment of which the appended is a *verbatum* copy Mr. Justice Burbridge says:—

"The first Act passed in Canada to encourage the manufacture of pig iron to which my attention has been called was passed in the year 1883. By this Act (46 Vict. c. 14) the Governor in Council, under regulations to be made by him. was authorized to pay out of the Consolidated Revenue Fund a bounty on all pig iron manufactured in

in Canada between certain prescribed dates, the bounty to be one dollar and fifty cents per ton where the pig iron was made from Canadian ore, and in other cases one dollar per ton. By the Act 49th Victoria, Chapter 38, the time within which such bounties could be earned was extented. In 1890 the bounty on pig iron manufactured from Canadian ore was increased to two dollars per ton (53rd Victoria, Chapter 22). Up to this time the bounties were offered to encourage the production in Canada of pig iron, and especially of pig iron manufactured from Canadian ore. In 1894 a further step was taken, and bounties were offered for the manufacture in Canada of iron and steel from Canadian ore. By the Act of that year 57-58 Victoria, Chapter 9, the Governor in Council was authorized to pay a bounty of two dollars per ton on all pig iron made in Canada from Canadian ore, and a like bounty on puddled iron bars made in Canada from Canadian ore, and on steel billets manufactured in Canada from pig iron made in Canada from Canadian ore and such other ingredients as were necessary and usual in the manufacture of such steel billets, the proportion of such ingredients to be regulated by order of the Governor in Council. By the Second section of the Act it was provided that in the case of the products of furnaces then in operation the bounties should be applicable only to such products as were manufactured therein between March 27th, 1894 and March 26th, 1899; and that in the case of any furnace which should commence operations thereafter and before March 27th, 1899, such bounties should be applicable to the products manufactured therein during a period of five years from the date of commencing operations. None of these statutes are directly in issue in this case, but they have been mentioned to show what preceded the statutes on which the question to be determined turns, and as showing a general intention of Parliament during the years mentioned, not only to stimulate the production of pig iron by furnaces then in existence, but to encourage the erection of other furnaces for that purpose and for the purpose of manufacturing such pig iron into puddled iron bars and steel billets.

"Coming now to the first of the two statutes under which the present claim arises, it will be seen that by the first section of the Act (60-61 Victoria, Chapter 6) it is provided as follows:—

> "1. The Governor in Council may authorize the payment of the following bounties on steel ingots, puddled iron bars and pig iron made in Canada, that is to say:—
>
> On steel ingots manufactured from ingredients of which not less than fifty per cent of the weight thereof consists of pig iron made in Canada, a bounty of three dollars per ton;
>
> On puddled iron bars manufactured from pig iron made in Canada, a bounty of three dollars per ton;
>
> On pig iron manufactured from ore, a bounty of three dollars per ton on the proportion produced from Canadian ore, and two dollars per ton on the proportion produced from foreign ore."

The second section of the Act prescribed the time within which such steel ingots puddled iron bars, and pig iron should be made in order that the bounty might be earned; and the third section gave the Governor in Council authority to make regulations in relation to such bounties and to carry out the intention of the Act. By the Act 62-63 Victoria, Chapter 8, the time mentioned in the second section of the Act 60-61 Victoria, Chapter 6, was extended, and a gradually diminishing scale of bounties prescribed; and it was also provided that no bounty should be paid on steel ingots made from puddled iron bars manufactured in Canada. A bounty could be earned on pig iron, and then on either on puddled iron bars or steel ingots made therefrom; but the manufacturer could not earn a third bounty by making the puddled iron bars into steel ingots. In the manufacture of iron and steel from the ore two bounties, but not three, might be payable with respect to the same material in a different form or state of manufacture. The regulations made by the Governor in Council respecting the payment of such bounties are in evidence, but no question arises thereon which does not equally arise upon the statutes under which they were made, and it is not necessary to refer more particularly to these provisions.

The company has, at Sydney, Cape Breton, four blast furnaces for the manufacture of pig iron, and an open hearth steel plant consisting of ten "H. H. Campbell Tilting Open Hearth Furnaces" for the manufacture of steel. The construction of these furnaces was commenced in the year 1899, and they have since been completed at a great cost and are now in operation. Part of the product of these blast furnaces is cast in a sand bed in the usual way; part is run in moulds that form what is called the pig machine; and a part is conveyed in a molten or liquid state from the blast furnaces to the steel mill and is there poured into a mixer or reservoir for holding this liquid metal, and from which a supply is drawn whenever a charge is required for one of the steel furnaces. The liquid metal is taken from the blast furnaces to the reservoir in large ladles set on trucks, and are moved by an engine on an ordinary railway track. While in these ladles the metal is weighed. That may be, and is done with convenience and accuracy. This practice of taking the metal in a liquid state from the blast furnaces direct to the steel plant was not in 1899 or in 1897 a new practice or process in the manufacture of steel from pig iron. As shown by Mr. Chrysler the practice has been followed for a number of years in almost every country in which iron and steel is manufactured. It has been followed in the United States, in Great Britain, in Sweden, in Germany, in Belgium, in France, in Austria, in Hungary, in Russia, in Syria and in Japan. And although this practice has in general been adopted only in cases where the blast furnaces and steel plant were under the same management, the evidence discloses a few instances in which a manufacturer of pig iron has sold part of the product of his furnaces to another manufacturer of iron or steel and delivered it to him in a molten or liquid state. Of course that is only possible within limits. The blast furnaces and the steel plant must be near enough to each other to permit of the ladles being moved from the one to the other without giving the metal time to cool.

There is no controversy about that portion of the product of the company's furnaces that is cast in the sand bed or run into the pig machine. The question in issue is raised in respect of the metal that is taken in a liquid state from the furnaces to the reservoir or mixer. As to that it is argued for the respondent that this metal in this state or condition is not pig iron within the meaning of the statutes, that have been referred to; and that no bounty is payable in respect thereof or in respect of the steel ingots manufactured therefrom. That is the question to be determined.

But before coming directly to that question it may perhaps be found convenient to refer to some rules that have been laid down to guide in the construction of terms occurring in Acts of Parliament. And with respect to statutes generally I do not know that I could do better than to adopt the language used in *Maillard v. Lawrence* (16 How. 261) where it is said that the popular or received import of words furnishes the general rule for the interpretation of public laws, as well as of paivate and social transactions, and wherever the Legislature adopts such language to define and promulgate its action or its will the just conclusion must be that it not only comprehended the meaning of the language it has selected but has chosen it with reference to the known apprehension of those to whom the language is addressed, and for whom it is designed to constitute a rule of conduct, namely, the com-

munity at large. That is a general rule. But in the case of tariff laws it has been held that in imposing duties the legislature must be understood as describing the articles upon which the duty is imposed according to the commercial understanding in the markets of the country of the terms used in the statute. The commercial designation, the use of the term by merchants and importers, is in such cases the first thing to be ascertained. *Arthur v. Morrison* (96 U. S. R. 108); *Robertson v. Salomon* (130 U. S R. 413); *Nix v. Hedden* (149 U. S. R. 304). And where a term has not acquired any special meaning in trade or commerce it is to be taken and received in its ordinary meaning in the common language of the people. In the present case we have to deal with statutes that must, I think, be taken to be addressed in the first instance to manufacturers of iron and steel. It is to them that the bounties prescribed are offered. And while persons engaged in other branches of the same industry or in other industries, as well as the community at large have an interest in the matter, it does seem that any enquiry that would leave out of account the meaning attributed by such manufacturers to the terms used in such statutes would be incomplete and might be misleading.

Pig iron is the product of a blast furnace used for the purpose of reducing iron ores. It contains, among other things a larger proportion or percentage of carbon than either steel or puddled iron bars. And one of the principal objects to be attained in the manufacture of steel ingots or puddled iron bars from pig iron is to get rid of this excess of carbon. The term, "pig iron" was derived from the shape which the iron assumed in the sand beds in which it was first cast; and when first used had reference no doubt to a particular shape or form. It has since acquired a larger meaning, and as used at present includes, it is conceded, any product of the blast furnace that is cast in any convenient form or shape without reference to what that form or shape may be. So far the parties to the present controversy are agreed. It has also happened that among ironmasters and those who are familiar with the processes by which iron ores are reduced and made into pig iron and then manufactured into wrought iron or steel, that the term "pig iron" has come to mean and include as well that substance in a molten or liquid state, it being usual to prefix to that expression some edjective such as "molten" or "liquid" when the speaker or writer wishes to distinguish between solid pig iron and liquid pig iron. But as in the nature of things diffculty and expense are involved in maintaining iron in a liquid state, and as there is in general no object in overcoming the difficulty or incurring that expense except for an inconsiderable length of time, most men see pig iron in a solid form; and that form is in general necessary to the handling of it as an article of trade and commerce. So it must, I think be conceded that in common speech the term "pig iron" carries with it the meaning of something that is solid and not liquid. If one turns to the dictionaries to ascertain the meaning of the term he will, I think, come away from the enquiry with the same impression. That of course may be because one lexicographer follows another and does not make the original research into the modern literature of the subject that Mr. Chrysler has with such great industry made. Of the result of his researches of which I have had the advantage, it is not possible with fairness to his argument and a proper regard for brevity, to make any present use further than to say that I do not think anyone sitting down to make a new dictionary from original sources, and reading the extracts Mr. Chrysler read, would adequately interpret the term "pig iron" if he failed to make it clear that the term is now, and has for a considerable number of years been used in a sense that includes that metal in a liquid as well as in a solid state. And if the only question were whether the metal which the company used in a liquid state for the manufacture of steel ingots was or was not pig iron, there could I think be only one answer to the question, and that is, that it was pig iron But the question is somewhat narrower than that. Perhaps it would be more exact to say that there are two questions, and that one of them is narrower than that stated With regard to the bounty on steel ingots that may be the question. Were or were not the steel ingots in question made from pig iron? With regard to bounty on pig iron the question is not perhaps whether liquid pig iron is pig iron, a question that suggests its own answer, but whether it is pig iron on which a bounty is payable under the statute? The steel ingots in question were undoubetedly steel ingots within the meaning of that term as used in the statute. There is no dispute about that; and they were manufactured from ingredients of which not less than fifty per cent of the weight thereof consisted of something made in Canada, and when one asks what that something was there is only one answer possible, namely that it was pig iron used in a molten or liquid state, but none the less pig iron; for as to that there is nothing to suggest that it can make any difference in what form or condition the pig iron was when so used. If the pig iron as it came from the blast furnace had been allowed to cool it would have been necessary to melt it before it could have been used in the further process of making steel. If it were suggested that the manufacturer who used the liquid metal for making steel has an advantage over one who is not in a position to do so, and that the latter would for that reason be placed in respect of the bounty in a position of inequality, the answer is that the statute does not disclose any intention on the part of Parliament, in any way to equalize the conditions under which different manufacturers would earn the bounties in question. I do not know that anyone could properly attribute any intention to Parliament, except that it was its intention to encourage the manufacture in Canada of pig iron, puddled iron bars and steel ingots; and the erection in Canada of furnaces and mills in which these things would be produced. But if one were to go beyond that and speculate as to matters not appearing upon the face of the statute it would, I think, be reasonable to conclude that Parliament intended (if as to that it intended anything) to encourage the erection of furnaces and mills using the most modern, efficient and best appliances and processes known to the trade or business. but for myself I am not sure that Parliament intended anything more than to leave each manufacturer to carry on his own business and to earn the bounty in his own way. All I do say is that I do not see anything in the statute to lead me to the conclusion that Parliament intended to handicap progress and economy in the art of making iron and steel by witholding the bonuty on steel ingots manufactured from liquid pig iron in the manner described.

But when one has said that the company has earned and is entitled to the bonnty on the steel ingots that it has made from such pig iron it does not follow as a matter of course that it has also earned and is entitled to a bounty on the pig iron itself. That, as has been stated, raises in some of its aspects a different question. The pig iron, the product of the blast furnace, is as much pig iron while it is in the blast furnace as it is when it has been run off into the ladles; but no one would suggest that the manufacturer could, with any hope of succeeding, say to the Governor in Council, here are my blast furnaces full of pig iron, pay me the bounty on the pig iron. The answer would no doubt be, if it is pig iron it is not in the state or condition in which a bounty is payable on it. Something more must be done. The amount of the bounty is to be determined by reference to the number of tons of pig iron produced. The pig iron must be weighed. It must also, I think be something that can be used. Not that any one to earn the bounty must make use of it, but no bounty is, it seems to me, payable in respect of any pig iron that cannot be put to some use. That ought I think to be implied. The bounty is payable on pig iron

manufactured in Canada from ore. The pig iron must be weighed before any bounty is payable, and it must be in a state or condition in which it can be used. These, it seems to me, are the conditions to be observed to entitle the manufacturer to this bounty. Has the suppliant observed them? I think it has. As stated the material produced is pig iron. There is no difficulty in weighing it while in the ladles. It has in fact been carefully weighed. In the molten state in which it then was it was fitted for one of the uses pointed to in the statute, itself, namely, the manufacture of steel ingots. It was used for that purpose, and in my judgment the company was entitled to the appropriate bounty prescribed by the statute.

But before leaving the subject I ought to add that I have not overlooked two arguments against the view that I have expressed, to which I have as yet made no reference. It is said that in the early statutes, when the bounty was confined to pig iron, that term meant what was known generally and commonly as pig iron, and possibly that may be so. And then it is said that the same term used in the later statutes must be taken to have the same meaning and not a wider one. Some weight no doubt is to be given to that consideration, but it is not conclusive. Other considerations are involved. Then it is said that the term used in the French version of the statute namely "le fer en gueuse" shows that it was the intention of Parliament to confine the bounty to pig iron having some shape; and that if it had been its intention that it should also be payable on pig iron used in a liquid state for the manufacture of puddled iron bars or steel ingots there was not wanting a more appropriate term such as "le fer fondu" to give expression to that intention. That too, is an argument entitled to consideration, but again it is not conclusive, if, as I think, the larger meaning is to be gathered from the statute as a whole. And as to that it does seem to me that Parliament was dealing with a substance or material, and was not particularly concerned with its shape or form or condition, so long as it was pig iron and could be weighed and put to some use; and with respect to the uses to which it could be put a special encouragement by way of a bounty was offered to any manufacturer who would use it to manufacture in Canada seel ingots or puddled iron bars, and I do not think that it was intended to draw any distinction between its use in a solid or in a liquid state. The suppliant is in my opinion entitled to the relief sought by the petition. The amount claimed is as stated, one hundred and ninety six thousand nine hundred and sixty seven dollars and fifteen cents ($196,967.15) and no question was raised as to the amount. But that an opportunity may be given to make that matter more certain, if there is any question about it, the judgment will be entered for the sum mentioned, and costs, with leave to either party to move to strike out the sum so stated and to substitute therefor such an amount as the company may on further enquiry be found to be entitled to."

It is greatly to be regretted that space forbids the publication of all the data furnished by this interesting action. The argument of Mr. F. H. Chrysler, K.C., who so brilliantly conducted the case for the Steel Company is in ttself a complete compendium and review of the technical literature and modern iron and steel metallurgical practice. Then there is the evidence of Mr. David Baker, Mr. Graham Fraser, Mr. A. J. Moxham and the other practical men who were examined at length before the Court at Sydney, and the testimony of such eminent metallurgical experts as H. M. Howe, Prof. Richards, J. M. Swank, Julian Kennedy, Wm. P. Snyder, Frank B. Thompson and others, taken before a Commission at Philadelphia, Pittsburg and Cleveland, the whole constituting a most valuable work of reference to the metallurgy of iron and steel. We understand the question of publishing this data is now before the Council of the Canadian Mining Institute.

The Expansion of Our Iron Industries.

The figures published by the Dominion Government in the Trade and Navigation Returns bear testimony to the progress Canada is making in the production of iron ore and pig iron, and the expansion of her iron and steel trade.

While the figures for the year just closing are not yet completed, we find by a reference to the returns given for the past ten months that our mines exported during this period 401,252 tons of iron ore of an estimated value of $996,254, as compared with shipments in the twelve months of the previous year aggregating 306,244 tons, of a value of $774,673. Our exports of pig iron also show a considerable increase; ten months shipments being recorded at 73,371 tons, of a value of $784,506, as compared with 57,600 tons shipped in the whole of 1901. The exports of our manufactures of iron and steel also show a largely increased trade. For the benefit of our readers interested in these growing industries, we take pleasure in reproducing the figures, compiled by THE REVIEW from the Government returns showing the exports.

IRON ORE EXPORTS 1903.

Month	Great Britain		United States		Total	
	Tons.	Value.	Tons.	Value.	Tons.	Value.
January	3,800	$5,800	.....	.....	3,800	$5,800
February	....	.....	30	$67	30	67
March	.....	.....	... ..	... ..	...	.....
April	.....	.....	26,458	66,525	26,548	66,525
May	... ..	. ...	148,263	369,880	148,263	369,880
June	.....	.....	96,099	239,505	96,099	239,505
July	.....	.....	12,577	30,896	12,577	30,896
August	.....	.....	33,440	83,008	33,640	83,608
September	.....	.....	36,275	89,646	36,275	89,646
October	.....	.....	44,110	110,327	44,110	110,327
	3,800	$5,800	397,252	$989,854	401,252	$996,254

NOTE.—There were also exported to other countries 200 tons of a value of $600.00.

PIG IRON EXPORTS 1902.

Month	Great Britain		United States		Total	
	Tons.	Value.	Tons.	Value.	Tons.	Value.
January	10,166	$86,920	37	$809	10,203	$87,729
February	3,800	33,000	20	560	3,820	33,560
March	4,260	42,600	3,347	34,311	7,607	76,911
April	16,295	164,050	.....	...	16,295	164,050
May	13,470	137,165	3,135	34,958	16,647	172,752
June	... ...	.....	4,170	43,193	4,170	43,193
July	25	800	2,192	42,653	2,217	43,453
August	2,000	20,000	1,522	16,105	3,522	36,105
September	112	3,090	1,300	17,056	1,467	21,616
October	5,488	78,266	1,935	26,871	7,423	105,137
	55,616	$565,891	17,658	$216,516	73,371	$784,506

NOTE.—During this period there were also exported to other countries 97 tons, valued at $2,099.00.

Imports of Mining Machinery.

The imports of mining machinery for October amounted to $61,396 of which $57,011 were brought in under the Free List and $4,485 subject to duty. Of this amount the United States contributed $58,923 and the balance came from Great Britain. The total imports therefore, for the ten months of the present year aggregate $737,410, the great bulk of which, as shown by our last issue, came in under the Free List. Our statement last month did not include Diamond Drills, which are, excepting the machinery for motive power, admitted duty free. For the ten months we find that the free portions of the Diamond Drilling machinery entered in the Custom's returns amounted to $14,154. The whole of these Diamond Drills were imported from the United States.

Exports of Canadian Asbestos.

The following returns compiled by THE REVIEW from the Monthly Statements of the Department of Customs, show the exports of Canadian Asbestos during the ten months ended 31st October last. As pointed out in a recent issue of THE REVIEW, this industry, which is confined to the Eastern Townships of the Province of Quebec, has been for many years one of the most prosperous of the mining industries of the Dominion. About three thousand persons are employed in the mines and mills, and all the properties of any consequence are earning handsome profits for their owners. The returns show that the year now closing will rank among the most successful since the industry was established in the early eighties.

	Great Britain		U. S. A.		Germany		Other Countries		Total	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value
Jan. ..	229	$23.795	1,190	$40,455	100	$2,985	40	$860	1,559	$68,005
Feb ..	51	460	1,387	44,669	92	3,360	36	5,480	1,566	53,969
Mar ..	155	5.495	1,713	49,322	.....	.....	141	5,363	2 009	60,180
April .	221	6.895	1,950	57,168	39	3.120	190	10.725	2,400	77,908
May .	948	46,550	910	31.275	117	1.945	48	5,610	2,023	85,380
June ..	100	1 750	3,234	80.153	17	263	55	3.855	3,406	86,021
July ..	116	5,701	1,264	34.925	69	1,505	269	8,585	1 718	50,716
Aug ..	....	.....	4,097	112,842	.....	.....	312	12,960	4,409	125 802
Sept ..	230	3.450	2,383	72,085	70	1,500	.....	.....	2,683	77,035
Oct. ..	632	32,985	2,184	67,6.8	535	8,612	124	3,300	3,475	112 525
Total	2,682	$126 991	20,312	$590,522	1,039	$23,290	1,215	$56,738	25,248	$797,541

During the same period in 1901 the exports amounted to 18,108 tons, of an estimated value of $428,397; the total exports for the twelve months exceeding 40,000 tons, of a value of about a million and a half dollars. Judging by the returns published above, the year 1902 is to take rank as the banner year in the history of asbestos production in this "or any other" country.

During the fiscal year, ended 30th June last, the figures given by the Trade and Navigation Returns show the exports to have been:—

To	No. I.		No. II.		No. III.	
	Tons	$	Tons	$	Tons	$
Great Britain....	867	119,888	507	23,865	2,714	57,721
Belgium	315	29,600	112	4,062	400	8,250
France	239	25,490	56	3,330	70	1,425
Germany	285	33,605	367	14,836	1,618	41,427
Italy.....	173	15,540	33	2,150	263	6,250
United States....	1,630	144,860	1,284	48,948	22,139	549,955
Total.....	3,509	368,983	2,359	97,191	27,204	665,028

It is worthy of remark that the production of this mineral in the United States during 1901 amounted to only 747 short tons, valued at $13,498, as compared with 1,054 tons, valued at $16,310, in 1900, and 681 tons, valued at $11,740, in 1899.

New and varied uses are constantly being devised for asbestos. Where it is used as an ingredient in fireproof paints, for wall plaster, as boiler coverings, as packing in the manufacture of fireproof safes, and for nearly all purposes in which nonconductivity of heat and not strength of fiber is the important factor, the amphibole variety can be used. On the other hand, where strength of fiber is an essential quality as well as nonconductivity of heat, it is the chrysotile variety the product entirely of Canada, that is used, as in the manufacture of cloth, rope, felt, boards, tubes, washers, blocks of various shapes, etc.

In the periodical Stone, for February, 1901, there was described a test, made by the British Fire Prevention Committee, of the fireproof material called gypsine. This material is composed of plastic hydraulic lime, sand, and asbestos compressed into bricks. In testing its fire-resisting properties, a partition 10 feet long by 7 feet, 9 inches wide was built of gypsine bricks laid in hydraulic mortar, with joints a quarter of an inch thick. The side of this partition, which was erected in the test hut, after having been coated with a thin layer of fire clay, was exposed for the space of one hour to a heat which arose during that time to 2050° F. This high temperature had no effect on the gypsine bricks, and throughout the test the temperature of the outer surface of the partition was never sufficiently high to cause the ignition of a match.

Our Pyrites Deposits.

This is a mineral to which prospectors have given comparatively little attention; and yet, as a source of sulphur for the manufacture of sulphuric acid, sulphite &c., it is of great importance. Formerly native sulphur was used almost exclusively for such manufactures, but the limited supply and the growing demand have driven up the price to and beyond the point at which it pays to use iron pyrites. The production of sulphur in the United States in 1901 was 7,690 short tons, and during the same year 175,210 long tons were imported. In the same year the United States produced 234,825 long tons of pyrites and imported 403,706 tons. During the eleven years 1891 to 1901, pyrites displaced sulphur for the manufacture of sulphuric acid to the extent of about 200 per cent. The value of the pyrites imported by the United States in 1901 is $1,415,149. The major part of it is used in making paper pulp by the acid sulphite process. Here is where this matter concerns us. Canada is destined to become—is becoming,—the great pulp producer for the world. As spruce forests are known to be of great extent, and as exploration is extended and made more minute new areas are being discovered. We are also well provided with waterways for transportation, and with water powers to drive mills. It is not so generally known that we have valuable deposits of pyrites. Those Canadians who are interested in pulp-wood lands should make it their business to keep the ownership of these deposits in the country. Our enterprising neighbors in the United States have already secured some of the largest and most easily accessible bodies of pyrites in Ontario and Quebec, and in most cases are shipping the mineral across the border for the manufacture of sulphuric acid. It may come to be a repetition of the old story of the pulp-wood of Ontario, but with this difference, that the wood is now kept in the province by legislation,—a policy which could hardly be adopted for pyrites. It is true that we may reasonably hope for a process which will put at our disposal for the sulphite process the unlimited quantities of sulphur in the copper-nickel ores of the Sudbury district; but in the meantime, 'a bird in the hand is worth two in the bush.' The time has come, too, when the manufacture of sulphuric acid, now in its very early infancy in Canada, should be extended to meet the growing demand for this chemical. In both these directions enterprising investors may safely reach out.

The Anglo-Klondyke Mi-ing Company.—The directors, in submitting their second annual report, with balance sheet and profit and loss account, for the year ending 30th September, 1902, state:

From the amount of available net profit, viz., £28,467 17s. 2d., the directors recommend the delaration of a dividend of 20 per cent. (free of income tax) on the ordinary shares, payable to all shareholders registered on the 30th November, 1902. This will absorb £24,659 12s., leaving a balance to be carried forward of £3,808 5s. 2d.

The board are very pleased to be in a position to report a much more favorable condition of affairs than last year.

The share capital is now all issued, the shares which were due at the date of the last general meeting to the Consolidated Mines Selection Company, Ltd., and to Mr. Joseph McGillivray, having been allotted.

With reference to the personnel of the board, Mr. J. M. Wilson has resigned, having left England to take up an appointment in South Africa, and Mr. A. F. Nichol has been elected in his place.

Side Lights on the Rossland Boom.

The Rossland *Miner*, a weekly sheet which played no insignificant part in promoting that notorious era of wild-cat speculation in mines and ten-cent shares in Rossland mining companies, has been made party to a law suit which promises interesting revelations of how the game was played in these memorable days, now happily, and we hope forever, things of the past. The paper was originally owned and edited by John Reevis, who "whooped her up" in lively style, until he was bought out by F. Aug Heinze, then operating the Trail smelter. A year ago last May Heinze sold the *Miner* to Bernard Macdonald, for the Le Roi Company for $20,000, one-half of the purchase money being paid down at the time, the balance falling due six months later. The utmost secrecy was observed in the sale, so much so that the sale was ostensibly made at Northport to the Northport Smelting Company, which apparently made the initial payment In reality, however, the charge went through the Le Roi Company's books under the caption of "Special Account," as Mr. J. R. Frecheville discovered when he made his investigation into the affairs of the company the following fall. Frecheville reported that the purchase of the paper was entirely unauthorized, and it was decided to allow the journal to relapse into the hands of Mr. Heinze by making default in the second payment. Mr. Macdonald and Mr. Thompson, although out of the Le Roi, still retained the management of the Le Roi No. 2, and they, with Edmund B Kirby, of the War Eagle-Centre Star, desired to keep control, so the second payment was arranged for in the following fashion: The Le Roi obtained a cash rebate of $2,500 and retained 750 shares of a par value of $10 per share. The War Eagle Centre Star people coughed up $7,500 and the Le Roi No. 2 $5,000, receiving in return 750 and 500 shares respectively. Mr Heinze was paid the balance of his purchase money and very quickly made it publicly known that all his connection with the paper had ceased. The second payment was made just about a year ago, and from that date until about April of the present year the paper was "carried" by the three combinations, viz.: The War Eagle-Centre Star, Le Roi No. 2, and the Le Roi, in proportion to their respective holdings.

Some time in the early spring of the present year Manager Mackenzie, of the Le Roi, who apparently has no great liking for "mining on paper," notified the other companies that the Le Roi would in future discontinue its contribution to the monthly deficit, and arranged to draw out the Le Roi's proportion of the debts owing to the *Miner* previous to that date. The joy of the other partners at this step on Mr. Mackenzie's part can easily be imagined, but as the matter had to be kept quiet at all cost the situation had to be accepted with as good grace as possible under the very trying circumstance narrated.

Some time last month the War Eagle-Centre Star people decided on a move to grab the *Miner* from the Le Roi. The officers of the company owning the paper included A. B Barker, the local manager of the Bank of Toronto, representing the War Eagle-Centre Star interest, as president; William Thompson of the Le Roi No. 2 as vice-president, and Mr. Wallace, of the Le Roi, as secretary-treasurer, these three constituting the board of directors, and between them representing the entire stock issued, viz, 2,000 shares.

According to the documents on file a suit was instituted last month by John A. McDonagh, of Toronto, against the *Miner* Company, for $3,000 for "money lent"—McDonagh being in reality the War Eagle-Centre Star combination, for whom it is said he has been all along acting as trustee, holding the 750 shares which represent their interest.

The writ was served upon the editor, J. P. Earngey, who now says he "mentioned" the matter to Mr. Barker (the War-Eagle-Centre Star representative on the board and the president of the *Miner* Company) and let the matter rest there. The Le Roi Company say that neither they nor their representative ever heard of the service of the writ until after judgment was signed for the full amount of the claim, in default of any appearance or defence being made by the defendant, the *Miner* Company, on October 31st last.

The Le Roi No. 2 Company also obtained a judgment against the *Miner* for $2,000 for money lent, it is alleged, in the same fashion as that got by the War Eagle-Centre Star combination, and now the wrath of the Le Roi Company has been aroused and a big fight has been commenced against the other companies interested, the first step in which is an application to set aside the judgments referred to.

James Anderson Wallace, the secretary-treasurer of the *Miner* Company and the Le Roi representative on the board, has filed a lengthy affidavit on the pending motion declaring that the judgments in question were obtained without notice to him or his company, and that all the proceedings were kept secret from him and them, and that it was only by accident that the matter was discovered after judgment had been signed.

Mr. Wallace says he offered to sell the 750 shares held by the Le Roi Company to A. B. Barker for his principals at a 50 per cent. discount on the day the suits in question were commenced, and that Barker said he must first consult with the other parties. As has been explained, howeuer, judgments were obtained, and presumably Mr. Barker is still waiting for a reply.

An effort was made to ring in the Rossland Great Western and the Kootenay Mines by selling these corporations 170 valuable Rossland *Miner* shares at par ($2,700) but some one got scared at the probable result and the deal is said to have fallen through.

Whatever may be the outcome of the present state of affairs the story is interesting as illustrating the situation in mining circles in the Rossland camp.

Mining Institute Awards.

The sub committee of the Council of the Canadian Mining Institute has recommended that the following awards be made for 1902 in the Students' Competitions:

The President's gold medal to O. N. Scott, School of Mining, Kingston, Ont. for his paper "On the Ore Deposits of Copper Mountain Similkameen District, B.C. Also two cash prizes of a value of $25 00 each to the following: H. W. De Pencier, McGill University, Montreal for his paper on "Mine Timbering in the Old Ironsides and Knob Hill Mines," and to L. P. Silver, School of Mining, Kingston, Ont. for his paper on "The Sulphide Ore Bodies of the Sudbury District". It is understood that one of the best papers contributed to the series, that by Mr. E. V. Corless, of McGill, last year's gold medallist, was at the special request of Mr. Corless withdrawn from the competition.

The Committee recommend that in the future, in addition to the President's gold medal, the Institute offer three prizes of a cash value of $25.00 each for papers contributed by Canadian Mining Students on the following subjects:—

GROUP I.—*Ore Deposits and Mining Geology.*—The subject may be treated generally, or some particular district or single deposit may be discussed or described.

GROUP II.—*Mining Practice.*—Any and every branch of mining may be treated such as pumping, hoisting, ventilation, timbering, ore extraction, development, etc, etc., or some particular method of mining, or some individual mine or group of mines, may be described or discussed

GROUP III —*Ore Dressing and Metallurgy.*—Any branch of ore dressing or metallurgy may be treated as for example - crushing, jigging, milling, concentrating, smelting, roasting, cyaniding, etc; or some particular plant may be described or discussed.

Protection for Silver Lead.

At a meeting of the Silver Lead Mine Owners of East and West Kootenay, held at Sandon, British Columbia, on December 10th, 1902, the following resolution was presented by J. L. Parker, and carried unanimously.

1. WHEREAS, The silver-lead industry of British Columbia, notwithstanding the unusual richness of the ore, the proved continuity of the veins, and the favorable natural conditions of mining in the Province, is, and for some time has been, in a declining condition which, if not ameliorated, will end in total stagnation. And

2. WHEREAS, the lead-mining camps of the United States, and particularly those in the adjoining state of Idaho, are and for years have been, enjoying great prosperity, due to a protective tariff conserving the home market. And

3. WHEREAS, the silver-lead mining industry has been for some years of national importance, and, unless allowed to decline, will speedily attain to a much greater degree of importance, benefitting by its increased expenditures the trade and advancement of both Eastern and Western Canada. And

4. WHEREAS, our domestic market for the manufactured products of lead is chiefly supplied from the products of ores mined in Mexico and Europe; where the labor cost of production is much lower than in this country; a condition of affairs permitted by the wholly inadequate protection afforded by the existing tariff; while the prices of white lead, lead pipe, sheet lead and shot, in the Dominion of Canada, are approximately equal to the prices charged for the same commodities in the United States, all to the detriment of the producers, consumers, and transporters of lead in this country. And

5. WHEREAS, under the existing tariff, little or no protection is afforded to the lead producing industries; whilst adequate protection is afforded to all other industries of equal importance, known to us. And

6. WHEREAS, these conditions result in the exportation of a preponderance of our crude ore and bullion, the former to American smelters and the latter to the markets of the world; there to enter into competition with the products of cheap European and Mexican labor, and the surplus product of the protected lead industry of the United States.

7. THEREFORE, we, the silver-lead miners of the East and West Kootenay districts of British Columbia in convention assembled do hereby recommend and respectfully urge the enactment of a Tariff Act which will afford ample protection to the producers, manufacturers and transporters of lead, thereby, creating and fostering a new and expansive home industry calculated to benefit all classes by the stimulation of national trade and commerce.

Having in view the interests of the producers, manufacturers and consumers of lead, we would recommend a duty equal to that imposed by the United States, viz.;

On lead in ores 1½ cents per pound.
On lead in bullion, pigs, bars, and old lead, 2⅛ cents per pound.
On lead in sheets, pipe, shot, etc, 2½ cents per pound.
On white lead, etc., 2⅞ cents per pound.
On all other products of lead as provided in the Dingley Tariff Act of July 24, 1897.

PROVIDED always that if at any time it shall be proved that a combination has been formed for the purpose of unduly increasing the charges made for smelting lead ores produced in Canada, or for refining or marketing lead bullion, or if the charge for smelting and refining in Canada is proved exorbitant, then the Governor-General-in-Conncil may at his discretion permit the admission into Canada of lead bullion smelted and refined, or smelted or refined in foreign countries, from Canadian lead ores, upon payment of an advalorem duty of 15 per cent upon the cost of such smelting and refining.

8. And the Secretary is hereby instructed to forward copies of the foregning resolutions to the Senators and Members of the Dominion Parliament, representing British Columbia, with the request that they present the same to the Federal Government as a memorial with their endorsement.

WHAT IS PIG-IRON?

Mr. David Baker, General Manager of the Dominion Iron and Steel Company, Describes the Metallurgical Practice at Sydney, Cape Breton.

In the celebrated suit of the Dominion Iron and Steel Company, to which reference is made elsewhere, Mr. David Baker, general manager of the company, gave the following evidence :—

Q.—What is your official connection with the claimants in this case? A.—I am general manager of the company.

Q.—And how long have you been acting as such? A.—I came here a year ago. I came the 1st of August last as general superintendent, and last March was appointed general manager, that is March of this year.

Q.—Are you an experienced worker in iron? A.—I graduated at Boston School of Technology in 1885. I began in the steel department of the Pennsylvania Steel Company at Steelton, about three miles from Harrisburg, Pa.

Q.—Is that an extensive works? A.—A very large plant, employing 6 000 men, and having a large blast furnace plant, open hearth steel plant, bessemer plant, rail mills and slabbing, and merchant mills.

Q.—And how long were you with the Pennsylvania Steel Company? A.—I was with the Pennsylvania Steel Company, the parent company, until March, 1887, when I went to Baltimore and took charge of the erection of an extention to their plant called at that time the Maryland extension of the Pennsylvania Steel Company. Afterwards it was organised as a separate company called the Maryland Steel Company, I remained with them until 1893, when the plant was, owing to the hard times, shut down completely.

Q.—Then as to the Maryland Steel Company? A.—That consisted of a plant of four blast furnaces, bessemer steel plant, rail mill, machine shop and foundries, and a ship yard for the construction of steel ships.

Q.—Will you continue what your experience has been since that? A.—After leaving them I was one year, from '94 to '95, with the Lackawanna Steel Company in charge of their iron plant at Lebannon and Cornwall, Pa, where they had five blast furnaces. A year later, owing to the starting up of the Maryland Steel Company, I was called back to that plant, and remained with them until December, '98, when I was offered a position with the Illinois Steel Company to take charge of their blast furnace department at the South Works, South Chicago, and left that month for that plant. I remained with them until August 1st, 1901. The Illinois Steel Company's plant consists of nine blast furnaces, ten open hearth furnaces, bessemer steel works, rail mill, plate mill, slabbing mill, and the necessary machine shop and foundry, and a plant for the manufacture of cement.

Q.—Then in all these works you have had to do with blast furnaces have you? A.—In the Maryland Steel Company I started in with the steel plant. I had general charge of their blast furnaces when I left there, and their steel plant. In Chicago I had the blast furnaces.

Q.—Will you tell us what your plant is here? A.—Our plant here consists of four docks, four modern blast furnaces, and our open hearth steel plant.

Mr. CHRYSLER. Explain on this plan where these are situated. A.—Our ore is received at No. 2 pier, the northern end of the works. It is then delivered to our ore bins back of the blast furnaces, and from there taken to the four blast furnaces which are arranged in a line with the regenerative stoves in between the stacks. They are marked "blast furnaces" on the plan.

Q.—Then how far from that is the shop in which the open hearth furnaces are situated? A.—One thousand feet from there the open hearth steel plant begins, that is, the buildings.

Q.—And those are all situated in one building? A.—They are in one building marked "open hearth" on the plan.

Q.—And what do you call the furnaces that are in that building? A.—These are, to speak exactly, "the H. H. Campbell Tilting Open Hearth Furnace."

Q.—How many of them are there? A.—Ten.

Q.—Then what is a blast furnace? Coming back to the first shop, tell us what you do there? A.—A blast furnace is a cylindrical furnace for the manufacture of pig-iron from iron ore. I have here a vertical cross-section of one of the furnaces in operation.

Q.—Will you describe the parts of that? A.—The lower part where the melting process takes place is called the hearth of the furnaces.

Q.—What is the furnace constructed of? A.—The furnace is constructed of fire bricks with a suitable binding material.

Q.—And what is the height? A.—The height of the furnace we have here is 85 feet. It varies considerably depending upon the ore, and the product required, and the size of the furnace. It may be as low as forty feet, or perhaps lower, and as high as 105 feet, and in some cases 110.

Q.—Then what is the diameter? A.—The diameter of these furnaces is 12 feet nine on the hearth, although each one is slightly different. That diameter is changed frequently.

Q.—And what is the widest diameter, and where is the widest diameter to be found? A.—The widest diameter of the furnace is at the top of the bosh, that is the part immediately above the hearth, and the sides of which slope into the hearth. The top of that bosh, where the angle of the furnace changes its direction, is the widest part of the furnace, and in the construction I have before me it is 20 feet. That is about the dimensions we have adopted here for our practice.

Q —And the thickness of the wall of the furnace above? A.—That varies from 30 inches up to five feet three inches in our construction.

Q.—Take the material that you put in and say what you do with it. What is the material that is used in reducing the ore in the blast furnace? A.—In the practice that we use here, coke is used as the fuel, and limestone or dolomite is used as a flux, and the ore is introduced with these materials, preferably in layers.

Q.—And where is it put in? A.—It is hoisted by means of an inclined hoist to the top of the furnace and dumped in the top.

Q.—Do you carry up the skips of the different materials used, coke, ore, and lime? Is that the order? A—That varies. It is very frequently charged in that way, but occasionally it is charged, coke, limestone and ore.

Q.—And all these materials are put in at the top. Is the top covered? A.—The top is closed by a large casting called a bell, in the shape of a bell, about 10½ feet in diameter. That makes a joint with another casting called a hopper.

Q.—It is really a cone? A.—Yes

Q.—And which way is the apex of the cone? A.—Upwards. The bell is hung by its apex.

Q.—And what is the nature of that? Does it close the top? A.—The use of that is to save gases and force them out of the openings in the side of the furnace.

Q.—The aperture is shewn in the drawing? A.—Yes. An aperature is shewn where the down-take or down-comer is joined to the furnace.

Q.—And the office of the bell is really a valve? A.—A valve and distributer which is used as a closing to the top.

Q.—Then the material being introduced at the top what becomes of it in the furnace? A.—The furnace in operation is kept full within two or three feet of the bell, and as the melting operation goes on in the hearth of the furnace these materials settle and fresh stock is added at the top, coke, limestone and ore.

Q.—And does all material come out at the bottom? There are two kinds of material at the bottom withdrawn? A.—Slag and iron are drawn out at the bottom.

Q.—The iron in what condition? A.—The iron in the form of what is termed "pig-iron."

Q.—And how is it drawn or where? A.—It is drawn in the liquid state by making a hole in the lower part of the hearth of the furnace.

Q.—What do you call that? A.—We call that the iron notch.

Q.—And the slag or cinder? A.—As much as possible is drawn from what is called the cinder notch which is located four or five feet higher than the iron notch.

Q.—Is it shewn on this plan? A.—Yes.

Q.—This is the aperture or the tap? A.—The cinder notch. The iron notch is not shewn there.

Q.—A part of the material goes off at the top? A—The gases and ligher portions of the solid material are carried off through the opening in the side of the furnace at the top and go down the gas-pipe or down-comers.

Q—You speak of the material being melted in the hearth. Where does the melting operation or fusing begin? A,—Air is introduced through the openings called tuyeres into the hearth.

Q.—Which are blow-pipes? A.—Which are water-cooled casings projecting into the furnace about nine inches.

Q.—And the office is to blow? A.—The air is forced through these water-cooled casings into the furnace.

Q —Hot or cold air? A.—Hot air.

Q.—Under about what pressure? A.—The pressure here varies from 10 to 15 pounds per square inch.

Q.—Did you state where the tuyeres began? A.—The tuyeres are located on a line about three feet above the cinder notch, and from this point up approximately twelve feet the intense melting action of the furnace takes place. That is called the zone of fusion.

Q.—And above that material retains more or less its solid condition does it? A.—The temperature at the tuyeres grows less as we ascend the the furnace. It grows less upwards towards the top.

HIS LORDSHIP.—About what is the temperature at the zone of highest combustion or fusion? A.—No very careful measurements have been made. They have only approximated the temperature, and as near as that can be obtained it is 3,500 degrees fahrenheit.

MR. CHRYSLER.—It is mentioned in some of the books in centigrades A.—I could not give it to you in my head. At the top of the furnace the temperature is between 300 and 600 degrees in good working.

Q.—Then it is graded from that down? A —Down to the tuyeres

Q.—You have told us the result of the work in the furnace is to produce molten iron. What is that iron composed of? What is the nature of that substance? What is it made of? A.—This pig-iron consists of between 93 and 94 per cent. metallic iron. The balance is non-metallic, and metalloids.

Q.—What are the principal other metals? A.—The principal metals are silicon and phosphorus, and the non-metallic elements are carbon and sulphur.

Q.—Which of these is present in the largest proportion in the usual pig-iron? A.—In ordinary pig-iron carbon is there in the largest quantity.

Q.—And is there any one of these ingredients that is necessary to constitute pig-iron? A.—The metallic iron is all that is necessary, only it must have some other substance with it that will make it possible to melt—make it fluid, so that it can be run out of the furnace.

Q.—And what is that substance? A —The carbon is the main substance which permits the iron to become fluid, and it is therefore sometimes called a carbide of iron.

Q.—Do you from the blast furnace ever obtain pure iron? A.—Never.

Q.—It is always a compound of of carbon and iron with phosphorus and and usually some other constituents in small quantities? A.—Pure iron is a substance never used in the arts. It only can be obtained as a curiosity in a chemical laboratory.

Q.—In your practice what is done with that molten iron? Is it of use in the production of steel? A.—In our practice we take a portion of the pig-iron direct in vessels called ladles to the steel plant, and a portion goes into our pig-bed, and another portion to a machine called the pig-machine, which is an arrangement constructed to save the expense of casting iron in the sand as was the old-fashioned way, and to make a cleaner iron.

Q.—We will take those separately and get a description. Take the oldest use of those. That was, I suppose, the pig-bed? A.—The oldest means of handling the product of the blast furnace was in the running of it into sand-moulds in a pig-bed, a building adjoining the blast furnace.

Q.—And you do here cast some of the iron in that way in the sand moulds? A—About a third of our iron goes into sand moulds.

Q.—And is the iron from the same source, from the same blast furnace which you cast in these sand-moulds, as the iron that you take to the steel furnace? A.—The iron that is intended for the steel furnace either goes direct in a liquid state, or else goes to the machine.

Q.—Is it the same material? A.—It is the same material.

Q. It is the same material? A.—The same material. We occasionally run casts into the sand from the same furnace, and from the same kind of iron.

Q.—Can you take for instance one ladle from the blast furnace to the pig-bed and the next ladle to the steel house? A.—Yes. We used to take it and cast it into sand moulds—carry the liquid and cast it into sand moulds in a building away from the furnace.

Q.—The material that you take up to what I may call the steel house? A —The steel mill.

Q.—The material that you take up to the steel mill in the ladle, which is a large pot? A.—A large vessel or pot lined with fire-brick.

Q.—And which you can raise and pour from. That is the same material that you use for casting cold pigs if you make them? A.—The same thing.

Q.—Then this other arrangement that you speak of which consists of casting the molten metal into a form other than the old one, you were describing that. What is the mould in that case? A.—The pig machine consists of an endless chain of moulds, either made of cast-iron or soft steel,

and the liquid is poured into these moulds, and cooled either by passing through a water tank, or having sufficient length of chain to allow the air to cool it, until it becomes solidified, and then it is dumped into cars.

Q.—Is that metal in the same form as the pigs that are cast in the sand bed? A.—Not in the same form.

Q.—How do they differ? A.—They are a different shape, caused by the necessity of the mould being able to discharge its pig.

Q.—What is it like? A.—It is flatter and shorter.

Q.—It is like the domestic bread pan? It looks so to me? A.—The sides are not as straight as the domestic bread pan?

Q.—It differs quite in shape from the old-fashioned bar of pig-iron, and in weight? A.—It is lighter.

Q —What would the old pig of iron average, as you make them? A.—From 100 pounds up to occasionally as high as 200 pounds.

Q.—And what do these small ones weigh? A.—These will average about 75 pounds.

Q.—Now the molten pig-iron is conveyed in the ladle to the steel mill; what is done with it there? A. –It is there poured into a vessel we call a reservoir or mixer, which is a reservoir for holding this fluid pig.

Q.—What is the office of that reservoir? A.—Simply so that we can have a supply of metal from which we can draw whenever a charge is required in one of the steel furnaces.

Q.—What is the capacity of the reservoir? A.—Approximately 300 tons.

Q.—What quantity of molten iron would you take from the blast furnace at a drawing? A.—Our ladles have a capacity of twenty tons, and we ordinarily take about 55 tons at a cast. Three ladles we ordinarily take.

Q —What is done with the liquid iron that is kept in that reservoir? A.—That is kept hot by gas and simply held as a reserve stock.

Q.—What do you do with it? A.—We draw from that whenever they need a charge in the open hearth furnace. When they need another charge we draw from that a portion of what is required for the charge.

Q.—And from the open hearth furnace you withdraw a metal which is what? A.—From the open hearth, steel.

Q.—What form do you cast it? A.—We cast it into ingots.

Q.—And do you sell the ingots? A.—We have no market for ingots here in Canada.

Q.—What is the nature of the steel ingot? Is it a finished product? A.—A steel ingot is not a finished product. It is a raw material for a rolling mill It is a product that is obtained by pouring metal into a mould of some sort.

Q —And what is the size of the ingot that you cast? What does it weigh? A.—These ingots weigh 5,500 pounds and measure at the largest end 19 inches square. They are 17 inches square at the small end and about 5 feet 6 inches long.

Q.—Did you say 5,500 pounds? A.—Yes.

Q.—Then do you market the ingots yourself at all? A.—We roll the ingot in the rolling mill. That is another mill. That is shewn further on. This is the open hearth plant, and about 700 feet from there is the blooming mill.

Q.—That is what we call the steel mill? A.—No.

Q.—And in that blooming mill the ingot is further dealt with. What do you do with it? A.—In that mill we heat the ingot. The ingot comes from the open hearth in a partially liquid condition ordinarily, inside the ingot being fluid, and the outside chilled enough so as to retain its shape.

Q.—It is then virtually a flask of steel? A.—Yes.

Q —With molten steel inside? A.—Yes, and these ingots are taken to the blooming mill and put into what are called soaking pits, a vertical heating furnace, and there heated until they become the same temperature through, and the temperature is high enough to permit the steel to stand the operation of the rolling.

Q.—And what do you do in the rolling process? A.—In the rolling process we pass the ingot through rolls, reducing its size to what are called bloom billets and slabs.

Q.—These are rolled products to be used in other mills. Describe the billet? A.—Anything below a bloom and slab are billets. A bloom is the largest size. Anything above 8 inches or 8 inches square and above is ordinarily called a bloom, and below that it is called a billet until it reaches a size of about ¾ inch, or you might say a half inch. Then it becomes a rod. These terms lap over. There is no one fixed line that would actually divide the billet or the slab or the bloom, but I have given you the approximate description.

Q.—And the product of the rolling mill is one or other of these forms of steel, and is that finished steel? A.- That is not a finished steel. That is subject to a further rolling process.

HIS LORDSHIP.—Is there any market for it? A.—There are mills here in Canada to handle that, and there are mills in the States.

Q.—And it is sold as steel per ton? A.—It is sold as billets and sold by the ton.

Q.—But the ingots are not sold as such? A.—We have no market for them. Of course possibly there might be such a market but we have not any market. There is no market here in Canada for them.

Q.—Did you finish the description of this sketch? There is another drawing there? A.—That shews what I describe as the tuyeres.

Q.—That is Exhibit 3. A.—This is the blast furnace shewing more in detail the tuyeres and the connection at the tuyeres. This shews also on this plan the relative position of the tuyeres, and the number of them.

Q.—Was there a process of making iron for use in the arts prior to the blast furnace, and if so explain what it was? What is the history of it? A.—The proces of making iron by what is not called a blast furnace is practically a blast furnace however, because it is a furnace in which a blast has been applied to the fire, but resembles more a blacksmith's forge. It was in such a furnace that that the first iron was made. You might say it was properly a blast furnace, because a blast was applied to it. A crude form of bellows was used to form the blast required to make the heat, and that same term has been applied to the largest furnace which is a different process altogether, but is properly a blast furnace, because the air is blown into it.

Q.—And what sort of iron was made in the old furnace? A.—In the old furnace under ordinary conditions a mellow iron was made, an iron that would not run, but would hammer out, and was called wrought iron.

Q.—What was the condition in the modern practice which was absent in the old process? A.—In the old process the temperature was much lower, and the metal did not remain long enough in contact with the carbon to absorb carbon enough to make it fluid.

Q.—And what was its condition? A.—Therefore was practically free from carbon, and contained very little impurity, was very nearly pure iron

Q.—But as to being fluid? A.—It was not possible to make it fluid. It would bail up and become soft enough to be worked under the steam hammer, or through rolls, but would not melt.

Q —Was there a name given to that method of making iron? A.—Those little furnaces were called forges. One type was called a Catalan forge. The ordinary term is "a forge." The proper name of the furnace was a forge.

HIS LORDSHIP.—What did you say was the diameter of your furnace? A.—At the widest part 20 feet.

MR. CHRYSLER.—All this is described very fully in books. It seemed to me a convenient method of getting at it would be to ask this witness whether this process is described in a standard work, and if he agrees with it we can read the book.

HIS LORDSHIP.—What do you say Mr. Aylesworth? He proposes to refer to some standard work and ask this witness if he agrees with it?

MR. AYLESWORTH.—I have no particular objection. I thought your Lordship's suggestion to my learned friend Mr. Ross was a proper one, that either of us could refer at pleasure to scientific works in the course of argument, not putting them in evidence. I should object to that.

HIS LORDSHIP.—It is practically putting it in evidence to read from the book and ask if he agrees. That is open to anyone on cross-examination, but it is not open on the examination of a witness, I think, under the rules of evidence, if objected to. It may be found very convenient.

MR. AYLESWORTH.—If it is anything compendious by which my learned friend wants to shorten the matter, I have no objection. I do not want it to be done systematically at all.

MR. CHRYSLER.—I only want to point out the convenience of it. There is a lot of material in these books. Without some witness to tell us what the terms mean, we might differ as to the application of them. I thought it convenient while the witness was here to put in such of those citations as we wish to refer to as requiring explanation.

HIS LORDSHIP.—I should be very glad, if Mr. Aylesworth has no objection. Of course I would have to rule as I understand the rule of evidence to be Of course both sides will get their turns according to the well known rule.

MR. AYLESWORTH.—My learned friends will get them from our witnesses in cross-examination, but if there is any term he wishes explained, I have no objection.

HIS LORDSHIP.—I suppose the only objection to your reading a paragraph and asking if he agrees with it, is that it is a leading question. To put it in as evidence in the case, of course, makes it unsworn testimony.

MR. CHRYSLER.—I have a book here. So that your Lordship and Mr. Aylesworth may both understand just what I am doing, let me say this. I have here a book which I understand is the work of the highest authority, Sir Lowthian Bell on the principles of the manufacture of iron and steel. It is the edition of 1884, and I think is the only edition. It is published in London. It is just to shorten Mr. Baker's examination as to the history. There is here a chapter on what is called the "Direct Process for making Malleable Iron," which we can refer to later. We need not trouble Mr. Baker to give evidence about it. There was such a process in use before the metal workers could produce enough heat to reduce iron to a molten condition, as Mr. Baker has just told us, and there was in that way what we find all the books refer to as a direct process of making iron from ore. It is described here. Mr. Baker has given the substance of it already.

Q.—Do you know Sir Lowthian Bell by reputation? A.—Yes. He is considered an authority in the iron business.

Q.—Do you know anything of his position and history in England? A.—Well, he is a proprietor of a very large steel plant in England, and has been president of the Iron and Steel Institute of Great Britain. He has contributed more than anyone else in original research on the blast furnace process, making a careful study of the chemical actions that take place in the blast furnace.

MR. CHRYSLER.—That is the nature of the evidence I want to give from this witness, so that when we come to look at the books we can know whether it has any standing or not. I think that is all I need say about that. I will read this, and my learned friend can object to it if he wishes. It is page 30: "Malleable iron and steel are obtained, as has been described, by the circuitous method of first making pig iron, and then removing the foreign matter which the metal has taken up in the furnace from the materials used in smelting. Any process, therefore, having for its object the production of malleable iron from the ore at one operation, is distinguished by the use of the word 'Direct'." That is the passage with which the chapter begins.

MR. AYLESWORTH.—That is the production of malleable iron.

WITNESS.—Malleable iron or steel, it says there.

MR. AYLESWORTH.—It was read, "Malleable iron."

MR. CHRYSLER.—You are both right. (Reads paragraph again.)

WITNESS.—It is also a "direct" process when you make steel direct from the ore. There are a number of processes for making steel direct from the ore.

Q.—Are they in practical use? A.—They have never been successful.

Q.—Never been successful? A.—Never been commercially a success.

Q.—That is the next step I wanted you to take. Tell us what these were, the principal ones? A.—The process of making pig iron, to make a metal which has a very large quantity of impurity in it, and then take and put it through another process to remove that impurity, has always been thought to be a waste of time and an unnecessary expense, and a great many efforts have been made to avoid this, to make what is called a direct process of making steel A great many such processes have been devised and patented and tested, but they have all failed as a commercial success. The only place where they are used to any extent is in Sweden where they have an exceedingly rich ore, very free from impurities, to start with. Direct processes have been used there for a great many years successfully.

Q.—That depends for its success upon the quality of the ore? A.—Upon an exceedingly rich ore which they have.

Q.—What do you mean when you use the words "Direct process" in the sense in which you have been speaking of it? A.—A process to go direct from the pig iron to the steel, and not to make an intermediate product. I mean a process to go from ore to the steel, and not to make an intermediate product called the pig iron, necessitating the very expensive process and plant of the blast furnaces.

Q.—That is a direct process as you have used the words, and I suppose that the words are very frequentiy used in the text books? A.—I might add right here in explanation, that the reason this has been sought for is that at one time in the blast furnace the metal is practically in its pure state, and if we could arrest it at that time we could make it into steel at a very low figure. It has been the aim of metallurgists for a great many years to design some furnace where they could arrest the process, and not make this intermediate product of pig iron.

Q.—What is the nature of pig iron in connection with your present evidence? How does pig iron differ from pure iron or steel? A.—Pig iron differs from pure iron or steel in that it has so much impurity it is fluid at a very much lower temperature. It has about 7 per cent.—between 6 and 7 per cent. of impurities, carbon and other metals.

Q.—How much of it is carbon? A.—Between 4½ and 5 per cent.

Q.—And that gives it what? A.—That mainly gives it fluidity.

Q.—Does silicon aid it? A.—Yes very much, but we can get iron that is very low in silicon and still have it fluid.

Q.—When you have this in its molten state do you do anything to expel the carbon? A.—There we burn out the carbon and silicon and remove the phosphorus.

Q.—You do burn out the carbon and silicon? A.—After it arrives in the steel plant we do that. That is in the open hearth furnace.

Q.—But the heating or keeping it hot in the reservoir, that is simply keeping it hot? A.—I have not explained the steel process. That is carried on in the steel process.

HIS LORDSHIP: You need the impurities relative to iron to get it in the fluid state, and then you need to expel them in order to get the steel? A.—Yes. It may be well for me to explain the steel process. The steel process which is most widely used is the one invented by Sir Henry Bessemer, and there we take the product of the blast furnace, this pig iron, and force through it air, and burn out these impurities. That is done very rapidly, and enough heat is generated by the combustion of these impurities, the carbon and silicon in the pig to keep the temperature up so that we can in the one process get a metal which is exactly the same composition as wrought iron. Of course it is not wrought, it is in a fluid state. The temperature is so high it has the same composition.

MR. CHRYSLER: Then what is the composition? A.—The composition of that is practically pure iron. Very low silicon and very low carbon. These elements are not absent altogether, but in a very small percentage.

Q.—And if you withdraw it in that state and allow it to solidify, what would the metal be? A.—It would be what they call ingot iron. It would not be wrought iron, but practically the same composition.

Q.—Consisting of very pure iron? A.—Yes.

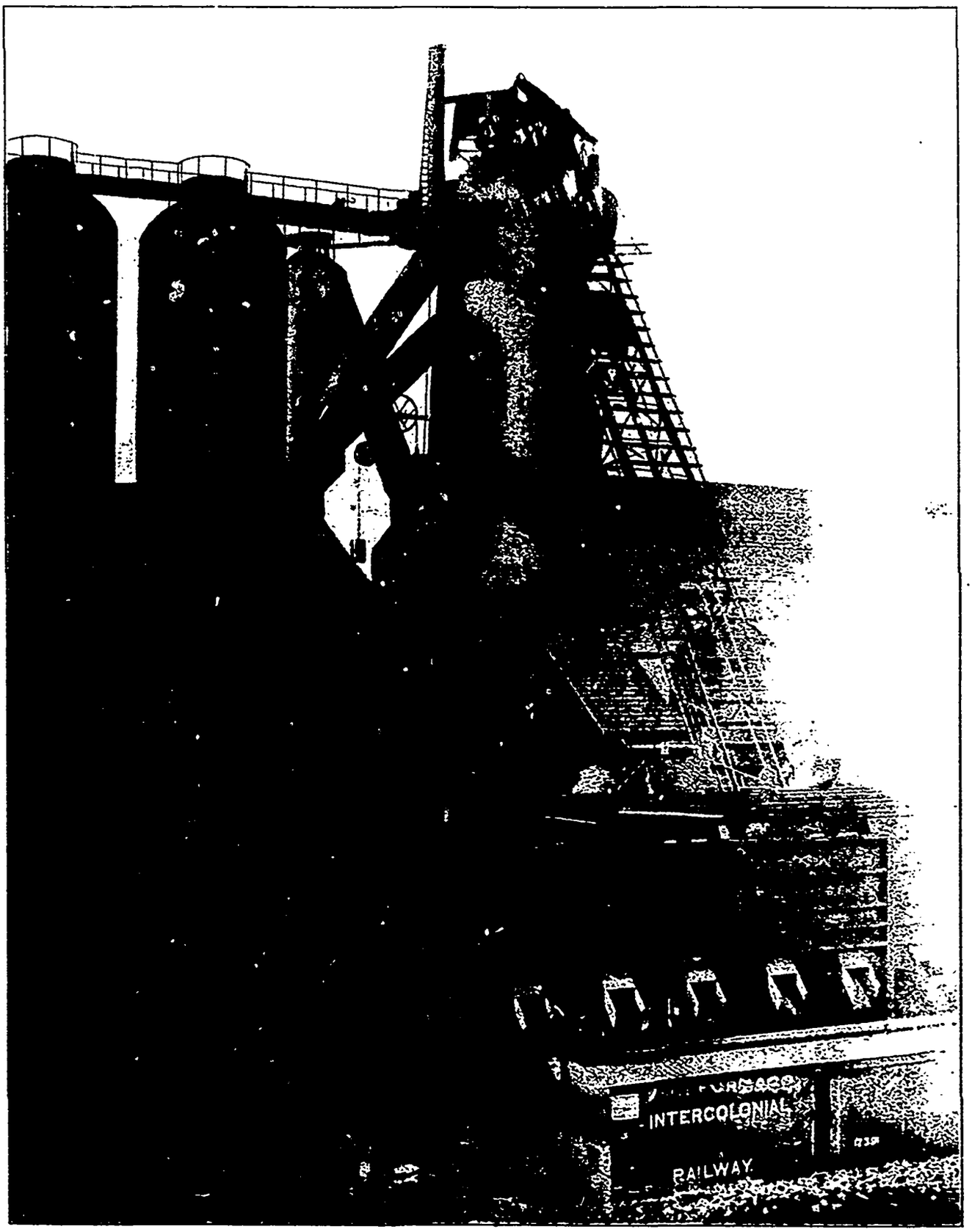
Q.—Then what is it you desire to do with it to make steel? A.—To make it into steel in this form, this ingot iron would be practically useless, because it is so full of gas when it solidifies the steel is full of blow-holes, or rather the metal is full of blow-holes. By adding a little carbon and a little manganese, we will make out of that metal a solid mass that will work better under the hammer and rolls, and be more useful in the art than the material termed ingot iron which is practically the same composition as wrought iron. We make a better material even than the wrought iron which is worked by hand.

Q.—And the object of a steel mill in brief is what? I refer to the plant that you have? A.—The object of a steel mill is to remove the impurities from pig iron, and to put back enough into the same metal—a considerable quantity into the same metal, so that we will have a product, so that we know what it will be, and know what it will do.

HIS LORDSHIP. Is the carbon that you expel the same as the carbon that you put in? A.—It is in a different state. Carbon exists in pig iron. There is a great difference in opinion. Metallurgists claim it exists in four different forms. We recognize two different forms, the combined form and the uncombined or graphitic, and that is termed by the furnace men kish. That flies off the metal while hot and blows off in the air. If we get it on our hands it has the same feeling as graphite, and analyzes nearly pure carbon, which graphite is.

Q.—When you add carbon again? A.—It is in a combined state.

Q.—The combination is different from the combination in pig iron? A.—Yes. I did not describe the open hearth process. The process we use here is the open hearth process. We could not use the Bessemer process here. We could not use the Acid-Bessemer process. The Bessemer processes are of two kinds. One kind that is most in use does not remove the phosphorus. That is the cheaper one. The one that removes the phosphorus is an expensive process and only used to a limited extent. In order to make the Bessemer process a success enough phosphorus has to be present in the pig iron to form a temperature in the process to keep the metal hot, and therefore this ore that we have to work here does not have enough phosphorus in it to make the temperature high enough to conduct that steel process. Another process was chosen which is called the Basic Open Hearth process. In that process we line the furnace with a material which has the power of removing phosphorus. It forms a slag over the metal, and that combines with the phosphorus and is removed. We add a material also to form this slag. We



DOMINION IRON AND STEEL COMPANY, SYDNEY, CAPE BRETON.

View of Furnaces, Skip Hoist and Bins.

add lime, which has the same effect as a lining, and the lining with a basic material is considered the best among chemists. The lining we put in an Open Hearth furnace is a basic lining. Usually we find the oxides of magnesia or magnesium, or magnesite as it is termed, to be the best lining we can use in the Basiac Furnace, Therefore we import that material to us to line these furnaces.

The charge that is put in the open hearth furnace consists of a quantity of scrap. There not being any scrap market here where we can obtain scrap, we use only what we make ourselves, that is the ends that are cut off in the blooming mill, and which ordinarily is about 12 per cent. We use with that cold pig. As the steel mill runs six days in the week, and the blast furnaces continuously, we therefore have one day's product which has to go to the open hearth and be re-melted, and cannot be taken direct as liquid pig, and and therefore that forms a portion of the charge in the open hearth. We put a portion of the cold pig in, and the balance we take in a liquid state from the furnace. The first operation is to cover the open hearth furnace with ore and with lime, burned lime. The effect of the ore in the lime is to make a slag. The ore gives up part of its oxygen to the metal, coming together. This oxygen combines with carbon and forms gas CO_2, carbonic acid gas, and the balance of the ore goes into the slag with the lime, forming a very thick slag, which combines with the phosphorus, and it is by that means we take the phosphorus from the metal. After the phosphorus is removed the carbon is removed next, and I might add that the silicon goes off first, and then the phosphorus and carbon.

Q.—Did you explain how the heat was applied to the furnace? A.—Here is a plan. This is a section of the open hearth furnace. (Exhibit 4.) This shows a section of the open hearth furnace.

Q —The furnace has a top, it is a covered furnace? A.—Yes and the gases and hot air are put in one end, and the product taken out of the other. It is properly called a reverberatory furnace. They reverberate against the roof and go out this side. This represents the cross-section of the furnace through the shortest diamater, and shows the spout out of which the metal is forced; and, that is the hole through which the gases ultimately pass in going out. They are called ports. This represents the flues which enter into the chambers where the brick work is piled up crossways so as to form a checker work, and the products of combustion virtually pass through one chamber and another, and heat this chamber, and here we have valves, so that we can reverse this operation. We can pass our gas in for making the heat in the furnace through this side, and the product comes out this side, or we can reverse the arrangement and pass gas through here and the product out that side. The rule is every 30 minutes to reverse and make the products pass through chambers that we have been passing the air and gas through previously, and therefore every time a change is made the temperature of the furnace goes up and any temperature can be reached in there.

Q.—How does the heat in that furnace compare with the blast furnace? A.—This can be just as hot. This furnace is invented by Siemens. It made it possible to make steel in an open bath like that—in an open hearth furnace.

Q.—It is sometimes called a bath? A.—Such a temperature was not obtainable until the invention of Sir William Siemens of these regenerating chambers, and by that a part of the waste is returned to the process each time.

Q.—Who is the originator of the open furnace that you have in use here? A.—This is a modification of the Siemen's furnace invented by H. H. Campbell the General Manager of the Pennsylvania Steel Company, and the inventor of the Tilting Open Hearth Furnace.

Q.—Then about the Tilting. Shew how that is done, and any feature peculiar to this furnace? A.—This furnace stands on a steel rocker, and these are the steel rollers which rest on this base casting, and the hydraulic cylinder is here. There are two ram cylinders. By turning on one we turn this this way. It will tip right over and tip to an angle of 45 degrees before running out of that spout. When that metal comes out there it is practically wrought iron. It is very low in carbon, but it is extremely fluid, because the temperature is so high, and in the ladle we put the Manganese which contains the fixed quantity of carbon and occasionally coke, if we have to make a steel of higher carbon than manganese will give us by its addition. We here shew the ladle we bring the pig iron in from the furnace, and here are the steel cranes left out of the drawing.

Q —Then Mr. Campbell of the Pennsylvania Steel Company was the gentleman who invented the type of furnace you have in use. "The manufacture and properties of structural steel, by H. H. Campbell." That is the same Campbell? A.—Yes.

Q.—So that we have a book here by the man who designed that furnace? A.—Yes.

Q —How long since the furnace was produced? A.—The first experiments were made in that furnace in about '95 as I remember it. I was in Maryland at the time in the employ of the Pennsylvania Steel Company.

Q.—Do you know Mr. Campbell personally? A.—Yes, and have known him for a good many years. He has written the best work on structural steel. He is considered the highest authority in the manufacture of steel by the process we are using here, that is in this country or on this continent.

Q —This is the work you are referring to? A.—That is the one in print. There is a later work I have not received a copy of.

Q.—This is "The Manufacture and Properties of Structural Steel by Harry Huse Campbell, S.B., Bachelor of Science," published in New York in 1896. In the Preface states that a considerable part of this work was published originally in the transactions of The American Institute of Mining Engineers, and other chapters recently appearing in the transactions of The American Society of Civil Engineers. Do you know what these Societies are? A.—They are Engineering Societies of The States.

Q.—And what is the nature of the transactions? A.—The volume is published yearly containing the papers read before their several meetings representing work and researches done by the members of the Society. It is considered a document that is more nearly up to date than any publication we have in science.

Q.—The transactions are considered authoritative? A.—They are published by leading engineers as the result of their observations up to date.

MR. CHRYSLER: There is a passage in the same work of Bell I would like to read. I think it is an example of part of the evidence you have given. It has reference to the question of the combination of carbon with the iron in the furnace. Page 155 of the same book :—

"Carbon is well known to possess a certain affinity for iron; but perhaps it would be more correct to designate their union in cast iron as chiefly due to the property on the part of the metal to dissolve the metalloid." What is meant by metalloid? A.—Metalloid is the carbon.

Q.—You called carbon an non-metallic substance? A.—It is between the two, and it is therefore called a metalloid by some chemists. It has not the properties of a metal, and therefore it is given that name. "The proportion of carbon in this form of solution never approaches the point where the two are present in the ratio of their combining equivalents (28 Fe to 6 C, or 4.66 to 1) The actual relation between the two is nearer 6 equivalents of iron to 1 equivalent of carbon."

"When the metal leaves a furnace which is producing rich iron, as it loses heat, it gives off a portion of its carbon, in the form of thin, black and brilliant flakes, known as "kish." The same thing happens again when the metal solidifies on cooling, the extruded carbon being deposited on the faces of the crystals in pig iron, in what is known as the graphitic form.

"A certain portion of the carbon in pig iron is regarded as existing in combination with the metal; and at one time it was considered that the whole of the carbon in white iron was of this character. It was also held that there was a necessary connection between the "richness" or large sized crystals of the iron and the quantity of carbon it contains in the graphitic form. The extruded kish, is however rarely a pure substance iron in greater or less quantity being generally present with the carbon. After tapping one of the Clarence furnaces, a considerable quantity of flakey matter was collected from the surface of the pigs. By means of a magnet it was separated into two portions."

That is page 155 of Bell. That contains what Sir Lowthian Bell has to say with reference to the question of the combination of carbon with the iron, being a solution or chemical combination, and I think you said that that was really a disputed point? A.—It is, yes.

HIS LORDSHIP.—That is whether the combination is chemical or mechanical. Is that the dispute? Whether the union is chemical or mechanical.

MR. CHRYSLER.—The mechanical combination is one thing. A solution is something intermediate between the chemical and mechanical.

WITNESS.—The solution is different.

HIS LORDSHIP.—In the chemical combination they unite and form a different substance.

A.—The substance is different, but in solution the substance is taken up and goes into it, and disappears as a substance. But in the mechanical you can see the substance just mixed up, and that is where a part of the carbon is mixed up with the air and floats off, and when you break it cold you can see it there.

MR. CHRYSLER.—Do all these three occur in the combination of iron and carbon in the blast furnace? A.—The best information we have today is that carbon exists in all three forms, if not in a fourth form in the pig iron.

Q.—The mechanically mixed, in solution, and also in part chemically combined? A.—Yes.

Q.—That is correct, is it. Then how long has your furnace been in operation—the blast furnace? A.—These blast furnaces were started in February 1901.

Q.—And when did you begin to manufacture steel in the open hearth furnace? A.—We made the first steel in December 1901.

Q.—And in your practice here you have been using the liquid pig iron only since December 1901 then? A.—For making steel.

HIS LORDSHIP.—About six-sevenths of it from what he said is used in the liquid state.

MR. CHRYSLER.—What proportion since? A.—If the open hearth were ready to take all the iron we aim to get six-sevenths of it, but the result is we usually take about three-quarters of what we use. We cannot hit it every time. Sometimes we have five or six open hearth furnaces that need to be filled at the same time, and we have not metal for them, and have to take the cold.

HIS LORDSHIP:—Do you take that off the rollers in the form of pig, or in what form do you take the other article that you allow to cool and melt again? A.—If we expect to use it in the open hearth we put it through the machine so as to have it free from sand—through our pig machine. If the sand adheres it attacks the lining of the open hearth and would cut it away.

MR. CHRYSLER:—For instance your Sunday product? A.—What is intended to be used at the steel mill goes to the machine.

Q.—Then you do reduce the seventh to pig before you use it? A.—Yes. It is called pigs. They are not the same shape as we make in the sand, but they are termed "pig iron." The product we sell in the market is mostly the sand pig, because the casting of the iron in the machine changes the grain of it, and our customers for the most part prefer the sand. However, we have a great demand for machine iron now because it is cleaner. That is something that has been caused since the introduction of the mechanical arrangement for making pig.

HIS LORDSHIP:—A little more than your Sunday product you use in that way. So that about a quarter of it all goes to the pig machine before it goes to the steel? A.—Yes.

Q.—Before it goes to the open hearth furnace? A.—Yes.

MR. CHRYSLER.—And is sold sometimes. A part of what you sell as pig iron is part of that? A.—Part of that iron we run through the machine is sold. Part is sold and part goes to the steel mill, but we aim to have all the iron that goes to the steel mill, that is not taken in a liquid state, put into the machine so that we can get it cleaner and be free from sand.

Q.—Then as the result of what you have described, from the blast furnace you get a compound substance largely composed of iron, with some proportion of carbon, which is for steel-making purposes an impurity? A.—Yes.

Q.—Has it any advantage for any other purpose—the existing impurities in the iron? A.—It renders the iron easily fusible.

Q.—And therefore suitable? A.—For making castings.

Q.—It is that very property, of a low point of fusion, which makes it valuable as cast-iron? A.—Yes, that is cast-iron.

Q.—What is the difference if any between the meaning of the words "pig iron" and the words "cast-iron"? A.—The word "pig iron" is a term common to the product cast at the blast furnace, and "cast-iron" is the same metal cast at a foundry, but we make castings out of blast furnaces also.

Q.—But pig iron for the purposes for which steel is required, is impure iron? A.—It is impure iron.

Q.—Which requires a further process of refining, and that is accomplished in your steel mill? A.—Yes.

Q.—In the open hearth furnace which you have described? A.—Yes.

Q.—Now with reference to the Bessemer process, you have described that as blowing air through the metal? A.—Yes.

Q.—I find that described in a passage I would like to read from the Encyclopædia Britannica, an article on iron, Vol 13 of the '91 edition, which is the last edition. It is an example of the history of the process that Mr. Baker has been giving us in the language of the author of this, article, page 290:

"General classification of methods employed for the extraction of Iron from its ores. The various modern developments of the earliest methods of iron extraction consisting of the heating of iron ores with fuel until more or less complete reduction was brought about, and hammering the mass, may be conveniently divided into four classes, viz:—(1) those in which cast iron is produced by a smelting process (secs. 9-21), and subsequently transformed into steel or wrought iron by decarbonizing the resulting pig iron (secs. 22-28); (2) those in which malleable iron or steel is obtained direct from the ore at one operation without passing through the stage of cast iron (secs. 29-31); (3) those in which steel is formed from wrought iron by directly carbonizing it (secs. 32-35); and (4) those in which steel is finally prepared by intermixture of carbonized and wrought iron in the fluid state (secs. 36-41). The methods of class 1 include the preparation of pig iron; its purification by refining, and conversion into wrought iron by fining and puddling (both by hand and machinery) and by inverse cementation (heating in contact with iron oxide); and the preparation of puddled steel and pneumatic steel and iron, i.e. steel prepared by Bessemer's original process, viz., decarbonization more or less complete by blowing air through molten pig iron, and also of Heaton's steel (pig iron decarbonized by nitrate of sodium), &c. Class 2 includes the Catalan forge and allied processess, and the "direct" methods of Clay, Chenot, Yates, Blair, Snelus, Du Puy, Siemens, and others. The processes included in class 3 are those of steel manufacture by cementation and partial acieration by case hardening, together with various other allied methods of producing steel from soft iron; whilst class 4 includes the Bessemer-Mushet steel process, in which blown Bessemer metal is made into what is usually known as "Bessemer steel" by incorporating with its spiegeleisen; and the allied open hearth steel processes, in which wrought and cast iron are melted up together, or iron is decarbonized in a Siemans hearth and then mixed with ferromanganese, &c., together with various modifications of these processes, such as the Snelus-Thomas-Gilchrist method of blowing phosphorized pig, the Uchatius process, the Ponsard process, &c."

Q.—That is the very beginning of the article. It is introductory to a great deal of a much more technical description which follows. The reference there to the Bessemer process is what you have described? A.—Yes, the Bessemer process, or the Pneumatic process.

Q.—The essential feature of which was? A.—The forcing of air through the liquid pig, which caused the combustion of the impurities.

Q. That is still in use. You mentioned the Illinois Steel Works? A.—Oh, all the rail steel that is made in the United States is made by the Bessemer process. All the steel rails made in the United States are made by the process of Sir Henry Bessemer.

HIS LORDSHIP.—Are you making any steel rails? A.—We are not. We are building a rail mill, but it is not completed.

MR. CHRYSLER.—In the practice of the Bessemer process, is the metal taken as liquid pig iron to the converters in any of the establishments that you know of? A.—In all the plants of any size in the States, in fact all the rail mills in the States take the metal fluid pig to the Bessemer plant.

Q.—And does the quantity of fluid pig iron produced and used in the manufacture of steel bear any considerable proportion to the whole quantity of iron manufactured in the United States? A.—Most of the iron manufactured in the States goes to the manufacture of rails.

Q.—And used in the manufacture of steel? A.—Yes.

Q.—I am not sure we got the answer with regard to the use of liquid pig iron as I asked the question. Is it taken from the blast furnaces to the Bessemer converters in this plant direct in the same way that you do it here. A.—Just the same as we do it here.

Q.—Carried in a ladle? A.—Yes.

Q.—And can you say what proportion was used in the steel manufacture that never became cold? A.—I could not tell you exactly, but all of Carnegie's plant. The United States Steel Company used that process altogether in their open hearth Steel furnaces and in their Bessemer Steel furnaces, so I think you could safely say that 90% of the steel that they make is made in that way.

MR. CHRYSLER.—Q.—Then you say to your knowledge a large proportion of the pig iron manufactured in the United States is used in its liquid state in the manufacture of steel? A.—Yes.

HIS LORDSHIP.—That is, of that proportion of the pig iron that is used for the manufacture of steel, the larger proportion is used in the liquid state? A.—Yes.

HIS LORDSHIP.—And he also does say, I think, that the larger portion of the pig iron is used in the manufacture of steel.

WITNESS.—It is all given on the sheets, but I should say the most of the pig iron made in the States goes into the manufacture of steel.

HIS LORDSHIP —And principally in a liquid form? A.—And principally in a liquid form. Of course one day in the week is cut out. Usually in a large plant they get 75% to 80% of their metal from furnaces as fluid pig, and the balance of cold pig.

MR. CHRYSLER —That is the present state of the art in the United States. Tell us what the advantage of that process is? What is the advantage in carrying the molten liquid metal direct from the blast furnace to the steel works? A.—It seems a waste of heat to allow the pig iron in the furnace to get cold and then take it to the steel mill and heat it up. Therefore, it has been the effort of metallurgists and steel works managers to stop that cooling off and to save that heat, and to take the metal that is with its original heat into the steel mill.

Q.—Were their recognized diffculties in doing that? A.—For a long time the direct process was considered no advantage at all, that is taking liquid pig to the steel works, because you did not get such an even mixture of iron. taking a fixed quantity at one time in the furnace, whereas if you took your metal from a pile of cold pig you would get a more uniform average of what the furnaces made, and it was not until Captain Jones of the Carnegie Company invented the reservoir or mixer, a vessel where the metal could be poured in and held and allowed to mix, that the process of taking pig iron direct to the steel works was proved a success. Since then it has been widely adopted.

Q.—When was it that that was successfully done in Carnegie's works? How long back does that date. A.—I think in about the year 1885 as I remember. About that time, I remember the time when it was introduced, and I saw the first mixer built.

Q.—And what is the point about the mixer? What is cured by mixing it? A.—An average product of pig iron that will give more uniform results.

Q.—And why was it that using a small charge direct from the blast furnace, taking it to the open hearth or the Bessemer converter, was considered unsatisfactory? What is avoided now? A.—In the adoption of the reservoir a more regular product of pig, a more regular analysis of pig is produced. For instance when they took the metal in a liquid state direct from the blast furnaces without putting it in this reservoir, just at that time the mill might not be working as well, and the whole operation of the steel mill would be impeded or probably disastrously affected as so as to injure the product.

Q—You are not answering just the question I had in my mind. Does the product of the blast furnace at the tapping vary from one drawing to another? A.—It varies, and varies in the same drawing in analysis.

Q —How would it vary in the same drawing? A.—A furnace ordinarily is tapped every four hours, and during that four hours the operation of smelting might be interfered with. The regulating materials must settle down gradually and steadily. If the furnace for instance is allowed to become too hot, the material in the lower part will adhere to the walls, and a scaffold will be formed which will hold up this enormous column of ore and coke and limestone, and until a space below is formed, and the scaffold, unable to support any longer, gives way. this material drops in unprepared, it is very much cooler, being held higher up, and it drops the temperature of the bath below—very much lower than it should be, and the elements which are kept out of the iron, sulphur for instance, which in order to eliminate it is necessary to have a higher temperature, and the Basic slag, is allowed to enter the iron, because the temperature is lowered by the sudden introduction of cold material, and that may all happen in the four hours, and sometimes, in a furnace not working steadily, the first part of the cast may be one analysis, the first part of the metal run may be one analysis, and the last part be a poorer analysis, that is inferior for the use of the steel mill, a greater per cent of impurities, and especially those we wish to eliminate. For instance sulphur. The blast furnace process has the power of removing sulphur almost altogether, and in order to remove it the process must be carried on regularly and evenly.

HIS LORDSHIP.—Then this reservoir where you put it mixes the one drawing with the other drawing, and it becomes uniform? A.—In the first drawing we aim to get the sulphur lower than we need it, and if we have a little metal that is higher in sulphur, that will simply raise the average not above the point where it is worthless, but to a point perhaps on a line, or as near the limit as we should have it in the metal to make it a successful product.

MR. CHRYSLER.—And in the reservoir you are adding at one point from the liquid metal from the blast furnace, and withdrawing regularly and successively charges for the different open hearths? A —Yes.

Q —A large quantity remaining constantly in the reservoir under heat? A —I might add :—One of the disadvantages in handling pig iron direct to the steel mill is that this iron cools off, in the vessels we use, the ladles and a large percentage of scrap is made there, and it is only since they have made these ladles very large that we are able to carry that without so much loss of scrap that it would make the process too expensive. That was the first objection when the process was started that there was a large percentage of scrap made that had to be re-melted.

Q.—To go back to the introduction of this process at the Carnegie works. Was the process known of conveying the pig iron from the blast furnace to one or other of the forms of convertors before Captain Jones' invention? A.—Yes, long before that.

Q.—But there were disadvantages connected with it which prevented its being adopted? A.—Prevented its being adopted widely.

Q —But it was known and was in use? A.—Yes, before 1860 sometime I think in '50 sometime if I remember, it was first used.

Q —Now you have been speaking hitherto of the United States. How is it with the art in England? A—They use what is called the direct process there, taking pig iron liquid direct from the blast furnace.

Q.—And how long ago was that in use in England? A.—I could not say. I think it was introduced there long before it was in the United States. I might say I spoke of the direct process. There are a great many direct processes of making steel, but taking the liquid pig direct from the furnace has the short name of "direct process." We have adopted that, but it is not a direct process of making steel. That has to be distinguished from the direct process of making steel which would mean the operation of making steel direct from the ore, which is carried on to-day. A great many different furnaces have been devised to handle it.

Q —Although the term "direct process" is applied to what is done here, it is described in the books as the process of the manufacture of steel from iron ore? A.—You will see in all the references in the long extended suit with the Carnegie Company on their patent mixer they use the word "direct process." That means carrying the pig metal right through to the steel works.

Q —You have said that this metal is pig iron. What do you say as to the use of the name? What do you know of the use of that term? A.—Well the term pig iron is a very old term, and given to the product of the blast furnace, because it assumes, as the furnace men termed it, the shape of pigs and sows. It was to their advantage to make runners in the sand, and from these runners to make shorter ones, about three feet long, and these short runners, when they were filled, form the pig, while the long connecting runner they called the sow, from its crude resemblance to a sow nursing a lot of pigs it got its name. The product of the blast furnace got the name of pig iron. But, that is a term used in a great many cases for the same metal, whether it is cast in the molten or not. It is a name given to the product of the blast furnace. Some of the blast furnaces cast their pig iron in long runners, and some in plates, but it all is termed pig iron.

MR. CHRYSLER.—I do not think my purpose would be accomplished then.

MR. ALESWORTH.—Then I do not think the purpose is legitimate. If he wants to have the witness affirm what is simply argument, that is not a legitimate purpose.

HIS LORDSHIP.—The difficulty I understand is this. The text itself in not evidence to commence with. The text could only be made evidence by being sworn to by the witness. He would not be allowed to use the text to refresh his memory. If he himself remembered and could state the same thing, why he might state it. To read him a paragraph and ask him if that is his view, has the objection of being a leading question, and although it might not be objectionable with this witness, it might be with another witness. However, you have a perfect right to ask him the explanation of any term of which he knows the meaning, and which we do not know, to assist us when we come to read these works, if you do read them in argument, and enable us to understand them the better, or to explain any process, or anything of that kind. To that extent of course you have a right to look at them. If you find a given process you can ask him what he knows about that process, and to explain it. If you find a given term you can ask him what the term means or has reference to.

MR. CHRYSLER.—That is what I wish to do. I will not ask him any questions of the other character.

MR. CHRYSLER —I refer to this as authority at page 292 of the same article, column 1, line 43 (Encyclopedia Britannic)

"To carry out this operation the blast furnace is employed, the ore, flux and fuel being charged in at the top of the erection, and air being blown in at the base, so that a mixture of carbon oxide and nitrogen is formed at the lower levels, which, passing upwards, effects the deoxidation of the ore, the heat produced at the base fuses the reduced iron and the earthy matters &c., Which accumulate in two layers (the former being the heavier), and are drawn off from time to time, the one as cast or pig iron, into moulds for the market, the other as cinder or slag, usually of little or no value. Fresh materials are added at the top, so that the furnace works continuously."

Then at page 295.

MR. ALESWOTH —I think my learned friend is doing the very thing he was not to do. I do not know that is objectionable at all, except that it is taking time uselessly.

HIS LORDSHIP.—If objected to I could not allow Mr. Butcher to extend that on his notes. When you come to argument you can read it. You are simply putting in the text.

MR. CHRYSLER.—There are some passages of this as to which I wish to ask the witness the meaning of the technical terms.

HIS LORDSHIP —If Mr. Aleswoith objects I do not think Mr. Butcher would be allowed to put that on the notes.

MR. CHRYSLER.—Then how am I to use this book when the witness is gone?

HIS LORDSHIP.—You can use it as a matter of argument.

MR. CHRYSLER.—I desire to ask about the meaning of the passage in the next page, page 295, column 2, at the bottom, "Flux and cinders—When a very pure iron is smelted, such as Cumberland haematite or Swedish magnetite, the amount of silicious and earthly matter present relatively to the iron oxide is but small, and in consequence the amount of flux requisite to be added is also small. By proper combination of ores of different kinds the necessity for the addition of flux may be almost or altogether avoided; thus a high aluminous ferric oxide known as bauxite (valuable as a source of aluminium and its compounds, as well as servicable as a source of iron and flux in the blast furnace) and silicious haematite smelted together, with the addition of a little limestone or quicklime, furnish a cinder consisting mainly of calcareous aluminium silicate which readily melts and separates from the pig iron"

Q.—What is bauxite? A.—Bauxite is a mineral that is rich in alumina and the alumina is an element that is hard to handle in the blast furnace. It requires a special slag to carry it off, to make a fusible material with, or a fusible substance with.

Q.—What he is dealing with there is a mixture of ores apparently? A.—Yes. Some ores are difficult to smelt, and some are smelted easily. Those difficult to smelt require a special flux added to carry off the impurities, otherwise they form an infusible mass in the furnace, and the fusing operation is stopped.

Q.—Is the bauxite a flux then? A.—It is not ordinarily called a flux. The term "flux" depends upon what kind of a smelting operation is being carried on. What is a flux in one operation would not be in another operation A flux is a material added which combines with the impurities and forms a fusible mass, a mass that will fuse at the temperature you maintain in your smelting operation.

MR. CHRYSLER.—I do not wish to persist in this if my learned friend objects.

HIS LORDSHIP.—I am afraid I will have to rule with Mr. Alesworth if he does object.

MR. CHRYSLER.—It only involves that inconvenience. We have these passages and shall rely upon them at the argument. It seems to me it is a convenient way to enable Mr. Aylesworth to cross-examine the witness if he desires to do so.

MR. AYLESWORTH.—I do not think it is convenient to argue the case now.

HIS LORDSHIP.—Of course Mr. Aylesworth on cross-examination will be able to refer to texts and to authors which you cannot do at present. You can on re-examination refer to the same thing if he opens it on cross-examination.

MR. CHRYSLER.—Then I will reserve the remainder of that. That article is a most instructive article from beginning to end, and there are a large number of passages I will read later on the argument. I will ask now as to some of the books we have here.

(Adjournment 1 until 2 p.m)

MR. CHRYSLER resuming.

Q.—We have a set of photographs which I was not aware of. We will put them in for the information of the Court. What is that photograph? A.—This print shows the entire plant, that is except the coke oven. (Exhibit 5.)

Q.—Shewing in photograph the structures that are shewn in Exhibit No. 1? A.—Yes.

Q.—You have written upon the face what it represents—the three principal structures shewn there? A.—Yes.

Q —These are the blast furnaces, the open hearth and the blooming mill? A.—Yes.

Q.—Now, what is Exhibit No. 6? A.—Exhibit 6 shews the plan of furnace, shewing four blast furnaces, the boiler house and engine house and stock house. Also the cast houses.

Q —Do the run-ways for the skips appear in this? A.—It shews half of the skip-way on which the skip travels which fills the furnace.

Q.—And Exhibit 7? A.—Shews in detail on a larger scale the side of the casting house and the spout projecting through which the liquid pig is run into the ladles.

Q.—Which are there shewn standing? A.—Four of them shewn standing upon small trucks.

Q.—Then Exhibit No. 8? A.—Exhibit 8 shews the front of the open hearth furnaces, and the methods of charging the cold pig into these furnaces

Q.—It shews one of the charging boxes with the metal in it? A.—Yes.

Q.—It is a piston or ram? A.—Yes.

Q.—Then Exhibit 9? A.—Shews the interior of the open hearth building, the opposite side from the other Exhibit, and shews the crane holding a ladle of steel and steel being tapped into the ingot moulds on trucks.

Q—A question has been raised, I don't know how it came up, whether in discussion or examination, whether the molten pig as you have figured it there and described it in these ladles is a merchantable article capable of being sold? A.—Yes, we would sell it if we had a plant located here and wanted to buy it. It is capable of being sold all right. It is possible to sell it, I mean.

Q.—To a concern under a different establishment? A.—If there was a foundry establishment here, and they wanted to get pig iron from us direct, and we had a portion of our product that was not needed in the steel plant, we would be glad to sell to them, the same as we are selling the pig we do not need in our steel plant now in general markets.

Q.—How far in practice has this molten metal been carried in ladles of that nature? A.—About six miles is the longest distance I know of it being handled in large quantities regularly. That is at Cleveland.

Q.—And it is actually being carried that distance there? A.—It is carried by an independent railway in Cleveland.

Q.—By railway not belonging to the works? A.—Shipped as freight under all the regulations of freight traffic.

Q.—And is it shipped to a different concern? A.—No, this concern has a plant of furnaces located a long distance away from these mills.

Q —But not owning the railway which connects them? A.—No; they have to pay freight on this commodity. That is the Newburg Steel works of Cleveland.

Q.—Supposing you were selling it as you say to a foundry plant who were using hot metal for castings, what would be the name of the material? A.—It would be called liquid pig.

Q.—Liquid pig what? A.—Liquid pig iron.

Q.—Are there pigs of any other metal besides iron? A.—Pig lead and pigs of copper; a great many different metals are run into moulds and called pigs.

Q.—So that the name "pig" is not used exclusively in connection with iron? A.—No, it is not.

CROSS-EXAMINED BY MR. AYLESWORTH :—

Q.—This Company, the Dominion Iron and Steel Company, had been in practical operation before for some months you came, I understand? A.—Yes the blast furnaces were in operation.

Q.—They had not begun to make the steel commercially yet? A.—They had not at that time.

Q.—At the time you came? A—No.

Q.—But the blast furnaces had been in operation in sending out pig iron for some six months? A.—Yes, about six months.

Q.—And during the whole of that time had been manufacturing the ordinary cold pig of commerce I suppose? A.—Machine and sand pigs but not the regular sand pigs.

Q.—All cold of course? A.—Oh, yes.

Q.—Selling it or storing it? A.—Selling it. They carried some stock, but it was on the market.

Q.—But selling it in the open market? A.—Yes.

Q.—Of course pig-iron is a perfectly well-known commercial commodity having a market price? A.—Yes.

Q.—Sold by the ton, is it? A.—Yes.

Q —And I suppose graded, is it not? A.—How do you mean?

Q.—Are there not different qualities or grades? A.—Yes. It is sold according to the fracture and also according to the analysis.

Q.—These words "fracture" and "analysis" that you mention are two separate means by which the grade or quality of the iron can be determined? A.—Yes, two separate means for determining the quality.

Q.—And different qualities I suppose command different prices in the market according to the quality? A.—Yes.

Q.—Then after you came, and the manufacture of steel was gone on with by the plaintiff company, did they continue to dispose of any of their other products besides steel? A.—Selling pig-iron right along.

Q.—And are still? A.—Yes.

Q.—But you are not selling any of the pig-iron in the liquid form? You use all the liquid? A.—Yes.

Q —And are you aware of any case in which there is sale of the liquid material? A.—No, I do not know of any place where they are selling liquid pig.

Q.—The only places where they use it are places where the same company or proprietor owns both the blast furnaces and the steel plant? A.—On this Continent that is true. I do not know anything about the condition elsewhere.

Q.—Then, if I understand you aright, the first thing you have to do to handle iron ore and get it into a merchantable condition, or workable condition, is to get rid of a quantity of the accompanying impurities that are always found present with the ore? Is that general statement correct as to the office of the blast furnace? A.—Well, the office of the blast furnace is to produce a crude form of metal to be used later on.

Q.—In some more perfect matter? A.—In some further process.

Q.—It is the first step in the process of the manufacture of the completed article, whatever it may be, from the ore? A.—Yes.

Q.—You never find iron pure in nature? A.—In very small quantities up in some northern latitude. Enough has been found so that it can be actually said to exist. Only in very small quantities however.

Q.—Practically it is always mixed? A.—It is always in the oxidized condition. Practically as an iron rust. The ore oxide is practically the same composition.

Q.—And I suppose each bed of ore or mine will differ largely from other mines in the constituents of the ore? A.—Practically it does, but not always

Q —And the same mine will present variations in the chemical analysis of bodies of its ore? A.—Quite often it does. Quite often we get a practically uniform body of ore, but it is not a rule.

Q.—Ordinarily found mingled with what other material? What other elements or metals? A.—Well, for the most part it is found mixed with silica, which is an oxide of the metal silicon, and alumina, which is an oxide of metal aluminum, and lime, which is an oxide of the metal calcium. Lime does not usually occur in the oxide form in the ore. It is usually in a carbonate, and then it is called lime-stone, and magnesia, which is an oxide of the metal magnesium.

Q.—And what about manganese? A—That is a metal and not called an impurity.

Q – But does it occur with iron? A.—It does usually.

Q —But in the state of nature, or as you find the ore, do you find carbon mingled with the ore? A —Very seldom except in some special varieties of ore called black sand.

Q.—But generally speaking you do not find carbon with it A.—No

Q —The sulphur and phosphorus are enemies? You want to get rid of them? A —Yes, we have to get rid of these.

Q.—Do they occur with the iron in the ore, or are they introduced in the process of manufacrure? A.—They occur with the iron, and they are intrdouced to some extent in the manufacture, and particularly sulphur. Phosphorus not so much.

Q.—And you generally find the ore mingled with earth I suppose? A.—Yes, generally find it in rather an impure condition.

Q.—Where do you get your ore from? A.—We are getting practically all our ore from Newfoundland.

Q —And it is in the form of hematite? A.—It is in the form of hematite and it occurs in a bed there. Practically one or two long beds or stratas on Bell Island in Conception Bay, Newfoundland.

To be continued.

NEW COMPANIES.

ONTARIO.

Cassiar Coal Development Co., Ltd.—Incorporated 25th Oct., 1902 Capital $300,000, in shares of $100.00 each. Head office: Toronto, Ont

London-Elgin Oil Co., Ltd.—Incorporated 29th Oct., 1902. Authorised capital $250,000, in shares of $25.00 each. Head office: London, Ont.

Little Rock Consolidated Mining and Development Co., Ltd.—Incorporated 30th Sept., 1902. Authorised capital $2,000,000, in shares of $1.00 each. Head office: Toronto.

Great Northwest Mining Co., Ltd.—Incorporated 29th Oct., 1902. Authorised capital $3,000,000, in shares of $1.00 each. Head office: Toronto, Ont.

New York and Canadian Copper Co.—Incorporated 12th Nov., 1902. Authorised capital $1,000,000, in shares of $10.00 each. Head office: Kingston, Ont.

Indian Joe Gold Mining Co., Ltd.—Incorporated 19th Nov., 1902. Authorised capital $500,000, in shares of $100.00 each. Head office. Toronto, Ont.

The Home Gold and Copper Co., Ltd.—Incorporated 15th October, 1902. Authorised capital $3,000,000, divided into 3,000,000 shares of $1.00 each. Head office: Toronto, Ont.

The Keenora Mining Co., Ltd.—Incorporated 15th October, 1902. Authorised capital $1,000,000, in shares of $1.00 each. Head office. Toronto, Ont

The Jubilee Mining Co. Ltd.—Incorporated 15th Oct., 1902. Authorised capital $500,000, in shares of $1.00 each. Head office: Toronto, Ont.

BRITISH COLUMBIA.

Halifax Mines of B.C., Ltd.—Incorporated 24th Oct. 1902. Authorised capital $150,000, in shares of 10 cents each.

Rosella Hydraulic Mining and Dev. Co, Ltd.—Incorporated 31st Oct., 1902. Authorised capital $250,000, in shares of 25 cents each.

COMPANY NOTES.

New England-Canadian Asbestos Co.—This company was incorporated in the State of Maine on 5th ultimo with an authorized capital of $1,500,000 in shares of a par value of $1 00. Shares issued $1,200,000. Directors: C. B. Ingraham, F. L. Smith, R. H. Martin, M. A. Steele, B. F. Riddell, Jas H. Waring, W. L. Wilds, T. E. Hathaway, G. Frank Allen, George Macomber, I. N. McClure. The head office of this company is room 1001, Banigan Building, Providence, R. I. Canadian office, Thetford Mines. The company has acquired 120 acres of asbestos property at Black lake, 200 acres at Thetford and 1800 acres at Broughton, Province of Quebec.

New Goldfields of British Columbia.—The 5th annual report of this company, for the year ended 30th June, 1902, has been issued.

The Profit and Loss Account shows a gross profit of £2,241 5s 3d., expenditure £2,233 16s. 10d., leaving a net profit for the year of £7 8s. 6d This balance, together with the amount brought forward from last account—viz., £2,240 18s. 3d., gives a total credit balance of £2,248 6s. 9d, from which has been deducted £549 5s. 3d for Income Tax, leaving a net credit balance at date of £1,699 1s. 6d., which with the reserve of £5,000 shown in last year's balance sheet, amounts to £6,699 1s. 6d.

The period covered by this report has not been favorable for this company's operations, which the directors have limited as much as possible, whilst maintaining where necessary its interest in subsidiary undertakings. The working expenses of the company and the payments to directors have meanwhile been considerably reduced.

Velvet Rossland Mine, Limited—The accompanying circular, just issued by that company, will show the greatly improved prospects of this mine, in which the company holds a large interest, and it will be seen from same that the manager, Mr. William Gray, is of opinion that the Velvet Mine at present looks better than ever it did.

The shipments, although as yet comparitively small, have been of high value, and have realized an average of £4 6s. 6d. per ton net from the smelters, and since the 1st September last have returned sufficient to meet all expenses at the mine.

Portland (Rossland) Mine, Limited.—Mr. Gray confirms the reports of Mr. James Morrish and Mr. Sorensen as to the rich character of the ore deposits on this property. The recent satisfactory developments at the Velvet, adjacent thereto, have further tendered to strengthen the favorable opinion hitherto entertained as to its value

Bluebell (Rossland) Mine, Limited.—Was formed to acquire the Bluebell property. This company's interest in it is now, therefore, represented by shares in that undertaking. The property has since been Crown granted, and it will be remembered adjoins the Portland and Velvet Mines.

Maldon Goldfields, Limited.—This company, with the additional capital raised, is carrying out the scheme of deeper working recommended by the

local directors, and at 1,100 feet a mineralised reef was struck, as anticipated, which is now being driven upon.

Klondyke Corporation, Limited.—There is practically no change in the position of affairs of this company since last report.

Melkedalen Copper Mines, Ltd.—The position of this enterprise is fully set out in a circular just issued to the shareholders of that company. Mr. Harman and Mr. Brooke Mee visited the property in September last, with Mr. Rickard, the consulting engineer, and feel assured that this company's interest in that undertaking is of great prospective value.

Le Roi.—Cabled returns for November: "Shipped from mine to Northport during the past month 15,576 tons, containing 8,380 oz. of gold, 9,600 oz. of silver, 407,400 lb. of copper; estimated profit on this ore, $75,000. Shipments from second-class dump suspended for the winter months."

Giant.—Cable received 5th December:—"Output for month of November, 215 tons. Return from smelting works $12 net per ton."

Montreal & Boston.—Officials of the Montreal & Boston Copper Company have received information of the discovery of an important body of ore in the Crown silver mine, belonging to that company. The ore was found at the 150-foot level, and thus far shows a value of more than $11 per ton or nearly double the average value of the ore hitherto taken from the mine. The management will at once increase the daily output to about 200 tons This the company will be able to handle when its new furnace is completed, which will be on or about Feb. 1.

CENTRE STAR.

The following is excerpted from Mr. Kirby's annual report referred to editorially in this issue of THE REVIEW:—

The condition of the Centre Star mine has much improved during the past year. The reserves of pay ore have been increased. The heavy decline in the price of copper has been more than offset by the reduction in smelting rates and the satisfactory solution of the problem of treating the low grades by milling now makes it certain that the large bodies of this ore exposed throughout the mine will soon be available.

There is no change to report above the 4th level.

The 5th level has developed within the main ore shoot two ore bodies which are now evidently continuous through the block of the 4th level second and third ore bodies described in the last report. Of these 5th level ore bodies, one is found to have large dimensions, extending 125 feet along the vein, averaging 29 feet in width and $8.25 smelter's gross assay value. The other is 75 feet long, 9 feet wide, averaging $16.00 smelter's gross assay value. These bodies extending below, terminate at some point in the block between 5th and 6th levels.

At the 6th level, the vein was found to branch. The north branch followed the previous place of the vein in which the inclined shaft is located, while the south branch assumed a more vertical position, departing at the shaft so that at the 8th level it stands about 200 feet south of the shaft station. The north branch so far as tested on the 6th, 7th and 8th levels is poorly mineralized and without pay values. The heavy mineralization is found to have followed the south branch, which is evidently the main vein. Its junction with the north branch has been found on the 6th level to lie about 450 feet east of the shaft. The time required to reach the vein in its new position by cross cutting back of the shaft stations has much delayed the exploration on the 7th, 8th and 9th levels. It is now well exposed on the 6th level, which extends through the greater part of the length of the claim The south vein is but partially opened by the 7th level, while the 8th level has only just begun, and the 9th level cross-cut has not yet reached the vein. On account of this delay, it was deemed best to suspend shaft-sinking until the three lower levels were more advanced.

The 6th level pay ore, so far as now known, comprises the aforesaid downward extensions into its block of the two-fifth level bodies. There is also a body 355 feet east of the shaft, which as cut by the level is 50 feet long and the full width of the level, averaging $7.95 per ton. With this exception, the level is generally in low grade ore and at various places in its course east of the shaft it cuts bodies of milling ore. These are evidently large in quantity, although their precise limits and grade cannot be ascertained until they are opened out for stoping.

The 7th level has so far exposed no pay ore, but has cut a body of milling ore of unknown dimensions.

The few feet of drifting done on the 8th level has been in low grade ore, but at the date of writing (Nov. 12) the level west from the shaft cross-cut has passed through 25 feet of high grade ore, averaging $16.00 smelter's gross assay value. The heading is now in low grade ore.

The ore sales during the year are 11,087 tons, averaging $13.31 smelter's gross assay value. The average assay contents were: Gold, .64 oz.; silver, .56 oz.; copper, 1.2 per cent. The present reserves of ore payable under the new smelter's rates are estimated at about 100,000 tons, averaging $10 33 smelter's gross assay value (priceing copper at 12 cents, instead of 16.25 cents as in former reports). These reserves include only ore so exposed that its limits and grade can be estimated with reasonable certainty. They do not include the downward extension of the 5th level ore bodies into the 6th level block, nor do they include the better portions of milling ore bodies which in a number of places are known to carry enough value to make them payable under the new smelter's rates.

The development of the mine has from the beginning continued to expose large quantities of ore too low in grade for smelting, but rich enough to promise a handsome profit to successful milling. Now that the difficulties of such treatment has been overcome, these low grade masses will soon be available. It is impossible to present any reliable estimate of their quantity or precise value, because their limits have not been clearly defined, and, until milling begins, they cannot be accurately sampled without excessive expense. The process of stoping them for the mill will undoubtedly develop much ore of higher grade which is not now disclosed by the workings.

CON. LAKE SUPERIOR.

The following is extracted from the first annual report covering the year ended 30th June last:—

IRON AND STEEL OPERATIONS.

Within the past year the operations of your Company have been very largely increased by the starting of the Bessemer steel works and rail mill of the Algoma Steel Company, Limited. The entire mechanical equipment of this plant was installed and practically ready to run at the end of 1901, but owing to delay on the part of the contractors for the structural work and the lack of girders and columns to support the cranes, without which the mill could not be operated, it was impossible to put this plant into operation before the close of the fiscal year, since which time it has been running continuously. The starting of this mill was an event of no little importance in the history of Canada, as it marked the beginning of a new industry of great magnitude and the rolling of the first rail in the Dominion from Canadian Bessemer steel, made from Canadian pig iron smelted from Ontario iron ore.

The steel produced thus far in the Algoma works has been made from purchased pig iron, of which a large supply was acquired in advance of the starting of the plant at advantageous prices, as the blast furnaces of the company have not yet been completed. Two furnaces, one to use charcoal and the other coke, are under construction and are now well advanced towards completion, to be followed by additional furnaces as may be required. Like everything else dependent upon iron and steel manufacturers for material, the construction of these furnaces has been greatly delayed. The completion of the blast furnaces will give to the Company its own supply of pig iron which can be produced profitably at a much lower price than it can be purchased, and which, furthermore, will enable the Company to earn the bounty which the Canadian Government pays on pig iron made from ore mined within the Dominion, only the bounty on steel now being earned.

The Bessemer steel works and rail mill now in operation constitute a thoroughly modern and well-equipped plant. Its converting capacity is sufficient to produce 600 tons of Bessemer steel ingots daily, while the blooming mill and rail mill will finish from 1,000 to 1,200 tons per day. The arrangement of the plant is such that material can be handled at a minimum labor cost, and an unusually large output per man is thus obtainable. The availability of electric power at much lower cost than steam is one of the great advantages enjoyed by this plant. With the exception of the two main engines, which drive the blooming mill and the rail train, and the blowing engines of the Bessemer steel department, electric power is used throughout the works for the operation of cranes, live rolls, tables, saws, drills and straightening presses.

There are few plants so well arranged and so efficiently equipped and with the completion of the blast furnaces, which will furnish an independent supply of pig iron, it is believed that these works will be in a position to compete successfully with the best equipped mills in the manufacture of steel rails.

Renewals on the 18,000 miles of railroad now existing in Canada, and the requirements of the new construction which is bound to increase largely under the progressive policy of the Dominion and Provincial Governments, will furnish a sure market in Canada for steel rails far in excess of the capacity of this first mill, as indicated by the orders which your Company already has booked.

(*Iron Ore Mines.*)—The iron ore operations of your Company are probably the most important productive undertakings, not alone on account of the profits on the mining and sale of ore, but also because of the profitable business which the transportation of this material furnishes to your railroad and steamship lines, and beyond this the completion of the blast furnaces will make these mines the independent basis of the steel industry at Sault Ste. Marie.

Iron ore shipments thus far have been confined to the Helen mine which has fully justified all expectations as to the extent of the deposit and the quality of the ore. The shipments during the fiscal year of your Company ended 30th June, 1902, amounted to 341,750 tons as compared with 91,436 tons during the preceding year.

Since the beginning of the present season, work at the Helen mine has been devoted largely to the systematic development of the property in such manner as to permit continuous shipments much larger than have been possible since the first opening of the mine. Shafts have been sunk, and at different levels workings are being extended in a solid body of ore, which will permit the mining of ore of higher grade even than was indicated at the surface. The first ore is now being raised from underground, and an increase in the output is now made possible.

Lake Boyer, on the shore of which the Helen mine is located, has been drained, and a large body of surface ore has thus been uncovered. An extensive deposit adjoining the Helen mine which was not included in the property originally purchased, has been acquired by your Company, and this will permit the extension of operations at the Helen mine to greater advantage. The purchase of this adjacent property, with other mining claims held by the same owners now gives your Company complete control of the Michipicoten iron range, and provides not only opportunity for present mining operations, but also abundant reserves for the future. Your Company will be in a position to meet the demand for iron ore for a term of years extending so far into the future that the time of its termination need not be considered.

The extension of the railroad to the Josephine mine, ten miles beyond the Helen mine, now affords an outlet to the second of your iron ore properties that is under development. At the Josephine mine a shaft has been sunk and the development of the deposit is being carried on, so that the shipments once begun can be continued without interruption. The beginning of another season will see this mine ready to make shipments of high-grade Bessemer ore.

Several other iron ore properties have been located along the surveyed line of the Algoma Central and Hudson Bay Railway, and as railroad construction proceeds their development will be undertaken.

(*Charcoal and By-products*)—The abundant supplies of hardwood upon the Ontario land grants of your Company will furnish ample fuel resources for many years. To meet the requirements of the charcoal blast furnace, and for other purposes, by-products retorts and bee-hive kilns have been constructed, with sufficient capacity to give a surplus of charcoal for sale after providing amply for all requirements of your Company's various plants, recent developments having opened markets elsewhere which will permit the sale of large quantities of charcoal at profitable prices, so that this department of operations can readily be made a source of considerable additional income.

Adjacent to the blast furnaces and steel works at Sault Ste. Marie a battery of twenty by-product retorts has been constructed, with all the necessary equipment for recovering the products of distillation and preparing them for sale. Experience has fully established the practical economy of making both coke and charcoal in ovens, which will prevent the loss of the by-products, and in the operation of the charcoal retorts which have been constructed at Sault Ste. Marie the recovery of the waste products—acetate of lime and wood alcohol—will practically pay the cost of making the charcoal. There is a ready market for the by-products and advantageous offers for the purchase of the entire output have been already made.

In addition to this by-product plant, fifty-six bee hive kilns have been built at points on the Algoma Central & Hudson Bay Railway, where supplies of hardwood can be obtained to the best advantage.

(*Nickel Operations.*)—Development of the nickel properties of your company in the Sudbury region of Ontario has proceeded continuously during the past year, and excellent progress has been made in bringing these properties into productive condition. Mining has been carried on steadily at both the Gertrude and Elsie mines, and in addition to the raising of a large amount of ores, these mines have been developed so that the desired output can be maintained continuously. Further exploration of these properties confirms the first impressions as to their extent and value, and it is now beyond us that in these mines your company possesses some of the most important deposits of nickel ore in the world.

The pure nickel ore, that is the ore which contains nickel without copper, is shipped from your mines to Sault Ste. Marie, Ont., where it is crushed and roasted to remove the sulphur. The sulphurous fumes from the roasting furnaces are utilised in the sulphite pulp mill, thus saving the usual expense of sulphur or pyrites required in chemical wood pulp mills. The roasted ore is pressed into briquettes, in which form it is ready for smelting with iron ore in the blast furnace, the resultant pig-iron containing a sufficient percentage of nickel to make a high grade of nickel steel when this iron is converted into steel. Pending the completion of the blast furnaces a large stock of the briquettes of roasted nickel ore is being accumulated ready for smelting when the furnaces go into operation. The making of a ferro nickel pig and its subsequent conversion into nickel steel will complete the series of processes for which the group of works at Sault Ste. Marie was designed and will permit the production of nickel steel with economy and positive results. The early completion of the blast furnaces, which is being hastened with all possible urgency, is all that is now required to put this plan into full operation.

The ore from the nickel mines containing copper are roasted in heaps at the mines to remove the sulphur, and the cinder is ready then for processes of reduction to metallic nickel and copper. The first smelter at the Gertrude mine was put into operation in June, with a daily capacity of about 20 tons of matte, containing about 16 per cent. of nickel and 8 per cent. of copper, and two additional smelters of similar capacity are under construction and approaching completion. A Bessemerizing plant for the elimination of the iron and impurities and the concentration of the 24 per cent. matte to about 80 per cent. of metallic contents will complete the works and enable the production of high grade matte of the preferred marketable form.

Contracts have been made with consumers of this matte, who will take a quantity equal to the entire output of the plant now provided for, and who will erect large works on the company's property on the American side at Sault Ste. Marie, for the refining and further manufacture of this material, using power from the new canal.

Negotiations have just been concluded for the establishment of large electrolytic refining works at Sault Ste. Marie, Ont., which will require an additional supply of ore from the nickel mines and matte from the smelters to be reduced into metallic nickel and copper.

The entire series of metallurgical and chemical processes based upon the nickel deposits of your company constitute a practical manufacturing undertaking of assured commercial success.

ADVERTISING PAYS.

Montreal, 21st February, 1902.

The Canadian Mining Review,
Ottawa.

We have been advertising in the Canadian Mining Review for some sixteen years, and as extensive manufacturers of mining machinery in Canada we have great pleasure in stating that we consider that the money spent in reaching the public through your columns has paid us an hundred fold. We consider it, without exception, the best medium to reach the mining, engineering and investing public in the Dominion of Canada, not taking into consideration its foreign circulation. Our continued patronage will serve as substantiating the above assertions.

We are

Yours faithfully,

THE JAMES COOPER MFG. CO.

PROVINCE OF NOVA SCOTIA.

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

—AND—

PRECIOUS STONES.

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

GOLD AND SILVER.

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

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

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

MINES OTHER THAN GOLD AND SILVER.

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

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

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

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

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

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

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

THE HON. A. DRYSDALE,
Commissioner Public Works and Mines,
HALIFAX, NOVA SCOTIA.

PROVINCE of QUEBEC

The attention of Miners and Capitalists in the United States and in Europe is invited to the

GREAT MINERAL TERRITORY

Open for investment in the Province of Quebec.

Gold, Silver, Copper, Iron, Asbestos, Mica, Plumbago, Phosphate, Chromic Iron, Galena, Etc.

ORNAMENTAL AND STRUCTURAL MATERIALS IN ABUNDANT VARIETY.

The Mining Law gives absolute security to Title, and has been specially framed for the encouragement of Mining.

Mining concessions are divided into three classes :—

1. In unsurveyed territory (*a*) the first class contains 400 acres, (*b*) the second, 200 acres, and (*c*) the third, 100 acres.

2. In surveyed townships the three classes respectively comprise one, two and four lots.

All lands supposed to contain mines or ores belonging to the Crown may be acquired from the Commissioner of Colonization and Mines (*a*) as a mining concession by purchase, or (*b*) be occupied and worked under a mining license.

No sale of mining concessions containing more than 400 acres in superficies can be made by the Commissioner to the same person. The Governor-in-Council may, however, grant a larger extent of territory up to 1,000 acres under special circumstances.

The rates charged and to be paid in full at the time of the purchase are $5 and $10 per acre for mining lands containing the superior metals* ; the first named price being for lands situated more than 12 miles aud the last named for lands situated less than 12 miles from the railway.

If containing the inferior metal, $2 and $4 according to distance from railway.

Unless stipulated to the contrary in the letters patent in concessions for the mining of superior metals, the purchaser has the right to mine for all metals found therein ; in concessions for the mlning of the inferior metals, those only may be mined for.

*The superior metals include the ores of gold, silver, lead, copper, nickel, graphite, asbestos, mica, and phosphate of lime. The words inferior metals include all other minerals and ores.

Mining lands are sold on the express condition that the purchaser shall commence *bona fide* to mine within two years from the date of purchase, and shall not spend less than $500 if mining for the superior metals ; and not less than $200 if for inferior metals. In default, cancellation of sale of mining lands.

(*b*) Licenses may be obtained from the Commissioner on the following terms :—Application for an exploration and prospecting license, if the mine is on private land, $2 for every 100 acres or fraction of 100 ; if the mine is on Crown lands (1) in unsurveyed territory, $5 for every 100 acres, and (2) in unsurveyed territory, $5 for each square mile, the license to be valid for three months and renewable. The holder of such license may afterwards purchase the mine, paying the prices mentioned.

Licenses for mining are of two kinds : Private lands licenses where the mining rights belong to the Crown, and public lands licenses. These licenses are granted on payment of a fee of $5 and an annual rental of $1 per acre. Each license is granted for 200 acres or less, but not for more ; is valid for one year, and is renewable on the same terms as those on which it was originally granted. The Governor-in-Council may at any time require the payment of the royalty in lieu of fees for a mining license and the annual rental—such royalties, unless otherwise determined by letters patent or other title from the Crown, being fixed at a rate not to exceed three per cent. of the value at th mine of the mineral extracted after deducting the cost of mining it.

The fullest information will be cheerfully given on application to

THE MINISTER OF LANDS, MINES AND FISHERIES,

PARLIAMENT BUILDINGS, QUEBEC, P. Q.

DOMINION OF CANADA

SYNOPSIS OF REGULATIONS

For Disposal of Minerals on Dominion Lands in Manitoba, the North-West Territories, and the Yukon Territory.

COAL.

Coal lands may be purchased at $10.00 per acre for soft coal, and $20.00 for anthracite. Not more than 320 acres can be acquired by one individual or company. Royalty at such rate as may from time to time be specified by Order-in-Council shall be collected on the gross output.

QUARTZ.

Persons of eighteen years and over and joint stock companies holding Free Miner's certificates may obtain entry for a mining location.

A Free Miner's Certificate is granted for one or more years, not exceeding five, upon payment in advance of $10.00 per annum for an individual, and from $50.00 to $100.00 per annum for a company, according to capital.

A Free Miner having discovered mineral in place may locate a claim 1500 x 1500 feet by marking out the same with two legal posts, bearing location notices, one at each end of the line of the lode or vein.

The claim shall be recorded within fifteen days if located within ten miles of a Mining Recorder's Office, one additional day allowed for every additional ten miles or fraction. The fee for recording a claim is $5.00.

At least $100.00 must be expended on the claim each year or paid to the Mining Recorder in lieu thereof. When $500.00 has been expended or paid the locator may, upon having a survey made and upon complying with other requirements, purchase the land at $1.00 per acre.

Permission may be granted by the Minister of the Interior to locate claims containing iron and mica, also copper in the Yukon Territory, of an area not exceeding 160 acres.

The patent for a mining location shall provide for the payment of royalty on the sales not exceeding five per cent.

PLACER MINING, MANITOBA AND THE N.W.T., EXCEPTING THE YUKON TERRITORY.

Placer mining claims generally are 100 feet square; entry fee, $5.00, renewable yearly. On the North Saskatchewan River claims are either bar or bench, the former being 100 feet long and extending between high and low water mark. The latter includes bar diggings, but extends back to the base of the hill or bank, but not exceeding 1,000 feet. Where steam power is used, claims 200 feet wide may be obtained.

DREDGING IN THE RIVERS OF MANITOBA AND THE N.W.T., EXCEPTING THE YUKON TERRITORY.

A Free Miner may obtain only two leases of five miles each for a term of twenty years, renewable in the discretion of the Minister of the Interior.

The lessee's right is confined to the submerged bed or bars of the river below low water mark, and subject to the rights of all persons who have, or who may receive entries for bar diggings or bench claims, except on the Saskatchewan River, where the lessee may dredge to high water mark on each alternate leasehold.

The lessee shall have a dredge in operation within one season from the date of the lease for each five miles, but where a person or company has obtained more than one lease one dredge for each fifteen miles or fraction is sufficient. Rental $10.00 per annum for each mile of river leased. Royalty at the rate of two and a half per cent., collected on the output after it exceeds $10,000.00.

DREDGING IN THE YUKON TERRITORY.

Six leases of five miles each may be granted to a free miner for a term of twenty years, also renewable.

The lessee's right is confined to the submerged bed or bars in the rivers below low water mark, that boundary to be fixed by its position on the 1st day of August in the year of the date of the lease.

The lessee shall have one dredge in operation within two years from the date of the lease, and one dredge for each five miles within six years from such date. Rental, $100.00 per mile for first year, and $10.00 per mile for each subsequent year. Royalty ten per cent on the output in excess of $15,000.00.

PLACER MINING IN THE YUKON TERRITORY.

Creek, Gulch, River, and Hill claims shall not exceed 250 feet in length, measured on the base line or general direction of the creek or gulch, the width being from 1,000 to 2,000 feet. All other Placer claims shall be 250 feet square.

Claims are marked by two legal posts, one at each end bearing notices. Entry must be obtained within ten days if the claim is within ten miles of Mining Recorder's office. One extra day allowed for each additional ten miles or fraction.

The person or company staking a claim must hold a Free Miner's certificate.

The discoverer of a new mine is entitled to a claim 1,000 feet in length, and if the party consists of two, 1,500 feet altogether, on the output of which no royalty shall be charged, the rest of the party ordinary claims only.

Entry fee $15.00. Royalty at the rate of 2½ per cent. on the value of the gold shipped from the Territory to be paid to the Comptroller.

No Free Miner shall receive a grant of more than one mining claim on each separate river, creek, or gulch, but the same miner may hold any number of claims by purchase, and Free Miners may work their claims in partnership, by filing notice and paying fee of $2.00. A claim may be abandoned and another obtained on the same creek, gulch, or river, by giving notice, and paying a fee.

Work must be done on a claim each year to the value of at least $200.00, or in lieu of work payment may be made to the Mining Recorder each year for the first three years of $200.00, and after that $400.00 for each year.

A certificate that work has been done or fee paid must be obtained each year; if not, the claim shall be deemed to be abandoned, and open to occupation and entry by a Free Miner.

The boundaries of a claim may be defined absolutely by having a survey made, and publishing notices in the *Yukon Official Gazette.*

HYDRAULIC MINING, YUKON TERRITORY.

Locations suitable for hydraulic mining, having a frontage of from one to five miles, and a depth of one mile or more, may be leased for twenty years, provided the ground has been prospected by the applicant or his agent; is found to be unsuitable for placer mining; and does not include within its boundaries any mining claims already granted. A rental of $150.00 for each mile of frontage, at the rate of 2½ per cent. on the value of the gold shipped from the Territory. Operations must be commenced within one year from the date of the lease, and not less than $5,000.00 must be expended annually. The lease excludes all base metals, quartz, and coal, and provides for the withdrawal of unoperated land for agricultural or building purposes.

PETROLEUM.

All unappropriated Dominion Lands shall, after the first of July, 1901, be open to prospecting for petroleum. Should the prospector discover oil in paying quantities he may acquire 640 acres of available land, including and surrounding his discovery, at the rate of $1.00 an acre, subject to royalty at such rate as may be specified by Order in Council

OTTAWA, 9th Dec., 1901.

JAMES A. SMART,
Deputy of the Minister of the Interior.

THE DOMINION WIRE ROPE CO. LIMITED

MONTREAL, CAN.

Manufacturers of **"LANG'S" PATENT WIRE ROPES**

FOR COLLIERY AND GENERAL MINING PURPOSES.

ALSO BEST STEEL WIRE ROPES FOR ALL PURPOSES.

ALSO

SOMETHING NEW...

SOMETHING TO LAST...

The Wearing Surface of Hemp.

The Strength of Wire.

The Flexibility of Manila.

UNEXCELLED FOR TRANSMISSION AND PILE DRIVING PURPOSES

BRANCH OFFICES: Vancouver, B.C. Rossland, B.C. Winnipeg, Man. Toronto, Ont. Ottawa, Ont. Halifax, N.S.

CATALOGUE ON APPLICATION.

MINING AND CONTRACTORS' RAILS...

RELAYING RAILS 30 lbs., 45 lbs., 56 lbs., 65 lbs. per Yard

IMMEDIATE SHIPMENT.

LIGHT MINING RAILS

12 lbs., 18 lbs., 25 lbs., 30 lbs., per Yard

..IN STOCK..

JAMES COOPER

ORE AND **..Mining Cars..**

WHEELBARROWS ALL KINDS

SPECIAL ORE BARROWS

Charging Barrows

PICKS, SHOVELS, HAMMERS, TOOLS, ETC., ETC.

CATALOGUE ON APPLICATION

Barrett Jacks. Car Movers.

ENGLISH OCTAGON DRILL STEEL CARRIED IN STOCK...

Office: 299 ST. JAMES ST., MONTREAL.