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
- [✓] Bound with other material/ Relié avec d'autres documents
- [✓] 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:

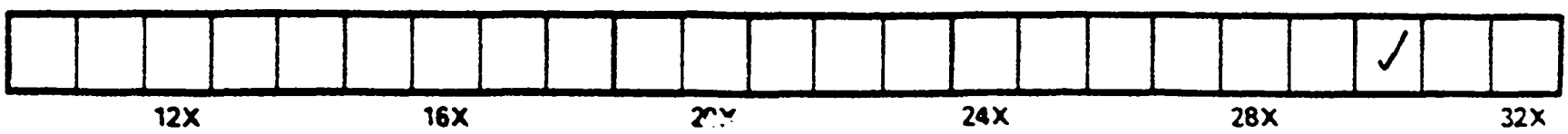
- [ ] Coloured pages/ Pages de couleur
- [ ] Pages damaged/ Pages endommagées
- [ ] Pages restored and/or laminated/ Pages restaurées et/ou pelliculées
- [✓] Pages discoloured, stained or foxed/ Pages décolorées, tachetées ou piquées
- [ ] Pages detached/ Pages détachées
- [✓] Showthrough/ Transparence
- [✓] Quality of print varies/ Qualité inégale de l'impression
- [✓] 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



FIFTEENTH YEAR OF PUBLICATION.

# The Canadian Mining Review

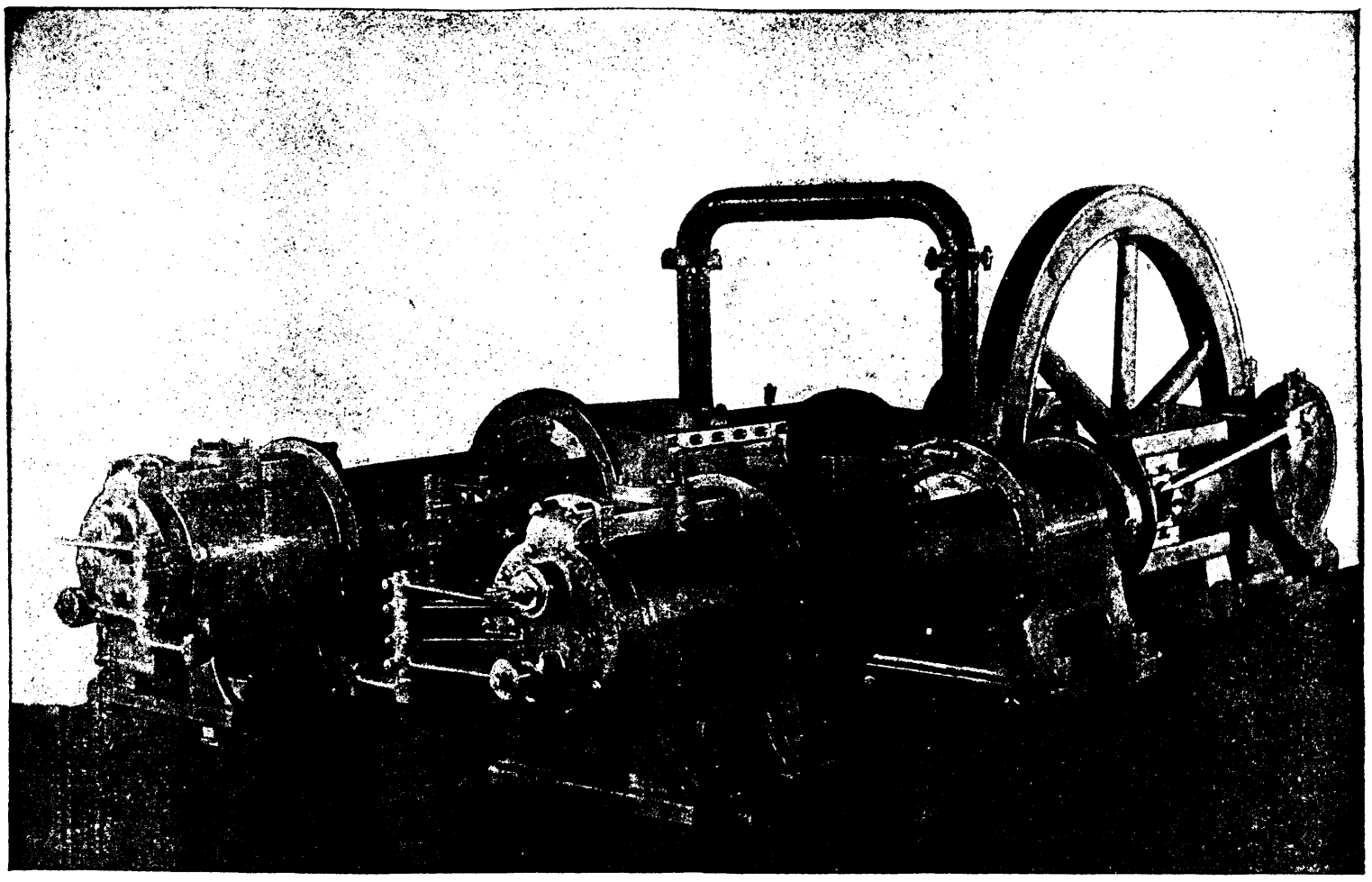
Established 1882

Vol. XVI.—No. 2 MONTREAL—OTTAWA HALIFAX. FEBRUARY, 1897.

Main Office and Works

# Sherbrooke

General Sales Office--**MONTREAL.**



HIGH CLASS AIR COMPRESSORS.

**BRANCHES--88 YORK ST., TORONTO.**

**F. R. MENDENHALL, ROSSLAND.**

**H. H. FULLER & CO., HALIFAX.**

# SCHOOL OF MINING,

## KINGSTON, ONTARIO.

## The following Courses are Offered

1. *Three Years' Courses for a Diploma in*
   - (A) Mining Engineering.
   - (B) Analytical Chemistry and Assaying.
2. *Four Years' Courses for a Degree in*
   - (A) Mining Engineering (M.E.)
   - (B) Chemistry and Mineralogy B. Sc.)
   - (C) Mineralogy and Geology (B. Sc.)
3. *Post-Graduate Courses for the Degree of*

   Doctor of Science (D. Sc.)
   For further information see the calendar of Queen's University for 1896-97, p. 128.
4. *Prospector's Course.*

   The School offers to Mine Foremen, Assayers, Prospectors and Mining Men generally, Special Courses of Instruction beginning January 6th, 1897, and continuing eight weeks.
5. *Extramural Classes for Prospectors and Mining Men.*

   Lecturers will be sent to Mining Centres to conduct Classes in Elementary Chemistry, Mineralogy and Geology as applied to the discovery and winning of valuable minerals.

---

The School is provided with well equipped Laboratories for the study of Chemical Analysis, Assaying Blowpiping, Mineralogy, Petrography and Drawing. In the Mining Laboratory recently built the operations of Crushing, Amalgamating, Concentrating, etc., can be studied on a large scale.

---

The BRUCE CARRUTHERS SCHOLARSHIP (value $200 per annum) will be awarded in May. Its object is to aid one who has had some experience in amalgamating, etc., in acquiring a good education in Mining Engineering. The conditions of the award will be made known on application to the Director or theBursar.

---

**FOR CALENDAR OF THE SCHOOL AND FURTHER INFORMATION APPLY TO**

# WM. MASON, Bursar,

## SCHOOL OF MINING, - KINGSTON, ONTARIO.

# PROVINCE OF NOVA SCOTIA.

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

—AND—

# PRECIOUS STONES.

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

## GOLD AND SILVER.

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

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

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

## MINES OTHER THAN GOLD AND SILVER.

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

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

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

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

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

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

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

**THE HON. C. E. CHURCH,**

**Commissioner Public Works and Mines,**

**HALIFAX, NOVA SCOTIA.**

## MINING LAWS OF ONTARIO.

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

Locations range from 40 to 320 acres.

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

Locations may be acquired in fee or under leasehold.

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

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

Rent of claims, $1 per acre each year.

Claims must be worked continuously.

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

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

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

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

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

ARCHIBALD BLUE,
Director Bureau of Mines

TORONTO, May 25th, 1894.

## John E. Hardman, S.B.

**CONSULTING MINING ENGINEER,**

**ROOM 2, WINDSOR HOTEL,**

**Montreal, Que.**

20 Years' Experience in the Mining and Reduction of Gold, Silver, Lead and Copper.

13 Years as a Specialist in Gold Mining and Milling.

---

## DR. ALFRED R. C. SELWYN,

**C. M. C., F. R S**

Late Director of the Geological Survey of Canada and of the Geological Survey of Victoria, Australia.

Mines and mineral properties examined and reported on. Fifty years experience in Britain, Australia and Canada.

OTTAWA, CANADA.

---

JOHN B. HOBSON, Min. Eng. and Metallurgist.

L. F. WARNER, Jr. Hydraulic and Min. Eng.

## HOBSON & WARNER

**Mining Engineers.**

**Twenty Years Practical Experience in California**

Will examine and report on mining properties in Canada and the United States.

**The Equipment and Opening of Deep Gravel Drift, Hydraulic and Gold Quartz Mines a Specialty.**

**QUESNELLE FORKS, BRITISH COLUMBIA.**

Agents for the Joshua Hendy Machine Works, Hydraulic and Mining Machinery, and the Well's Lights, for use in Hydraulic Mines.

REPRESENTED AT VANCOUVER BY

## J. M. BROWNING,

Corner Granille and George Streets, Vancouver, British Columbia.

---

## J. BURLEY SMITH,

**Civil and Mining Engineer,**

**30 Years Experience.**

**Glenalmond, Buckingham, Que.**

*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 and Assays made.

---

## J. T. DONALD,

**Assayer and Mining Geologist,**

**156 St. James Street, Montreal.**

Analyses and Assays of Ores, Fuels, Furnace Products, Waters, etc. Mines and Mining Properties Examined and Valued.

---

## WM. HAMILTON MERRITT, F.C.S.

Associate Royal School of Mines, &c.,

*MINING ENGINEER and METALLURGIST,*

Will report on Mines and Mineral Properties

ADDRESS:

**15 Toronto St., Toronto, Ont.**

---

## EDWARD C. HALL, Jr., S.B.

Graduate of Mass. Institute of Technology.

**MECHANICAL AND . .**

**. . MINING ENGINEER**

*Maps, Plans and Specifications, Examination of Mines, and Mining Properties a Specialty.*

**MINE CENTRE, Seine River, Ont., Can.**

---

## WALPOLE ROLAND,

**Civil and Mining Engineer.**

**Reports, Surveys, Estimates, & Development**

REFERENCES:

Engineering and Mining Journal, New York. The Canadian Mining Review, Ottawa, and The Mining Journal, London, England.

*CONSULTING ENGINEER.*

OFFICE: LA SEINE RIVER, ONT.

**Cable Address: "ROLAND," A1 Code.**

---

## T. R. DEACON, C.E., O.L.S.,

Graduate of the School of Practical Science,

**CIVIL & SANITARY ENGINEER,**

Ontario Land Surveyor, Valuator and Draughtsman.

Timber Limits, Mining Locations, Town Property, Etc, Surveyed. Plans and Specifications prepared Promptly and Neatly.

*Office: Upstairs in Humble's Brick Block,*

**Main St. RAT PORTAGE, ONT.**

---

## A. H. HOLDICH,

**NELSON, BRITISH COLUMBIA.**

Analytical & Consulting Chemist and Metallurgist.

From Royal School of Mines, London.

Seven years at Morfa Works, Swansea. Seventeen years Chief Chemist to Wigan Coal & Iron Co., England.

---

## R. P. FRASER,

**MINING BROKER,**

**Dealer in Mines and Minerals.**

**Expert at Diamond Drill Work.**

P. O. BOX 278,

*NEW GLASGOW, NOVA SCOTIA.*

---

## G. ORDWAY, B.S.,

**MINING ENGINEER.**

Mines reported on . . .

. . . Underground Surveys made

ASSAYER AND CHEMIST,

**ROSSLAND, B.C.**

---

## HOWARD WEST,

(Associate of Royal School of Mines, London.)

**MINING ENGINEER, ANALYTICAL CHEMIST And ASSAYER.**

*THREE YEARS IN THE KOOTENAY.*

Properties examined and reported on for intending Purchasers.

**BELLEVUE AVE., - - NEW DENVER, B.C.**

**A B C Code**

---

## GUESS BROTHERS,

**Metallurgical . Chemists .**

Thoroughly familiar with the Boundary Creek and Okanagan Mining Districts.

Properties examined Assays and Analyses of Ores, Fuels, Furnace Products, etc.

**OFFICES:**

**Midway, B.C., Greenwood, B.C.**

---

## J. C. GWILLIM, B.Ap.Sc

**MINING ENGINEER**

**New Denver, SLOCAN, B.C.**

---

## VON SCHULZ & LOW,

**ASSAYERS, CHEMISTS AND BULLION DEALERS.**

P.O. DRAWER 1537. 1746 CHAMPA ST., DENVER, COLO.

**Prices for Specimen Assays.**—Gold, Silver, Lead, or Copper, $1.00 each; any two, $1.50; any three, $2.50. Complete price list and sample bags for mailing furnished on application.

---

## E. E. BURLINGAME'S ASSAY OFFICE AND CHEMICAL LABORATORY

Established in Colorado, 1866. Samples by mail or express will receive prompt and careful attention.

**Gold & Silver Bullion Refined, Melted and Assayed, or Purchased.**

**Address, 1736 & 1738 Lawrence St., Denver, Colo.**

---

## MICHIGAN MINING SCHOOL.

A State School of Mining Engineering, located in the heart of the Lake Superior mining region, giving practical instruction in Drawing, Blue-printing, Mechanics, Mechanism, Properties of Materials, Graphical Statics, Mechanical and Electrical Engineering, Shop-practice, Analytical and Technical Chemistry, Assaying, Ore Dressing, Metallurgy, Plane, Railroad and Mine Surveying, Hydraulics, Mining, Mineralogy, Petrography, General, Economic, and Field Geology, etc. Has Summer Schools in Surveying, Shop-practice, and Field Geology. Laboratories, Shops and Stamp Mill well equipped. Tuition free. For Catalogues apply to the Director

**Houghton, Mich.**

15th YEAR OF PUBLICATION.

# The Canadian Mining Review

Established 1882

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

B. T. A. BELL, Editor and Proprietor. Published Monthly. OFFICES: SLATER BUILDING, OTTAWA; METROPOLE BUILDING, HALIFAX; WINDSOR HOTEL, MONTREAL.

VOL. XVI., No. 2. FEBRUARY, 1897. VOL. XVI., No. 2.

## Amazing Arrogance.

The lower house of the Nova Scotia Legislature has recently passed a measure entitled "An Act concerning Civil Engineers," which, for egotism, arrogance and blind pride reflects the highest credit upon its originators, a coterie of the institution known as the "Canadian Society of Civil Engineers."

Dwellers in the eastern part of Canada have known for a long time that this society contained most of the swelled heads of Eastern Canada, and that the really able practising engineers, though still allowing their names to remain on the membership list, did not go to the meetings nor contribute to the amazing erudition to be found amongst its transactions.

It has been equally well known that of recent years many of its members have been extremely dissatisfied with the administration of the society, and have felt that the rooms in Montreal were more of a shrine in which a few members could express their mutual admiration of each other, than a meeting place to which visiting engineers would wend their way. From the east and west, not only whispers but loud voices of members have been heard in remonstrance, and one member distinctly announced his intention to resign on the evening in January last when the Annual Feast was going on.

But the crowning audacity and conceit of the institution is shown in this bill in paragraph 4 of Sec. 1, in which these solons have declared that the statutory meaning of the expression "civil engineer" in Nova Scotia shall mean "anyone who acts or practises as an engineer in * * * * * electrical, mechanical, mining or other engineering works."

No doubt an institution whose utility as a society is dead, would like to have infused into its veins the vigorous blood of the mechanical, mining and electrical engineers of this province by the sea.

But we may be assured that this Nova Scotia bill is only the thin end of the wedge, and that the aims of the society are to have similar bills enacted all over the Dominion, so that the great and glorious "Civil Engineer" shall monopolize all practice.

But a further perusal of the bill shows its iniquity, and that these gentlemen of the Can. Soc. C. Eng. are not working for glory. Oh, no, they are after pelf! For it is further enacted in Sec. 2 that no person shall use the name nor practice in any of the engineering professions *unless he is a member of the* Canadian Society of Civil Engineers, and *pays therefor the sum of* $20 *per year* to the treasurer of this omnipotent institution! Herein is the gist of this bill which should have been entitled "A Bill to increase the revenues of the Canadian Society of Civil Engineers by coercion of all other engineers."

The provisions of this unique bill go on to say who may and who may not be admitted to the privilege of paying this private institution the sum of $20; to say that the council of this tremendous body of learning shall have power by committee to examine all candidates for admission; and to arbitrarily decide whether or not a man shall be permitted to practise his profession.

And these solons bring coercion into the Act also, for Sec. 10 inflicts a fine upon any engineer who may give an opinion in Nova Scotia unless he is a member of this society, and also puts a premium upon dishonest clients, inasmuch as it robs the engineer, who is not a member, of his legal right to recover for his services. (Sec. 9.)

The REVIEW does not hesitate to characterize this bill and this attempt of the Can. Soc. of Civil Engineers, as the most iniquitous and impertinent piece of legislation it has yet seen.

Canada has a society known as the Federated Canadian Mining Institute which numbers in its ranks almost all the practising mining and mechanical engineers of the Dominion who are cognizant of the needs and requirements of their professions, and who are vastly better able to say who shall and who shall not practise as mining and mechanical engineers than the Can. Soc. Civil Engineers ever has been or ever will be, and many of whom would smile at the idea that any committee of this omniscient society knew enough to examine them.

It is incomprehensible to the REVIEW that the government of Nova Scotia could sanction such a bill without asking the views of the engineers practising in that province, but, we understand, with the exception of the engineers drawing government pay, no one's opinion was asked, and the only outside engineer who was present, Mr. Alex. Dick, entered a formal and dignified protest.

The absence of the local engineers at the Montreal convention, doubtless, accounted for this lack of protest, but the REVIEW learns that opposition is being made to its passage through the upper house by the Federated Canadian Mining Institute and the Mining Society of Nova Scotia.

For the information of our readers, we print the bill below, and shall have more to say of it in a future issue.

A BILL ENTITLED, AN ACT CONCERNING CIVIL ENGINEERS.

Whereas, by an Act of the Parliament of Canada, 50–51 Victoria, Chapter 124, "The Canadian Society of Civil Engineers" was incorporated, and it is deemed advisable to establish the qualifications necessary to permit persons to act or practice as civil engineers in the Province of Nova Scotia.

Be it therefore enacted by the Governor, Council, and Assembly, as follows:—

1. The following expressions in this Act have the meanings hereby assigned to them, unless there is something in the text repugnant to such construction:—

(1.) The expression "the society," means the Canadian Society of Civil Engineers;

(2.) The expression "the council," means the council of the said society;

(3.) The expression "corporate member," means a member or associate member of the said society.

(4.) The expression "civil engineer," means anyone who acts or practises as an engineer in advising on, in making surveys for, or in laying out, designing or supervising the construction of railways, bridges, roads, canals, harbors, river improvements, light-houses, and hydraulic, municipal, electrical, mechanical, mining or other engineering works; but is not deemed to apply to a mere skilled artisan or workman.

2. On and after the first January, 1898, no person shall be entitled, within the Province of Nova Scotia, to use the title of civil engineer, or any abbreviation thereof, or any name, title or description implying that he is a corporate member of the said society, nor to act or practice as civil engineer within the meaning of the first section of this Act:

(*a*) Unless such person is a corporate member of the society; or

(*b*) Unless he is entitled by some statute of the Dominion of Canada, or of the Province of Nova Scotia, to use the title of civil engineer; or

(*c*) Unless he is practising as a civil engineer in this Province, and within one year from the passing of this Act, becomes a corporate member of the society.

3. The following persons shall be admitted as corporate members of the society:—

(1.) All persons being practising civil engineers within the Province at the time of the coming into force of this Act, who, within one year therefrom, apply for admission to and pay the subscription fees required under the by-laws of the said society;

(2.) All persons who, having been admitted to study under the provisions of this Act, shall have passed the prescribed examinations, and shall have been duly licensed as civil engineers by the said society.

4. The council shall name a board of examiners of not less than six persons, any three of whom shall have be a committee to examine candidates for admission to the study, or for admission to the practice of civil engineering. The said board shall meet at least twice each year at the cities of Halifax and Montreal alternately, on the first Tuesday in May and November.

5. A candidate for admission to study shall

(*a*) Give one month's notice to the secretary of the society of his intention to present himself for examination, and at the same time shall pay such secretary the sum of twenty dollars as a fee, one-half of which shall be remitted in the event of failure to pass the prescribed examination;

(*b*) Produce a certificate of good character;

(*c*) Pass an examination in the following subjects, namely: General geography, that of Canada in particular; history of Canada, arithmetic, elements of geometry, use of logarithms, algebra up to and including quadratic equations, trigonometry up to and including the solution of plain triangles.

If successful, the candidate shall be entitled to a certificate that he has passed such examination.

If a candidate holds a degree of Bachelor of Arts, Bachelor of Sciences, or Bachelor of Letters, conferred upon him by Canadian or British university, he shall, on making satisfactory proof that he is the person named in such degree, be entitled, on payment of the above mentioned fee, to receive a certificate permitting him to study.

6. A candidate for admission to practice shall:

(*a*) Give one month's notice of his intention to present himself for examination, and, at the same time, pay the said secretary the sum of forty dollars, as a fee;

(*b*) Produce a certificate of good character;

(*c*) Establish that he is at least twenty-one years of age;

(*d*) Establish that since his admission to study, he has been engaged in the pursuit of engineering in the office or in the service of a member of the society for a period or at least five years, or, for a period of two years, if he has a degree from any college or university in Canada granting degrees or diplomas in applied science after a course of not less than three years;

(*e*) Pass an examination before the board of examiners of the society on theory and practice of engineering, and specially in one of the following branches at his option, namely: railway, municipal, hydraulic mechanical, mining or electrical engineering.

7. Any student who has passed the examinations prescribed by this Act, is entitled to receive a diploma and becomes a corporate member of the society.

8. No by-law passed, or that may be passed by the society, shall have force or effect in this province until approved by the Lieutenant-Governor in Council.

9. No person practicing the profession of civil engineer, and not entitled to do so under this Act, shall recover before any court of justice any sum of money for the professional services rendered in such practice

10. Whosoever, not being entitled to do so under this Act, practices as a civil engineer within the province for a remuneration or in the hope of being remunerated, rewarded or paid for his services, directly or indirectly, or, who falsely pretends that he is a civil engineer or a corporate member of the society, shall be liable to a fine of not less than twenty-five dollars or more than fifty dollars for each offence, and in default of payment, to imprisonment not exceeding thirty days.

11. Prosecutions under this Act are subject to the provisions of part LVIII of the Criminal Code, 1892.

12. Nothing in this Act shall be deemed to encroach upon the rights and privileges conferred upon provincial land surveyors by any Act of the Legislature of this province.

13. This Act shall come into force on the day of its sanction.

---

## Causes for Failure in English Mining Investments.

In a recent issue of the REVIEW we referred to a letter from Mr. Thos. Tonge, an English gentleman long resident in Colorado, which set forth very clearly and fairly some of the reasons why British capital invested in Western American mines has been unremunerative and frequently lost.

It is worth while, perhaps, repeating some of Mr. Tonge's remarks for the benefit of those of our readers who are noting the rapid increase of popular interest in Canadian mines, and who are taking shares in some of the numerous ventures now offering.

In speaking of the causes of failure Mr. Tonge enumerated as the the chief ones (1) over capitalization, (2) excessive promoters and middlemen's profits, (3) excessive officers and directors' expenses, and (4) inexperienced and incompetent mining engineers, managers, etc., etc., sent out to report upon or to manage, or in some way or other to draw salaries or fees at the mine.

The two first causes are practically one; a property is sold by the original vendor at say $35,000 or £7,000, is taken over by promoters and put upon the London market at £550,000. And the property is often worth the original price, and far more, but is not worth its larger capitalization, which is frequentiy necessitated by the exorbitant "rake-off" or profit of the promoters. Such men "are not content with a fair remuneration for their trouble, but look for big profits from unloading stock" quickly and long before the expected dividends can possibly be earned.

No remedy for this evil, of which we have given an extreme but truthful example, can be proposed; nothing short of the radical reformation of the promoter which, at least, we of this generation shall never see.

Yet from this cause, and frequently this cause alone, many promising mines have become financial failures, it being impossible to return satisfactory dividends upon prices such shares have originally been sold at.

It needs but a glance at our corporations to notice that the million dollar mark is frequently passed, the B. C. Gazette reporting 336 companies registered in 1896 with a capital aggregating over 346 millions of dollars.

Upon any such capitalization as $1,000,000 a mine must pay at least $150,000 annually as dividends (and more frequently $250,000) to be financially a satisfactory investment. For the dividend life of a mine, as a rule, worked on the modern American method is rarely over seven years, andone eminent English authority recently, in our hearing, placed it at five years. To this there are, of course, brilliant exceptions, and we need only remark that "Rio Tintos," "Calumet and Heclas," and "Homestakes" are not in every mining camp.

Supposing therefore that the longer period of seven years represents the average mine, in that period the original capital must be returned together with a reasonable percentage each year as interest on the same. Expressed in figures this may be represented thus:—100 p. c. + (7 × 10 p.c.)=170 per cent. in seven years. For in view of the more or less hazardous character of the investment most financiers would consider 10 per cent. per annum small enough; therefore as above the actual return should be in the neighborhood of 25 per cent. per annum.

These figures are borne out by a careful examination of the market price and dividends paid by the mining companies in the public exchanges. It is, however, only fair to say that of late years so much more intelligence and skill have been brought into the management of mining enterprises that their values in the public marts are increasing each year.

The third cause mentioned, viz.:—Excessive office and directors expenses is peculiarly British, does not obtain on this side, and has no reason for its existence. As Mr. Tonge says:—"The most experienced and successful mining men (in Colorado) do not waste their time on public stock companies with the minimum of efficiency and the maximum of red tape formality and office expense, but form themselves into small private syndicates or companies, the capital being furnished by themselves, and the money put into work on the properties."

The recent statement of the Hall Mines Co., L't'd. is better than that of most English companies in this respect, yet the London expenses, for salaries, fees, etc., amounted to £2,377, while the salary and expense account at the mine was only £1,558.

The fourth cause assigned, that of sending out inexperienced engineers to report on properties or manage mines or otherwise quartering upon the revenues of the company a lot of incompetent, poor or worthless connections of the directors is an old, old story, but too familiar to those of us who have been in districts where English capital has been invested.

For this only the exertions of the individual shareholders to have a competent board can avail.

Mr. Tonge writes particularly in relation to Colorado, but substitute Canada for Colorado, and change his paragraph a little and we can close with his most excellent advice given to Britishers.

There are in Canada a sufficient number of mining engineers, both American and British, of many years' local experience and unblemished reputation, to perform the duties of experts. Such men are of necessity more competent to pass opinions on the merits of Canadian property than any man sent from England, possibly for the first time, and at best strange to the country and unfamiliar with it. British capitalists would save large sums in expenses and get more reliable advice if they utilized to a greater extent competent Canadian engineers and experts, whose education and training have familiarized them not only with the obvious features of the mining industry here, but also with the more obscure factors upon which ultimate success may depend.

---

## The Revival of Mining in Cariboo, B. C.

From 1858 to 1863 British Columbia was the centre of the world's attention as a gold field. In the first-named year the Fraser river excitement broke out, and the restless adventurers that had drifted to the Pacific states and territories rushed recklessly to the new El Dorado, which had then been developed on the bars and benches of the lower Fraser, between Forts Hope and Yale. Pushing their way up the narrow defile known as the Big Canyon,by which means the great river gains a passage through the lofty Cascades to the sea, the more venturesome of this army of gold seekers entered the interior of the province in open defiance of the opposition of the native tribes which flocked to the river to challenge their right to pass. Boston Bar, Lytton, Lillooet, the Lower Thompson river, Big Creek, Soda Creek and the mouth of the Quesnelle were in turn reached and explored. At the mouth of the Quesnelle, the golden trail, which has been followed up the valley of the Fraser, left the main stream and the greater part of the vanguard of the army of gold hunters turned their faces toward the mountains which the increasing coarseness of the gold found indicated to the quick-witted miners' as the source of the supply of the precious metal of which they were in search. The main body of the pioneer gold seekers of the district that subsequently became famous under the name of Cariboo, thus left the main valley of the Fraser at Quesnelle mouth and entered that spur of the Rockies known as the Blue mountains by the way of the Quesnelle river. Another lot of prospectors who had pushed higher up the Fraser valley, finding the river bars impoverishing in gold, left it at the mouth of the Cottonwood and entered the Blue Range through the tributaries of that stream—Willow river and Lightning creek. As the common saying prevailed in the Roman era, that all roads lead to Rome, so the various valleys which the pioneers of Cariboo adopted to enter the Blue Mountains,all led to one common point or rather peak, a cone-like bald-topped mountain situated in the very heart of the range and rising between six and seven thousand feet above the sea level. From this bald-mountain, now known under the name of Mount Agnes, almost every gold-bearing stream in the Cariboo district takes its rise and a dozen or more of them whose names have been familiarly associated with the province for thirty-five years, radiate from it like the spokes from the hub of a wheel.

The rich discoveries of gold made in 1861 and 1862 in Antler, Keithley, William and Lightning creeks electrified the world, and the great rush of 1862 and 1863 followed, in which tens of thousands—how many nobody knows—of adventurous spirits participated. The gold found was coarse, and in William creek and some of its tributaries it was easy of access and was deposited in enormous quantities. The source of the yellow stream of the precious metal which extends 500 miles to the lower reaches of the Fraser river had thus been found and fabulous fortunes were made in the brief period of a few weeks, by some fortunate claimholders.

But the golden days of Cariboo were short lived. With the exception of a few shallow places on some of the streams named, it became apparent very soon to every miner that the bulk of the precious metal contained in the Placer deposits radiating from Bald mountain would have to be won by hard labor at considerable expense, and be attended with great risk. Deep gravel mining there was accompanied with many drawbacks that deep gravel mining in California has not and cannot experience. The summers in Cariboo are short.

They begin towards the latter end of May, they close at the beginning of October. The rest of the year the snow flies and the ice king reigns. When the "Chinook" wind comes up the valleys from the south in the latter part of April, it sweeps over a blanket of snow from eight to twelve feet thick lying over the face of the country, and which the dense forest timber shields everywhere up the limit of timber growth on the flanks of the higher peaks in the range. The melting of such a mass of snow naturally covers several weeks and saturates the ground with water and with this the deep gravel miner of Cariboo in the sixties found in most cases to be beyond his power to cope. In the early sixties it cost a dollar a pound for transportation of miners' supplies, provisions and machinery from the seaboard to the mining camps easiest of access. Capital was scarce and the natural resources of the country were inadequate. As a gold mining country for the poor man Cariboo therefore began to decline. In 1863, while William creek was still in its prime as a gold producer, the exodus began. Tens of thousands left it. By the close of the sixties the entire mining population of Cariboo had fallen off to about 2,500, and the annual yield was only a tithe of what it had been in previous years. Since then the district has had a fitful experience. For a time there was a spurt in quartz, but it developed as a stock-jobbing affair and went through the usual experience of such movements. For thirty odd years Cariboo had consequently been regarded as a "petered out" lead mining camp. The old timers have been digging away in the old claims from which immense volumes of gold dust were taken in early days, uncovering now and again a spot of rich ground that had escaped notice before, and prospecting for lost leads on various creeks heading from "Old Baldy" or Mount Agnes. During the past three or four years, however, that is, since the new developments made in the Kootenai district, Cariboo has shared in common with California the attention of capitalists and money for mining development in and around "Old Baldy," the scene of the gold supply of the Fraser valley, has been gradually flowing in. At present it is being diverted to the development of the deep Placers in the district and the washing out of the gold which has been released in times past from its native matrix in the rocks and is lodged in the beds of the living and dead rivers. Perhaps some day capital will branch out and attempt one of the most gigantic engineering feats of the ages, the piercing of "Old Baldy," in search of the veins of the precious metal now concealed from the miners' gaze by the forest's growth and the dense lining of moss underlying it and covering the entire face of the country excepting in such places as the miner has removed the Placer deposits in his search for gold. Such veins are supposed to be ribboning the famous peak and to have yielded through the elemental erosion of ages, the metal which enriched the gravel deposits. The new era of mining development in Cariboo is manifesting itself on all sides around "Old Baldy." It was started five years ago under the direction of Sir William Van Horne, president of the Canadian Pacific Railway, with the view of developing mining properties that would serve as valuable feeders to the railroad, besides paying a fair interest on whatever capital might be invested, opening up new territory for capital and industry, and thereby furnishing freight and passenger traffic for the road. The services of Mr. John B. Hobson, a mining engineer of long experience, in this State, having been associated with deep-gravel mining in the vicinity of Gold Run and Iowa Hill, were enlisted, and as a result extensive purchases and locations have been made, more particularly on the forks of the Quesnelle river and its tributaries.

The later developments made in Cariboo indicate strongly the presence there of the same kind of auriferous dead rivers as mark the flanks of the Sierras in this State and extend into Southern Oregon and to which have been applied the name of the Blue lead. The properties which Hobson secured on the Horse Fly and the south fork of the Quesnelle for the syndicate he represented, composed largely of Canadian Pacific Railway officials, bear all the characteristics of the blue lead of California, so far as the operations already show. Under Hobson's management something like $600,000 have been spent in the development of the Horse Fly hydraulic mine and Cariboo hydraulic mine, the former being situated on Horse Fly creek, four miles north of the discovery claim of James Moore and his associates in 1859, and the latter four miles east of the town of Quesnelle Forks. The operations in both properties have been on a gigantic scale, establishing beyond doubt the theory which possessed every one of the early prospectors in Cariboo that only with the use of unlimited capital was it possible to develop the wealth of the district. Two thousand miners' inches of water was brought from Mussel Creek to the Horse Fly hydraulic mine through twelve miles of ditch, six feet wide at bottom, eleven feet at the top and two and one-half feet deep, and two and one-quarter miles of thirty-inch steel pipe. The pipe line is laid on the plan of an inverted siphon and carries this large body of water over three deep depressions. The giant has been introduced into these latter day hydraulic operations in the Cariboo district, and volumes of water quite as large as any used in California in the best days of hydraulic mining are being handled during the "open season." There is no anti-debris law in British Columbia to interfere with mining operations, nor are there any farming lands in danger of being flooded from the overflow of the river.

The Fraser and all its tributaries flow into deep beds between high banks or benches where the level or prairie country is traversed and in narrow rocky gorges where mountain ranges are pierced. The navigable waters of the Fraser are too remote from the scene of mining operations to be affected by them, and the fierce floods of spring and summer scour the water channels and keep them at their normal depth Hydraulic mining is, therefore, possible of the highest and most perfect development in the Cariboo district, with nothing to hinder or interrupt it except the long severe winters, during which the snow fall is measured by feet and the thermometer drops often below the freezing point of mercury, and sometimes touches a record quite as low as what any arctic explorer has experienced in the far north.

Almost all the "pay dirt" in the placer deposits of Cariboo resembles the material contained in the blue leads of California. It is a sticky compact conglomeration of highly washed gravel, sand and clay with which every placer miner is familiar, and from which when found, he always hopes to reap that rich reward for which he is in search. In the Horse Fly hydraulic mine the dirt hitherto worked has been a free washing gravel, but during last season it changed to a hard, compacted, cemented gravel that must be crushed before washing to win from it all the gold it contains. Since this change presented itself in the face of the pit only a small portion of the gold contained in the gravel piped off has been recovered, chunks of the cemented gravel being found at the foot of the sluices, unaffected by the pipe or the grinding in transit in the sluices. A ten-stamp mill, with a capacity to crush from 100 to 120 tons per twenty-four hours, will be installed on the premises. Mr. Hobson estimates it will cost from $1.50 to $1.75 per ton to mine and mill the cement which working tests show contains from $4.82 to $5.36 in gold per cubic yard of gravel. The mill will be operated during summer with water power and during winter with steam, as drifting can be carried on winter and summer alike. The vastness of the deep gravel deposits of the Cariboo district is shown in the pit of the Cariboo hydraulic mine. The company controls about three miles of the ancient river channel which is a thousand feet wide between the rims and the bank of auriferous gravel rises from 350 to 400 feet above the head of the sluices, while it is estimated that while from 80 to 100 feet more pay dirt lies between the present workings and the bed rock.

A considerable area of the top gravel has been washed off and work on the lower bench of high grade gravel will be commenced early in 1897. This is the mine that yieided during the last season $128,000

worth of gold at a total cost of $85,000. An early setting in of winter is said to have deprived them of the means of taking out from $50,000 to $75,000 additional. There were four giants in operation last summer. Two more giants will be put in operation this year.

How puny the efforts of the hydraulic miners of Cariboo of the sixties were, when they worked with canvas hose and one-inch nozzle pipes, compared with the operations now going on in the district, is shown by the fact that the canal and reservoir capacity of this mining company amounts to 3,000 miners' inches of water delivered from the big nozzles of the largest giants manufactured, and there is nothing superior to its system of pipes, canals and reservoirs anywhere on the coast.

Everything has drifted into big companies in the way of mining in that district now. The Miocene Gravel Mining Company of which R. H Campbell is manager, and whose claims cover four miles of the Horse Fly to the mouth of Beaver Lake creek has a paid up capital of $2:00,000, and Campbell has just left San Francisco to begin operations for opening up the property systematically. The Harper claim on the same creek is owned by a San Francisco syndicate and it is to be worked by a hydraulic elevator. About $50,000 has already been spent there in the construction of a ditch and pipe line.

Seven miles south-east of the town of Quesnelle Forks is carried on one of the most gigantic placer mining operations ever attempted on the coast. It is at a point where the great Quesnelle Lake empties its overflow waters into the south fork of the Quesnelle. There the Golden River Quesnelle Company, limited, of London, is employing now about 400 white men and 100 Chinese in excavating for an immense waste weir that is intended to divert the waters from their natural outlet. When this waste weir and the necessary gates are completed, the construction of the dam, to hold back the waters of the Great Quesnelle lake, which is 100 miles long and from one to five miles wide, will be commenced. The overflow waters which it is intended to divert cover a space 300 feet wide, and are now at the lowest stage of the river, flowing eight or ten feet deep. As the water in the lake rises six or eight feet each season, it can easily be seen what a gigantic piece of work the company has undertaken.

It is estimated that the dam will cost $228,000 and probably $350,000 or more will be expended before the company completes the work and gets ready to clean up the gold from the bottom of the South Fork river, eight miles of which it controls. It is expected that much of this will be worked out before the lake overflows the dam erected to hold it back. The gates will then be opened, the flood waters let off and the lake drawn down. The gates will be again closed and mining operations carried on while the lake is again filling.

But the attack on the auriferous deposits of Horse Fly and Quesnelle Forks represents only one side of the base of Old Baldy, the supposed source of Cariboo's golden wealth. On all the creeks taking their rise in it—Keithley, Snowshoe, Cunningham, Harvey, Willow, William, Grouse, Antler, Goose, Lightning and other water courses equally familiar to old timers—new efforts on a correspondingly large scale to those named are being instituted. The Cariboo Gold Fields and Exploration Company, organized in London with a capital of £1,000,000, have purchased nearly all the old claims on the famous William Creek at Barkerville in the Cariboo district, and have expended several hundred thousand dollars in bringing up a bed-rock drain tunnel to relieve the deep gravel claims of the water that caused the former owners to quit work. A large ditch is being brought from Jack of Clubs Lake that is intended to deliver the water to the hydraulic elevator under a pressure or head of 900 feet.

The old channel of Antler Creek, for which unremitting search has been made for over thirty-five years, is claimed to have been discovered at a remote point from the present stream, and extensive operations for working the dead river channel are being made. A Canadian company, with a capital of $2,000,000 has taken up twenty miles or more of Lightning Creek from its junction with Cottonwood, intending to hydraulic it.

A Seattle and New York Company has been organized by Colonel Fishback in which the Goulds are said to be represented with a capital of $5, 0,000, to work twenty miles of the bed of the Quesnelle river. A French syndicate and a Montreal syndicate, the latter with a capital of $2,500,000, $50 ,000 of which is to go at once into reservoir and ditch construction, are also operating on Quesnelle River.

These are only a few of the big companies with large capital that have recently entered this old-time and supposed to be "petered out" mining district. Even the beds of the Fraser and the Quesnelle, which cannot be reached by pick, shovel or hydraulic monitor, are being attacked by dredges in hopes or winning the golden contents of their sands. The Cariboo miner of thirty years ago looks on and marvels.

Many other mining locations have been made and companies organized for the operation of gravel mines in Cariboo district, which lack of space forbids mention in this article.

But a perusal of the above will show that famous old Cariboo has at last awakened from the Rip Van Winkle sleep into which she fell after the excitement caused by the fabulously rich discoveries of gold on Antler, Lightning and William Creek in 1861 and 1862, had subsided.

The most skeptical should also be convinced that British Columbia in general and Cariboo district in particular, holds out inducements to the capitalists of the world for the investment of their idle money equal if not superior to those offered by Africa, Australia or any other mining country.

The size and number of the lakes and rivers of British Columbia—from its southern boundary through Yale, Lillooet, Cariboo, the Omineca and Peace River districts to the far northern boundary line, are the wonder and admiration of every engineer and miner that visits the Province and mining districts.

The mining and land laws of British Columbia are liberal and justly administered. The criminal laws are enforced without fear or favor, and with such vigorous promptness that serious crimes are rare. A murderer is there speedily captured, mercifully but justly tried, and when convicted is promptly hung. No web of legal technicalities is allowed to be woven around.

---

## The Foley Mine, Shoal Lake, Ont.

Our illustrated supplement this month is almost entirely taken up with a series of views of the celebrated Foley Gold Mine, at Shoal Lake, Seine River District, Ontario, owned and operated by the Foley Mines Co., of Ontario, Ltd. In his report to the shareholders, Mr. J. H. Chewett, C. E., of Toronto, the consulting engineer of the company, describes the ore deposits as occurring "in veins which are undoubtedly true fissures."

### CHARACTER OF ORE DEPOSITS.

The vein walls show a selvage of talcose and chloritic material giving evidence of well-defined "slickensiding." The vein matter is quartz carrying free gold, iron pyrites, chalcopyrite, galena and zinc-blende in varying proportions. The gold is usually very fine, but frequently large particles of visible gold are found. The nature of the quartz differs in the various veins: For example, that from the Bonanza and No. 5 vein is very friable and seamy, sometimes rosy and sometimes milky in color, but nearly always flecked with galena, pyrites and fine particles of gold; while that from No. 9 shaft is quite pink and very heavily mineralized with zinc-blende and chalcopyrite. Lucky Joe vein yields both pink and white quartz, and so far as

development goes exhibits a mineralization of galena pyrites slightly heavier than that of the Bonanza and No. 5 veins. Another character of the ore is observed in one of the eastern veins, where bands of galena are found in the quartz."

The principal veins are known as the "Bonanza," "No. 5," "Lucky Joe," "Jumbo," "No. 7" and "No. 9."

Some idea of the value of the three most important may be gathered from a reference to the following:—

| Vein. | Width. | Location. | Value per ton. | Remarks. |
|---|---|---|---|---|
| Bonanza ..... | 8 to 40 ft. | A. L. 74 | $24.00 | Detd. by F. G. Corning. |
| No. 5 ..... | 4 " 60 " | " 75 | 26.70 | " " |
| Lucky ..... | 10 " 20 " | " 75 | 60.00 | J. H. Chewett. |

Mining operations were begun in March, 1895. To date this mine has been opened in the following manner:—

DEVELOPMENT TO 1ST FEBRUARY, 1897.

| Vein. | Location. | Size of Shaft. | Depth. | Width of vein. |
|---|---|---|---|---|
| Bonanza ..... | A. L. 74 | 8 x 12 | 210 feet. | 26 inches. |
| No. 5..... | " 75 | 6 x 9 | 113 " | 19 " |
| Lucky Joe..... | " 75 | 6 x 9 | 39 " | 14 " |
| No. 8..... | " 74 | 6 x 8 | 31 " | 54 " |
| No. 3..... | " 74 | 6 x 8 | 10 " | 42 " |
| No. 6..... | " 74 | 6 x 8 | 12 " | 18 " |
| No. 1..... | " 75 | 6 x 8 | 17 " | 40 " |
| No. 2..... | " 75 | 6 x 8 | 14 " | 16 " |
| No. 4..... | " 75 | 6 x 8 | 19 " | 24 " |
| No 7 ..... | " 76 | 6 x 8 | 11 " | 23 " |

Cross cut 6 ft. x 6 ft. from "Bonanza" vein to "Jumbo" vein, 109 feet, at 160 feet from surface. Average width of "Jumbo" vein, 5½ feet. Out-crop, 1,100 feet. Estimate of ore in sight on this vein 300,000 tons. Assay value, $11.00.

*"Lucky Joe" drifts.*—North drift, 10 feet; South drift, 16 feet. Average assay of vein, $60.00 per ton. Assay value of concentrates, $300.00.

*Drifts and Winzes from "Bonanza" Shaft.*

100 FOOT LEVEL.
- North drift—38 feet.
- South drift—61 feet.
- Winze to second level—56 feet.

150 FOOT LEVEL.
- North drift—63 feet.
- South drift—166 feet.
- North winze—35 feet.
- South winze—34 feet.

200 FOOT LEVEL.
- North drift—69 feet.
- South drift, 83 feet.

*Drifts from No. 5 Shaft.*

60 FOOT LEVEL.
- North drift—47 feet.
- South drift—83 feet.

Total depth of shafts, 469 feet; total length of drifts, 610 feet; total depth of winzes, 125 feet; total length of cross cutting, 109 feet. The total amount of underground development work, 1,313 feet; total number of veins, twenty-nine.

EXPENDITURES.

During the year 1896 there were from fifty to seventy-five persons employed in mining and in other development of property. Since work was first begun on the claims in March, 1896, up to 31st December last, $65,000 have been paid out to employees. The total expenditure on the property, including purchase of claims, machinery and equipment, and in development to date, is stated to be $211,000. An itimised statement under 8th February shows expenditure on buildings and machinery:—No. 1 engine house, 40ft. x 36ft., $500; one 40 H. P. boiler, 14ft. x 36ft., $850; one 20 H. P. boiler, 10ft. x 12ft., $325; one double drum hoisting engine and three drill compressors, $12,000; 4,400 ft. of trestle work Tram-road, $3,000; No. 11 engine house, 26ft. x 36ft., $350; one hoisting engine, 56 in. drum, $1,000; north shaft house and skip-road; $1.000; one skip and six cars, $425; 20 stamp mill (Fraser and Chalmer's complete) with assay office, including duty, ($3,764) $29,500; blacksmiths' shop, 24 x 36, $250; barn 28 x 32, $240, boarding house, $1,400; two storey office, 6 rooms, 340; six dry houses and sleeping camps, $450; or a total of $57,480;

## The Mineral Revenue of Nova Scotia.

We are indebted to the courtesy of Mr. W. H. Brown, Accountant of the Department of Mines, Halifax, for the following statement, showing the amounts received from the various sources of revenue in connection with the Department of Mines, Province of Nova Scotia, during the year ended September 30th, 1896; also, for the 12 months ended September 30th, 1895:—

| | Year ended Sept. 30th, 1896. | Year ended Sept. 30th, 1895. |
|---|---|---|
| Prospecting licenses.....Gold | $9,336 20 | $9,336 00 |
| Rents—Lease applications..... " | 2,258 00 | 2,468 00 |
| Rentals ..... " | 3,875 00 | 2,276 30 |
| Royalty ..... " | 9,869 58 | 7,724 36 |
| Licenses to search—Minerals other than gold and silver..... | 4,050 00 | 4,170 00 |
| Leases—Minerals other than gold and silver ..... | 1,000 00 | 2,800 00 |
| Rentals—Minerals other than gold and silver ..... ..... | 7,290 00 | 7,029 00 |
| Coal royalties..... | 235,918 02 | 214,647 76 |
| Iron " ..... | 6 10 | |
| Fees ..... | 426 00 | 467 65 |
| | $274,028 90 | $251,910 27 |

Increase of 1896 over 1895, $22,118.63

Memo showing by Counties the amounts received in connection with Gold by the Department of Mines, for the year ended September 30th, 1896:—

PROSPECTING LICENSES.

| | |
|---|---|
| Guysboro ..... | $3,136 50 |
| Halifax ..... ..... | 2,970 20 |
| Lunenburg. ..... ..... | 1,465 50 |
| Queens ..... ..... | 774 00 |
| Hants ..... | 502 00 |
| Colchester ..... | 201 00 |
| Victoria ..... | 107 50 |
| Yarmouth ..... | 78 00 |
| Other counties ..... ..... | 101 50 |
| | $9,336 20 |

RENTS—GOLD LEASE APPLICATIONS.

| | |
|---|---|
| Guysboro ..... | $1,186 00 |
| Halifax..... ..... | 492 00 |
| Lunenburg..... | 266 00 |
| Hants..... | 116 00 |
| Queens..... ..... | 114 00 |
| Other counties ..... | 84 00 |
| | $2,258 00 |

GOLD RENTALS.

| | |
|---|---|
| Guysboro ..... | $951 00 |
| Halifax..... | 876 00 |
| Hants ..... | 804 50 |
| Queens ..... | 641 50 |
| Lunenburg..... ..... | 360 50 |
| Colchester ..... | 100 50 |
| Other counties ..... | 141 00 |
| | $3,875 00 |

GOLD ROYALTIES.

| | |
|---|---|
| Guysboro | $2,968 13 |
| Halifax | 2,667 34 |
| Queens | 2,080 88 |
| Hants | 1,935 62 |
| Lunenburg | 200 93 |
| Other counties | 16 68 |
| | $9,869 58 |

Memo showing amounts received by the Department of Mines, Nova Scotia, during the year ended September 30th, 1896; also, for the twelve months ended September 30th, 1895, from the various sources in connection with "Minerals other than Gold and Silver," in undermentioned counties:—

LICENSES TO SEARCH.

| | 1895 | 1896 |
|---|---|---|
| Cape Breton | $1,380 00 | $1,440 00 |
| Inverness | 330 00 | 750 00 |
| Cumberland | 390 00 | 630 00 |
| Pictou | 450 00 | 330 00 |
| Colchester | 480 00 | 270 00 |
| Victoria | 150 00 | 270 00 |
| Antigonish | 120 00 | 180 00 |
| Hants | 300 00 | 90 00 |
| Richmond | 330 00 | 30 00 |
| Other counties | 240 00 | 60 00 |
| | $4,170 00 | $4,050 90 |

Increase in 1896—$120 00

LEASES OF MINERALS OTHER THAN GOLD AND SILVER.

| | 1895. | 1896. |
|---|---|---|
| Cape Breton | $1,200 00 | $650 00 |
| Inverness | 300 00 | 200 00 |
| Pictou | 50 00 | 50 00 |
| Cumberland | 1,050 00 | 50 00 |
| Other counties | 200 00 | 50 00 |
| | $2,800 00 | $1,000 00 |

Decrease in 1896, $1,800 00.

RENTALS—MINERALS OTHER THAN GOLD AND SILVER.

| | 1895. | 1896. |
|---|---|---|
| Cape Breton | $2,910 00 | $3,510 00 |
| Cumberland | 1,770 00 | 2,220 00 |
| Inverness | 630 00 | 660 00 |
| Pictou | 1,110 00 | 390 00 |
| Richmond | 240 00 | 270 00 |
| Other counties | 360 00 | 240 00 |
| | $7,020 00 | $7,290 00 |

Increase in 1896, $270.00.

COAL ROYALTIES.

| | 1895. | 1896. |
|---|---|---|
| Cape Breton | $133,654 05 | $153,607 37 |
| Cumberland | 43,416 37 | 44,078 76 |
| Pictou | 36,354 90 | 37,099 06 |
| Victoria | 1,189 98 | 1,066 07 |
| Other counties | 32 46 | 66 76 |
| | $214,647 76 | $235,918 02 |

Increase in 1896, $21,270.26.

# CORRESPONDENCE.

## Amendments to Ontario Mines Act.

SIR,—I have read the letter of Mr. R. W. De Morest in your January issue *re* amendments to Ontario Mines Act, with much interest. I am glad to see that a movement is being made to remedy some of the deficiencies of the Act, but would remind Mr. De Morest that the minority interest, if held by the prospector, is unable usually to pay its share of any development assessment. The forcing of the minority to sell or develop unless very carefully restricted by law would open up all manner of abuses and be a subject of unending litigation. If Mr. De Morest will permit me I would suggest that the matter might be controlled by a board, as he suggests, appointed to guard minority interests, that majority interests should furnish the funds for any development, and the amount pro rata so expended be deducted by the board, from the minority interest, at the time of any sale, or from working profits.

I would like to call your attention to another deficiency in the Mines Act. That is the facility with which parties can survey large tracts of land, and hold them by the act of survey, against all comers, they neither paying or intending to pay for the land. Parties afterwards applying for any part of such tracts usually have little chance of obtaining it, as the department notifies the first party, who then considers that such part must be of value and so promptly pays for it. Thus the second party has his trouble for his pay, and the natural result is that these large tracts are held for years without profit to anyone.

All this could easily be prevented, I think, by a law requiring, say $50 worth of work per year being done on each 40 acre tract. Some application of the British Columbia law in fact. We have now, to be sure the requirement of $5 per acre per 160 acre tract, but as the time is seven years the land can be held for that length of time undeveloped. Prospectors could easily do $50 worth of work per year on each 40 acre claim, and some of the benefits derived would be :

1. A cessation of the tieing up of large tracts through surveys alone.
2. Development of prospects.
3. Lessening the wild-cat speculation on worthless properties.

I think all mining engineers who have been called to examine Ontario gold prospects will bear me out in the statement that the insignificant amount of development done on most of them renders it extremely difficult to make any sort of a full or complete report.

Yours etc.,

E. C. HALL, JR., M. E.

Mines Centre, Ont., 13th Feb., 1897.

## Mining at Shoal Lake, Ont.

SIR,—In your issue of January, 1897, I notice in your correspondence a reference to "Mining properties on Shoal Lake, West of Lake of the Woods," and as I am an owner of several properties in that neighborhood, I take the liberty of writing you to put you right in this matter and anything I have to say you are at liberty to publish over my signature. Evidently someone is attempting to boom unknown and undeveloped properties on Shoal Lake, claiming that they are in the vicinity of some known properties, assuming mill runs, etc., which they have not made and by grouping names of their properties with some that are well known and that have had mill runs made from them. If these people wish to do any advertising they should make some mill runs and then crow all they please and possibly if you wish to publish a reliable sheet, you might insist (before you publish such items) that the "Advertiser on Borrowed Thunder," for they are nothing else, and I can name and describe them if you wish, make a definite statement

and give credit to the mines and mine owners who have sufficient confidence in their properties to develop and mill the ore from them. Such stolen notoriety forces me to come to the front and ask you and other Canadian editors, who I am satisfied are not boomers, but men who wish to put facts before the public, to be cautious; do not publish such squibs, they are damaging and misleading. The few facts that I shall state are open to all. I shall name the properties and all the properties that have made mill runs within the last year, and all the properties that have milled ore taken out in the Shoal Lake district.

First, the Mikado (in which I have no interest whatever) has milled nearly 300 tons. I do not know the exact value of the ore, but think the amount you state is not much out, viz. about $70 per ton.

Next comes the Cornucopia (I was an original owner in this property and am still heavily interested in it), I took out and teamed to the Reduction Works here and milled 24 tons of ore from this property with most satisfactory results.

I also (from properties owned by me) have made three other mill runs of about four tons from each property. I have not been able to christen these properties with any Oriental names. They are in the immediate vicinity of the Cornucopia and the celebrated Mikado is not far off, but we do not wish to borrow anything from it, the geological features will not permit. The Sultana is, unfortunately, some thirty odd miles from us and is not in line; the Regina is still farther from us and can't line up. These two last named, Sultana and Regina, are producing mines with mills on the ground in operation. The three properties I mentioned above are only known by their survey numbers and the mill runs from them were all that was expected; I can show up the buttons for that. The numbers are 228 D, 213 D, and 214 D. I trust you will be able to see the matter as I do and insist upon all boomers who wish to use the press standing upon their own development of their own properties; it is much more fair to a confiding public than to be "in the neighborhood," or "right in line" with some property that is known to be of value. I may be able to furnish you a few facts from time to time, if you wish, and you may bear in mind this one thing, I do not wish to run in any boom items; I have no properties to unload upon the public. Hoping that you may find room for this.

I am, yours etc.,

E. F. KENDALL.

Rat Portage, 5th Feb., 1897.

---

### A Government Assayer.

SIR,—Your Nova Scotian correspondent appears, in his endeavors to assist the mining developement of that province, to have hit on a very meritorious scheme. He suggests the appointment of a government assayer, who, by receiving a salary will be enabled to work at half price for the benefit of prospectors, and mill owners who lose gold in their tailings. This is a step in the right direction. But why confine the benefits to the mining profession? Let the government appoint also some deserving lawyer, photographer, surveyor, doctor and architect, and by giving them salaries, enable them also to work at half price. Thus would a greater number be benefitted and the millenium brought nearer.

Yours etc.,

"FAIR PLAY."

Greenwood, B. C., February 12th, '97.

---

The whole of this issue of the REVIEW has been sold out in advance of publication.

---

Mr. Hardman's exceedingly interesting paper describing the prominent mineral districts of British Columbia which are at present attracting so much attention, has been held over until next number. Dr Coleman's address on the Western Ontario gold fields will also be published in our March issue.

---

### NOVA SCOTIA COAL TRADE IN 1896.

By courtesy of the managers we are enabled to compile the following authentic statement of the output and shipments by the prominent Collieries, from returns furnished direct to the REVIEW.

| COMPANY. | TOTAL OUTPUT. | TOTAL DISPOSALS. | To Nova Scotia. | To P. E. Island. | To Newfoundland. | To Quebec. | To New Brunswick. | To St. Pierre. | To United States. | Steamers. | Colliery Consumption. | Company's Railways. | Colliery Employees. | Other Countries. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dominion Coal Co..... | 1,152,802 | 1,058,755 | 183,079 | 16,359 | 42,598 | 556,306 | 41,940 | 4,598 | 162,489 | 51,386 | 51,711 | 4,628 | 18,237 | ..... |
| General Mining Association..... | 278,500 | 226,465 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Cape Breton Colliery..... | 17,757 | 17,757 | 5,094 | 535 | 1,500 | 7,391 | 580 | 131 | ..... | ..... | 1,474 | ..... | 518 | 534 |
| Acadia Coal Co..... | 199,303 | 198,006 | 121,220 | 23,540 | 138 | 1,020 | 4,214 | ..... | ..... | 12,750 | 29,059 | ..... | 6,065 | ..... |
| Cumberland Ry. & Coal Co..... | ..... | 355,887 | 107,048 | ..... | ..... | 58,182 | 172,188 | ..... | 18,469 | ..... | ..... | ..... | ..... | ..... |
| Canada Coal & Ry. Co..... | ..... | 51,206 | 4,422 | 15,832 | ..... | 12,435 | 28,273 | ..... | 180 | ..... | 4,569 | ..... | 1,146 | ..... |
| Intercolonial Coal Co..... | ..... | 180,410 | 109,151 | ..... | ..... | 39,801 | 1,903 | ..... | ..... | ..... | 9,747 | ..... | 3,976 | ..... |

## Review of the Pig Iron Trade of 1896.

By Mr. George E. Drummond, Montreal.

The records of the Pig Iron Industry in the leading markets of the world for 1896 afford an interesting and instructive study to the miner, the business man, and the political economist.

Tariff enquiries specially touching the subject of iron in the United States and Canada, and investigation into the causes of diminishing trade in Great Britain, mark the year, and make it desirable that any review of the iron trade should take into account the political as well as the business phase of the situation.

Protective State Legislation was the foundation upon which and by which the great iron industries of Great Britain, the U. S. and Germany were successfully established. Of these countries, the U. S. and Germany still stand by the principle of protection as being the best method to ensure successful development. Great Britain alone abandoned protection, and then only after she considered her position impregnable. To Canada, in her present somewhat hesitating mood, the relative progress made by the U. S. and Germany, under consistent protection, as against Great Britain, under so-called "Free Trade," should be somewhat of a guide in shaping her own course in the question of the utilization of her natural gifts in iron ores, coal and forest wealth.

On the surface the iron trade returns of 1896 show sunshine in Europe, brought about in part by war office and navy yard contracts, whilst in America the business horizon might be termed "cloudy, with occasional storm signals," and yet even on this continent those interested in iron have very much to be thankful for.

In the U. S. the year closes without significant disaster, with an output of iron close upon that of the previous year, and with returning confidence, born of faith in the strong national fiscal policy foreshadowed by the newly elected president and his party.

In Canada, uncertainty as to tariff matters, the somewhat natural outcome of the recent change in government, has served, in the case of some of the furnaces, to restrict the production of iron during 1896, but on the other hand, as predicted last year, the advent of the Hamilton furnace makes 1896, in point of gross tonnage, one of the best years that Canada has ever seen. The returns received to date from the furnaces at New Glasgow, Londonderry, Radnor Forges and Hamilton register a total output of 61,839 tons for the calendar year of 1896, being an increase for the furnaces mentioned of 41 per cent. over the tonnage of 1895. This does not include the records of furnace work at Drummondville, Que., of which has not yet been received.

Natural conditions in connection with the trade are good, and there has fortunately been a gratifying freedom from bad debts throughout the past year.

Following the usual course, we will review in order of magnitude, the markets with which the Canadian iron producers have to compete, and then deal with the Canadian Pig Iron Industry itself, in some of its various bearings.

### THE UNITED STATES.

As pointed out in this Association's last Annual Review, the year 1896 opened with the largest rate of output in the history of the Republic, promising to show at the close of the year a production of 10,220,000 tons, a pace evidently too good to last, for although it seemed at first almost an impossibility to satisfy the wants of the largest consumers at Pittsburgh and Chicago, yet natural laws of supply and demand, governed by the unusual disturbances of the late presidential election, were at work, and it was soon evident that the output was too great for actual requirements. When the demand for pig iron eased off, it was found that many of the mills had purchased too largely, in eager anticipation of improved business, and the demand for finished products was insufficient to utilize promptly the pig iron contracted for. The furnaces least able to meet the lowest ranges of prices went out of blast, and the trade gradually adjusted itself to circumstances, until at the close of the year prices were inclined to be again on the up grade. The range of quotations during 1896 will be best appreciated by reference to the figures ruling at the beginning of the year as against those obtainable in midsummer.

On January 1st, No. 2 Southern iron sold at $9 per ton at Birmingham, or equal to $13 per ton delivered at points of consumption in the north. In July it was down to $6.50 per ton at the furnace, or $10 per ton at point of consumption, the southern iron producer always including his freight rate to the point of consumption as part of his cost.

Bessemer pig quoted in January at $16 per ton was less than $10 in July. Northern iron, whilst fluctuating in grey forge quality from $12 in January to $9 in July, and then again upwards to $10, held fairly steady in choice brands of foundry iron, the price for which showed only $1 per ton decline as between the figures quoted at New York, 2nd January, 1896, viz. $13.50, and December 31st, 1896, $12.50. At even the steadier prices obtainable for northern foundry iron, none but the most favorably situated furnaces can hope to make money, and prudence will recommend a curtailment of output until prices again advance.

The Ore Pool formed towards the close of 1895, managed to maintain their prices throughout 1896, for best grades of Bessemer ore at $4 F. O. B. docks Cleveland, and in all grades of ore held pretty closely to agreed figures. Within the past few months, however, large ore properties, controlled by strong interests outside the pool, have come into prominence, and it is now a question of considerable doubt whether the ore pool can be held together to control prices during the coming year. The shipments of ore from lake ports during 1896 showed a decrease of about 1,000,000 tons, as against 1895.

Among the interesting and significant features of the year was the demand which came from Great Britain for iron manufactured in America. Commencing in a limited and apparently experimental way in 1895, it increased in volume during the first half of 1896, and assumed considerable proportions in the closing months of the year. One order taken in December for Alabama iron was for 10,000 tons, destined for Liverpool, and for which more remunerative prices were said to be realized than could be secured for the same iron in the American market. The exports of southern iron alone aggregated nearly 100,000 tons during 1896. With steady prices ruling on both sides of the Atlantic, it is thought that this export business will grow from day to day, entirely reversing the order of things which obtained in the trade 20 years ago, when British iron found a place in the regular practice of American foundrymen, and entirely upsetting the "Free Trade" theory that a country in which the industries are highly protected can hope for a foreign trade.

In connection with the invasion of England by protected American iron producers, it is a matter of particular interest to note, as per "Cleveland Iron Trade Review" of December 17th, 1896, that "a noteworthy example of the pressing close home to English iron manufacturers of the competition of southern iron is afforded in the contract recently taken for a new subway under the Thames. The Lancashire Foundry Co. that is to do the work will make its castings from American foundry iron, 12,000 tons having been purchased for that purpose."

A presidential election year is always unsettling to the American iron trade, and never in the history of the United States have the issues been so grave as those which were fought out during 1896. The almost revolutionary programme adopted by the Chicago convention in the early summer, and upon which the presidential contest was waged, wellnigh paralyzed the financial energies of the nation, and it is therefore all the more remarkable that the natural strength of the American iron industry was so great that the year 1896 closes with a record of 8,623,127 tons of pig iron produced, as against 9,446,308 tons in 1895,

a decrease af barely 9 per cent., and still leaving the American record of iron production far in advance of that of any of her competitors.

GREAT BRITAIN.

If volume of business, and immediate conditions existing in commercial circles of the British Isles, were the sole gauge, 1896 could readily be set down as a fairly prosperous year.

Returns from the three principal iron centres give the 1896 output,

| | | |
|---|---|---|
| Scotland | 1,180,005 tons | |
| West Cumberland and Furness District | 1,282,260 " | |
| Cleveland | 3,162,308 " | |
| | | 5,624,573 |

as against a total tonnage in 1895, for the same districts, of 5,022,951 tons. An increase in output of 601,622 tons, with an actual decrease in stocks at the close of the year, would indicate a good season's business, but it is a notable fact that the increased trade came from the British Isles itself, and that the export trade showed decreases in the shipments of 1896, as against those of 1895, to France, Russia, Spain, Portugal and Canada.

The prices of Warrants ranged from about 45s in January to 49s. in November, but eased off a little at the close of the year, on account of fear of labor disputes. Maker's brands held at firm figures throughout the year. "Sumerlee," for instance, ranged at from 50s. to 52s. 6d· the prices at the close of the year being stiff at the latter figure. Very little Scotch iron came to Canada, the price being so much above that of similar brands of American pig. "Summerlee" brought an average price in currency of $18.75 ex wharf Montreal, or equal to about $20.75 delivered at Western Canadian points. American and Canadian iron was sold at fully $4.00 per ton below these figures, so that the Scotch iron masters were quite unable to compete. The home trade was the salvation of the British iron producers in 1896. Large shipbuilding orders, and the prospect of Government contracts for warships, served to stimulate matters considerably during the year, but while the general tone remained favorable at the close of the year, the constantly increasing shipments of American pig iron and products thereof to the English market, and the ever decreasing export trade in iron from the British market itself, form a combination of circumstances that are not promising

So far as Britain's trade with Canada is concerned, the fact is very noticeable in the returns for 1896 that the total shipment of Scotch iron to British North America is set down, in Messrs. Jas. Watson & Co's., circular of January, 1897, at 2,454 tons, whereas 1892 gave a record of 22,913 tons of Scotch iron shipped to Canada. A decline of almost 20,000 tons in tonnage in 1896 as against that of 1892 is very significant.

In the face of the increasing strength of the American competition· it is also anything but reassuring to the British iron masters to know that their home ores are growing scarcer, that the "Black-band" is nearly worked out, and that they require increasing quantities of foreign ore to mix with "Clay-band." The iron mines in Bilbao, upon which the British iron masters have for the past few years depended to a considerable extent, are also getting wrought out, and while they are still good for ten or a dozen of years, the price of the ore is growing higher as the demand increases. British consumers are now turning their attention to the ore from the Almeria and Seville districts, and other new mines are being opened up in the south of Spain, the ore being taken in consumption in greater quantities than has hitherto been the case.

The price of Spanish ore will likely increase rather than decrease, and it will become more and more difficult as time goes on for the British iron masters to compete with their American rivals.

GERMANY.

Total pig iron produced in 1896, 6,360,982 tons, against 5,788,798 tons in 1895.

BELGIUM.

Total production in 1896 (12 months), 990,856 tons, as against a total for 1895 of 828,510 tons.

Comparative figures show that the German output, under Government policy of encouragement, is rapidly increasing from year to year.

CANADA.

As compared with the records of 1895 those of 1896 show a very marked improvement in point of gross tonnage and general operations.

Returns received from the furnaces at New Glasgow, N.S., Londonderry, N.S., Radnor Forges, Que., and Hamilton, Ont., report a combined gross production of 61,839 net tons of pig iron, 12,964 net tons of steel, 1,243 net tons of forgings, and 4,575 net tons of puddled bars, etc.

To produce this quantity the following Canadian materials were used :—

| | |
|---|---|
| Ore | 82,705 net tons, |
| Coal | 114,554 " " |
| Coke | 46,219 " " |
| Charcoal | 557,400 bushels, |
| Limestone, consumed | 34,946 net tons, |

although a larger quantity was actually made.

Of foreign material used the Hamilton Blast Furnace Co., L'td report :—Of American ore, 32,025 net tons, being about 72½ per cent. of their total consumption. Of American coke, 30,217 net tons.

The N. S. Steel Co. consumed of Newfoundland ore 7,269 net tons. Spanish ore, 3,164 net tons, being about 25 per cent. of their total consumption of ore.

The Londonderry Iron Co., L'td., and the Canada Iron Furnace Co., L'td., of Radnor Forges, Que., used solely Canadian material.

The details of operations are as follows :—

THE NOVA SCOTIA STEEL CO., L'TD., NEW GLASGOW AND FERRONA, N.S.

| | |
|---|---|
| Coke pig iron made | 20,470 net tons |
| Steel made | 12,964 " " |
| Forgings made | 1,243 " " |

*Materials Used.*

| | |
|---|---|
| Coal | 113,298 net tons |
| Coke | 28,000 " " |
| Canadian ore | 30,051 " " |
| Newfoundland ore | 7,269 " " |
| Spanish ore | 3,164 " " |
| Limestone | 16,000 " " |

*Men Employed.*

| | |
|---|---|
| Married | 482 |
| Single | 193 |
| Boys | 30 |

Wages paid.—$277,500.

*Men Employed Mining Coal and Other Raw Material.*

| | |
|---|---|
| Married | 160 |
| Single | 50 |
| Boys | 50 |

Wages paid.—$153,000 for these latter services, or a total wage roll of $430,000.

Total labor of all classes.—965.

This, as in all other cases dealt with, does not include merchants, railway men, etc., nor any of those indirectly dependent upon the business.

THE LONDONDERRY IRON CO., L'T'D., LONDONDERRY, N.S

| | |
|---|---|
| Coke pig iron made | 10,497 net tons |
| Ore charged | 27,053 " |
| Flux charged | 8,882 " |
| Raw coal | 1,256 " |
| Coke | 18,290 " |
| Total coke raised | 29,327 " |
| Total limestone mined | 9,062 " |

*Furnace Output, 1896—Rolling Mills and Forges.*

Three heating furnaces and three train rolls manufactured in 1896.

Iron made (all sorts) 361 tons.

Puddled bar made at works and scrap and other iron made .. works—414 tons.

Total fuel consumed—452 net tons.

*Iron and Steel Works.*

Eight double puddling furnaces in fire and one single puddling furnace in fire.

| | |
|---|---|
| Production of iron | 3,800 net tons |
| Consumption of pig | 4,198 " |
| Consumption of fettling ore | 2,215 " |
| Consumption of fuel | 6,285 " |

Furnace campaign of 2896 very brief.

Average number of men employed in all departments, including labor in coal mining, etc.—425.

THE HAMILTON BLAST FURNACE CO., L'T'D., HAMILTON, ONT.

| | | |
|---|---|---|
| Coke pig iron made | | 25,270 net tons |
| Ore used—Canadian | 11,876 | |
| American | 32,024 | |
| | | 43,900 net tons |
| Coke used (all American) | 32,176 | " |
| Limestone (all Canadian) | 8,469 | " |

Average number of men employed at forges—120.

CANADA IRON FURNACE CO., L'T'D, RADNOR FORGES, QUE.

*Operations in Raw Material Department.*

| | |
|---|---|
| Charcoal produced | 630,000 bushels |
| Ore produced | 24,713 net tons |
| Limestone produced | 2,415 " |

*Charcoal Iron Produced in 1896, in a Campaign of Eight Months.*

| | |
|---|---|
| Charcoal pig iron made | 5,602 net tons |
| Charcoal consumed | 557,400 bushels |
| Ore consumed | 13,725 net tons |
| Limestane flux consumed | 1,415 " |

Average number of men employed—600.

As explained in last report, the labor of this furnace is principally drawn from the farming class, and the field work is therefore of a more or less intermittent character, being performed between seed time and harvest, or at other seasons of the year when the farmer is not engaged in his usual agricultural pursuits.

The auxiliary branches of business in connection with this Company are the Montreal Car Wheel Co., and the Drummond McCall Pipe Foundry Co., L't'd, Lachine, Que. A portion of the output of the furnace is used at the Lachine works, where employment is given to a farther staff of 150 men.

PICTOU CHARCOAL IRON COMPANY.

Ore produced—10,784 long tons. From 35 to 40 men employed. Blast furnace idle the whole of 1896.

BRISTOL IRON COMPANY.

Ore produced—1,033 tons Magnetite. This was shipped to the United States by the lessees, Messrs. Ennis & Co., of Philadelphia, Pa.

TORBROOK IRON COMPANY.

Ore produced—8,797 long tons. Mine worked for only four months. 43 persons employed.

As already pointed out, it is difficult in dealing with the history of the Canadian iron trade of 1896, to overlook the investigation which is at present being made by the Federal Government into the merits or otherwise of the encouragement granted to the manufacture of iron in Canada. "Good often comes out of evil," and if the agitation in regard to iron duties, does nothing more than to attract the earnest attention of Canadians to this, the basis of all industries, to the necessity of providing diversified employment for our people, to the fact that this country is especially adapted for the enterprise of iron making, and to the desirability of avoiding national vassalage to our neighbors, in regard to a commodity so important in times of peace or war, as iron, then a long stride shall have been made in the right direction.

The investigations of the Dominion Government Tariff Commission, have naturally brought out arguments for and against the retention of the present system of encouragement to the industry. Human nature showed itself in the arguments. Importers and distributers of foreign iron opposed the native industry, deemed the country not yet prepared for it, although seemingly quite ready for the products of the foreign sources of supply which they happened to represent. Some consumers of iron, arguing that any lowering of the existing duty meant additional profits in their own pockets, went in for that idea, but even they were fair enough and wise enough to suggest, that in event of any lowering of the duties, there should be an adequate increase in the bounties, so that home industry might be preserved, and an American monopoly of the Canadian market prevented.

The bulk of the evidence gathered from unprejudiced witnessess seems decidedly favorable to the continuance of Government encouragement in some form or another, to the production of pig iron from Canadian ores and fuel.

A very notable illustration of the value of the Charcoal Iron Industry comes from the farmers of the Province of Quebec, hundreds of whom have recently signed a petition to the Dominion Government, asking that the industry be preserved to them.

Firstly.—Because it is one of the very few rural industries that they enjoy, and because, through the resident employes at the works, it provides a ready cash market for farm products.

Secondly.—Because without it, they would be deprived of a cash market for the bog iron ore existing on their own and neighboring lands.

Thirdly.—Because the operations of the furnace provide them with a profitable market for the waste hard woods, which they are compelled to clear from their lands in preparing same for agricultural pursuits.

Finally, the petition points out, that without the labor afforded by the existance of Charcoal iron furnaces, they, as farmers, would be compelled, through climatic conditions, to exist for twelve months of each year upon the profits derivable five month's work, in their ordinary agricultural pursuits.

Such a petition is surely worthy of the best consideration of the Government, for investigation will show that the interests of the farmer in the Charcoal Iron Industry, are relatively even greater than those of the capitalists who have invested their money in the enterprise.

The following are a few points that naturally present themselves in considering the question as to the advisability, or otherwise, of granting encouragement to the manufacture of pig iron from Canadian raw material.

1st. Is Canada naturally fitted for the enterprise of iron making? The work of the Geological Survey has amply demonstrated the existence in Nova Scotia, New Brunswick, Cape Breton, Quebec, Ontario, Manitoba and British Columbia, of almost every class of iron ore known

to science, and of mineral fuel in Nova Scotia, Cape Breton and British Columbia.

Wood, hard and soft, suitable for charcoal fuel, is found everywhere throughout the Dominion, and of such quality and quantity that Canada easily ranks in natural resources with Sweden and the United States and with a properly developed industry, stands to secure a share of the world's trade in the highest class of charcoal iron, (of which there is an ever increasing demand(, at the same time, through this medium, securing to herself a utilization of waste material and an employment of labor of incalculable value.

The moral obligation to utilize such gifts rests upon the Government and people of Canada. The mines and forests must be opened up, either by the Government or the country, or if, as in the case of other iron producing countries, by private capital and enterprise, then, as in the case of the latter under adequate Government encouragement and protection.

2nd. Due consideration must be given to the course pursued under like conditions by Great Britain, Belguim and the United States, the methods so successfully followed in the initial years of development in these countries being presumably good enough for Canada.

History attests that Great Britain gave 73 years efficient protection (from 1787 to 1860) to her iron industry. The trade returns of to-day show that not only has the British iron master been driven out of the Canadian and other foreign markets, but the protected iron makers of the United States and Germany are successfully invading the English market itself, the facts raising a very grave question as to whether Great Britain did not make a serious error when she abandoned the principal of protection.

The United States has already given 34 years of a strong policy of protection, and has just elected Mr. McKinley, and his party to continue that course.

Germany has consistently followed the same road to success. Would it be wise for Canadians to go against all experience and precedent, and follow an untried course, instead of acknowledging the wisdom of the methods adopted by the most successful iron producing countries of the world?

3rd. The necessity of protecting Canadian labor against the lower range of pages paid to European workmen must be considered, and the equal necessity of protecting Canadian capital in the initial stages of the enterprise, against the developed industries of the United States and Great Britain, must be taken into account.

The Association is indebted to Messrs. C. A. Meissner of Londonderry, N. S., and John J. Drummond of Radnor Forges, for the following comparative figures, showing wages paid for labor in Canada as against the rates paid in European markets :

| | Blast furnacemen, Laborers. | Coal Mining Laborers. | Iron Ore. (Mining Laborers.) |
|---|---|---|---|
| Canada..... | $1.20 per day | Avg. $1.60 per day | Avg. $1.30 |
| Belgium..... | .58 | .83 | |
| Germany..... | .68 | .68 | .72 |
| Great Britain.... | 1.06 | 1.08 | |
| Sweden..... | .40 | .65 | .65 |

In the case of steel workers, puddlers and others, the same ratio of difference exists as between wages paid in Canada and in the countries mentioned.

Perhaps the keenest competition, in point of labor, that the Canadian producers have to contend with, is that of the negro and convict labor of Alabama, and other sections of the southern U. S. Mr. C. A. Meissner, formerly of Alabama, in a recent able paper contributed to the transactions of the Mining Society of Nova Scotia, says that "the peculiar labor and commissary conditions of the south give the producers of that section an advantage, on labor alone, of probably $3 or more per ton, over the Nova Scotian furnacemen." He says, "the worst feature of the southern labor conditions is the contract prison labor, which is a virtual system of legalized slavery. All State prisoners are auctioned off to the highest bidder, usually a mining company, and then penned up in a camp near the mines and made to work, the company feeding and housing them, besides paying the stipulated price to the State per man. This system naturally allows of very cheap mining, for, while the men are usually treated quite fairly, yet every effort is made to get the most work out of them for the least expenditure."

The absolute necessity of protecting the labor of Canadian workmen against that of Europe and the southern U. S. is apparent, and as for the necessity of protecting Canadian capital in the initial stages of the enterprise of iron making, it must be remembered that the Canadian furnacemen stand, as yet, in a very different position to that occupied by the iron masters of the U. S. and Great Britain, who now enjoy all the benefits of fully developed mines, and of perfected appliances for handling and shipping their ores, as well as all the advantages accruing to a long experience, and the possession of extensive plants, made possible by the large home markets that they enjoy.

The investment in permanent plant for the establishment of smelting works is very large, and the risk to investors greater than in almost any other enterprise, because if unsuccessful it means often a total loss of capital, as blast furnaces and their accessories cannot well be converted to other uses. In addition to this the Canadian furnaceman is at this disadvantage, that the mines of the Dominion not being fully developed, furnaces cannot be established until a sufficient supply of ore and fuel is not only discovered, but secured. Even when the ore is discovered, difficulties are experienced in securing control of it, the rights being often held by speculators at high prices. This difficulty overcome, the Canadian furnaceman owner has to undertake all the heavy cost and risk of opening up mines, many of which in the end may not prove commercially remunerative, by reason of the quantity and quality of the ore therein.

In these particulars the manufacture of iron from native raw material, differs from the manufacture of any other articles now made in this country, because in the latter case the supply of raw material, which Canada is unfitted by nature to produce, can be obtained in the markets of the world as soon as the factories are erected and ready to manufacture.

In the U. S. to-day, the smelting of iron in blast furnaces is a comparatively simple operation, as the blast furnace proprietors purchases his ore and fuel of a specified analysis from the owners of the already developed and active mines. Where charcoal fuel is used he is often able to buy this in the open market from those who manufacture it for the profit they make out of the by-products, such as wood alcohol, acetate of lime, etc. His investment and risk are therefore limited to the mere erection of a blast furnace and its accessories. He is not obliged, as the Canadian often is in charcoal furnace work, to carry a year's stock of raw material ahead, so that wood may be seasoned and initial and climatic conditions met, the American investment being therefore very much less, proportionately to his output, than that of his Canadian competitor.

The American government, appreciating fully these initial difficulties, built up the great mineral wealth of that country by consistently (for now upwards of 34 years) protecting those private investors, who undertook and so well succeeded in the work of opening mines and building up the industry.

4th. It is only just to the Canadian furnacemen of to-day to contrast the average prices which their American competitors were able to secure for their pig iron products between the years 1870 (when the war was over) and 1890—21 years—when the U. S. was busy building up her industry, and years during which the conditions in the U. S. may well be taken as analogous with existing conditions in Canada.

Reference to the second edition of Swank's "Iron in all Ages," page 514, will show that the average prices secured by American man-

ufacturers during the period named, viz. 1870 to 1890 inclusive, for coke iron delivered at Philadelphia, was $25,25 per gross ton, and if we even go still further and include the unprofitable and often bankrupt prices of American pig iron ruling from 1891 to the present day, the average price obtained during the 27 years from 1870 to date, by American makers of coke iron, has been at Philadelphia no less than $22.72 per gross ton. Philadelphia is chosen as a base point, as it compares somewhat with the position occupied by such cities as Toronto, London and Montreal, not being an iron producing centre.

Still more marked were the high prices obtained during the years mentioned for charcoal iron, as against the prices ruling in the U. S. to-day. It is most interesting also to note the average figures realized by the Scotch iron masters for their pig iron products during the last 25 years, viz. from 1872 to 1896 inclusive. Statistics prepared by Messrs. Jas. Watson & Co., of Glasgow, Scotland, under date 7th January, 1897, show that the average price obtained for Scotch Warrants during the period mentioned was 54s. per ton, equal to $13.20 currency. Add to this the usual average difference between the value of warrants and that of "maker's brands." viz. $1.50, it will be seen that the iron masters of Scotland secured for their "maker's brands" of pig iron a return of no less than $14.70 per gross ton.

It certainly speaks well for the financial strength of the Canadian producers of pig iron, that they have been able to keep their furnaces in blast against the competition of American furnaces during the past five years, when in addition to the initial difficulties and disadvantages already alluded to, they have had to face standards of prices for American iron that were often set by the returns received for bankrupt stocks.

Reference to approximate figures quoted in the *Canadian Mining Iron and Steel Manual*, 1896, *page* 310, show that from 1888 to 1895 inclusive, the Canadian manufacturer of coke pig iron has not received a greater average return than $15.50 per gross ton at the furnace in Nova Scotia, and it is a notable fact that to-day the Nova Scotian furnaces are only getting a return of from $11.50 to $12.00 per gross ton at the furnace, figures that are very considerably lower than the average price secured by the Scotch furnace masters during the past 25 years, competitive with what they are selling at to-day, and ridiculously small as compared with the returns secured in the same initial stages of the enterprise by their American rivals.

It is quite evident that a great part of the brunt of the early development, has fallen on those Canadians who have invested in the enterprise of iron making, and not altogether, as claimed, upon the consumers and tax bearers of the country.

5th. Government encouragement is even more necessary to Canadian producers, than it was to the pioneers of the iron trade in Great Britain and the United States. The developed industry of the United States in 1896 is, in point of magnitude, as well as geographically speaking, a far more formidable rival to the Canadian producers of iron than any of the rivals with which the early producers of other countries have had to contend.

6th. Shall Canada safeguard the interests of these capitalists and workmen at present engaged in the manufacture of iron in this country, and who undertook the work in good faith under the policy adopted by the vote of the people in 1887, and which the latter have endorsed down to the present time?

The Canadian people cannot afford to be other than just and honest in dealing with the question, and they must not overlook the fact that whilst cotton, sugar, tobacco and kindred industries, have enjoyed protection for upwards of 17 years, iron, which is naturally much slower of growth, where native materials have to be secured, developed, and utilized, has only had a protection for something less than nine years.

7th. Are our native furnaces producing a quality of iron suitable for the requirements of consumers?

Foundrymen, like doctors, often differ. Those in the trade know how often one foundryman will condemn as unsuitable for his purpose a brand of iron which another man in exactly the same line of business considers an ideal metal. Prejudice and theory enters into the question to a very considerable extent, and for that reason the sweeping assertion made by some consumers of iron that they cannot use Canadian iron, must not be taken *ipso facto*. There are many iron founders in Canada to-day, who, aside from scrap iron which must necessarily, to some extent, enter into their mixtures. use solely and alone the pig iron product of Canadian furnaces, and secure most excellent castings.

Admitted that for certain work it is desirable to mix say a Western iron with, for instance, the proudct of Nova Scotian furnaces, in that case why not use, at least in part, the metal produced from Lake Superior ores by such a furnace as the one now located at Hamilton, Ont., rather than the ore produced from exactly the same ores by an American furnace? Wherein lies the difference?

Then if a further diversity of quality is really required, import from abroad for the present, whatever may be actually wanted to make specially fine work. in the meantime let development go steadily on in all the Provinces, the furnaces using ores from rhe Canadian shores of Lake Superior, rather than from the American shore, from Ontario, Quebec, and Nova Scotian mines until finally Canada like the United States, shall be independent in the matter of her iron supplies.

Until as late as 1881 American foundrymen occupied the same position with regard to this matter of mixtures as the Canadians occupy to-day. Many of them until then had continued to import and use "Summerlee" and other such brands of Scotch and English iron, firmly believing that they could not get a perfect mixture with the product of their own furnaces. Under consistent protection the latter increased and multiplied. New mines were opened up in different portions of the United States., new ores came into use, American "Scotch" became a known quality of pig iron, prejudice was removed, and the use of foreign metal was discontinued. In due time the same state of affairs will be brought about in Canada.

8th. In event of our native industry being abandoned, upon what source of supply would Canada now, and for the future, have to depend for pig iron and the products thereof?

A reference to Canadian Government statistics say from 1885 to 1895, or to the same figures given in the *Canadian Mining Iron and Steel Manual for* 1896. *page* 321, *etc.*, will demonstrate the fact that the iron producers of the United States are rapidly driving the iron masters of Great Britain out of the Canadian market. As a matter of fact British iron is now but very rarely used in the iron foundries of Ontario, the largest consuming market in the Dominion. Take the figures on pig iron.

In 1885 we imported from Great Britain 34,773 net tons, and from the United States 7,389 net tons.

Within ten years it will be found that these figures are completely reversed.

In the Fiscal year 1895-96 we imported from Great Britain 6,525 net tons, and from the United States 32,597 net tons, and the same progress is going steadily in almost all other manufacturers of iron and steel. Where formerly we used British steel boiler plates, structural iron for steel, etc, etc., we now use American. The only possible rivals now and hereafter to the American producers of iron and steel will be our own native furnaces and mills, and it is for the people of Canada to consider which is best, in the general interest of our country, to sustain and encourage.

9th. What has been the effect the iron duties on the shipping interests of Montreal and other ports of the Dominion, and what will be the effect on the railroad interests if the Canadian iron industry is

injuriously affected by a change in the policy of protection and encouragement?

British iron to-day competes with American under exactly the same tariff. As already shown, the British iron masters have almost abandoned the market, acknowledging that they cannot compete with their American rivals. Quotations on British pig iron for delivery in Ontario towns run fully $2.00 to $3.00 per ton over those of equal manufacturers of American make. Competition is impossible on these terms. If pig iron was admitted free into Canada the relative position as between the English and American iron producers would be unchanged, and not a single ton additional freight could be secured for Western Canadian points by the vessels plying between the British ports and Montreal, or other Canadian points. A glance at Government statistics will prove to the vessel owners that they can have no hope to increase the tonnage of pig iron from British or European ports by any decrease in the Customs duties.

It has been claimed that the iron duties injuriously affect the interests of the vessel owners by stopping the importation of bar iron. A further reference to statistics will evidence the fact that so far as tonnage is concerned, scrap iron, the present raw material of the leading Canadian mills replaced for a considerable time the loss of bars, the vessels from London and such ports simply taking the tonnage which formerly came in the shape of bars from Liverpool and Glasgow. The Americans to-day are capturing even the scrap iron trade, the vessel owners losing, but not enrough the operations of the iron duties.

Any legislation tending to injure the native iron industry of this country will be a direct blow at railroad interests. This can be readily understood when the fact is considered that Nova Scotia, Quebec, and Ontario furnaces have to depend very largely upon the railroads for not only carrying their finished goods to the market, but first of all to bring the raw material to the furnace. It is only necessary to mention one or two cases in point as an illustration of what the manufacture of iron means to railroad enterprise.

For instance the business of the Londonderry Iron Co., and the Nova Scotia Steel Co., Ltd., combined, means a revenue of $200,000 per annum to the Intercolonial Railway and connecting lines, a very important factor to the Government.

In the case of the charcoal iron furnace at Radnor Forges the revenue derivable therefrom by the railways amount to upwards of $35,000 per annum, and with the expected increase of operations at that point, which will assuredly come if a consistent policy of Government encouragement is maintained, these revenues will constantly increase.

Those interested in railroads in the United States and Great Britain appreciate most fully the great importance of the iron industry as a provider of freights, and it may be readily assumed that our own Canadian railroad managers also understand this thoroughly.

10th. Is pig iron a raw material or a finished article?

Presumably it will be admitted that the best gauge as to whether an article, which nature happens to have fitted the country to produce, is to be considered as a raw material or a finished article, is the amount of native labor employed to bring it to a merchantable stage. If taken on this basis the manufacture of pig iron from Canadian raw materials, by Canadian labor, must be considered a far more valuable enterprise to the country than the mere manipulation of the metal in the iron foundries of the country. It is quite safe to estimate that $2.00 is spent in labor in producing coke pig iron from the ore, where $1.00 is spent in transforming it into castings. In arriving at the relative value it must not be forgotten that the fuel used in our western foundaries is invariably the product of American mines and of American labor. Where $10.00 is spent in labor (the raw material all representing labor) in producing coke iron in Nova Scotia, only $5.00 is spent in the labor of resmelting this pig iron into castings in the foundries of Ontario and Quebec. Where charcoal is used as a fuel in smelting native ores, as in the case of Quebec furnaces, the labor value to the country of such pig iron is from three to four times as great as that of smelting it into castings in the ordinary foundry. Pig iron then may well be considered a finished article, and should be protected and encouraged as such.

Consumers of iron have sometimes claimed that if they had their so-called "raw materials" (pig iron, etc.,) free, that they would be willing to have the protective duties on their own products lowered. The manufacture of pig iron cannot occupy a similar position because his industry, being the initial one, he has no one to fall back upon except indeed his workmen, a position which would certainly be detrimental to every Canadian interest.

11. Shall we have a protective duty or a system of bounties?

Three leading interests are involved.—(1.) The producers, (2) the consumers, (3) revenue.

Assuming that the object of all is to develop the manufacture of iron from native ores, and native ores only, it would be better to increase the bounty and decrease the duties. The experience of all who have taken part in the enterprise of iron-making in Canada is that whilst development has gone steadily forward, the business has not, in the nature of things, up to the present, proved a paying investment. Most of those now interested in a direct financial sense, might have done better to have simply invested their money in bank stocks, and allowed their workmen to seek employment in the United States or elsewhere. The facts in connection with the industry prove that in the present stages of development a less encouragement (protection and bounty combined) than is now afforded, would mean that progress would be seriously retarded. Supposing then that the present total amount of encouragement is allowed, make the duty $3.00 per net ton and the bounty $3.00 per net ton, and only pay the bonus when Canadian iron ores are used. This change would have the effect of encouraging producers of iron to develop the mines of the country, so that they might earn the bonus. The consumers would be able to purchase their material $1.00 per ton less than at present, and as Canadian furnacemen have not for some time past taken advantage of the full amount of the protective duty (selling, as they do, their product to western consumers at almost 10 per cent. below the price of American iron, delivered duty paid) the Canadian consumers would be able to purchase their metal reasonably close to the prices paid by their competitors in the Northern American States. The revenue of the country would have the benefit of $3.00 per ton on such American iron as might be imported into the country for the present, all the interests being thus, as much as possible, conserved.

12th. Specific vs. ad valorem duty.

The experience in all iron producing countries has been that a specific duty is the only safe form of duty on pig iron. In the first place it is impossible to determine the value of pig iron in its natural form. Second, the freight from distant iron producing points, such as Great Britain and the Southern States, forms a very large part of the value of the iron itself, the only safe basis of valuation therefore is the point of consumption, and not at the works where the iron is produced. In adopting a specific duty the argument which obtains with regard to many other articles of consumption, viz.: that the poor man pays as much on his necessity as the rich man on his luxury, does not carry weight with regard to pig iron, inasmuch, for instance, as the iron used in the manufacture of the rich man's furnace may, by reason of the greater weight of the casting, be of a poorer quality than that used in the poor man's stove, where the plate being very thin the metal used must necessarily be of strong and good quality. Further, the highest class of iron, and the most costly, viz.: charcoal iron, is most generally used in the manufacture of articles upon which the safety of human life depends. For instance, the manufacture of railway

car wheels, electric trolley wheels, structural work for buildings, bridges, etc., etc.

Legislation, affording protection and encouragement, through bounties, should be left entirely in the hands of the Dominion Government.

The British North American Act of Confederation (of 1867) vested in the Dominion Government the regulation of Trade and Commerce (30 and 31 Vic. Cap. 3, clause 91.) Speaking specially for the Province of Quebec, it was assuredly upon this distinct understanding that we became an integral part of the Confederation.

In November, 1894 the Government of Ontario, of which Sir Oliver Mowat was then premier, placed upon the statute books of that province an admirable, but unfortunately, sectional Act, entitled "An Act relating to mines and mining lands," by which Ontario appropriated the sum of $125,000 to aid miners and producers of iron ores in developing the ore deposits of that province. Clause 12 of the said Act authorized the treasurer of the province to pay out to miners, or producers of ore, upon all ores which shall be raised or mined and smelted in that province, for a period of five years from 1st July, 1894, the equivalent of $1.00 per ton on the pig metal products of such ore, this to a maximum of $25,000 per annum.

The Act in question was only passed after a most careful examination into the causes that had, up to that time, served to retard the development of the iron industry in Ontario. The local legislature, in its wisdom, decided that it was of the utmost importance that the industry should be fostered, and secondly that the encouragement afforded by the Federal government to the manufacturer of iron from native ores, and which amounted to a combined duty and bonus of $6 per ton, was insufficient to bring about a successful establishment of the industry. They fully recognized the heavy initial expenses which would fall upon those undertaking the opening of the mines and the general development of the enterprise, and therefore determined to do what the Federal government should have done, viz. to increase the encouragement. The Act of November, 1894, was the result. The Act in question, in other respects admittedly wise, unfortunately violates if not indeed the letter of the law as laid down in the British North American Act, certainly the spirit of that law, for in affording an undue advantage to Ontario producers of iron, it in effect legislates directly against freedom of business as between the provinces comprising the Dominion of Canada, several of which provinces, for financial and other considerations, cannot attempt at present to follow the lead of Ontario in affording similar additional encouragement to the producers of iron within their own boundaries. The considerations which led the government of Ontario in November, 1894 to offer additional encouragement for the utilization ofits ores, and the manufacture of iron therefrom, should have at least sufficient weight with the Dominion government to prevent any possible reduction in the present Federal encouragement, and at the same time, in simple justice to the other provinces of the Dominion, and for the safety of inter-Provincial trade and commerce, steps should be taken to rescind the Ontario Act in question, and preserve to the Dominion government the sole control of the policy of encouragement.

### MARKET.

Canada ranks, per capita, as a consumer of iron second only to Great Britain and the U. S., and as the country progresses her demand for iron and steel will increase not only in tonnage, but probably also in ratio.

It is estimated that since Confederation, we have imported iron and steel, and the manufactures thereof, to the value of nearly $400,000,000. With the natural advantages which the Dominion possesses for the manufacture of iron, is it reasonable that we should go on importing our requirements, and annually draining our country of enormous sums of money?

In an able article recently prepared by Mr. C. A, Meissner, manager of the Londonderry Iron Co., one avenue of development is pointed out in the opportune statement that "there is only one country under the sun with 15,000 miles of railway that does not manufacture a single steel rail, and that country is Canada."

Aside from pig iron and steel rails there is anuually a very large consumption of bar iron and steel, hoop and band iron, iron and steel boiler plates and sheets, chain cables, slabs, blooms, bridges and structural iron and steel, iron and steel for ships, steel ingots, bars, billets and other forms of iron and steel, and the productions thereof, too numerous to mention, the greater portion of which is now imported into the country.

If the materials we are obliged to import came, as formerly, from Great Britain, Canadians might accept the situation. Unfortunately there is little hope of this. The mines of the mother country are in many districts well nigh worked out, the British iron masters have to increasingly depend upon a foreign ore supply, the cost of production being so much increased thereby that pig iron and finished material of American and German manufacture will not only have to compete successfully for a share of the home trade, but may in time actually have to be depended upon to supply actual requirements, unless, indeed, Canada and the other colonies come to the rescue, by building up industries that will make the Empire perfectly independent with regard to an article so absolutely necessary to the life of the nation as iron admittedly is. For the present Canada possesses an ample home market for the output of her coke furnaces, and not only a home demand, but the probabilities of a large foreign trade for her charcoal iron. Surely such an industry is worthy of a broad and comprehensive policy of encouragement from her government and people; such a policy will give confidence to both capital and labor, so that the work of development may go forward without hindrance.

### DISCUSSION.

MR. GRAHAM FRASER (Nova Scotia Steel Co.)—I am not the talking director of our company, but I may say that I have been very much interested in Mr. Drummond's paper. I agree with him in many things; in fact I think that I can agree with nearly everything that he said; but there is one point that I did not quite catch, and I would ask Mr. Drummond with respect to it. I refer to the bounty paid on pig iron made from native ores. He has told us that a large amount of labor is expended in getting the fuel and also the flux, and I would ask whether that should not be considered when the bounty is paid on iron as well as on ores?

MR. DRUMMOND.—I quite agree with you.

MR. FRASER.—I think myself that it should be so considered.

MR. DRUMMOND.—Under existing conditions, decidedly.

MR. FRASER.—Then there is the question of freights to Canada from the old country. Of course that has been pretty well threshed out, and it is quite evident that the steamers would receive no more freight if we had free trade in iron. There are also a great many other points in connection with the paper, but I may say that we have Mr. Stairs and Mr. Graham of our company with us, who might give some information. If they say anything that is wrong I will put them right.

MR. JOHN F. STAIRS.—I feel with all the other gentlemen present that we owe a great deal to Mr. Drummond for his able paper, but I do not feel just now in a position to discuss it. I would, however, like to say something later in the evening if there are any questions asked. I feel so deeply that it is a paper that should be discussed, and knowing a little about the manufacture of iron in Nova Scotia, I would be willing to answer any questions that should be asked. I think that the gentlemen present should catechise you a little, Mr. Drummond, and in that way we could bring out the facts more clearly, and I would suggest that those present would now ask questions.

DR. GILPIN, Inspector of Mines for Nova Scotia, having been called upon, said: I think, Mr. President, it would be out of place for me to enter into any discussion after these gentlemen who are so cognizant of the business have spoken. I could not follow all that Mr. Drummond has stated as regards the competition of American pig iron in England, but I have always understood that it was rather of a temporary character. I think, however, that the British producer has all he can do to supply the home market and also to supply the demand from Germany. I understand that the southern pig iron is peculiarly adapted to England, and therefore was received with some favor.

MR. DRUMMOND.—In reply to Dr. Gilpin I may say that England has not got anything like the trade that her furnaces can supply. Those who have been in the trade as I have been for some years (I may say that I represent a good many English furnaces as well as a good many Scotch furnaces) can understand this. A large number of furnaces have been idle, and while last year was a very fair year, still England and her workmen are feeling very seriously the depression caused by the trade that is being taken away from them, the depression caused by the loss of the Canadian and other foreign trade captured by the American and German producers, and perhaps worse still the loss of their own home trade by the American and German iron and products thereof. The English capitalists feel this matter very keenly; they feel that while their market is open to Americans, the American manufacturer has his own market reserved to him under protection, and can then compete with the English capitalist in his own market. I can give you the evidence of Americans who ought to know; I can give you the evidence of one who was here within the past week, and who is now doing a large business in London. He says that they are there to stay, and what is more, my English and Scotch friends acknowledge that they are there to stay.

MR. HARVEY GRAHAM.—I can, with other gentlemen who have spoken, congratulate you, Mr. President, very highly, on the admirable paper to which we have just listened. I have not yet heard any paper which has discussed this question so exhaustively as the one we have heard to-night. The amount of research and care that must have been spent upon it is most creditable to Mr. Drummond. Naturally we who are interested in the industry think that iron is the greatest industry in the country. Free trader as I am, I think this is the industry above all others which requires the fostering care of the Liberal Government. This is the industry above all others that helps to build up the country, that helps to develop its strength and resources as much, perhaps more so, than any other industry that is in existence. I am sorry that the evening is so late, for I think a whole night could be spent profitably and properly in discussing this subject. There are some points in the paper which, while not controverting them, I would like to discuss a little more fully, but I do not think it advisable at this late hour to discuss it it any further.

MR. STAIRS.—In connection with the discussion I may say that I will not be able to be present at the other meetings, and as the matter is so very important I would just ask the attention of the members present for two or three minutes. I want to say one word upon the general question of the manufacture of iron, and in justification of the policy which has been pursued, and it is that the iron makers of Nova Scotia—that is, those gentlemen managing the company with which I have the honor to be connected—have had in anticipation that if in the future they were able to reduce the cost of their product they would be quite ready and willing to do so. It is quite true that it has been cheaper in the United States than in Nova Scotia, but in Alabama and in Virginia it has brought to my notice very strongly in connection with the figures discussed before the tariff commission that it is altogether a question of wages. If we in Nova Scotia were able to compete in wages with those in Alabama we could make iron as cheap as they do. We would of course always be able to get the price of our iron very much reduced by improved processes of manufacture. In compiling some figures the other day, I noticed that in the last seven years the selling price of the steel of the Nova Scotia company was reduced to $14 per ton, and in time we expect to get it down still further. This shows that the iron and steel industry in Nova Scotia has been a progressive one. It has increased its capacity in the last seven years. As you know, sir, and as every man present in this room knows, if you want to keep up to the times you must put in new and improved plant and machinery. One of the things that the iron makers have to contend with in the Ontario market is the long distance, and the heavy freights to be paid by rail, and in this connection I may say that the iron people of Nova Scotia look with favor upon the deepening of the St. Lawrence canals. They think that by the deepening of the St. Lawrence canals the question for them is very largely to be solved, as it would put them in a very much better position to compete with the Americans than they are at present. With reference to the remarks of my friend, Dr. Gilpin, about the competition of Southern iron in England I may say that I, with him, thought that it was only of a temporary character and would only last a short time, but later on I came to the conclusion that it had got into England to stay; and I am afraid that northern iron and steel billets will get in to stay too. The question was brought out at the Tariff Commission when we met the other day, and it showed the price of steel billets in the United States and in England, and either the Hon. Mr. Fielding or Sir Richard Cartwright asked why it was that with such a great difference in the price in the United States and in England these steel billets did not go into England. It was stated then that the price in the United States had not been down to this low point for very long, but if it continued the English iron masters would have to look to their laurels or their United States brethern would be competing with them successfully, and would take away from them a very large proportion of their trade. As the hour is late, and I know that the gentlemen want to get away, I will say no more at present.

MR. HARVEY GRAHAM.—Mr. President, I can give you some evidence as to the cost of labor in Alabama. One gentleman writes to me that his company could get 300 men, that is common laborers, at seventy cents per day on two days' notice. Another letter from the same gentleman a day or two later, says that unskilled labor is ninety cents per day; the other cost of labor is sixty-five cents per ton of pig iron. They have two furnaces. In addition to that there are the truck stores from which their workmen are paid, and the profits of these truck stores amount to a profit on the whole industry. When a man is working for seventy cents a day and takes his pay in goods the net cost of his labor to the company is from thirty-five to forty cents a day, or fifty cents a day at the most, as against $1.25 a day in this country.

DR. J. B. PORTER.—You could get a fair grade of workmen in Alabama for seventy-five cents a day in any quantity—fairly intelligent negro labor—and the negro of Alabama and of the south is now trained to be a fairly good furnaceman. I know that one of the best furnace foremen I ever knew was a negro, and he had practical charge of the furnace, of course under the superintendent. One of the best puddlers I ever knew was a negro; he was a very good man. When I am speaking of a puddler or a foreman I am not speaking of any ninety or seventy-five cent men, but you could get a very good man for furnace work or for handling ore for from sixty-five to ninety cents a day, and then the goods' store in some cases enables a still further reduction on that. However, there is considerable legislation against that, and I do not think that it will last very long. There are only a few places where it exists now, and I trust that very soon we will see the last of them.

THE PRESIDENT.—We have to thank the members for giving so much information, particularly in regard to labor in the south. It shows what the iron producers have got to contend against, and I hope that the government will be as unanimous as this meeting appears to be in helping to build up the great national industry of this Dominion

## The Economics of Joint Stock Companies and the Laws Relating to their Incorporation.

—

By Mr J. Bawden, Barrister, Kingston, Ont.

Is the system now in general use in Ontario and British Columbia for floating or converting into cash the stock of mining companies, a proper system? Is it the best that may be devised from a financial point of view? Is it correct in method from a legal point of view?

The object of company promoters is (1) either by the sale of shares to sell their property for the highest obtainable prices, or (2) to convert a part of the interest into cash and acquire working capital for the development of the remaining interest, or (3) solely to obtain working capital. The first of these objects is legitimate though framed to attain indirectly a result not directly attainable; and any interference with lawful methods for attaining it will be opposed by the commercial spirit of the age, which says to buyers of every degree, "let the buyer beware." The law interferes only to protect men's stomachs from adulterated food, not by any preventive process to protect from pick-pockets in the guise of vendors of valueless shares.

The question, whether in the interests of the public it is advisable to interfere with the right to sell valueless shares lest individual liberty and the inalienable rights of British subjects be imprudently invaded, is a question of expediency which those who have at heart the development of mining enterprise may discuss without a tilt with brokers or jurists. The sale of worthless shares injuriously affects the sale of valuable shares. It goes without saying that capital seeking investment in mining shares is a limited quantity; that it is coaxed out of hoards, at the cost of much wind in the form of reports, advertisements, puffs, editorials, and that the characters of many people are staked upon representations, sometimes made in good faith, but too often discredited by adverse results. The argument therefore against the legality of the sale of worthless shares is founded on the economic ground that the business should be prohibited by legislation because it will work irreparable injury to honest enterprise.

Unless the mining industry of this country is able to establish a character for fair dealing, it will be a moral boon to mankind to send the whole mining constituency to some warmer climate where the temperature may generate conscience; a moral boon to let the world know that fraudulent corporations are not prevented from obtaining a legal status in this country.

The law of limited liability while it guarded shareholders from the consequences of corporate trading in excess of ability to pay, also secured to creditors execution against any sums due to the company on the issue of shares. The capital announced was therefore, in general terms, a measure of the money required as working capital. The prudent promoter avoided an over issue of shares beyond the capital required, because idle money will not earn dividends; at the same time care was taken to call in enough capital to avoid the costly necessity of borrowing, or to avoid a deficiency of working capital. The nominal capital had some relation to the business in view, and was usually an estimate. Industrial stocks cannot be put on the English market without estimates carefully prepared by chartered accountants. The plan of organization of such companies leaves nothing to be desired in the way of reasonable safeguards for the protection of shareholders. The result is that although a percentage of "industrials" are failures they are not only the favorite stocks in Great Britain but they have done much, as joint stock companies are eminently fitted to do, to promote the great commercial prosperity of the "tight little island."

The sale of bonds below par had been cited to justify the sale of new stock below par. The quotation of the former has always some relation to the rate of interest the vendor is willing to pay; and being ostensibly a security of fixed nominal value issued under legal sanctions, the buyer owes it to his self-respect to investigate the security offered. In the case of shares the investment offered has none of the characters of a bond. The share certificatæ neither binds nor obliges any. In fact there is not a more innocent, vague, unrepresentative, and yet plausible piece of paper in the world than a mining share certificate. It may stand for a share in a mine which has no existence, for a part of the capital of a scheme which never had and never will have a dollar in its treasury, or it may represent the title to a share in a bonanza honestly administered, paying the largest profits ever realized, and be good documentary evidence of the ownership of value many multiples of the money share stated on its face.

The issue of stock in small shares was condemned many years ago by English judges on the ground that it encouraged the promotion of bubble companies. The danger is perhaps less to-day than in the time of Lord Eldon, owing to the enlightenment offered by the press. The source of protection, however, is one of danger, and it must be remembered that it is wholly irresponsible. A reckless or mercenary correspondent may innocently in the one case or fraudulently in the other, spread false information which may take from the seamstress her savings, the clerk his hoard for the wedding and house furnishing, from the mechanic his provision against rainy days and storms; for all which injury the sufferer will have no redress. The issue of small shares works injury by the encouragement of a class it is most desirable to deter from mining investments. It can only be to tempt and encourage the holders of small savings to invest in mining stocks that shares have been made of such small nominal value as five cents. The business man is not beguiled by any such art of the broker as to conceive for a moment that his position as the holder of 1,000 five cent shares in a million dollar company is one whit different from the holder of fifty one-dollar shares in a company of fifty thousand dollars capital. Given two companies with property of equal value he would probably prefer that of the smaller capital.

The Stock Corporation law of New York State enacts that shares shall not be less than five or more than one hundred dollars; and that "no corporation shall issue either stock or bonds except for money, labor done or property actually received for the use and lawful purposes of such corporation. No such stock shall be issued for less than its par value. No such bonds shall be issued for less than the fair market value thereof."

The enticement of Lilliput with its picayunes and pence into the mining world will only make the howling louder in the event of disaster. The failure of half a dozen mining companies among so many would be deemed no unusual occurrence by the ordinary run of buyers of mining shares, but when the losses fall on those who in the nature of honest things should have been dissuaded or deterred from investing, the cry will be bitter indeed.

The promoters of honest enterprises who have fallen upon this mode of raising capital may have been encouraged by the facility it afforded. They have, however, not only paid enormous percentages for brokerage but have laid the foundation of future peril for any interest they may have retained in the property by creating a large and unmanageable constituency. The sale of a mine, often the most advantageous way of getting rid of unsuccessful managers, may be hindered very effectively by a few opposing shareholders insisting upon their right to maintain their investment in a particular property; and strangely enough the opposition is often in inverse ratio to the interest of the discontented. While five cent stocks have usually been sold in blocks of not less than 100 shares there is nothing to prevent their transfer among 100 holders. It will be comparatively easy to crowd out any business meeting by the transferees of a very small minority of shareholders, whose physical force may make up for lack of voting power.

There has been invented the curious device of selling parts of the stock issue at varying prices—a feature antagonistic to the principle of

joint stock company organization, that shareholders shall share equally in their contribution to the enterprise. The creation of preference shares, it is true, is opposed to this principle, but is justified or excused on the ground that it may be necessary to offer preference in the nature of security in order to obtain capital for working operations or to provide for some pressing liability. The issue of dollar stock at five cents with the notice that the next issue will not be less than ten cents or more is an invention which would have met prompt rebuke from the courts in days gone by. Promoters would have been told that if it was conceded to them to sell stock at a discount the concession implied a uniform discount. But to sum up the objections which suggest themselves against this mode of raising the wind for mining operations, that which should most seriously engage consideration is that the word "capital" becomes a misnomer, a term of no value in fact either in the prospectus or in the accounts of a company selling various issues of stock at prices regulated by the brokers. While every reasonable and honest facility should be afforded for raising money for working mines, to allow a company to characterise as its capital of $1,000,000, the shares which it has authorized its brokers to sell for $50,000, less a large per cent. for commission and other expenses, is to allow the use of misrepresentation. Where a company has done this it should be compelled in every case to print the amount of the actual capital under the nominal capital, and in future no issue of stock should be allowed at varying prices below par. On every share certificate or other document, in every advertisement, under the words and figures stating the nominal capital, the amount of the actual capital raised or intended to be raised should be made to appear.

It is an economic law that the value of a stock is greater in proportion to its security than in the ratio of its profit. It is a cognate law that the cost of obtaining capital by the sale of stocks increases in proportion to the hazard of the investment offered by the stock. It is therefore, of the first importance to give the buyers of mining shares legally sanctioned guarantees that the following elements are inherent in the shares.

1. That the mining company had on its incorporation a good title to the property described in its prospectus, or in the case of a development company formed to buy and develop mines has at least ten per cent of half of its capital paid into the company's treasury.

2. That every agreement made by the promoters which calls for a payment out of the company's capital is referred to in the charter, and is open to the examination of the public, and that every broker selling stock in such company is supplied with copies for perusal by intending buyers.

3. That share certificates shall in addition to the nominal capital state the amount of subscribed stock at the date of issue of such certificate, the amount of subscribed capital paid in cash or by the sale of land to the company, the amount of treasury stock to be sold and the price thereof fixed by the directors.

4. That the company's treasurer has given the indemnity of a guarantee company for the faithful performance of his duty, or that the proceeds of treasury stock are to be administered under the scrutiny of a trust company.

Further consideration of the economics of Joint Stock companies is so much involved with matters of necessary legislation relating to their incorporation that their discussion will come up under this head.

I invite the provincial representatives of the mining interests of the Dominion to make it their duty to promote uniform legislation upon the incorporation and government of joint stock companies among all the provinces of the Dominion. Let there be a uniform code of Joint Stock Company Law from the Atlantic to the Pacific, and if this cannot be comprehensive enough for the whole scope of joint stock company enterprise let it at least embrace all mining enterprise The department of Trade and Commerce, exercising a function of the British Board of Trade, with the assistance of the Provincial Law Departments, might readily consummate this great object. There is no reason why we may not in this law abiding country offer to the world a simple yet comprehensive, liberal yet widely efficient, method of Joint Stock Incorporation and Regulation which will secure the rights and the property of picayune shareholders as well as of more substantial capitalists. In the pursuit of this end let us keep steadily in view two things. (1.) That security of investment is the most important of all factors in the promotion of mining enterprise, and that the clamor of certain brokers and speculators for financial facilities and license for tricks upon travellers must be stoutly opposed; (2.) that our labors shall not weave redtape and legal machinery and friction for the wheels of mining enterprise. To encourage us in labor for these objects there are some flushes and streamers in the sky which stimulate the fancy and beget the hope that we Canadians are near the dawn of the greatest development of mining enterprise which has ever visited any country.

1. I propose to touch cursorily in order some of the enactments and amendments required in a code of Joint Stock Company Law.

1. *Notice of Application.*—This should be abolished because unnecessary. Notice of incorporation only should be required.

2. *Scope or objects of Incorporations.*—English law permits the grant of a charter "for any lawful purpose." Some provincial scrutiny has been suggested, *e. g.*, that the purposes or objects of the company shall be cognate. This suggests departmental discussion of the business to be operated by the company, a matter which so long as the purpose is lawful, no departmental deputy or head has the least right to discuss or question. Let men under the grant of a charter pursue collectively any business enterprise they may lawfully pursue as individuals. At the same time let the objects of incorporation be set out always on the face of the share certificate.

3. *Capital*—Incorporation has for its main purpose the acquisition of working capital which included the first cost of the mine, the cost of raising the required sum, and the reward of the promoter. The latter element is difficult to eliminate or to control with reasonable limits. It knows no bounds of law, reason or honesty. It is the most highly paid and perhaps the least serviceable commodity in the market. The most practicable plan of dealing with what of evil there may be in the scheme of promoters is to bring them to the light, that is, to require, as is the practice in England, that all agreements respecting the sale of property to the company and the division of the capital among the promoters shall be referred to in the prospectus, and shall be open open to inspection. The fullest information about ground-floor operations must be afforded the public. Payments in shares to promoters, directors and others concerned in getting up companies should be declared simply null and void unless disclosed in the prospectus and made public in any announcement of the sale of the treasury stock. The non-assessable character in all the provinces of all mining shares not paid by instalments should be declared, as it has been in Ontario. If traders will give credit to mining companies it should be clearly understood that their only remedy in all cases is against the company's personal property, not against shareholders. The non-assessable character of stock should also carry with it this warning on every share certificate that under the Joint Stock Companies Act the capital stock may be increased by a majority vote, and such issue may be made a preference stock and that the company's property may at any time be mortgaged or bonded by the majority.

When stock is divided in a company's scheme into proprietary and treasury stock, without any cash contribution from the holders of the first-named, and the latter being the smaller share interest, there should be some provision that the shareholders, whose money is risked for development, shall not be sacrificed if the company is wound up or a new issue of stock called for. That the law may not interfere to make a contract for those who will not protect their own interests by a safe

contract is generally admitted. At the same time there is no mutuality of contract in the case mentioned. Let the treasury stock be exhausted; it is just possible the mine may be a good one and the creation of new stock for working capital quite legitimate. It should not in such case be in the power of the holders of the majority to clean out the minority by the issue of preference shares or of bonds. The proprietary shareholders should in such case cancel an equivalent part of their stock and unite the holders of treasury stock in the issue of new preferred stock. Other methods of securing the interests of the minority will suggest themselves according to circumstances. One thing is clear the law should interfere to protect those whose cash has been risked for development on the representation of the promoter who has controlled the management and expenditures of the mine.

### Accounts.

I pass from the discussion of the subject of registration of shareholders and mine officials, which should be reduced to a complete system, and without reference to minor but necessary amendments, to the subject of "accounts." Under this head all mining officials should be placed in a fiduciary relation to shareholders. The system of book-keeping which should be followed by every mining company may hardly be the subject of legislation. The department issuing charters may, however, recommend a system of accounts and provide forms. They may legislate to require returns readily made up from such forms and impose penalties for failure to make returns quarterly. The British Board of Trade appoints an inspector of a company's accounts on the petition of the holders of one-fifth of the shares. This might well be granted on the petition of a less per cent. of the share interest in the case of companies carrying sky-scraping decimals in nominal capital. Official auditors in every province should be without petition directed by the provincial departments to investigate accounts where the quarterly returns may be found incorrect. Interference in business management should be avoided as much as possible, and where correct balance sheets shall be made quarterly there will be no ground for interference except under criminal circumstances. The adage that "good book-keepers never become bankrupt" if made the basis of reasonable legislation will go a long way to help in the practical management of mining companies, protect shareholders, make money easily obtainable for sound mining enterprises and win for Canada the fair renown that honest mining companies are not "abune the micht" of Canadian law.

### Directors, their Powers, Liability for False Statements in Prospectus.

Provision should be made that directors shall be liable for company debts in excess of the actual cash capital; that their acts shall be void beyond the year for which they are appointed; that they shall be liable for any issue of bonds or hypothecs in excess of two-thirds of the actual cash capital, with other provisions in the stock corporation law of New York. The liability of directors for false statements in prospectuses and advertisements is probably as extensive as necessary, although there is some difference of opinion on this subject. As a general rule the so-called mining expert is in cases of misrepresentation the chief-wrong-doer. This evil will, it is hoped, diminish with the increase in members and respectability of the profession of mining engineers. The director is as often the dupe of the expert and prospector as the means of luring ignorant shareholders. The engineering profession owe it to themselves and to the best interests of the country, that they shall have a registered membership. The expert's report protects the director who uses it, but who protects the shareholder and director against the expert? The latter is the party who is assumed to know and his professional fee is sometimes intended to guarantee that he does know. It is quite right that the fee should bear some relation to the responsibility, but then the responsibility should not be impecunious. Some gnarantee should be afforded that the report on a mine is made by a competent expert or the fact if otherwise should plainly appear. If directors will stake their reputation and base their confidence on the reports of experts who have no solid reputation or decent bank balance, should they not, who ought to have inquired into the truth of their company's prospectus, suffer rather than shareholders? I repeat that in the majority of cases of fraudulent prospectus I believe that directors have been deceived, and that there are forces in operation which will soon rid us of the arch-enemy of mining enterprize. Our universities are giving us a yearly generation of competent experts whose reports will be found reliable. We shall have ere long a registered body of mining engineers, jealous for the reputation and honor of a learned and noble profession, from whose lists will be struck off any one found guilty of unprofessional conduct.

Buckley, commenting on the English Act of which the Ontario Directors Liability Act is a copy, says that "if the competent expert was fraudulent and his report false and the person attacked under this act knew it to be false he will escape so far as this act is concerned." The remedy will be under the law as it exists outside of this statute, by which any person is liable for untrue statements upon which another has acted to his damage.

The attention of the minister of justice might be directed to the necessity for criminal legislation as a means for preventing the operations of pretending or fraudulent experts. The subject is one which I submit should have the consideration of the profession of mining engineers.

### Duration and Winding-up of Companies.

The number of years for which mining companies shall hold their charters requires amending legislation. It will greatly promote investment if in ordinary cases charters shall be granted for ten or twelve years only, provision being made for a simple form of renewal for a longer or shorter term, as circumstances require. In cases where the property has not been developed or the mine closed for a period of five or seven years, the property should revert to the Crown to be sold, the proceeds to be distributed among shareholders. Where companies obtain land from private owners they should be required to convey to the Crown and take from it a title snbject to this reversion. The law of Ontario respecting winding-up companies leaves little to be desired except that some of its provisions might be simplified. In addition to the grounds provided a company should be wound up at the expiration of two years if unable to pay a yearly dividend of four per cent. on paid-up capital, unless three-fourths in value of the shareholders by resolution vote for continuing work one year longer; but in the event that three years shall have passed without such a dividend the rule should be "Cut it down, why cumbereth it the ground?" The reverter of property to a vendor who has sold in fee in the case of a company becoming defunct should be taken away, and the property should revert to the Crown.

### Share Certificates.

These documents should not contain the minimum of information with the maximum of engraver's decoration, but should inform the shareholder in a concise manner what are his rights under the charter. As for example among other things that on petition of ten per cent. of the treasury stock the holders may obtain an examination of the accounts if refused by the company; also that in the event of a proposed sale of the property by a majority of the stockholders the holders of a minority of the stock may require the value of their shares to be ascertained by arbitration; with other matters which should be endorsed on the certificate or appear on its face.

### Registration of Companies.

Companies incorporated in any of the Dominion provinces other than that in which they carry on business, and all foreign companies should be allowed to acquire mining property anywhere in Canada (subject to the preceding clause respecting duration of title) upon

registration of their charters with a list of shareholders and statement of paid-up capital, assets and liabilities, in the Provincial Mine Department or Bureau; subject always in the case of foreign companies to their conformity to the law relating to "accounts" and audit, as if incorporated in this country.

Bonding Powers, Remedy of Mortgagees and Creditors.

The power to bond or mortgage under the Ontario Act is extraordinary. It is limited only by the vote of two-thirds in value of the shareholders "present" in meeting called for the purpose not by the vote or written consent of the owners of two-thirds of the stock as is the case in New York. The limit at which bonds, debentures or other securities of an Ontario company may be sold is "at such price as may be deemed expedient or necessary." In New York the bond or mortgage must not exceed the paid up capital, or if the property of the company is greater, then two-thirds of the value of such property, with this safeguard that directors are made personally liable for bonding the company's property beyond the lawful limit. Our own Dominion Act limits the power to hypothecate to 75 per cent. of the actual stock. It is difficult to find a reason for the difference between the Dominion and Ontario Joint Stock Acts in this respect as well as for the difference between them in this, that the Dominion Act requires 10 per cent. of half the capital stock to be paid before grant of charter, while the Ontario Act has no such provision.

For the protection and security of lenders, provisions respecting mining companie's mortgages, similar to those under the Railway Act of 1888, are required. Under this authority will be given the trustee of the mortgage to appoint a receiver of a mining company with power to run the concern or sell it, as circumstances may warrant. It is obvious that in mining districts a magistrate should have power to direct the audit of accounts on petition, and to direct the management of mines by a receiver at the instance of mortgagees, and with other functions. An administrator of mines would be the executive of such judge or magistrate. He should give security for the faithful performance of his duties.

Officers capable to audit mining companies accounts and to direct the financial management of mining affairs in the case of defaulting companies would beyond question be of great service to debtor concerns as well as their creditors. There is a useful provision of the New York code that a shareholder may by paying a contribution to the mortgage debt in proportion to his stock, be subrogated *pro tanto* to the rights of the mortgagee.

Mining Partnerships.

The provision of the British Columbia law for the formation of mining partnerships is an admirable adaptation of the Cornish cost-book system to the environment of British Columbia, and might be profitably introduced elsewhere through the Dominion.

The scope of the title of this paper is so comprehensive that I must crave indulgence for the omission of many heads of the subject which may be thought to require discussion in view of the demands of the hour, but to avoid excessive tediousness I make a comprehensive reference to Imperial and American legislation as sources for many necessary amendments. The Joint Stock Company Limited is the creation of statute law having no status or function that is not within the control of the State. It is therefore beyond question all important that the creation shall be efficient for all beneficent use and capable of immediate check and regulation in any direction in which its powers may be invoked for evil purposes.

Before the first half of '97 shall have passed it will probably be known whether or not certain members of the Huronian formation in Canada are everywhere gold-bearing rocks. If the certitude shall be golden it will bring the country face to face with enormous treasures which under modern modes of thought do not practically belong to the nation. Evolution has not yet brought us to that level that as a nation we are able without calling on private picayunes or foreign dollars to work our mines as national property, and with their treasures build railroads, endow colleges and libraries, promote scientific investigation, erect beneficent institutions, reward inventors and artisans, and pay for all these without taxation, while at the same time stimulating manufacturing industry beyond the dreams of enterprise or avarice. Perhaps we should not complain that evolution is tardigrade because the character is our own. It is still true that where the carcass is there are the eagles. If we must surrender the "chief things of the ancient mountains and the precious things of the lasting hills" to the cormorants of the exchange we should at least endeavor to have the spoliation of national property so governed and regulated that the work shall be done decently and in order, so that if public interests must suffer private right may nevertheless prevail.

Discussion.

Mr. W. R. White, Q.C., Pembroke—Mr. Bawden was kind enough to send me a copy of his paper some days ago, but as I happened to be away from home I did not have sufficient opportunity to peruse it carefully enough to discuss it as it ought to be discussed. It seems to me that the paper is full of very valuable suggestions indeed, and many of these suggestions strike me as being almost of public importance. I suppose all of us, whether miners or not, are face to face with the fact that there are a great many schemes being put on the market now, not for the purpose of extracting gold from the rock, but money from the people, and I presume that Mr. Bawden's position is very like that of any other honest man in the country; he is desirous of preventing this as far as possible. I differ from him, however, as to the course to be pursued. I do not think it possible to surround the incorporation of mining companies with such safeguards as would prevent such schemes being put upon the market and being eagerly seized upon by those who desire to invest their money in a gambling proposition. But there is a law which prevents stealing in this way as well as picking pockets, and I think the whole thing could be crystallized or put into a nut-shell in this way: we have a clause in that portion of our criminal law which punishes those who make false statements in reference to any scheme of this kind, but I think Mr. Bawden will agree with me in saying that even it does not go far enough at present, and I think it is quite right for this Institute to take the necessary steps to have the law amended. As I understand the law at present it touches only the promoters of the company. Now the question is, what is a promoter. We all have different ideas in regard to what a promoter is. Is the promoter the man who comes with the nice prospectus of the company already incorporated and asks you to take stock in it, informing you that he has a report from some person calling himself a mining engineer or mining expert? Now all these persons can be reached if the law was in the position I think it ought to be in, and would include in its scope any person who sells shares as well as the promoter of a mine or those who put stock on the market, to include in fact any person who makes a false statement with reference to any detail of the scheme he is putting on the market. It is really nothing more or less than obtaining money under false pretences. It is reprehensible that Canada should be endangered by fake schemes being put upon the market. It seems to me that one great difficulty is that the people either do not know the law or do not put it into operation. Now there is another question that has struck me with considerable force since I have taken any interest in mining, and that is the idea of having mining experts and mining engineers formed into a body and incorporated, and placed in such a position as to be responsible to the public. I cannot see how that can be made practicable. It seems to me that, belonging as I do to the legal profession, as Mr. Bawden does also, that if one of you gentlemen go to him he may give you an honest and perhaps sound opinion upon any question submitted to him, and if the person to whom you are opposed comes to me I may give him an

opinion directly to the contrary. That occurs every day. Even leaving lawyers out of the question, judges themselves differ upon the law. We all know that. Therefore why should not two mining experts differ upon their estimate of the same property. I do not know, but I am told, that there are mining experts or engineers so skilful that they can go to a property and tell you whether it is going to be a mine or not. My little experience, extending over the past few years, is that mining experts differ upon that question just as lawyers do. I think all those interested in mining will agree that there ought to be some organization whereby a man would be placed in the position that he would be known as a mining engineer. I do not agree with Mr. Bawden's position when he speaks in regard to the institutions that are turning out young men. I do not think these young men when turned out, are competent to do much more than push a barrow in a mine. They may get technical knowledge, but they require the practical experience before they become mining experts and engineers; they are like every other profession in this way. I thought myself considerable of a lawyer when I first started out in business, but I could not convince the general public of that fact. It is only after going out into the world that we find out what we do not know and how much we have to learn. It is, however, much easier to criticise than it is to compose, and I am merely expressing the opinion of a tyro in mining, but one who has the welfare of the country at heart. Every person, whether in Nova Scotia, Quebec, Ontario or British Columbia ought to take a deep interest in this matter and see that what we do in connection with mining should be done on strict business principles in so far as it is possible. Now it seems to me that the comparison between industrial corporations and mining corporations is not a fair one. If you take an industrial corporation you know what you have got. Let us take timber limits; any expert can count his trees and see what he has got, and he knows whether it will justify him to improve the stream so that he can bring his timber down to market. So with any other industrial scheme, or any manufacturing scheme. All these things can be made a matter of account; an accountant can tell you just exactly what is in it, but you cannot do so with any absolute certainty with regard to mining. You have to spend money in the first place in order to find out what you have got and whether it is worth while going ahead with it. Now can that money be obtained in any other way than by asking people to put their money into it. I think it is most reprehensible that the mining interests of our country should be endangered as they are in some cases by fake schemes being put upon the market and money being put into them by persons who can ill afford to loose it; but that there are many sound mining enterprises, hundreds, even thousands of sound propositions throughout the Dominion no man will deny. Now then we must get down to business, and the only way we can do it is to make our criminal law as stringent in regard to putting these schemes on the market as you would with respect to a man picking your pocket or cutting your throat, and then when you get laws into that condition, enforce them. They will never be enforced unless the honest common sense of the people engaged in mining schemes will take the matter up and enforce it themselves. The mine is there and it developes into a sort of gambling scheme. There is a jack pot there—I do not know what the term means, Mr. Chairman—and they chip in and hope to rake off that jack pot. There must be more or less of that at the outset, but I think there is a time in the history of a mine when it ceases to be a gambling speculation and comes to be a business proposition, and if the mining people themselves will discountenance on every occasion all schemes that have not got a mine at the back of them we will get down to the position in which they are in California at present, down to a business basis. I believe they have got down to that in Nova Scotia and Quebec; I do not know whether we have in Ontario, but I hope we will get that far very soon. I believe we have a large amount of mineral wealth, and the only people we have to fear are those who live so far away from us that we cannot watch them, but still there are a great many honest people amongst them. You can treat the investor in mining property as if he were a child, and protect and surround him with all sorts of safeguards, but that is too much paternal government to suit me. A man goes into a speculation with his eyes open and if he puts his money into shares that do not represent the mine he ought to be in the same position as any other greenhorn who gambles.

In my short experience, I find that a great many people listen to you carefully and attentively and you think you are going to do business with them, but they shake their heads and the first thing you know they have gone into some other scheme. If a man chooses to buy a pound of tea because it is cheap there should be no law to say that he should not buy a cheap pound of tea because it is cheap. This is the first meeting that I have attended and I do not know whether these papers are intended to provoke discussion. I am not in the position to discuss this paper as I would like, and I should certainly like to have been the gentleman who wrote the paper, because I would be in a better position to defend it than to attack it. I may tell you, Mr. Chairman, that I came to this meeting to learn, and I hope I may be able to learn something before I go away.

Mr. A. Dick.—Mr. Chairman, I have recently come from British Columbia, and as Mr. White, mentioned Ontario and left British Columbia out it might be assumed of course that British Columbia had a monoply of this wild-cat industry. Now, speaking for myself and my friends who are here, I am quite sure that all mining men in British Columbia are quite willing that all safeguards should be thrown about investors in the east, and that, in the interests of these mining men as well as investors, all these fake schemes should be exposed. But I think on the other hand we are apt to unduly magnify the numbers of these fake schemes, and we should be very careful in making statements in our own papers especially as foreign papers might be very apt to assume that there were very few honest mining enterprises being worked in British Columbia. The Mining and Engineering Journal took for granted the large production of South Africa, West Australia and the United States, but it was very particular to add that an increase was expected in British Columbia, but they had better be careful as there was a dangerous breed of wild cats springing up in that country. I think that we should endeavor to show our friends in foreign countries, the United States, etc., that there are a great many mines which are likely to prove very productive and very profitable.

Mr. White, Q. C.—I certainly hope that I did not say anything which would convey to my friends in British Columbia the idea that they had the monoply of wild cat schemes. On the contrary from all I can hear they have very good mines there, and I have met a gentleman from British Columbia who was an honest man investing his own money in his own mine.

Mr. J. Bawden then moved, seconded by Mr. John Hardman, "That this Federated Mining Institute declares that the amendment of the law relating to the incorporation of mining companies throughout the Dominion demands the early attention of the Dominion and Provincial Legislatures for the purpose of securing as much uniformity as may be practically attainable, for affording increased protection of the rights of shareholders, and for promoting the financial integrity and safety of mining enterprises operated by joint stock companies; that the following gentlemen be a committee on legislation to submit to the Dominion and Provincial Legislatures such amendments to the law as may appear suitable to promote these objects: Dr. Porter, Dr. Goodwin, W. R. White, Q. C.; Mr. John Hardman, S. B. M. E.; Mr. B. T. A. Bell, Mr. F. A. Heinze and the mover.

Mr. White, Q. C.—I think, Mr. Chairman, that this is a resolution that ought to pass. It can certainly do no harm whatever, and I think it would do a great deal of good. My view with regard to it is that there is very great reason why all the laws of the different provinces

should be assimilated. As I understand, we do not propose to mine "Provincially" but "Dominionally." While, however, these laws are under the Provincial jurisdiction they might be assimilated. The development companies, such as in South Africa, might be able to work in different provinces. It would give them a very much larger scope, and we would get a very much larger amount of capital in our mining enterprises.

The motion was carried.

## The Responsibilities of the Mining Engineer.

By Dr. J. B. Porter, Montreal.

I have been asked to talk this evening on a subject of very great importance and one which we, as an association, have every interest in bringing to the attention, not only of the young men entering our profession, but of the public as well. I question the probability of finding in any society a higher average of personal or profesional integrity than in an association such as this or of mining engineers; but although this is a great deal to say, it seems to me that it applies to us as individuals rather than as a society. We should be able to say still more. Other bodies of professional men, as for example, the physicians and civil engineers have set up for themselves ethical codes; and by so doing have put at least a check to the operations of the incompetent and unscrupulous men, who unfit and unable to become members of these societies, have, nevertheless, used the name of engineer or physician as a cloak under which they have covered their own operations.

The time may never come for us, as mining engineers, to set up any code different from that governing all self respecting professional bodies; nevertheless—and unfortunately—the business of mining offers more temptations to the unscrupulous man than almost any other, and I think it behoves us, as the body most likely to be effective, to do what we can to put the work, not only of ourselves but of the profession at large, on the highest possible plane.

And while in one sense it may seem almost impertinent for me—a new comer—to address you as I shall this evening—to call attention to duties which no doubt you appreciate as well as I, and to say words of warning which might be better and more authoritatively put by many of our old members, in another sense, it is perhaps not inappropriate. As a new comer, I hope I may be excusable in pleading ignorance of local conditions and of local prejudices, if such exist. At the same time, I trust that the position I have the honor to hold in our great university here, and the amazing kindness and cordiality of the people in this city, have already quite removed me from the ranks of the outsiders.

I have been here less than six months and when I look at the magnificent beginnings of the establishment in which I hope before long to be at work and see nothing but bare walls and unfurnished spaces, the promise of great usefulness but the accomplishment as yet of nothing, when I see this, I feel that I am indeed a new comer and so far as you are concerned unknown. The moment, however, that I turn to the people about me, all this feeling of newness goes. I have been here not six months, but double that many years. My friends could scarcely be more numerous nor more helpful had we been associated since childhood, and I feel that I really am what I hope you will consider me—one of you.

Let me then talk freely, for I promise to be brief, on a subject of the very gravest importance to us—The Responsibility of the Mining Engineer.

A few years ago there was a spirited discussion, I had almost said, row, among my confreres over in the States, about the value of the mining engineer from a commercial standpoint. Let us begin by looking at this side of the matter, although it is far from the most important.

At first sight the returns of the U. S. Census of 1890 seem to show that the mining engineers of that country are a most insignificant body of men. I can't say how many engineers there are, civil, mechanical or electrical, to each man who even poses on the returns as one of our craft. As we get deeper into the thing, however, we take heart. Although so few in numbers, we find that the enterprises which we control play no small part in the financial affairs of the country, and when the figures are finally cast up it becomes evident that for each mining engineer in service there are added not less than $100,000 yearly to the earnings of the nation. On the supposition that the average engineer remains in practice for twenty-five years, this means that a man in our profession controls and superintends during his life, operations which yield between two and three million dollars gross revenue.

These figures are of course merely approximate and have even been questioned by some; but the most severe criticism still leaves it evident that the mining men play a greater part than their brother engineers, no one group of which can show even one half of the above average figures, even by the most partial methods of calculation.

Furthermore, the work of the miner has one great distinction over most other commercial enterprises. He does not merely divert wealth from some distant channel to that one in which he is interested, but he actually creates wealth, by bringing into use material which otherwise would remain inert and worthless.

If therefore the work of our profession is of such great importance to the community, we should be the more careful that it should be not merely as good as other people's work, but really above reproach.

The case is even stronger than this, however. In many branches of engineering, the engineer, while he has great responsibility, is in a sense working in plain sight and with plain facts. Unless he be dishonest or utterly incompetent, he is carried along by his work and his facts to what is, approximately at least, the proper solution of the problem at hand. With the mining engineer, on the contrary the case is different. The whole question of ore deposits is one of uncertainty. The science is as yet in its infancy, and at best can never be made the subject of exact laws like those of most other matters considered by engineering. Therefore the mining engineer deals not with certainties or calculable probabilities, but with indefinite probabilities or even improbabilities.

In Mining the possibilities are immense—almost fabulous—but to balance this, the chances of failure are correspondingly great. I refer of course to legitimate and honest effort: alas! the opportunities for fraud are also very great, and although fortunately the pay of dishonesty is usually low, yet it is not always so, and I am certain that there are few among those of us who have begun to grow gray, who have not to confess, at least to ourselves, that it has been hard to withstand the temptation of some particularly "good thing."

If the line of demarcation between what is right for us and what is wrong were the comparatively plain one between honest work, and self evident sconndrelism, with an accompanying risk of an exposure in the courts; the case would be different and I should talk of something else, for it is scarcely my intention to discuss the advisability of keeping clear of the prisons. It is, however, very different. As I have already pointed out, there are important branches of mining in which the game is at best one of probability, and often of mere chance; and it is a curious fact that a chance is a most fascinating thing and often more tempting to us than a certainity. When this chance, as in mining more than in any other venture, is for some very great prize, our judgment —already struggling against our gambling instinct—is doubly taxed.

I am sure that older members of the profession here will agree with me, that for every mining engineer who deliberately does the wrong thing or makes a purposely false report, there are twenty—nay, fifty— who are more tempted by this wonderful thing—Chance;—in other words, by their own hopes, by the enthusiasm of the people about

them, mine owners, the very miners themselves, and so are lead—without the least conscious dishonesty—to write too favorable a report, to advise an extravagent purchaser, or to continue work where plain hard common sense and good engineering would commend a more conservative course or perhaps abandonment of the enterprise.

It is against this kind of dishonesty—for it is nothing less—that I think we should make an aggressive fight. At this moment there are many young men preparing to go—as some no doubt will soon do from my own lecture room—from the steady conservatism of this settled matter of fact world of home, college and business, to the golden west and north—the lands of great expectations—of sudden and great success—and also of many and bitter disappointments.

Let us speak most forcibly to such men, but also, if it must be, to some who are older in the profession, and perhaps even we may be the better if we heed our own words.

Let us remember that the profession requires more than the mere honesty and personal integrity that every rightminded man must have. It requires of the engineer intelligent and painstaking personal study of each case brought to him, watchfulness against fraud on the part of others, and the innocent, bnt no less dangerous enthusiasm of friends and workpeople, watchfulness indeed even against his own hope and enthusiasm, or perchance against his equally excessive dread of failure; and after he has thus come at his facts, he must study the chances, weigh them as fairly as possible and come to a decision not only as regards what is apparently certain, but also as to what are the possibilities of greater success and the prospects of corresponding disappointment. If he makes his report, advises his manager, or runs his own mine, if manager, on such a basis as this, he will be doing his best. If he does less, he will fall short of the high standard of worth and integrity, which the true mining engineer should strive for.

Some will say to this, that if every miner followed so dreadfully conscientious a method, some of the greatest mines of the world would never have been discovered. I question it, although no doubt the discoveries would have come later and often have been better used. But even granting the truth of the statement and waiving the unanswerable argument that "right is right, and that our knowledge and ability are given us to be honestly used," still I think it easy to prove, that for every dollar lost or rather unfound by intelligent conservatism, there have been twentyfold losses through extravagance, through hopeless efforts of sanguine ignorance, and, worst of all, through the dishonest use made by unscrupulous stock jobbers and promoters, of the reports made by engineers and experts, who themselves were not dishonest, but just a little too hopeful or too easily misled.

And in closing I must speak briefly of this last mentioned thing—the false prospectus and its use in securing the money of people, who are those usually least likely to be able to spare it.

In times of mining excitement like the present, along with the notices of genuine discoveries and developments, the newspapers are full of lying statements, and there are hosts of sharks about, ranging in size from the great promoter from London or New York to the petty pedler of shares in some backwoods district; each with specimens of ores, glowing prospectus, reports and all the paraphernalia of the trade.

We engineers cannot of course undertake the Herculean task of putting down or even denouncing all of these frauds, but I do think that many of us, and perhaps the Society as a unit, falls short of its real duty. Some of us know of reports—perhaps our own—that are being used in a difierent sense from that in which they were intended; still more frequently, we chance to know positively that the stories of this or that district or mine are absolutely false, yet, as we are not concerned, we let the lie do its work unchecked.

If instead of this, we co-operate with some of the journals which at present wage an almost singlehanded war on this sort of fraud; and in all other ways practicable strive, both as a society and as individuals, to put the mining business on the best possible basis, we should do much for the credit of our profession, and more for our country at large; and perhaps by some happy law of compensation, the money thus saved from the sharks, might in part at least go to some honest mines employing us at munificent salaries.

---

## The Question of Initial Payments on Bonds.

By Howard West, A.R.S.M., New Denver, B.C.

A considerable time spent in the heart of the great Kootenay country, during which in my professional capacity I have been brought into close connection with both the capitalist and the prospector, has convinced me that the above question has become one of more than passing importance, and that in fact it plays, and is destined to play still more, a no inconsiderable part in the development of regions now perhaps unprospected for lack of proper communication, but which are known to be exceedingly rich in mineral deposits and must eventually succumb to the rapid advancement now being made in all directions.

It is very obvious that the higher the percentage of investors who lose money by embarking in mining ventures here, the lower the reputation of the province will become as a medium for safe and systematic investment. As this is of all things what we wish to avoid most at the present time, when not only British and American capital is being turned this way, but Canadians themselves are displaying unwonted interest and activity in our mineral resources, it is distinctly advisable for us to try and discover if possible, a means of developing them to the best advantage, with the least possible risk to the investor. In this connection, there are two courses which immediately commend themselves to all thoroughly practical mining men. The first of these is what is known as the working bond: the holder in this case guarantees to do a stipulated amount of work on the property in a given length of time, at the expiration of which he decides definitely, whether he will take it at the price previously agreed upon, or relinquish all right in that direction. This is now becoming quite a common procedure in the Slocan and elsewhere, and while under certain conditions it presents undisputed advantages, it compares favorably with other methods now in vogue.

The other general arrangement referred to, which slightly modified appears in a variety of forms, is that whereby the discoverer and original owner receives payment in direct proportion to the value of his find. This is readily accomplished in more ways than one; by disposing of a portion of the property for a sum to be spent in development estimated to be sufficient to place it in a paying condition, either to a private individual or a company; or it can also be done, by leasing the claim to responsible parties who agree to pay a regular percentage of the value of the output, whatever it may be, for the privilege of working it. This to me seems about as fair a proceeding as can ordinarily be devised for the benefit of indigent prospectors, the only difficulty arising in fixing the exact percentage to be paid, which must, of course, accommodate itself to the varying conditions inherent in different properties. If the mine can be worked at a profit, this arrangement when properly carried out is clearly to the interest of both parties. These important phases of the bonding question are undoubtedly deserving of the most earnest consideration at our hands, but in this paper it is found utterly impossible to cover the entire ground, so for the rest I shall confine myself to the subject mentioned in the title, namely—initial payments.

In the ordinary method of bonding as accepted almost universally in the west, it is customary to divide the total consideration into two or more payments, usually the latter, which become due as different stages of development are reached; and here I wish to remark that from per-

sonal experience, I have no hesitation whatever in saying, that in many parts of the country, obstinacy regarding the exact terms of these preliminary payments, has caused more deals to fall through than all other causes combined, although I do not wish to disguise the fact that exorbitant valuations have also much to answer for in that direction.

To those but superficially acquainted with western mining ways, and the economics of mining in these regions, this may seem to be at first sight an extravagantly broad statement, and in view of the large number of properties which are bonded on the regular plan without inconvenience to either contracting parties, contrary to general experience and entirely unsupported by fact; but to those whose daily avocation brings them into more intimate relation with those people, the conviction is forced upon them that the question is assuming serious dimensions in certain parts of Kootenay, and it is no exaggeration to say that in consequence of this attitude, many who would willingly assist in developing our mines refuse to do so. Should they invest on this basis, and in addition to the actual money spent in proving what they never owed, a large part payment be also lost, they will in all probability go away with the determination to leave mining severely alone in the future.

The main question then which we wish to discuss may be briefly stated as follows:—Is it right or reasonable on the part of the owner of a mineral claim under bond, to expect an initial payment before the bonder has had any opportunity of proving its value.

The prospector says that it is; the investor, with interests in this case diametrically opposite, that it is not; with, of course, the usual exceptions on either side; so that it merely remains for us to consider the matter in detail impartially from both standpoints.

There are naturally two sides to every question; we will begin therefore by noting carefully the contentions already advanced by the prospector in support of the principle of initial payments.

He argues that he spends time, trouble and experience in searching for mineral claims which may ultimately prove of value, and thus help indirectly to enrich the province and all connected with it. Considering the arduous and intermittent nature of his occupation, and the uncertainty of adequate remuneration attending his efforts in this direction, I suppose there is nobody so uncharitable as to grudge him the full measure of such success as may result from his undertakings. Supposing now that having staked his property, he is fortunate enough to bond it for say $50,000; the surface showing would evidently indicate that it was worth in all probability at least that sum, and possibly a great deal more. If in the course of development, it should prove to be worth *ten* times that amount, he has no hold whatever on the property, and will consequently receive only a fraction of the true value of his find. Should the prospect on the other hand turn out to be valueless, the person holding the bond will lose the amount of money which he has expended in development only, assuming that no initial payment has been made. The prospector then stakes the possibility of his property eventually turning out to be more valuable than he anticipated, against the amount of development work done, which the bonder stands to lose. In his opinion the odds are not equal, and to compensate him for the advantage which he considers the bonder has, he insists on a percentage down before any development is attempted.

The fallacy of the main point in this argument is seen when we observe that the initial payment is not required to be anything additional or supplementary, it merely forms part of the total consideration, and should the claim prove to be of value, the owner receives actually no more than he otherwise would, saving a trifle in interest, which for all practical purposes may be ignored; failing which, he obtains that to which he has no title or right.

To put it concisely then, the initial payment clause only becomes effective, at the very time when it should not; that is to say, when the claim has proven itself unworthy of further expenditure upon it.

Inquiries are frequently made by claim owners regarding the manner in which they are expected to live while their properties are being exploited by others, unless they are paid something in advance. This of course admits of various replies: I presume ordinarily in the same way that they would gain a livelihood if the claim were never bonded at all, but as a matter of fact in the majority of instances, the person bonding the claim is only too glad to take advantage of their local knowledge and assistance during development, and pay them well for their services.

If the prospector had always to deal with honest or true capitalists intent on working the properties themselves, the main problem would be much simplified; but as it is, they can here advance the strongest and most effective argument in support of their demands.

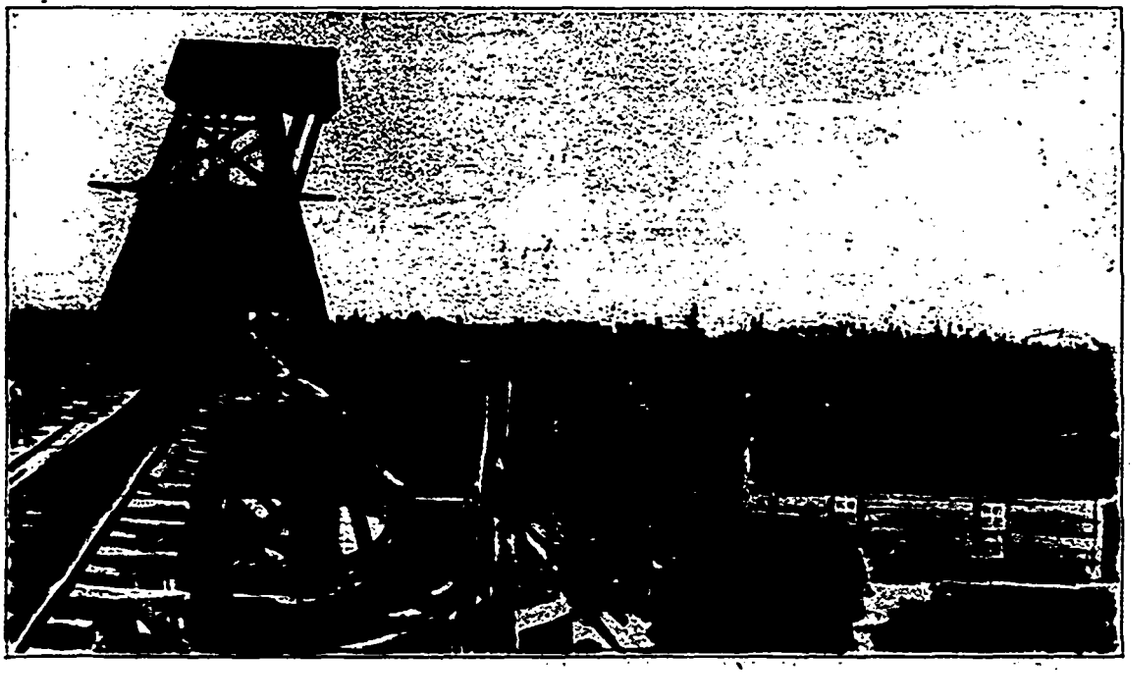
Too many of those who pose as men of means or representatives of capital, are the most ignoble scoundrels, regular wolves in sheeps' clothing, whose sole aim is to gain an option on a good property from some unsuspecting and too confiding prospector, not be it understood with the object of working it or ultimately taking up the bond, but intending to transfer the option to some one else for a higher figure, without ever having invested a single cent in the undertaking. In the event of failure to interest others in the venture, the prospector has his property tied up, and entirely beyond his control for probably the best months in the year, which means to him a serious loss that he can ill afford. Nobody in their senses will blame him for trying to protect his interests by demanding an initial payment under such conditions. It is a lamentable fact that he is unable to distinguish the man who means well, from the imposter whose every act should be made to betray his identity, because in this way those who approach him with the intention of acting fairly and conscientiously have to suffer for the sins of the scheming fraternity.

So far as the true capitalist is concerned, it is readily apparent that in the majority of cases the prospector possesses that which in its present condition, is to him entirely valueless for all practical purposes. He can do nothing without the assistance of capital, and having obtained that, it is clearly evident that the man with the money is the only one who stands to lose materially should the property not turn out satisfactorily. This being the condition of affairs, it cannot surely be right to impose an additional burden upon the shoulders of those to whom we look with confidence for the necessary assistance in opening up our latent resources. Any such attempt must inevitably react upon those who conceive the idea, and tend to drive elsewhere those whose consideration and attention we have been striving so assiduously to obtain in the past.

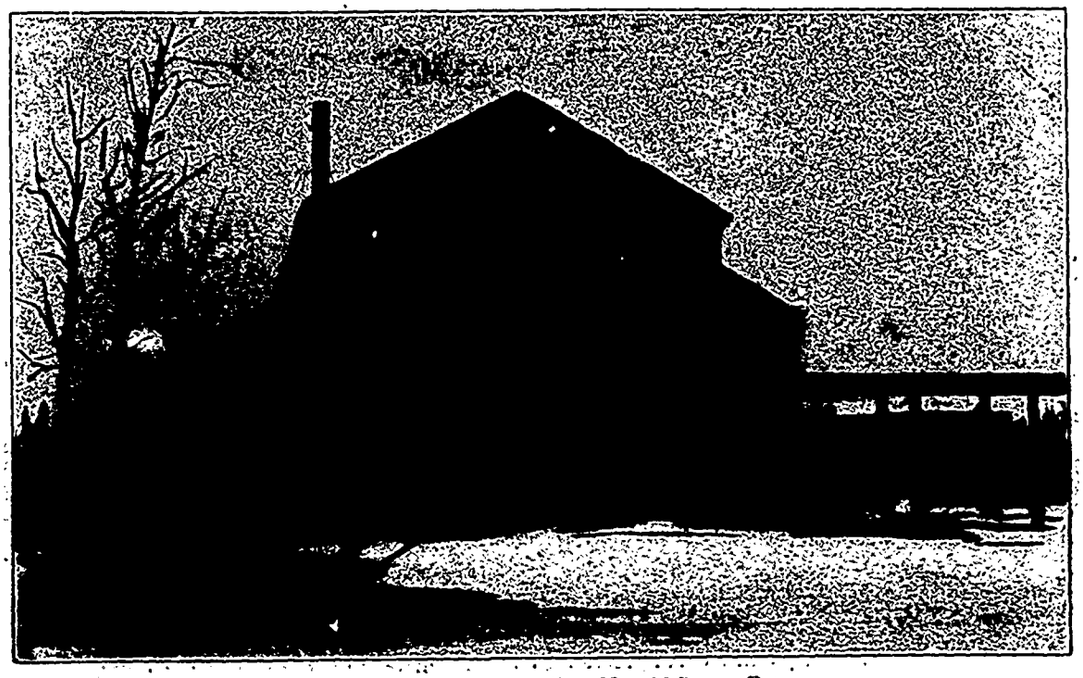
Let it be understood that in this paper I make no attempt to explain the principles governing the entire bonding system, such a task would be prodigious in its magnitude, and take up more time than is at my disposal; no fixed method of procedure can be laid down as applicable to all cases, circumstances invariably differ, and in every instance, it is necessary that the wording of the bond be carefully adapted to the special conditions connected with the particular mine or claim; but the disastrous effects of the present methods are constantly being brought under my notice, and while I think the principle of initial payments is a decidedly pernicious one, and unwarrantable where the true capitalist is concerned, it is manifestly due to the prospector, to explain the difficulties under which he labors, in trying to avoid the advances of those whose presence may become a menace to the speedy and effective development of the country.

Mr. George E. Drummond, Canada Iron Furnace Co. President General Mining Association, Prov. Quebec, 1897.—President Federated Canadian Mining Institute 1897.

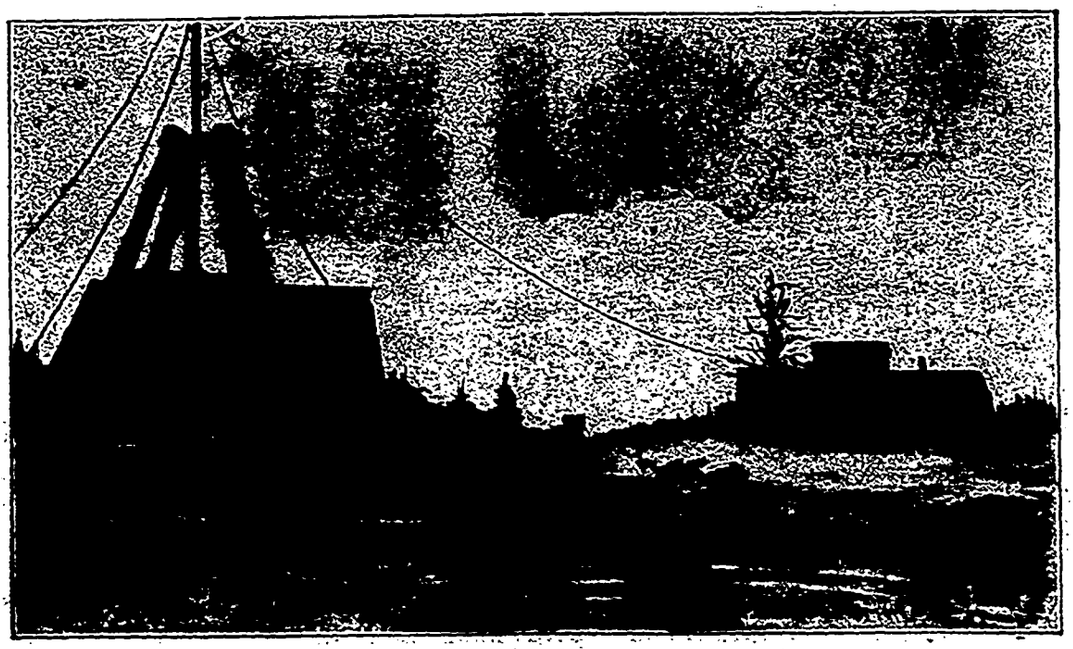
The Foley Mine Co. of Ontario, showing outcrop of Vein No. VII, A. L. 74.



The Foley Mine Co. of Ontario. No. 5 Shaft, Bonanza Vein.

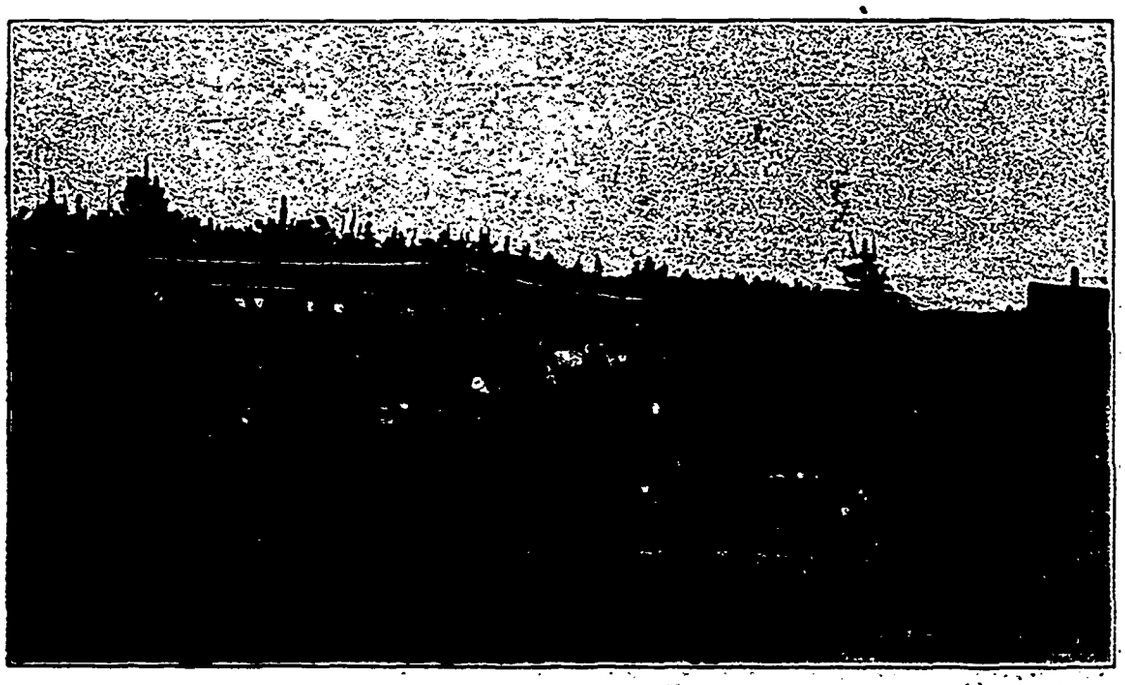


The Foley Mines Co. of Ontario. New 20-Stamp Battery.



The Foley Mines Co. of Ontario. No. 5 Shaft-house, Blacksmith's Shop, etc.

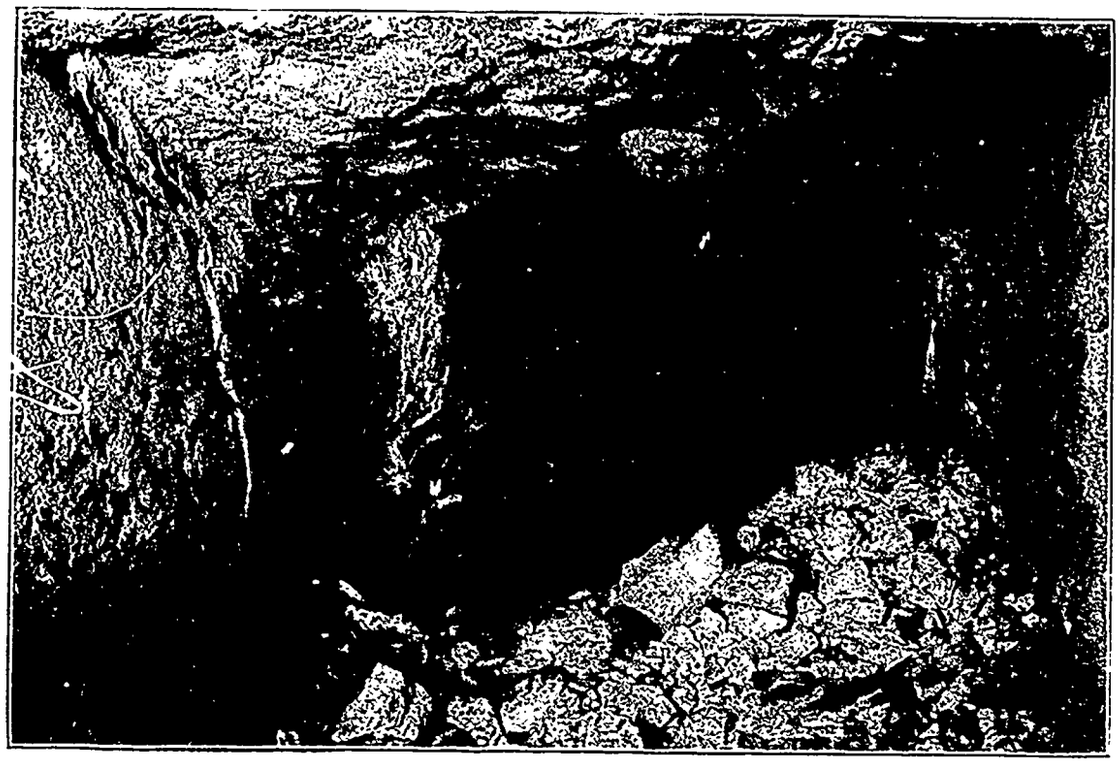
The Foley Mines Co. of Ontario. No. 5 Shaft and Engine House.



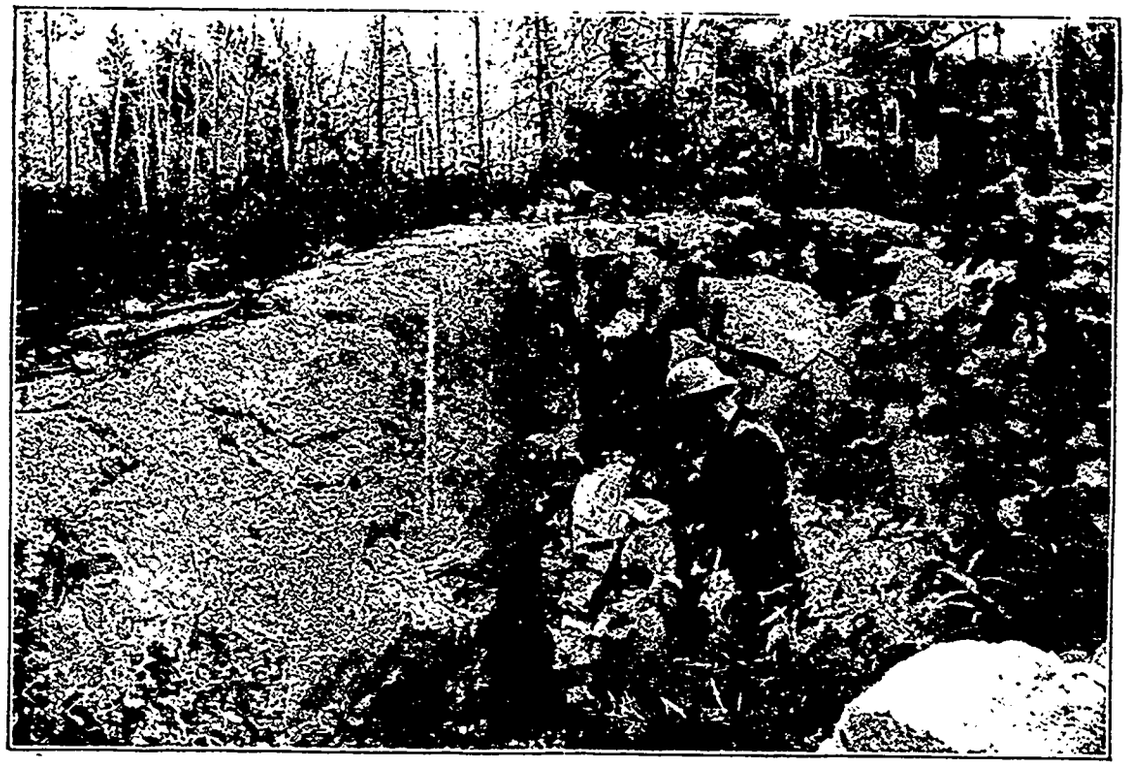
The Foley Mines Co. of Ontario. Tramway, looking south from Bonanza Shaft.

The Foley Mines Co. of Ontario. View taken after a blast in North Drift, 150 feet level, North Shaft.

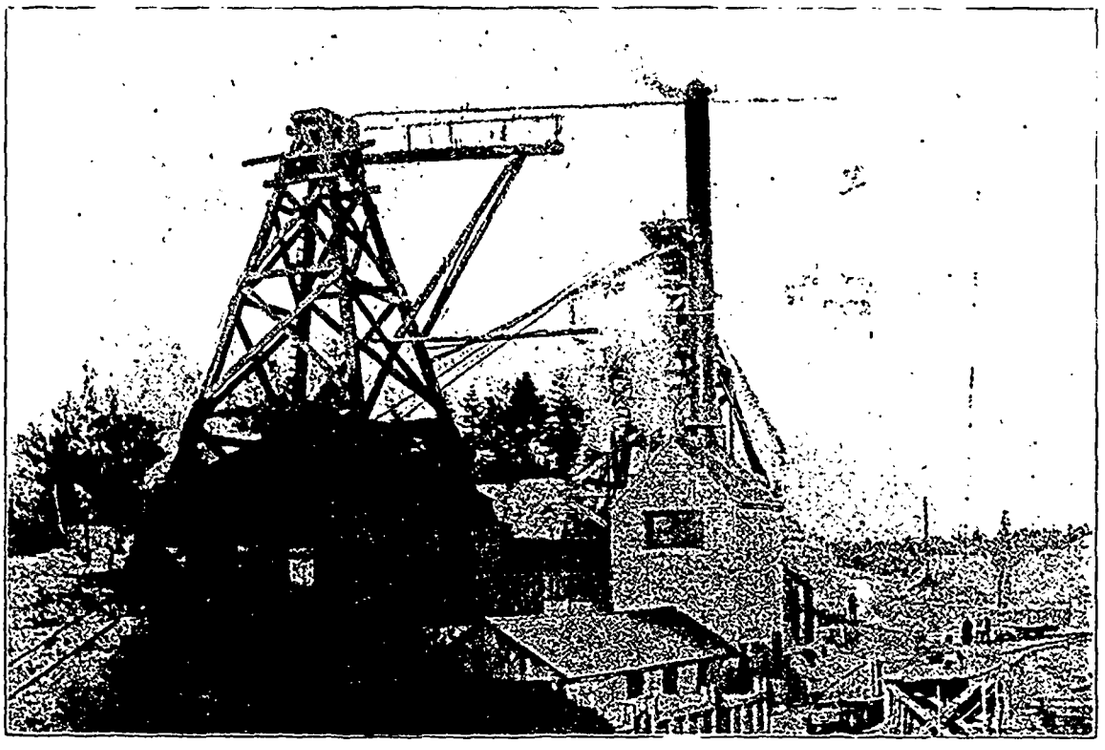
The Foley Mines Co. of Ontario. Air Drill working in South Drift, 200 feet level, North Shaft.



The Foley Mines Co. of Ontario. After a blast in South Drift, 200 feet level, North Shaft.

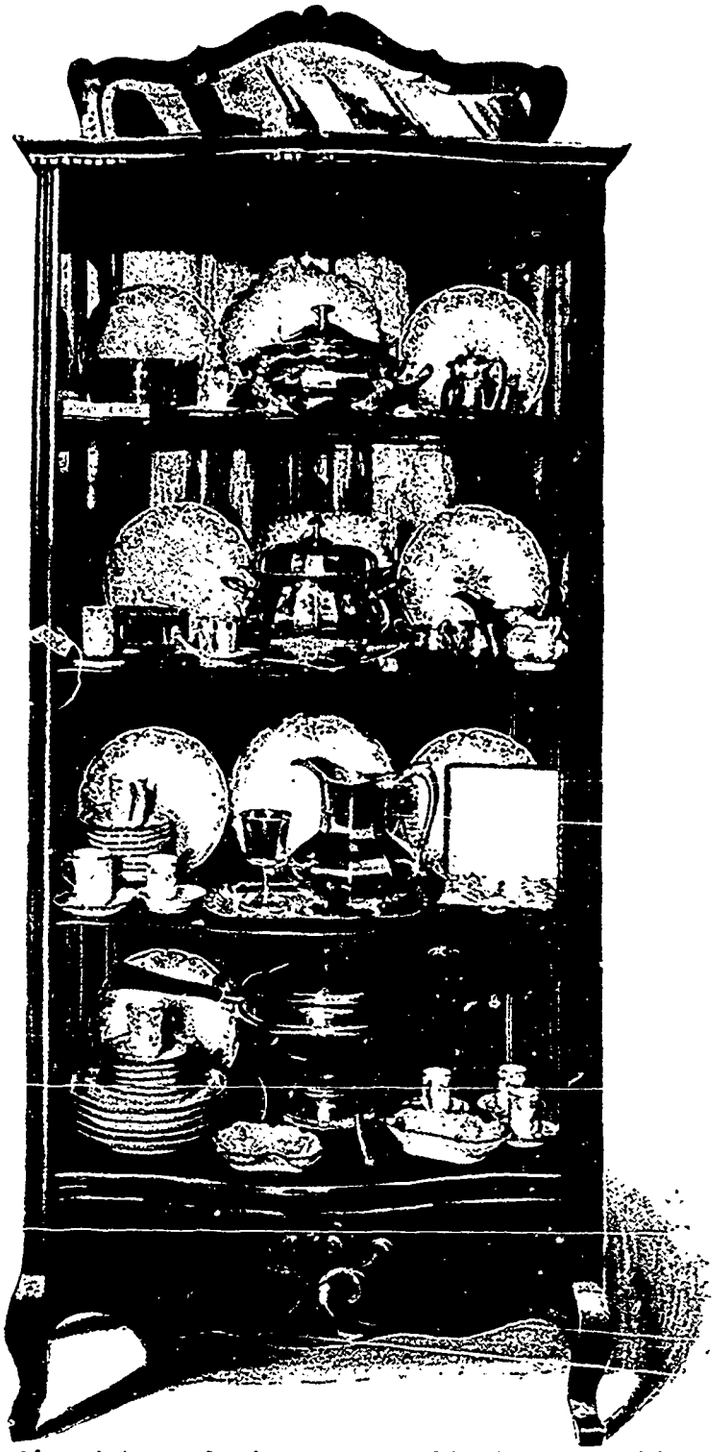


The Foley Mines Co. of Ontario. Outcrop No. 5 Vein, Location A.L. 74.



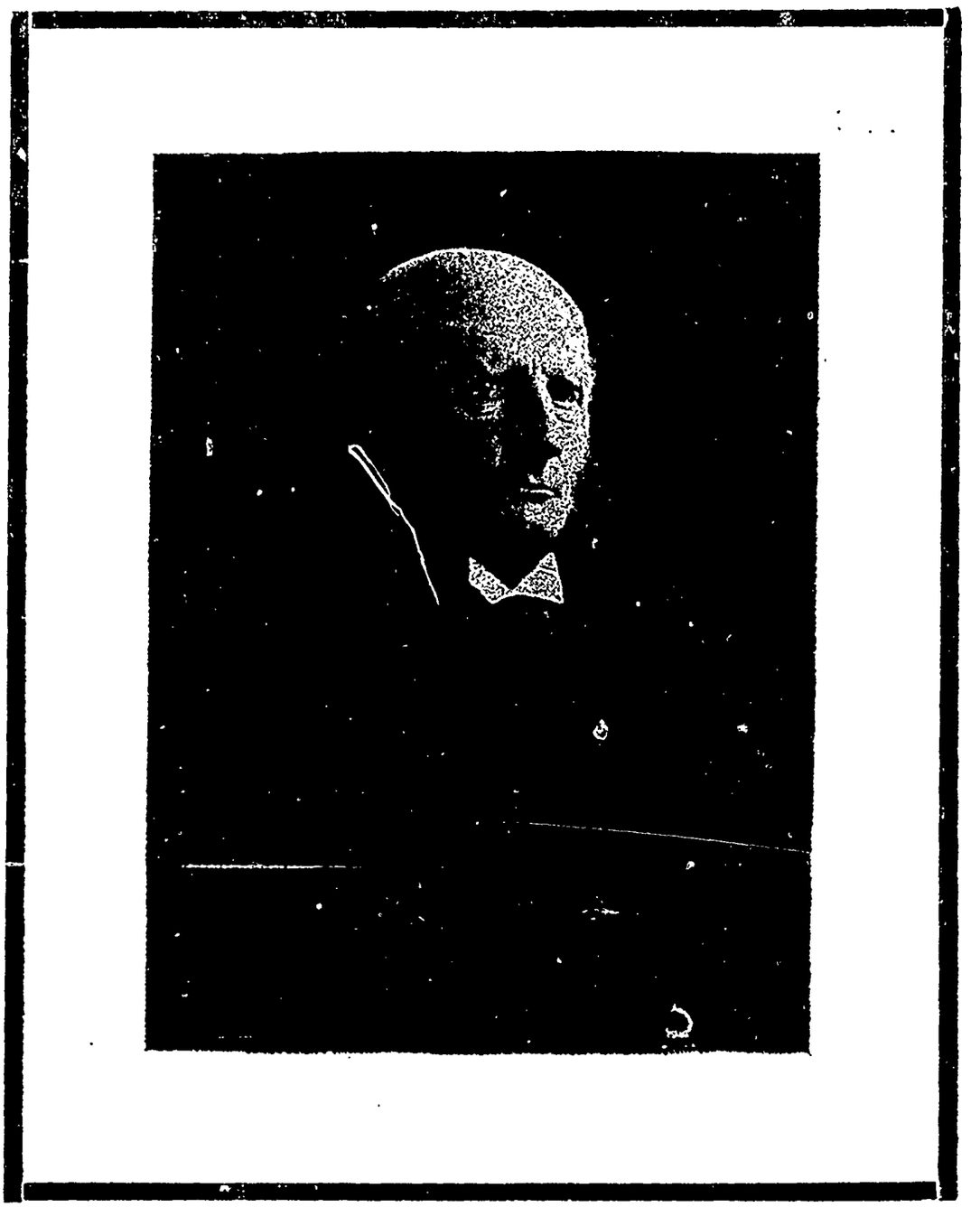
Wentworth Gypsum Co., Windsor, N.S. Cable Towers and Hoisting Plant at Quarries.

Wentworth Gypsum Co., Windsor, N.S. View of Quarries.



Cabinet of Silver and Chinaware presented by the Quebec Mining Ass'n to Mr. A. W. Stevenson, C. A.

Mr, A. W. Stevenson, C.A., Treasurer, Quebec Mining Ass'n.



**The late Hon. George Irvine, Q.C., Quebec.**

(JOHNSON'S ASBESTOS COMPANY)

PAST PRESIDENT GENERAL MINING ASSOCIATION OF PROVINCE OF QUEBEC.

Died 24th February, 1897.

## Advantages of Compressed Air.

By Jas. F. Lewis, Chicago.

The first recorded experiments in compressing air were made by Hero of Alexandria, who flourished 150 years before Christ. Papin in the seventeenth century investigated the subject to some extent, and according to Ganot's physics, the air pump was invented 1650 by Otto Guerick.

In 1726,1753 and 1757,patents were taken out for different methods in compressing air. From 1810 to 1860, quite a number of patents were issued along this line, but the first work of any moment done by compressed air was in 1861, driving the Mt. Cenis tunnel. The honor of first applying successfully to any great extent compressed air for the purpose of driving rock drills in America belongs to one of your prominent and highly respected citizens—Mr. Walter Shanly, when he was driving the Hoosic Tunnel from Dec. 1868 to Dec. 1874. This tunnel is 24,100 ft. long; 361,500 c. yds. of rock excavated; 544,735 lbs. nitro glycerine and mica powder burned. Mr. Shanly in that early day found great saving in cost over hand labor, as well as time in completing his work.

It was in this tunnel also that nitro-glycerine was first introduced into this country, Therefore, Mr. Shanly has the honor of being the first to make a success of the three great powers that have been instrumental not only in developing the great mining industries of this country—sinking to great depth for the precious metals—but making it possible to carry out wonderful engineering projects,—driving tunnels and excavating canals from one to thirty-four miles long,—air compressors, rock drills and high explosives. We might say that these three powers have revolutionized the world. I would call to your minds to the excavating of Flood Rock in the East River, N.Y. In this work 21,669 ft. of tunnel was driven, 80,232 c. yards of rock excavated, and about 480,000 lbs. of high explosive consumed. After this ground had been taken out, 12,561 holes or 113,102 ft. of borings was made in the roof and top of pillars, in order to blow them down. These holes were filled with 240,399 lbs. of rackarock powder, and 42,331 lbs. of dynamite, or a total of 282,730 lbs. of high explosive, costing $106,509.93. The total amount of rock broken by the final blast was 270,717 c. yds.,making a total of 350,949 c. yds. of rock excavated from under the East River, requiring 762,730 lbs. of explosives—about 2·17 lbs. to the c. yd. of rock.

The driving of the N. Y. aqueduct tunnel, 34 miles long, 14 to 16 ft. diameter, excavated through 32 shafts from 60 to 387 feet deep. Time required about five years.

The Chicago drainage canal, 28 miles long, with 14 miles of rock sections, 160 feet wide, 35 ft. deep, 14 dirt or glacial drift, sections 210 ft. wide at bottom, 350 ft. wide at top. Total excavation of rock 12,343,316 c. yds., 28,059,488 c. yds. of glacial drift.

Also copper mining in Lake Superior, where from 1881 to 1887 inclusive, was mined 467,459,465 lbs. of copper from shafts 3,000 ft. deep; from 1888 to 1897, nine years, they have taken out 999,854,-186 lbs.

One of these mines—the Atlantic—pays good dividends with rock carrying only ·64 of 1 per cent. of copper.

The mining industries of Quebec, copper, mica, asbestos, and the nickel and copper mining of Ontario, the gold mining of Nova Scotia, and the extensive coal mines of Cape Breton,coal being taken out from under the sea so cheaply that they are able to ship it to the States. Also British Columbia, where a great many towns are being built, and large dividends paid monthly from precious metals taken from the bowels of the earth.

These and many other large industries have been made possible by the use of compressed air.

The largest compressed air plant in the country is at Quinnsec Falls, on the Menomonee River, the falls being 47 ft. in height and furnishing unlimited power, which has been harnessed by modern skill to do economic duty.

This plant consists of three pairs of air compressors, 32 in. diameter by 60 in. stroke, and one pair 36 in. in diameter by 60 in. stroke, delivering 3,000 h. p. through 3½ miles of pipe to the Chapin and Ludington Iron Mines at Iron Mountain, for pumping, hoisting and motive power engines above ground, and direct acting pumps and rock drills below ground. This power is carried through a 24-in. pipe, with a loss of only one pound in pressure, and the Superintendent figures that he gets an efficiency of 75 per cent.

The second largest plant is at the Calumet & Hecla Copper Mines. They have three pairs of compressors, 28 in. diameter by 48 in. stroke, 32 in. diameter by 48 in. stroke, 36 in. diameter by 60 in. stroke respectively. During the first craze for electricity, this company refitted their mines with electric power. After working it two or three years they became convinced that it was costing them much more money than when they used compressed air, therefore the electrical machinery was discarded and they returned to the use of air.

Until quite recently the mine owner has taken no thought as to the economy or efficiency in compressed air, feeling that it was a necessity and caring little about the cost, so long as it enabled him to prosecute his work, but during the past three or four years there has been a great change in this respect. The mining engineer has been looking carefully into the question of economy,and the manufacturers find with pleasure that they are willing to pay for the highest type of air compressors. The same may be said also of contractors. They are fast becoming educated by experience to the fact that there can be a great saving made by using the most economical machinery for their work.

The Chicago drainage canal has been a great educator in this respect. It was a long time before the contractors on that work could be convinced that it was economy to use compressed air as a power on open work as against steam. Finally, however, Mason, Hoge, King & Co., and E. D. Smith & Co., were persuaded to purchase compressed air plants, but before they could be installed, the work had been prosecuted for six months by the use of a number of small steam plants scattered over the mile sections. The air plants were installed in the centre of the section, and the air carried in pipes along the banks of the excavation, and after working six months with compressed air, they were fully convinced that it was at least 20 per cent. cheaper than the use of steam for the same work. Therefore ten rock sections out of fourteen were worked with compressed air. The other four with steam, and from data thus obtained, it shows conclusively that air was the most economical. The cost of drilling with steam was 8.64c. per cu. yd. of rock, with air 6.30c. per cu. yd. of rock.

Two of the contractors had the courage to purchase a high type of air compressor and the saving in the coal pile was greatly to their advantage, and very soon paid for the extra cost of the compressors.

Messrs. E. D. Smith & Co., who excavated two miles of the Chicago drainage canal, are now driving a two mile tunnel near Boston. From the experience they had on the canal, they equipped the two miles of tunnel with two first-class Corliss engine air compressors, both of them duplex machines, 20 in. diameter cylinders, 36 in. stroke. The plant is installed at one end of the tunnel, the air carried the two miles through pipes and the entire work of pumping, hoisting and drilling is done by compressed air.

This same company is also doing a large piece of work at Niagara Falls, excavating for the new wheel pits, which are to be 185 feet deep, 20 feet wide, 180 ft. long. The entire work of drilling and channeling is being done with compressed air.

Great progress has been made during the past four or five years with compressed air as a power in mechanics. In fact it is fast be-

coming universal for use in machine shops, boiler shops, foundries, railway shops, bicycle shops, and also for deep well pumping.

There is yet much skepticism as to its economy or efficiency for mechanical purposes, but a great change of opinion has and is taking place among many of our most thoughtful mechanical engineers. They are becoming converted rapidly in favor of compressed air. They find no end to its uses, after it is once introduced into the shop or foundry. The advantages of it as a motive power in shops are numerous. It is easy to handle; it is clean and neat; it is always ready to do its work the moment the throttle is opened; it can be carried from one end of the shop or yard without loss, if properly piped.

It has been considered until quite recently rather an expensive power, because railway shops have labored under the same impression as mining men, that an old cylinder or machine was good enough to make compressed air. For instance, you will find railway shops using five or six locomotive pumps that produce from 50 to 60 cu. ft. of free air per minute. This means an investment of $600 or $700 tied up on the wall.

With an air compressor that would not cost over $500, they can produce double this quantity of air with one-fifth the amount of steam. Many railway shops are being fitted up with the most economical air conpressors, and mechanics are becoming ready to testify to its efficiency and great saving over other powers.

Four or five years ago, the Messrs. Cramps installed a large economical air compressor in their shipyard, piping the air throughout their works. They say to-day that it has been one of the greatest money saving machines they ever purchased.

About a year and a-half ago, the Atchison, Topeka & Santa Fe Railway installed a duplex 20 x 48 air compressor in their shops at Topeka. They have now about 5 miles of air pipe running through their shops and yards.

Since then they have purchased six compressors for their different line shops.

It may be interesting for you to know what their master mechanic says regarding the saving over the old way, by using the Baird Portable Machine Co's. tools, run by compressed air. Of course, this saving is figured on the basis of the tools working steadily through the day:—

"With the 10 ft. reach stationary riveting machine you can drive 2,000 rivets per day of 10 hours with three laborers at a total cost of $4.75 per day. This compared with hand labor, three men, total $7 per day, will drive 200 rivets.

The 6 ft. riveter, combination flange punch and riveting machine, and the bridge and girder riveter, will each average about the same as the 10 ft. reach riveter.

The truck riveters, one machine operated by two laborers, total $3 per day, drive 3,000 rivets in a day of 10 hours. As compared with hand labor, three men at $6 of a total, in the same class of work, will only drive 175 rivets.

The frame riveter will average about the same as the truck riveter.

The stay-bolt breaker will make an average saving of $8 a day.

The tank riveter will make an average saving of $10 a day.

The mud-ring riveter will drive as many rivets as can be handed to it, and will make a saving of from $12 to $15 a day for that class of work. Not only does it make a great saving, but it insures every rivet hole being entirely filled, and insures tight work, while with hand-driven rivets in mud rings a large per cent. of them invariably leak and have to be caulked or fullered up.

The stay-bolt cutter will do the work of 15 men. This machine will very easily cut off 1,500 bolts an hour, while when cutting off by the old method of hand, hammer and chisel, you must agree it goes very slow and it is hard work.

The rotary tapping and drilling machine will do the work of four men.

The rotary grinder saves the work of 6 men.

Rotary saw, for sawing car roofs, saves the work of four men.

Pneumatic hammer will save the work of 3 men.

Crown bar bolt machine saves the work of three lathes.

Rail saw saves the work of two men.

Rail drill saves the work of two men.

Device for operating transfer table saves $6 per day.

Device for revolving driving wheels for setting valves saves the labor of two men.

Device for shearing bolts saves the labor of two men.

Thirty hoists in shops save the labor of ten men at $1.50 per day.

Device for loading and unloading oil at storehouse saves $6 per day over the old method.

Jack for pulling down car draft sills saves $10 per day.

Device for fitting up hose couplings over the old method saves $15 per day.

Pneumatic painting machine, one man does the work of 10 using a hand brush.

Machine for tearing down old car roofs saves $8 per day.

Jack for raising and lowering freight and passenger cars makes an average saving of three men.

Drop pit makes an average saving of three men.

Device for sanding engines saves one man.

Shifter for switching cars in shop yard saves $50 per week.

Device for cleaning coaches saves 10 men.

Device for rolling flues makes a saving of two men over the old method.

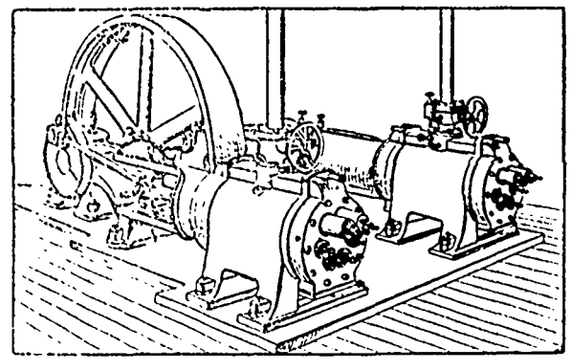
Whitewashing, when in use, will do the work of 10 men with a brush.

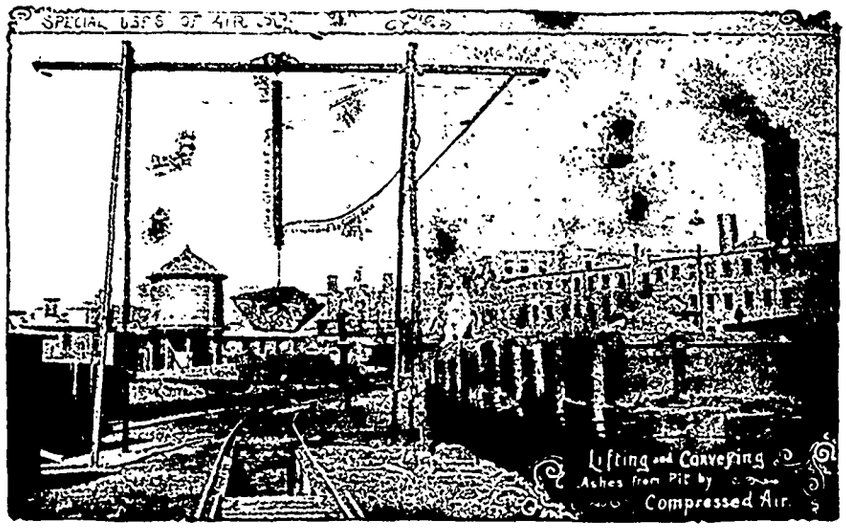
Mr. J. H. McConnell, Superintendent of motive power of the Union Pacific Railway, furnished the following interesting and reliable figures showing what can be done by the use of compressed air in shops. He says:—

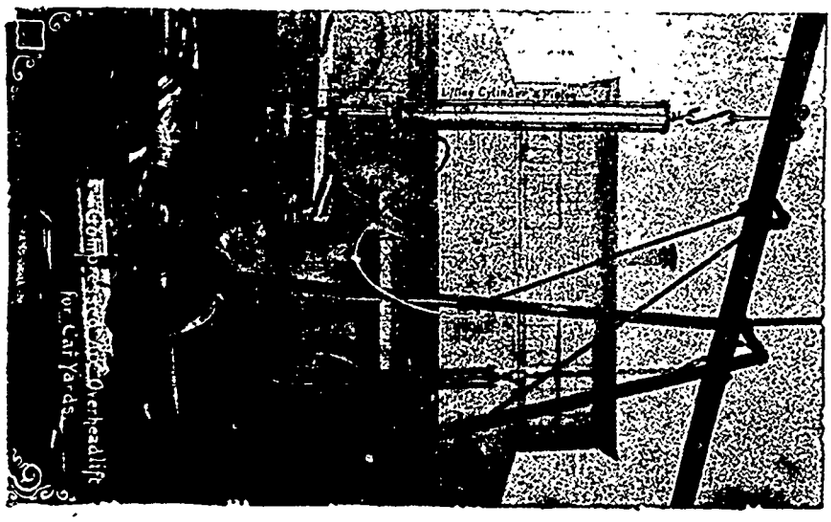
The many savings through the use of air in shops of the Union Pacific system aggregate $10,000 per year in labor alone.

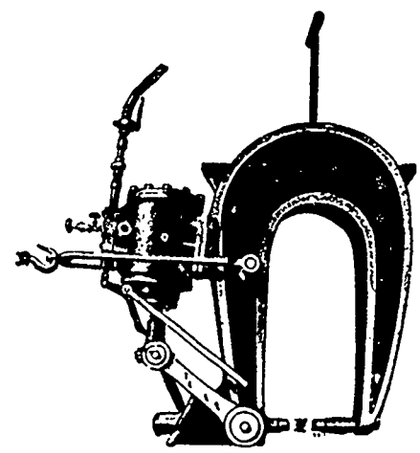
SAVINGS PER DAY.

| | |
|---|---|
| Putting wheels in wheel lathe, three lathes in the shop, an average of one change a day, save one man in handling this work | $1 60 |
| Hoisting steel tired wheels and axles in lathe, an average of six changes a day, save one hour in time, 20 cents, and one man less to handle the work, $1.60 | 1 80 |
| Hoisting axles into cut off lathe, an average of ten changes a day, save one hour per day in time | 25 |
| One large boring mill, averages two changes a day, $1.60, saving of time of 30 minutes and the use of one helper, 15 cents | 1 85 |
| Handling cylinders in large boring mill and planer, save the labor of one man and one-half hour each change | 1 60 |
| Three men working on pistons, etc., in raising them from the floor to the bench, serving three machinists, save one helper a day | 85 |
| Rising chucks, face plates and other heavy work, air hoists in the machine shop, save one helper a day | 1 50 |
| Lifting driving wheels and other heavy work on the large slotting machine, save the time of one man and 20 minutes | 1 50 |
| In applying cylinders on boilers, save one machinist and helper's time of 10 hours | 2 40 |
| Facing valves, save helper's time of four hours | 60 |
| Pressing on driving wheels and axles, three less helpers, one hour each | 45 |




SPECIAL USES OF AIR
Lifting and Conveying
Ashes from Pit by
Compressed Air.


Compressed Air Overhead Lift
for Car Yards.



Boring out cylinders, three helper's time, 4 hours..... 1.80
Applying driving brakes to old engines, drilling holes, reaming, etc., saving 15 hours of time of machinist, and helper.... 6.70

Pneumatic tin and galvanized iron press, in getting out stock for 20 dozen water buckets, get it out in eight hours, where it previously took 40 hours.

In making brake shoes, stamping a loup to have casting run on, previously one man would do 200 in a day, where he now does 600. All work on this machine saves in the neighborhood of from 50 to 60 per cent.

Running foundry elevator with the air hoist saves 25 per cent of one man's time.

Save 75 per cent. time putting in stay bolts in a fire box by using air motor for tapping out holes and screwing in bolts.

Save in the neighborhood of 50 per cent. in using pneumatic hammers for caulking both flues and boilers.

Take engines in and out of round house when necessary to change them, saves the work of 6 men, pinching, possibly 45 minutes, not counting the delay of the men waiting to go back to work on the engine.

Blowing out engines with air, save a cord of wood, besides the inconvenience and delay, as the men cannot work around a hot engine to advantage.

Handle all engines on the transfer tables, now run by air, previously run by crank. One man does now what six did before; where six men move a foot in a minute, air motor under like conditions will move 12 feet. As this is moved several times a day this is in itself a great saving.

Pneumotic hoist for unloading scrap at the foundry. The old method took six men 10 hours, under the same conditions with the hoist, two men will do it in 4 hours.

Unloading a car of wheels it takes six men half an hour, now three will do it in 15 minutes.

Sandpapering off a 50 foot baggage car by hand took in the neighborhood of 60 hours, now it takes 14 hours with the sandpapering machine.

Air jacks for raising and lowering freight cars now take one man 3 minutes, where previously it took two men 10 minutes

Truck jacks to remove three pairs of wheels take 1½ hours, the old method takes 6 hours.

Cleaning a car by air saves 10 per cent. in time.

Air white washing machine, where it took ten men 5 days, it now takes four men one day, and a 75 per cent. better job,

New applications of compressed air are made daily, two of the most recent being an air motor attached to a differential hoist and a portable stay-bolt cutter that can be operated in the hands of one man, thus doing away with the cumbersome affair hung on a post."

Geo. D. Brooke, master mechanic of the St. Paul and Duluth R.R. says —

"We are rapidly increasing the use of the air in the shape of hoists, air boring machines, air bull-dozer for blacksmith shop, air flue welder, and a 4-in. cylinder air hammer for light forgings and drawing out the ends of driving and truck springs. It is giving perfect satisfaction and will soon pay for itself in the item of saving in laboring help, independent of shortening the time of doing work."

He also sends the following data of a test of Rand Air Compressor 7½ x 14 in. diameter x 16 in. stroke air cylinders with 10 x 16 duplex steam cylinders:—

"Steam pressure, 70 lbs.

Air pressure, 110 lbs.

Revolutions per minute, 35.

Temperature of cooling water, 55 Fr.

Temperature of discharge water from cylinder jackets and inter-cooler, 62 Fr.

Temperature of engine room, 80 Fr.

Temperature of cold air inlet, 70 Fr.

Temperature of discharge air from low pressure cylinder, 170 Fr.

Temperature of air entering high pressure cylinder, 65 Fr.

Temperature of discharge air from high pressure cylinder, 135 Fr.

AVERAGE FROM A NUMBER OF INDICATOR CARDS.

Two steam cylinders 10 x 16 in., initial pres. 54 lbs., M.E.P. 40·4 lbs., I.H.P. 17·95 lbs.

Low pres. air cylinder, 14 x 16 in., M.E.P. 21·3 lbs., I.H.P. 9·24 lbs.

High pressure air cylinder, 7½ by 16 in., M.E.P. 21·3, 46·0 lbs., I.H.P. 5·75 lbs.

Both air cylinders (high pressure reduced to low) M.E.P. 34·5, I.H.P. 14·99.

Friction of compressor 16·4 per cent., I.H.P. 2·96 lbs.

Steam per I.H.P. per hour, 29·33 lbs.

Cubic feet of free air compressed to 110 lbs. pressure per pound of steam at 54 lbs. initial pressure, 10·6 lbs.

Efficiency of air cylinders, 91·5 per cent.

The apparent large loss due to friction of machine was entirely brought about by the machine being new and stiff, and the slow speed which we ran it governed by the air consumption."

Mr. F. L. Wanklyn, master mechanic of the Grand Trunk Railway System has been greatly interested in the use of compressed air for a long time, and has made it quite a study so far as he could with the machine that the company was willing to give him, which consists of an old engine taken out of the scrap heap, to which he fitted an air cylinder. He is using air for the following work, and says:—

"The uses to be found for compressed air seem to be inexhaustible as far as a machine shop is concerned, as hardly a day passes without some suggestion being made for a new and advantageous application of this handy and expeditious system of transmitting power.

1st. For hoisting.

2nd. For running small reciprocating engines and rotary motors for drilling and tapping, especially in connection with stay-bolting of fire-boxes, also for facing valve-seats and re-boring cylinders.

3rd. For breaking stay-bolts when removing old inside fire-boxes.

4th. For cutting off projecting ends of new stay-bolts prior to riveting.

5th. For chipping and caulking, and driving and snapping tank rivets.

6th. For whitewashing.

7th. For operating moulding machines.

8th. For testing air-brake apparatus, and blowing through air and steam pipes.

9th. For supplying necessary blast in connection with oil-gas furnaces for setting and removing tires.

10th. For supplying blast to rivetting fires in portable forges.

11th. For operating cinder hoist in connection with round house ash-pit.

12th. For operating small pneumatic jacks to take the place of the holder-up in rivetting over fire-box stay-bolts.

In a discussion on the advantages of compressed air at a meeting of the Western Railway Club, Mr. E. M. Herr, then master mechanic of the Chicago & Northwestern Railway, now superintendent of motor power of the Northern Pacific Railway, says:—

"Compressed air is advantageous about a railroad shop for another reason, in this it differs from electricity and has an advantage over it, that is that when the storage is not being drawn upon the plant can be shut down absolutely, and still the reservoir with the power is at hand at all times for use. This is of great advantage in a place where but a small amount of compressed air is used and used occasionally. For instance, at night it might be very advantageous to have compressed

at hand for use at intervals, when a compressor that would probably work an hour or an hour and a half at night, would compress all the air that was necessary. This being stored in the reservoirs can be drawn upon and the compressor would automatically shut down when the desired pressure was attained."

There has been but very little data accumulated from actual practice regarding the cost of making compressed air. We have the following from the A.T. & S.F. railway shops at Topeka :—

"Steam pressure, 80 lbs.
Air pressure, 100 lbs.
Tons of coal of 2,000 lbs. per month, 155.
Cost of coal per month, $139.50.
Cost af coal per ton, 90c.
Amount of free air per minute, 1,712 cu. ft.
Amount of free air per day of ten hours, 1,027,584 cu. ft.
Amount of free air per month of 31 days, 31,855,104 cu. ft.
Revolutions per minute, 50.
Pounds of coal per 1,000 ft. of free air, 9.7.
Cost per 1,000 ft. of free air, .00437c,

The above compressor is fitted with Meyer adjustable steam valve, compound air cylinders with mechanical air valves on low pressure cylinders. Air taken from outside the engine room.

The above cost is for air delivered from the compressor for fuel only, that is, the cost of oil, labor and interest on cost of plant not considered.

Steam cylinders 20in. x 48in., air cylinders 28in. and 16in. x 48in. H.P. 310 in.

Mr. Wm. Forsyth, of the C.B. & Q.R.R., says regarding the cost of compressed air :—

"We have indicated the engine with the air compresor free and also when it was compressing air to 80 lbs., and found that it required 40 H.P. We got a horse power with a Corliss engine with 4¼ lbs. of coal per hour, and the air compressor consumes 204 lbs. of coal per hour, and at $3 a ton the cost of a thousand cubic feet of free air compressed to 80. lbs is 10c. With coal at $1.50 per ton, it is of course only 5c. per 1,000 c. ft.

Mr. W. Renshaw, supt. of motive power and machinery of the Illinois Central R.R. Co, says :—

"We installed at our Burnside shops, about a year ago, a Rand Duplex Corliss Air Compressor with compound air cylinders and at present are using compressed air for the following purposes :—Elevating sand at engine house, elevating oil at oil house, hoisting heavy castings and parts at machine tools, etc, forcing couplings on air hose, operating cylinder boring bar, operating valve facing machine, filling cylinders of hydraulic presses, removing and applying driving tires, testing water pumps after repairs, drilling with motor, tapping with motor, reaming with motor, cleaning boilers, cleaning machinery, punching jacket rivet holes, taking old paint off tin roofs, rolling and beading flues, chipping, cutting, caulking small bull-dozer, elevating water from deep wells, testing air and driver brakes, elevators in storehouse, operating letter presses, cutting out stay-bolt stubs, jacking up cars and trucks, cleaning interior of coaches, cleaning upholstered work, burning paint off coaches, painting cars, sand-blast ends of cars, gasoline heater, cutting off stay-bolts, screwing in stay-bolts, rivet forges, one blacksmith forge, pressing in driving-box brasses, operating flange clamp, swedging flues.

This is the list of to date, but we are finding further use for the compressed air every day and we could not afford to be without it.

I consider it the best means of transmitting power in and about shops. 1st. On account of the many uses to which it is adapted, and the simple appliances needed in connection with its use. 2nd. With but few exceptions in the above list steam and electricity could not perform the work without more complicated apparatus, and in a great many instances air alone is applicable. 3rd. Most of the appliances used are of our own manufacture, and in connection with the pipe line are easily kept in repair by our own shop men. 4th. There is no element of danger, and the apparatus requires no skilled mechanic to handle same, and it is safe to use in places where steam or electricity might be objectionable. 5th. It can be carried greater distances without loss than steam, and taking into consideration cost of plant, cost of maintenance, skilled help required, etc., it can be produced for less money than electricity.

As regards saving made over old methods would say, taking into consideration all things, that an average all-round saving of from 25 to 30 per cent. could easily be realized.

Take, for instance, the saving effected by use of air hoists alone, which, though hard to figure, will assume large proportions when the amount of labor they take the place of is taken into consideration.

We figure a saving of 66 per cent. in burning paint off passenger cars, and 50 per cent. in painting freight cars and passenger trucks."

This compressor is a duplex, with steam cylinders 20 in. diameter x 30 in. stroke, fitted with improved Corliss valve gear. The air cylinders are compound, 26 x 30 low pressure air cylinder, 15 x 30 high pressure air cylinder, having an intercooler which carries the air from the low pressure cylinder to the high pressure, through pipes that are surrounded with water, thus cooling the air after the first compression before it goes into the second compression cylinder. The intake cylinder has a hooded head, arranged so as to take the air from the outside of the building. Whenever required, it gives them the air compressed to 150 lbs., with steam pressure at 80 lbs.

The same type of compressor is used by the St. Paul & Duluth Railway Co., also Atchison, Topeka & Santa Fe Railway Co., also the Michigan Central R. R. at St. Thomas.

In a paper read before the Western Foundrymen's Association by Mr. Geo. A. True :—

"Taking a basis of 2,000 ton-feet per day, assuming the operators labor at $2 per day, we have an operating or attending labor of about 25c. per 1,000 ton-feet. The total cost, therefore, of hoisting one ton 1,000 feet will be about 32c., or in a foundry of 30 tons daily capacity about 65c. per day, using direct acting vertical hoists, or roughly, in a 30 ton per day foundry, $5 per day represents the labor of hoisting by hand power, against 65c. per day by air hoists, a saving well worth considering.

Making a comparison with hand power, as already stated, the cost of hoisting by manual labor in the foundry under consideration would be not far from $5 per day, equivalent in good times to $1,500 per year. By air it would cost $200 per year, or, if we include interest on the investment, which is only fair, we will have a hoisting cost, when operated by hand power of about $1,600 against $380, using air. The saving would go far towards purchasing a first-class air plant."

Messrs. The Massey-Harris Co., of Toronto, Ont., say :—

"We are using this air compressor in connection with burning oil fuel in our smith shop. We have for some years been using oil for fuel instead of coal. Last week the writer spent some hours in the factory of Wm. Deering & Co., Chicago, where they are using compressed air for hoisting cranes, which seems to work very nicely indeed. The heavy flasks in the moulding shop and the molten iron are lifted by these pneumatic hoists as well as the heavier castings in the machine shop. They are also to a limited extent using it for ramming the sand into the moulds, etc. I have no doubt it will be used to a very much greater extent in the near future than it has been in the past. So far as using it in connection with oil fires is concerned, we may say that after some six years experience with oil we would not go back to coal under any consideration."

Air is being used very extensively for pumping deep wells, taking the place of the old style deep well steam pump, and in every case it increases the output of the wells from 25 to 75 per cent.

In a recent 24 hour test, pumping four St. Peter wells, the following data was gathered:

"Wells about 400 ft. deep. Water standing to within about 6 ft. of the top when not being pumped. When being pumped, the water fell to about 84 ft. Wells were cased with 6¾ in. I. D. casing. Air pipe one and a half inches. During the twenty-four hours there were delivered 2,016,678 gallons water, lifting it about 96 ft. There was an average delivery of 11.15 gal of water per H. P.

Cards were taken from the steam and air end of the compressor each hour. Average H. P. of steam cylinders 125.6. Average H. P. of air cylinders, 116.14, showing a mechanical efficiency of about 92 per cent. or about 8 per cent. of friction."

We also have the following data taken from one month's report in pumping water from three deep wells:

"Steam pressure, 80 lbs.
Air pressure, 68 lbs.
Tons of coal of 2,000 lbs. per month, 106¾.
Cost of coal per month $167.60.
Cost of coal per ton $1.57.
Amount of free air per minute, 352.8 c. ft.
Amount of free air per day of 24 hours, 508,032 c. ft.
Amount of free air per month, 15,748,992 c. ft.
Revolutions per minute 45.
Pounds of coal per 1,000 ft. of free air, 13.5.
Cost per 1,000 ft. of free air, .0106 c.
Amount of water pumped, 76,255,000 gallons.
Cost per 1,000 gals., .002 c.

The above compressor is fitted with Meyer adjustable steam valves, 14 in. in diameter x 22 in. stroke, air cylinders simple, 14 in. x 22 in., fitted with mechanical air valves, air taken from outside of engine room. The above cost is for the air delivered from the compessor for fuel only, that is, the cost of oil, labor and interest on plant not considered. H. P., 51 in.

The U. S. government made very exhaustive tests before adopting compressed air for the Navy. They have recently purchased air compressors for use on board ship, compressing the air to 600 lbs., with 80 lbs. of steam pressure.

They have also purchased several compressors for their dynamite guns, using the air at 1,700 lbs. pressure, with 50 lbs. steam.

The efficiency of compressed air is greatly increased by re-heating before it enters the working cylinder. This has been demonstrated by experiments in our shops. Also practically demonstrated in Paris, where air is carried about the city for power purposes by what is known as the Popp System. They claim an efficiency of 92 per cent. by re-heating the air, as against 70 per cent. not heated.

During an experiment by the writer in running street cars by compressed air, it was found that the cars could be run 8 to 10 miles when the air was re-heated before entering the cylinder, and only 4 to 5 miles with cold air. The air was carried in storage tanks at from 600 to 800 lbs. pressure, being passed through water heated to 360 degrees, to a reducing valve, and used in the cylinders at from 50 to 150 lbs. pressure, according to the grades or condition of the track. This was known as the Mekarski System, which has been used successfully in Nantes for the last eight or nine years, and three years ago, three street car lines were established in Paris under the same system. They carry the air at a pressure of between 1,100 and 1,200 lbs., reducing it to the proper pressure when used.

During the experiment in this country, the cars were run about 40,000 miles, fully demonstrating that compressed air is practical, economical and most delightful for street car propulsion.

Compressed air as a power has certainly proved itself worthy of consideration, and to be produced economically, it should be treated on the same basis that a mechanical engineer would treat the question of economy in a steam plant. I am happy to say that there have been rapid strides in this direction during the last two years.

There is no question but what compressed air can be produced and utilized with as much economy and as great efficiency as any other power by simply putting in economical machinery for producing it.

---

## Safety Arrangements in Pit Head Gear.

We are always glad to notice any device that tends to minimise the dangers of the miner's hazardous calling, and the suggestions made by Mr. C. S. Smith in the paper he read at the Derby meeting of the Chesterfield and Midland Counties Institute of Engineers are unquestionably in that direction. He said that detaching hooks acted with considerable certainty, but the speed at which the cage was run up to the wheel was at times so great that after the rope was detached the cage rose the full length of the suspending chains, and then dropped with so much force as to break the suspendlng tackle from the detaching hook, thus allowing the cage to fall down the shaft. The only way to provide against this was to have props in the head-gear to catch the cage. He had invented props which saved the sudden jar when the cage fell. When the cage had been raised so as to disengage the props, and the lifting tackle gave way, the cage in dropping was caught between the inclined faces of the props, and effectually arrested by their wedging action. Should the cage yield to the wedging force, so as to descend to the bottom of the inclines, it would then be stopped and supported by the beaks of the props. The remedy is certainly a simple one, and there is no reason why it should not be adopted in general practice.

---

## Comparison of Power Plants in Mines.

In a well-reasoned article on the comparative advantages of steam, compressed air, and electricity for power purposes in mines, Mr. McMurtrie comes to the conclusions that while rope haulage driven by a steam engine, at surface or below, is more economical than similar plants driven by compressed air or electricity, yet that when the time has arrived for the haulage to be extended, and for subsidiary engines to be put down inbye, electricity and compressed air only can be used. Also, that of the two, electricity, on account of its greater efficiency and its reduced first cost, is thus to be preferred. Mr. McMurtrie's article appears in the "Iron and Coal Trades Review" of January 29; it shows a wide and intelligent acquaintance with mining, and though we cannot agree with him on all points, we feel assured that what he has to say is well worthy of careful perusal.

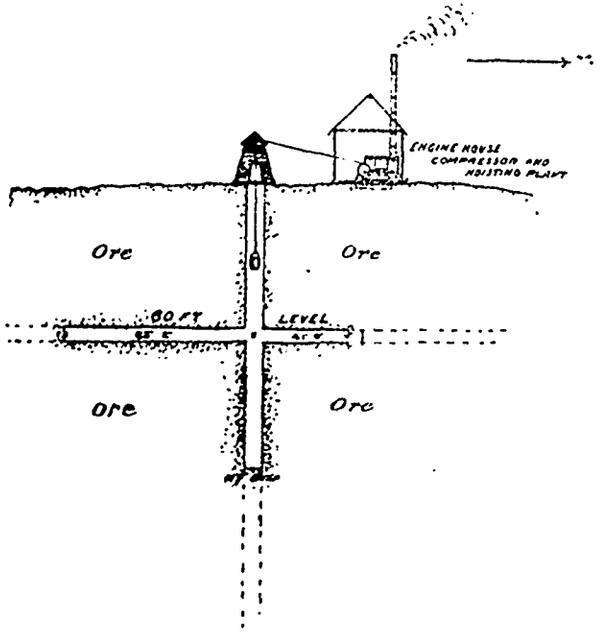
---

# FOLEY MINES COMPANY

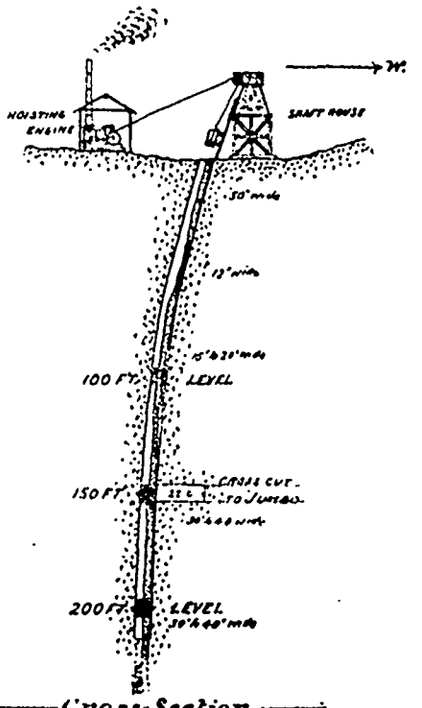
OF ONTARIO

## Sections of Workings

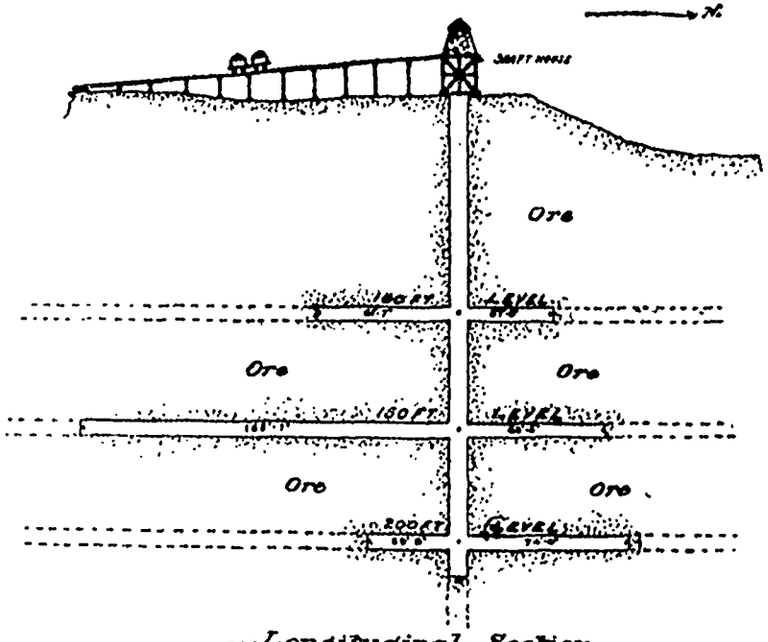
Toronto 30th Nov. 1896.




Longitudinal Section
Shaft No. 5.




Cross-Section
North Shaft




Longitudinal Section
North Shaft

# Notes on the Gold-bearing Lodes of Cayoosh Creek, B. C.

By Mr. G. F. Moncton, F.G.S., Vancouver, B.C.

Cayoosh Creek is a river which debouches into the Fraser about one mile below the village of Lillooet. The valley through which it flows is a narrow gorge between very rugged and steep mountains, affording magnificent scenery, many of the bluffs rising sheer to a height of eight hundred feet. These crags expose fine sections of the formation composing the rocks of the district.

The creek can be travelled for the first eight miles by a good waggon road, which is to be extended in the spring, and beyond that there is a good trail for a long distance up the creek. All along the bed of the stream, wherever the current was not too strong, placers have been worked. The most important of these lie below the canon, at which point bed-rock was reached. The auriferous character of the stream was not known until 1886. In the following four years $160,000 were extracted. It is not, however, with a description of placer mines that I propose to occupy your time, but with some notes on gold-bearing lodes.

Claims have been taken up for a distance of about twenty miles from the mouth of the creek. The nearest claim to Lillooet which I have examined is the "Talisman" about five miles up the river. Little work has been done at that point, but several quartz veins are exposed in the face of the bluffs. The enclosing rock is quartz schist. The direction of these veins is nearly E. and W. and their dip vertical. They are chiefly notable for the fact that they carry a considerable percentage of galena, pointing to the possibility of a belt of lead-bearing rocks existing here.

Proceeding further up the creek we come to the Ample property, which was worked by the Lillooet, Fraser River and Cariboo Co., Ltd. The principal development work done was to sink an incline shaft on a vein dipping to the west. This vein is partly composed of quartz, but contains also a great deal of slate carrying iron pyrites. In the end of a drift carried from this incline some good sections of anticlinal veins may be seen. In the great cliff which rises above the mouth of the shaft the outcrops of numerous other veins are visible. These works are at an altitude of 2,700 feet above the water. Before passing to a description of other properties, I may make some general remarks on the formation to be seen in the gorge.

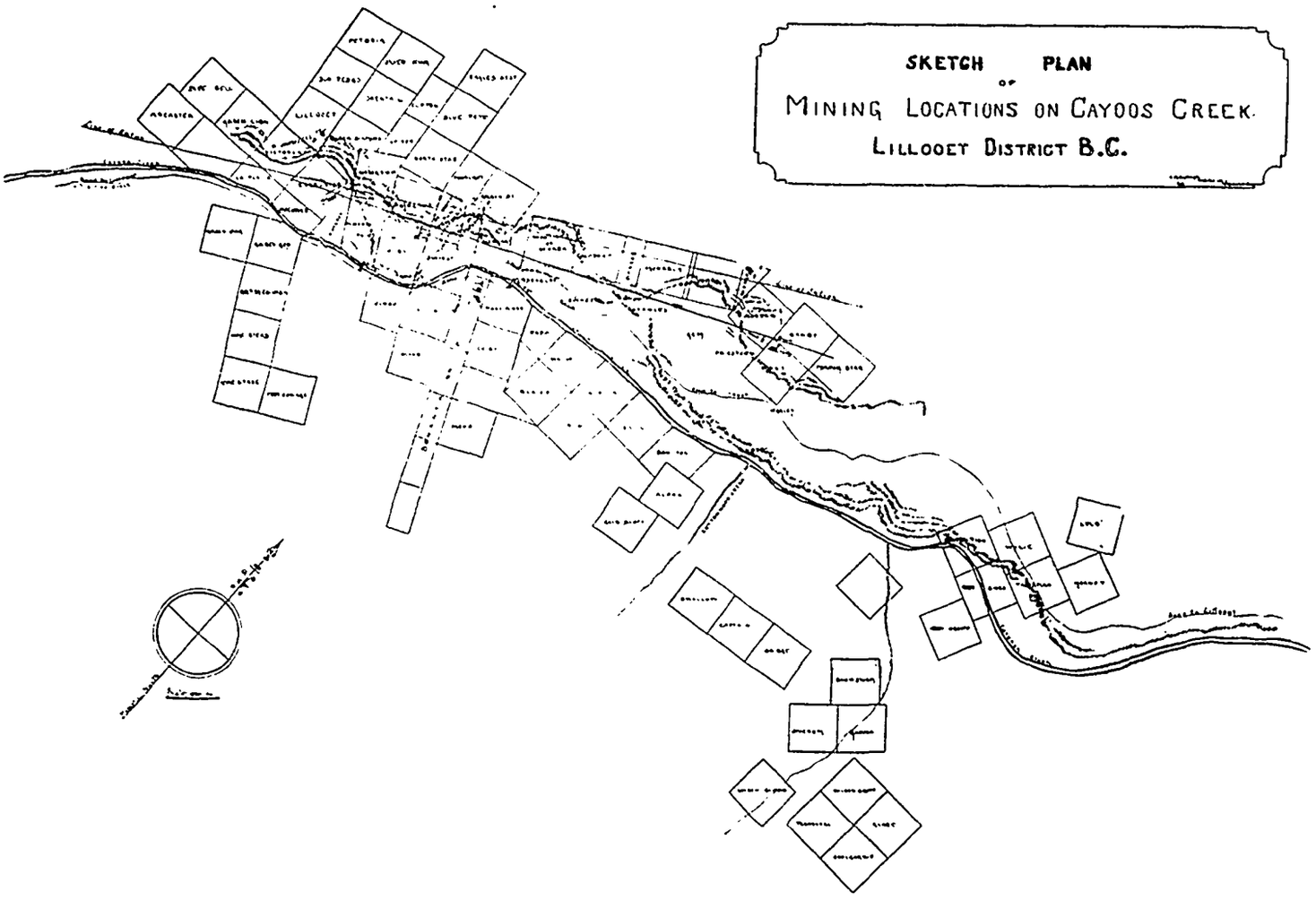
In the sections visible in the cliffs numerous anticlinals may be seen, accompanied by their corresponding synclinals. The first anticlinal axis is that of the Ample, the second that of the "Bonanza," and others occur on the "Alphabelle," "Golden Eagle" and "Golden Stripe." There are perhaps two others—One between the "Ample" and "Bonanza," and another west of the "Excelsior." They might perhaps be viewed as subordinate depressions and elevations in the crown of one great anticlinal. A fine section of the third and fourth may be seen in the face of the bluff, which rises 1,000 feet from the water on the "Ruby," "Surprise" and "Alphabelle" claims. The general direction of these anticlinal axes appears to be S.S.E. and N.N.W. In the "Bonanza" group on the south side of the creek considerable work has been done by the Lillooet Gold Fields Company. The principal development was to run a tunnel 400 feet along the apex of one of the anticlinals on a body of slate and quartz carrying a little pyrites. This yields a little gold by assay. Its width is four feet. The incline shaft has been sunk on the east dip, which was filled with water at the time of my visit. The lode here dips 35 degrees to the east. A little below the mouth of the drift, which is 300 feet above the mouth of the stream, several small quartz veins occur, which carry some gold. There is another lode outcropping above the drift, which has a width of eight feet. This outcrop shows the east dip and also the apex of the saddle. The country rock at this point is all plumbaginous slate. Above these works there has been a good deal of development work done on other lodes.

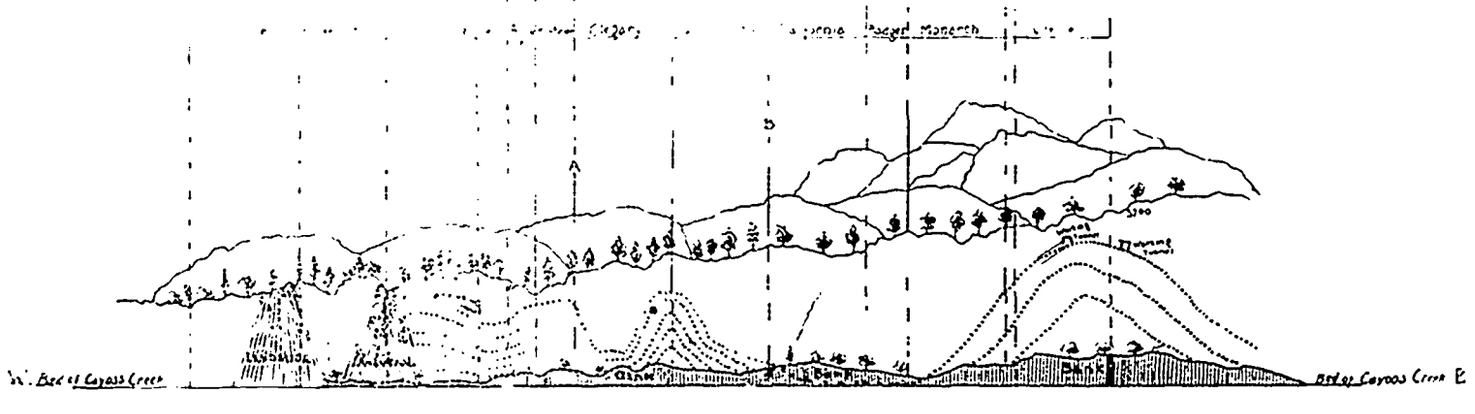
A little further west and north of the "Bonanza" are situated the works of the "Golden Cache" mine on a lode 1,300 feet above the water. A good section of the formation is given on the face of the bluff into which the level has been driven. The vein dips one in five to the east, and has been stripped for a length of 400 feet along the face. The quartz is about twenty feet thick at the mouth of the tunnel. Above the quartz is a wide seam of slate, which is reported to carry 6 dwts. gold per ton. Free gold may be seen plentifully sprinkled through the quartz, but the value of the material is difficult to guage in the writer's opinion without a mill test, as coarse gold is too irregularly distributed in quartz to test by assay without very careful sampling of a large quantity of the ore. It is proposed to build a mill on the property.

There has been a great deal of speculation in the shares of this company, so that its name is well known. Its discovery was accidental and has served to invest it with a halo of romance. A half-breed shot a goat, which fell over a precipice on what is now the "Golden Eagle." Climbing over to recover his spoil, he found it lying on a projecting ledge, and brought away with him some rocks, which he had broken off, as it contained shining specks. These were afterwards discovered to be gold. This occurred in May, 1896. Since that period a drift has been carried into the lode to a distance of seventy feet. A short distance above this drift the lode begins to dip to the west.

The vein reappears on the "Golden Stripe" and also on the "Alphabelle," which lies to the east; in which latter claim it is 15 feet thick. Although it is claimed by some that it is the same vein as that which appears in the "Excelsior" claim; this is not a certainty, but the two lodes resemble one another, and that on the "Excelsior" occurs where one would expect to find the continuation of the more famous lode. It outcrops on this claim for a length of 600 feet and has an average width of about six feet. On the west side of this claim some small lodes may be seen dipping to the east, which shows the existence of another synclinal at this point. Beyond this claim appears a dyke of eruptive rock which appears to run parallel to the anticlinal axes, and slate with quartz lodes in it occurs beyond this, but the writer has at present no knowledge of the rocks on the stream above this point.

So little has yet been done on this stream except in placer mining that it is too early to boast of its treasures, but as far as one can see there is good cause for believing that the lodes of Cayoosh Creek will make its name famous among mining camps, for it is not merely in the richness of one or two bonanzas that we have to put our trust, but the proved auriferous territory is at least ten miles wide, and the number of lodes underlying one another is very great; their regularity is also a point in their favor. The thickness of the enclosing rocks is, so far as we know at present, 3,000 feet at least. It is probable that as the lodes are developed we shall find that the paystreaks have some common dip; and perhaps that the apices of the saddles are the richest deposits. as in similar lodes in Australia, but this must be at present a matter of conjecture. The lodes appear to thin out towards the synclinals.


SKETCH PLAN
OF
MINING LOCATIONS ON CAYOOS CREEK.
LILLOOET DISTRICT B.C.


W. Bank of Cayoos Creek
E. Bank of Cayoos Creek
3 Veins above another in a height of 1500
3 Veins appear in this property
3 Veins appear East of B

# Notes of the Mining of Low Grade Gold Ore in Nova Scotia.

By Mr. C. F. Andrews, Country Harbour, N.S.

In view of the interest which at present is being awakened in the low grade gold ores of Nova Scotia, some personal observations in this line may not come amiss; the purpose of this paper is, therefore, to give an outline of some personal experiences while manager of the Richardson Mine at Isaac's Harbor, in the Province of Nova Scotia.

The writer does not for a moment claim that all the methods adopted during this experience have been at all times as satisfactory as he could have wished. Circumstances often compel us, when we cannot obtain that which we would desire, to accept that which of things obtainable, comes the nearest to meeting our wishes.

The Richardson belt is composed of slate and quartz, between regular walls of whin. It is located in what is known as Stormont Gold District as the Gold Brook Anti-clinal (also called the Upper Seal Harbor Anti-clinal) the course of which is N. 62° W. and S. 62° E.; and along which auriferous belts, lodes and drift have been discovered for a distance of three miles.

The Richardson belt was first discovered and worked on its south dip, where the average width was 11½ feet. In working west the belt narrowed down considerably. Eastward the belt turned in a northerly direction increased in width to 18 feet and lay very flat, the dip changing from south to east; continuing, it swung around and ran westwardly, assuming a north dip and growing smaller again than on the turn.

The mill for crushing this ore is located about three hundred yards from the mine on the shore of a lake, from which the water supply is obtained. The ore is conveyed from the mine in cars running over steel rails, laid the greater part of the distance on trestle work. These cars are hauled by means of a steel cable, the power being taken from the mill. The total expense for haulage averages about three cents per ton, including renewals of cars, ropes, wheels, axles, &c.

When first started the mill was furnished with but fifteen stamps; a few months later the number was increased to twenty, and later to forty.

The following extracts from a report to the directors in June 1894 may be of interest, it being remembered that the mill then consisted of twenty stamps with hand breaking and feeding:

"At the mine three shafts have been sunk. The west shaft is not more than 30 feet deep and was put down mainly to test the length of the belt, which is here about seven feet wide.

"The middle shaft is down 100 feet, width of belt here from eight to fourteen feet. Tunnels and stopes are driven west from here 72 feet or to a point within eighteen feet of the west shaft."

The labor expenses here for drilling and blasting amounted to 26 cents per ton. The cost of dynamite per ton of ore sent to mill was 3½ cents.

"Tunnels and stopes are also driven east from here to connect with the east shaft, which is 108 feet deep. The southerly dip of the middle shaft is about 52° from the horizontal, that of the east shaft about 42°. East of the east shaft a tunnel has been driven on the belt 89 feet, the belt at this point having a width of 17½ feet. Here a bend of 70 to the northward takes place in the course of the belt. A tunnel has been driven here on the belt for a distance of 85 feet, the dip being 23° in an easterly direction, the width 18 feet."

The total cost for mining, transporting to mill, and milling at this time was $2.90 per ton, including an allowance for total depreciation in value of plant in five years, and for taxes, insurance and all charges.

"The belt for the most part is composed of one large lode on the back-wall side varying in width from one to four feet, and a varying number of smaller lodes intermixed with slate. At places nearly the entire belt is quartz, and gold is sometimes found in the soft slate between the lodes. Not enough black or waste rock can be obtained below to load the scaffolds; and the walls have to be supported by leaving in blocks or pillars of ore."

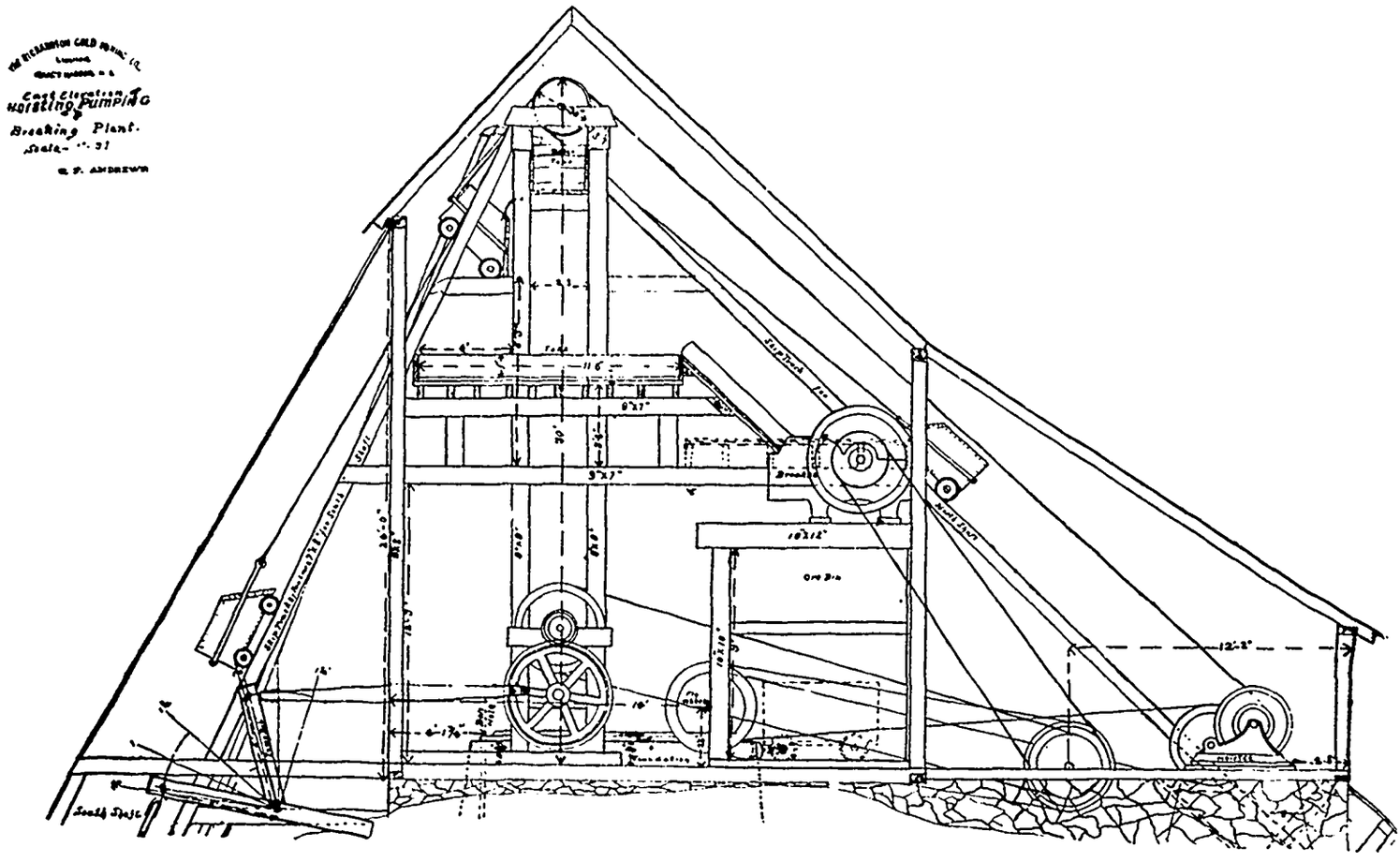
It may be stated here that the underhand method of stoping was employed. In an attempt to use the overhand method it was found that the slate between the veins of quartz was not firm and solid enough to hold the quartz in place overhead, and, consequently, large masses of rock were falling, making it dangerous to the miners beneath. I am of the opinion that at greater depth the slate becomes more firm and solid, and overhand stoping may be resorted to.

At this time hoisting was done from the east and middle shafts by a single cylinder engine, geared to a single friction-drum. The gear was so located that the rope could be shifted from one shaft to the other as occasion required. Wheelbarrows were used below ground as a means of transporting the ore to the shaft; and the ore was then hoisted in tubs to the surface, where it was washed, the waste rock thrown out, and the good ore shovelled into cars to be hauled to the mill.

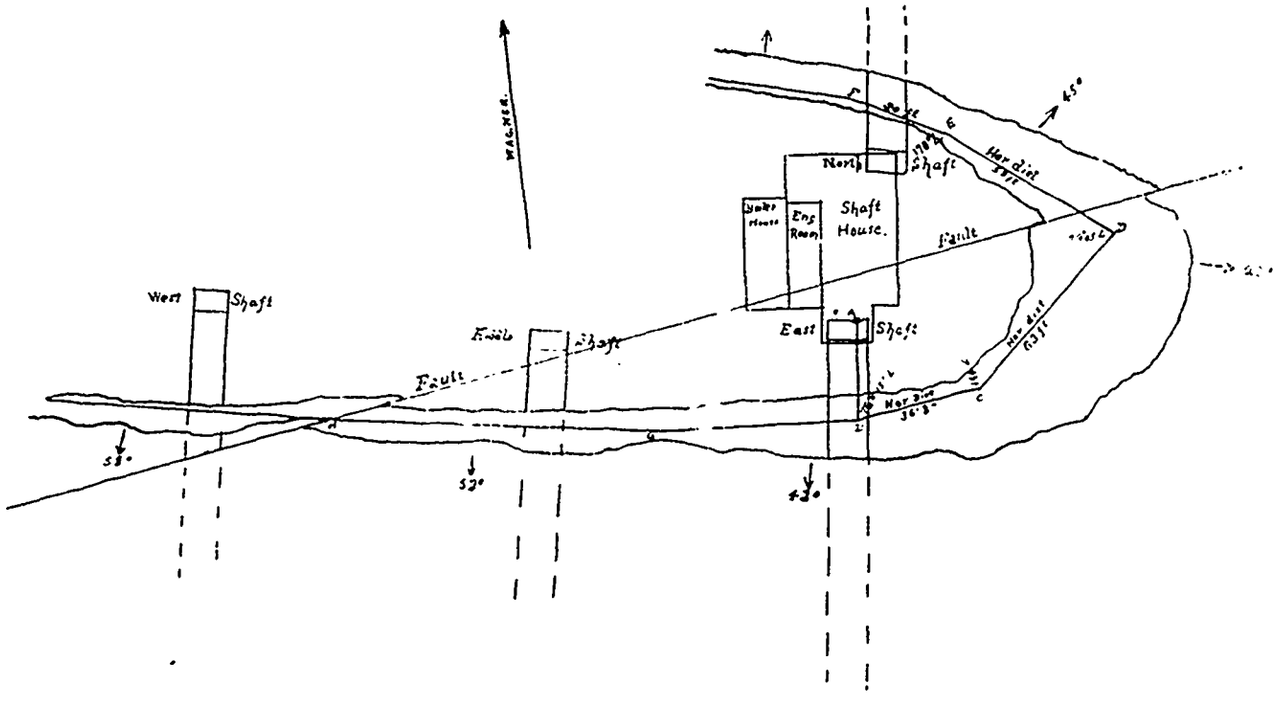
Since then the belt has been followed farther west on the south dip; the east shaft, now the pump shaft sunk to a depth of 200 feet, and the belt driven and stoped on around the turn and followed west on the north dip. At the time of writing the belt produces more waste slate than in 1894.

The present plant consists of a hoisting, pumping and breaking gear, located on the apex of the semi-cone formed by the turn of the belt. Two shafts are worked from here, one on the south dip and one on the north. The bottoms of these shafts are about 250 feet apart, as measured on the belt around the turn; and as they are sunk this distance is of course increasing. At the surface they are 48 feet apart and converging towards each other. At a height of twenty-six feet above the surface the skip-tracks from each meet above the same deck head; and self dumping skips empty their loads beside the same rock-breaker. The "sump" at the deck-head into which the skips dump their loads is lined on the bottom with open-sand cast iron plates ⅞ inch thick, laid in ⅝ inch of cement. The ore is here thoroughly washed, the waste rock thrown into trolleys and run out on the dumps, and the good ore shovelled into a hopper which drops it between the jaws of a 9 x 15" Blake breaker, from which it falls into a bin. Cars are run under the bins where the ore is allowed to fall into them. They are then run out on the main track and hauled by the wire cable to the mill, where they are dumped into a bin of 500 tons capacity. Thence the ore runs through shoots into the automatic feeders supplying the mortars. Copper plates are used inside these mortars. The surface dimensions of the outside plates are 12 ft. 6 in. x 4 ft. After passing over the outside plates and through mercury traps, the sand is discarded; no attempt being made at concentration.

In the mine every attention has been paid to working the rock to the greatest advantage. On account of the dip to the seams in the belt, it has been found that two drills working toward the west accomplish as much as three drills working towards the east. The works below are now supplied with a regular system of tracks over which the ore is conveyed in trolleys to the electric-lighted loading stages at the shafts. The south shaft, being the main shaft, is supplied with two skip tracks, one for the east and one for the west ore. The pump way is between the skip tracks and a little below them, or nearer the foot wall; thus being out of the way when ore is being loaded into the skips or timber being unloaded from them. The ladder-way is a compartment by itself cribbed up under the foot-wall cribbing, where it passes through the surface material, thus being out of the way of anything which could fall or injure a man. The slope of the shaft is so flat that no ladder is required to




Richardson Gold Mining Company. Hoisting, Pumping, and Breaking Plant.




Plan Showing Richardson Belt on east turn Gold Brook Anti-clinal, also location of Shaft House.

Horizontal Distance A to B, 30 ft. 8 inches.
Vertical Distance " 45 ft. 2 "
C. D. E. F. = Points in Roof.
Arrow head = Direction of Dip.

get at the pump. The north shaft has a skip-way in the east end and a ladder-way in the west end. The stopes were started from the east side of the south shaft and carried round to the north shaft—this rock being hoisted from the south shaft. The stopes are then continued west beyond the north shaft and the ore hoisted from the north shaft. Thus while ore has been hoisted from both shafts, the sinking and expenses connected therewith have been confined to one shaft. The number of hand-drills employed here to produce 2000 tons of crushing ore per month has never exceeded nine—two men to a drill. The surface plant at the mine consists of a 60 h.p. tubular boiler set in brick, and a 50 h. p. compound engine set on concrete foundation. Floors of engine and boiler rooms are of concrete. The hoisting machine is a double drum one, built especially by the Jenckes Machine Co., and laid on a concrete foundation The drums are side by side and of the usual cone-friction type; but instead of being driven by two small cylinders attached to it, its driving shaft is driven by belt and pulley from the compound engine; the same engine serving to drive the pumping gear and the rock breaker. The experience here has been that it is far more economical to drive everything from one compound engine than from a number of smaller ones, particularly where all machines are working continually day and night. The engineer fires his own boiler, and no extra attendance is required for the hoisting machines. Thus, the deckman when not engaged in bringing up or lowering skips, can wash and assort ores.

The water from the mine pump is discharged into a tank under a hatch in the peak of the roof. A hose from this serves for washing quartz or for fire purposes. The building is heated by exhaust steam from the engine, and like the mill, forge, workshop, stables, office, manager's house, etc., is lighted by electricity.

At the mill the plant consists of forty 850 lb. stamps, two return tubular boilers, one 16 x 42 Corliss engine, one Worthington duplex steam pump, 3½ inch suction and 3" discharge, one Northey pump of the same description, a dynamo for lighting purposes and the hauling gear for bringing the ore from the mine. The forty stamps are arranged in a row, and the ore bin extends the full length of the batteries.

The ore cars enter the building at right angles to the ore bin, are turned on a table and run along the top of the bin to be dumped wherever the ore may be most required. One mortar is reserved for test purposes, the bin in front of it having a partition to keep the test ore separate from the regular ore.

The stamps drop 90 times per minute, and the mortars are arranged for very fine crushing. At times the gold is so fine as to be indiscernible to the naked eye. An instance of this was when 4,000 tons of ore were milled in which not a colour of gold was seen, but which, when cleaned up, gave a fair profit.

With this plant up to the time when my connection with the mine ceased, the total cost for mining and milling, including all charges, was $1.65 per ton.

At the mill but one engineer was employed on each twelve hour shift, it being also his duty to attend to the dynamo and lights. It may be interesting to know that the electric light plant installed here paid for itself in one year in the saving of kerosene oil alone. When there is power to spare, as was the case here, and a large number of lights required, it cannot be too highly recommended, particularly around the plates of a mill.

The Richardson belt is very heavily mineralized; and there is great cause for regret that only the free gold is saved. The results of a careful and elaborate series of tests of the tailings from this mine made by Mr. F. H. Mason, are somewhat surprising to many who do not consider the auriferous ores of N.S. worth concentration. But facts speak loudly for themselves, and, much as we would like to have all of our ore free milling, this desire does not alter the refractory nature of some of it.

According to these tests made when the ore being crushed was of an unusually low grade, the average loss was 1 dwt. 18 gr. per ton. A sample of tailings from which all the concentrates were not extracted gave 1.3% of concentrates, which had an assay value of 1 oz. 10 dwt. 1 gr. per ton and still left a value of 1 dwt. per ton in the tailings. Another sample of tailings gave 6.3% of sandy concentrates, having an assay value of 1 oz. 1 dwt. 13 gr. per ton of concentrates. In neither sample was free gold or amalgam detected. The majority of the arsenical iron pyrites is contained in the slate; some samples of this slate assay very high. A chance sample gave the surprising result of 28 oz. 8 dwt. of gold to the ton of concentrates and yielded 30% of its total weight in concentrates. Two more assays of this slate gave concentrates valued respectively at 4 oz. 2 dwt. 8 grs. and 5 oz. 6 dwt. 12 grs. per standard ton of concentrates. As this slate contains so little free gold but a small portion of it is crushed.*

An analysis of clear concentrates taken from the sluices of the mill gave the following composition:—

| | |
|---|---|
| Silica | 2·65 |
| Iron | 35·63 |
| Sulphur | 16·80 |
| Arsenic | 42·25 |
| Copper | trace |
| Bismuth | " |
| Zinc | " |
| Mercury | nil |

An assay of these concentrates gave gold 2 oz. 14 dwt. 21 gr. per ton. A chlorination test of these concentrates obtained an extraction of 97% of gold contained.

Being myself present when Mr. Mason made a great many of his tests and assays, and knowing the care that was taken with them, I cannot help feeling that it would be of general interest to those interested in gold mining in Nova Scotia to quote from Mr. Mason's report as follows:—

"It will be seen that you are losing a considerable amount of refractory gold in your tailings, you are dumping a considerable quantity of auriferous slate and leaving a further and larger quantity in the mine, and finally you have a large tailing dump, parts of which would pay handsomely for working over. I am satisfied that the gold you are losing in your tailings is practically all in the form of concentrates. In churning up an ore (often heavily charged with mispickle) in the battery, you must of necessity at times flour a certain quantity of mercury; added to this, owing to the quantity of slate you are finally crushing, you have a very slimy tailings, consequently the floured mercury has little chance of re-settling, and small quantities are at times found to be carried away with your tailings. * * *

"With a view to saving the refractory gold, I would strongly advise you to put in Frue vanners, use a coarse mesh screen, and cut down discharge to one half what it is at present. I would also increase the stamping capacity by increasing the number of drops from ninety, at which you are now running your mill, to one hundred drops a minute. In advising you to to do this I wish to bring the following advantages you will gain to your notice:—

1. You will be able to crush the whole belt for, "your slate certainly contains refractory gold, and at times free milling gold. Your mine superintendant told me that he estimated that not more than one third of the rock broken underground was milled, so at the present time you are paying for breaking rock 66% of which you have not in

*Near the surface the slate is soft and partly decomposed. In this condition it yields considerable free gold when milled. As the depth increases the slate becomes harder, increasing perceptibly in bulk and in the quantity and qnality of its concentrates. Below a depth of about 100 feet it contains so little free gold that it is unprofitable as a free milling ore.

the past milled, nor would I advise you to mill it unless you put in concentrators, and crush it only coarsely for it is highly refractory, and if crushed finely it will flour mercury, and in that way probably carry away more gold than it would contribute to the amalgam in the battery or on the plates."

2. "You will decrease your mining expenses by more than one half; the only extra expense will be in hauling part of the slate, and in winding and hauling the remainder, while your output will be nearly three times what it is at present."

3. "I am of opinion that the slate will provide enough free gold to pay for the milling, in which case the concentrates will be all clear profit."

4. "You will dispense with the cost of picking the ore. I estimate that the cost of Frue vanners erected in Nova Scotia will be about $150.00 per stamp. To get satisfactory concentration it will also be necessary for you to put in mechanical sizers, (the cost of which is small) and feed the coarse tailings on to one set of vanners and the fine on to another set."

"Having obtained your concentrates, chlorination is undoubtedly the method by which they should be treated. The cost of such treatment in Nova Scotia will, I estimate, be about $4 00 per ton of concentrates. It will also be a matter for consideration whether the arsenic will be worth saving for two reasons, firstly, for its value, which is doubtful, and secondly, to prevent its contaminating pasture lands and consequently prevent claims against you for poisoning cattle."

"The cost of an eight or ten ton chlorination plant erected in Nova Scotia will be about $3,000, exclusive of building."

Up to the present time this property has produced 43,000 tons of ore, which goes to show that the mining of low grade ores in Nova Scotia at a reasonable cost per ton, has got beyond the experimental stages and is a reality. The handling of the refractory ores has yet to be experimented with, and from the appearance of nearly all the ore I have seen along the Gold Group anticlinal I am of opinion that material for the experiment is not lacking.

## The Gold-Bearing Deposits of the Eastern Townships of Quebec.

By Robert Chalmers, of The Geological Survey of Canada.

The area of the gold bearing region of the Eastern Townships of Quebec has been estimated at from 3,000 to 4,000 square miles.* It extends from Massawippi Lake on the south-west to Etchemin River on the north-east, and from the range of mountains nearest the St. Lawrence River, constituting the north-east prolongation of the Green Mountains into Canada, southward and eastward to the boundary line between the Province of Quebec and the United States. Only in certain parts of this area, however, does the precious metal really occur. Although fine particles of gold can be obtained in many places near the mountain ranges and along most of the river valleys, there are considerable tracts in the basin of Cambro Silurian rocks where it has not been found.

The topographical and physical features of this region are well known having been described by Logan and Hunt in the earlier reports of the Geological Survey and by Ells in the later reports, ‡ and it seems unnecessary here to refer to them were it not that they have affected the distribution of the alluvial gold in some places. For the sake of clearer explanation, therefor, the main physical and geological outlines will be briefly recapitulated.

Commencing at the International boundary we have first a mountain range, constituting a natural divide, a portion of which consists of pre Cambrian schists and granites, namely from Emberton to Risborough, flanked by a belt of Cambrian slates. Next we find a wide undulating plain underlain by Cambro-Silurian slates crossing the whole region at a south-west and north-east direction in which granite mountains rise at intervals. To the north-west stretches a narrow broken range of pre-Cambrian, also flanked by Cambrian slates in places, known in the southern part as the Massawippi and Stoke Mountains, farther east as the Dudswell and St. Francis Mountains. Between this and the next range lies a narrow irregular band of Cambro-Silurian, and next is the wide, broken range of pre-Cambrian schists and eruptive rocks already referred to as the north-east extension of the Green Mountains into Canada. This borders the great plain of the St. Lawrence valley.

The belts of pre-Cambrian and Cambrian rocks are the highest while the Cambro Silurian occupy, for the most part, basins between these. The great undulating plain or valley between the Stoke Mountains and the boundary line is occupied by thick deposits of boulder-clay and other superficial beds largely concealing the rocks from view. This seems to have been a depression into which sediments from the north-west and from the south have been carried from an early date in geological history.

### Gold in the Pre-Cambrian.

The schists, gneisses, slates, etc. of the pre-Cambrian age being the oldest rocks here and the source of much of the material constituting the later rocks, the question arises whether they are not also the primary source of the gold of the region. And first it may be stated that it was to this series that Sir W. E. Logan and Dr. T. Sterry Hunt traced the gold of the Eastern Townships when the region was first examined by them.* Gold has been found in a number of places in these since the days of Logan and Hunt, and occurs at Massawippi Lake, also near Capelton and Sherbroke in small quantities associated with copper ores; at Dudswell Mountain where a small quartz vein shows visible gold in small grains, also in a sort of conglomerate enclosing this vein. At Leeds and St. Sylvester it is also found associated with copper, likewise at Handkerchief settlement, etc. In all these places the gold is clearly derived from pre-Cambrian or associated rocks. Not only in the Mountains referred to does gold occur in this series, but rocks of similar age and character along the International boundry in Emberton, Chesham, Woburn, Clinton and eastward seem to have furnished it to the alluviums of that district. The Little Ditton River, along whose valley alluvial gold is found, takes its rise in or near the pre-Cambrian schists of the boundary, quite close to Prospect Hill, an intrusive mass of diorite. Across the boundary in New Hampshire its occurrence in rocks of this series is also recorded

In the pre-Cambrian the gold appears to be associated with quartz and sulphides, chiefly iron and copper pyrites, in veins; but at Dudswell in a sort of conglomerate or arkose consisting chiefly of quartz felspar and talc, carrying sulphides.

### Gold in the Cambrian and Cambro-Silurian Rocks.

Although the view has been generally held that the main sources of the alluvial gold of the Chaudiere valley, Ditton, etc. were in the Cambrian rocks they have not yet yielded gold in the matrix in workable quantities. Traces of gold in quartz veins have been found in these

*Report of Progress, Geol. Survey, Can. 1850–51 p. 6.

‡ Geology of Canada, 1863 pp. 1-4. Ann. Report Geol. Survey, Can. Vol. 2, 1886. pp. 30-32.

*Geology of Canada, 1863, p. 519 and p. 739.

rocks in a considerable number of places, and milling work has been attempted in at least two localities in the Chaudiere district, namely at the Devil's Rapids and at Riviere du Loup, but the results, so far as I could learn, have not been encouraging. At the first mentioned place several veins containing quartz and sulphides occur which have, on assay, yielded gold.* In the Gilbert River valley gold has also been found in quartz veins † but as the are deeply buried beneath surface deposits their exploration was very difficult, and but little development work was attempted. At the falls of the Bras River a quartz vein which showed sulphide minerals gave on assay in the laboratory of the Geological Survey .117 of an ounce of gold to the ton.‡ "White garnetiferous rock near this place is also reported to contain visible grains of gold."** At Liniere, Risborough and Marlow the occurrence of gold in quartz veins has been shown by assays, while a specimen from a vein near Lake Megantic gave traces of gold to Dr. Hoffmann of the Geological Survey. †† In addition to the foregoing a number of instances might be cited, showing that specimens from other parts of the area, assayed by reliable chemists and mineralogists, yielded the precious metal and that it occurs widely distributed in the Cambrian rocks as pointed out by Dr. Selwyn and Dr. Ells in official reports,¶ but as yet found only in very small quantities.

The amount of gold hitherto found in the matrix in these rocks being so insignificant, the view is sometimes expressed that no workable veins occur in the Eastern Townships. As, however, the alluviums have proved rich in some localities where the Cambrian and Cambro-Silurian rocks prevail, as for example in Gilbert River valley, Millstream, the lower part of River du Loup, Ditton, etc., and the source of this alluvial gold is held to be local by every competent mining geologist and miner who has examined the region, it follows that the rocks of the districts mentioned must contain gold in some hitherto undiscovered veins in greater quantities than have yet been met with. To account for its apparent scarcity in these at the present day it has been supposed that the upper and richer portions of the auriferous veins in the districts referred to have been eroded and thus furnished the gold to the alluviums from their destruction, while the lower and deeper parts of these veins, now examined and prospected, were less auriferous. There is no doubt that a great thickness of the strata, probably amounting to several hundred feet, has been denuded and swept away since the land rose above the sea in Silurian or Devonian times; but against this hypothesis is the fact that in the southern or upper part of this same Cambrian belt where it is overlapped by Cambro-Silurian rocks and consequently must have suffered less denudation, the veins carry no more gold, nor indeed as much as below. We are, therefore, forced to the conclusion, from this and other considerations, that the veins, or those portions of them which contain the most gold in the districts mentioned, have hitherto eluded discovery, being probably concealed by the deposits of boulder-clay and other materials which cover large portions of the surface to a great depth,

### Quartz Veins; Their Probable Origin, Etc.

The quartz veins occurring in the Cambrian and Cambro-Silurian rocks, and perhaps those also met with in the older pre-Cambrian schists, exhibit differences and local characteristics which show that they cannot all have been produced under the same conditions, nor at the same geological period. The commonest of these consist mostly of white vitreous quartz, often without sulphides, though sometimes showing a selvage of pyrites These, forming as they do, the hardest rocks, are often seen above the regular surface, and are apparently the prevailing kind in areas which have suffered least disturbance from intrusive diorites, diabases, etc, though also met with where the latter occur. So far as known these veins contain no gold, or if any, it is in very minute quantities. They are probably the oldest quartz veins of the region, though whether all were formed at the same period is problematical They have been extensively prospected on the surface for the obvious reason that they occur everywhere in exposures.

Another set of quartz veins, of a less conspicuous character, found in some parts of the Eastern Townships, are often of a dull whitish or brownish colour from the presence of iron or other minerals with which they are charged in greater or less quantity. These are more limited in their distribution being apparently confined to the areas of metamorphic or intrusive rocks. It is in quartz veins of this kind that gold has been found in small quantities; but they are so seldom seen that our knowledge of their character and distribution is very limited. They seem, however, to be related in origin to the diorites and other intrusive rocks of certain parts of the region and to be of later age than the quartz veins first referred to. But even these may not all be of one age, that is, if dependent upon the intrusion of the igneous rocks; for Ells has shown that rocks of this kind occurring along the boundary line must have been erupted at an earlier date than those in the ranges nearer the St. Lawrence.*

As having some bearing on the origin of such auriferous quartz veins as were met with we may refer to Ells' reports and maps, well as to reports and papers by Dr. Selwyn, showing the distribution of the dioritic, diabasic and serpentine rocks of the Eastern Townships. On the maps Dr. Ellis has depicted an irregular belt of these intrusives traceable "from the Vermont boundary at Lake Memphremagog north eastward for over a hundred miles, crossing the Chaudiere River and extending into the Townships of Cranbourne and Ware. † *This seems to be the great mineral-bearing belt of the Eastern Townships.* Within it are to be found the deposits of copper, of chromic iron, of asbestos, etc. and also the auriferous rocks so far as known, except those met with near the New Hampshire boundary. Now as regards the occurrence of gold in localities where these igneous rocks are found it may be asked is this merely a coincidence, or is it probable that these dioritic diabases, etc. have produced faults and fissures in the rocks into which gold in acid solutions has been brought up from below, as held by many geologists? Dr. Ells regards the auriferous veins there as related to the intrusives, more especially in the Chaudiere valley.‡ In Germany and the United States where investigations in regard to the origin of gold ores are being prosecuted with much zeal and ability similar views seem now to be revived. Von Kraatz in a recent paper on "The Formation of Gold Ore" says "if we look around for eruptive rocks in the famous gold districts we find that the principal fields of California, Australia and South Africa are cut in all directions by dykes of eruptive rocks of the diorite and diabase group. The inference is not far to seek that gold was present in the silicious waters which accompanied the eruption of these as well as other deep seated or surface flows, and that it was precipitated in the adjacent rocks by the agency of sulphides which already existed there or were sublimed by the eruptions." And further, "it is certainly not by chance that rocks of the diorite group occur in close relation with gold districts in regions far removed from each other; and it is on the other hand altogether likely that it is

* The Mineral Resources of Quebec; Annual Report Geol. Survey, Can. Vol. IV. 1888-89 p. 75 K.

† Ibid. pp. 74-75 K.

‡ Ibid. p. 76 K.

†† Ibid. p. 76 K.

¶ Ibid. p. 71 K.

* Report of Progress, Geological Survey, Can. 1870-71. Annual Report Geol. Survey, Can. 1886, p. 51-57 J.

* Annual Report Geol. Survey, Can. Vol. II. 1886, p. 41 J.

† Annual Report Geol. Survey, Can. Vol. II, 1886 p. 39 J.

‡ Canadian Mining Review, January, 1896, p. 15.

this very class of rocks whose presence serves as the invariable associate and *raison d'etre* of gold deposits.*

In the Chaudiere district diorite bosses occur on both sides of the river, especially within the Cambrian area, from Beauce Junction to St. George. They are abundantly developed near St. Francis and the Devil's Rapids, also in the Gilbert River valley, many more occurring there than could be shown on the published Geological map of the scale of 4 miles to one inch. They were also observed in Famine River valley These eruptives seem to have produced marked changes in the physical features of the district and a dislocation in the channel of the Chaudiere River, from which the Devil's Rapids originated. Just what relation the gold ores and the quartz veins bear to the eruptive rocks, or whether they really have any, has not been determined in this locality, as exploration has been limited in this respect, except such as was carried on by Mr. Wm. Lockwood and no pits or shafts were open at the time of my examination. Mr. Lockwood worked out the Geological structure of the Chaudiere Valley at the Devil's Rapids in considerable detail and traced several faults and a number of quartz veins there and to the north west. He also informs me that while carrying on underground work in the alluviums of Gilbert River, he attempted the exploration of at least two of these auriferous quartz veins, following them for some distance, but was unable to continue the work.

The fact of alluvial gold being most abundant where these intrusive diorites are most common here may or may not have the relation referred to by Von Kraatz, we certainly require further evidence on this point. There is a lack of knowledge concerning quartz veins in general, and until the local structure of the gold-bearing districts is worked out in detail and the veins followed for some distance in a horizontal direction, as well as opened in some places vertically, nothing but hypotheses can be offered regarding the mode of occurrence of the gold in them, or any analogy drawn between them and the gold bearing rocks of other countries.

The further investigation and exploration of the quartz veins of the Eastern Townships should, it seems to me, be in the direction of testing those in which traces of gold are actually known to occur, and by this means possibly reaching richer portions of them. There seems little reason to doubt that if careful development work were carried on in this way, especially in the Chaudiere, Dudswell and Ditton areas, gold in paying quantities might be found in them.

### Gold in the Alluviums.

The comparative abundance of gold in the alluviums of several portions of the Eastern Townships, has been unfavourable to explorations in regard to searching for gold in the matrix. For, when a local miner can get a dollar's worth of gold a day more or less, with the chances of picking up a good sized nugget now and then simply by the ordinary processes of digging and washing, and with no further outlay than what it costs to buy a pick, shovel and rocker, he is very likely to be indifferent as to the expensive and uncertain exploration of quartz reefs. In discussions which have taken place regarding the gold mining capabilities of the region, and more especially of the Chaudiere district, it is often remarked that work has been carried on in a haphazard and unskilful manner there, but these statements seem to be only partially correct. When we consider that quite a number of mining geologists, engineers and experts have examined and reported on the alluvial gold mines of the Chaudiere and other parts of the region from time to time since 1850, it becomes evident that they cannot have suffered to any great extent from lack of skilful investigation and study. The capital employed in developing and working these mines has also, in the aggregate, been very large, and all the parties who have invested cannot be charged with a desire simply to squander money. Nevertheless, the successful ones have been few, while the failures foot up a pretty large total. Some of the causes for this condition of things are not far to seek and are apparent to any one who will visit the district, especially the Chaudiere valley, and enquire into gold mining matters for himself; but it would be an invidious task for me to point them out. My object at present is to refer more particularly to the difficulties attending alluvial gold mining in the Eastern Townships, especially in the district last mentioned—difficulties due to the position in which the superficial deposits now lie, to their peculiar character, and to the irregular and sporadic manner in which the gold has been distributed in them.

The general succession of the superficial deposits in the districts in which alluvial gold occurs may be thus succinctly stated in descending order: (1) Surface gravel and sand, often forming a thick, stratified deposit in river valleys, and containing fine gold; (2) boulder-clay, including an interglacial deposit in some places; (3) Stratified clay and sand in alternate beds, the "pipe-clay" of the miners and the "quicksands." These two are not known to contain more than fine colours of gold (4) Stratified gravel which in gold bearing districts is usually auriferous, often rusty or oxidized. (5) Rotten rock in some places (saprolities);* (6) rock surface, often containing gold in the seams and crevices. In the Ditton and Dudswell gold districts the quicksands have not yet been met with in any quantity, but the workings in these places are, so far, only in the shallow beds. In the Chaudiere area, however, they are developed in great bulk and together with the overlying boulder-clays form one of the greatest obstacles to successful and profitable gold mining in the deeper workings.

Into the history of the causes which produced these quicksands and the boulder-clay it is unnecessary to enter. The former belong to the Tertiary or preceding ages, and were deposited in a period of slack drainage brought on either by differential changes of level in the land, or by a damming of the rivers by glacier-ice or both. Succeeding this was the glacial period when ice covered the country and when the heavy beds of boulder-clay were laid down from 75 to 100 feet thick in some places. A shaft sunk on the west side of the Chaudiere, opposite Jersey Mills, is 77½ feet deep, or nearly 60 feet below the present level of the river, and the bottom of the boulder-clay was not reached. This shaft shows that the old river bed in this vicinity is lower than the ledges over which the river now flows at the Devil's Rapids. Another shaft 70 feet deep was sunk by Mr. W. P. Lockwood just above the Devil's Rapids. These shafts show the difficulties to be encountered in deep alluvial mining, at least in the main Chaudiere Valley below the confluence of the Du Loup.

The superficial deposits of the Eastern Township it thus appears are differently constituted from those of other known alluvial gold mining regions except it may be British Columbia. Below the boulder clay and quicksands the beds are practically the same there as in other countries, but these usually mantle and conceal the alluviums and are apparently greater hindrances to mining than even the lava beds of Australia or California. Either in shafting or drifting they constitute the great drawback to the exploitation of deep mines in Beauce County When to this is added the fact that the distribution of the gold in the gravels beneath these is sporadic and that only in certain parts of the district is it likely to occur in sufficient quantities to be profitably worked under the most advantageous condition, the precarious and uncertain nature of alluvial gold mining there becomes apparent.

Gold mining in this region has hitherto consisted largely in the

* American Geologist, August 1896. Translation by H. V. Winchell.

* This a term applied by Dr. G. F. Becker, of the U.S. Geological Survey, to the "rotten rock" in the gold fields of the Southern Appalachians (U.S. Geol. Survey, sixteenth Annual Report, 1894-95, p. 289.

exploitation and washing of the gravels in the shallower beds, and little has been attempted in the deeper portions, or where the auriferous deposits lie below the level of the present rivers, except in the Gilbert River valley in which Mr. Wm. P. Lockwood informs me he mined these deposits at a depth of 70 or 80 feet lower than the present stream bed. The future development of alluvial mining seems, nevertheless, to lie in the direction of working these deep-lying beds, especially in the valley of the Chaudiere and the lower part of the main tributaries. Though great local difficulties present themselves in attempting to exploit these in the particular localities mentioned, yet they would seem to offer an inviting and ample field for the exercise of the genius of the mining engineer or practical miner. While the prevailing opinion in regard to these deposits is that they are rich in gold, it is evident that their auriferous character should be sufficiently tested before development work is attempted. The great thickness of deposits to be penetrated by shafts or tunnels before the auriferous gravels can be reached, has especially to be borne in mind. If these were known to be equally rich, or to have the same value throughout, then openings might be started in the most accessible and favourable locations at the surface; but these auriferous beds do not seem to be all equally rich, and some portions will likely be found not to contain gold in paying quantities. The necessity of exploring and testing them before commencing work is therefore evident. To effect this it would seems that boring machines are absolutely necessary, especially in the Chaudiere and Ditton districts. With appliances of this kind the position of the old river channels in which the alluvial gold is supposed to have been concentrated, could be located at much less expense and in much less time than by shafts or tunnels, the thickness, and probably to some extent, the paying character, of the auriferous beds beneath made known, and the advantages or disadvantages with respect to drainage ascertained before commencing actual mining operations.

Preliminary exploration of this kind would, moreover, seem to be necessary to prove the gold content and show, if possible, whether it will warrant the expenditure required to work the deep-seated auriferous deposits. Some portions of them, it is evident from the great expense attending their exploitation, will require to be very rich in gold in order that they may be profitably mined, while in other places there does not seem, as already stated, to be sufficient gold to prove remunerative under the most favorable conditions for extracting it. A thorough study of the deposits, and of the mode of occurrence of the gold in them, from actual observation, are desirable, and in this investigation the experience of the old miners who have spent a large portion of their lives and in some cases considerable sums of money, might be utilized to good advantage.

Notwithstanding the difficulties and uncertainties of alluvial mining just referred to the writer considers the prospects not at all discouraging, and regards the region on the whole, as offering inducements to miners and capitalists equal, in some respects at least, to other gold mining districts more favorably spoken of. Knowledge and skill are, however, absolutely necessary to success, and these if acquired from a study of the peculiar local phenomena found in the region itself, will, I venture to add, prove to be the most useful.

In this short paper little has been offered beyond a few facts and inferences touching the questions brought forward, and I have, therefore to apologize for its incomplete character. An official report is now in course of preparation in which fuller details will be given.

---

# Gold Quartz Mining in Canada and Victoria, Australia.

By Dr. A. R. Selwyn, C.M.G., Ottawa.

We have latterly heard and read so much about gold in Canada and the marvellous richness of Canadian gold mines, that I have thought a few facts and comparisons respecting gold and gold mining in Canada and Victoria might be welcome, and serve to dispel some illusory ideas on the subject. It is said that "comparisons are odious," but then in these days of universal "booming" truth to many persons who have "axes to grind" or schemes to work, is still more odious and unpopular, but that is no reason for telling that most pernicious and meanest of lies, half the truth.

You are all so familiar with the history of gold discovery and development in Canada that it seems needless to do more than refer to a few dates and documents respecting it. In Quebec its existence was first made known by Lieut. Baddeley, R.E., in 1835—sixty years ago. In chap. XVII, pp 518-20, and in chap. XXI., pp. 739-40 of the Geology of Canada, 1863, all that was known of its distribution and development up to that date is to be found, and on pages 47 to 90 of the Geological Survey Report 1863-66 are to be found the first records of its development. Then as now extravagant figures and estimates were indulged in. About the same time, 1860, auriferous quartz veins were discovered in Nova Scotia, and in 1865 there appear to have been 24,867 oz raised; in 1866, 24,162 oz., in 1867, 27,583 oz., or equal to 76,612 oz in the three years. From 1869 to 1874 the average production in Nova Scotia was 18,987 oz. The deepest mine is now only about seven hundred feet, and it seems to me strange that better results have not been attained.

In 1871 I examined and reported on the Nova Scotia gold mines, and I saw that the geological conditions there were almost precisely like those in Victoria, where the deepest mine is now 3,000 feet, and it strikes me as strange and not very creditable to the mining enterprise of Nova Scotia that even now the average production and the depth to to which the mines have been worked, has made so little progress. In 1858 I stated my opinion as regards the gold mines in Victoria (see correspondence appended) I hold the same opinion with regard to Nova Scotia, and I think work should be undertaken in order to see whether that opinion is correct, and some deep shafts should be sunk to test it. The veins in Nova Scotia are not as abundant as they are in Victoria, but are quite as rich if not richer.

In Victoria the truth of opinion has been proved by shafts two thousand to three thousand feet deep now being worked.

As regards alluvial mines also I think proper investigation should be made. The lakes and lagoons in Nova Scotia represent and,—except the absence of water,—are quite like the auriferous flats and gullys in Victoria from which millions of ounces of gold have been extracted. That no such deposits should exist in the depressions between the hills in Nova Scotia seems incredible.

The first record of the discovery of gold in Ontario is in the Geological Report, 1866-69, pages 165 71. This was the well known Richardson mine, and the first mine worked for gold in Ontario. Nothing was known about gold or its distribution in Western Ontario till about the time of the building of the Dawson road and the endeavors of the Geological Survey to trace out and define the various belts of Huronian strata after having recognized their importance as the mineral bearing series of Canada, and the further recognition that these belts were not Laurentian but Huronian, and the same as the lower copper bearing group of Sir Wm. Logan; consequently that they would probably be found to present the same mineral character.

Of the actual yield of gold from these belts in Ontario to date I have no record, but in the Geological Survey Report, 1872-73, p. 107, the "New Gold Field" of Shebandowan Lake is described. Prior to 1885 I find the names of six gold mines that were then working in the Lake of the Woods and Rainy River district. These were as under Manitoba Consolidated, Pine Portage, Canada Mining Company, Lake of the Woods, Keewatin Mine and Argyle Mine. They were then working, but now I find that not one of them appears in Mr. Bell's admirable Index to Mining Companies in the Mining Manual for 1894, and there is no record of their history other than that above referred to. The result of the work done on them would be interesting, especially if accompanied by a correct debtor and creditor account. All these mines, I may say, were well examined and described in the Geological Survey Report, pages 5 to 20, in 1884.

It seems unlikely that the history of gold mining in Canada will differ from what it has been in other countries, and under corresponding geological conditions.

In British Columbia gold was first discovered in 1858, and as we all know has been more or less profitably worked ever since. The total production from 1858 to 1894 has fluctuated from 70,000 oz. in 1858 up to 3,913,563 ozs. in 1863, and down to 456,066 oz. in 1894, the total of the thirty years being 3,614,989 oz. Thus the report shows in every country a steady, though gradual and fluctuating decline in yield. What the effect of the opening of new ground, better mechanical and chemical methods and appliances may be, we have yet to learn, but it is not likely that in the next thirty years an equal amount of gold produce will ever again be recorded within the same area; though the advent and vigorous prosecution of vein mining in British Columbia will have a potent influence in that direction.

In the last copy of the the MINING REVIEW I see a statement that "It is out of place to attempt a comparison between the gold fields of Ontario and those of any other province or country." Why, does not appear, and I certainly cannot endorse the statement. It is only by knowing and comparing with results elsewhere that we can gain a true and accurate knowledge and appreciation of our own results and possibilities. In any case, comparisons are always educationally useful, if truthfully stated, carefully considered and intelligently applied. All circumstances duly considered, I hold that Australasia is the richest mineral country in the world, and especially so in regard to gold. I find the following record of produce for quinquennial periods from 1851 to 1893:

| | Ounces. |
|---|---|
| Australasia | 92,648,000 |
| United States | 89,353,000 |

This probably includes Canada, but amply proves—area, population and age considered—that Australasia is really the richest gold country in the world, unless developments in Africa place it in the first rank. You will see that Australasia has actually exceeded the whole of America in the quantity of gold produced. The area of Australasia is about the same as Canada; the population is also about the same, about four and a half millions or not quite five millions, and the population of the richest of all the Australian gold fields (Victoria) is only a little over one million—it may be 1,500,000—thus when we consider relative area and population, I do not think that America (with her population of sixty millions) has anything to be proud of, or can claim to be the richest gold field in the known world.

The idea seems prevalent that Canada is an exceptionally rich mining country. This I hold to be a fallacy. Canada's resources in minerals are large, and are capable and worthy of better development. It is, however, in the last degree unlikely that it can ever vie in gold produce with the smallest province of Australasia. Canada is essentially an agricultural and pastoral country, and on the vigorous development of these industries will her future prosperity mainly depend. The produce from these is always an increasing one, while that from gold mining is always diminishing and must eventually terminate. Of the three kingdoms of nature—the mineral, the vegetable and the animal—only one is incapable of reproduction, and therefore mortal. The animal and vegetable kingdoms are always re-producing; and therefore always increasing in quantity and value.

The chief and greatest value of gold and gold mines—especially in a new and unexplored country requiring people to work and develop its re-productive resources,—lies in its power to attract such people rapidly and in such numbers as no other inducement will succeed in accomplishing, and therefore every Canadian must wish the utmost success to the efforts now being made to develop the gold mining industry in the Dominion, but not by the plan of the modern miner who, unlike the ancient miner, begins by opening a broker's office on a leading thoroughfare instead of a tunnel in a mineralized hillside. I quote from the Canadian MINING REVIEW for January (page 4): "It is sound advice that those who cannot afford to lose should leave mining investments severely alone." Canada in eight years has not produced as much gold as Victoria has produced often in a single year. For instance, in 1894, Victoria produced 673,680 ounces, while from 1886 to 1893 Canada only produced 496,896 ounces. As regards the gold produce of Victoria I can give you the figure for the quinquennial periods from 1851 to 1890 to show what I speak of, the diminution of gold production. The figures are as follows:

| | Ounces. |
|---|---|
| 1851 to 1855 | 11,218,772 |
| 1856 to 1860 | 12,712,946 |
| 1861 to 1866 | 8,341,464 |
| 1866 to 1870 | 7,105,820 |
| 1871 to 1875 | 6,130,962 |
| 1876 to 1880 | 4,136,753 |
| 1881 to 1885 | 4,081,269 |
| 1886 to 1890 | 3,111,373 |
| 1887 | 617,751 |
| 1888 | 625,026 |
| 1889 | 614,839 |
| 1890 | 588,561 |
| 1891 | 576,400 |
| 1892 | 654,456 |
| 1893 | 671,126 |

You will see by these figures that there was a gradual decline from eleven million ounces from 1851 to 1855 down to three million ounces during the period of 1886 to 1890.

In 1858, I stated what I considered to be the prospects of gold mining in Victoria. Anyone who takes an interest in the future of quartz veins in Canada can read this correspondence. The important point here now in Canada is the same question. The deepest mines in Nova Scotia, as already stated have not yet exceeded seven hundred feet, and, I believe, not five hundred in Ontario, while I could name you ten mines in Victoria whose depth runs from 2,333 to 3,000 feet. Now in view of the relative depths of quartz mining in Victoria and in Canada, and the recorded yield of the quartz, the quantities crushed and the depths attained are not complimentary to the enterprise and energy of the Canadian miner. As regard Nova Scotia at least, the conditions, as already stated, are precisely like those of Victoria, and there seems no reason why the veins in Nova Scotia should not be worked to depths as great as those of Victoria. To the depths already reached the average richness of the quartz crushed has been greater than that of Victoria, and the returns should certainly be much greater than they have been.

In British Columbia, unlike Nova Scotia, Quebec and Ontario, nature has given you easy access to depths of thousands of feet beneath the surface, and the facilities for mining and mineral development there are far greater than they ever can be in the other provinces.

I do not think I have anything further to add to these remarks. Perhaps some people will consider them very deprecatory of Canada and Canada's resources, but I do not look upon them in that light at all. I simply regard them as a statement of the truth, and I have no wish to encourage people in thinking that all their geese are swans.

## DISCUSSION.

DR. GILPIN.—I fear in this case I will have to endorse Dr. Selwyn; in fact, the advice I have been giving in the last few years has been on his lines as regards alluvial mining in Nova Scotia, but nobody will make any attempt to test it. There is no doubt that there are rich alluvial mines in Nova Scotia, not in large extent of territory but in limited ones which are very rich. I know that in one district a friend of mine makes a very comfortable living out of alluvial mining, but he does it on scientific principles. He takes out the refuse rock and puts it through the mill, but he makes a profit out of it, and I think there are many districts that would pay. As regards the depth of gold mining in Nova Scotia, I can give as an instance a mine which perhaps a great many of the gentlemen here know better than I do, and that is the Wellington mine at Shelburne. That mine was worked down to pretty near six hundred feet, and it proved profitable from the surface down to that depth. I think it was abandoned partly from change of ownership and partly from want of new machinery. It was abandoned I think twelve years ago, but I think it could be worked profitably yet. The past history of mining in Nova Scotia has been confined to high grade veins, and when they worked out it was given up, but the fact remains that it has kept at one stage with slight fluctuation for about thirty years. During the last few years more attention is being paid to the lower grade deposits, and in those deposits the future of gold mining in Nova Scotia is to be found. I think you will have a very interesting and instructive paper before this meeting ("The Treatment of Low Grade Ores") which will bear out a great deal of what I have said. With regard to sinking deep shafts, that has been brought to the attention of the Government at different times, and the Government have, I think, gone so far as to intimate that such shafts could be subsidised, but there is some trouble about getting the proper district, etc.

MR. W. H. MERRITT.—I would ask Dr. Gilpin if he alludes to the free milling conditions or the alteration of the vein at the greater depth.

DR. GILPIN.—There are cases in Nova Scotia where the proportion of free milling gold seems to decrease and the proportion of gold and concentrates seems to increase; in either case it seems to be pretty uniform. There is no approximately fixed depth below which ores can be worked. The water line, or line of oxydation, in Nova Scotia does not appear to be like it is in other countries; that is to say, there are veins on the surface that are unoxydized and there are veins unoxydized to quite a considerable depth.

DR. SELWYN.—You find them continue?

DR. GILPIN.—Yes.

DR. COLEMAN.—Do you find in Nova Scotia that there is any free milling gold below the line of oxydation?

DR. GILPIN.—No.

DR. COLEMAN.—I know that in Ontario we have unoxydized veins that sweep away the surface.

DR. SELWYN.—Of course that sweeping away commenced many years ago and has been continued under favorable conditions ever since. The advantage in Anstralia is that this oxydised surface has not been removed. The sandstones, slates, etc., are changed into pipe-clay, and it can often be mined with pick and shovel. No costly excavating in hard rock is required. Occasionally the quartz vein stands up quite distinctly in the pipe-clay, and miners have sometimes sunk in it in hopes of getting a "second bottom." Of course they were deceived. There has been no glacial action in Australia to remove the decomposed rocks, as there has been in Canada.

MR. MILLER.—I would like to say a word or two concerning Dr. Selwyn's reference to the gold deposits of Hastings county, Ontario. It seems to me that this district has not received very fair treatment so far; in fact it has received very unfair treatment. Some years ago when these deposits were first opened little was known concerning the treatment of arsenical ores. Difficulties were naturally met with and the owners appeared to have lost courage and worked the mines more with the intention of selling them than of trying to make a profit. They cleared up swamps, built brick houses for the manager and officers planted maple trees, etc. As late as last December I visited the Deloro mine, and at a depth of one hundred and eighty feet the vein was found to be still defined. A new plant is being put in for the purpose of treatment by the cyanide process by what appears to be an exceedingly strong company. This company appears to have confidence in the district, as they are taking options on thousands of acres of mineral land. I do not know that they are offering any stock or issuing any prospectus, and you see nothing in the newspapers about it; but they are expending over twelve hundred dollars a week in wages although they are not as yet turning out much ore. This expenditure is more or less in buildings. They are also erecting expensive machinery, and more than that they are getting some of the best qualified men that can be got in the country. It should be remembered that these veins have not been continuously worked; they have only been worked by fits and starts and apparently by weak companies. Last year Mr. Rothwell, who was present here the other evening, had some of this arsenical ore stamped in the Kingston School of Mines. He had some of the pure Mispickel, and he extracted considerably over ninety per cent of the gold contents, treating it in five ton lots, so I think this district should not be condemned off-hand. We know more about treating these refractory ores now than we did years ago. The new process (the Bromo-cyanide) has been tried in London, and there is every hope of its being successful. The Richardson deposit is not a typical one of of the district; all the others are quite different.

THE PRESIDENT.—With regard to the Wellington mine of which Dr. Gilpin spoke, I think I have heard Mr. Hardman say that it averaged twenty dwts. of free gold at the time. Moreover they had a very small area to work, as upon going down a short distance they found that it dipped into the adjoining property. Then there is the distinction that Dr. Selwyn ought to have made when he said that the operations in Nova Scotia were not creditable to the mines. He probably meant the depth, not the miners.

DR. SELWYN.—I was speaking of the depth.

THE PRESIDENT.—You probably meant the operators.

DR. SELWYN.—One great drawback to Nova Scotia is the large number of mills and the small number of stamps in each. The cost of a staff of engineers and miners is quite as large to run a mill of ten stamps as to run one of fifty stamps, or very nearly so.

DR. GOODWIN.—I should like to make that point a little stronger. It is particularly well seen in the Montague district, where you can see two or three properties, each with its little stamp mill and equipment. If these were all combined into one it would certainly greatly tend towards economy.

THE PRESIDENT.—In Australia they do not do as we do here,—that is, start a broker's office first thing. The miner here or anywhere else is no more responsible for the actions of brokers than the farmer is for the speculations, and wild speculations too, in pork and wheat. Because he raises pork and wheat he is not responsible for the wild and exaggerated stories upon the Chicago Exchange, and for the hundreds of thousands of dollars that are dropped here every month on grain and pork.

DR. SELWYN.—My remark was not meant to blame the miner at all.

THE PRESIDENT.—I may say that there are probably a dozen or more mines in operation in Nova Scotia now. I heard it stated in Halifax by a man who ought to know, and I believe it is true, that all those mines are worked to a profit, and some of them make a very handsome profit in a small way. All the speculative ones have been weeded out long ago, and those mines now in operation are being worked by local men and local capital, and all are paying.

DR. SELWYN.—There is one thing that ought to be insisted on, and that is some regular debtor and creditor account, so that the position of the mine may be perfectly plain to every commercial man in the Dominion Insurance companies, banks and others have to publish a statement of their expenses and their profits yearly, and I do not see why mines should not do the same. They do it in the old country and I do not see why they should not do it here, and then the public would be informed whether they were working at a profit.

MR. W. H. MERRITT.—At this juncture we should hear from Dr. Dawson who has given us a foresight of what may be expected in the great West. Now I am not a broker nor a boomster. I am professionally engaged in mining; therefore, I do not want to talk a long time, but I will say that I cannot agree with Dr. Selwyn when he says that the vocation of Canadians should be that of a purely pastoral and agricultural character, that we should look forward to being tillers of the ground.

DR. SELWYN.—I did not say a purely pastoral and agricultural character.

MR. MERRITT.—I am not exaggerating what you stated. Professionally and advisedly I may say that I believe Canada is destined to be one of the great mining countries of the world. Dr. Dawson has given us a foresight of what we may expect in the great North-west. He, of course, must speak as the Director of the Geological Survey, and must naturally speak more conservatively than the ordinary mining engineer would do. I would like also to draw your attention to the fact that the great West in the United States which has developed and produced more than Australia——

DR. SELWYN.—Pardon me, the records do not say so as regards gold of which I was speaking.

MR. MERRITT.—Produced more in silver and copper than Australia. The metalliferous ores to the south of Canada—of which Canada has an equal area—have produced upwards of $150,000,000 of ore, and there is no reason why Canada, at least within measurable time, perhaps most of us cannot see it, should not be producing her $100,000,000 a year from the continuation of those veins in the United States which time and expenditure have proved to be so rich. These are facts and figures, and I think as Canadians we should hope the best for our country. We can confidently expect to reap some of that success which has been so largely developed to the south of the line. With regard to gold mining in Ontario, we are still in a prospecting and developing condition, but so far the results obtained have been most favorable, and, as has been said, we are justified in entertaining very sanguine expectations as to the product of our Huronian belt in the Western if not in the Eastern part of the province, to which Mr. Miller has alluded. In regard to the Lake of the Woods district, I would like to ask what was their capitalization, what amount did they actually spend in developing. The amount was so insignificant that when the slightest difficulty occurred they had to shut down. This gave the whole country a black eye. That was the chief trouble in the Lake of the Woods district. Take the example of Mr. Caldwell in the Sultana mine. He found it very expensive, but as there was so much money involved he had to raise the money, and he is now reaping a brilliant success as the result of his labors. I remember that there was a reference in Mr. Coste's report to the small amount of work done; it was nearly all arsenical, nearly all refractory ore.

DR. SELWYN.—I do not think that is in Mr. Coste's report at all.

MR. MERRITT.—My impression is that arnesical and mainly refractory ores were mentioned, but the fact to-day is that the Sultana mine at two or three hundred feet is free milling; the concentrates are small and only run from thirty to forty dollars a ton. Between eighty and ninety percent is free milling. I did not happen to come across any arsenical ore up there, probably because I have not seen as many specimens, but still I have seen a great many and I have not yet run across any arsenical ores, although I have run across base matter. Perhaps Dr. Dawson in his official capacity and speaking very cautiously as the Director of the Geological Survey might tell us something about it.

DR. SELWYN.—Allow me to say one or two words. While I certainly agree with Mr. Merritt that the mining development of this country requires greater enterprise and energy I certainly think it will develop into a very good mining country. I only made the comparison that it would never compare with other countries. I did not say it was bad; I said on the contrary that we should try to encourage in every way the efforts now being made to develop it. I spoke of it in this sense, that the more you work a mine the poorer it gets, while the more you work the animal and vegetable resources the better they get. These are facts that nobody can deny who states the absolute truth, that as the result of development the animal and vegetable products are always going ahead, while the other within given areas, is always diminishing. Then I gave certain figures of the gold products of the United States as compared with the gold products of Australiasia, showing that Australiasia has actually produced more gold than the United States.

DR. DAWSON.—I did not come prepared to make any statement on the subject on which Mr. Merritt particularly asked me to give an expression of opinion, but I might begin by saying that, with regard to his allusion to Mr. Coste's report, I have a distinct remembrance that he was disappointed in finding so little actual mining in progress at that time. He collected a great many specimens which were assayed, and his report was that there were a number of prospects or incipient mines that would probably pay to work if properly managed. That is about all he could say at that time. As Mr. Merritt knows, even Mr. Caldwell, who is now so successful, had to struggle for a long time with difficulties, and anyone seeing the mine in its initial stages could not have foreseen all that development has since proved. The main point, however, to which Mr. Merritt alludes, that of the general mineral wealth of the Dominion of Canada, cannot be discussed in a few moments. I shall content myself with saying that I have the greatest possible confidence in the mineral wealth of the country as a whole, but at the same time we must draw distinctions, for some parts of the country are very different from others in that respect. For instance take Manitoba and the North-west as a whole; we know very well that we must not expect any very vast mineral wealth there except in coal, petroleum and other coarse minerals and to utilize these we must have an agricultural population not too remote. Turning, however, to British Columbia, where the agricultural land is relatively limited in extent, I have no doubt at all that British Columbia is the greatest hope of the country in regard to mineral wealth. It is precisely analogous to the Southern belt of the country which is producing nine-tenths of all the precious metals of the United States. It is just beginning to be developed now. I have always held that belief and I have had opportunities of traversing and examining the greater part of the province. There is a magnificient mining future before British Columbia. Now about the Lake of the Woods, Rainy Lake and that portion of Ontario generally, we have there a country a good deal different. We have nothing exactly analogous to it anywhere else, and it has got to make its own record. I do not know any country in the world like it. The Huronian formation is more largely developed in Canada than anywhere else, and we have got to ascertain what it contains. So far everything goes to show that it is richly metaliferous, particularly in gold. With regard to the older mining districts of Nova Scotia and the eastern provinces these are already well known. Last year, I think it was, the aggregate products of minerals in the Dominion was over $23,000,000 and it is mounting up every year. In British Columbia it is very likely to double within the next two years. The position of mining in Canada is most hopeful in all respects.

# Notes from the Mines.

(From our own Correspondents.)

## Rossland District.

The past month has been productive of much good to the camp ; both directly and indirectly. Directly, by the number of rich strikes that have been made, and indirectly by the sale of the War Eagle for a large cash figure, which transaction will naturally attract other capitalists to so promising a field. When we say "promising" it recalls to mind that more or less growling has been heard lately from outside stock holders who object that there has been too much promise and too little fulfilment. Now let us be fair ; let us neither be widely enthusiastic nor completely disgusted. It takes a long time to put a property in Tail Creek on a dividend-paying basis, but it will take much less time in the future than it has in the past ; for now we have facilities to assist such operations where but a short time ago we had but obstacles to surmount. It is true that our list of dividend payers is a short one, but reflect how much time they have had to be productive. While the War Eagle and the Le Roi have been exploited for four and five years, most of the other properties under development can boast of but a few months' active life. It will not be many years before the gold output of Trail Creek will be a very large item in Canada's production. We are not yet a Cripple Creek nor a Johannesburg and because we are not, a few disgruntled shareholders are grievously disappointed ; whereas if some of the expectations were realized it would be nothing short of a miracle considering that the camp is as yet an infant.

The new War Eagle management have put on an extra force of men and are rapidly pushing their property. Several miners were laid off lately for a few days in order that the timber-men might catch up with them, but now a double timber gang has been put on and stoping is going on fast. Work was just started on the old shaft, the sinking of which will be continued.

At one end of the War Eagle lies the Iron Mask, which is now shipping considerable The Iron Mask has a fine ore-body now ; in one place it is five feet wide of rich shipping ore. At the present rate the mine will doubtless soon be in very comfortable circumstances.

The O.K. ran into some remarkably rich ore a short time ago in the upraise from level No. 11 to level No. 10. The ore is a beautiful quartz, literally sparkling with yellow gold. It will run several thousand dollars to the ton and is so rich that it is being taken out with gads and sacked. Manager Warner intends running this through a small sampling mill instead of sending it to a smelter as it is too rich to be put under the stamps. The extent of this rich chute has not yet been determined, as upraising with a gad is much slower work than upraising with steel and giant powder, and no drifting has yet been done. The mill is now running well and regularly, crushing something like 25 tons per day. Manager Warner expects to use a slightly larger mesh in the near future so as to increase the capacity of the mill to 30 tons.

This rich ore on the O.K. has commanded more than the usual attention to O.K. mountain on which the but little talked of free milling belt of the camp is located. Scarcely any development work has been done on this mountain except in the O.K. and it may yet prove to be a source of wealth. The character of the veins is different from the usual heavy camp rock carrying sulphides. They are clean quartz lodes carrying free milling gold, and it is not unreasonable to believe that within the next two years the ten stamps of the O.K. will be furnishing less than a third of the rythmical sound of a gold mill, now to be heard in Sheep Creek Gulch.

The IXL and Golden Drip both adjoin the O.K. and on both of them work is being pushed. The Golden Drip has already showed up a body of free milling ore, and the IXL, in running a cross cut to strike a known vein cut through another one which proved to be shipping ore.

The Monte Christo, which has always had a large body of sulphide ore, though of low grade, ran into shipping ore from a cross-cut driven from the lower tunnel. There is a fault in the vein of about one hundred feet to the south. The lower tunnel drifting in to this fault turned and following the fault struck pay ore just under the mouth of the upper tunnel. The vein runs but a short distance here before it faults back to about its normal position, so Superintendent Fred Oliver intends cross-cutting to the main ore instead of following it through the present chute.

The Colonna bids fair to become a shipper in the near future. It has always had had more or less rich ore, but a short time ago ran into about three feet of beautiful copper ore, carrying a fair value in gold. This rich strike sent Colonna stock up several pegs. The property now looks well, and as soon as an air-pipe from the Monte Cristo compressor can be laid, it is intended to turn on two machine drills. This will hasten development work, and as soon as a stope or two can be opened up, the Colonna will join the ranks of the shippers.

The Monita, adjoining the War Eagle on the north-west has but lately started up work and their shaft is in very rich ore. Assay returns of over $100 were got and an average of everything in the shaft showed considerably better than shipping value. This is very encouraging and looks as though the property were a valuable one as this ore is apparently not the continuation of the War Eagle chute which was stoped close to the Monita line, so it appears that besides the present rich ore the property also holds the War Eagle vien.

The Le Roi has not been idle while these new ore bodies were being uncovered but recently showed up a large and rich chute to its owners. Capt. Hall started a drift from the 500 ft. level to find the length of the present large chute and after passing through a few feet of waste, ran into the present rich find. The ore is said to be fine shipping ore and one assay of $400 is reported.

There has been some rumor lately that the Le Roi is to be sold but the owners deny that there is any definite arrangement made, and say that the mine will not be sold for less than $5,000,000. If a sale of that magnitude were made and that coupled to the sale of the War Eagle it would be evidence enough of the character of Trail Creek Mines.

Considerable work is being done by claim owners this winter in the region of Sullivan Creek. This district is about eight or ten miles north of Rossland and towards the head of Sullivan Creek on top of the divide which separates it from Murphy Creek some very good rock has been found. The formation is different from that around Trail Creek being a coarse grained biotite granite cut in all directions by numerous dykes of different eruptive rocks. The veins are well defined ones of quartz carrying phyrrotite and pyrite and but little chalcopyrite ; and are easily traced on the surface. The rock is similar in appearance to the pyrite bearing quartz of the Mother Lode of California. There has been but little investigation into this region and consequently but few claims bonded. The only company whose ground is located there is the Heather Bell and this corporation has been working its claim for the past two months and now has a shaft some 50 ft. deep and a tunnel in about 40 ft. Assays as high as $50 in gold have been reported from this property which if true is very promising as the surface showing is exceptionally strong. When the snow goes off and the results of the winter's work have been made known it is highly probable that the Sullivan Creek region will show some good prospects.

In one or two places here in the camp there are pieces of ground which, apparently, could, with comparatively little work, join the shipping list. Take the West Le Roi and Josie Campany for instance. This company owns the Annie and the Rockingham Fraction. This ground is in the best of neighborhoods lying close to the War Eagle, Le Roi and Josie. and moreover can show some very rich ore. Yet in spite of all this, there is no work going on, or at best in only a desultory way. Not less than two months ago forty cents a share were refused for the controlling stock or a valuation of the property of $200,000. Yet the inability of the owners to agree on any definite course of action, or some unknown reason, is grievously retarding development work on a property which is a very promising one.

The Nickel Plate is a mine of which the public hears but little, yet some of the richest ore in the camp has been taken out of it. It is owned principally by Scott McDonald and A. W. McCune of Salt Lake City. The owners are rich enough to exploit their property without outside assistance consequently not the slightest attempt has been made to give it notoriety. There are several hundred feet of development work done on the property and a pile of rich ore on the dump but it is evidently the intention of the owners to keep on with their development and open up several stopes before making regular shipments.

Spokane now boasts a stock exchange, but it has met with anything but a favorable reception in Rossland. Mine owners complain that the quotations are lower than market prices, and orders for stock at Exchange quotations are not filled. Now Spokane offers difficulties to the inception of an enterprise like this, because Spokane has but few buyers and many sellers. Of course once the Exchange can get on its feet and stand firmly then the buyers will come, but as it is now, small blocks of stock are knocked down at low figures, the quotation stands at these figures and the brokers are unable to fill orders for large blocks at the same price. This has been the cause of considerable opposition to the Exchange which has been made to feel both ridicule and scorn. However, it is a step in the right direction, and handled by the right men it should come out on top to the advantage of both public and mine owners.

The ore shipments are keeping up well. During January there were shipped somewhere in the neighborhood of 5,000 tons of which more than half went over the Red Mt. R.R. The Le Roi has lately been shipping a train load of eight cars a day, and when its new hoisting plant is installed these shipments will be increased. The War Eagle and Josie are making steady shipments as are the Columbia and Kootenay, Red Mountain, Cliff and Iron Mask.

If the Northport smelter be built, and it is expected that ground will be broken by the first of March, these shipments will easily be more than doubled within the next six months. Nor will it depend entirely on the Northport smelter to increase the output of the camp, for several properties will soon become regular shippers in spite of high rates ; and the Centre Star alone could prodnce 500 tons a day as soon as a low freight and treatment is secured.

The Le Roi declared another dividend the last week in January of $25,000, making $50,000 paid during that month.

The Red Mountain has closed down for the present, but a diamond drill is at work prospecting the ground.

GODWIN ORDWAY.

Rossland, 15 February, 1897.

## Boundary Creek.

There has been greater activity in mining matters in camp during these winter months than was anticipated by even the most sanguine. A considerable number of properties have been bonded at good figures, and a fair amount of development work is being carried on.

On the Mother Lode the tunnel is in about 180 feet, supposed to be crosscutting the vein. Nearly all this is in an ore carrying considerable copper pyrites and a few dollars in gold, but for the last about 30 feet, a chute has been cut that is learned on good authority, can be shipped at a profit directly a railroad comes in. It is quite probable that this tunnel is cutting the vein obliquely to both it dips and strike, and that when the vein is truly defined it will be found to have considerably less width than it shows in the tunnel. The width showing at present is, however, well able to stand a very substantial lessening without ill effects.

Work is progressing rapidly on the Jewel. The shaft is down over 50 feet, and the values in gold and silver are remarkably high. It is understood that a hoist has been ordered from the Jenckes Machine Co., Sherbrooke.

The Monarch, Tamarack and some lesser adjoining claims in Greenwood camp have been bonded by a Mr. Young, persumably for an English company. The

amount of the Monarch bond was $15,000. The Monarch is a veritable "mine" to its owners as it has already earned two 10% payments on bonds that have been taken and allowed to lapse.

The Boundary Creek M. & M. Co. are at present working twelve men. The shaft on the G.A.R. is now down 45 feet, and a tunnel is being driven to strike the D.A. mine at a depth. The tunnel to tap the Big Ledge vein is in 50 feet.

A prospectus is shortly to be issued for the Golden Crown Mining Co. The promoters have two promising properties in Wellington Camp—the Calumet and Golden Crown. The former is held on a bond of $18,000, while on the latter some arrangement was made for a cash payment, the owner retaining an interest in the stock of the company.

Very good bituminous coal is being taken from the mine at Rock Creek, where work has been carried on since November. The clean coal has only about 6 per cent. ash and makes a hard metallic coke.

At Camp McKinney the tunnel driven to tap the vein on the Victoria has, it is reported, cut through 14 feet of quartz heavily mineralized.

A number of claims in Camp McKinney around the Cariboo have been bought and it is rumoured that the London and B.C. Gold Fields Company are buying these and negotiating for the Cariboo and Amelia. Up to Date, the Cariboo M. M. & S. Co. has paid $112,000 in dividends, with a 10-stamp mill. Their property was under bond in the summer of '95 to the old Butte & Boston Co. for $185,000. Nothing definite can be learned at this writing regarding the present supposed deal.

Fairview is just at present the liveliest camp west of Rossland, and there is no doubt active development will be carried on through the coming summer. Stock companies are being formed to work properties, good, bad and indifferent—the two latter kinds being fairly well represented. It will be well, nevertheless, for the eastern investor to watch the developments closely as there are many good properties there, the camp being probably the best free milling camp in the Province.

H. G.

Greenwood, Feb. 14, '97.

## Slocan District.

With the many influences which are now bringing the Slocan to the front and before the public, which will tend to largely increase our population before many months, people altogether unfit for mining camps will come in. Some looking for "snaps" in mining investment, and many more looking for mines or work in mines. The mining fraternity is somewhat exclusive and there is also some skill required in the make-up of a miner. So that it is rather hard to get such work without serving a long apprenticeship knocking round amongst the people to get acquainted, and ultimately under the favor of such acquaintance, get a start in the mines. The man who is "willing to do anything" can't do anything to speak of until he gets acclimatized to the social atmosphere of this place, and meanwhile living is expensive. The best plan is to build a shack at once on coming into a district, and then form all the connections possible with the people. Concerning the people who are looking for snaps, it is only necessary to remark that there are very many men well qualified to appreciate such things already in the field. Where money is now, it has usually been ventured. Americans are eminently capable in this line of business. Prospectors are rarely pessimistic about their claims. They rate them high and enjoy the contemplation of themselves as prospective millionaires.

Just at present the middle-man is somewhat in evidence in the Slocan. It furnishes a beautiful field for the sauve promoter. The mode of proceedings of such is usually to persuade the owners into a depreciation of their claims, to carry the option or agreement of transfer to some centre, and then spread enough pleasant information concerning the property to make the vendor sad and sorry that the bonanza has left his control. But more often the practice is to pay the vendor enough cash to supply his pressing needs, and to make him take stock for the rest of his price. Say the claims are stocked for $1,000,000. The vendors get a third of the shares, a third goes into treasury stock to pay all expenses, besides development work, and usually even the cash payment made at time of transfer. For their trouble and their aid in bringing their stock to market, the promoters get the other third, some of which often has to go in order to subsidize a big fish for the little fish to follow. The public does not ask for much more information, but buys its cheap stock and loves the element of chance. Amongst other things which will throw a favorable light upon this camp is the recent Bulletin of the Provincial Mineralogist. The array of facts drawn up in this report and the natural inferences, should lead towards a more popular appreciation of silver mines.

In order to make the position of this camp more definitely understood it may be said, that so far there are no silver or gold mines in the mountains immediately west of Slocan Lake and Slocan River. The well mineralized area as so far prospected is bounded on the north by Wilson Creek and the several drainage basins of Carpenter and Kaslo Creeks. To the west, as before said, there is nothing, to the east, Kootenay Lake practically ends the productive area, and to the south nothing below. The south fork of Lemon Creek and main Lemon Creek amounts to much so far, though this is new ground and may yet be gold-producing, as the granites immediately north of it are found to be so.

There appears to be a good deal of discontent in this district over the questions of Government aid, taxation, and allowing of freedom of the country to Americans. This may be the natural result of populating a district with men from parts of the Dominion and States who have little knowledge of the Province, and who fail to see that the whole paraphernalia of a Provincial Government cannot be re-arranged to meet a question which has but lately come to the front. Probably the local Government is doing the best it can, placed as it is with a sparse population and a great field for development. It may be like many a prospector prospectively rich in resources, but financially low at the time.

Concerning the matter of aliens, the local press takes up the matter to some extent, yet is inclined to show mercy to the men who first came in to develop the country (for the good of the country, of course), but is nevertheless somewhat inclined to retaliate the stringency of the United States with regard to Canadian labor. In the Slocan the Canadian element is probably now in the ascendent, or at least there is little objection upon the part of our neighbors to our laws and institutions, which are so favorable to them.

A miners' union has been formed at Silverton, on Slocan Lake. This is something new in Slocan camps. Silverton is but a new, and not very busy centre as yet. It is near here that the much criticised Galena Mines are situated. A miners' association to look after the mining interests of Kootenay is also being agitated.

The Noble Mine got to work with its concentrator and tramway in January without any trouble of any kind in the running. The whole concern was built since the fall. The Aerial tramway, a mile long, is being put up amid the heavy snows of Kootenay winter.

Though the prospect of 10 or 12 feet of snow in the mountains appears a formidable obstacle to development it is not so great as to stop any enterprise, such as opening up a mine under land. The snow packs into a hard trail over which horses can be taken, and a few tons of supplies will last out a lot of preliminary work. The Slocan Star not being able to secure enough water for its concentrator by the flume from Cody Creek, built an additional 1000 feet to tap the upper waters of Carpenter Creek. This work was successfully put through in January under the engineering of H. W. Mussen a late graduate of McGill.

The "Two Friends" one of the richest galena mines in the Slocan, is now running in a long cross cut to tap the vein at the third level. Not much ore is being taken out at present. The trail being somewhat hard to keep open at this time of year favors the carrying on of development work.

At the Skylark and Ranger on Lemon Creek, things are just ready for extensive prospecting of the Ledge. Many places being selected upon which to sink shafts, as such shaft sinking is the usual mode of preliminary development in the dry ore belt where the veins dip at less angles. All the equipping of these prospects for development has been carried out since the snow became deep.

The Bank of Montreal is now establishing a branch of its bank in New Denver. This is the first to be placed at a Slocan Lake point, and it is also the only branch of this bank in the Slocan. The Banks of B. N. A. and of B. C. are in the field at Kalso and Sandon.

The Slocan Star compressor is at work in the driving of the 5th level tunnel which is already in some 800 feet and has to go several hundred feet further yet. This tunnel was begun in 1895.

Interest is running along the North Fork of Carpenter Creek, more especially at present in connection with the "Cordelia," a dry ore property recently stocked as the Dry Belt Mining Co. This stock is selling well on the local market.

At the Wellington, development work is being pushed along on a good scale and some rich ore is taken out and shipped. This is one of the very few mines in the Slocan which has a resident engineer and assayer, W. R. Ashwith of Ottawa. However it is probable that the complicated workings of many of the mines will soon need some straightening out when the easy method of "gophering for ore fail to pay."

Amongst the transient mining men who have lately paid the Slocan a visit one may mention the name of D, W. Brunton the eminent mining engineer of Colorado camps.

A traveller getting a back view of Sandon on his arrival by the C.P.R. remarked sotto voice "Beats Rossland eh?" The view was not impressive, Sandon does not subsist on scenery.

The Kootenay Ore Company operating the Sampler at Kaslo is buying a good deal of Slocan ore direct. Payments for ore are thus made much more readily than by awaiting the smelter returns. These works were established last summer, no ore going out by the C. P. Ry. has this facility.

The Payne mine is showing up exceedingly well in its shipments, sending out more ore even than the Slocan Star of late, per week. It belongs to a close corporation of three persons.

The total output for West Kootenay during January very nearly reached $800,000. This from the Trail and Hall mine's smelters and some score of Slocan Kaslo mines.

A bill has been drafted by the Committee of Ways and Means of the Republican party, increasing the present ¾ cent per lb. duty on silver lead ores to 1 cent where the silver value is greatest and to 2 cents where the lead value is greatest.

The Le Roi and the Slocan Star are now equals in dividends each having paid $300,000 in just about the same length of time.

J. C. G.

Sandon, 12th Feb., 1897.

(From our New Denver Correspondent.)

That the rigorous northern winter which is generally supposed to prevail here, does not in any way interfere with the prosecution of mining operations, outside of mere prospecting, is made abundantly evident by the enormous amount of development work now in progress, and the keen interest taken in this section by representatives of outside capital. Actual results are singularly striking, for while in previous years it was the exception for a mining deal of any magnitude to be consummated while the snow was yet on the ground, this year it is conspicuously the rule, and almost every day witnesses some such occurrence.

The whole of the Idaho & Alamo Company's effects, including the mines, tramway and concentrator are reported to have been acquired by the British Columbia

Exploration Syndicate for half a million. It has been known for some time that a deal was pending, but no particulars beyond the bare statement of fact have been so far obtainable. If the report is substantiated, the largest transfer of mining property ever made in the Slocan will have to be recorded.

The California too, the nearest mine of any consequence to New Denver, has been bonded recently for something over $60,000.

Another big sale is that of the remaining third interest in the Ruth mine to George Alexander of Nelson; the other two-thirds having been disposed of a short time since to W. Foster, M.P., of London, Eng., for $166,000. The price paid by Mr. Alexander for the interest which he now holds has not been made public, but it was no doubt a large sum, as the owners previously refused an offer of $83,000.

Investors are displaying great anxiety to acquire mining properties here before spring opens and the rush comes, their extreme desire to obtain claims leading them to completely ignore in many instances precautions which they would otherwise take. The general opinion prevails here among those interested in the mines that next summer will witness a boom in the Slocan which will place entirely in the shade any demonstration of attention and activity on the part of investers such as Rossland has been able to boast of during the last two years. The anticipation is, in the words of the prospector, that anything will go next summer, and preparations are being made accordingly to accommodate those having the temerity to investigate claims for themselves independently of advice from a properly qualified engineer.

By the way, the subject of what constitutes a mining engineer is receiving due recognition from many of the leading provincial papers. Some even going so far as to advocate Government interference in order to rid the mining districts of bogus adventurers travelling under the titular misnomer of experts. It is becoming increasingly apparent that something must be done to check this evil, as the whole profession is gradually falling into disrepute, among those who should be the first to appreciate the benefits to be derived from a thorough scientific and technical education, allied of course with practical experience. In reality the remedy is wonderfully simple if people could only be taught to apply it, and lies entirely with those who suffer most from the eccentricities of these individuals, viz: to employ only those whom they know are thoroughly competent to safeguard their interests.

The output of ore from the mines for the month of January has been something enormous. The Payne which promises to rank next to the Star as the greatest mine in the Slocan, has fully maintained its lead in the matter of production; the shipments for December are stated to have netted in the neighborhood of $100,000, and the mine is now shipping at the rate of 1,500 tons a month. The results of development under the present management have been remarkably satisfactory to all concerned, the clean ore having widened out permanently to over two feet.

The Noble Five has signalized the advent of the new year by commencing to operate their new tramway and concentrator. This, of course, will largely augment the present output of the mine and make the possession of shares in the company doubly desirable. Many old innovations have been departed from in the construction and working of the system introduced to which unfortunately space will not permit of a more extended reference; but so successful has been its general operation that the Reco company announce their intention to erect an almost exact counterpart early in the spring to treat their own low grade ores.

An event of more than passing importance which is likely to open the eyes of the world still wider to the tremendous possibilities of the Slocan as a field for judicious investment in the $100,000 dividend recently declared by the board of management of the Reco. The accompanying confident assurance by the directors that another of like amount would be declared in the near future must have been extremely gratifying from the shareholders' point of view.

When the Le Roi and Slocan Star are declaring twenty-five and fifty thousand dollar dividends, it comes rather as a surprise that the Reco is capable of paying single dividends exceeding these amounts which easily eclipse all previous efforts in Kootenay in that direction.

The old primitive methods of mining and development seem to be rapidly passing away in the Slocan and are being superseded by more modern methods and processes. The fact that much of the ore is sufficiently rich to stand all kinds of errors and mismanagement in the mine, is no excuse for limiting the profits and retarding the development of the industry; and it is significant of the progress of the times, that the old antediluvian methods are now happily being dispensed with, and an era of active and economic development begun by the introduction of modern scientific and technical improvements in the methods of winning and treating the ore.

The absence of local sampling works has long been keenly felt by all mine owners in the district; hitherto no reliable check on the smelter returns from their ore shipments has been obtainable; but now, thanks to the enterprise of the Kootenay Ore Company, works of the most complete description have been established at Kaslo, and for the moderate consideration of $1.25 per ton, shipments may be carefully sampled and assayed before they reach the smelter at all. The success of the undertaking is assured, the ready co-operation of so many mine owners enabling the works to sample on an average six car-loads of ore a day.

Another direction in which the mining industry has profited, is in the introduction of gasoline engines for hoisting purposes; these are found both useful and economical, and a considerable saving is effected in the long run by their adoption. Three are now operating successfully in the Slocan, the latest addition being in the case of the Payne, where further improvements in this direction are also in contemplation.

Several mines, too, are to be congratulated upon a further advance in the direction of working economy, by being enabled to ship ore in bulk, instead of going to the trouble and expense of sacking all the ore before it leaves the mine. This, of course, effects also an appreciable saving on the freight charges, as the weight of a large number of ore sacks is considerable.

The mine owners of the Slocan have long seen the necessity of combined action in resisting so-called Government reforms, which their increased knowledge of the ubject told them could only in the end prove detrimental to the best interests of the district, and it is pleasing to record that this sentiment has at last assumed tangible shape in the formation at Kaslo of what is known as the Mine Owners' Protective Association. The personnel of the present Legislative Assembly are not by any means noted for their individual display of brilliancy or even sound common sense in things appertaining to the government of the country, and such an organization was badly needed to voice the feelings of those dependent upon mining operations for a living. We are of the decided opinion and sincerely trust that they may be relied upon to act judiciously in all cases of emergency. It is clear that in the past the Government has not acted towards Kootenay and its only industry with that spirit of fairness and impartiality which ought to characterize all its efforts for the public good. With a revenue exceeding $20,000 from the New Denver office alone last year, the people of Slocan cry in vain for a readjustment of their grievances and some kind of recognition from the Government treasury-box. Less than five per cent of the amount received has been expended in the district, and as a natural consequence discontent is uppermost, when so many pressing requirements are continually to hand. Several of the towns are seriously considering incorporation as a means of partial redress, but it is very evident that more drastic measures will have to be resorted to, before we receive the consideration and attention that our importance warrants. The division of West Kootenay into four parts and more adequate representation in the Provincial Legislature is being warmly advocated in certain Government circles, but whether it will mature or not remains to be seen.

With the advent of the McKinley administration, a great stimulus should be given to home smelting. Unconsciously the Americans are paving the way for the building up of large smelting centres on the Canadian side of the line. Mine owners here have stood uncomplainingly the three-quarters of a cent tax on lead in the past, but that is not to say that their patience can never be exhausted, and the increase in the duty has been ill-timed, just when we are preparing to take advantage of our own natural position and resources and smelt the ores as near the mines as possible. It is safe to predict that before very long some of the American smelters which have been run almost exclusively on British Columbia ores will have to close down on account of a scarcity of raw material to operate on, in fact some optimists freely assert that the States will be sending more ore over here to be smelted than ever before left the Kootenay for foreign treatment.

The part which Americans and American methods play in the development of mining camps here is well known and is exemplified once again by the formation of a Miners' Union at Silverton composed at present entirely of men from the Black Hills and Cœur D'Alene. Despite the untimely death of a kindred organization at Rossland and the abortive efforts to obtain recognition at the hands of employers, these pioneers who wish to introduce the so-called civilized methods of adjusting labor difficulties, express themselves cheerfully on the subject of eventually governing the country and making all mine owners conform to their standard. They state without the slightest reserve and rather as a matter for congratulation, that they expect a well known Leadville agitator to direct the affairs of the Union when he has paid the penalty of his last indiscretion and is released from jail in Colorado. Their first effort in the direction of reform in giving a well known mining manager here six hours to leave the country, communicated by letter anonymously when he was a day's walk from the nearest town, will hardly come under the category of unqualified successes, because the person in question treated it with the silent contempt which it merited, by entirely ignoring its contents. When we require instruction on the subject of how to avoid labor difficulties, which have fortunately so far not arisen, and which we all hope are yet a long way in the distance, we shall hardly go to the States for it, and for the present it might be as well for all to remember that they are governed by British institutions and must abide by British law. Intimidation is the last thing to have the desired effect, and the sooner the Silverton Miners' Union is made aware of this fact the better it will be for themselves.

An important event in mining circles has been the issuance of the Provincial Mineralogist's Report on the Nelson, Ainsworth and Slocan districts. While giving due prominence to our many producing mines and undeveloped resources, Mr. Carlyle abstains from those booming tendencies which do so much harm, and takes a sufficiently conservative view of matters to be of immense benefit in advertising the mineral wealth of the country. The statistics which are included in the report speak eloquently for themselves, and coming from a high government source ought to carry conviction to the mind of the most sceptical.

The avidity which has been displayed by the various banking institutions to get a share of Kootenay trade is a study in nature to the uninitiated. Three months ago Nelson and Rossland were the only banking centres in the district; to-day there are two branch offices at Kaslo, and two at Sandon. The Bank of Montreal have also announced their intention of opening at once in New Denver, and the Imperial Bank will follow suit at Revelstoke. Truly the results of example or competition are encouraging to those holding interests in the country.

It is very amusing and sometimes even ludicrous to observe the reasons advanced by rival towns through the medium of their respective local papers, why smelters or reduction plants should be erected immediately at those particular spots. Places where it would be utterly impossible to obtain fuel at any price and others again where an adequate ore supply could not be reasonably expected for many years to come, to say nothing of economic conditions which must prevail before a profitable industry could be established, are all proposed in good faith by these mistaken enthusiasts. In one instance, the owners of a mine situated some ten miles from through communication and connected by a steep waggon road, gravely announced that they intended to put in a concentrator at an early date to treat their ore preliminary to shipment. Upon my pointing out to them that the character of the ore would hardly permit of its profitable concentration, they capped the climax by causing it to be publicly stated that a smelter would probably be erected at the mines as soon as spring opened. With a daily output of less than a ton of ore, and this by no means assured for any length of time, it presents the most patent absurdity to practical men that can well be imagined, and yet this sort of trash is widely propagated through the country and eagerly devoured by stock owners in the company.

So conspicuous are the numberless press errors becoming that too much support cannot be given to those papers which make a point of employing only strictly reliable correspondents. Claims having no connection with the Slocan at all appear to be freely advertised in Toronto and other places as being within its limits, and thus the reputation of this great mining camp is held out as a tempting bait by unscrupulous promoters before the eyes of ignorant would-be investors. It is useless to keep repeating the same old warnings to those investing their small savings in

stock companies, because with the glamour and excitement attending the few who are fortunate, no heed is taken of the hundreds and even thousands who lose their all, and the giving of sound common sense advice is, in the majority of cases, so many words wasted.

Worthless companies are still being floated by the dozen; the prospectuses being usually unaccompanied by any reliable report as to the value of the property, the statements made regarding the width and richness of the vein are vastly exaggerated almost without exception. Six inches of quartz found somewhere on the property from which one small piece of rock containing a fragment of grey copper or other argentiferous mineral is found to assay 200 ozs. in silver does not justify the statement in the prospectus that the company has six inches of clear ore which assays 200 ozs. to the ton; yet such misstatements are deliberately made with a view to deceive the public and promote the sale of shares. It is high time for investors to use a little discretion and judgment of their own in these matters, because in the event of them losing their money the responsibility no longer rests with the people of this province, who have done all in their power to prevent wild-cat schemes being floated on the market; but with themselves for their pig-headedness in not following sound advice from those better informed.

Reverting for a moment to the subject of newspaper blunders, I observed in a recent issue of a certain Spokane paper which claims to give specially reliable mining items, that five out of seven statements made by "our own correspondent" were the grossest exaggerations; but I think the funniest of all to mining men was where it was stated that the shaft of the Currie was down 50 feet and all in solid ore, which must have been galena, as that is the ore they are looking for. As the dimensions of the shaft in question are 7 by 14 feet and they are sinking vertically to cut the vein and not on it at all, it is indeed a wonderful showing and must have greatly astonished the management of that property. And yet people here wonder at the country getting into bad repute among investors.

It is pleasing to record that the newer sections of the Slocan are all progressing satisfactorily. On Four-mile we find that during the past month the Thompson Group has shipped two carloads of ore; the Fisher Maiden, which exhibits a quartzose gangue impregnated with proustite or light ruby silver, one carload; with the Wakefield and others showing immediate prospects on following so good an example. On Ten-mile the Enterprise is now working forty men and taking out ore continuously, while the Bondholder looks more promising than ever. The Two Friends on Springer Creek continues to ship, the last two carloads giving returns of the value of $5,400 which immensely pleased the directors of the company. Many claims in this neighbourhood which are now in the incipient stage of development, will be actively producing mines before the year closes.

HOWARD WEST.

New Denver, 15th Feb., 1897.

---

(From our Nelson Correspondent.)

Not very much can be said about mining in the middle of a West Kootenay winter. Snow is still sufficiently plentiful to render any attempt at prospecting useless and such work as can be done is confined to developing the incipient mine by tunnels started before snow fell. Many claims, however, are changing hands as the weekly records sufficiently testify, and it is to be hoped that in most cases the change of ownership may have a highly advantageous result; the original owners being, in the vast majority of cases, financially unable to work their claims themselves, and therefore wisely disposing of them to others who are in less straightened circumstances.

Still, notwithstanding all the drawbacks of the winter weather, new locations are being made, notably on the North Fork of the Salmon river and on Wild Horse, Hall and Boulder Creeks, all of which can be reached by the Nelson and Fort Sheppard Ry. to the South and West of the city, and from reports brought in and assay returns shewn, there should be a very favourable prospect for claim holders in that district. As far as can be gathered, not less than 100 men are actively engaged now, and have been all the winter, in working various claims in that neighbourhood, and as soon as snow goes away, no doubt that number will be three or even five times augumented, this alone speaks very well for this hitherto scarcely known ground.

It is also very satisfactory to record that the older camp of Ainsworth on the Kootenay Lake, not far from Nelson, is now coming forward, evidently with the intention of occupytng its legitimate position as one of the oldest and best camps in West Kootenay, but which chiefly on account of the fall in value of silver has been very quiet, if not neglected, during the last few years.

We may mention in particular that the Dellie, the Kras, and the I.X.L are all looking remarkably well, while work has been started by its new owners on the Little Donald and Black Diamond. Other mines are shipping ore, which at present goes to American smelters; the head smelting works at Pilot Bay having up to the present not recommenced operations. There is a strong rumour, however, that they very shortly will do so, and under good management, undoubtedly these works ought to be able to make a very large profit, especially if the new tariff duty on lead and lead ores exported to the U.S. become law, as it probably will.

On Toad Mountain—the home of the Silver King—but little has been done recently, (except by the Silver King); still some little tunnelling and other development work is being done on the Athabasca group, which carries some free milling gold, and claims to have some five ledges on the property.

The Exchequer is another group, about which, so far, little is known. Two claims, the "Golden" and "Alaska," have recently been sold, at least so it is stated, and the Deadwood, an adjoining claim, is also reported to have been bonded for some $30,000. These are all practically on Toad Mountain and are said to carry free gold. Development on these claims will be commenced as soon as the snow has sufficiently gone off the ground, and all interested as well as outsiders are anxious to see these claims "pan out" as well as the assays made seem to indicate.

Speaking of Toad Mountain and the Silver King, it is satisfactory to note that the Hall Mine's smelter has been running steadily since about January 9th, and is daily putting through the furnace 120 to 140 tons of ore. As far as can now be foreseen this very good work will be continuous, and as the new machinery at the mine gets more into its regular working groove, the output can be largely increased so as easily to supply the new blast furnace, at present in course of erection.

When the long-talked-of Crow's Nest Pass Railway is built, it will be of enormous advantage to Nelson and the district adjoining, as cheaper and possibly better fuel will make other smelters to start up and make a profit where now that is impossible.

The new tariff on ores and their products (above referred to), will greatly assist in keeping Canadian produce in Canada, and so increase the general prosperity of the country, although this may not at first be so apparent, as some few mines will be unable, with the increased duty to ship their ore to the U. S. But what follows? We must smelt them here, and the sooner that this country is dotted over with smelters, the better it will be for us all.

Possibly, in conclusion a few words about Nelson itself will not be out of place. During the year just past, more than $138,000 have been spent in building, and this year it is probable that only the scarcity of supplies of lumber will prevent as much more being so spent What used to be a barren looking hillside is now covered with handsome houses, than which there is no surer sign of prosperity of a town. It is confidently expected that an iron foundary will be shortly established here, and that of itself speaks well for the opinion the promoters have of the future of the place. It is now practically settled that Nelson will be incorporated in a very few months, and then there should be less criticism as to the Government support which hitherto the town has, or in the opinion of many, has not received. The principal mine owners and managers in the vicinity have decided to form a Mine Owners' Association, with the most laudable object of securing equitable legislation on mining matters; and most undoubtedly there is great need of such an association, for there are many points that should now be reconsidered as time and circumstances have so changed the conditions existing at the time those special laws were framed. Just to mention one point; all men employed in or about a mine are compelled to pay $5 annually for a miner's license; but this does not apply to coal miners. At least the Mongolians employed at certain of the Vancouver Islands collieries do not have to pay any license, and one can only wonder if there was what has been called "wheels within wheels" when that exception was made in the favour of those particular mines. There are other matters besides the above, and it is to be hoped that the new Mining Association will be successful in attaining the reforms it wishes to get. As an instance of the prosperity of the district, the Customs Officer here reports for 1896: Value of exports from Nelson, $2,762,822; value of imports, from Nelson, $1,146,873. With such a showing as that, who can doubt the prosperous future in store for not only Nelson, but the whole of West Kootenay.

A. H.

Nelson, 15th Feb., 1897.

---

**Resignation of a Popular Mine Official.**—Mr. Wm. Blakemore, who has, for a number of years, been prominently identified with the operations of the Dominion Coal Company as its resident mining engineer in Cape Breton, is, we understand, about to sever his connection with that company. During his residence in Canada Mr. Blakemore has gained much popularity among his confreres in his profession and has assisted materially in the work of the Mining Society of Nova Scotia, of which he is a vice-president.

**Nickel Steel.**—Although it is not more than ten years since we heard of nickel steel, it is interesting to know that the alloy was known about a hundred years ago. It was only, however. in the early part of the present century that it was made in any quantity by Wolf. Mr. H. K. Landis says in the *Scientific American* of January 9th, that an attempt was made in the United States to make nickel iron alloys directly in the blast furnace; this, however. was not a commercial success, and was abandoned. It is only in recent years that tests made in Europe and in America demonstrated the toughening effect of nickel upon steel. It now stands first among all high spicification steeis. Iron has a strong affinity for nickel, and combines with it in all proportions very readily. Commercial nickel steel contains from 2 to 5 per cent. of nickel, and in this proportion it is used for heavy armour plates. While it offers remarkable resistence to stress, it is almost as easily worked as soft steel, is not brittle while hot or cold, is not much affected by tempering or annealing, and is remarkably homogeneous. One of its principal peculiarities is its diminished liability to corrosion. This has been proved by tests with propellers and metal sheathing of ship's bottoms. Opinions differ, however, as to the applicability of the alloy to the construction of steam boilers. Some authorities state that it corrodes rapidly in pure water, and in the presence of various boiler compounds. Low percentages of nickel do not interfere in the least with the process of Harveyising, tempering, or forging, and give to the plates all the qualities of high carbon steel without its brittleness. We may look forward to the extended use of this alloy in a great variety of mechanical structures in the near future.

**Separate Ventilation in Fiery Mines.**—The following article by J. Mayer, is taken from an Austrian paper: This article aims cheifly at showing the advantages of the panel system of mining, that is driving the workings into districts totally separated from each other by coal barriers, and only connected by the main roads.

The Austrian miners have learned by experience what has been learned in every coal mining country in the world, and that is the best security against loss of life in the event of an explosion, and it is also the best security for property. The writer claims that large doors ought to be provided to act automatically in cutting off the connections with the main air-currents in the event of an explosion occurring on the main roads of the mine. He also has much to say about what he calls separate ventilation, but what he really means is driving single headings with a brattice, or box or pipe ventilation, and he strongly prefers speciil motors and special fans for the ventilation of such headings. For some reason or other he says that the driving of such headings, when prospecting in coal, is associated with danger, for, notwithstrnding the fact that the ventilation is kept good up to the most advanced cross-cut, yet the breasts in advance of these cross-cuts, he thinks, are in danger of explosions, arising from deficiency in ventilation.

## SEVENTH ANNUAL GENERAL MEETING

OF THE

# GENERAL MINING ASSOCIATION

OF THE

PROVINCE OF QUEBEC.

The seventh annual general meeting of the members of the General Mining Association of the Province of Quebec was held in the Club Room, Windsor Hotel, Montreal on Tuesday' 2nd, February. There was a large attendance. The opening session was called to order at three o'clock. Mr. George E. Drummond, (Canada Iron Furnace Co.) in the absence of the President, Captain Adams, being called to the chair.

The Secretary read the minutes of the Sixth Annual Meeting held in Montrea on 8th, 9th, and 10th January 1896 which, on motion, were adopted.

The Secretary reported the membership as follows :—

Honorary Members 20; Active and Associate Members 84; Student Members 17 or a total of 121. The Association's cash prizes for original papers contributed to the proceedings in 1896, had been awarded, the first to Mr. Raoul Green, B.A., Sc. (McGill) for his paper entitled "Notes on the Eustis Mine, Que.", and the second prize to Mr. W. Morton Webb, B.A., Sc. (also McGill) for his paper on "The Petrolia Oil Industry."

### NEW MEMBERS.

The following new members were elected :

Mr. John E. Hardman, S. B. M. E., Montreal.
Mr. H. E. C. Carry, C. & M. E., Toronto.
Mr. Lionel L. Shirley, M. E., Montreal.
Mr. W. Barclay Stevens, Montreal.
Mr. S. J. Simpson, Montreal.
Mr. George McDougall, Montreal.
Hon. C. C. Colby, Stanstead.
Mr. James F. Lewis, Chicago.
Mr. Charles Ramos, Barkerville, B.C.
Mr. J. W. Pyke, Montreal.
Mr. Peacock, Montreal.
Mr. J. D. Sword, M.E., Rosslaud, B.C.
Mr. Henry Bragg, Montreal.
Mr. J. Stevenson Brown, Montreal.

## FINANCIAL STATEMENT.

Mr. A. W. Stevenson submitted detailed statement of the finances of the Association showing :—Receipts, $1,301.74 ; Disbursements, $1,019.34 ; leaving a cash balance in hand of $282.40.

THE CHAIRMAN. —This statement is certainly very satisfactory and compares most favorably with the reports of similar organizations.

The report, on motion was duly adopted.

### ELECTION OF OFFIBERS.

PAST PRESIDENTS.

Hon. George Irvine, Q.C., (Johnson's Asbestos Co.), Quebec.
Mr. John Blue, C. & M.E., (Eustis Mining Co.), Capelton, Quebec.
Capt. Robt. C. Adams, (Anglo-Canadian Phosphate Co.), Montreal.

PRESIDENT.

Mr. George E. Drummond (Canada Iron Furnace Co.), Montreal.

VICE-PRESIDENTS.

Mr. James King, M.L.A., (King Bros.), Quebec, Q.
Mr. H. A. Budden, (Intercolonial Coal Co.), Montreal.
Mr. W. A. Allan, (Kootenay aud Columbia Prospecting and Mining Co.), Ottawa.
Mr. John E. Hardman, S.B.M.E., Montreal.

TREASURER.

Mr. A. W. Stevenson, C.A., Montreal.

SECRETARY.

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

COUNCIL.

Mr. George R. Smith (Bell's Asbestos Co.), Thetford Mines, Quebec.
Mr. John J. Penhale, (United Asbestos Co.), Black Lake, Quebec.
Mr. R. T. Hopper, (Anglo-Canadian Asbestos Co.), Montreal.
Mr. Feodor Boas, (Danville Asbestos and Slate Co.), St. Hyacinthe, Que.
Mr. Dwight Brainerd, (Hamilton Powder Co.), Montreal.
Mr. C. H. Carrier, (Carrier, Lainé & Co.), Lévis, Que.
Mr. H. W. DeCourteny, (Jas. Hutton & Co.), Montreal.
Mr. Milton L. Hersey, B.A.Sc., Montreal.
Mr. S. P. Franchot, (Villeneuve Mica Co.), Buckingham, Que.

DELEGATES TO FEDERATED INSTITUTE.

Mr. George E. Drummond, Montreal.
Mr. John Blue, C. & M.E., Capelton, Que.
Mr. John J. Penhale, Black Lake, Que.
Mr. R. T. Hopper, Montreal.

### INVITATION TO VISIT THETFORD MINES.

Mr. George R. Smith, Manager of the Bell's Asbestos Co., extended at an invitation to the Association to hold its summer meeting at Thetford Mines.

On motion of the Secretary, Mr. Smith's invitation was accepted with thanks.

### VOTE TO THE SECRETARY.

On motion of the Treasurer the Secretary was unanimously voted the sum of two hundred dollars as an honorarium for his services.

This being all the business the afternoon session adjourned.

## EVENING SESSION.

The members re-assembled at eight o'clock, Mr. George E. Drummond, President, in the Chair :—

The Chairman expressed his pleasure at the presence of so many students and welcomed, particularly, Dr. Goodwin, and his party, from the School of Mining, Kingston and Dr. Porter, the Students from McGill.

### STUDENTS' COMPETITION.

The following papers were then read by students for the cash prizes donated by the Association :—

"THE MISPICKEL GOLD ORES OF THE MARMORA DISTRICT."
By Mr. J. Walter Wells, School of Mining, Kingston.

"NOTES ON ASBESTOS MINING AT THETFORD, QUE.
By Mr. H. N. Thompson, McGill University, Montreal.

"GOLD MINING IN THE YUKON DISTRICT."
By Mr. W. M. Ogilvie, McGill University, Montreal.

### PRESENTATION TO THE TREASURER.

Mr. B. T. A. BELL.—I rise, Mr. Chairman, with a great deal of pleasure to perform a very pleasant duty. I have been asked, on behalf of the members, to express their very cordial appreciation of the splendid services reudered to the Association since its inception, six years ago, by the gentleman who has presided with so much success over our finances—our good friend Mr. A. W. Stevenson (applause). On Mr. Stevenson, a busy man at all times, has fallen the onerous and often times none too pleasant duty of providing the "sinews of war" without which we could not have reached the prominent position our Association has attained—that he has succeeded is amply demonstrated by a reference to the annual statements of our accounts. We have purchased a very handsome oak cabinet of silver and chinaware which we beg he will accept in the true spirit in which it is given as a slight token of our great appreciation of his services and of the good will of all our members (applause).

Mr. A. W. STEVENSON.—Mr. President, Mr. Secretary and Gentleman, I have to thank you very sincerely for your very handsome testimonial and for the very kind and flattering remarks that have been made. I must say, however, that whatever I have done for the Association has alway been a great pleasure to me. I do not take as much credit to myself as you have given me in connection with the work of the Association. I must say that we have been fortunate in having with us a body of men with one common interest and who, one and all, have worked unselfishly towards the development of our mineral resources and the expansion of legitimate mining operations in our Province. Believe me, gentlemen, I sincerely appreciate the kind thoughfulness that has prompteh this very handsome testimonial of your appreciation and goodwill. (Applause).

### THE PRODUCTION OF CHROMIC IRON IN QUEBEC.

Mr. J. OBALSKI.—The shipments by the Q.C.R. for 1896 amount to 2,108 as follows :—

| | Tons. |
|---|---|
| To Philadelphia | 750 |
| Pittsburg and vicinity | 1,232 |
| Other points | 126 |
| | 2,108 |

The value of above at the mine being about $26,000. It should be remarked that the ore sent to Philadelphia is high grade (50% and over) used for manufacturing of Bichromates. The ore sent to Pittsburg is low grade (40% and a little over) for refactory bricks and lining of furnaces. A very small quantity is used for producing ferro chrome.

Until now our principal market has been in the United States, but I think as profitable as one could be found in Great Britain. The prices are the same as last year, viz : $18 for 50% and $8 to $12 for 40 to 44% f. o. b. car of the Q.C.R. About 60 men are employed by this industry.

The total production up to date should be read as follows :—

| | Tons. | |
|---|---|---|
| Shipped previous to 1894 | 50 | |
| " in 1894 | 915 | |
| " in 1895 | 2,837 | |
| " in 1896 | 2,108 | |
| Total shipped | 5,910 | 5,910 |
| On hand ready for shipment (over the half being high grade) about | 1,100 | |
| Total production | | 7,910 gross tons. |
| Or, in round numbers | | 7,000 " |

There is no progress to report in the way of mining chrome ore, no machinery of any kind being yet used. The future of such an industry lies in the concentrating of inferior grades, which would enable our district to supply the bichromates manufacturers with an uniform high grade product.

### THE PRODUCTION OF COPPER AND PYRITES.

Mr. JOHN BLUE.—Pyrites mined in the province of Quebec for the year 1896, 30,200 tons of 2,240 lb, out of which shipments to the United States of green ore were 21,100 tons ; and treated in Canada—that is sulphur extracted and residue converted into mattes 9,100 tons.

The year's output represents a quantity of 2,200,000 lb of pure copper all of which was refined in the States.

The number of men employed in mining and dressing ores averaged 220 per day ; work carried on the whole year except legal holidays.

Wages paid for the year approximated $85,000,00.

Mr. BELL.—It is worthy of remark that our enterprising friend Dr. Reed has re-opened the old Harvey Hill copper mine at West Broughton and made several shipments during the past year. I am sure we all wish him success in his venture (hear ! hear !).

### GOLD MINING IN QUEBEC.

Mr. JOHN HARDMAN.—The gold industry of Quebec cannot be said to have made substantial advancement during 1896.

Work of a more or less desultory character was carried on in four localities in Beauce County, with a resulting production of about $1,300. More or less work of a prospecting character was done in Ditton, near the Pope mine, and washing was carried on at Rowe's Brook, these two localities producing by estimate something over $600.

At Dudswell, however, some systematic work was begun by the Roderigue Company, who are reported to have produced about $3,000.

There is no definite prospect of increased work the coming year.

The total production of Quebec way be estimated at from $5,000 to $6,000 for the year.

Nothing has been done in quartz mining which remains as heretofore.

### THE PRODUCTION OF ASBESTOS.

THE SECRETARY.—Mr. Penhale, who was to have submitted a review of this industry is unfortunately unable to be with us but the figures furnished to me officially may perhaps be of interest.

| | Tons. | |
|---|---|---|
| Black Lake | 996 | *via* Quebec Central Railway. |
| Thetford Mines | 4,640 | do |
| Broughton | 63 | do |
| Danville | 4,939 | Grand Trunk Railway. |
| Ottawa County | 172 | Ottawa & Gatineau Valley. |
| Pointe au Chene | 784 | |
| Total asbestos all grades shipped in 1896 | 11,594 | |

### THE PRODUCTION OF MICA AND FELDSPAR.

THE SECRETARY.—The exports of mica from the port of Ottawa during the year amounted to 378,958 lbs. Several shipments were also made from other ports but the total value of the exports from the province for the year, it is estimated, did not exceed $80,000. At Templeton station, a feldspar mine was opened and 560 tons shipped to the United States for the manufacture of pottery.

### GRAPHITE MINING.

THE SECRETARY.—Several mines were worked in Ottawa County for the production of Graphite. Mr. Brunnell, who was to have dealt with this section is, however, not present and I am unable to give the figures.

### REVIEW OF THE IRON INDUSTRY.

The President then read his paper reviewing the Pig Iron Industry in 1896 a full report of the paper being given elsewhere. This closed the proceedings and the meeting adjourned at eleven o'clock.

## THE FEDERATED
# CANADIAN MINING INSTITUTE
## HOLDS ITS FIRST
## Inter-Provincial Conference of Mining Engineers, at Montreal, on 3rd, 4th and 5th February.

The first Inter-Provincial Conference of Canadian Mining Engineers and Mine-Owners, held under the auspices of the Federated Canadian Mining Institute, took place in the Club Room, Windsor Hotel, Montreal, on the 3rd, 4th and 5th February. There was a large and representative attendance at all the sessions, the following, among others, being present :

His Excellency, Lord Aberdeen, Governor General.
Mr. Neve, A.D.C.
W. E. C. Eustis. Eustis Mining Co., Capelton, Que.
John Blue. C. and M. E. " " " "
W. H. Nichols. Nichols Chemical Co., Capelton, Que.
S. L. Spafford, Nichols Chemical Co. Capelton, Que.
George R. Smith, Bell's Asbestos Co. Thetford Mines, Que.
John J. Penhale, United Asbestos Co. Black Lake, Que.
James King, M. L. A., King Bros. Asbestos Mines. Quebec.
S. P. Franchot, Emerald Phosphate Co. Buckingham.
J. F. Higginson, Ottawa Powder Co. Ottawa.
John E. Hardman, S. B. M. E. Oldham Gold Co. Montreal.
Dr. James Reed, Harvey Hill Copper Mine, Reedsdale, Que.
J. S. Mitchell, Beaver Asbestos Co. Sherbrooke.
Jas. F. Lewis, Canadian Rand Drill Co. Chicago.
E. W. Gilman, Canadian Rand Drill Co. Montreal.
Capt. W. A. Jamieson, 43rd Mining and Milling Co. Ottawa.
F. W. Valleau, Agnes Hydraulic Mining Co. Ottawa.
Hector McRae, Kootenay and Columbia Prospecting and Mining Co. Ottawa.
E. D. Ingall, A. R. S. M., Geological Survey. Ottawa.
L. L. Brophy, Geological Survey. Ottawa.
J. H. Chewitt, C. E. Foley Mines Co. Toronto.
W. Hamilton Merritt A. R. S. M. Toronto.
F. H. Mason, F. C. S., Halifax, N. S.
Wm. Smaill, B.A. Sc. Montreal.
A. Macdonald, St Johns, Que.
Milton L. Hersey, B. A. Sc. Montreal.
J. T. Donald, M. A. Montreal.
H. A. Drury, Imperial Oil Co. St Johns, Que.
H. W. DeCourtenay, Jas. Hutton and Co. Montreal.
C. H. Carriere, Carriere, Laine and Co. Levis.
S. J. Simpson, Ingersoll Rock Drill Co. Montreal.

F. H. Hopkins, Dominion Wire Rope Co. Montreal.
Wm. Sclater, Sclater Asbestos Co. Montreal.
H. C. Baker, B. A. Sc. Blackburn Mine. Templeton.
A. T. Anderson. Toronto
Hon. C. C. Colby. Stanstead, Que.
George Macdougall, Montreal.
Lionel H. Shirley, M. E. Montreal.
Dr. Frank D. Adams, McGill University. Montreal.
Duncan McDonald, Truro Foundry Co. Truro.
Charles Archibald, M. E., Baltimore Coal and Ry. Co. Halifax.
C. Macdonald. Mount Uniacke, N. S.
John F. Stairs, Nova Scotia Steel Co. Halifax.
W. Stevenson, Granite Creek Gold and Platinum Co. Granite Creek, B.C.
H. M. Morrison, M. E. Scranton, Pa.
Captain Donnolly. Kingston, Ont.
Capt. A. L. Howard. Brownsburg, Que.
R. W. Leonard. C. E. Beauharnois, Que.
L. A. Klein, M. E., American Asbestos Co. Black Lake, Que.
W. Dawson. Vancouver, B. C.
D. W. Robb, Robb Engineering Co. Amherst, N. S.
W. Price, Intercolonial Ry. Moncton, N. B.
W. J. E. Thomson. Halifax.
W. P. Lockwood. Montreal,
Dr. G. M. Dawson, C.M.G., Geological Survey, Ottawa.
Dr. A. R. C. Selwyn, C.M.G., late Director Geological Survey, Ottawa.
Col. Ray, Port Arthur.
Graham Fraser, Nova Scotia Steel Co., New Glasgow, N. S.
Harvey Graham, Nova Scotia Steel Co., New Glasgow, N. S.
Clarence Dimock, Wentworth Gypsum Co., Windsor, N. S.
F. S. Andrews, Richardson Gold Mining Co., Country Harbor, N. S.
C. E. Willis, M. E., Halifax Chrome Co., Halifax.
E. A. Sjostedt, M. E., Pictou Charcoal Iron Co., Bridgeville, N. S.
A. A. Hayward, Golden Lode Mining Co., Halifax.
Dr. E. Gilpin, Jr., Inspector of Mines, Halifax.
Major R. G. Leckie, Dufferin Mining Co., Halifax.
Major R. G. E. Leckie, M. E., Torbrook Iron Co., Torbrook, N. S.
H. A. Budden, Intercolonial Coal Co., Montreal.
H. M. Wylde. Sec. Mining Society of N. S., Halifax.
T. R. Gue, Acadia Powder Co., Halifax.
John J. Drummond, Can. Iron Furnace Co., Radnor Forges, Que.
George E. Drummond, Can. Iron Furnace Co., Montreal.
T. J. Drummond, Montreal Car Wheel Co., Montreal.
J. T. Burchell, Cape Breton Colliery, New Campbellton. N. S.
J. Obalski, Inspector of Mines, Quebec.
Dr. J. B. Porter and Party of Mining Students from McGill.
Dr. W. L. Goodwin and party of Mining Students from Kingston Mining School.
Dr. A. P. Coleman, School of Practical Science, Toronto.
Joseph Bawden, Kingston.
W. R. White, Q. C., Crystal Gold Mining Co., Pembroke.
Dwight Brainerd, Hamilton Powder Co., Montreal.
Daniel Smith, Hamilton Powder Co., Montreal.
R. T. Hopper, Anglo Can. Asbestos Co., Montreal.
James D. Sword, M. E., Rossland, B. C.
F. Aug. Heinze, B. C. Smelting and Refining Co., Trail, B. C.
C. Warfield, Rossland.
J. B. Hobson, M. E., Cariboo Hydraulic Mining Co., Quesnelle, B. C.
A. Dick, M. E., Rossland.
Chas. Ramos, Slough Creek Mining Co., Barkerville, B. C.
W. F. Dean, Canadian General Electric Co., Montreal.
C. H. Taylor, M. E., Montreal.
A. W. Stevenson, C. A., Montreal.
B. T. A. Bell, Editor Canadian Mining Review, Ottawa.

The opening session was called to order at eleven o'clock on Wednesday morning, Major R. G. Leckie, M. E., Torbrook, N. S., President of the Federated Canadian Mining Institute, in the chair.

## SECRETARY'S REPORT.

Mr. B. T. A. Bell, Secretary, read the minutes of the meeting held in Montreal on the 10th of Jan. 1896, which, on motion, were adopted. He also submitted the financial statement for the calendar year showing:

| | | |
|---|---|---|
| Sub from Mining Society of Nova Scotia | $100 00 | |
| do Gen. Mining Associat'n, Province of Quebec | 100 00 | |
| do Ontario Mining Institute | 100 00 | |
| Sales Journal | 21 20 | |
| Mining Society of Nova Scotia on account of printing 1895 proceedings | 25 00 | |
| | | $346 20 |
| Loan Mr. A. W. Stevenson | | 150 00 |
| | | 496 20 |

### Disbursements.

| | | |
|---|---|---|
| Printing— | | |
| Estate Mortimer & Co., on account | 150 00 | |
| Times Printing and Publishing Co. | 44 00 | |
| Ottawa Printing Co | 23 75 | |
| | | 217 75 |
| Engraving— | | |
| Etching Plate for Fergie's Paper | 3 00 | |
| Sabiston Engraving Co | 9 28 | |
| Grip Printing and Publishing Co | 69 48 | |
| | | 81 76 |
| Expense Account— | | |
| Postages, $42.07; Telegrams, $4.41 | 46 48 | |
| Clerk and Stenographer | 25 00 | |
| Travelling, $4.00; Express charges, $0.55 | 4 55 | |
| Advertising, $15.00; Stationery, $14.55 | 29 55 | |
| Bank charges | 4 75 | |
| | | 110 23 |
| Balance | | 86 46 |
| | | 496 20 |
| Assets— | | |
| Mining Society of Nova Scotia, outstanding printing 1895 proceedings | 50 00 | |
| Cash in hand | 86 46 | |
| | | 136 46 |
| Liabilities— | | |
| Mr. A. W. Stevenson, Loan | 150 00 | |
| Estate Mortimer & Co. | 210 00 | |
| | | 360 00 |

The above accounts have been carefully audited and found correct.

Signed, { S. J. Simpson, H. W. DeCourtney.

With respect to the accounts he would remind them that when the federation was made it was the intention, following the precedent of the Royal Society of Canada, which received $5,000 annually, to seek some assistance towards their work of publication from the Dominion Government. Everyone would realize the impossibility of carrying on the work of the Institute on a paltry contribution of $100 per society. During the year the Institute had published twenty-eight papers, which had been widely distributed, and would, doubtless, do much to attract attention to the resources of the country. A good deal of work had been accomplished in securing a more liberal interpretation of the law respecting the admission of free mining machinery. The statement of the Jenckes Machine Company, which for some time had been officially used at the Ports of entry had been withdrawn in favor of the statement of mining and smelting machinery made in Canada, compiled by the various societies in the federation. He had pleasure in submitmitting a copy for the inspection of any members who had not seen this statement He also had had interviews on behalf of several of their members respecting importations which had erroneously been charged for duty, and he was glad to say that in nearly every instance the Institute had succeeded in securing a remission of the duty. The law was still, however, open to some objection, inasmuch, as Aerial Tramways were held not to be mining machinery. As these tramways were a necessity to the successful operation of many mines, notably in British Columbia, and as they were not manufactured in Canada, it was hoped that the representations of the Institute to have them placed on the free list would be successful. In accordance with a resolution passed at the last meeting of the Board, he had had considerable correspondence with a view to holding an International Convention of Mining Engineers in Canada this year. The American Institute of Mining Engineers and the Federated Institute of Mining Mining Engineers of Great Britain

had each accepted a provisional invitation, but as the Iron and Steel Institute, which had also been invited, could not visit Canada this year, he thought it would be advisable to postpone this gathering to a more convenient date. He tabled the correspondence for the inspection of any member who would care to read it.

MR. JOHN HARDMAN referring to the accounts and the statement of the secretary said that the Institute had progressed and accomplished good work but it was quite evident that the contribution from the societies was altogether too small to maintain the Institute in anything like an efficient condition. He confessed that the only way out of the difficulty was to ask the Dominion Government for a grant towards their publications. There were also one or two clauses in the constitution which might be amended with advantage.

MR. BELL suggested the appointment of a sub-committee to report on amendments.

MR. HOPPER thereupon moved that Major Leckie, Mr. W. R. White, Q. C., Mr. Hardman, Mr. Merritt and the secretary be a sub-committee to report on suggested amendments to the constitution at the afternoon session. The motion was adopted.

---

### A MINING MUSEUM FOR MONTREAL.

The SECRETARY referred to the work of the Quebec Mining Association towards establishing a scientific and industrial collection of minerals, a reference library and reading room of mining literature and a Public Record of mining undertakings in Montreal. The premises secured by the Association in the Macdonald Building on Victoria Square were large enough for an institution that might be made something more national in its character and it was a matter for consideration whether the Institute, representing as it did, the mineral interests of the country, should not make an endeavour to maintain and equip such a Mining Bureau or Museum on national lines. If the Quebec Government gave $1.500 per annum, as they promised, it was not unlikely that the Federal Government would also contribute something to the maintenance of such an institution. The following letter reproduced in a recent issue of the Montreal *Gazette*, from the Hon. L. R. Masson, Minister of Militia and Defence, under date, Ottawa, 20th December 1879 in reply to a strong remonstrance from the Board of Trade and Corn Exchange against the removal of the Geological Museum from Montreal to Ottawa would be of interest :—

*Wm. J. Patterson, Esq., Secretary Board Trade and Corn Exchange :*

SIR—In reply to your letter of the 15th last. informing me that it was rumoured the Government intended placing the Geological Survey offices and Museum in a temporary building at the Capital until suitable premises could be found, and requesting the members of the Cabinet from the Province of Quebec, in the name of the members of the Board of Trade and Corn Exchange Association, to use their influence with the Right Honorable the Premier and colleagues to stay proceedings—I beg to state that Parliament having decided that, on public grounds, and to ensure effciency, it was necessary to remove the Geological Survey offices to the Capital, it now rests with the Government to adopt means for the early removal of those offices ; but I may inform the members of the Board, through you, that there is no intention of effecting that removal to a temporary building, as rumored. It will on the contrary, when removed, be of a permanent character. *Relating to the Museum, which more particularly interests Montreal, the Government will do all in their power to meet the views of the Board of Trade and Corn Exchange, as expressed in your letter.* The collections of Montreal contain a very great number of duplicates ; those duplicates will no doubt be made available for the creation of the Museum here in connection with the Geological Survey branch of the department ; *but the Government will, on account of the particular circumstances of the case, maintain* (during the pleasure of Parliament) *a Geological Museum in Montreal for the benefit of educational institutions of the city.* Hoping that, under the circumstances, the above will be found satisfactory by the members of the Board of Trade and Corn Exchange, I have the honor, etc.

(Signed) L. R. MASSON.

There was a very strong desire on the part of the business men of Montreal that such an institution properly equipped and managed should be established in that city—particularly now when the attention of its capitalists was being directed largely to mining investments.

MAJOR LECKIE.—What we want is a commercial museum right here in Montreal directly in touch with the capital of the country. In talking the matter over with the bankers I find that they are very desirous of having such a museum here. If we could get such an institution established the business men of the city would make very good use of it.

After some discussion it was resolved to leave the matter in the hands of the Council to arrange for an early interview with the Dominion Government with a view to securing suitable assistance, towards carrying the projected Bureau into effect.

### ADVANCE PUBLICATION OF PAPERS.

MR. WHITE, Q.C.—Before closing I would like to submit a resolution with reference to procedure. I beg to move, "That all papers hereafter proposed to be read at the meetings of this Institute shall be transmitted to the Secretary at least ten days before such meeting, and that the Secretary cause such papers to be printed and distributed among the members of the Institute on the opening of the meeting."

My reasons for this motion are that a great deal of time is wasted in reading papers. Necessarily a gentleman dealing with a subject of prime importance to the interests assembled here puts his views sometimes pretty lengthily, and it takes up a great deal of time in reading. I am quite sure that when a paper is read here for the first time you are unable to at once judge whether it requires discussion and how it shall be discussed. Now the result of my motion will be to give an opportunity for that ; it will give an opportunity to every member to take that paper and study it, and he would then be able to discuss it intelligently here. I think the papers can then be taken as read, and we can do the business in two days instead of three. An objection of course might be made as to the cost.

MR. B. T. A. BELL.—I have very great pleasure in seconding Mr. White's resolution. At the same time the whole matter resolves itself into a question of cost. Some allowance must be made for us at this our first meeting. However, with respect to present programme of papers. all of which it is impossible to read at this meeting, I may say that they will all be printed in full in the current issue of *The Canadian Mining Review*, within the next two weeks. The Mining Society of Nova Scotia meets on the second Wednesday of next month, and the Ontario Mining Institute is to meet at Toronto about the same time, so that most of our members will have an opportunity of discussing any of them at these meetings. I quite sympathise with the movement to place papers in the hands of the members in advance of a meeting. I think it would enliven and brighten up the discussions. I hope that by the time we meet next year we shall have sufficient funds to do things up as we would like, but give us a chance ; we are young yet.

DR. PORTER.—I have had some little experience in connection with the American Society of Mining Engineers, and I think the advantage is so great that if the Institute ever tries the experiment it will feel satisfied that even at considerable additional cost it is worth that cost. The chief value of a paper is the discussion ; and the discussion of a paper cannot amount to very much if it is made impromptu immediately after it has been read. A very important feature of many papers is the figures, and I think the discussion would not only be doubly but ten times as valuable as it now is if we had the papers in advance. It would also bring into the discussion men who do not touch it at all now.

MR. WHITE'S motion was carried unanimously.

---

### INVITATION TO VISIT McGILL AND THE WORKS OF THE ROYAL ELECTRIC COMPANY.

MR. BELL here announced that the Governors of McGill University extended a hearty invitation to the members of the Institute to visit the Laboratories and the Redpath Museum, and that Mr. Brown, manager of the Royal Electric Company, invited any of the visiting engineers who might have time to visit their works.

The meeting adjourned until the afternoon.

---

### PRESIDENT'S ADDRESS.

The members reassembled at three o'clock :—

MAJOR LECKIE.—The effort to bring together, in one federal body, the several Mining Societies of our different provinces, is fully justified by the results which we now see. Around us here are met men from every province of the Dominion—engineers of high technical training and extended experience, explorers, who have shown pluck and endurance in their tireless search for croppings ; miners, who have developed the discoveries, and metallurgists, who have extracted the refined metals from the ore.

Mining, in almost every portion of the globe, is at the present day exciting more attention than any other industry, and the production of almost all kinds of mineral was greater last year than has ever before been known.

Of all the industrial arts which contribute to the progress and welfare of mankind, we may claim the most important place for mining and its handmaiden metallurgy.

Although the art of mining may refer only to the winning of ores and minerals and their preparation for further treatment by the metallurgist, yet within the scope of this and other similar societies, are comprehended, geology, mineralogy, civil and mechanical engineering ; while metallurgy rests on chemistry, physics and mechanics as the foundation of the sciences.

The importance of our Institute in a scientific and technical way is therefore obvious.

The reasons for organizing such an Institute as ours will not be seriously called in question in the present day. by any engineer or professional man. Every profession has its individual and perhaps exclusive society. Every branch of industry and commerce has its organisation, and craftsmen and laborers vigorously maintain their own unions. Our Institute, as you know, is a federation of Provincial mining societies, which in their own limited spheres have been of great service to their members, both from a technical commercial and legislative point of view, besides promoting a spirit of social good-fellowship.

This Federated Institute will carry the work of these Societies to a wider sphere, extending from ocean to ocean, and discuss matters from a broader point of view.

The Provincial societies will still have their own immediate affairs to look after, which in many respects are practically of greater importance.

The titles to lands, conditions and terms of mining leases, laws regulating the workings of mines and employment of labour, all come within the sphere of the Provincial Legislature, likewise local taxation, the encouragement and regulation of technical education and other such matters.

The Canadian Mining Institute will, I take it, devote itself more to technical and scientific matters, as the syllabus now before us shows. It contains a list of papers of the highest interest and practical value, which would do much credit to any similar association in the world.

In the discussion of the papers, everyone should take an active interest. Ideas and opinions are evolved of much value, being the result as a rule of either individual experience or research.

Practical men are not often given to writing, but such discussions frequently elicit their views, which are of the greatest value, and expressed in the clear, fresh and terse language of the thoughtful worker. It is like the excitement of the dynamo; of mind upon mind, or as the wise king of old said: "As iron sharpeneth iron, so the countenance of a friend brighteneth that of his neighbour."

Then there are the advantages of personal acquaintanceship formed, of exchange of experience, and information obtained upon special subjects, which cannot be overrated. The remarks of Sir Thomas Kitson, on a similar occasion are called to mind;

"It is well that we should meet thus, eye to eye and voice to voice, to discuss the interests and scientific aspects of the great industry which absorbs us. It is thus we learn how much has been accomplished by persistent and intelligent labour, how much remains to be achieved, and how, by free exchange of ideas and productions, friendly understanding is promoted and personal acquaintance is built up. Through such orderings we are convinced that Providence has designed to wind the silken chain of commerce round the world."

The papers already published by the Institute, are but the beginning, I trust, of a series of volumes, which will embody technical and practical information of the highest professional value,

I repeat that Mining and Metallurgy form the basis of human progress and civilization.

Sir Lowthian Bell has well said, "That with the exception of air and water, it is open to question, whether there is any form of matter which the human race could less easily spare than iron. Without this metal for an anchor, or steel for a compass, the adventurous navigator could never have crossed the wide Atlantic," and as I once heard the Hon. Abraham Hewitt, of New York, at the meeting of the British Iron and Steel Institute, in 1891, say of Sir Henry Bessemer that, "We can trace, therefore, directly to the Bessemer invention the ability to reduce our national (United States') debt, and finally, to pay off the outstanding debts at maturity. It ought to secure for him the gratitude of every American citizen, and I am glad to have the opportunity on this occasion, to bring this obligation to the notice of my countrymen, whose homes he has multiplied, whose country he has developed, whose burdens of debt he has lightened, and whose progress in all the arts of civilization he has placed upon a basis as durable as the material with which his name has ever been associated."

To her coal and iron resources, with the skill of her miners and metallurgists, Great Britain is indebted for the marvellous development of her manufactures and commerce, and they still enable her to remain mistress of the seas, more effectually than when her ships were of English oak. At the present day, when our thoughts are all running after the precious metals it is well to bear in mind that iron is still the most precious of all metals for the comfort and progress of mankind.

The systems of banking and the world's exchange are based upon the fruits of our labours. What would merchants and bankers do without us? The miser, as well as the Minister of Finance, alike feels safe with his hoarded gold. Our Chancellor of the Exchequer feels cheerful when the vaults of the Bank of England are bursting with fifty million pounds sterling. Last year our fellow-labourers added to this exchangeable wealth of the world, over two hundred millions of dollars, weighing over four hundred tons of refined gold. Yet, the rapacious maws of bankers and financiers are still crying for more. As the greatest individual producer of this enormous wealth, the British Empire still leads, and this lead is likely to be increased further by the development of the limitless resources of our Dominion. The Eastern Provinces will increase their supply, and Western Ontario has a brilliant future, but it is to our domains on the Pacific slopes that we look for a rapid addition to the yield of gold as well as silver. Progress there, for many years was slow, but within the last twelve-months it has been marvellous. We look with the deepest interest and fraternal pride upon the labours of our professional brethren in British Columbia, and trust that their brightest hopes will be realized, both in the interests of the Province itself and the noble Empire to which we belong.

It is gratifying to have so many students present at our meeting. They come from an atmosphere of theory and the laboratory of scientific experiment. to rub shoulders with the hardy explorer and those engaged in the active pursuits of the profession.

In Ontario there are two institutions for techaical education of great excellence, and in this city you have a university eqnipped for scientific research and technical application, unsurpassed in the world, thanks to the unstinted generosity and public spirit of one whose name should always be held in high honor by the profession, Mr. W. C. McDonald (applause). The means are given to acquire what John Milton considered a complete education. "A complete education," he said, "I hold to be one that prepares a man to perform wisely, skilfully, magnanimously, all duties, public and private, in peace and war."

Here you will meet the hardy pioneers of our industries, men of unflagging conrage, possessed of "sinews of steel and muscles of iron." Those are the men who forming the advance guard of civilization, have conquered the wilds for humanity, who in the country south of us have added new States to the Union, and who within the British sphere have developed new colonies, almost continents, to enrich and strentghen our world-wide Empire. (Loud applause.)

The following papers (reproduced elsewhere in the Review) were then taken up at this session :—

(1) The Economics of Joint Stock Companies and the Laws relating to their incorporation by Mr. J. Bawden, Kingston.

(2) The Question of Initial Payments on Bonds by Howard West, A.R. S.M., New Denver, B.C.

---

### AMENDMENTS TO CONSTITUTION.

Mr. W. R. WHITE, Q.C., on behalf of the Committee, submitted the following suggested amendments to the Constitution and By-Laws.

Sec I.—The organisation shall be named the *Federated* Canadian Mining Institute.

Sec. IV.—To read: The affairs and business of the Institute shall be managed and controlled by a Council consisting of the Presidents of the Societies in the Federation and one member for every forty and fraction thereof in good standing in their respective societies to be elected annually by each such society, *said members to hold office until their successors are elected. A majority of said Council shall constitute a* QUORUM.

Sec. V.—The Council *at their annual meeting*, shall elect a chairman and a secretary-treasurer, the latter to receive such remuneration as may be determined by it; *such* meeting shall be held immediately after the annual meeting of the Institute.

Sec. VI.—* * * the funds of the Institute shall be received by him (the Sec.-Treas.) and be deposited in his name, as Secretary-Treasurer, at a bank approved by the Council.

Sec. VII.—*All payments on behalf of the Institute shall be made by the Secretary Treasurer upon the approval of any member of the Council.*

Sec. IX.—The Societies of the Federation shall each pay an annual subscription towards the expenses of the Institute of such an amount as may be determined upon *by the Council* but the contribution from each Society shall at no time exceed in amount the sum of three dollars *for each member of such society.*

Sec. X.—deleted.

Sec. XI.—The Annual General Meeting of the Institute shall be a united meeting of the various Societies in the Federation; it shall be held on the first Wednesday in February, commencing at eleven o'clock in the forenoon of said day, or at such other tin e as the Council may determine.

Sec. XIII.—Contributors of papers shall be entitled to twelve copies of any paper presented by them and published by the Institute. Additional copies shall be sold at such price as the Council may determine.

Sec. XVI.—The Council may accept papers or other documents from persons who are not members of the Institute and allow them to published in its proceedings.

Sec. XVII.—Any amendment or alteration to the Constitution or By-Laws of the Institute may be made by the majority of the members of Council, such amendments to be in force until the next general meeting of the Institute when the same must be ratified by a majority of the members of the Institute present. Notice of such amendments must be sent by the Secretary to every member of the Institute at least two weeks prior to such general meeting.

MR. WHITE moved, seconded by Mr. Hardman, that the Report of the Committe be adopted. Carried.

The afternoon Session then adjourned.

EVENING SESSION.

The members re-assembled at eight o'clock.

Mr. W. Hamilton Merrit, A.R.S.M., Toronto, exhibited and explained a very complete portable field outfit for prospectors, manufactured by Messrs. Lyman & Sons, Montreal, which could be used for determining, to some extent, the value of ores and minerals in the field.

Thereafter Dr. John B. Porter, Professor of Mining Engineering at McGill College read a brief paper on The Responsibilties of the Mining Engineer, (reproduced elsewhere in this number).

---

**ONTARIO MINING ACT.**

The Secretary read the following letter :—

SIR,—As the Provincial Legislature is about to convene in the near future, I have taken the liberty of calling your attention to a deficieney in our present Mining Act. There is nothing in it which makes provision for the working of mineral properties when the minority prospector or other interest will not be party to or accept any reasonable proposition for the sale or working of such minority interest. A number of properties up here are lying idle for this reason. It would be to the benefit of the country of the country if a clause were inserted in the Act making it compulsory for the minority interest to accept the same pro rata terms should the majority dispose of their holdings. Or in the event of the majority interest working the property that the minority be compelled to contribute their share for the expense of opening up, proving and equipping of the property, if results warranted it. Some of our prospectors and others holding very small interest in properties have been able by their extravagant demands to keep properties tied up and undeveloped which would otherwise have been opened up and tested. The end in view is simply that such provision be made as will prevent this and at the same time protect the minority interest. It would seem as though this could be accomplished if the government would appoint one or more umpires to rule on such matters whose decision would be final and prompt. In such cases at present there is no way of setting such matters unless the courts are resorted to. This is expensive and much valuable time is lost before a final ruling is given.

In view of this can we ask you to bring this to the attention of the Canadian Mining Institute that the matter may be forcibly presented to the legislature at its coming session and oblige.

Yours, etc.,

R. W. DE MOREST.

Sudbury, 13th January, 1897.

MR. BAWDEN.—There is also a mode of dealing with the difficulty which arises where there is an obstinate minority, by means of arbitration. Parties who think they are not properly dealt with may have arbitrators appointed. The minority nominate one arbitrator and the majority nominate theirs, and the umpire decides the difference. It is quite practicable to meet the difficulty in this way.

MR. W. R. WHITE, Q.C.—I think he means to deal with these properties which are held in the hands of the original owners and have not been changed into joint stock companies at all. It seems to me that the laws of Ontario could be made use of by simply letting those who desire to sell apply to the Court. I think he referred to the Joint Stock Companies Act.

MR. BAWDEN.—To the Mining Department Act of British Columbia.

MR. WHITE.—We have no such law in Ontario.

MR. BAWDEN.—No ; but such legislation is required that would meet it.

MR. WHITE.—It would seem to me to be a very hard thing that any person who had any interest in the property could be compelled to open up a mine if he did not wish to do so. I think the law as it now stands deals with it the same as any other real estate in the country, which I think would be quite sufficient in a matter of that kind. The only way to do is to apply the law of the country as it now stands. I happen to have had some experience in nickel property at Sudbury.

DR. GILPIN, Inspector of Mines, Nova Scotia.—The only remark I can make on the subject is that in Nova Scotia when that question came up we concluded that the best way to prevent any misunderstanding was to have a short Act passed for the partition of mining properties, leaving it to be dealt with in the same way as the partition of lands in dispute, and so far this seems to be satisfactory.

MR. BELL.—Under the Ontario Act there has been a tremendous blanketing of lands by speculators who are blocking up large areas and who undoubtedly tie up the country to the prejudice of its development.

MR. WHITE.—That does occur in the Sudbury district. I know that a very large corporation there did so not for the purpose of working the property but for the purpose of shutting out competition. That of course might be dealt with in an entirely different way, perhaps by preventing any mining corporation from holding more than a certain number of acres of and. That is the only way in which it can be dealt with, and it is quite proper that should be done. Land companies, for example, are dealt with in the same way. A land company cannot acquire land on which an ordinary mortgage is held, and hold it more than five or seven years without dealing with the property or without selling it, and if the same law existed with regard to mining corporations, then they could not hold the land longer than a certain number of years without working it, that would cover the point. I know that what Mr. Bell says with regard to the blanketing of land is true. Large properties have been secured in the Sudbury district without doing or intending to do anything.

MR. BAWDEN.—According to the Joint Stock Companies Act, if the property is held for more than seven years it becomes forfeitable to the crown.

Mr. WHITE.—That covers the whole thing.

The discussion then dropped.

The following papers were then taken up :

"The Advantages of Compressed Air" by Jas. F. Lewis' Chicago.

"The 150 H. P. Hydraulic Air Compressor erected for the Dominion Cotton Mills Co., at Magog, Que.", by C. H. Taylor, M. E., Montreal.

"Louisburg : Its importance as an Imperial Coaling Station," by Wm. Blakemore, Glace Bay, C.B.

"The Responsibilities of the Mining Engineer," by Dr. John B. Porter, M. E., Montreal.

"Notes on Underground Photography" (illustrated), by Mr. George R. Mickle, M. E., Sudbury, Ont.

THURSDAY MORNING SESSION.

The meeting convened at eleven o'clock Major Leckie, President in the Chair :

The following papers were read and discussed :—

"Notes on the Western Ontario Gold Fields," by Dr. A. P. Coleman, Toronto.

"Gold Quartz Mining in Canada & Victoria, Australia," by Dr. A. R. C. Selwyn, C. M. G., Ottawa.

THURSDAY AFTERNOON SESSION.

The President took the Chair at three o'clock. His Excellency, the Governor General, was present during the whole of the session.

The following papers were discussed :—

"Notes on some Mining Districts in British Columbia," by Mr. John E. Hardman, S. B. M. E., Montreal.

"The Gold Bearing Lodes of Cayoose Creek," by Mr. G. F. Moncton, M. E., Vancouver, B. C.

"The Utilization of the Mill Refuse & Peat Mosses of the Ottawa," by Mr. Ernest A. Sjostedt, M. E., Bridgeville, N. S.

"Notes on the Mining of Low Grade Ores in Nova Scotia," by Mr. F. S. Andrews, Country Harbor, N.S.

FRIDAY AFTERNOON SESSION.

The meeting convened at three o'clock. Mr. H. A. Budden, Intercolonial Coal Co., in the absence of the President, being called to the Chair.

---

**EARLIER PUBLICATION OF THE GEOLOGICAL SURVEY REPORTS.**

COL. RAY (PORT ARTHUR).—I live in that portion of the country where the Autumns come along somewhat early, and I have found that the reports of the Geological Survey Department at Ottawa were not of that benefit that they otherwise would be if issued earlier in the season. The prospectors start out early, about the time the snow gets off and the mosquitos get on, and they have not the opportunity of reading any of the reports until the next winter. I want to see if this Institute can do anything to induce the Department at Ottawa to get out their reports earlier. I am aware that possibly the staff may be somewhat short-handed and perhaps they may be overworked. It looks to me that if a representation made by an organization like this could induce the department to increase the staff so as to enable them to

issue their reports at a time of the year when it would most benefit these prospectors it would be a good thing. I left home on the 5th of January and up to that time I had not received the report from the Geological Department —I mean the report for 1895. I was making an enquiry yesterday and I found that the report had been issued just recently.

DR. G. M. DAWSON,—I am quite sure we are very much pleased to have any suggestions in reference to these reports. I might explain that we have different kinds of reports. There is the Summary Report. That is the only report which according to our Act has to be closed as soon as the new year opens. It is all in type now and as soon as it is issued it will show the work up to the close of the calender year. I think this is about as prompt as it can be expected to be issued. I think that the statistical report which contains the figures of the production of the year—that is the summary statement for 1895 was issued in March last—at least the main figures of it were at any rate. Then in regard to the third series of reports which are of a more permanent class: they are issued just as they are finished. These reports are more or less of a finished character and are supposed to have more of a permanent form. I think perhaps the figures with regard to mineral Provention might be issued earlier. I know the Summary Report of 1895 was issued last winter. It could not have been later than March, and as summing up the work I think it is of use to the Prospector who can study it in his winter quarters before going out in the spring.

COL. RAY.—It looks to me as if the Doctor had made out a very good case, but perhaps those who have been in the habit of sending in reports could do so earlier. I accept the Doctor's explanation, and I believe the Summary Report is just what we want, and if we could get it as promptly as we were told they were issued last year it would be all right.

### PROVINCIAL TOPOGRAPHICAL SURVEYS.

DOCTOR DAWSON,—Now that the Federated Mining Institute has been established I hope it will turn its attention to those matters which require attention sooner or later. I hope it will help us a little in the way of topographical surveys. It is surprising that there is not a proper survey of the older provinces. I do not know whether in Ontario or Nova Scotia the Government have ever done any surveying except the running of cadastral lines, etc. There is no doubt that a proper topographical survey is much needed.

DOCTOR GILPIN (HALIFAX),—I had the pleasure of intimating to Dr. Dawson's predecessor the methods employed in making a topographical survey in the province of Nova Scotia. The Geological Survey did begin and worked from Halifax to the eastward, and made a very excellent map indeed and I believe a very accurate one. The cost of that survey has been saved to the country at many times over. It has been shown that it is not only of a theoretical value from a prospector's point of view but it has practically been the foundation of operations for domestic life in the districts there.

THE CHAIRMAN,—Before leaving the subject which Col. Ray has introduced I may say that I remember that very many years ago—I speak of 35 years ago—the mining men appeared to be in closer touch with the Survey than in the past. The reports were sent to the mining men then, and I should like very much indeed if those conditions existed now.

DOCTOR COLEMAN,—There is great need for a really good topographica survey of the older provinces. In the more thickly settled parts of the country we should have a good topographical map. Such a map would be of immense advantage, not only to the mining engineer himself but also to the laying out of railroads, etc. The Geological Survey might combine in such a matter with Ontario and the other provinces, making use of the information already acquired.

THE CHAIRMAN,—With Nova Scotia especially.

DR. GOODWIN.—I think Ontario is one of the most backward in this respect. The Ontario maps are made and the reports sent in by land-surveyors. There ought to be something like a good topographical survey. There is no doubt about that.

MR. LIONEL H. SHIRLEY,—I think it should be a direct trigonometrical map as nothing else will take its place. It is not a too expensive operation for the Government to undertake, and if once it is laid down all the rest will fit in accurately afterwards.

### SUCCESSFUL GOLD MINING IN NOVA SCOTIA.

THE SECRETARY,—I rise, Mr. Chairman, to correct an erroneous statement in one of the evening papers from which one would infer that gold mining in Nova Scotia was not a success. I need not say, in this company, that such a statement is wholly untrue (hear! hear!). In almost every instance where ordinary business prudence has been exercised in the selection of a property or in the choice of a manager, success has been the result and not failure. In many places the mines have been equipped with plants that will stand comparison for effectiveness and economy with those of any other gold producing country in the world. Among other successful mines at present yielding handsome returns to the proprietors I might mention the Golden Lode at Mount Uniacke, the New Egerton at 15 Mile Stream, the Richardson at Country Harbour, the Libbey Mine at North Brookfield, the Bluenose at Goldenville, the Modstock at Stormont, the Tuoquoy at Caribou and many others. The easy means of access, and consequent convenience of personal examination, the low cost of working, the cheapness of labor, fuel and supplies, the permanent nature of the deposits as inferred from their geological structure, are all good and sufficient reasons why capital should find remunerative investment in the extensive area of gold measures of Nova Scotia. (Applause).

MR. A. A. HAYWARD, MOUNT UNIACKE, N.S.,—I should like to say a few words with regard to Nova Scotia gold mining. I came to the Province about 15 years ago and the opinions that I formed were that Nova Scotia possesses exceptional advantages for mining. I know of one mine which has been successfully worked down to a depth of 900 feet and I believe there are other mines there working down to about the same depth. It seems to me that Nova Scotia offers as many advantages for mining as any other part of the Dominion. I have also heard it said that the titles in Nova Scotia were somewhat defective, but during my time in Nova Scotia there has been comparatively little litigation in comparison with other countries, and in no instance has it been from imperfection of titles but from people attempting to break titles. I have mined successfully there for 15 years with very good results. (Applause).

### THANKS TO THE INTERCOLONIAL RAILWAY.

THE SECRETARY:—On behalf of the Institute, and particularly on behalf of those of our members who have travelled to this meeting from the Maritime Provinces, I desire to express our cordial acknowledgement of the courtesy of the management of the Intercolonial Railway in placing exceptional facilities for travelling over their line to our meeting; not only were exceedingly low rates given to our delegates but everything has been done by the Passenger department to make things pleasant for our Nova Scotia friends on so long a journey. Mr. Price, who has looked after the interests of our Neva Scotia delegates, is particularly deserving of our recognition for his admirable efforts on their behalf and I have much pleasure, therefore, in moving that the best thanks of the Institute be conveyed to him. The motion was carried unanimously.

### ELECTION OF OFFICERS FOR 1897-98.

Mr. George E. Drummond, President of the General Mining Association of the Province of Quebec was unanimously elected President for the ensuing year and Mr. B. T. A. Bell, Editor of the *Canadian Mining Review*, Secretary-Treasurer.

Mr. Penhale, seconded by Mr. Hopper, moved that a hearty vote of thanks be tendered to the Secretary-Treasurer for his very efficient services during the year. Carried.

The meeting then adjourned.

### MEETING OF THE FEDERATED BOARD.

A meeting of the Council of the Institute was held immediately after, Mr. George Drummond, President, on the chair. After some discussion of the affairs of the Institute and its work during the ensuing year the following resolution, moved, by Mr. R. T. Hopper, Montreal, seconded by Dr. W. L. Goodwin, Kingston, was adopted:—

*Resolved*:—That the Secretary-Treasurer be authorized to draw upon each of the Societies in the Federation for the sum of $74.55 to liquidate outstanding liabilities for the calendar year 1896; and that the sum of two dollars per capita be assessed, payable quarterly, to cover operating expenses for the ensuing year.

The meeting closed at seven o'clock.

**ANNUAL MEETING OF THE MINING SOCIETY OF NOVA SCOTIA:**—The Mining Society of Nova Scotia will hold its annual meeting at Halifax, on Wednesday, 10th March, when it is hoped there will be large attendance, in view of the interesting programme prepared for the occasion. The following papers will be discussed: "The Gold Bearing Tailings of Nova Scotia," by Mr. F. H. Mason, F.C.S.; "Mines and Mine Management," by Robert Archibald, M.E., Joggins; "The Mechanics of Mining," by D. W. Robb, C.E., Amherst.

The annual dinner will likely take place in the Halifax Hotel in the evening.

**ANNUAL MEETING OF THE ONTARIO MINING INSTITUTE:**—The annual meeting of the Ontario Mining Institute will be held in Toronto, on Wednesday, 7th April, having been unavoidably postponed from Wednesday, 3rd March. A number of valuable papers will be submitted.

# SONG AND SENTIMENT.

## Mining Men Make Merry. Imposing Gathering at the Federated Canadian Mining Institute's Dinner. Notable Speeches.

The first annual dinner at the Federated Canadian Mining Institute was held in the Windsor Hotel, Montreal, on Thursday evening, 5th February, and was in every sense a pronounced success. Previous to the Dinner, His Excellency held a Reception, after which Piper Carruthers of the Royal Scots played the party to the banquet hall. Covers were laid for 160. Major R. G. Leckie, M.E., Past President of the Federated Institute presided, having on his right His Excellency, Lord Aberdeen, the Hon. Sydney Fisher, M.P., Minister of Agriculture, Ottawa, Hon. Thomas Chapais, Commissioner of Colonization and Mines, Quebec, Dr. George Dawson, C.M.G., Director of the Geological Survey, Ottawa, and Mr. Neve, A.D.C.; and on his left the Hon. W. S. Fielding, Minister of Finance, Ottawa, Dr. Anderson, United States Consul General, Montreal, Dr. Peterson, Principal of McGill University, Montreal, the Rev. Dr. Barclay, Montreal, Dr. A. R. C. Selwyn, C.M.G., late Director of the Geological Survey of Canada, Ottawa; Hon. Peter White, late Speaker of the House of Commons, Mr. John McKergow, President of the Montreal Board of Trade, Mr. T. J. Drummond, Montreal Car Wheel Co., and Mr. B. T. A. Bell, Secretary of the Institute. Among other guests noticed were Dr. Gilpin, Deputy Commissioner and Inspector of Mines for Nova Scotia, Mr. Goff. Penny, M.P., and Mr. M. J. F. Quinn, Q.C., M.P., Montreal, Dr. A. P. Coleman, Provincial Geologist for the Province of Ontario, Toronto, Dr. W. L. Goodwin, Director, Kingston School of Mining, Kingston, Dr. John Bonsall Porter, M.E., McGill University, Montreal, Lt. Col. Caverhill, Montreal, A. W. Fleck, Secretary, Canada Atlantic Railway, Ottawa, F. Aug. Heinze, British Columbia Smelting and Refining Co., Trail, B. C. W. H. Kelson, Canadian Pacific Railway, Montreal, W. H. Price, Intercolonial Railway, Moncton, N. B., Wm. McMaster, Montreal Rolling Mills Co., Montreal, J. W. Peck Peck, Benny & Co., Montreal, Donald McMaster, Q.C., Montreal and others.

The Rev. Dr. Barclay said Grace. During the dinner, which was served in the Windsor's best style, a number of choice selections were rendered by the orchestra. After dinner, the Chairman gave the toast of "The Queen which was loyally honored, the company singing right heartily the National Anthem.

### HIS EXCELLENCY THE GOVERNOR GENERAL.

The Chairman briefly and appropriately proposed the toast of "His Excellency the Governor General," the company responding with "For He's a Jolly Good Fellow."

His Excellency Lord Aberdeen,—upon rising to respond, received an enthusiastic reception. After the ovation had subsided, he said:—Mr. Chairman and gentlemen, I am very much impressed and very much touched by the cordial and kindly manner in which this toast has been proposed and received. As I was listening just now to the company joining so heartily in singing the National Anthem I could not help thinking that I had never heard it better rendered, and I also thought that when the time comes to return to the old country one of the things I would record in regard to Canada would be the enthusiasm with which throughout the length and breadth of this fair Dominion that noble song is honored (applause). Of course I do not admit that in England they are any the less loyal than in Canada, but they do not always succeed in expressing their loyalty and feelings in such good tune, such good tune, and in such good heartedness as we do in Canada. Let me also say that afterwards when another song was rendered that I thought I never heard that song, for effect and genial feeling, better rendered. I listened, though I did not join in any personal reference of course. Mr. Chairman, I can assure you that I am glad to be here. I am here in a twofold capacity; first, in an official capacity, and it is in that capacity that you have recognized and honored this toast to the person who for the time being has the privilege of representing our Most Gracious Sovereign. I am also here in the capacity of Patron of the Federated Canadian Mining Institute. It is a very good rule when one is asked to undertake any office, to enquire what are the duties of that office, but I confess that I entirely forgot on this occasion to make such enquiry. I, of course, accepted at once the privilege of being named its patron. (Applause). However, I have discovered that one of the duties of this office was to enjoy an uncommonly good dinner in uncommonly good company. (Applause). That duty I will always be willing to undertake on every occasion. But the reason why the Governor General is asked to be the Patron of this organization is because your operations and influence covers the whole of this wide Dominion, and therefore you look to the person who happens to occupy a position of a representative character, technically the head of the community, and ask him to be connected with an association of this kind, representing as it does in a very comprehensive, in the most far-reaching manner, the interests of the country at large. (Applause).

The present occasion is one of special interest and importance. Mining research and mining enterprise are no new things in Canada, but recently the various societies and organizations devoted to this undertaking in different parts of the Dominion have been federated and centralized and the present is the first general gathering since this desirable arrangement was effected—desirable not only in regard to the advantage which it may be expected to produce in a direct manner, but also because any well-considered movement in the direction of co-operation on the part of different bodies has a helpful influence. (Applause.) We are all ready, and with good reason, to praise and magnify the greatness and the resources of our country; but it is possible that when we have to take action in any particular direction, there is a tendency to allow what is supposed to be for the advantage or the magnification of our own particular province or locality to obscure our view as to the benefit of the community in a wider, a national sense. (Hear! Hear!)

There is another reason why this Federated Mining Institute should be regarded with public satisfaction and approval. We all know that when any special development is attracting attention, there are plenty of people who will be on the alert to secure an advantage for themselves,—as the phrase is, to turn a penny,—but not altogether perhaps an honest penny, (hear, hear), and in no form of enterprise is there greater liability to this than in that of mining. Nor is it very easy to see how this can be prevented. As long as there are "Simple Simons" going about, there is likely to be a "Pieman" to deal with them. And in case the old rhyme is not sufficiently familiar to all, I may explain that I am referring to what is sometimes described as the "booming" system. (Hear, hear.) It is marvellous how ready many people seem to be to seize the first bait that is offered; and of course the harm is done not only to individuals but to interests as a whole. May it not be expected that an institution such as this, combining scientific knowledge with a stable position, may afford opportunities for spreading sound information which will be of practical benefit especially to "Simple Simon," if he will take the "trouble to apply for the needed information? (Applause.) At any rate it is quite evident that one of the purposes which the Institute places before itself is the checking of "booming" and artificial inflation in relation to mining speculation, and more particularly the prevention, as far as possible, of fraudulent or misleading prospectuses. (Loud applause).

I think the Institute and the public may be congratulated upon the nature of the proceedings of the present convention. I have had the advantage, as one of the lay members of the assembly, of listening to some of the papers and discussions of to-day. These had reference especially to mining in a portion of the Dominion which has for some time been attracting particular attention, not only throughout Canada, but in different parts of the world. I refer of course to British Columbia,—and it seems to be always improving on further acquaintance. (Applause.) It is perhaps natural that I should have been particularly glad to hear the papers regarding British Columbia, because while of course to the Governor General every part of the Dominion is in one sense of equal importance and interest, yet as an individual I cannot be wholly unmindful of the fact that in British Columbia I happen to have a nest—I do not mean the Crow's Nest (laughter)—I should be glad for some reasons if my habitat were there (hear! hear!)—but a retreat devoted not to mining but to horticultural enterprise, where, as my friend the Lieutenant Governor of Quebec kindly observes, the Governor General and his family are transformed into jovial farmers. Our joviality on a recent occasion was somewhat marred by an untoward accident of fire which consumed part of our premises, namely, the office; and I refer to that, in itself, somewhat small incident, because I observe that subsequently concern and anxiety were expressed in other parts of the Dominion as to an apprehended injury to public interests by the supposed destruction of State documents, &c., and therefore I wish to reassure anxious minds upon that point. It is true that there was a piece of Government (i. e. British Columbia) property in the shape of a telegraphic cypher code in the office; and when the alarm was given, I sallied forth, bent upon valorous deeds in rescuing this article; but a voice checked me,—a voice from that quarter which has hindered so many a man from rash and ill-considered action, though afterwards he is apt to imagine that it was his own prudence and foresight which protected him; the voice of Lady Aberdeen, "Remember the ammunition!" (laughter and applause.) It is marvellous what a quenching effect upon zeal in the matter of extinguishing a fire is produced by the thought of gunpowder stored in the building. In this case it was cartridges,—not cartridges for explosive purposes in mines, but for the chase; and we realized the danger that would have been incurred by entering the building, when a thousand or so of cartridges stored in it began to discharge themselves. The effect was indeed remarkable; it would have made a splendid Fourth of July Celebration in the United States. (Laughter and applause.) But I should perhaps explain that that ammunition did not belong to me—certainly not to the Government—but to my friend and Secretary, Captain Sinclair. I am sorry to say that he was the chief sufferer as to more important matters, for many of his own private papers were destroyed, and a good deal of extra work was occasioned to him by the necessity for re-copying other documents; but, as I indicated before, no original Government papers of any importance were lost.

Having referred to Captain Sinclair, I may be pardoned for going on to remark that the election of that gentleman to the Imperial Parliament as Member for one of the largest and most important counties of Scotland will have been observed with interest by not a few in Canada. (Applause.) His departure from this country will be a loss, a very real loss, to those with whom he was immediately associated, but it will be something more than that ; for the usefulness of the Governor General's Secretary, when the post is occupied by such a man, is something far beyond the sphere of personal convenience—it is of public advantage.

I merely wish to take this opportunity of saying that Canada is losing in him a most faithful servant, (applause) but he will remain a faithful friend, and you may be sure that if at any time matters affecting Canada are discussed in the National Parliament, he will be ready to take an intelligent part, contributing that practical knowledge and good sense which is generally apparent and is of real value. (Applause.) And it is surely well that it should be increasingly recognized that Members of Parliament have distinctly an added qualification for their duties if they have made themselves at least t some extent personally acquainted with the different features of the Empire. It is a good many years now since Lord Rosebery, having himself set an example in that respect, advocated the importance of this branch of political education, and since that exhortation was uttered i may say that I have been one of those who have noted its worth by having travelled in India and Australia, and also, long before I had any idea that I should be sent here officially, in Canada—and in the greater part of our tour round the world I was accompanied, as it happens, by the Member of Parliament of whom I have been speaking, Captain Sinclair.

Certainly I shall always take an opportunity of urging my younger friends in public life to take all opportunities of visiting the main portions of the Empire, commencing, of course, with Canada.

I must thank, you again, Mr. Chairman and gentlemen, for your kindness and cordiality on this occasion, and also for the kind manner in which you have listened to my remarks. (Loud applause).

Mr. G. H. McLeod sang "Scots Wha Hae" in his usual brilliant style.

---

### "THE PRESIDENT OF THE UNITED STATES."

THE CHAIRMAN.—Your Excellency and gentlemen, it is with much pleasure that I ask you to give a most cordial response to the toast which I now have to propose—the health of the President of the United States. (Applause). I ask you to do this to the President not only as the chief ruler of the great neighboring Republic and kindred nation, but also to the President as a man who has done his best to promote peace and good will among his own kith and kin. (Applause).

The toast was cordially received, the orchestra playing "Yankee Doodle."

DR. ANDERSON UNITED STATES CONSUL GENERAL, in replying said : Mr. Chairman and gentlemen, this friendly recognition of a neighboring Republic, who, although living under another flag, another form of government, are yet so frequently received and accepted by you as kinsmen, cannot but excite a lively emotion of gratitude and satisfaction in the hearts of all citizens of that country temporarily residing in your midst. (Applause). As such to-night, in behalf of the people of that country and for their chief executive, permit me to express to you my sincere appreciation and thanks for the manner in which you have received this toast. I accept your greeting and good will expressed with great pleasure. This pleasure is enhanced by the presence of the representative of Her Most Gracious Majesty and the fact that he has joined with you in extending this greeting. (Applause). It will be my pleasure, so far as lies in my power, to convey this greeting to those for whom it was intended as another and additional evidence of your desire to strengthen the friendship and brotherhood between the two great English speaking nations of the world. (Applause). Such an expression at this time may possess particular value and importance, for there never was a time in our history when rational action, when widespread and collective influence might be so potent in promoting, if not securing, the fulfilment of the desire and prayer of civilized people all over the world for ages, that peace on earth which is now foreshadowed by the negotiations pending between our two Governments. (Great applause). It is true we have some fire-eaters in the United States; I believe you have some in Canada also. (Laughter and applause). They certainly made their existence manifest on both sides of the line within the past year. It is not my province to discuss the causes which afforded the opportunity, but we remember with regret how the sparks of discord were fanned almost to a white heat, how black and ominous were the clouds over our head until the great conservative sentiment of both countries asserted itself and was heeded. (Loud applause). This disturbing element may be and I believe is greatly over-estimated, and I believe it may be greatly over-estimated for the same reason given by the farmer who happened to have a good sized pond on his farm, and hearing that a certain class of people in a hotel nearby were fond of frogs' legs, he went to the proprieter and offered to make a contract to deliver at a day's notice two car-loads of frogs. When the proprietor overcame his astonishment and declared that he could not possibly use so many, he finally compromised by agreeing to take on the following day six dozen frogs. The time came and the old farmer made his appearance with a basket in which there were eleven frogs, and made the statement that that was all he could find. "Why," said the landlord, "I thought you were prepared to deliver two carloads." "Well," replied the old farmer, "I thought there were two car-loads by the noise they made before I came here." (Laughter and loud applause). But even though their number may be small, His Excellency has already told you what the small boy with fire-crackers can accomplish, and it is well for us to remember that a healthy, well-formed mosquito can disturb, in the stilly hour of night, the tranquility of the best disposed individual, and we should remember also that the cow of Mrs. O'Leary gave a kick that resulted in the destruction of the City Chicago. (Hear, Hear, and applause). Hence I believe that we should join hands in putting up such safeguards as will prevent our over-zealous kickers and mosquitos from destroying our national prosperity. (Applause). Recently standing in the doorway of the banquet hall of this same hotel I heard the distinguished President of Harvard College declare that it seemed unthinkable that these two great nations, which enjoyed as great a state of personal justice and perfect liberty as any two nations ever did see, should relapse into the savagery of war for the settlement of differences between them. It does indeed seem hard to believe that we should relapse into such savagery. But while he spoke of his country and mine, there arose before me that four years of fratricidal strife and savagery, and the destruction of many structures, and my mind was carried, as no doubt was also that of the honored head of Harvard College, to the memorial building of that college, where in the central hall you will find the walls covered with inscriptions and tablets to the memory of those sons of Harvard who lost their lives in that same war, that relapse into savagery in our own country. I believe that while war was but an incident in its history, it admonishes us to spare no effort, to do all that we can to promote the ratification of that treaty that is now pending between Great Britain and the United States. (Applause.) Mr. President and Gentlemen, this is a meeting of mining engineers, I believe, and if the evening was long enough I should like to tell you what I don't know about mining, but the evening is too short for that. But there is one thing ; whilst I am here in the midst of scientific men, I should like to have explained—I am referring to the United States and our sections where the precious metals are found ; and I would like some scientist to tell me what there is in the atmosphere of such a country that tends so largely to exaggeration. (Applause.) A few years ago, out in the State of Colorado. I had occasion to pass a few weeks in a mining camp up in the classic shades of Buttermilk Gulch. Before taking the trail to that mountain resort I supplied myself with checked shirt, overalls, top boots and the other paraphernalia that was necessary, but when I reached the ranch an old miner there read through my disguise as easily as President McKinley does the lofty and disinterested patriotism of those who are daily visiting his home at Canton. I was put down as a tenderfoot. Shades of Munchausen ! what a feast of fiction was offered up to me during my few weeks stay there. Before I visited that country I used to think that it was a pretty strong story told by the man who wished to impress his friends with the almost inconceivable heights of the Himalaya mountains. He told them that one day when he was far up on the side of the mountain with his gun he shot at something in the air and when it fell at his feet he was horrified to find that it was a cherubim. (Great laughter.) I thought that a pretty strong story, but that man could not pass an examination to enter the primary department of that mining camp (Laughter.) Why, I was expected to believe and report that a shaft 88 feet in depth was 136 feet by actual measurement and a cloud of witnesses ; I was expected to believe and report that a vein of ore which I could span with my hand was from 18 to 26 inches in thickness ; I was expected to believe and report that a few stunted pines a mile or two down the gulch was a forest right at the mouth of the mine which would furnish stulls for a century ; I was expected to believe and report that the roadway up the mountain at an angle of about 45 degrees was practically a dead level, and so on through the whole category of mining camp surroundings. And to cap all, as I was about to leave the old miner expressed his regret that he had not had time to show me one-fourth of the merits of that mining region. (Laughter.) I thought I would leave something for his comfort, and I assured him that if I did not leave that country an accomplished liar it was not his fault. (Laughter.) I have no doubt, gentlemen, that you think I profited by my experience. (Laughter.) I should say, however, that that was before I had ever taken any part in politics. (Laughter.) I fear I am taking up too much of your time. (Cries of "Go on, go on.") I thank you again most sincerely, and I assure you it is no formal thanks. I thank you again for the cordial manner with which you have received the toast of the President of the United States. (Applause.)

Doctor Louis Frechette recited in a brilliant manner "The Battle of Waterloo" in French.

---

### "THE DOMINION HOUSES OF PARLIAMENT."

Mr. Geo. E. Drummond proposed the toast of the Dominion Houses of Parliament, coupling with it the name of the Hon. W. S. Fielding, Minister of Finance.

Hon. W. S. Fielding, Minister of Finance, in responding said:—Your Excellency, Mr. President and Gentlemen, I desire to express my very warmest thanks for the handsome manner in which the toast has been proposed by our friend Mr. Drummond and the hearty manner in which it has been received by the whole company. To me it is especially an agreeable duty to come to Montreal to-night and to participate in an assembly of gentlemen to whose intelligence, energy and capital we shall be so largely indebted for the future prosperity of the Dominion of Canada (applause). I have personal reasons for regarding the occasion as a pleasant one, because I have the opportunity of renewing very many pleasant acquaintances of former years, and also because the occasion recalls to me many very agreeable events of past years when in my own province I had the opportunity of enjoying the good company and the generous hospitality of the mining fraternity (applause). Indeed, looking around me to-night, I might also imagine myself down in Nova Scotia again. I well remember one occasion which was of a broader character, when the representatives of the mining industry in the province of Quebec went down east and joined their brethren of the Lower Provinces in that memorable meeting where they discussed mineral matters in the midst of the splendid mineral wealth of Cape Breton. I believe that meeting was of more than ordinary importance, because I understand it was the foundation of the occasion under which we are assembled here to-day. I believe that in the parlor of the Sydney Hotel one night, which I remember well (applause)—I hope my Nova Scotia friends will not think that I am going to give away any secrets—but I believe that in that parlor on that occasion there was prepared the beginning of the organization which has now taken the shape of the Canadian Mining Institute, and therefore, I recall that occasion with very great pleasure, not only for its social merits, but because of its connection with your present organization (applause). Nor am I likely to forget the memorable meeting in the city of Montreal when the American Institute of Mining Engineers had a very grand gathering in this great city, and I am sure that on that occasion much was done to advance the mining interests of Canada (cheers). And so, Sir, I have many reasons for regarding the present occasion as one personally agreeable to myself. If I were an older member of the House of Commons I might hesitate to speak much of it because I should be open to the suspicion of praising myself, but as I have but recently joined the ranks, as I am one of the cadets in the House of Commons, I am free to speak of it with greater warmth, and I venture to say, that all who have ever heard the debates at Ottawa will, irrespective of politics, be proud of the House of Commons of Canada (cheers) I remember when Charles Dickens came to America on his first visit—he came by a Cunard steamer to Boston—he spent a few hours at Halifax, and was present at the proceedings of the provincial Parliament, and in one of the chapters of "American Notes" he said of this event: "It seemed to me that I was looking at the proceedings of the British Parliament through the wrong end of the spy glass." That expression would not suit the Parliament of Canada however. I thought that what was in the mind of Dickens was happily that in the colonies he found that our Parliamentary institutions followed the principles, examples and traditions of the great Parliament of the mother land (loud applause). We have to-night at our Board a distinguished member of the Conservative party who presided over the deliberations of the last Parliament of Canada, and presided with great dignity and honor. (Applause.) And to-day, through the changing current of politics, another gentleman fills that high position, and fills it with great ability and honor—(applause)—and it is a great comfort to know that however we may differ—and men must differ in the Parliament of Canada—there is among the men on both sides of the House a desire to uphold the honor and dignity and the privileges of free Parliamentary institutions. (Cheers.) It has been so in the past, and I am sure, sir, it will continue to be so in the future. But while I speak of Parliament generally, I remember that after all I represent only the Committee of Parliament—that Committee which is called the Government. Now, it is difficult to speak of that Committee without trenching on the debateable lines of politics, but I am quite sure you will agree with me when I say that it ought to be possible to make passing allusion to public affairs, to political affairs, without giving offence to those who differ from us. (Hear, hear.) If I have any fault to find with the public just now, it is that they expect a little too much from that Committee called the Government. The Scriptures tell us that "to whom much is given much shall be required." And much has been given to the Government of the day in the way of public confidence and respect. We have the support of a loyal and generous party, and it is but right to say that among those who have opposed the present Government there has been, and is to-day, a warm and generous disposition to give the Government a fair chance and fair play. (Applause.) We have had many evidences of that disposition from gentlemen who have differed from us in the past, and who perhaps will retain the right to differ from us in the future. But while we ought to recognize, and we do recognize, the fact that among all classes in the community there is a strong disposition to wait a reasonable time and see what will come out of this Government, still there are some who have such a good opinion of the capacity of the present Government that they are disposed to expect too much of it; they would like it to accomplish in a single session what might well occupy their attention very creditably during the whole Parliamentary term. (hear, hear.) But while I am not going to make rash promises I think we may have the consolation of knowing that we may have a second parliamentary session—I do not go so far as to say a second Parliament—but there is the session which is close at hand and then another session, and if verything is not accomplished during the present session we can look forward to the Session that is to follow (laughter). Now there were three great questions in the minds of the people at the time that this Government came into power. Whether right or wrong we won (applause) and the people have been looking to this Government to deal with these three questions. First, there was that vexed question of schools, nominally local in its character but actually wide reaching in its character; that question which seemed to divide our people in a most unpleasant way. I am sure that every one in Canada will feel that he can rejoice if that question was considered settled. I do not suppose that any question could be so perfectly settled that there would not be somebody to say that it would have to be settled yet. I shall not dwell upon it further than to say this, that it is settled so far as any question of the kind can be settled in Canada. I make the statement with a full sense that it may be tested by time, when I say that that question is so far settled that no political party will take it up again. If that be the case, while I have the most profound respect for the men who do not agree with that settlement, I say whether rightly, or wrongly, that question is settled so far as political parties can settle it and it will not be taken up again by any political party in the present Parliament of Canada (applause). And if that be true and we have settled that question on these lines I think we may claim to have done something towards what will be for the making of Canada. Then there is the great question of tariff reform and that question has been occupying the attention of the Government in a very close way. I, at all events, must plead that I have had to give it very close attention, and this I will say that in view of the wide diversity of opinion that has been expressed at the various tariff meetings, we have no hope that we shall be able to please every body, but we have a strong hope that we will be able to devise such a tariff measure as will vindicate the policy laid down in the great Liberal convention which was held in Ottawa. Many of you gentlemen differ from that policy, but I think that policy is one to which we are committed, and if we are to win the respect of our friends.—Nay if we are to win the respect of our opponents—we must be true to the policy which we have proclaimed to the people of Canada. That was a policy of reform and not a policy of revolution (applause). To use the happy expression of Sir Oliver Mowatt, we are conscious of the difficulties of the position; we are conscious of the wide divergencies of opinion: but I want to assure this meeting that we are approaching this question with an earnest desire to carry out the principle to which we are pledged, and I believe we can do so in such a way as to do no injustice to any legitimate interest in the Dominion of Canada (applause). Then there was a third great question to which we had to give attention, and one which is a vital question to-day, because as we speak here to-night the train is carrying two of my colleagues to Washington to discuss with the American Ministers at the American capital better relations with our country to the South of us. We are conscious of the fact that it has been stated that we were too anxious to have friendly relations with these people. If that be an offence we plead guilty to it. We are anxious to have friendly relations with the United States. (Hear, hear). I know that there are extremists on both sides of the Line, as my friend the Consul General has said, who have tried to make trouble. I know we have a few people in Canada whose mistaken zeal has led them to believe that in order to be thoroughly British they have to be suspicious of their friends across the border. We believe that it is a mistake. I believe that every statesman will agree with me when I say that the people of Canada can do no better service to the mother land than by cultivating friendly relations with the people of the neighboring Republic. (Applause.) We are willing to admit that such has been our earnest desire, to cultivate such relations, and the responsibility has been cast upon us to approach our American neighbors and tell them candidly that such is our desire. We are going to make an earnest effort to bring about better relations between these two great peoples, because we believe that it will be better for the five millions of Canada and better for more than five millions across the line. But let there be no mistake. It has been the misfortune of the Canadian people at times to be misunderstood by our friends across the line. Living under Republican Institutions they have been led to believe that only under American Institutions can liberty flourish. We have shown them that that is a mistake; that in Canada, owning allegiance to Her Most Gracious Majesty, we could have a degree of liberty which is no less than theirs, and we are proud to declare that fact to them. (Applause.) And while we go to them with an earnest desire to bring about these better relations of which our friend the American Consul has spoken tonight, at the same time we are prepared to declare that we propose to be citizens of Canada and citizens of the grand old British Empire (loud and prolonged applause.) We propose to say to the American people, and we

believe we can say it in the name of the people of Canada, in the name of the best people of Canada, both Liberal and Conservative, that our earnest desire is to establish friendly relations with these people ; but if after we have made that offer to them they do not see it to their interest to agree with us—if they think there is no business in it for them, if they think there is no money in it for them then we can say that we have done it in good faith. If they reject our offer then we propose to gather ourselves together and say that as citizens of this great Empire we are going to work out our own salvation. (Applause.) And if there be within the great Republic people who are so ill-advised as to imagine that by any commercial policy they can adopt they can in the smallest degree interfere with our devotion and loyalty to the mother land, we say that they will discover by experience, if they have not already discovered it in the past, that Canada proposes first, last and all the time to be thoroughly Canadian and thoroughly British. (Loud cheers.)

Hon. PETER WHITE :—May it please Your Excellency, Mr. President and gentlemen, when I made up my mind to attend this banquet here to-night I little thought that I would be called upon to respond to the toast of the House of Commons, from which the will of the people have excluded me at the present time. I feel, Sir, that that institution is one of the great institutions of the English speaking people. I have had the pleasure of sitting in Parliament for a great many years. Mr. Fielding has been kind enough to pay me the compliment of saying that I presided over the deliberations of that body during the last Parliament with dignity and with credit to the Parliament of Canada (applause). I am afraid that in the kindness of his heart he inclines to be too complimentary in regard to the course which I pursued during that period of time. At all events whatever may have been my shortcomings and faults I endeavored to discharge my duty to the best of my ability, and in the discharge of the duty which I was called upon to perform during the last Parliament I can say with truth that all the members of Parliament on both sides of the House gave me the greatest assistance and the greatest possible consideration. We, Sir, in the Parliament of Canada differ in our political views. Some of us hold views in one direction and some in another ; those views are diametrically opposed to each other ; but whatever may be the political complexion of Parliament, whatever may be the political complexion of the party in power, my experience has been that every Member of Parliament has endeavored to the best of his ability to promote the best interests of the country. Whether Grit or Tory, Liberal or Conservative, the great desire of the Members of Parliament was to promote the interests of this—shall I call it a nation, Sir, I hope it will be (loud applause) ; and whilst I do not agree with the gentlemen who now control the destinies of Canada I admit with all frankness that I feel satisfied, and I am reassured by the statement of Mr. Fielding to-night, that those gentlemen are as truly Canadian as we pride ourselves on being (applause) Sir, I trust that when these gentlemen come to negotiate with a foreign country a treaty which will have for its object freer trade relations between these two countries—and I am glad to be assured by a responsible member of the Government here to-night—the interest of Canada will be first, last and always in their minds (applause) and that whatever may be the result of these negotiations that the interest of the people of Canada will not be forgotten by the Government which have been charged by the majority of the people of this country with the management of their affairs for the next five years. While naturally I am not going to say that I wish for them another Parliamentary term, they will no doubt have another session of Parliament, perhaps two, three or four sessions, but of course as disagreeing with them politically I naturally hope that they will not have the opportunity of another Parliamentary term. At all events, however, speaking with all candour I may say that I am prepared, because I cannot help myself, (laughter) to give these gentlemen the fullest opportunity during this Parliament to show the people of Canada what they can do to promote her interests. I will give them the credit of doing the best in their power according to their light to promote the interests of the country (cheers) I have been taken advantage of to-night and did not have an opportunity to prepare any set speech, but I may say that I am pleased to have an opportunity of expressing to this magnificent assemblage my thanks for the kind, hearty, and complimentary manner in which this toast has been proposed and the hearty manner in which it has been received (applause).

MR. G. H. MCLEOD sang, in fine style, "The Minstrel Boy" followed by the Zingari Banjo and Mandolin Club which gave some fine instrumental selections, the Hancock March being much appreciated.

---

### "THE LOCAL LEGISLATURES."

HON. C. C. COLBY, gracefully proposed the toast of the Local Legislature.

HON. THOMAS CHAPAIS, who responded said:—"Your Excellency, Mr. Chairman and Gentlemen, it is indeed a pleasant duty to be present here at this gathering as a representative of the Local Legislature. I would be most happy to give you a good English oration but I am sure that you have already noticed my very poor English ; nevertheless, I will try and address a few words to you in the language which is the mother tongue of the Mining Institute and of this gathering. (Applause). Gentlemen, I am here to-night to tell you that the Provincial Government and Legislature are in full sympathy with the objects of your Institute, with the great aims you have in view, and with your strenuous and praisworthy efforts for the development of the mining resources of the Province of Quebec especially, and of the Dominion at large. (applause). As a proof of that sympathy the Provincial Government has thought proper to give a larger place to the mining interests in the organization of our public department. We have now the new department of Colonization and Mines, and I may tell you that we intend to do our utmost in favor of the great cause to which you have devoted your energies and to develop the mining resources of our Province (applause). Sir, this is a very happy occasion for me to make my first public statement as the new Commissioner of Mines for the Province of Quebec and I will avail myself of the opportunity. Mr. Chairman and Gentlemen, I have the great pleasure in making known to you that the Government of the Province has finally decided by an Order-in-Council, signed to-day by His Honor the Lieutenant-Governor to give the Mining Association of the Province of Quebec a grant of $2,500 for the establishment (applause) of a mining bureau in the centre of this great city (renewed applause). That is to say we propose to give the sum of $1,500 for the annual rent during five years and $1,000 more during the first year for equipment and installation (applause). Mr. Chairman and Gentlemen, I do not want to detain you any longer in my broken English. I thank you for your kind reception ; I thank you for the noble manner in which this toast was proposed and received and I wish every success for the Federated Mining Institute and the General Mining Association of the Province of Quebec in their endeavors and labors (great applause).

Mr. G. W. STEPHENS, Jr., sang in splendid voice, "The Brigadier" in French, and Dr. Drummond recited his original poem, "Le Chasse Gallerie," and gave another original poem in response to a hearty encore.

---

### OUR MINERAL INDUSTRIES.

HON. W. S. FIELDING,—Your Excellency, Mr. President and Gentlemen, I shall only detain you a moment in proposing the toast which has been allotted to me, though one might be justified, having regard to the occasion and to the gentlemen who surround this Board in calling it the toast of the evening, "The Mineral Industries of the Dominion." I am sure we have all learned with satisfaction of the story that is thrust upon us from day to day of the magnificent discoveries of mineral wealth in British Columbia. To-night we have heard from the Hon. Mr. Colby some account of the splendid mineral wealth of Quebec, but I know that in the great Province of Ontario also there is a development of mineral wealth which bids fair to rival even British Columbia itself, and in the Province of Quebec we know that for a long time we have had mining interests of the greatest importance and to-day we go further into the Eastern Provinces we know there we have had for a very extensive operation in minerals, not only of coal—of which we produce two millions and more every year—but also gold and iron industries, which are attracting widespread attention. I may say that the public returns of the Province of Nova Scotia show that in gold mining they have had one of the most successful years in the history of the country (applause). I am sure that we can all agree with the remarks made by Mr. Drummond that we have reached the mining age of the Dominion. Whatever may be said of other industries we know that the mineral industries of Canada are one of her greatest natural resources and any one connected with the public affairs of the Dominion should be ready and willing to render such assistance as will give them a fair chance to be developed (applause). Without further remark I give you most cordially the toast, "The Mineral Industries of the Dominion." (enthusiastic applause).

MR. B. T. A. Bell,—Sang most acceptably, "Drill ye Terriers Drill" with a characteristic musical accompanient the fine chorus being taken up lustily by the company.

MR. F. A. HEINZE, (British Columbia Smelting and Refining Company) of Trail, B.C., was the first to respond to this toast. He said: Your Excellency, Mr. Chairman and Gentlemen I feel that the hour is growing late, and while I was notified by your energetic Secretary that I would be called to speak to-night and am therefore unable to plead the excuse of Mr. White and Mr. Colby, still I have considerable trepidation in in addressing you this evening. I wish to state before I start that while I have some profession to being a mining man, to being a smelting man and to being a railroad man, I have none whatever to being and after-dinner speaker. (Hear! hear!) Now I have been called upon to make some remarks about British Columbia. You have all doubtless heard of this virgin Province of the Dominion. I may state that I am one of the pioneers in the mineral development of British Columbia, and I am a firm believer in its future. I have spent large sums of money in the development of the natural resources of the Province, and in furthering the investigation of its possibilities. I believe gentlemen that there is no Province in the Dominion which offers greater facilities for investment to an enterprising man than British Columbia does to-day

(applause) I believe, however, that the mining industry of British Columbia has also at present a surfeit of what we of the mining profession call curb-stone brokers, men who mine on the curb-stone and not in the ground (laughter). I trust, gentlemen, that you as Members of the Federated Canadian Mining Institute will understand what I mean (hear! hear!) I have mined all over the United States, I have mined in Mexico and I have mined in Canada; I have done what I could to develop the mineral industry, the mineral resources of the different parts of this Province which have been brought to my notice, and gentlemen, I am forced to state that no region has ever come to my notice, which to my mind offers the possibilities that British Columbia does to-day (applause). We have gentlemen in that province an aggregation of wealth in the ground, which should I attempt to give you an adequate description might lay me open to the charge of being too enthusiastic, of going beyond the realities of the situation. And yet when you gaze upon the map of British Columbia from the time you start from the eastern side of the Province to the west there are indications which rival any part of the world in mineral possibilities (applause). As I said before, in a small way, I am connected with the railroad interest, with the smelting industry and with the mining industry. Mr. Heinze then referred to the great possibilities to the country to be derived by the development of the Crow's Nest coal field, the great resources of the Fort Steele district in silver, the Slocan, Trail and other camps which are now beginning to attract attention. In conclusion he asked them to join him in drinking success to the great mineral industries of British Columbia (applause).

Mr. W. H. Nichols, (Nichols Chemical Co. Capleton Que.) of New York, was also asked to respond. He said, Gentlemen, when the almost world renowned Secretary of this organization did me the honor to inform me that I was expected to address this gathering I wondered why I should be expected to say anything at a meeting like this, composed of mining men who knew the Province better than I did. Still as I thought it was due to my regard for the mining industries of the Province of Quebec my enthusiasm rose; but as I wended my way northward and as I reached your fair City of Montreal I found that that enthusiasm had almost entirely disappeared. The reason for this was not far to seek, as I felt my own inadequacy to do the subject justice, while to add to my discomfiture I have been placed between British Columbia cranks and a lot of Nova Scotia sharks (Oh! and laughter). What is a poor representative of Quebec to do in such company. I can say this, however, that Quebec may not have the mountains of British Columbia or possibly its natural gas (laughter and applause); she may not have the gold nuggets of Nova Scotia, although I have seen some very handsome ones which have been reported to me, a tenderfoot—as having come from the Province of Quebec. And yet after the old Province of Quebec has no cause to hide her head in this or any other assemblage. (Applause.) While she does not claim great riches in minerals yet after all she has done something for Canada and for the world in the development of her mineral resources. (Applause.) Quebec has furnished large quantities of what Canada has very much more of than what Canada needs I mean the phosphates (applause) where we find the possibilities of vast industry. This industry is now suffering from a "Florida Enchantment" but it will be heard from again. Quebec also possesses vast quantities of copper pyrites, which not only contains the metal which gives it its name but also the element which added to phosphates gives the fertilizer which Canada needs. It always seems to me that the farmer who needs it so much does not know the value of phosphates as a medium for replenishing his worn out lands. In the United States the annual consumption of fertilizers is 1,500,000 tons, or more; while in Canada the consumption is a very few thousand tons. The industry will have to remain a little dormant until the farmer realizes the value of these fertilizers. The province also supplies the asbestos product of the world, while its mica and chromic iron production is rapidly gaining prominence. Now Mr. Chairman and Gentlemen this is the first time I have ever had the pleasure of seeing a real Governor General. (Hear, hear and applause.) I came very near seeing one a while ago in the fact that my good wife who visited the House of Parliament at Ottawa with me in passing through the Senate Chamber was told that certain a place was the throne. She immediately seated herself upon it to see how it felt, so that I feel that I have a kind of passing acquaintenance with His Excellency (laughter). I was assured that he was a jolly good fellow. (Hear, hear.) I must say that from my intercourse with my brethern in Canada for a great many years he is simply a type of all the men with whom I come in contact. I have never met, and I can say it without flattery, and I have a wide experience, I have never met a more earnest and more reliable lot of men than I have met in this part of the hemisphere. (Applause.) I notice that you recognize the allusion. I have been very much interested tonight in hearing what the Honorable Minister of Finance had to say. What little I had seen of public men in Canada it so happens that I have been brought in contact with the gentlemen who have formed the other party. Of course, I have no politics in this country. On the other side of the line nobody knows what his politics are, as they change so often. In that country I am known as a mugwump. I know in Canada there is only one mugwump, the Hon. Peter Mitchell, (laughter) but in our country there are a great many mugwumps. (Hear, hear.) But I was never one of those who believe that all the virtue existed in one party, and while I confess to having watched the last election here and I noticed the result with a good deal of surprise—for I had been told that there would be only one result and that was the other—still my surprise did not result in any feeling of chagrin, because I recognize that there is no great party elected to power by any great people, with all the responsibly that that position entails, which will not do its very best, not so much to sustain its party as to do that which it believes it is best for the country. (Applause.) And after what the Hon. Minister of Finance had to say tonight I found that the country was as safe as it always had been, and as far as my interests are concerned I leave them in his hands and in the hands of his coadjutors, knowing that if they make a mistake of the head, I feel confident that they will not make a mistake of the heart, and knowing that the people will be relied upon to correct that mistake. Now, gentlemen, I did not intend to take up so much of your time. I will take my seat in a moment. I have said very little for Quebec. Quebec speaks rather by actions rather than by words. I believe in its future. It has already shown its interest in the mining development by a grant to the Institute from its Provincial Legislature as we have heard tonight. I sincerely trust that the Dominion will find it to their interest to also make a grant, and that they will continue it indefinitely, as I believe it can be shown to be in the interests of the whole Dominion. (Applause.) As a taxpayer I would be willing to have my burdens increased in that direction. I thank you for the courtesy extended to me, a stranger, but I can assure you that I will be glad of the time when I decide to cast my lot in this direction. (Applause.)

Mr. Wilkes here sang, "Drinking" very acceptably

---

### OUR MINING SCHOOLS.

Mr. B. T. A. Bell,—May it please Your Excellency, Mr. Chairman and Gentlemen, at this late hour I do not propose to say a single word in respect to the next toast on the list. In this company it is wholly unnecessary to eulogise the work of our Technical schools. I ask you to drink a rousing toast to "Our Mining Schools."

Dr. Goodwin of the School of Mining, Kingston in responding, said:—Your Excellency, Mr. Chairman and Gentlemen, at this late hour it would ill become me to say more than a very few words in response to this toast which you have drunk with so much enthusiasm. It has been hinted several times this evening that miners are not very truthful, and as this accusation has been received in silence, we may take it for granted that it is, to some extent, true. (Oh!) There are two other classes of men who are not considered very truthful, namely, lawyers and those whom we may call horsey men. I have heard it whispered that lawyers have redeemed themselves from this imputation and the third class might be said by some people to be beyond redemption. But I think we may consider that the miners are open to salvation, and it will be one task of the mining schools of Canada to do what they can to convert them to honest ways (applause). We have heard this evening a great deal about the mining possibilities of Canada. It will be one of the tasks of the mining schools of this Dominion to turn out men to convert these possibilities into probabilities and ultimately, we hope, into paying realities. The school which I have the honor to represent in particular is not yet four years old, but it is I am happy to say a vigorous and growing school, full of promise, and I hope, perhaps, in some respects, owing to situation, that it is likely to grow as rapidly as the demand for the kind of men which the country needs. I thank you again for the kindly manner in which you have received this toast (applause).

---

### OUR GUESTS.

Mr. A. W. Stevenson,—Your Excellency, Mr. Chairman and Gentlemen, the toast I am about to propose is one of the most important on the list. We have with us this evening a great many very distinguished guests, and I only regret for the sake of those present that we will not have the pleasure of hearing from them all. We have with us the Rev. Dr. Barclay (applause), a gentleman that we see too rarely on occasions of this kind and therefore, we all the more appreciate his presence this evening. We have with us Principal Peterson of McGill University, a gentleman known to you all. We have also with us the president of the Montreal Board of Trade, Mr. McKergow, as well as Mr. J. H. Perreault, of Chambre du Commerce; also Dr. Dawson of the Geological Survey and our old and esteemed friend Dr. Selwyn. We have representatives of the Banking and Railway interests of the Dominion, but with your kind permission I will ask Dr. Barclay, Mr. McKergow and Principal Peterson, to reply to the toast of "Our Guests."

Rev. Dr. Barclay, who was the first to respond said: "Mr. Chairman, Your Excellency and Gentlemen, I very greatly appreciate the kindness which has made me one of your guests this evening. When I received the invitation I felt the honor but I did not fully appreciate the extent of that honor until I

read the address of your President in this morning's papers. I had always looked upon mining as one of the principal industries of the world and upon miners as a very important factor in the human race. But I never knew until I read that address that mining was the industry of the world upon which the others were dependent, and the industry which more than all others promoted the culture and civilization, the material and social improvement and welfare of the human race. Your President said that mining was the basis of all the progress and civilization of our race and that miners were the converters of countries and continents (hear, hear). He called mining the Queen of Science, and to this science he gave a handmaid, which he called metallurgy and mining and metallallargy requisitioned into their service nearly all the other sciences. I noticed, however, that there were two sciences to which he owed no indebtedness—astronomy and theology. I was not very much surprised; indeed I thought it somewhat natural because these two sciences dealt mainly, theology with the things that are above and mining with the things that are below (laughter and applause). Well, notwithstanding the the fact that he made no acknowledgement of indebtedness to the science of theology—I do not specially recognize any connection between mining and theology—I do not feel the least bit from home because I am surrounded by miners. From what I have sometimes heard and sometimes read and from what I did hear from Dr. Anderson to-night I came to the conclusion that theology, of course in a somewhat deluted form, might be offered to advantage to some of your mining centres and mining camps (applause). After all human nature everywhere is very much alike and human industries and governments have a marvellous similarity. Our occupation after all is a kind of mining, a very difficult kind of mining, and sometimes a very disappointing kind of mining. Our duty in life is to try to discover and to develop the true metal of humanity (applause), and in our endeavors and researches we come upon some of the most unlikely and some of the most unpromising surface, and yet by patient endeavor and by genuine honest work we sometimes discover a little of the true metal; and I am sure you will agree with me when I say that of all the discoveries and developments that we know there is none that yields better interests and adds more to the exchequer of humanity (applause). It is very hard sometimes to find even a trace of the true metal and when we do find it is so mixed with alloy that in vain would your best mechanical appliances assist in the separation. We too, like you, have constantly to change, vary and modify our appliances and instruments, but I think that you will admit that after all we have not been the less useful and less successful in developing the true gold of humanity. (Applause). We have also a different kind of mining to do. We have got to dig deep into the ponderous tomes of ancient and modern lore, to mine all the wealth and also the folly of passing centuries. I myself have dug deep into some of these volumes and found as a result that I had a ton of alloy and scarcely an ounce of gold and thankful even for that. When we do meet with a little of the true metal we find that the people do not want it. They prefer the alloy, and they keep to it and they cling to it. (Hear, hear). We have also another difficulty, that when after a great deal of laborious research we get a little of the precious metal there is no rush on the part of the public to secure it. We cannot boom it (Hear, hear). I am very glad that you recognize the clergy to-night. I sometimes feel that we are not sufficiently recognized at public occasions of this character. (Hear, hear). I congratulate you on the importance and success of your meetings and I congratulate you most of all upon your expressed determination that whatever desire you may have to see your interests advanced you are resolved to protect the ignorant and the innocent, the unsuspecting and credulous public from fraud. Analogy runs throughout the whole of life, and I always think that iron and gold are the natural allies for integrity and honesty, and that they may be united is my earnest hope, and I know that it will be your earnest endeavor to continue that union. (Loud applause).

Mr. JOHN MCKERGOW, President of the Montreal Board of Trade, was next called upon said:—Your Excellency, Mr. Chairman and gentlemen, I have very few words to say to you at this late hour of the evening, but representing as I do the largest commercial body in this Dominion I wish to heartily congratulate you on the success which seems to have attended your meetings. I have no doubt that to many people it was a revelation as it has been to me, that the mining industry of this Dominion is of such importance, has attained such vast proportions. I think that in many ways of late, what we might call the boom in the mining industries of British Columbia, will indirectly do Canada a great deal of good. It brings the name of Canada before the world, and I have been very much pleased to-night to hear that this Mining Institute has set its face against any wild cat schemes, against any unprofitable schemes which will result in loss to those who put their money in them. (Applause). Evidently from what has been said there are plenty of solid mines; there are enough mines that will pay a good return on the investment, and I think something should be done to place these before the public so that the wheat and the chaff might be separated. (Applause.) There is another point in which the mining industry of this country is a very great benefit from a commercial point of view. The miners are producers. They produce the wealth from the soil. They are also large consumers and in that way they are a great benefit to the agricultural and the manufacturing industries of this country. It is with great pleasure that I express the hope that in the future the mines of British Columbia will be opened up so that a large immigration will flow into that Province and find profitable employment. The adjoining territories and also Manitoba will find a home market for their produce which it needs. They have been beginning of late years to offer wheat and grains, and with a large market in British Columbia they can follow their farming successfully and in that way prosper. I am much pleased with what I have heard to-night and I thank you for the opportunity you have given me to say a few words; on behalf of the body which I represent I heartily congratulate you, and I hope that when you have a meeting again, as I presume you will yearly, you will be able to report great progress. I thank you gentlemen for the kind attention you have given me. (Applause).

Mr. L. L. BROPHY, of the Mines Section, Geological Survey of Canada, then gave a topical song which he had specially composed for the occasion, and which was enthusiastically applauded. Some of his verses were as follows:—

If you want me to sing you a topical song,
I can sing till the sweet bye and bye;
It may be all right and it may be all wrong,
You'll know best in the sweet bye and bye.
But on one point I trust, that you all will agree,
If there s anything wrong, you won't blame it on me,
And I'll mention some things, that perhaps you may see
Come to pass in the sweet bye and bye.

Now I known that of course you're not out for the dust;
It's no use in the sweet by and bye;
Your motto I'm told is "Be healthy and just,
And lay up for the sweet bye and bye."
If, however, by some, vulgar wealth is preferred,
Just float a few "wildcats," no risk is incurred,
At least, not just now, your reward is deferred,
It will come in the sweet bye and bye.

We have men here to-night from way down by the sea,
Come again in the sweet bye and bye;
We've had tales of Quebec and tall yarns of B.C.
There'll be more in the sweet bye and bye.
Though in mineral riches these regions abound,
They're really "*not in it*" with what we have found;
We have *traced* miles of coal, just a foot underground,
'Twill be there in the sweet bye and bye.

I see here and there some retiring M. E.'s;
May they live till the sweet bye and bye.
Don't you think sweller titles might some of them please,
You'll find out in the sweet bye and bye.
Now that Canada's mining has reached such a stage
And Jubilee honours will soon be the rage,
I hope they'll have letters enough for a page,
And a few for the sweet bye and bye.

The papers are full of a district called Trail,
And its chance in the sweet by and bye,
If the prayers of the "widows and orphans" don't fail,
It may last till the sweet bye and bye.
Now to Rossland's shrewd boomers, great schemes owe their birth,
Which to some may bring sorrow, to others much mirth,
If its cheap stocks advance, *servant girls own the earth*,
And wont work in the sweet bye and bye.

Dr. PETERSON, Principal of McGill University, also responded. He said: Your Excellency, Mr. Chairman, honorable gentlemen and gentlemen, the knife of the executioner in the shape of the Chairman's inevitable mandate has fallen upon me. I am the last guest to intervene between you and the banquet hall deserted, and I rather fancy probably one of the last speakers who will endeavor to satiate that somewhat unconscionable bid for oratory which since my citizenship here I have noticed is one of the great characteristics of this Dominion. Gentlemen, I came here in what was I hope the laudable and the creditable aim of developing my education,—an education which I am free to confess to you must be said from many points of view to have only commenced when I came to Canada. I do not know very much about mining; it may be that I have been at times solicited to take some personal interest in the subject something of that speculative interest which whether with good or evil results, tends to lend additional interest to one's study of the daily newspaper. Hitherto I have not succumbed to this solicitation, and I am rather inclined to remember to-night that I also stand before you as the head of one of your great mining schools. I have had much pleasant intercourse with my neighbour the American Counsel, and I am disposed to call your attention to the fact that during your proceedings for the last day or so you have had the co-operation of McGill University. (Applause). You have also had the co-operation of one

for whom I have the profoundest respect, my friend Dr. Porter, and also Mr. Hardman (Applause), to whom we were greatly indebted last winter at McGill I refer to this fact to show you the cosmopolition aims that McGill cherishes in securing for every department the very best talent available, no matter what country that talent may represent. (Hear, hear). I heard Dr. Barclay say that human nature is the same all over the world, and it would seem so according to what was said by Mr. Nichols when he told you how his wife sat down on the Throne in the Senate Chamber at Ottawa. It reminded me of an incident which occurred a few months ago when I had the great privilege of attending the 150th anniversary of Princeton University. I stood there on an elevated dais with President Cleveland, and with that charming lady, his wife, and as soon as the place was cleared, and we retired, lingering behind for a time to study the characteristics of the crowd, I noticed how every woman who could possibly achieve the feat rushed to the dais and sat down on the chair that had been occupied by that gracious lady. (Laughter). "Is this where she sat?" was the question which rose to their lips. (Laughter). Gentlemen, I think that we had there again testimony to the fact that human nature is the same all over the world, no matter under what institutions we live. I am very glad to have been present to-night not only for my personal interests, but also that McGill may do something to develop these cosmopolitian interests, and to develop further that feeling of the brotherhood of nations which is so important for this Canada of ours. (Applause). I shall say a single word in thanking you for remembering me, a new comer, a new settler, one ignorant of many of the things you have at heart, but one who yields to no one else in this country in his desire to further everything that is for the best interests of this Dominion, and who on the plane that has been alloted to him, to fasten every indication of popular sentiment and popular interest,—to attach you and those whom you represent to that institution to which my life will henceforth be dentified. (Applause).

---

**"THE CHAIRMAN AND SECRETARY."**

LORD ABERDEEN :—I am afraid Gentlemen, that when you see me rise you will be afflicted with a certain sense of nervousness, because as you have been reminded I am a British Columbia farmer, and as Mr. Nichols observed there is natural gas in British Columbia and at this late hour of the night you do not want a supply of that article. But I can promise Mr. Nichols and you gentlemen, that if we establish a natural gas company in British Columbia, it shall be a limited company. (Laughter.) My excuse for rising is that there is another toast that we should honor before separating and that is the toast to the Chairman, and before we drink that toast let me say a few words. I think we may certainly congratulate the Chairman for the manner in which this evening has passed off. It is a notable occasion. In addition to the great interest which has brought this meeting together, there is another interest which is represeuted here, and which has not been referred to the plough. It does not make so much noise as the drill, but the plough is a very important matter for the farmer and also for the miners. You, Gentlemen, must be fed and we farmers desire to turn an honest penny to supply your wants. I am glad that the Dominion is also represeuted by the Minister of Agriculture, Mr. Fisher (applause) who has kept himself in modest silence. He is here, not only personally but in his official capacity to show his desire to recognise this important interest. I congratulate the Chairman in presiding over such a gathering and also in the manner in which it has gone off. Dr. Barclay has humourously referred to his address, but I had the pleasure of sitting under his aegis this afternoon. I am sure you will all heartily join in drinking this toast. (Applause.)

THE CHAIRMAN, (Major Leckie) :—Your Excellency and Gentlemen, I feel more deeply indeed than I can express to His Excellency the very kind manner in which he has proposed my health and to you Gentlemen for the cordial and enthusiastic manner in which it has been received. During the last year or more we have heard a good deal of Ian MacLaren and his charming sketches of Highland life and character, and I daresay that your Excellency has not missed some of the philosophy of the baker of Drumtochty. You remember his opinion was that "There is a good deal of risk in attending a marriage because you never ken how it is going to end but there is no risk whatever in attending a burial". (Laughter.) Gentlemen, this is a kind of a marriage and a very joyful one it has been. It is a marriage of our federated interests and I trust that you shall never have any reason to regret the most excellent idea which inspired our Secretary Treasurer in bringing our Societies together in this Federated Institute. Gentlemen, he has been our inspiring genius, our guiding Counsel and friend, and while I thank you most cordially from the bottom of my heart for the kindness that you have displayed, yet we must attribute the success of our meeting and of this banquet to my friend Mr. Bell. We cannot I assure you overdo the cordiality with which we respond to the toast when I ask you to drink his health and also to thank him for his untiring energy in bringing about this most successful meeting (great applause).

Mr. B. T. A. BELL.—May it please your Excellency :—

Whatever work there may have been incidental to the inception of our Provincial organisations and their expansion into our Federated Institute has been amply compensated by this magnificent testimonial of your appreciation and good will. Mr. Chairman, I thank you heartily for your kindly references to myself, and you, my good friends all, for the very great compliment you have paid me and the very cordial manner you have responded to the toast (applause).

One of the most successful banquets ever held in the Windsor Hotel was brought to a close in the wee sma' hours ayont the twal, by the whole company joining with great heartiness in the singing of the National Anthem.

---

# NOTES FROM THE MINES.

## NOVA SCOTIA.

(*From our Halifax correspondent.*)

The new plant at North Brookfield is now in full swing and the new 20 stamp mill built by the Truro Foundry Co. is pounding away day and night. Mr. F. H. Mason of Halifax, is at the mine in connection with the new chlorination plant. We shall give a full and illustrated account of *the new plant* n our next issue.

---

Mr. Damas Touquoy has bonded his property to a Truro syndicate, and it is probable that the sale will be completed, in which case Mr. Touquoy wil leave us for some time. Mr. Tonquoy is an old land mark in Nova Scotia mines and his bricks have been coming up to Halifax regularly every month for a number of years, and there is no one who we are more pleased to see drop into our office than the genial Frenchman.

---

An attempt was made while the majority of the mining men were out of town at the Montreal convention to push through a bill compelling all engineers to become members of the Canadian Society of Civil Engineers. The bill passed the lower house and was up for committee before the Legislative Council. A deputation of mining men consisting of A. A. Hayward, F. H. Mason, C. F. Andrews, C. E. Willis and T. R. Gue waited on this committee and showed them the utter absurdity of the bill at least as far as mining men are concerned and the committee agreed to cut out their portion of it referring to the mining engineer, so the deputation retired and allowed other classes of engineers to put forward their claim for having their class removed also. We would be the first to favour the supression of bogus experts and to give our approval to any measure governing mining engineers, but the idea of asking a mining engineer to become a member of a society like the Canadian Society of Civil Engineers, which has little or no standing even in Canada, and which certainly has nothing in common with the mining engineer, is utterly absurd.

---

A Company has been formed to work the gold deposits at the Ovens, Lunenburg Co.

---

Truro has quite a mining boom on just now, the latest being a company applying for incorporation with the object of working mines in British Columbia ; they evidently appear to think that a mine is like a prophet—without honour in its own country.

---

The Bluenose Co., in Goldenville, have struck some very good ore in the Coberg lead, and we expect to see the returns go up.

---

The official Blue Book for 1896 is out and we shall have a few comments to make on it in our next issue. We see that the Brookfieid mine leads by a long way as a gold producer having turned out over 4,000 ounces of gold during the year. Fifteen Mile Stream comes next with 2,500 ounces, but none of the others reach 2,000 ounces.

---

Nova Scotians generally are proud of the very fine gold exhibit made in the Windsor Hotel during the Montreal convention of Mining Engineers held this month, but when our local papers come out with the startling statement that we don't want any foreign capital and we have nothing to sell we say most emphatically it is all "bunkum. This exhibit was got together

for the sole reason of bringing our gold industry to the notice of capitalists; we have the mines and we want the money to work them, and statistics will show that Nova Scotian gold mines when worked with proper economy will show favourable comparison with any other gold field in the world.

### ONTARIO.

The 10 stamp mill for the Saw-Bill Lake Gold Mining Co., manufactured by Fraser & Chalmers of Chicago, was shipped on February 5th. The shipment comprises: Blake Crusher, Challenge Feeders, 4 Compartment Browne Sizer, Frue Vanners, and three sets of Forged Steel Shoes and Dies, all wearing parts being in duplicate; It is said by Fraser & Chalmers to be the most complete mill of the size they have yet turned out.—Two 35 horse power boilers and a 70 horse power Corliss Engine, together with a saw-mill plant, are being manufactured by the Waterous Company of Brantford, and will be ready for shipment about the 15th of this month. The Saw-Bill mill building and camp will be lighted by a 75 light, 16 candle power dynamo.

A double cylinder Lidgerwood hoist, with a capacity of sinking 400 feet, together with a 35 horse power boiler, manufactured by The Jenckes Company, Sherbrooke, P. Q., have been shipped to the Hawk Bay Mine. The Compressor Plant for Hawk Bay is also manufactured by the same company and will be ready for shipment about the middle of February.

The Crystal Gold Mining Co., at Lake Wahnipatae is proceeding with the construction of the stamp mill being put up by the Jenckes Machine Co., of Sherbrooke. The mill is being put up under the specifications of Mr. John Hardman, S. B., the well known gold mining engineer.

Reports from the Seine state that a very rich strike has been made in the Ferguson mine being operated by the Seine River Gold Fields Ltd.

A large mill is also under construction here.

Mr. J. Burley Smith, M.E. writes:—It may interest you to know that we have cross cut the continuation of the Sultana lode running beneath the water in Bald Indian Bay, Lake of the Woods, by 3 diamond borings put down from the ice covering a depth of water of 15 feet. The width of the lode is 25 feet.

In our next number we hope to give our readers some particulars of the very interesting plant being constructed at Deloro to treat the mispickel ores of that district by the Bromo-Cyanide process.

Work of construction on the Foley mill is finished and before another week their 20 stamp battery will be in full swing. Ore is being run down daily over their tramway from both shafts. So far only one vanner has been erected. The ore at present in sight and on their dumps is of such a high grade and free milling character that the absence of vanners will not affect them seriously. A large force of miners is now engaged in this mine the output of which is increasing steadily in quantity and quality.

Machinery is also arriving for the Ferguson mine (The Seine River (Ont.) Gold Mines), the manager of which Mr. W. D. Ferguson left for England last month seriously indisposed. Their working force is 50 men. Mr. Whitley is the Engineer in charge.

Beyond these two places very little *regular* mining is in operation until the upper reaches of the Seine are reached *i e* at the Saw-Bill, Lake Harold and Island Falls mines. At the latter place Mr. H. Bruce Proudfoot, C.E. has been most successful in developing one or two prospects into, apparently, paying concerns—while the success of the Wiley Co., in the Saw-Bill and Harold Lakes has been simply phenomenal.

Mr. Walpole Roland, C. E., and M. E., is *en route* for this immediate section in the interest of foreign capitalists, and will visit all the mines under operations there.

### NEW BRUNSWICK.

In the summer of 1894 the Government of the Province of Ontario decided to adopt the policy of the Australian Government and purchase a Diamond Drill to be rented at a nominal price by mining concerns in the Province who wished to develop mineral properties by the use of one of these machines. After giving the matter considerable investigation, they purchased from the Sullivan Machinery Co., Chicago, one of their "C" Sullivan drills with complete outfit, and have been using it very successfully ever since.

The Province of New Brunswick had this same matter under consideration for some time, and, when the necessary appropriation was made, investigated the question of Diamond Drills very carefully. The Hon. A. T. Dunn, Surveyor General, visited many of the manufacturers of these machines and has just placed an order with the same company for a duplicate of the Ontario plant.

## THE SLOCAN AND ITS CONCENTRATORS.

By Raoul Green, B. A. Sc., Sandon, B.C.

The mineral bearing country herein referred to comprises that part of West Kootenay lying between Slocan lake to the west and Kootenay lake to the east, it runs north and south from Carpenter and Kaslo creeks to Kootenay River. It may be called the Slocan country though it includes the Kaslo and Ainsworth districts It is divided in two portions:—the silver, lead or slate district and the dry ore or granite district.

The silver lead district contains most of the country east of Slocan lake and north of Ten Mile creek—while the dry ore belt is mostly to the south east of Slocan lake and includes more especially that portion between Ten Mile and Lemon creeks.

The character of ore bodies in this latter district might first be mentioned.

The ore bodies are mostly in the form of quartz ledges carrying both gold and silver—the accompanying minerals being argentite, iron, pyrites, sphalerite, grey copper and native silver and free or combined gold.

This is a very promising country as the generality of ores is high grade running from 2 to 3 hundred ounces in silver and up to $90 in gold.

There are several paying mines in this district and quite a number of promising prospects, but as yet it is not as well developed as the silver lead districts it being much newer. The ore is sent direct to smelters as no system of milling has yet been devised. No doubt in the near future stamp mills will be seen in operation.

The silver lead district has many successful mines—which the writer will not attempt to enumerate or discribe—but will simply give an idea of the character of the ore and its treatement.

The galena runs in the lower grade properties from 60—80 oz silver with about 70% Lead—the higher grade galena contains 200 to 300 ounces and from 20—60% Lead.

The minerals mixed with the galena and giving it its value are grey copper, argentite, antimonial silver and ruby silver.

There are also carbonate ores which run from 50—150 oz silver and 20—60% Lead, and containing also considerable oxide of iron and sulphate of lead.

In a few properties adjoining the granite belt gold is found with the galena, generally not more than $10 to $20 per ton.

The galena specially in concentrating ledges is mixed with much sphalerite and spathic iron, while in others the vein is nearly pure, and ready for shipment without concentration. The larger ledges are all fit for concentration, there are now three concentrators in running order. They are the Slocan Star, the Noble Five and the Alamo or Slocan Coy's.

#### Slocan Star Concentrator.

The ore is carried down from the mine to the concentrator by means of a gravity tramway 1,700 feet in length. It is dumped automatically into the ore bins where after passing over a grizzly with bars 1" apart it is fed to a Reliance crusher of Blake type.

The portion crushed by the Reliance and that which passes through the grizzly goes to a set of rolls which breaks it to 3/8" ring.

The stuff is next taken by a belt elevator to the trommel where it is screened to 5 sizes. N, one, two, three, the largest sizes go separately to three 2 compartment double Hartz jigs while the two smaller sizes go to hydraulic classifiers which separate the whole in three sizes—which go to corresponding 3 compartment double Collom jigs—thus making in all six sizes.

The middlings of the Hartz jigs are run into 2 sets of rolls and thence to elevator which discharges into the trommel hence the process is continuous.

The middlings of the Callom jigs are carried down to 1 set of rolls, crushed, elevated, classified, and again fed to the Callom jigs.

The overflow from the classifiers is run into a large settling tank all the heavier material sinking to the bottom and hence flowing over 2 double deck slime tables. The middlings of these tables are crushed by 1 set of rolls elevated, classified, etc., and run again through Callom jigs.

The concentrates are run into 3 ore bins. While the first bin is being filled, the second is dried, while the third is emptied.

The overflow from these bins is run into the slime where it is given time to settle.

MOTER POWER.

A four foot Pelton with head of 450 feet furnishes the necessary power during spring and summer—but in winter time this is partly replaced by a 40 H. P. engine—to furnish wash water during winter time a flume 9700 feet in length was laid out by the writer last autumn, this, together with a feeder put in recently, furnishes all the necessary water.

The amount of water necessary for washing purposes in a 150 ton capacity concentrator is from 80 to 90 miner's inches—while 50 H.P. is ample enough to run it.

Capacity of Slocan Star concentrator about 150 tons turning out 30 tons a day of concentrates.

Both crude ore and concentrate ore shipped. The latter contains about 80 oz silver and 72% lead while the crude ore runs higher in silver.

NOBLE FIVE CONCENTRATOR.

The Noble Five Concentrator has just been completed and does not itself materially differ from the first described as it has to treat much the same kind of ore.

However in this the ore is carried down from the mine by means of a Bleichert or two cabled tramway—its lenght is 1⅛ mile and it has 50 buckets. I may say that both the tramway and concentrator are a perfect success in this as well as in the other cases.

THE SLOCAN MILLING COY'S CONCENTRATOR.

This has to treat higher grade ores—the concentrates sometimes running up to 250 ozs and over. A gravity tramway carries the ore from the mines to the bin from which it is fed to a Gates crusher ; it next goes to a set of rolls, is elevated and sized to Nos 1-2-3, which sizes go to corresponding Harts jigs.

Tailings of jig No 1, together with middlings of jigs No 2 and No 3 go to corresponding rolls.

The oversize from the trommel goes to a Huntington mill and thence to slide jigs—the middlings of these go to a settling tank and finally to 4 double deck slime tables, etc. It is seen that in this the process is essentially the same as in Slocan Star and Noble Five Concentrators except for the use of the Gates Crusher and Huntington mill.

Both types of concentrators work very successfully. The two former were built by Tom Mitchell and the machinery furnished by the Edw. P. Allis Coy—the machinery of the third was furnished by Fraser & Chalmers.

There is a probability that 2 or more concentrators will be put up this spring and greatly add to the output of the Slocan district.

The ore is no doubt an ideal concentrating one—no lead, or under 1% is lost in the tailings. Of course a few ounces of silver do escape in the cracks—but as a whole the concentration may be said to be a success. This country is going ahead rapidly and a great influx of capital is expected next spring.

---

**ELECTRIC MINING.**—A crippled coal miner of West Elizabeth, Pa., who has been confined to his house for several years, has invented an electric coal cutter with novel features. The machine cuts the coal with saws fastened to an endless chain which runs around a wheel on a swing arm, and is controlled by the operator. There are three different positions in which the machine can be placed, and the work it is to do is easily understood by the miner. Two men are required to run each machine, one for the cutter and the other for the drill, and it is started that they can make 2,000 bushels of coal ready for the shovellers in ten hours. They undermine, cut the ends, and drill the holes ready for shooting it down. The machine leaves the botuom smooth, making it much easier for the loader. It can be arranged to cut any depth desired, and the coal cut out by undermining is only one-fourth cut into dust, the other three-fourths being nut coal. The apparatus is mounted on a truck, and can be worked in a space four feet wide. The "Western Electrican," in giving this description, does not say whether a machine of this kind has actually been constructed and set to work, or whether it refers to the inchoate design only of the disabled collier. An account of what the machine has done would be more satisfactory.

**COAL WASHING PLANT.**—The devices resorted to for the washing of coal are now very numerous, but we question wether a sufficiently simple and inexpensive system has yet been evolved. The plain jigging arrangement whereby the coal dust is floated in water, and the shale and other impurities allowed to sink by gravity, has always appeared to us tolerahly efficient without much liability to derangment. The plant which now comes under our notice is illustrated and described in the "Colliery Guardian" of January 29th. It is a system which has been in operation at Murton Colliery for three years, and is said to have given much satisfaction. One novel feature is the washer, which consists of an articulated endless belt, with upturned sides, forming practically and endless trough. It is constructed of steel, 60 feet long between centres of drums, 3 feet wide, 8 inches deep, and is worked at an inclination of 1 in 18. The joints are intended to be water-tight without any kind of packing. The dry coal as it descends into this is driven with some force by a water spout. The impurities are precipitated in the trough, and the washed coal carried on to a suitable elevator. It is possible this arrangement may be quite efficient, but it is somewhat complicated, and we should think will be troublesome and costly as regards repairs. The endless belt forming the washer is ingenious, but we should of the joints remaining long water-tight. If leaky, the working of this machinery must be attended with some discomfort to the attendants. It has one advantage, and that is, that the coal does not require to be crushed before washing. The coarser grades of nut coal, as well as the finest duff will pass through the machine.

---

**IMPROVED FLEUSS BREATHING APPARATUS.**

A coal mine may be ventilated in the most approved manner,—fitted with the best appliances to secure safety to life, and may be worked with selected explosives and the safest system of firing, and yet we know only too well that such a mine has sometimes been visited by a fatal explosion. Any improvement, therefore, that will tend to save the lives of the workers under such circumstances ought to receive every encouragement. In a recent number of this journal we gave a brief account of a pneumatophor, invented, and put to practical use in Germany. This seems however, to be merely a modification of what is called the Fleuss apparatus, which has been long known in this country, and although it has been instrumentel in rescuing men from suffocation in certain collieries has not perhaps been as much used as it might have been. The reason of this is due in some measure to the clumsiness and weight of the earlier forms of the apparatus. But a considerable improvement has recently been effected by Mr. G. H. Winstanley, who read a paper on the subject at a meeting of the Manchester Geological Society. It is well known that the loss of life attending an explosion is due not much to the direct effect of the explosion as to the deterioration of the atmosphere which immediately follows it. The poisonous gases resulting from the after-damp have rendered it too often impossible for a rescue party to reach the victims, who are usually rendered insensible. The Fluess appartns was designed to enable a person to enter and remain in the most poisonous gases for a considerable time with safety. The rescuers carries his own atmosphere with him, and with an electric safety lamp, is enabled to penetrate to any portion of the workings that are not blocked by falls. In the new form, the apparatus is comparatively light, for its weighs not more than 30 lbs., and it carries sufficient oxygen, in compressed form, to serve tee person to whom it is attached, for three or four hours. Mhe oxygen clinder is strapped to the back, the breathing bag, charged with 4lb. of caustic soda, placed in front, and the corrugated inspiration tube connected to the bag and to the mask. It may be that even in its present form the weight is still objectionable, but Mr. Winstley has shown that by using a steel instead of a copper cylinder a considerable reduction in weight can be effected. As some little skill and experience is necessary in using the apparatus it seems desirable that in each colliery district a number of men should be trained to its use, and thus be ready at all times to put it into practical application whenever necessary.

---

**A DEEP BORE-HOLE.**—The deepest bore-hole in the world, says Mr. C. Zundel, in a late communication to the Industrial Society of Mulhouse, is one of 6,573 feet below the surface of the soil, made at Paruschowitz, near Rybrick, Upper Silesia. The previous record for depth was the 5,733 feet hole drilled some years ago at Schladebach, near Leipzig. The latter bore was made in search for coal measures, and 83 separate seams, some of considerable thickness, were penetrated. The hole was 12 in. in diameter at the beginning, and this was lined with a tube 0·4 in. thick ; at a depth of 230 feet the bore was reduced to 8¼ in. diameter, and thus continued for 351 ft. At this point the blue marl encountered became so compact that the diamond drill had to be used, and under the action of the water the marl swelled to such a degree that the diameter of the pipe had to be again reduced. The greatest difficulty encountered was the great weight of boring-rods as the depth increased. Though steel was used at a depth of 650 feet, the total weight of the tools reached 30,155 lbs. Under this weight ruptures of the rods were frequent, and an accident of this nature finally stopped the work ; about 4,500 ft. of rods fell to the bottom, and being jammed under a part of the tubing it was impossible to withdraw it. The diameter of the well at the bottom was 2¾ in. Temperature observations made showed 12 deg. Cent., or 53·6 deg. Fah., at the surface, and at the depth of 6,571 ft. the temperature reached 69·3 deg. Cent., or 157 deg. Fah. This is equivalent to an average augmentation of heat of 1 deg. Cent. for every 34·14 m. of depth, or 1 deg. Fah. for every 63 ft. These figures differ slightly from those obtained in other deep borings.

# COMPANY NOTES.

**The Invicta Gold Mines, Ltd.**—The following is exerpted from the report of the shareholders submitted at the annual meeting held in London on the 21st December last:—

"As early as possible after the incorporation of the Company, the Directors selected and despatched Mr. James W. R. Young as Manager of the property.

Mr. Young, immediately on his arrival, made an examination of the Company's claims, and reported in a very favorable manner in regard to both their extent and value. In his first report Mr. Young wrote: "The results of my examination of the mine and what tests I have been able to make are, that I am convinced you have a very valuable deposit of gold-bearing gravel extent, and the average value hitherto placed upon it appears to have been moderately stated."

The greater portion of the present season has necessarily been occupied in development work, in purchasing and fixing the requisite plant, and generally in preparation for washing on an extensive scale during the following year.

However, by pushing everything forward with energy it was found possible to start washing in the early part of August, but this washing was only carried on as subsidiary to the development and installation work going on at the same time. Under these circumstances the Directors are quite satisfied with the results obtained.

The Manager, in concluding his report reviewing the past operations, states: "From the experience and knowledge gained of the different portions of your property, the rich ground of the north and with improving ground on the south, I am fully justified in assuring the Directors of my belief that next year will place the Company on a profitable earning basis.

It is already known to the shareholders that, in addition to its deposit of gold-bearing gravel on the surface, the Company possess a 'deep lead' or lower channel of gravel, which is believed to carry large quantities of gold. During the present winter a shaft will be sunk with a view of testing this lower deposit."

The following is taken from the accounts:—

DR.

| | £ s. d. | £ s. d. | £ s. d. |
|---|---|---|---|
| To share capital authorized | 100,000 0 0 | | |
| Issued—85,000 fully paid up shares issued to vendors in payment for property, as per contra | | 85,000 0 0 | |
| 10,607 shares 15s. per share called up | | 7,955 5 0 | |
| | | 92,955 5 0 | |
| Less calls in arrear | | 1,212 10 0 | |
| | | 91,742 15 0 | |
| Add calls paid in advance | | 1 15 0 | |
| | | | 91,744 10 0 |
| Sundry creditors | | | 479 6 7 |
| | | | £92,223 16 7 |

CR.

| | | | |
|---|---|---|---|
| By purchase of property | | | 85,000 |
| By construction account— | | | |
| New dams, ditches, flumes, ground sluices, etc | | | 1,985 11 9 |
| Electric light installation | | | 20 9 9 |
| New buildings | | | 162 2 5 |
| Stores in hand | | | 231 15 10 |
| By Expenditure Account— | | | |
| British Columbia—From the date of the incorporation of the Company (August 29 1865) Manager's and accountant's | | 500 0 0 | |
| General expenses | | 656 18 4 | |
| Working Expenses— | | | |
| Repairs to buildings and works | 225 0 6 | | |
| Ground sluicing | 735 16 9 | | |
| Piping | 227 3 10 | | |
| Electric Light— | | | |
| Maintenance | 62 18 7 | | |
| | | 1,250 19 8 | |
| | | 2,407 18 0 | |
| Less— | | | |
| Sales of gold, including gold in transit | 1,189 1 8 | | |
| Transfer fees | 10 17 6 | | |
| Exchange account | 4 14 10 | | |
| | | 1,204 14 0 | |
| | | | 1,203 4 0 |
| London, from the date of the date of the incorporation of the Company (Aug. 19, 1895) to October, 1896, preliminary expenses | | 310 0 0 | |
| Directors' fees, law charges, office rent, salaries and general expenses (including stationery, printing, postages, cablegrams, etc | | 1,296 12 10 | |
| | | | 1,606 12 10 |
| | | | 2,809 16 10 |
| By Gold in transit | | | 905 12 4 |
| " Cash at Bankers and in hand— | | | |
| London | | 129 17 2 | |
| British Columbia | | 378 10 6 | |
| In transit | | 600 0 0 | |
| | | | 1,108 7 8 |
| | | | £92,223 16 7 |

**Cariboo Mining, Milling and Smelting Co.**—Through a typographical error in our last issue the dividend paid by this company on 7th December read $1,600 instead of $16,000.

# BOUNDARY CREEK MINING AND MILLING COMPANY.

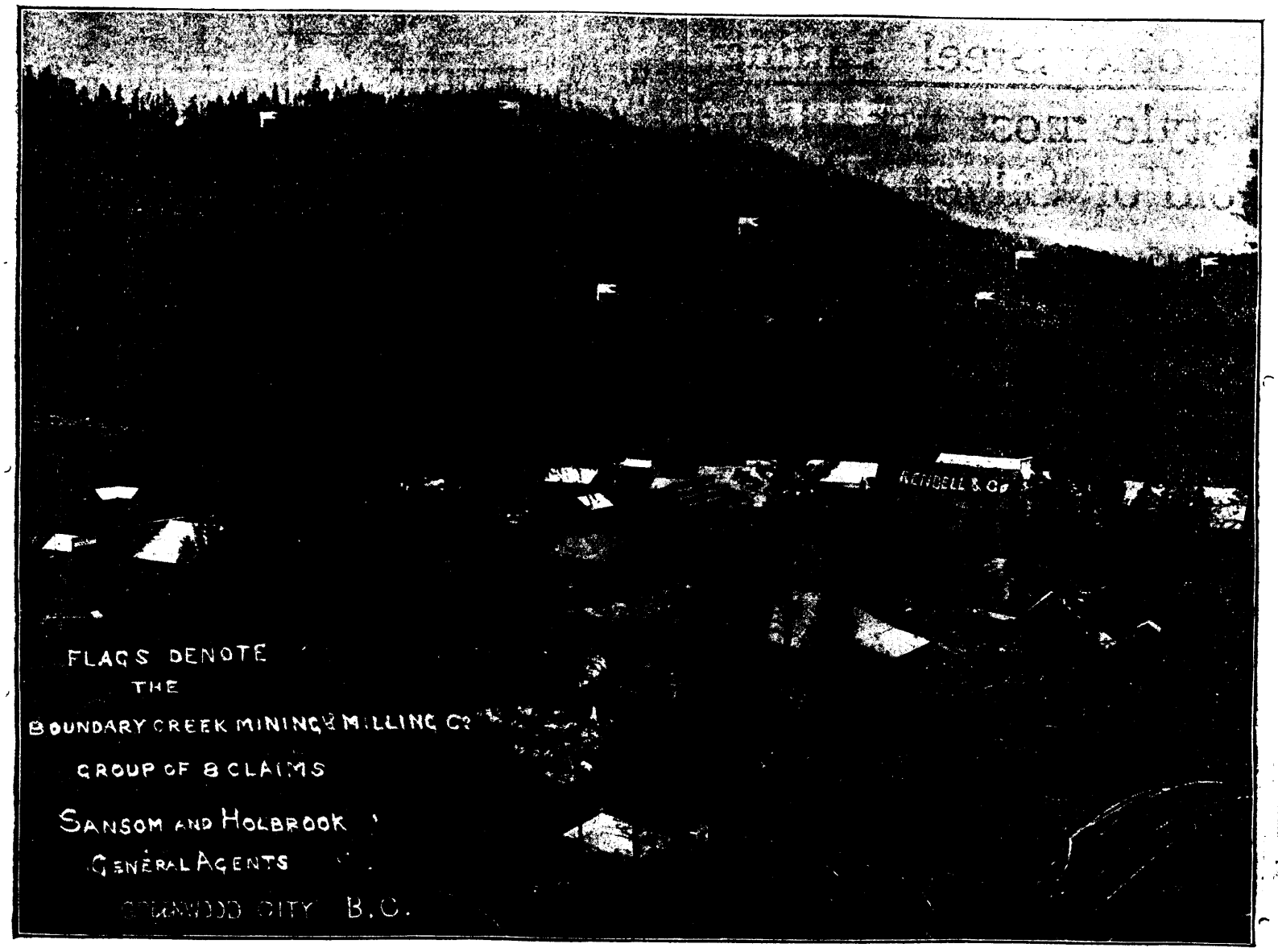
INCORPORATED OCTOBER 21st, 1896.

**CAPITAL, $1,500,000. - - - - 1,500,000 Shares at $1.00 Per Share.**

**. . 700,000 Shares in the Treasury for Development. . .**

THIS Company owns and operates a group of the highest grade in Gold, Silver and Copper properties in Boundary Creek.

EIGHT CLAIMS—The G.A.R., D.A., O.B., S.H.B., J.A.C., FRED D., S.F., and BIG LEDGE, constitute the group which is the most compact and advantageously situated of any under one ownership in Boundary Creek. The proposed Columbia and Western R.R., being surveyed to pass right through Greenwood City and along the base of the hill.




From the above photograph it will be readily seen that, lying as they do on a steep sloping hill the properties offer unusually good facilities for drainage and rapid and economical development, by main working tunnels driven in from the base of the hill.

The veins lie in the Granite Area—which occupies the upper part of Boundary Creek basin—along the line of contact with the more basic eruptures, and are among the oldest locations in the camp.

A small shipment of 8,653 lbs. was made to the Everett Smelter in 1894, yielding per ton, gold $103.15; Silver 74-7-10 ozs.; Lead 2 per. cent. and a considerable amount of shipping ore is at present on the dumps of the different claims.

Careful investigation is earnestly invited by the Company as their properties are being developed with a view to making mines and not to booming stock.

Shares in this Company can be confidently recommended in all respects as a strictly first-class investment.

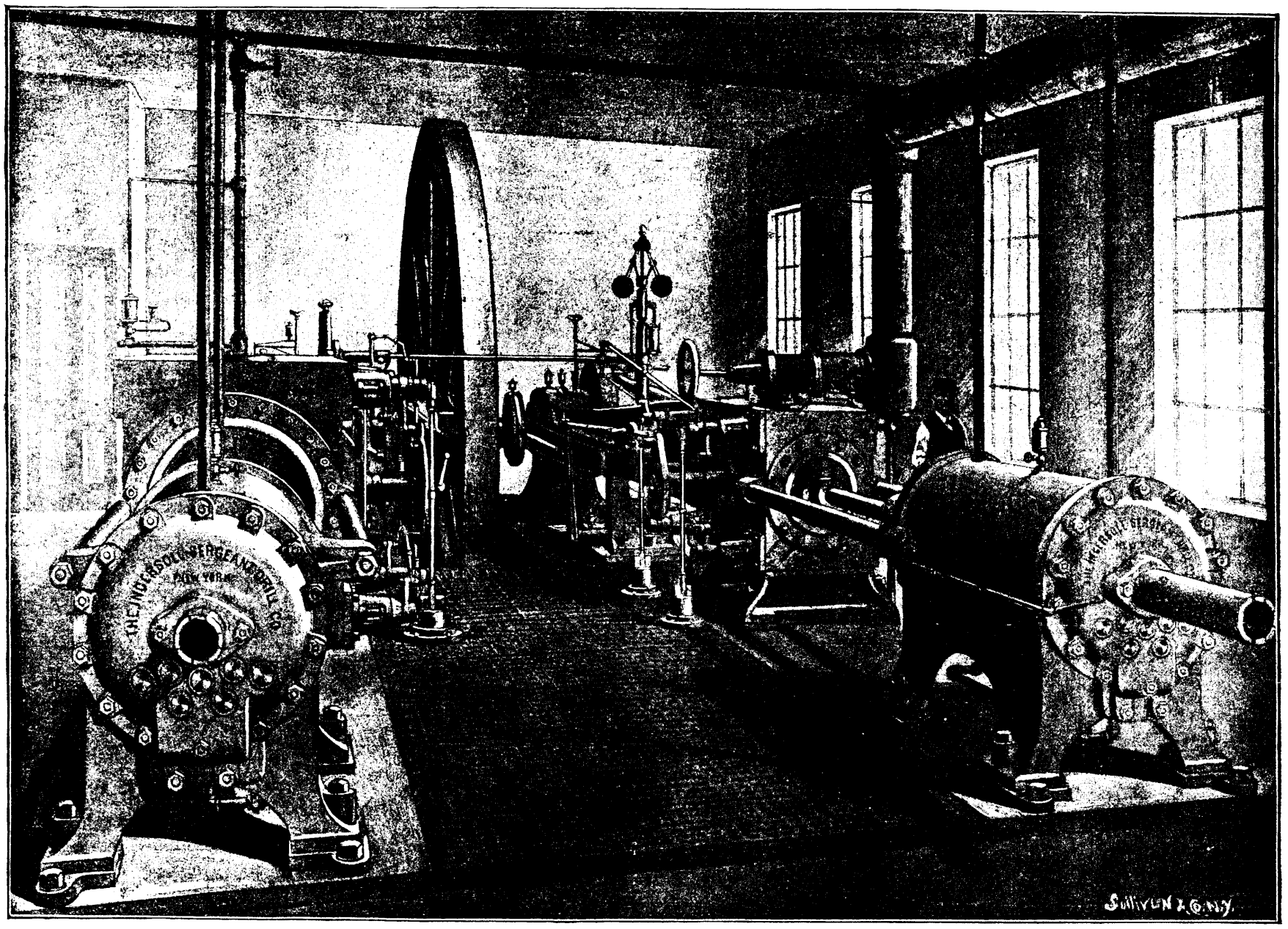
150,000 shares have been put on the market at 10 cents, and most of the stock so far sold has been taken up locally. A large proportion of the miners now working are also taking stock in payment. For further particulars address,

## BOUNDARY CREEK MINING AND MILLING COMPANY,

**SANSOM & HOLBROOK, - - - - Greenwood City, B.C**

# AIR COMPRESSORS.

## INGERSOLL SERGEANT PISTON INLET.




Corliss Cross-Compound. Air Cylinders 22 in. Diameter by 42 in. Stroke.

**We Supplied two of these Compressors to Dominion Coal Co.,Glace Bay, C.B.**

COMPRESSORS OF LATEST TYPES . .

BELT, GEARED WATER WHEEL OR STEAM ACTUATED

ESTIMATES CHEERFULLY FURNISHED.

# Ingersoll Rock Drill Co., Montreal,P.Q.

BRANCH OFFICES—ROSSLAND, B.C., AND HALIFAX, N.S.