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CIRCULATION.

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CONTENTS.

THE TWENTIETH ANNUAL REPORT OF THE ONTARIO BUREAU OF MINES.

The twentieth Annual Report of the Ontario Bureau of Mines has just made its appearance. While its statistics are brought up only to the end of the year 1910, yet there are many pages that include information gathered as late as March of the current year. This palliates the sin of tardiness. However, we can see no reason why the special reports, many of which must have been ready months ago, could not be published as "separates."

In the 301 pages of the Report there are presented many papers of exceptional interest. Inspector E. T. Corkill's chapter on mining accidents is praiseworthily complete. Mr. N. L. Bowen's description of the Thunder Bay silver region will stir up interest in that historic mining country. We quite concur in his belief that the district is worthy of attention. Dr. E. S. Moore, who writes on the Sturgeon Lake gold field, offers a word of warning. He advises against the hasty erection of mills before ore has been blocked out. Prof. M. B. Baker, who was sent by the Bureau to investigate the lignite deposits near the Mattagami River, sums up his opinion thus: "Beyond local use, "confined to the outcrops from which a few tons might "be economically mined, it does not seem that the lig-"nite of the Moose Basin has an economic value." Other papers, all of a high order of merit, are presented. It is, however, with Mr. T. W. Gibson's statistical review that we are presently concerned.

According to Mr. Gibson's official estimate, the value of Ontario's mineral output during the year 1910 was $39,313,895, showing an increment of more than 19 per cent. over the preceding twelve months, and of 53 per cent. as compared with the year 1908. As pointed out by Mr. Gibson, only in one year, namely 1908, has there not been recorded a very substantial gain since 1905.

Although gold is still a very small item in the returns, so impressive are its possibilities that we do not hesitate to deal with it first.

In the past year, only nine mines are on record as having produced gold bullion. These are the Gilmour, in Hastings County; the Havilah, formerly the Ophir, on the north shore of Lake Huron; the Canadian Exploration Company's mine at Long Lake, on the Sault branch of the C.P.R.; the Mikado mine, Lake of the Woods; the LePage and Norwalk, Michipicoten; the Swastika, Otto Township; and the Hollinger and Dome mines, Porcupine.

The total production of these mines amounted to only $68,498. Inconsiderable as this may seem, it must be remembered that a vast change has been effected

in the status of gold mining in the last twelve months. Before Porcupine was exploited, the man who suggested spending money upon an Ontario gold prospect was looked upon as possessing more than his share of temerity. Since Porcupine has begun its spectacular appeal, every corner of Ontario is being searched. Both in the east and in the west old mines have been brought to life. Meanwhile, the pent-up energy of Porcupine itself is about to be expressed in terms of gold bars. Two years ago, the value of the annual output of gold in Ontario reached the low level of $32,445. It may be predicted with safety that in the coming year, 1912, the mines of Ontario will yield at least half a million dollars worth of the much-desired metal. Not a little of this will come from districts other than Porcupine. Gold mining will bulk large in the public eye for some years to come.

Silver, by far the largest single item in either metallic or non-metallic products, was produced to the value of $15,481,322, a figure greater by $3,016,600 than the returns for 1909. To the end of 1910, the mines of Cobalt, Gowganda, Elk Lake, and South Lorrain have sent more than ninety-four million ounces of silver to the markets of the world. During the current year an output considerably larger than that of 1910 is expected. Cobalt has not yet, apparently, reached its zenith. With sixteen concentrating plants at work, and several more projected, it is probable that the production of the camp will be maintained at a high level for a long time. During the year 1910, 305,569 tons of ore were concentrated. The concentrates produced amounted to 7,014.3 tons, carrying 7,084,740 ounces of silver. The average ratio of concentration was 43.5 to 1. It is evident that Cobalt depends in constantly increasing degree upon relatively low-grade ores. The general position of the camp is best indicated by the fact that dividends paid during the year amounted to $7,275,239.90, bringing the total during the life of the camp up to $21,802,179.58.

The Province's output of copper totalled 9,630 tons, a gain of 1,697 tons over the previous year. Of iron ore 230,656 tons were mined, a falling off of $131,901. An increase in the quantity of pig iron is reported. Last year's total was 447,351 tons, whereas in the year 1909, the figure stood at 407,013 tons. Seven electric furnaces, producing iron and steel alloys, are in operation.

Materials of construction, including brick, lime, various stones, Portland cement, and special clay products, were manufactured on a larger scale than before.

The value of arsenic produced was $70,709, an average of only 2.31 cents per pound. It is probable that the market suffers from over-production. Iron pyrites mining, of which 33,812 tons were shipped, more than held its own. Mica, thumb-trimmed, was mined to the value of $85,294. Salt was produced to the amount of 84,071 tons, a very fair gain.

Of the minor products, talc appears to be the most important. The product of G. H. Gillespie & Co.'s mill at Madoc is valued at $46,592, which figure does not by any means represent the real market value.

Feldspar is being mined in larger quantities—16,374 tons as against 11,001 tons. Corundum mining is decidedly more active. Gypsum, quartz, graphite, and fluorspar show much increased interest.

For the benefit of the complainer, it may be mentioned that the mining revenue of the Province has fallen from $979,464.15 to $941,030.09. The revenue for 1911 will be larger.

* * * *

The Report, in its entirety, is a credit to the Department. Mr. Gibson's summary is a model of careful condensation.

THE STUDENT.

After four or five months of toying with the shovel, the pick, the hammer, and the drill; or the same time spent in fighting the man-eating mosquito; or laborious months with the bucking board, the furnace, and the balance; the mining student has arrived with his "wad" to take up for another year the routine of college.

He is a wiser and weightier personage than he was last spring. Physically he is tougher. Morally and intellectually he is more developed. If he is entering on his last year, he is prepared to look with hostile eye upon the crude sophomore and the frivolous freshman, and with critical tolerance upon his professors. He has been up against the real thing, and he champs his bit. O, for next spring! Oh, for the freedom that graduation brings!

Eight months of hard work will temper this fine autumnal enthusiasm. The pale graduate that emerges next year will need no curb. He will find that billets do not hang on every bush. There is room for him, but he must squeeze and push and shove.

Meanwhile let him take heart of grace. The percentage of mining men that fall by the wayside is low. There is no need of increasing the number. Impatience, lack of actual preparedness, and the desire for soft snaps are the three main causes of failure.

To-day the horizon of the mining man is wider, and must remain wider. Even through the four years of college the student can prepare himself for broader citizenship than is implied by mere technical work. Even in the loneliest mining camp the young graduate need not rust. His interest in professional matters, in general reading, in politics, and in progress should remain unabated. Narrowness is to be avoided. It is deadly.

One specific against dry-rot, one cure for the blues, is letter writing. Within proper limits, a large correspondence is invaluable. The act of writing clears the mind, and exercises and stimulates the mental faculties. A regular and methodical record of work

done, of methods used, of mistakes, and of successes, makes the days and months of early labour infinitely more interesting and valuable. A man's career thus becomes an organic and coherent whole, instead of a disconnected series of incidents.

* * * *

The CANADIAN MINING JOURNAL extends to the mining student its heartiest good wishes. May the sessions of 1911-1912 be more instructive than ever before.

THE ENGLISH STEEL INDUSTRY.

Bound by conditions imposed by the International Steel Rail Syndicate, English rail manufacturers are facing a grave situation. The Syndicate is composed largely of Great Britain's competitors. By mutual agreement, no quotations are made below certain figures. In itself this is a sane arrangement. Unfortunately the Syndicate does not now control the world's production. In the year 1907 it had practically all the large producers in a solid phalanx. Since that year, however, large independent concerns in Canada, the United States, and Russia have come into the international market. These new unfettered competitors have brought about a condition that imperils very seriously the steel trade of England. This will be understood when it is stated that Russia has sent rails to Ireland, and Canada has filled contracts in England. England, in other words, is prevented from poaching, but is forced to suffer it.

During the immediate past England's steel trade has been steadily losing ground. Germany, the United States, and Belgium have gained ground. Fourteen years ago England exported about 600,000 tons of steel rails; last year she exported only 435,000 tons. This is true despite the fact that English manufacturers have modernized their plants in every respect.

Present circumstances show that Judge Gary's suggestion of world-wide syndication will hardly appeal to England. The present agreement expires in March next. Until then the English manufacturer must be content to see his rivals forge ahead whilst he remains in statu quo. After the expiry of the syndicate agreement it is highly improbable that England will do anything but hoe her own row, and mind her own business without reference to her competitors.

SICILIAN SULPHUR.

Including the island of Sicily, there are in Italian territory more than 400 producing sulphur mines. Of a total annual output of crude ore exceeding 2,800,000 metric tons, Sicily is credited with more than 2,600,000.

The Sicilian sulphur occurs in argillaceous limestone, associated with gypsum and bituminous marl. The crude ore is brown or yellow in colour. The indication sought for by the miner is the presence of "boiscale," a yellow, porous, crystalline alteration product resulting from the oxidation of the sulphur and the action of the sulphuric acid thus formed upon the limestone.

The crude ore contains 25 per cent. of sulphur. Extraction is simple. The ore is burned in beehive ovens, or in "calcaroni"; or it is treated with superheated steam. Three grades of sulphur are exported, the first being practically pure, and each of the two other grades being thrown into three sub-grades—"vantaggeata," or best; "buona," or good; and "corrente," or current.

The effect of the competition offered by Louisiana is seen when it is noticed, that in 1902, the United States and Canada imported about 177,000 metric tons of sulphur from Sicily, whilst in 1909 the imports were only 16,972 metric tons.

MR. THURBER, REDIVIVUS.

An indignant correspondent, evidently a loyal friend of Mr. Thurber, writes us to the effect that we have wrought gross injustice upon that long-suffering person. The accusatory letter has been printed in full on another page. A little explanatory comment will not be out of place.

About two years ago, or more, Mr. Thurber induced some citizens of Kenora to back financially his efforts to extract more gold from ores and rocks than nature had placed there. Or, to put it more fairly, Mr. Thurber asserted that all modern methods of gold extraction, including even the fire-assay, were incomplete and inaccurate, and that he himself could obtain several times the amount even obtained by ordinary workers. Naturally Mr. Thurber failed to substantiate his claims, although he was given every chance.

Now he has former an unholy alliance with a stock-jobbing concern in Winnipeg, and again his process has been advertised.

Our correspondent inveighs against us for our narrowness in refusing to encourage a worthy inventor. Our attitude is attributed to professional jealousy. He makes the mistake here of thinking that any inventor who works in the dark and also aids in bleeding the public can be taken seriously. If Mr. Thurber's process is revolutionary it is also patentable, so that even did we wish to misappropriate his invention it would hardly be feasible to do so. It must be confessed, however, that our time is pretty fully occupied with our various duties. Reasonable doubts exist in our editorial mind that we would swipe Mr. Thurber's secrets in any circumstances. The temptation does not touch us on a weak spot—otherwise the inventor might possibly not be safe. As matters stand, we can assure both correspondent and inventor that they can put everything on the table without danger. We shall go farther. We shall guarantee to have Mr. Thurber and all his heirs and assigns pensioned comfortably for life if he can show the goods. This is not a costly offer. Ourselves also would be furnished with a much-needed bank reserve.

ADVERTISING.

Just how far and in what manner the mining engineer should keep his name before the public is a much-debated point. In times of activity, the engineer who has to do with companies whose stock is being pushed finds himself subjected to advertising that is objectionable. Often this cannot be prevented. The victim is immolated upon the shrine of the stock market.

The case is quite different, however, when the engineer designedly exploits himself in the newspapers. Apart from all questions of good taste, the newspaper puff is immoral. It appeals only to those who have no knowledge of the standards by which the mining engineer is judged.

Brief notices in the public press of movements and engagements are to be commended. In these days it is necessary to keep one's name before the reading public. Anything beyond this is to be frowned upon. The engineer is not a merchant selling his wares Professional etiquette forbids him to enter into commercial, rate-cutting competition with his fellows. And it also should prevent him from displaying himself in type.

In Canada there is far too much of this form of vulgarity. Ostracism is the only suitable penalty. The self-respecting engineer does not need to circulate inflated praise of his accomplishments.

THE TRANSLATION OF MR. COCHRANE.

It is with unqualified regret that we note the removal of the Hon. Frank Cochrane from the Ontario Department of Mines. For six years Mr. Cochrane has administered the Department of Lands, Forests, and Mines, a billet that is by no means a sinecure.

Whatever faults can be found with Mr. Cochrane's direction of mining affairs in Ontario can be attributed to honest errors of judgment. No shadow of doubt exists that he was sincerely anxious to do his duty. Brusque, outspoken, and sometimes a trifle too ready to lock horns he undoubtedly was. These qualities may be regarded as virtues when contrasted with the smooth adaptability of the professional politician.

During the last election campaign Mr. Cochrane displayed a genius for effective organization. So important a part did he play that Mr. Borden felt that not only was high recognition necessary, but that Mr. Cochrane should become one of his fixed advisers.

As Minister of Railways Mr. Cochrane will have a chance for showing what he is. While we are sorry that he was not placed at the head of a new Department of Mines, we can honestly congratulate the Premier upon having Mr. Cochrane associated with him.

EDITORIAL NOTES.

The alleged discovery of placer gold in Baffin's Land by Messrs. Elmsley and White has roused considerable comment. It has not yet received sufficient certification to be taken as accurate.

It is the intention of the Provincial Workmen's Association to ask that all coal cutting machines run by electricity be removed from the collieries of Nova Scotia. The ground of complaint is the inferior capacity of such machines as compared with those run by compressed air.

For the total loss of his sight, Peter Collins, an employee of the Britannia Mining and Smelting Company, B.C., was awarded $9,000. In his charge to the jury, Judge Morrison stated that whilst an employer is not an insurer of his employees, yet he must adopt all reasonable precautions to ensure their safety. An employee is not an inspector of his employer's plant.

A Toronto newspaper lately printed in its "Want" columns the following advertisement:

> "Will pay for information if you know of any "one who has made money in mining. Your "name not mentioned. Box — —"

This typifies the average lay mind. The casual citizen learns his mining on the stock exchange. He takes a prospectus to heart. When roseate promises turn to ashes he blames the industry, instead of chastening himself. The advertiser, had he known aught of mining, would have known some dozens of names, representing men in Toronto alone, who are receiving legitimately earned dividends from mining properties.

Personal and General

Mr. Howard W. DuBois, managing director of the Quesnelle Hydraulic Gold Mining Company, has been spending a vacation in the Canadian Rocky Mountains Park, after having seen in full operation the big water supply system be designed and had constructed for his company in Quesnelle mining division, Cariboo district, British Columbia.

Mr. John Hopp, who operates several hydraulic placer-gold mines in Barkerville district, Cariboo, was in Victoria about the end of September.

Mr. W. H. Trewartha-James, of Victoria, B.C., general manager of the Tyee Copper Company, left British Columbia late in September on a business visit to the East, as far as New York.

Mr. W. L. Coulson, manager of the Canadian Collieries (Dunsmuir), Limited, has been in the eastern States lately.

Mr. W. M. Brewer, now manager of the Matanuska Gold Mines, developing a lode gold mining property in Alaska, was down from the North recently, on a visit to the Coast cities of British Columbia.

Mr. H. M. Ridge, a well known specialist in the treatment of silver, lead, zinc, and other base metals, has left British Columbita on his return to London, after having spent a week examining mines in the vicinity of Slocan Lake.

Mr. H. M. Davys, managing director of the Silverton Mines, Ltd., operating the Hewitt-Lorna Doone group of mines, and the Wakefield mill, in Silverton camp, Slocan Lake, has returned to his home in England after having spent several weeks in British Columbia.

Prof. John Cadman, D.Sc., professor of mining at Birmingham University, England, was at Bellevue, Alberta, a short time ago. Beside having contributed several important papers to the Institution of Mining Engineers, the professor three or four years ago was engaged in special research work for the Royal Commission on Mines.

Mr. Thomas Kiddie, Vancouver, B.C., has been making enquiries for the Government of British Columbia into the question of an intended increase in the charge for electric power, notice of which has been given copper mining and smelting companies operating in the Boundary district of British Columbia, which companies appealed to the Government against such increase in rates by the company supplying the power.

Mr. Martin Nordegg sailed from New York for Europe on October 8th.

Mr. Hector McInnes, one of the directors of the Dominion Steel and Coal Company, was in Toronto early in October.

Mr. Norman Fraser, formerly superintendent of the Michel Collieries of the Crow's Nest Pass Coal Company, was in Toronto on business on October 5th and 6th, when he left for Ottawa. Mr. Fraser is connected with Rocky Mountain Collieries, whose head office is in this city.

Mr. L. D. Huntoon, for the past seven years professor of mining and metallurgy at the Sheffield Scientific School of Yale University, has opened offices at 42 Broadway, New York, for the general practice of mining engineering. Mr. Huntoon will be remembered by many Canadian friends who met him on the A. I. M. E. excursion to Sudbury and Cobalt in the summer of 1908.

Mr. F. G. Stevens, mining engineer, 404 Albert St., Kingston, Ont., left on October 6th for Mexico. He will return at an early date.

Mr. Harold Kingsmill has resigned the office of general manager of the Rea mine, Porcupine. Mr. Kingsmill has been in charge of the Rea almost from the first. He is to take over the management of a South American mining property.

CORRESPONDENCE

To the Editor of the CANADIAN MINING JOURNAL:—

Sir,—Your excellent journal is, I believe, devoted to maters of vital interest to the mining as well as to the scientific world, and there are, I am sure, many thousands of your readers who hail its coming with delight.

A copy of your journal occasionally falls into my hands, and I must admit that I peruse its pages each time with much interest.

Your aim is, Sir, to keep abreast of the times in so far as the conduct of your journal is concerned, and for this your many readers will no doubt commend you.

But, Sir, when you mar your editorial pages with criticisms of an unwitting character, you are really slipping away from the goal towards which you strive. A newspaper's character, they say, can be determined by its editorials.

Mr. Thurber, of Kenora, has been the subject of your remarks on two different occasions, and it seems to me that had you taken the trouble to find out a little more about this much abused gentleman and his process before trying to cross swords with him, your better self would have recoiled with feelings of disgust and revulsion. [Editor's Note:—Sic.—]

You have made your journal responsible for harbouring and giving vent to sentiments which should be altogether foreign to it, which are far from being creditable to either yourself or the journal over whose destiny you rule.

Like many inventors who brought light to the wirld, Mr. Thurber is having his struggles and up-hill work. He is not being encouraged and helped along as he undoubtedly deserves to be; on the contrary, he is put down as one whose company should be shunned; as a man who is trying to foist his fool invention on a long-suffering public.

This experience, of course, has been the lot of many others who have made good, and, notwithstanding your criticisms to the contrary and your efforts to wither Mr. Thurber out of existence, I have very substantial reasons to know that the "Thurber process" will in the near future surprise not only yourself but the whole mining world. [Editor's Note:—We have no doubt on this point.]

Mr. Thurber has contented himself so far by completely ignoring his enemies; he works away quietly and unassumingly, and it is doubtless this attitude, combined with his dogged persistence and "stick-to-itiveness" which gall those jealous busybodies and slanderers who had better look to their own foul doorsteps before even attempting or daring to criticize a gentleman whose shoe strings they are unworthy to tie.

In conclusion, I would offer the remark that the attitude assumed in many parts of the country towards the Thurber Process is doubtless due to the knowledge that present-day methods of extracting gold from ores must sooner or later give way to a simpler and better one.

Can you, Sir, give your readers any plausible reason, based on scientific facts, why the Thurber Process should not fill the bill?

Yours truly,

T. SCOTT CAMPBELL.

Pine, via Vermillion, Ont.

Sept. 25th, 1911.

BOOK REVIEWS.

THE COPPER HANDBOOK, Volume X, 1910-11—A Manual of the Copper Industry of the World — Compiled and pubulished by Horace J. Stevens, Houghton, Mich., U.S.A. 1911.

Volume X., the tenth edition of the Copper Handbook, has just been received. The new issue of this work, which is considered a standard authority on the subject of copper and copper mines for the entire globe, has 1,902 octavo pages, containing nearly 1,500,000 words. In addition to the miscellaneous chapters, it lists and describes 8,130 copper mines and copper mining companies, in all parts of the world. This is the largest number of titles ever listed by any work on mining. The descriptions range from two or three lines, in the case of dead companies, wherein reference is made to detailed descriptions in past volumes at the period of their activity, up to 21 pages in the case of the Anaconda mine, which yields one-eighth of all the copper made in the world.

The miscellaneous chapters of the book, 24 in number, treat the subject of copper from all possible viewpoints, there being chapters on the history, chemistry, mineralogy, metallurgy, brands and grades, alloys and substitutes for copper, with a copious glossary, and a chapter of statistics ending the book that contains 40-odd tables, thoroughly covering copper production, consumption, movements, prices, dividends, etc. The Copper Handbook is sold on the unique plan adopted nine years ago. The publisher sends the book by mail, prepaid, to any address ordered, without advance payment of any sort, and subject to return after a week's inspection. The price is $5 in a strong green buckram binding with silk headband and gilt top, or $7.50 in full library morocco. Anyone interested in copper, as a producer, consumer, or investor in shares, would do well to write the author and publisher, Mr. Horace J. Stevens, Houghton, Michigan, ordering a copy of the new Copper Handbook sent prepaid, subject to approval.

Application of Electricity in the Metallurgical Industry of Italy.

[Specially abstracted for the Canadian Mining Journal from a paper by R. Catani (Rome), read before the Iron and Steel Institute.]

This paper discusses the production of steel by electricity; the smelting of pig iron by electricity; and the production of alloys of iron with other metals by electricity.

I. Production of Steel or Iron in the Electric Furnace. In Italy steel is manufactured in the electric furnace either direct from ores or from iron products. The first experiments in the direct production of steel from ore in the electric furnace were made at Rome by Stassano in 1898.

A. Steels Produced Direct from Ore.—The problem of the direct reduction of steel from iron ores, using coke or coal as fuel, has not been solved by old methods on a commercial scale. But the results of a few years' trial with the electric furnace have surpassed expectation. In due time, it may now be affirmed with certainty, the problem of producing steel by a direct electric process will have been overcome.

In Stassano's experiments at Rome the material was first crushed, pressed into briquettes with tar, and finally treated in the electric furnace. Recent trials have shown, however, that it is equally easy to treat the ore in a fine state or in lumps, and hence briquetting can be dispensed with. Because he adhered too closely to blast-furnace practice, both in regard to the shape of the furnace and the process itself, the first experiments of Stassano led to no practical results. The first furnace used at Rome, 1898 to 1899, was a shaft furnace in which, instead of having tuyeres, electrodes were provided for conducting electric current. The ore was arrested by means of a grating at a distance of about 20 centimetres above the electric arcs.

Finally Stassano adopted a furnace of the hearth type. The principal characteristics were that it was roofed over, and long electric arcs played between the mass of the charge and the arch of the furnace. The arcs swept the surface of the slag without passing through it. The heat, therefore, passed indirectly into the bath by radiation. The electrodes had a high density, and were held in water-cooled supports. The furnace was completely closed in, and the gases evolved were collected and carried off.

Some Stassano furnaces are fixed, others can be rotated. In some the only rotary movement is that of tilting towards the side of the tapping hole so as to facilitate tapping. Others can be rotated on their vertical axis so as to stir the bath. Single-phase current with one or more pairs of electrodes or three-phase current can be used. Stassano's experiments for the direct production of steel may be divided into two groups, namely, those performed during 1898-1902, the results of which were published in March, 1902; and those the results of which were published in 1908.

In the first trials only hematite ore of first-class quality, from the island of Elba, was used.

The analyses of the ore, charcoal, pitch, limestone, and product follow:—

Ore.	Per cent.
Fe_2O_3	93.02
MnO	0.619
SiO_2	3.790
S	0.058
P	0.056
CaO+MgO	0.500
Moisture	1.720

Quantity used per 100 kilogrammes of steel produced: 165.8 kilos.

Charcoal.	Per cent.
C	90.42
Ash	3.88
Moisture	5.70

Quantity used per 100 kilogrammes of steel produced: 26.5 kilos.

Pitch.	Per cent.
C	59.20
Hydro-carbons	40.50
Ash	0.27

Quantity used per 100 kilogrammes of steel produced: 20 kilos.

Limestone.	Per cent.
CaO	51.21
CO_2	43.43
MgO	3.11
Al_2O_3 } Fe_2O_3 }	0.50
SiO_2	0.90

Quantity used per 100 kilogrammes of steel produced: 19.1 kilos.

Average product.	per cent.
Fe	99.7
C	0 10
Mn	0.10
Si	0.10

Quantity used per 100 kilogrammes of steel produced: 100 kilos.

Altogether there were produced only 125.6 kilogrammes of steel. The loss of iron was about 8 per cent. The consumption of energy averaged 4187 kilowatt hours per ton of product, and the mean efficiency of the furnace was 48 per cent. The electrode consumption was estimated at 12 kilogrammes per ton produced.

The industrial importance of the process was insignificant, as only first-class material could be used, the cost of preparation was excessively high, and the energy consumption prohibitory.

In the second series of his experiments, Stassano used an ore of the following composition:

	Per cent.
Fe_2O_3	68.70
Mn_3O_4	3.23
SiO_2	17.15
Al_2O_3	2.
CaO	1.
MgO	5.67
P	0.15
S	0.12
(Fe	48.09)

The ores were again crushed and briquetted, but with a 25 per cent. solution of silicate of soda instead of with pitch. Steels of good quality were obtained, the analyses of the product of charges Nos. 2 and 4 being given herewith:

	Charge No. 2.	Charge No. 4
C	0.26	0.80
Mn	0.21	0.30
Si	0.03	0.22
P	0.010	0.015
S	0.040	0.045

In this second series of experiments, in which only four charges were worked, particulars were not given either of the total production or of the consumption of electrode, or of the composition of the limestone and the charcoal. The furnace was of 200 horse-power, with three-phase current, and the average consumption of electric energy was 4,250 kilowatt hours.

The charges were as follows:—

	Kilogrammes.
Ore	100
Limestone	35
Charcoal	24
Aqueous solution of silicate of soda	8
Carbide of calcium	5

Assuming that the loss of iron was the same as before, namely, 8 per cent., the consumption of material per ton of steel produced would have been:—

	Kilogrammes.
Ore	2250
Charcoal	540
Limestone	787
Silicate of soda	180
Carbide of calcium	112

In addition, it is calculated that, in these last experiments, the furnace consumed, for every ton of steel produced, about 50 cubic metres of water for cooling the holders of the electrodes.

B. Steels from Iron Products.—With the electric furnace, however, the general practice is to use pig iron instead of ore, in which case the material can be charged into the furnace in either the liquid or the solid state. The following table shows the approximate power consumption when different materials are used.

Kilowatt hours necessary for producing a ton of steel

	Kilowatt hours.
From cold pig iron	1500
From liquid pig iron	1100 to 1200
From cold pig iron and cold scrap	900 to 1300
From liquid pig iron and cold scrap	600 to 1000
From cold scrap	300 to 900

Refining.

	Kilowatt hours.
Steel of crucible quality from liquid iron	200 to 300
Ordinary electric steel from liquid form	120
Mixer	50

1. Cold Charging. — The raw materials consist generally of pig iron, scrap, ore, and additions.

The first installation of the Stassano furnace was made at the Royal Artillery Works at Turin, by the Italian Ministry of War in 1903. The furnace is of 200 horse-power. Subsequently the Stassano Electric Furnace Company established an electric steel works at Turin. Following are the general specifications:

No. of furnaces	2	2	2
Horse power	100	200	1000
Volts	75	100	150
Amperes	1000	900	2700
Kind of current	Single-phase	3-phase	3-phase

Three-phase current at 21,500 volts was supplied by the Societa Anonima Elettricita Alta Italia, and this

was stepped down by special transformers to 75, 100, and 150 volts for the furnaces of 100, 200, and 1000 horse-power respectively. The single-phase furnaces of 100 horse-power were shunted, on a single-phase circuit. The current supplied to the furnaces amounted to about 350 kilowatts from December to March, and to 800 kilowatts from March to December, while the total power of the furnaces was 2,600 horse-power= 1910 kilowatts. The Turin works of the company manufactured chiefly parts of railway carriages, wagons, and automobiles. The company went into liquidation in 1909. Some of the furnaces of the Turin plant have been transferred to the works of the Elba Company at Portoferraio and some to the Milan Steel Works.

The Stassano furnace installed at Portoferraio now works with cold charges; but it is probable that the company will soon adopt liquid charging for the production of high-quality steel. The installation at Milan is not yet in operation.

Heroult furnaces are installed in Italy at the works of the Mannesmann Tube Company, formed by the amalgamation of the Mannesmann Tube Works at Dusseldorf and of the Metallurgical Company of Rome. The works are situated at Dalmine in the district of Sabbro, Province of Bergamo. Three-phase current is delivered at the central station at 12,000 volts, where it is transformed to 550 volts. There are two furnaces in which open-hearth steel scrap is melted. Both furnaces are in operation.

One Girod furnace is in course of construction at the steelworks at Cornigliano Ligure of the Giovanni Ansaldo Company. It is three-phase of 350 kilowatts at 50 cycles, with a capacity of 4 to 5 tons. The material is charged cold, the maximum potential between phases being 70 volts. The furnace is intended for the manufacture of special steels only. When operated with liquid charges the production will be increased by about 40 to 50 per cent.

Electric furnaces may be charged either with liquid pig or with steel from the converter, or the acid or basic open-hearth. With liquid steel a simple refining process only is required, and, by the removal of occluded gases, the quality is much improved.

The first furnace worked with liquid charges in Italy was the Kjellin furnace installed at the works of the Giovanni Andrea Gregorini Steel and Iron Foundry Company at Castro on Lake Iseo. It is now working on liquid steel taken from a 4-ton open-hearth furnace, which supplies to the electric furnace 1400 kilogrammes of metal at each heat. The steel supplied has the following composition

Carbon, 0.08 to 0.10; silicon, 0.03 to 0.05; sulphur, 0.010 to 0.020; phos., 0.008 to 0.015; mang., 0.18 to 0.35.

The final product contained: Carbon, 0.60; silicon, 0.25; manganese, 0.12.

The recarbonization was effected by adding pig iron. The furnace is tapped every 2½ hours, yielding at each heat 1400 kilogrammes of steel. Thus the daily production amounts to about 15 tons. The steels produced, whether hard or soft, are always very malleable.

The Kjellin furnace in question is a simple induction furnace taking 300 kilowatts. It is supplied with single-phase current at 25 cycles. When working on cold charges the production is about 10 tons daily, the energy consumption being 690 kilowatt hours per ton of steel produced. The patent furnace lining of the Poldihutte is used, which lasts for about 120 heats. High speed steel can be manufactured carrying 25 per cent. of tungsten and 6 per cent. of chromium.

II. Production of Pig Iron in the Electric Furnace.

In the Canadian experiments conducted by Dr. Eugene Haanel, and in the successful industrial efforts of Swedish manufacturers, ordinary grades of iron ore were used. In Italy experiments have been carried out by Carcano for the production of pig iron from pyrites residues. Purifying, enrichment, and agglomeration are necessary to prepare pyrites residues for treatment in the blast-furnace. The material often carries more than 4 per cent.

The residues treated by Carcano in the electric furnace contained:

Silica	From 7.9	to 12.25	per cent.
Iron	From 47.0	to 60.3	per cent.
Alumina	From 6.9	to 18.80	per cent.
Sulphur	From 2.01	to 4.25	per cent.

The residues were charged in their powdery condition. It was endeavoured to work with the most basic slag possible, with a certain percentage of manganese, so as to ensure a sufficiently strong desulphurizing effect. Generally, manganese is found to be a satisfactory desulphurizer. In the experiments raw material containing up to 4.25 per cent. sulphur yielded a pig iron running between 0.015 and 0.058 per cent. sulphur in the presence of from 2.17 to 2.54 per cent. manganese. Various types of electric furnace of different powers were used. The furnace tried by Carcano in 1908, which gave the most favourable results, was of a capacity varying frob 200 to 300 horse-power. It was aclosed furnace with neutral hearth supplied with single-phase or three-phase current with automatic charging, and with recovery of the carbon monoxide evolved during the reactions. That gas was used to prevent deoxidation of the pyrites residues. The energy consumption per ton of pig produced averaged 2100 kilowatt hours in a furnace of 180 kilowatts and using residues containing 50 to 55 per cent. of iron in the form of ferrous oxide. The lower ends of the vertical electrodes rested on the slag, so that the furnace worked as a surface resistance furnace and the slag was of very high temperature, much above that of the bath. By this means it was possible to obtain highly fluid slags sufficiently basic in character.

Too many data are lacking to make it possible to present a practical estimate on the economic aspect of the process.

III. Ferro-Alloys.

The chief metallurgical products manufactured in the electric furnace in large quantities are ferro-alloys. Such alloys as ferro-manganese and ferro-silicon low in silicon, were known before the introduction of electric smelting; but with the electric furnace it is possible to produce alloys with a very much lower carbon content than before. The production of such alloys as high grade ferro-silicon, ferro-chromium, ferro-tungsten, is practicable only in the electric furnace, and these are manufactured either from the ores themselves, or direct from the metals, or from the metals and ores together. The only ferro-alloy electrically manufactured in Italy on an important scale is that of ferro-silicon, of which 628 tons were produced in 1909. Some experiments in other directions may be briefly mentioned.

A. Ferro-Alloy from Ores. — The author of this paper has made experiments for the purpose of studying the economic possibility, under given conditions, of producing ferro-silicon by smelting silicates of iron or iron ores too highly siliceous for treatment in the blast-furnace; also cast iron or pig iron that has been rejected on account of its high sulphur or phosphorus content. The electric furnace used was specially modified by the author. It was marked by the absence of any kind of flexible conductor. A minimum quantity of current passed through the conductors and through the electrodes; a minimum space was taken up by the conductors; and water-cooling was confined to those parts of the furnace above the plane of the electric arcs. These furnaces have a high total efficiency, and can be adapted to the manufacture of calcium carbide. With alternating current the power factor approaches as near as practicable to unity. The current supplied is of 12,00 amperes at 42 volts 25 cycles.

B. Ferro-Alloys from Metallurgical Products.. The greater part of the ferro-silicon manufactured in Italy is produced from quartz and scrap iron. The first works in Italy that manufactured on an industrial scale were those of the Societa Elettrochimica at Bussi. The production in 1907 was 175 tons; in 1908, 808 tons; and in 1909, 606 tons.

In 1909 the Piedmontese Company for the Manufacture of Carbide of Calcium and Allied Products produced 22 tons of ferro-silicon. The electric furnace used for smelting ferro-silicon is absolutely identical with that used for the production of carbide of calcium, and works with the same current at the same pressure.

RESEARCH WORK ON CERTAIN NOVA SCOTIAN GOLD ORES.

By ORA WILLIS KNIGHT, M.Sc., D.Sc., Bangor, Maine, U.S.*

(Continued from October 1st issue.)

Arsenopyrite, pyrrhotite, pyrite, and other precipitants of gold are generally distributed throughout practically all of the bedded veins, and well defined slate partings which are also capable of precipitating gold exist above and below the quartz of these bedded veins, as well as often mingled with the quartz, so it is quite evident that any gold passing through the bedded veins in solution should have been precipitated therein sooner or later. Over a hundred assays made by me on material taken from bedded veins, at considerable distances from fissures, have failed to show the presence of gold in paying quantities, the gold value found being from 40 to 67 cents per ton of ore. The conclusion seems certain that the bedded veins so sampled, all being on or near anticlinal axes, had not served as trunk channels for gold-bearing solutions.

A number of assays made of ore taken from near fissure veins, but on bedded veins, gave gold values ranging from $1.50 up to hundreds of dollars per ton of ore, indicating that better gold values were present near the fissure veins which are commonly known as "angulars" in Nova Scotia.

As there seems to be a well developed opindion among the miners of the province that the presence of troughs in the wall above the vein, or the presence of the so-called barrel rolls of quartz are indications of pay-ore and are generally considered infallible, I wish to say that samples taken in several places where these conditions were prominent gave assay returns averaging 67 cents in gold to the ton of ore.

Although, of course, it is possible that in certain districts there are bedded veins which were actually trunk channels for gold-bearing solutions, it is my purpose to claim that the fissure veins or angulars, or in other words veins cutting across the strata either in extent or in dip, were the main trunk channels for the gold-containing solutions. Fissure veins passing across quartzite formations would encounter the conditions most favourable to precipitation of gold at such places as they either passed through slate formations, passed through or intersected bedded veins, passed through quartzite containing pyrites, or other precipitating gold or solutions themselves bearing gold and capable of precipitation by the material in the fissures entered.

Where a fissure vein, carrying gold-containing waters, intersected a bedded vein full of precipitating material there would be formed a pay-shoot, often extensive, along the general line of intersection, or sometimes merely a local enrichment of nuggety gold, according to existing conditions. Under such conditions extensive pay-shoots were formed in many instances, and doubtless extend to great depths along the line of intersection.

The intersection of a fissure with a bedded vein, under conditions highly favourable to the precipitation of gold, may result in so completely throwing down the gold along the area of contact that there is not sufficient gold left to be precipitated and form pay-shoots at the intersections of the fissure with other veins more or less vertically above it. Under such conditions no profitable body of ore would exist above such a pay-shoot, but at a sufficient distance one way or the other along the fissure, where the dip of the bedded vein would take it down and out of the field og influence, other pay-shoots would be formed on other bedded veins.

Similarly where fissures passed through slaty strata or other formations capable of completely precipitating gold, the gold would form more or less extensive pay-shoots along the line of intersection, and no pay-ore would occur beyond until other precipitating agencies are passed through.

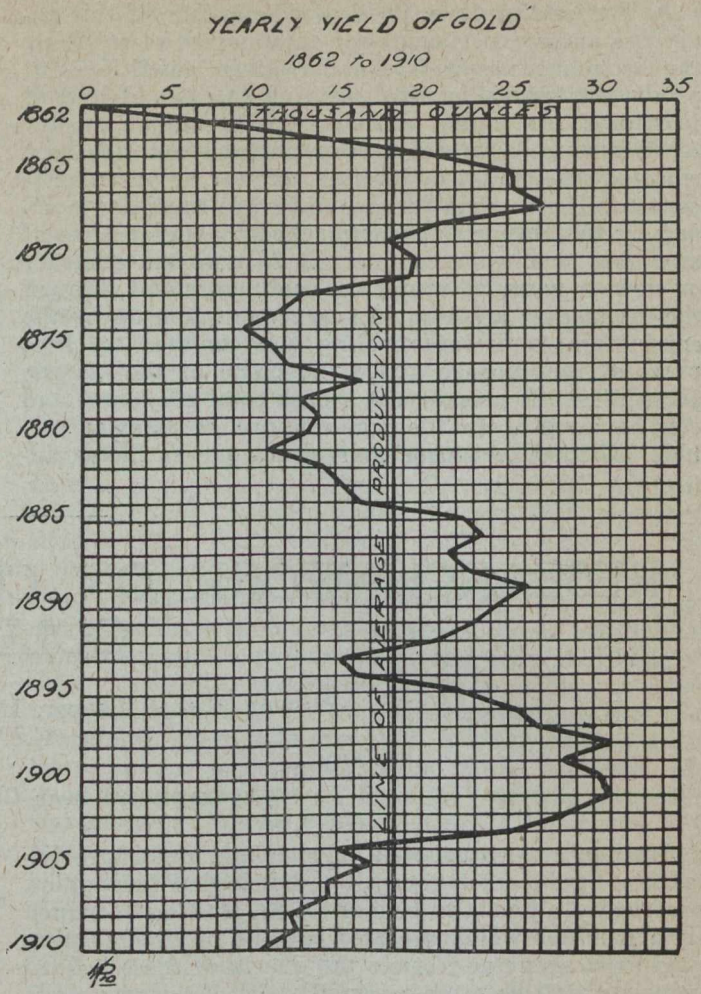
Where fissures were intersected by other fissures at various angles, the one carrying gold-containing solu-

*Abstract of paper read before the Mining Society of Nova Scotia.

tions and the other precipitating solutions, then pay-shoots would be formed along the line of their intersection. The extent, width, and richness of these would be dependent upon the relative length and width of the fissure through which the gold was passing which was connected with the precipitating fissure, and upon the respective volumes, strength of flow and richness of the solutions passing from one into the other.

A small fissure, less than half an inch in width, may at its intersection with a bedded vein give hundreds of ounces of gold in a small space on the bedded vein near the intersection. As an illustration we may mention the Ross vein in the Holman mine which at its intersection with a half-inch fissure yielded very many ounces of coarse gold, while elsewhere in the workings this vein has yielded practically no pay-ore until very recently at its intersection with another fissure where I am told by Mr. Holman that Mr. Ross, who is now at the mine, reports that it contains some fine gold. This vein carries a considerable percentage of metallic sulphides, much intermingled slate, and other precipitants of gold wherever it has been exposed, but except as noted, has yielded no paying quantities of gold. The small fissure (angular) intersecting it where the gold was taken remained unnoticed for nearly a year until discovered by me, and its probable influence on the vein pointed out.

During the years of erosion and the action of atmospheric and aqueous agencies upon the rocks of the Meguma series, it is very certain that some gold had been dissolved, carried down through crevices, joint-planes, and open fissures, and finally deposited on various bedded veins beneath, forming small pockets or bonanzas of gold.



Cornish Pump at a Nova Scotian Camp.

There are probably several instances known in Nova Scotia where pay-shoots along bedded veins, dipping more or less steeply, have been followed over 1,000 feet down on the incline. These pay-shoots often dip at an angle one way or the other along the vein, and this angle of dip of the pay-shoot has often been between 30 deg. and 45 deg. It may be argued that these instances are seeming exceptions to my assertions, but I am inclined to believe that the bedded veins were not the trunk channels of the gold-bearing solutions, for if they had been we would expect the pay-shoots to be more nearly vertical. The more reasonable conclusion to me seems to be that gold-bearing solutions entered through very narrow fissures, extending to great depths and in contact with the bedded veins for a very considerable distance along the line of dip of the existing pay-shoots. The gold was precipitated in the bedded veins near the point of entrance to them and along the line of the fissure through which they entered. Failure to discover such fissures is merely negative evidence, for like the angular intersecting the Ross vein, they have probably never been looked for, and it is possible that at the present time all trace of them may have been obliterated by subsequently exerted pressure.

As far as my studies have gone in connection with the gold districts visited by me in the Province, the conclusions reached point to the fact that in those districts characterized by well developed anticlinal folds (and some of them by domes as well) the bulk of the gold deposition is directly traceable to the influence of fissure veins, through which the gold was originally brought in solution. At places in the quarzites where I found the veins carrying pay-values in gold, there was in every instance strong evidence to prove that the gold was brought in through a neighbouring fissure; and furthermore places shown me where very rich ore was said to have been taken in the past were all near fissure veins. In these instances, at distances from the fissures where pay-ore had ceased to exist, the vein contents were otherwise identical, save in gold value, and in every instance minerals capable of precipitating gold were present.

Instances sometimes may exist where a fissure comes up to a bedded vein, turns and follows along it for a greater or lesser distance, finally turning again and passing upward. In such a case a pay-shoot would probably be formed along the vein between the point of entrance and the point of departure of the fissure vein, and until sufficient mining had been done to ascertain the truth of the matter it might appear that such a vein was a seeming exception to my conclusions.

It seems evident to me that too little work has been done in developing the various fissure veins, especially the small but nevertheless true fissure veins locally called "angulars" in Nova Scotia. It may be well to explain that the term angular vein as used in Nova Scotia is synonymous with the term "fissure vein" as used by western miners, while western miners generally use the word "angular" to designate any small, generally not extensive, lateral branch, stringer, or feeder of a fissure vein.

It would be my preference in developing a mine in Nova Scotia to sink the shaft at the intersection of a fissure vein with a bedded vein, preferably, of course, at such an intersection as is known to carry pay-value in gold. Where possible the shaft should be carried down on an incline coinciding with the dip of the intersection of the two veins. In such a case the hanging-wall of the fissure will serve as the hanging-wall of the shaft, while that of the bedded vein may be in many instances made to serve as what might be termed

Montagu—Veteran Miner standing behind remains of stamp-battery foundations

the "hanging side wall" of the shaft, but in some cases the angle of dip might necessitate doing otherwise. At various levels reached, drifts can be run along the fissure vein to its intersection with other bedded veins, either known or supposed to exist, and pay-shoots located at such intersections can be stoped up on. Again, where, as is very often the case, parallel fissure veins are known to exist nearby, a drift can be run on the bedded veins at different levels to the intersection with such fissure and pay-shoots stoped up on, etc.

We may say that as a general rule the nearer to the horizontal a bedded vein runs where cut by a fissure vein, the coarser and more nuggety any gold found will be.

Where a bedded vein dips at an angle from the horizontal, some coarse gold will be deposited at the intersection, while much finer gold will be found scattered down the bedded vein to a greater or lesser distance, according to whether its dip is slight or extreme.

Some fissures will give good deposits of gold at their intersection with each of several superimposed bedded veins, while in other instances deposits will be found only at a few of such intersections and intervening ones may be unprofitable to work.

Although there is probably a future time coming when the low-grade slates, conglomerates, and quartz veins will be worked at a profit, I will not dwell on their possibilities in this paper.

In concluding, I wish first to express my admiration of the very complete, accurate, and valuable work done by Mr. E. R. Faribault in mapping the various mining districts, veins, and geological formations of Nova Scotia. The mining industry of the province owes very much indeed to his genius and indefatigable work. Finally, I wish to put myself strongly on record as not being in accord with the conclusions of an eminent mining expert and geologist who was once paid a very liberal sum for his report regarding the future possibilities of extensive deep-mining in Nova Scotia. On the contrary, I believe that the province has a great future before it, and that with ample capital and intelligent development of its mines, Nova Scotia will take its right place among the great mining camps of the world.

Sampling of High Grade Cobalt Silver Ores.

[Editor's Note.—The following article was not available for our last issue. It supplements fully the very brief description then given. Our readers are referred to the last issue for illustrations of the equipment. Only the flow-sheet is here reproduced. The preliminary notes touching the history of the enterprise are most interesting.]

In 1907 Messrs. Campbell and Deyell formed a partnership as mining engineers, and in April of that year took over the business of Mr. C. M. Tilkie, assayer, of Cobalt, operating it on a small scale in conjunction with the practice of engineering. It soon became evident from the trend of events that a sampling plant was positively required in Cobalt; but certain investigations made had resulted in the conclusion that it would be impossible for a custom sampler to obtain sufficiently accurate results from this ore. The result of experiments in the small laboratory of Messrs. Campbell & Deyell encouraged them in attacking the problem, with the result that in November, 1909, the present company was organized with the old assay and sampling business as a nucleus, and construction on the present sampler commenced.

In June, 1910, the first lot of ore was sampled and after a few weeks of experimenting it was demonstrated beyond question that it was practicable to check on repeated valutions of this ore. It must be understood that the hand methods used to that date did not give sufficient moral security to the interested parties and that the two smelters who had mechanical samplers did not attempt to make more than one valuation of a car. This allowed of no check. The present plant is almost entirely mechanical. The points at which the ore is touched by the workmen being subject to careful supervision by representatives. From the time the ore is crushed till four separate and independent samples of the car are obtained, no human being has access to the ore.

The capacity of the plant is about 30 tons per day. This, of course, varies considerably above and below, according to the nature of the ore which is either coarse or fine, dry or wet, hard or soft, free from or full of arsenides, and with varying quantities of metallic silver; thirty tons of ore yielding on occasions as much as two tons of metallic silver from the ball mill screens.

The figures to show the amount of ore that has been sampled are not to hand; but it suffices to say that the machinery has been working day and night ever since the plant was first turned over, except, of course, the usual stoppages for repairs. The patronage of the larger mines has been secured; but, unfortunately, a few of the smaller ones are tied up with contracts with smelters and in other ways prevented from taking advantage of the sampler. It is confidently expected that these few will be taken into the fold in the near future.

In the following article the writer has not touched on the storage of ore, for which there is ample capacity, nor the grading of ores, which has proved to be an important branch of the business, nor the marketing of the ore and bullion: these are lengthy subjects and can be dealt with at a future date if found of sufficient interest.

The following are a few of the reasons why there should be a sampler in Cobalt:

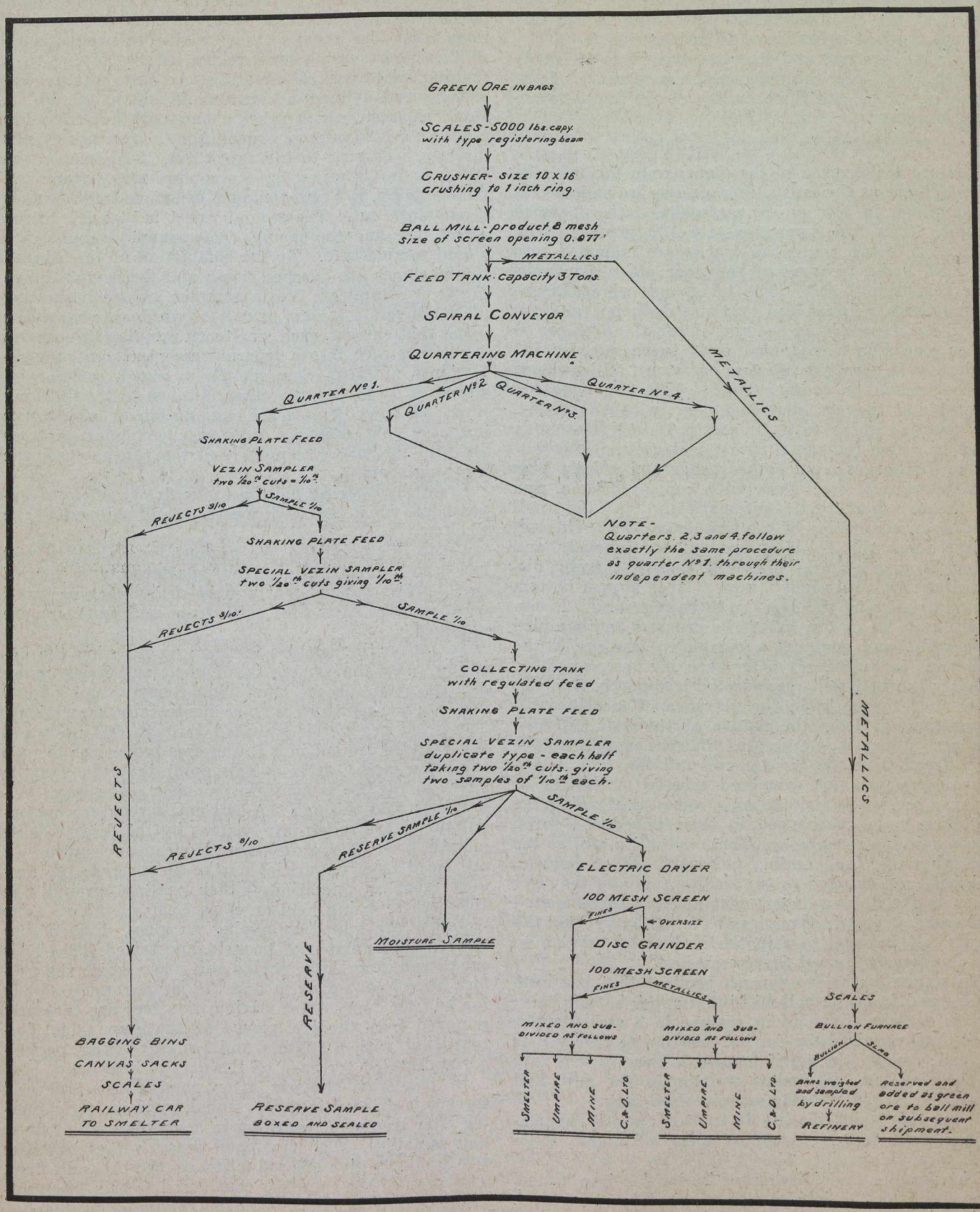
The mines are assured of a neutral and disinterested valution of their product.

The machines give an automatic sampling which, to the greatest possible extent, eliminates the personal equation.

The ore is marketed at the point of production and its contents and value known almost at the mine's mouth. In this way the most advantageous market may be chosen.

Mines having different grades of ore may sample each lot independently and blend them to make a desirable product for the smelters.

The smelter having its representative at the plant may, at the discretion of the mines, determine the


GREEN ORE IN BAGS
SCALES - 5000 lbs. capy. with type registering beam
CRUSHER - SIZE 10 X 16 crushing to 1 inch ring.
BALL MILL - product 8 mesh size of screen opening 0.077"
METALLICS
FEED TANK - capacity 3 Tons.
SPIRAL CONVEYOR
QUARTERING MACHINE
QUARTER No 1.
QUARTER No 2
QUARTER No 3.
QUARTER No 4.
METALLICS
SHAKING PLATE FEED
VEZIN SAMPLER two 1/20th cuts = 1/10th
SAMPLE 1/10
REJECTS 9/10
SHAKING PLATE FEED
SPECIAL VEZIN SAMPLER two 1/20th cuts giving 1/10th
REJECTS 9/10
SAMPLE 1/10
NOTE - Quarters. 2, 3 and 4. follow exactly the same procedure as quarter No 1. through their independent machines.
COLLECTING TANK with regulated feed
SHAKING PLATE FEED
SPECIAL VEZIN SAMPLER duplicate type - each half taking two 1/20th cuts. giving two samples of 1/10th each.
REJECTS
REJECTS 8/10
RESERVE SAMPLE 1/10
SAMPLE 1/10
ELECTRIC DRYER
100 MESH SCREEN
FINES
OVERSIZE
DISC GRINDER
100 MESH SCREEN
FINES
METALLICS
MOISTURE SAMPLE
RESERVE
BAGGING BINS
CANVAS SACKS
SCALES
RAILWAY CAR TO SMELTER
RESERVE SAMPLE BOXED AND SEALED
MIXED AND SUB-DIVIDED AS FOLLOWS
SMELTER
UMPIRE
MINE
C.&O. LTD
MIXED AND SUB-DIVIDED AS FOLLOWS
SMELTER
UMPIRE
MINE
C.&O. LTD
METALLICS
SCALES
BULLION FURNACE
BULLION
SLAG
Bars weighed and sampled by drilling
REFINERY
Reserved and added as green ore to ball mill on subsequent shipment.

tenor of the various lots of ore and so bid intelligently.

The mine may store the ore, knowing its exact value and contents, and await a desirable market.

Certificates of sampling and valuation may be cashed at the local banks and the value in the raw product realized a few days after it is mined.

Four independent and separate samplings are made on each lot of ore, the reasonable concurrence of the assays on which, put the accuracy of the sampling beyond question.

Custom Ore Sampler—Cobalt.

The ore is delivered to the plant, from the mine, in railroad cars at the mill siding, or else in wagons. It is contained in jute or canvas sacks, each of which weighs, when full, approximately 100 pounds. The bags after being loaded on trucks are trammed into the mill, being weighed at the door on a Fairbanks type registering scale. The tram and ore sacks are subsequently weighed and this tare deducted, and the net green or receiving weight obtained. The ore is either placed in locked bins, or if to be sampled immediately, is elevated (electric elevator), still in bags, to the second or crusher floor. Here the bags are opened and the ore shovelled over a 1-inch grizzly, the oversize going to a 10-inch x 16-inch Buchanan crusher, which reduces it to 1½-inch ring.

The discharges from both crusher and grizzly pass to a cylindrical steel tank with conical bottom, and is thence discharged automatically to the ball mill by an adaptation of the Challenge feed. The ball mill reduces the 1½-inch product continuously and passes it over a spiral screen (8 mesh), thereby discharging the "throughs" into a steel hopper-bottom car and returning the oversize to be reground. Necessarily each lot of ore has to be crushed and sampled separately, and requires a complete clean-up of the mill and the machinery after each lot has passed.

After the ball mill receives the last portions of ore from the crusher tank, the presence of metallics becomes evident from the nature of the ball mill discharges. When it is adjudged that the metallics have been freed from the brittle ore and the mill is discharging a product composed mostly of pellets of silver, a section of the screen is removed allowing the metallics to be discharged in their unreduced form, into a suitable receptacle. These metallics are, at the discretion of the mining company, either bagged, weighed, and shipped to the smelter; or else they are taken to the bullion department and are there melted and cast into ingots. Samples are taken by drilling the ingots. It is usual to ship the bullion by express to the London or United States markets.

To return to the No. 8-mesh product that has been discharged from the ball mill into hopper bottom cars: this is occasionally held in reserve in a steel hopper tank until required for further treatment; rarely it is bagged; usually the car is trammed, directly it is full, to the elevator, elevated to the top of the mill, and there discharged into the sampler feed-tank.

From this point the ore is treated entirely by machines until four separate samples, of about 15-lb. each, are obtained.

The sampler tank discharges its burden into a steel pipe fitted on the inside with a spiral band of steel. This spiral conveyor is rotated by a chain drive, the ore having the combined motion of advancing in the pipe and being tumbled over. This last motion, which gives a mixing action, while not equalizing the whole tenor on the ore passing through, cuts out the sharp lines of difference and enables the sampling machines following to have a uniform product discharged to them during each of their revolutions.

From the spiral the stream of ore is fed by a spout to the quartering machine, which in each of its revolutions takes four equal sections of the ore stream. Each of these quarters is separatedly led by a pipe to a shaking plate, which equalizes the intermittent discharges and delivers a constant stream to the No. A Vezin sampler, which takes a one-tenth cut from the stream (2 1/20 cuts per revolution). The reject falls directly by a pipe to the reject bin. The sample (1,500 pounds) is taken by a second shaking plate and thence to No. B Vezin sampler, which, as before, takes a one-tenth cut. The second reject is also led to the reject bin; and the sample (150 pounds) caught in a sealed sample safe. At the completion of the run all the machines are brushed down and the sample taken to No. C Duplicate Vezin sampler. Here a shaking plate delivers a stream of ore to two double revolving vanes that extract, each, one-tenth sample (15 pounds) depositing each into a separate receptacle and the reject into a third. One sample is boxed, sealed, and stored as a reserve; the other is taken to the finishing room; the reject goes to the bagging bin, or is held over until the next shipment from this particular mine, as are also the mill sweepings and the rejects from the finishing room.

From the bagging bin the ore is drawn off into canvas bags, which are tied, weighed, and shipped to the smelter.

Up to this point the fine product from the ball mill has been automatically mixed, quartered, and each of the quarters independently sampled by machines until eight samples of the lot (two from each quarter) are obtained.

To follow the samples further: on reaching the finishing room the sample is weighed and dried in an electric oven for six hours at a temperature of 100 deg. C.; the moisture is thus incidentally ascertained. The dried product is screened through 100-mesh and the oversize ground in a Braun disc pulverizer to pass the same mesh. It is at this point that the metallic silver in the ore is again in evidence. The small pellets that pass through the ball mill screen are flattened out, or are rolled into spheres by the discs These metallics, No. 2, are disced until clean as required, or are freed from impurities on the buckboard; the product from all operations either passing through the 100-mesh or being held on it as clean metallics. The metallics are mixed by coning on glass, divided into the requisite number of packets, and sealed. The fines are placed in an Abbe pebble mill, from which the pebbles have been removed, and the jar is rotated slowly for half an hour. After mixing, the fines are carefully removed from the jar, placed on the glass table, flattened out with a spatula and sections taken, packeted, and sealed for each of the parties interested.

In this way, the ore after passing the ball mill screens is divided into four equal portions, each quarter after treatment resulting in a sample each of fines, and metallics. The combined assay values of these two products give one valuation on the ball mill fines. The mean of the results is considered to be a fair valuation of this product. The maximum allowable difference between any of the four valuations is one per cent. Just recently several improvements have made, and it is hoped to reduce this extreme variation limit to about one-quarter per cent. of the total assay value. The mean of the four valuations, of course, reduces

the probable variation from the actual value of ore lot to about one-quarter per cent.

In estimating the total value of the car of ore sampled, the amount in ounces per ton of the ball mill fines is multiplied by the exact tonnage of same, giving the total ounces. The total number of the fine ounces obtained from the ball mill metallics is added to this figure, and the result multiplied by the present market price of silver, giving as a net result the prevent value of the shipment.

Silver Lead and Zinc Deposits of Slocan

Mr. O. E. LeRoy, of the Geological Survey of Canada, who has during two or three years last past closely studied the geology and mineralogy of the Slocan district, delivered an address on this subject before the meeting of the Western Branch of the Canadian Mining Institute, held at New Denver, Slocan Lake, B.C., on September 13. He entitled his contribution to the proceedings, "Notes on the Silver-lead and Zinc Deposits Occurring in the Slocan Slates and Associated Granites." He said:

"The area now under consideration lies between Slocan and Kootenay Lakes, including Four-mile basin to the south, and Whitewater to the north.

"The rocks consist of the Slocan series, comprising interbedded slates, quartzites, and sandstones intruded by certain phases of the Nelson granites, in the form of batholiths, bosses, dikes, and sills, with some later intrusions of basic dikes.

"The vein fissures cross the strike of the formation as a rule, or in cases strike with the formation and cut the dip of the rocks at varying angles. They vary in length from a few hundred to 2,000 feet or more, with widths ranging up to 150 feet. The strike is usually east or west of north, though in some instances it is east and west. The dip varies from 20 deg. to vertical. The fissures terminate in different ways, the most common being the fraying or feathering out on a sharp turn in which the vein peters out along the strike of the formation. In the granite the fissures follow the most prominent lines of jointing. The orebodies range up to 400 feet or more in length, and up to 40 feet in width, with depths of several hundreds of feet. They are composite and consist of a series of lenses of ore—galena or zincblende — either pure or mixed, lying in lines or "en echelon." As one lens of galena peters out another commences a short distance from it. The paystreak as a rule favours the hanging wall.

"The ores are popularly classified as wet and dry. Wet ores consist essentially of galena with a gangue of siderite; dry ones of silver-bearing minerals usually low in lead, with quartz gangue.

The chief metallic minerals are galena, zinc blende, and grey copper (freibergite), with minor amounts of pyrite, chalcopyrite, ruby silver, argentite, and native silver. In the oxidized zinc, sulphate of lead occurs occasionally, and more rarely linarite or sulphate of lead and copper. The gangue minerals are siderite, quartz, and calcite.

"In the normal type, siderite is first in deposition, followed in turn by zinc blende, galena, and grey copper; with yellow copper, pyrite, and quartz toward the closing period. The rule, however, has many exceptions, and the method of deposition is very complicated. The value varies from 7 to 75 per cent. lead, and 20 to 200 oz. silver per ton. Gold occurs in many of the ores—from $1 to $7 per ton.

"The developments of the last year are very encouraging and give strong hopes that the ores occur at far greater depths than has hitherto been considered probable. While the depth at which pay-ore will be found will vary in different parts of the area, encouragement is taken from the healthy appearance of the veins in the best-developed mines.

"Many of the properties now lying idle, and with no ore reserves, offer favourable blocks of ground for judicious prospecting with which, no doubt, some of them would be found capable of being made productive. Owners of idle properties should be willing to accept a fair sum for their holdings, or to offer liberal conditions for leasing, bonding, or purchase, in order to encourage the expenditure of the capital requisite for the development of such properties, for they would thereby add to the prosperity of the community and impart to the life of the district a healthier tone than has characterized it of late years."

(Note.—Fuller particulars of the Slocan district are contained in Mr. LeRoy's annual reports, printed in the "Summary Report of the Geological Survey for 1909 (pp. 131-133), and 1910 (pp. 123-128," respectively).

Lucky Jim Zinc Mine, Slocan, B.C.

(Notes by A. J. Becker, Superintendent.))

The zinc deposits of the Lucky Jim mine occur as a replacement of the lime by a zinc solution.

The ore occurs in a lime dike, which traverses the slates in a direction E. 6½ deg. S., with a dip of 45 deg. S. The slates of the foot wall are very silicious, badly mixed with hard blue lime and iron sulphides. The slates forming the hanging wall are the ordinary Slocan slates. This lime dike varies in thickness from 10 to 200 feet, and the orebodies depend largely on the thickness of the lime dike. The lime dike is fractured by fissures taking the usual Slocan course, namely, northeast by southwest, and where these fractures are found cutting the lime the deposits of zinc occur. The fractures sometimes extend through the slates, but so far we have failed to find any zinc ore outside the lime dike, although lead ore has been found in these fractures outside the lime dike and in the slates.

So far we have two known orebodies, about 500 feet apart. On the surface of one there is a large deposit of ore, this forming quite a "glory-hole" and extending down to our lower explored level, but decreasing in size owing to the lime dike lessening in thickness, with the ore, however, extending from the foot to the hanging wall slates. The second orebody is 500 feet east of the first orebody; near the surface this showed ore from the slate on the foot to that on the hanging wall, but the dike here showed reverse conditions to that in which the other orebody occurs, for its smallest part is at the surface while it gradually increases in thickness until, on the No. 4 level, it is 180 feet wide. Now this fracture near the surface, and as far down

as No. 4 level, is accompanied by lesser fractures, and these are sometimes filled with paying ore. On the No. 5 level these smaller fractures consolidated into one huge deposit of zinc ore, in places mixed with lead ore, all the lime between the main fracture and the lesser ones having been replaced by zinc.

It is noteworthy that the ore does not always occur in the fractures, but sometimes on either side of the fractures, as a replacement, while the fractures themselves are barren.

From my observation thus far, I am positive these zinc deposits depend upon the depth of the lime dike, and since the lime dike is cut by a deep canyon much lower than our present workings, there appears to me to be a good future for the Lucky Jim mine.

Development.—The mine has been developed by 8 adit tunnels. In the No. 4 (Geo. Hughes tunnel), a winze was sunk 108 feet on the dip of the vein; much of the zinc ore shipped by Mr. Hughes was taken out of stopes opened from this winze. No. 5, which was started from a point 200 feet vertically below No. 4, reached the first orebody at 360 feet from the portal of the adit. This orebody is here 22 feet wide. At 425 feet farther on the second orebody was entered; this proved to be 91 feet in width. In the middle of it there occurs about ten feet of ore badly mixed with iron, and then about six feet of silver-lead ore; after that the ore is all zinc. The total length of No. 5 is between 900 and 1,000 feet. An aerial tramway was erected from the portal of No. 5 down to the Kaslo & Slocan Railway track, alongside which ore bunkers were built, but both tramway and bunkers were destroyed by fire last year, just before they were fully completed.

No. 6 adit was started at an elevation of 27 feet above the railway track. It is now in about 925 feet. We expect to reach the first lime dike within 100 feet from the present face, and afterwards to have to drive through about 75 feet of lime to reach the ore.

Progress in Coal Prospecting

J. A. Wentz, Charlton, Ia.

There are four commonly known methods of prospecting coal lands, which show the same number of successive steps in the development of the art of obtaining exact knowledge as to the commercial value of a given formation. In order of general value they are as follows:

First, sinking of shafts or driving of slopes on the coal vein.

Second, drilling test holes with the churn or percussive drill.

Third, drilling core holes with chilled shot or saw-tooth bits.

Fourth, drilling with the diamond core drill, using the double-tube core barrel.

The first method, which consists in exploring the vein by shafts or other workings, is necessarily slow and prohibitive in cost. The second is cheap and rapid, but the records obtained thereby are naturally unreliable. The samples taken from holes drilled by this method consist of chopped-up particles representing the contents of the hole, the various strata of which are necessarily more or less intermingled, so that determination of the condition of the coal as to purity, and of the character of the overlying and underlying strata, is mere guess work. The third method, that of drilling with chilled shot, or saw-tooth bits, is an improvement over the second, but leaves much to be desired in the matter of drilling speed and condition of the core. The apparatus does not lend itself to the use of devices by which the core is extracted carefully, and does not operate with the precision and smoothness required to prevent the core from being broken up by vibration.

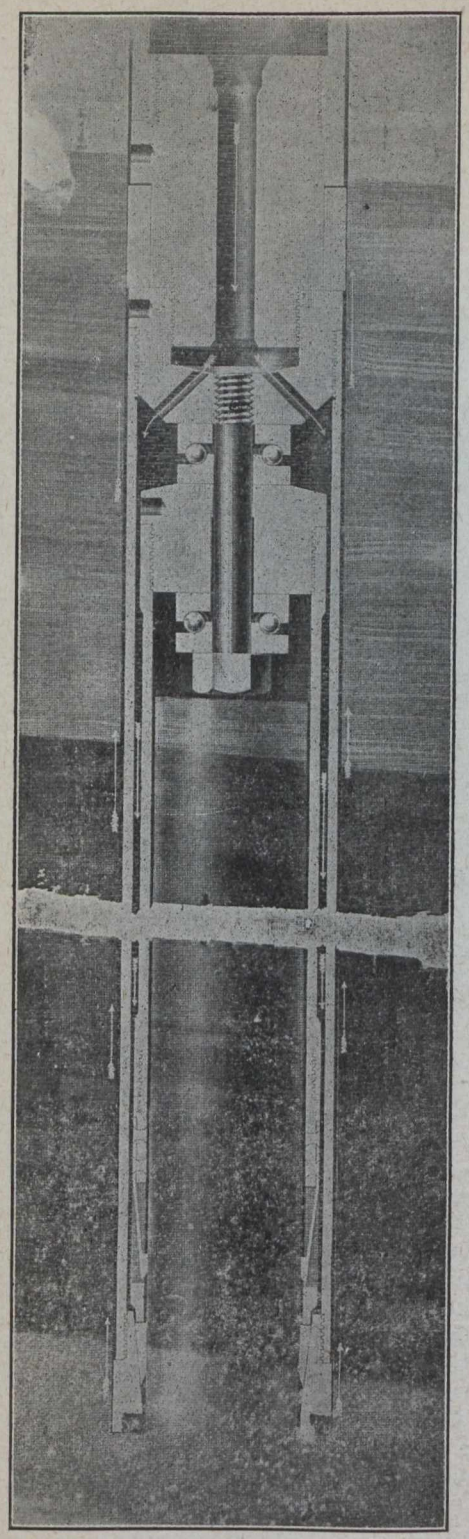
In order to secure even half-way results with machines of this type, it is necessary to use tools taking out a very large core from four to six inches in diameter. This involves a rate of progress and a cost for labour, which increases the price per foot of drilling to an unprofitable degree.

The necessity for obtaining the most perfect records possible is apparent, when it is remembered that large amounts of capital must be expended in the purchase of lands, building of railroads, installation of mechanical equipment, driving of workings, and building of houses, before a coal property can be put on an operating or dividend-paying basis.

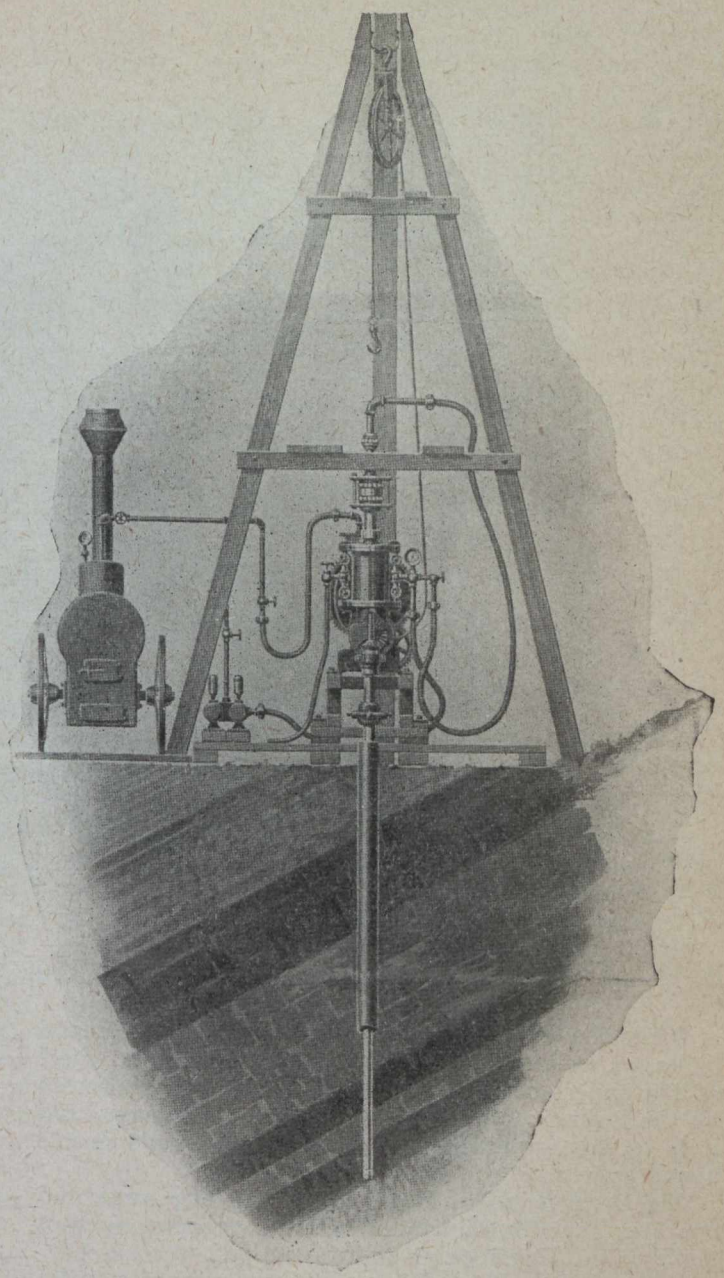
It is a fact, accepted almost universally by mining engineers, that the highest development obtained in this art in the diamond core drill, including the double-tube core barrel, which is shown in operation in the accompanying cut. The principle on which this apparatus works is as follows:

The drilling crown or bit is faced with black diamonds or carbon. This bit is placed at the end of a tube or core barrel, which is of peculiar construction. As implied in the name already mentioned, this core barrel consists of two tubes, an inner and an outer member, the inner one being suspended on especially designed ball-bearings, to make it free of the rotation of the outer tube. The outer tube is made to fill closely the hole and to rotate without vibration. Between the inner and outer tubes is a space through which water is forced, which emerges under the bit, carrying away the cuttings. Close to the bit is placed an automatic device which grasps the core, bringing it to the surface, when the core barrel is lifted.

The core barrel is connected to the drill on the surface by the required number of drill rods, made of hollow steel tubing, in exact ten-foot lengths, by means of which the depth of the hole at any given time is accurately measured. The bit, core barrel, and rods are rotated by means of a suitable engine, and are fed downward by hydraulic pressure regulated by finely graduated valves. The hoisting and lowering of the rod is accomplished by means of a derrick, or tripod, carrying a sheave wheel and a rope, which is wound upon the drum forming a part of the drilling machine. The entire apparatus is designed in strict accordance



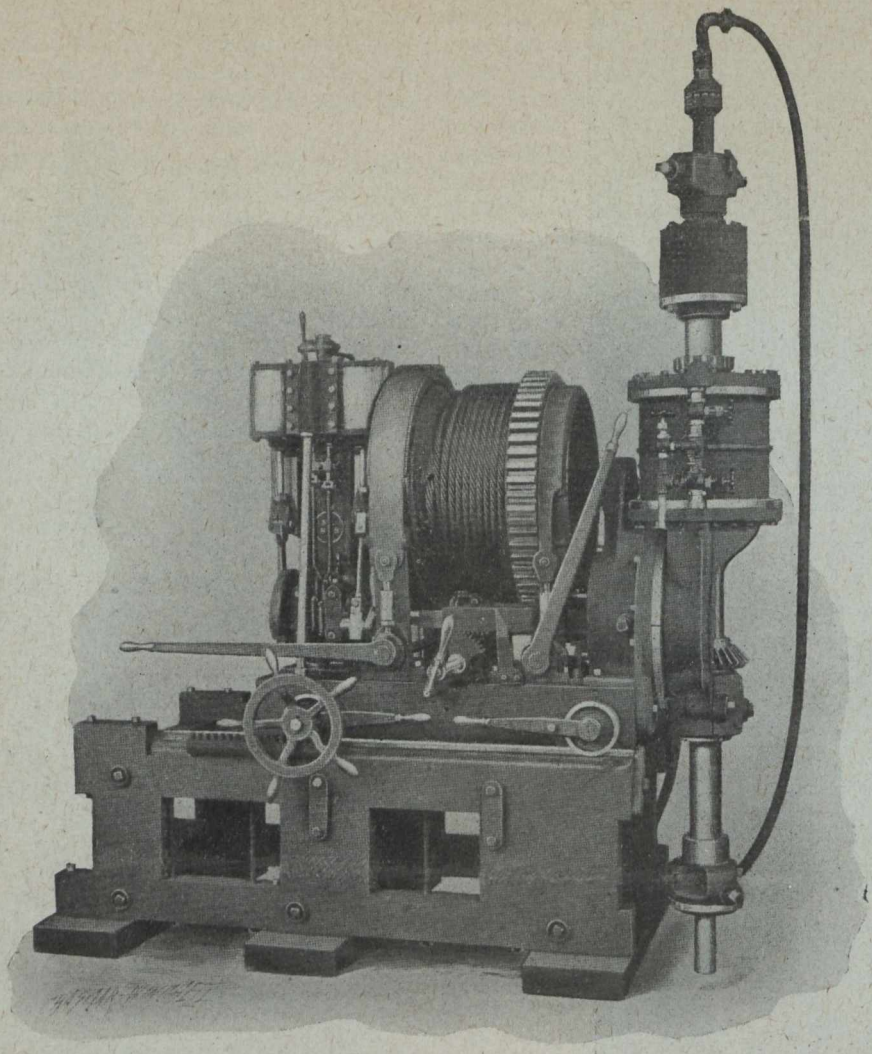
Double Tube Core Barrel Passing Through a Coal vein. The arrows indicate the course of the wash water.



Arrangement of typical Diamond Drill Outfit.

with engineering principles, and every detail of materials and construction in these machines receives the careful attention of the manufacturers. "Built like a watch" was the criticism of a recent purchaser of one of these drills. The cores are two inches in diameter, a dimension fixed upon after extensive experience. The cores extracted, even in friable formations, are practically complete, showing only a minute loss from abrasion, and are a perfect record of the formation existing at the point drilled. They are placed in suitable cases for preservation. Vertical sections of the core may be taken for analysis, as required, the remaining portions being preserved.

The method described is equally applicable to prospecting for any other mineral, and is especially desirable when cores are liable to be broken or ground up by ordinary drilling. In addition to securing reliable records, diamond drills are much more rapid, than any other coring drill, owing to the small diameter of the hole bored, and to the readiness with which the diamond bit penetrates any strata encountered.



Diamond Prospecting Core Drill. Single cylinder hydraulic feed.

While the writer has used various types of diamond drills, as well as other core drilling machinery, most of his experience has been with those manufactured by the Sullivan Machinery Company, of Chicago, and it is to this apparatus that reference is made in the above article.

The Department of Mines in Nova Scotia owns and operates several diamond drills and also some shot drills of the Davis Calyx pattern.

These drills are leased to mining companies, principally coal mining concerns, and the results as to progress and cost are very carefully recorded by the government officials; so that a definite comparison of the work and cost of operation of these two types of machines is available. Such a comparison is very interesting, as it is seldom that the two patterns of prospecting drills are used in the same formation.

The following table is made up from the records of the Department of Mines for several years past, and throws an interesting side light on the relative proportion to the whole cost of the cost for diamonds, and the cost for shot. The writer has only figured out the cost of labour and management for one year, 1909; in this year, this item for the diamond drills averaged 58 cents per foot, and $1.17 for the shot drills.

Table 2 appeared recently in the Engineering and Mining Journal, with the exception of the last column, which shows a hole 1,217 feet deep, bored by the diamond drill.

Table 1.	1907	1908	1909	1910	3 years
Footage all drills	6273	7905	5576	5222	6234
Footage by diamond drills		2962	3378	4498	....
Footage by Calyx drills		3412	2198	724	
Cost foot for all borings	1.23	1.06	1.405	.99	1.057
Cost foot diamond drills	.73	.845	.59	.93	.854
Cost foot Calyx drills	1.71	1.34	2.166	1.44	1.642
Carbon cost per foot	.029	.077	.037	0.67	
Cost shot per foot Calyx drill	.47	.056	.055	.02	

In the year 1910, the footage on which diamond drilling was based, represented 6/7 of the total work done and the footage on which the shot drilling was based represented the other 1/7.

Comparison of Hole Boring Costs.

	1 Diamond	2 Diamond angle of 45 deg.	3 Diamond	4 Calyx Shot	5 Diamond
Total depth of hole, fefet	463	125	285	559	1217
Size of core, inches ...L	2	15/16	15/16	6	2
Fastest hourly rate, feet	5⅓	3.75	...	6⅓	5.14
Average hourly rate, feet	1.93	1.00	0.92	1.27	1.2
COST PER FOOT FOR—					
Labour	$0.131	$0.306	$0.392	$0.326	$0.120
..Management	.356	.500	.295	.358	.304
Fuel	.056	.032	.026	.311	.057
Light, oil, waste, etc.	.007	.006	.010	.024	.008
Carbon wear	.048	.048	.053	....	.115
Shot consumption	....	....	....	.019	....
Gravel consumption	....	....	....	.005	....
Lumber	.054	....	....	.081	.017
Casing pipe	.030	.032	.004	.018	.009
Freight and truckage	.058	.244	....	.279	.061
Blank bits	.003	.004	....	.020	.004
Core barrels and lifters	.032	....	....	....	.026
Laying water pipe, etc.	....	....	.025	....	....
Total cost per foot	$0.775	$1.172	$0.805	$1.441	$0.724

Prospecting Three Centuries Ago.

(Continued from September 1st issue.)

Mark now the fact that Mr. Plattes was by no means devoid of empirical knowledge. In giving further guidance to the prospector, he commands him to "goe "to the bare Rocks, and there to find out the clifts, "cracks, and cranies: this done, to goe to the toppe: "or till you finde some grasse growing right on the "top of the said Cranies, and then to observe diligent- "ly, the kind of that Grasse, and how it differeth from "other Grasse, ordinarily growing in the same Moun- "taine; not onely in forme, but also in colour, which "colour showeth the greatest difference in the heat of "Summer for the subteraneall Vapours issuing out of "the Orifice of Mines, and differ from those which issue "out of the more solide places in the Mountaines."

The next step is to see if there be any "marcasites" visible. These, it is explained, are usually of divers colours "and seldome good for any thing, yet they are "strong signes of Mineralls within, being themselves "the spume or frothe of the better Mettalls, breathed "forth, even as Drinke breatheth up his Yest or Froth "to the Superficies."

"Marcasites," evidently is a generic name for all metallic sulphides and arsenides, for "these if they "be put in an ordinary fire, they will turne blacke, and "yeeld a smell of Brimstone, Arsnicke, Antimony, or "some other thing, commonly called or knowne by "the name of middle Minerall."

Behind all this quaint vagueness there are glimmerings of practical common sense.

Naturally, Mr. Plattes believed firmly in the divining rod, virgula divina. "The operation with the Virgula "divina is thus to be performed: some observe a set "day and houre with certain words and Ceremonies "at the cutting up of the same, which I have found to "bee little to the purpose." In fact, the excellent Plattes tried the rod successfully in any and all circumstances. He concludes, therefore, the reason of this attraction "to bee of Kin to the Load-stone, "drawing Iron to it by a secret vertue, inbred by na- "ture, and not by any conjuration, as some have fond- "ly imagined."

Should it serve any good purpose, our author declares himself prepared to show more experience of that kind than any man in England.

Tight little England did not mark the limits of Mr. Plattes' ambition. The "new Plantations," New England, Virginia, Bermudas, we are assured, offer high chances to the prospector, chances of "more gaine in "one yeare, than their Tobacco and such trifles would "yeeld in their whole lives.'

Because lead is one of the most common metals found in "these Northerne Countries," Chapter 3 takes up the melting and refining of that metal. Regardless of protests from the careful housewife, the reader is instructed to build a grate fire in the chimney-corner. After filling the improvised grate with "Char-coales "Kindled, in the middest thereof set your melting Pot, "with one pound of Lead-oare, and foure ounces of "filings of Iron mingled together, and so blow to it "strongly with a paire of good hand-bellows." The resulting metal is hammered free of slag, and is then assayed and refined. The first test consisted in roughly cupelling two ounces of the lead on a "peece of good Oake-wood," over a fire "about so strong as "to roast a Pigge." In three-quarters of an hour the silver button is to be expected. This is weighed, and

the number of ounces to the "Tunne of Lead" calculated therefrom. Lead that does not yield eight or ten pounds of silver to the ton, is not worth refining.

To make his cupel, or "Test," the ingenious Plattes secures an iron ring about four inches wide, two deep, and a quarter of an inch thick. This is his mould. Then he calcines mutton-bones and beef bones, crushes them fine, "then with a little beere or water tempers a small "part thereof like pappe" so that it will "remaine "clammish, betwixt powder and paste."

For melting-pots "you may bee at choise whether "you will buy the same at the Gold-smiths, or Potters "in London, which sell Flanders melting Pots, or "make them your selfe."

Chapter 4 proves excellent Plattes to be an expert in the metallurgy of tin. "As for the refining of it, I "am sure it cannot be done by any artifice; for I sup- "pose that I have tryed more experiments about it, "than any 10 men in England. . . . but the more I "tryed the worse I sped." Resorting to the expedient of melting equal parts of gold and silver with the tinne, he found that "all was vaine, for the Tinne poisoned "and consumed some of my rich Mettalls." "Refining," in the terminology of the day, embraced the extraction of "royall mettalls" from base metals. Mr. Plattes, confessing his inability to accomplish this, supplies readers with a way of enriching themselves without running any risk "to damnifie themselves in "any manner of value that is considerable." His hint consists in recommending men of quality to set apart a portion of their leisure for the purpose of prospecting.

As the melting of iron cannot be carried on in the chimney-corner, the reader is told "to learne the prac- "tise thereof in every Country almost where he shall "come." Gold, we are informed, can be extracted out of any iron, but the process is so costly that it "satis- "fieth no man."

Copper ore is to be treated like lead ore, except for the absence of iron filings. Refining, also, is done by cupelling with lead. We are warned that "in the "refining of strange Minerals, as Marcasites, and espe- "cially those which the Minerallists call by the name "of Divells Dirt," the test may become foul. It must then be thrown away.

Silver associated with lead ore is subjected to the same simple process. When the silver ore is strongly mixed with spar and stony substances, it is crushed, washed until "the greatest part of the terestreity and "filth" has disappeared, dried and treated with a liquid amalgam of lead and quicksilver.

For the extraction of gold simple amalgamation in a "little Bucket of Iron" is commended, "Quick-sil- "ver being the most friendly mineral to the royall "mettalls."

The method of purifying gold is set worth in Chapter 9. In this the author deplores the enhanced cost of living.

"Cinabar naturall, Antimony, Auripigment, Arsen- "ick, Talcum, Muscovy glasse, Emery and many other "things" are touched on in Chapter 10.

The subject of the next chapter is "the waies to find "out Pit-coales." Neither in extremely fertile nor in barren ground is the mineral to be sought, but "in "ground that is proane to beare wood and thornes. . . . . of an indifferent fertility." . . "Also the said grounds are proane to bring forth large Cattell, "and well horned." We can thus see the disciples of Plattes scouring the country for long horned kine as a preliminary to opening a coal mine.

Chapter 12, the last, is in part an excursion into the realm of botany. On the second last page, however, is given an inventory of the equipment needed by the prospector. Thus it runs: "He will neede nothing but "two or three Pipkins, two or three Urinalls, an Iron "Picke-Axe well steeled, a spade, and a Crow of Iron, "if he will be at the charge thereof."

And with this last quotation we must leave Mr. Plattes. His book deserves longer and fuller attention than it has been possible to give it. No matter how ludicrous some of his statements seem in the light of to-day, his was a courageous soul. Peace be with him and his pipkins!

—J. C. M.

Zinc Investigation Progress Report.

On July 20 the secretary of the Western Branch of the Canadian Mining Institute wrote to the Director of Mines, Ottawa, requesting that any available information relative to the progress made in connection with the Zinc Investigation and experiments be sent to him in time for submission to the general meeting of the branch of the Institute, convened for September 13th, at New Denver, B.C. Too late for presentation at the meeting he received from Dr. Haanel a copy of a progress report received by the director from Mr. W. R. Ingalls, of New York, consulting engineer in this connection. It has not, however, been deemed advisable to incorporate in Mr. Ingalls' report any details of the special experiments and tests which have been made. Mr. Ingalls' report to the director follows:

"In compliance with your request for a report upon the progress of the Zinc Investigation now being conducted by the Canada Department of Mines, I beg to present the following:

"The general plan of the investigation was fully outlined in my report to you under date of January 28.1911, to which I beg to refer you. Since that time work has been prosecuted, especially in the field of electric smelting, this having been done in the metallurgical laboratory at McGill University, Montreal, under the immediate direction of Dr. Alfred Stansfield. A large number of experiments have been made with several forms of furnaces, certain of which have been of rather elaborate construction, and with a variety of raw material.

"Our early experiments were directed chiefly toward a discovery of the metallurgical conditions that have heretofore prevented a satisfactory condensation of zinc as molten spelter. While I cannot say that these experiments have afforded us a complete explanation of these conditions, they have taught us a good deal, but in spite of the knowledge acquired, we have been so far unable to master the difficulties.

"We have, indeed, produced some small quantities of spelter and in certain experiments have condensed a fairly large proportion as molten metal, but we have not yet been able to do that at will.

"Our experiments have thrown light upon the principles of furnace design and have led us to condemn several types that we have tried. Our work has indicated that in order to achieve any material improvement over the ordinary practice of zinc smelting, it is necessary to abandon certain features of the latter and contemplate continuous charging of the ore and reduction material and discharging the residuum with-

out interfering with the process of distillation. These conditions introduce a multitude of perplexing difficulties that can be worked out only by tedious experimentation.

"At the request of the secretary of the Canadian Mining Institute, and with your permission, I presented at the meeting of the Institute in Quebec, in March, 1911, a paper on 'The Problem of Mixed Sulphide Ores,' (copy of which I attach to this report) that concisely summarizes the state of the art in the treatment of such ores and the natural obstacles that block procedure in certain directions.

"A careful scrutiny of the work on the treatment of such ores that is being done by other metallurgists and investigators has been maintained, and I have examined numerous proposals that have been presented with more or less detail, both through your office and to me directly, but I have not discovered anything save one that in my opinion holds out any promise of successful adaptation to the conditions existing in British Columbia. I am conducting correspondence respecting this, but as to inaugurating experiments upon it, I am disposed to hold them in abeyance pending further progress in our electric work.

"I regard the electric work as being of particular interest as an exploration in a virgin field of unknown possibilities. Doubtless with the same idea a great deal of work in this field is being done by numerous investigators in both Europe and America. I have been informed within a few weeks that there are now two electro-thermic zinc smelteries in operation in Scandinavia, viz.: one at Trollhattan, Sweden, using about 7,000 h.p., and one in Sarpsborg, Norway, using about 4,000 h.p. Operations at these works were inaugurated five or six years ago, but according to my information the results were for several years commercially unsatisfactory, and it is only recently that it has been claimed to have become possible to make spelter from ore upon an industrial scale. The companies operating these works maintain absolute secrecy respecting them, and I have not been able to learn any details as to their operation.

"Apart from the work in Scandinavia, as to the commercial success of which no information is available, the electric smelting of zinc ore is, in spite of all claims to the contrary, not only still in the experimental stage, but is in the infancy of the experimental stage. Even if the metallurgical difficulties can be overcome, which is possible, I am of the opinion that no one, except perhaps the Scandinavians, is yet in a position to make any reliable estimate of commercial advantage or commercial results in any way. It is, however, well worth while to determine the possibilities and publish the results for the general benefit, unveiling so far as possible the secrecy that is likely to be maintained as to the investigations in this field by private interests, having always in mind, of course, the hope that our work may develop a process that will be commercially applicable to the treatment of the zinc ores of Canada."

(Note.—Mr. Ingalls' paper on "The Problem of Mixed Sulphide Ores," is far too long for reprinting here. Those who have access to files of The Engineering and Mining Journal, of New York, can find it in the issue of that journal of July 29, 1911, pp. 211-213. Members of the Canadian Mining Institute may find it in the C. M. I. Quarterly Bulletin for June, No. 15, pp. 23-30).

BOUNTY ON LEAD MINED IN CANADA.

The following figures, obtained by Mr. E. Jacobs, for submission to the meeting of the Western Branch of the Canadian Mining Institute, held lately, show the amounts paid during several periods to July 1, 1911, and the balance unexpended at that date, of the 2,500,000 originally voted by the Dominion House of Commons for the payment of bounty on lead mined in Canada:

Total expenditure (under first Lead Bounty Act),) during period ended June 30, 1908	$700,390.04
Paid during fiscal year ended March 31, 1909	274,447.50
Paid during fiscal year ended March 31, 1910	343,099.08
Paid during fiscal year ended March 31, 1911	249,370.38
Paid during three months ended June 30, 1911	49,713.32
Total amount paid as bounty on lead..	$1,617,020.32
Add amount appropriated for zinc ore reduction experiments	50,000.00
	$1,667,020,32
Balance still available as at July 1, 1911	834,979.68
Total amount voted	$2,500,000.00

Industrial Section

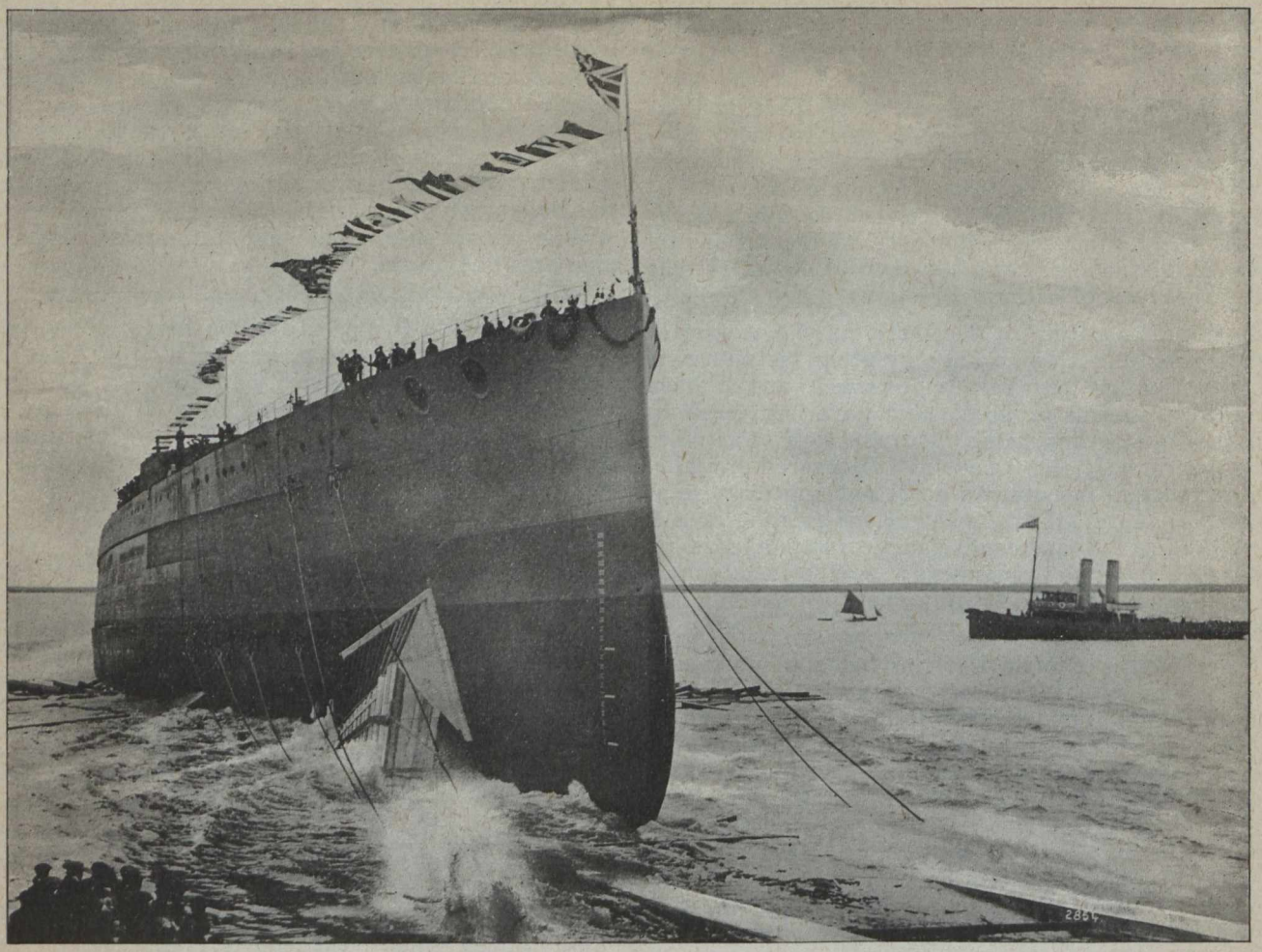
WIRE ROPE.

The manufacture of wire ropes of exceptionally large size and high breaking stress has made such great strides of late years that a brief description of some recent examples in this important branch of manufacture may prove of interest to our readers.

Wire ropes may not loom very large in the mind of the ordinary lay reader, but it is well known to all those who are engaged in operating our mines, lumber camps, engineering, and contracting in all its branches, that wire ropes play a very important part in the successful working of all these industries.

The old-established firm of Thos. & Wm. Smith, Ltd., of Newcastle-on-Tyne, England, has for many years past done a large and increasing business in all classes of wire ropes throughout the Dominion of Canada, and the following particulars of some exceptionally large ropes that it has recently completed will serve to show what results can be obtained from the products of a really live wire rope works.

Our illustration shows the largest warship hitherto launched for the British navy, the Dreadnought cruiser "Princess Royal," recently launched from the Barrow Yard of Messrs. Vickers, Ltd. Owing to the ex-



ceptional length and launching weight of this vessel, Messrs. Vickers naturally went very closely into the question of launching checks, and the contract for these important ropes was finally awarded to Thos. & Wm. Smith, Ltd. The ropes were 8 inches in circumference, having a total length of about 5,000 feet, and whereas the British Admiralty specification for this size of rope calls for a breaking stress of 170 long tons, Messrs. Smith were able to give a guarantee of 200 long tons for these ropes. A test piece was cut off each coil and sent to a public testing house, and it is a wonderful testimony to the excellence of the material and manufacture of these ropes that the testing machine was unable to break a single one of the test pieces, although the full stress of 200 long tons was applied in each case for two minutes. A still higher breaking stress was recently obtained by the same firm from a 7¾-inch circumference flexible plough steel wire rope, which they supplied to the War Department for a heavy gun dipping crane at Woolwich Arsenal. This rope was 1,896 feet long, and a test piece submitted to a public testing works broke at a stress of 246 long tons—a truly remarkable result for a rope of this size. A still larger rope was also supplied a short time ago by Messrs. Smith to the Aukland Harbour Board. This rope was 9½ inches circumference, and was tested at a public testing house under Admiralty inspection, breaking at a stress of 348 long tons, which is within two tons of the limit of the largest testing machine in Great Britain. It is true that such large ropes as those we have mentioned have seldom if ever been used in this country up to the present, but the requirements of engineers are growing more exacting every day, and it is comforting to know that whn called upon, up-to-date wire rope manufacturers in the Old Country can still meet any demands that may be made upon them.

Amongst the more important orders for the Dominion recently fulfilled by Messrs. Smith may be mentioned a large slope rope for one of the most important companies in Nova Scotia, which was 20,000 feet long by 1⅛-inch diameter and weighed 22½ long tons, and a hauling rope for an aerial cableway in British Columbia which was 38,000 feet long by 1-inch diameter, and weighed 27 long tons.

Westinghouse Officials

At a meeting of the Board of Directors of the Westinghouse Electric and Manufacturing Company, held in New York on August 1st, the following officers were elected:—

Chairman of the Board of Directors—Robert Mather.

President—Edwin M. Herr.

Vice-Presidents—Loyall A. Osborne, Chas. A. Terry, Harry P. Davis.

Acting Vice-Presidents—Henry D. Shute, George P. Hebard.

Comptroller and Secretary—James C. Bennett.

Treasurer—T. W. Siemon.
Auditor—F. E. Craig.

Mr. E. M. Herr is elected to succeed Mr. Edwin F. Atkins, who has been president of the company since June, 1910, and who declined re-election.

Mr. Herr has been first vice-president of the company since 1905. He has announced the appointment of Calvert Townley as assistant to the president.

Edwin M. Herr, who was elected president of the Westinghouse Electric and Manufacturing Company at a meeting of the Board of Directors held in New York August 1st, has been the first vice-president of this company, and in charge of operation of same at East Pittsburg since June 1, 1905.

Mr. Herr was born in Lancaster, Pa., May 3, 1860. Upon completion of a common school course, he was given the position of telegraph operator on the Kansas Pacific Railroad, with which company he remained for two years. He was promoted from the construction train service to the position of station agent.

In 1881 he entered the Sheffield Scientific School of Yale, graduating in the class of 1884, and worked as an apprentice in the shops of the Pennsylvania Railroad Company at Altoona, Pa., during the two summer vacations.

From 1884 to 1885 he was an apprentice at the West Milwaukee shops of the Chicago, Milwaukee and St. Paul Railroad. He then went to the Chicago, Burlington and Quincy Railroad Company as a draughtsman in the mechanical engineer's office, and afterwards became assistant engineer of tests, and was promoted from this position to engineer of tests on this road at Aurora, Ill.

From 1887 to 1889 he was superintendent of telegraphy, and from 1889 to 1890 was division superintendent of this road.

From 1890 to 1892 he was division master mechanic of the Chicago, Milwaukee and St. Paul Railroad at West Milwaukee.

From 1892 to 1894 he was superintendent of the Grant Locomotive Works at Chicago.

From 1895 to 1897 he was superintendent of motive power and machinery of the Chicago and Northwestern Railroad. From June 1, 1897, to September 10, 1898, he held the same position with the Northern Pacific Railroad.

On September 10, 1898, he became assistant general manager of the Westinghouse Air Brake Company at Wilmerding, Pa. He was promoted to the position of general manager on November 1, 1899, which position he held until June 1, 1905, when he was elected first vice-president of the Westinghouse Electric and Manufacturing Company.

Mr. Calvert Townley was for many years connected with the Westinghouse Electric and Manufacturing Company, at first in Pittsburg, and later as manager of its Boston office, and as special representative in New York City. He comes to the company directly from the New York, New Haven and Hartford Railroad Company, where for the past five years he has been closely identified with the electrification of this road.

Mr. Harry P. Davis has been with the Westinghouse Company for twenty years, and for the last few years has held the position of assistant to first vice-president and manager of engineering at the East Pittsburg Works.

SPECIAL CORRESPONDENCE

ONTARIO.

Cobalt and Gowganda.

Much above the average were the shipments of ore from Cobalt for the week ending September 22, when thirteen mines sent out 18 cars, of which 11 were high grade. The total weight was 1,181,790 pounds, or 590.89 tons, as compared with 663.67 tons the preceding week. During that week Nipissing sent out bullion worth $22,670, and the Temiskaming sent out 7 bars valued at $3,600. For the week ending September 29th the shipments were slightly heavier than for the week before. Nineteen cars of ore were despatched by 12 mines, the ore totalling 1,200,525 pounds in weight, or 602.26 tons. Of this 10 cars were of high grade, and with the other shipments during September all above the average, this week's will make September the record month for the first nine of this year.

Cobalt and Gowganda.

Sinking on the main shaft of the Temiskaming has commenced from the 575-foot level, the object being to attain a depth of 650 feet, where the eighth mine level will be cut. The shaft is now down over 600 feet and but a short time will be necessary to reach the required depth. The new vein at 575 feet, cut 10 feet west of the shaft, is producing some high grade ore.

During the month of August, the Buffalo mill made a much better recovery than was the case in the preceding month, and the grade of ore treated was higher than in July. In August 144,446.06 ounces of silver, shipped previously, were paid for. Following is the mill report:

Mill run ..... hours	592½
Ore milled .... tons	3,093.5
Ounces recovered	94,041
Mill expenses	9,439.76

A shipment of 51,066 pounds of high grade ore was made last week from the Miller Lake-O'Brien at Gowganda, the ore being hauled over the summer road. This operation, ordinarily taking slightly over a week, required three weeks for completion.

During the fiscal year ending August 31, the Temiskaming and Hudson's Bay Mining Company shipped 676.32 tons of ore. The average assay was 1,191.10 ounces to the ton, a total of 805,572.88 ounces of silver. The new mill treated 11,109.6 tons of ore. Manager Young, in his report, says that the ore in sight assures equally good results for the coming year.

Last week gold bullion was shipped from the Gold Pyramid and the American Eagle, in Munro Township, the former sending out 70 ounces, valued at $1,400, and the latter 120 ounces, worth $2,400. Shipments of bullion have previously been made by the Gold Pyramid and the Detroit Syndicate properties.

During the week ending September 30th bullion shipments were made by the Nipissing on two separate days. One consignment was of 53 bars, valued at $28,400, and the other of 59 bars, valued at $30,800, total value $59,200.

At the 75-foot level of the McKinley-Darragh, exploration work in an abandoned working has led to the discovery of a rich vein. About 30 feet of drifting has been done on this ore body and high values are being secured.

This week saw the completion of the new shaft house and hoist house at the Gould Consolidated. Two drills are at work underground and the new shaft, which was commenced during the summer, has reached a depth of over 90 feet. The first station will be cut at 100 feet and the shaft may be continued to the 200-foot level.

Mackenzie and Mann have sent a large force of men into the West Shiningtree district, northwest of Gowganda, to work on their newly acquired claims there, purchased for a large sum from Gosselin, and although little is heard of the section, there is still a steady rush into the new field, and every day reports come out of new rich finds. A gang of 20 men has gone in to work on the Eplett-Caswell property and men are also working on the claims of the Sudbury Syndicate, bought from a man named Thomas, and situated on the shores of Cow Moose Lake. The Canadian Northern is cutting a good road in, and the journey in from the end of the steel is now but a half day's canoe trip.

Porcupine and Swastika.

Extensive exploration work is being done on the property of the Pike Lake Gold Mines, at Swastika, and some good free gold showings have been uncovered. A drill is now down about 50 feet and at 60 or 70 feet it is expected to strike the main vein. Little but surface work and testing has been done so far. The main vein, which is from 4 to 25 feet wide, has been traced for several hundred feet and a hexagonal ore body now being stripped of overburden is over 30 feet wide in places. It is made up of schist and quartz stringers.

Considerable development work is being accomplished on the McAulay-Brydge claims in Bristol township, recently purchased by the Cartwrights, of Cobalt and Porcupine. No. 1 shaft on the western end of the big dyke is now down about 20 feet, and in the shaft there is a 5-foot vein of solid quartz in addition to a smaller vein on the north wall. The other shaft is down the same distance near the eastern end of the claim. A gang of 30 men is employed in prosecuting this work, and a diamond drill is working.

A new vein carrying a spectacular showing of free gold has been opened up on the LaPalme property in Whitney township. The vein averages 6 feet wide and has been uncovered for nearly 200 feet. This is the 23rd vein opened on this property in which free gold has been found.

Within three days, three spectacular strikes were made on the Lucky Cross property at Swastika, and development work is being pushed at as rapid a pace as possible. A number of very promising veins have been opened and the ore bodies are proving to be of great size. These free gold showings were found while sinking, shot after shot bringing out rich samples.

On the south side of the lake a new shaft has been started on the Plenaurum property, and a depth of nearly 20 feet has now been reached. A boiler has been installed and a headframe erected so that when the compressor arrives it may be set in operation and work carried on at full capacity with as little delay as possible. A depth of over 50 feet has been attained in the main shaft.

Last week saw the starting of the plant at the Swastika mine. The outfit includes a 10-drill compressor and boiler, and four large machines are in use underground. The new main shaft has been timbered to 100 feet, and last week the drills started on the raise from the 200-foot level from the old shaft to reach the 100-foot level of the new or main shaft. At the present time, at the 200-foot level, a drill is driving on the main lead and the original values are still being encountered in the vein. A force of 65 men is engaged under Capt. John Reddington, formerly of the Coniagas, and superintendent of the Cobalt Provincial.

A 40-stamp mill is to be erected on the McIntyre, on which property over $250,000 will be expended. Five shafts are to be sunk on this property, and three of them are now well under way. The big 12-drill compressor is running and work in shafts No. 1 and No. 4 is being pushed at a rapid pace. It takes many men to work with 12 drills, and President Freeman, who has just returned to New York after visiting the property, says that from now until the first of next year underground work will be prosecuted at the rate of 2,000 feet per month.

Four shafts are to be sunk on the West Dome, which now has its camp buildings almost completed. The shot drill is now drilling the last hole that will be sunk, and shaft No. 1, where so many lives were lost in July, is being pumped out. Work is now going on in three shafts. In all portions of the property tests have been made with the core drill to a depth of 400 feet and the results have been highly pleasing to the management.

Last week underground work on the Preston claim of the Preston East Dome was resumed for the first time since the fire, two shafts having recently been pumped out. At the 80-foot level of the other shaft unwatered, 50 feet of cross-cutting and drifting has been accomplished. A new shaft has been started on the Preston vein and the shaft on the East Dome claim is down 30 feet.

Free gold has been found on the claims of the Sociate Mines, Limited, located in Deloro. In addition to the showings of gold in the free state, high assays have been received from other veins opened up. These claims are owned by a company of young Americans, who have a force of nine men engaged in development work.

Excellent progress is being made in the rebuilding of the structures destroyed at the Dome mines. New camp buildings of brick veneer are being erected and large numbers of men are busy in the reconstruction of the power plant, mill, and cyanide plant. Supplies are coming in rapidly on the Dome's siding and approximately 300 men are on the payroll. Some of the machinery damaged by the fire has been repaired, but considerable new equipment was found necessary.

No. 2 shaft at the Hollinger is now down 100 feet and it will be continued as quickly as possible to the 200-foot level. Not until the Pearl Lake extension of the T. & N. O. is completed will the heavy machinery be brought in, so that it will be some time in December before development work is carried on on the scale contemplated. The sleep camps and several cottages are being erected on the Timmins townsite.

High assays have been obtained from drill cores on the Pearl Lake property, and a main shaft, 13 by 5 feet, is to be sunk in a spot calculated to tap several large ore bodies. This shaft will go to 400 feet before any cross-cutting is done, and will be about 350 feet north of a line connecting B shaft and shaft No. 2.

There is another rush in progress to McArthur township, where rich finds were made earlier in the summer. This time the rush has been caused by the free gold discoveries on Morrison's and on Hull's claims. Some very rich samples have been brought out, and these properties are being developed on a fairly large scale.

A deal has just gone through in Montreal by which the Crown Chartered has taken over the Davidson property on which it had held an option for several weeks past. The Davidson claims, 5 in number, adjoin the Crown Chartered, and are located in North Tisdale. At a depth of 70 feet encouraging values are being encountered, and this addition of 200 acres should prove a valuable acquisition.

Cobalt Ore Shipments.

Following are the ore shipments from Cobalt for the week ending September 22nd, in pounds:

La Rose	238,480
Nipissing	151,090
Coniagas	123,150
Cobalt Townsite	100,520

McKinley-Darragh	64,250
Kerr Lake	60,870
Right of Way	56,980
Trethewey	56,980
Crown Reserve	50,800
Temiskaming	40,320
	1,181,790

Following are the shipments for the week ending September 29th, in pounds:

La Rose	278,780
Cobalt Lake	183,450
McKinley-Darragh	120,600
Drummond	120,000
Cobalt Townsite	65,100
Nipissing	63,980
Chambers-Ferland	63,900
Hudson Bay	53,000
Right of Way	61,500
Kerr Lake	60,930
Beaver	60,785
Coniagas	58,500
	1,200,525

BRITISH COLUMBIA.

Mining is progressive in several districts of British Columbia, notably on Vancouver Island and in Nicola Valley, of the coal mining parts of the province; and in Slocan, Sheep Creek, Hedley, and Coast camps, among the metalliferous mines. The Hedley Gold Mining Company has declared another five per cent. dividend on its issued capital of $1,200,000, this being the third distribution of $60,000 this year by this company. In Rossland camp, the War Eagle mine is continuing to produce much ore of good grade, while others of the Consolidated Company's mines in that locality are also doing well. The Le Roi No. 2 is regularly maintaining its normal output, with results that admit of the occasional payment of a dividend.

There does not appear to be any immediate prospect of a settlement of the strike of the coal-mine employees in the Crow's Nest Pass district. It is stated that the companies concerned are endeavoring to obtain men to work in the mines, but the only colliery reported to be producing and shipping coal in the district is that of the Corbin Coal and Coke Company.

Slocan.—The construction of the railway spur from the Canadian Pacific Railway at Three Forks to Bear Lake, on the divide between Slocan and Ainsworth mining divisions, is being pushed on while the weather continues favourable for outdoor work. Meanwhile preparations are being made at both the Lucky Jim zinc mine and the Rambler-Cariboo silver-lead mine to ship ore in considerable quantity when the new railway shall be completed.

Mines in the Cody section of Slocan district are expected ere long to again ship ore. In the Noble Five mine, both silver-lead ore of good grade and silver-zinc ore containing a high percentage of zinc have been developed during recent months. There is also a probability of the Surprise mine again shipping ore soon, for the long raise from the 1,100-foot level up 850 feet to the bottom of the old workings will probably be completed before winter shall set in. Development work is being done on both the Reco and Sunset mines, also in the vicinity of Cody Creek, while near Sandon the Ruth-Hope and Richmond-Eureka groups are being operated.

Similkameen.—From a recent number of the Similkameen Star it is learned that the deal for the Voight group of mineral claims, situated on Copper Mountain, near Princeton, is practically complete. Representatives of the British Columbia Copper Company have been endeavouring to get titles cleared, before undertaking development work. Prospecting shafts are being sunk to bed rock in ground situated at the forks of the Similkameen and Tulameen Rivers, and held under placer mining lease. Work is being done on the Lucky Pair group, in Whipsaw Creek camp, a few miles up the Similkameen from Princeton. Development work is also in progress on mineral claims in several other camps in the district, these including Copper Mountain, Roche River, Fivemile, and Coquihalla Pass.

The Princeton Coal and Land Company is employing fully 100 men at its coal mine at Princeton, and is shipping up to 200 tons of coal per day. Facilities for mining on a larger scale are being provided, and it is stated a screening and dry-cleaning plant is to be put in, so that a thoroughly marketable grade of coal may be produced continuously. A preliminary small shipment of coal has been made from the Columbia Coal and Coke Company's Coalmont mine, situated between Granite Creek and Collins Gulch, about 15 miles up Tulameen River from Princton. Here the adit being driven to cut the coal at the depth of about 1,200 feet on the incline, is in 1,600 feet; it should be in coal when driven 500 feet further. Mr. Geo. L. Fraser, manager of the company, who had been visiting the eastern States in connection with ordering coal-handling plant and machinery, has returned to Coalmont, where the construction and equipment of the tipple and other facilities for the shipment of coal will be energetically proceeded with.

Not much information has lately been received relative to mining operations in the Tulameen district above Otter flat, but it is understood the company organized by Mr. Chas. F. Law, of Vancouver, is prospecting its gold-platinum-bearing gravel deposits, preliminary to taking steps for the recovery of these metals in commercial quantity.

Nicola Valley.—An important development has lately taken place on the property of the Nicola Valley Coal and Coke Company, Middlesboro, Nicola Valley. The company's chief coal-mining operations have heretofore been in what is known as Coal Gully Hill. A few months ago the directors authorized the expenditure of between $90,000 and $100,000 in additional plant, machinery, buildings, and other surface improvements and in further development underground. Included in the programme of progress was diamond-drilling, and a contract was let to the Sullivan Machinery Company to drill about 4,000 feet of holes in various parts of the property. For prospecting underground, the company purchased a small diamond drill. Since then the Sullivan Company has been engaged in drilling on lower ground than that in which the company has been mining, and this work has been done in what had previously been regarded as probably non-productive ground. The result has amply justified the expenditure, for, first, what was thought to be an extension of No. 4 seam was encountered, size and character of coal being similar to that mined from No. 4; next, a second seam, believed to be an exsion of No. 5, has been passed through by the drill, and now the bore is being deepened with the expectation that No. 1 seam, which lies beliow No. 5, will be found as well. Where the drill passed through No. 5 there was 7 feet of coal in the core, but this is not the right-angle thickness of the seam, for the hole had been drilled diagonally; where mined, though, No. 5 contains 5 feet of good coal. Nos. 4 and 1 are both larger seams where mined in the developed part of the property, so it is to be expected they will also be larger where now found.

The contract time within which the new tipple at Midddlesboro was to be completed expired on October 1st, but the contractors required a short time longer to get it into running order. Nos. 4 and 5 mines have been connected by means of a rock tunnel, so that all coal from No. 4 can now be hauled out through the haulage way of No. 5 mine. The recent additions to plant and machinery include a complete coal-screening tipple with picking conveyors, slack conveyors, and car hauls,

capacity 1,000 tons per 10-hour day; a 50-ton raw coal per hour Stewart coal-washing plant, and storage bins of frame construction with the requisite foundations; a box car loader; and all machinery in tipple and washery necessary to receive, handle, and load out into box cars mine-run coal at the rate of 100 tons per hour. As indicating the progress this company has made in production, the following figures showing yearly output of coal are quoted: In 1908, 25,600 long tons; in 1909, 62,210 tons; in 1910, 141,487 tons. Production figures for the current year are not at present available, but it is known they show a substantial advance over those of last year, while a still greater increase may be looked for now that coal-handling facilities up to 1,000 tons per 10-hour day have been put in.

Howe Sound.—While little information has been published lately concerning the operations of the Britannia Mining and Smelting Company, it is stated by men believed to be well-informed that this year's developments in the company's mines, situated on Britannia Mountain, in the vicinity of Howe Sound, are the most satisfactory yet experienced by the company during the course of several years' persistence in developing its mines and proving the value of the orebodies occurring in them. No particulars have been obtained, but it is understood that ore of higher grade than that mined in earlier years has been found in considerable quantities, and that production has been enlarged accordingly. The further statement is made that the mines are now being worked on a profit-earning basis and the outlook is correspondingly encouraging. No other copper-mining enterprise yet undertaken in the Coast district of British Columbia has been conducted under similar conditions, long decidedly discouraging to those who found the large amount of money that has been expended in extensively exploring this property, so that the news of eventual success will be generally received with much gratification, and the abundant success of the Britannia company be earnestly hoped for.

Vancouver Island.—Efforts have been made to secure capital to work the hydraulic placer-gold mine at the mouth of Sombrio and Lost rivers, on the southern coast of Vancouver Island. This enterprise was undertaken in 1909 and continued in 1910 by a syndicate known as the Sombrio Mining Partnership, which acquired five hydraulic and four creek mining leases. The ground covered by the leases, as described in the last Annual Report of the Minister of Mines, consists of a large deposit of gravel formed at the mouth of the Sombrio River, at which point it is probable the old channel of Lost River also came out, although the latter stream now finds its way into the sea through a new channel, two miles to the eastward, out through the rim-rock of the older channel. It is stated that the quantity of gold-bearing gravel available here is large. Immediately back of this gravel delta the hills rise rapidly. These hills are composed of schists, greenstones, conglomerate, sandstones, and shales, with heavy deposits of gravel that at one time filled the river valleys, which were evidently gouged out by glacial action. Into these gravel-beds the present streams have cut deeply, depositing their detritus—and probably the gold—in the delta comprised within the leases. The water supply is furnished by the Sombrio and Lost Rivers, the former estimated as having a flow of 400 cubic feet a second, and the latter 700 cubic feet; this water has been brought on to the ground in a flume, under a head of 200 feet. A good dump for tailings, into the sea, is available for all time. It is estimated that the gold content of the gravel is about 15 cents per cubic yard. The partnership has put in 4,900 feet of steel rivetted pipe, of different sizes—1,400 feet of 24-inch, 1,000 feet each of 22, 20, and 16-inch, and 500 feet of 9-inch; also 300 feet of flume, with suitable headgates, and two 4-inch giants. Mine buildings consist of a large cabin, cookhouse, blacksmith shop, office, stable, etc., accommodation having been provided for 20 men. The total outlay has been about $35,000. The partnership attempted to hydraulic the gravel, but as the deposits were covered by a heavy growth of timber and underbrush, these caused unexpected obstacles to the work, which was eventually suspended until such time as additional capital can be obtained to provide means for the removal of this forest growth.

Texada Island.—Mines on Texada Island are not now so productive as in several recent years, except in the case of the Marble Bay mine, owned and operated by the Tacoma Steel Company, which has increased its production of gold-copper ore. Much development work has been done during this year in the mines of the Cornell-Copper Queen group, but the output of ore was smaller while this work was being carried out. The Little Billy and other mines on the island are expected yet to become productive, for it is known that in several there are orebodies that give promise of proving well worth working if the requisite capital to open them sufficiently shall be obtained. The big iron property, owned by the Puget Sound Iron Company, has not yet been sold, although negotiations looking to its purchase have been carried on. Smelting copper ore, with oil for fuel, in the blast furnace at Van Anda is expected to become practicable on a commercial scale after furnaces shall have been built to meet the special conditions the demonstrations made during recent months have shown to be requisite to successful operations.

GENERAL MINING NEWS.

ONTARIO.

Porcupine, Ont.—Camp building at the West Dome is proceeding with rapidity, machinery is being installed, and from now on the management will mine.

Four shafts will be sunk on the property and every effort will be put forth in carrying on the work of development as rapidly as possible. But one more hole will be bored by the shot drill, and in a few days' time work on the No. 1 shaft will be commenced. This shaft, where the terrible loss of life occurred in July, has been filled with water since the catastrophe that resulted in the tying up of operations for so long a period, but it will be pumped out and sinking resumed.

Prospecting operations have been satisfactory, and during the winter all efforts will be confined to underground workings. In all portions of the property tests have been made with the shot drills to a depth of 400 feet.

Toronto, October 6.—With a view to realizing on the Keeley mine, which has been practically idle since the disastrous failure of the Farmers Bank, the liquidator, Mr. G. T. Clarkson, has prepared several plans on which tenders will be called for in the course of a few days.

The first proposition will be in the nature of a bonded lease, an option on the property being offered provisionally on a certain sum of money being paid over and an undertaking given that an adequate sum will be expended yearly in development work, the bank working in as a partner until the whole of the option has been taken up. The other proposition, and the one that finds more favour, is the selling of the mine outright.

Cobalt, October 10.—Thorough prospecting operations on the Trethewey have resulted in the opening of another new vein in shaft No. 2. This vein is not large, but it carries high values. It was found in the southeastern corner of the claim. Where cut, the vein shows about two inches of smaltite and silver, the latter running in the neighbourhood of 3,000 ounces to the ton.

Porcupine.—The shaft on the Rea at Porcupine has nearly reached the 300-foot level.

If values still are found at the depth consistent with those higher up, the shaft will immediately be sunk to 400 feet.

Shaft No. 2, 175 feet west of the main shaft, is down to the 200-foot level, and is connected with the main shaft by a drift along the main wall. The main vein has been uncovered for over 400 feet, and is fairly wide. Trenching is being done along the west end of a large ridge in an effort to locate more veins.

Porcupine, October 9.—At 55 feet in the shaft the main vein of the Dobie has been cut. At this point the vein is dipping to the north and values are exceptionally high. Manager Charles Watson says that the values have not been determined by assays. A few feet deeper it is expected that another vein will be encountered.

ALBERTA.

Blairmore.—At Blairmore there are upwards of forty men working at the mines and the daily output of coal is considerably over a hundred tons. The management report that they can get all the help required and that every day there are applications for work from experienced miners. The number at the Blairmore mine of the West Canadian Collieries will be increased as soon os sufficient accommodations have been provided.

At Frank there are several miners working and considerable coal is being mined. More men will be added in the near future and the daily output will be greatly increased.

At the Davenport Company's mine at Burmis there are forty men working and the daily output of coal at that camp is over one hundred tons.

The mines at Passburg and Police Flats, which are owned by the Leitch Collieries, are working full swing. There are at present 125 men working at these mines and they are shipping between two hundred and three hundred tons of coal per day.

Lethbridge, Oct. 11.—Every local in District 18, United Mine Workers of America, is represented at the miners' convention here to-day to consider the strike situation. At the noon adjournment nothing definite had been decided on. It is stated that the men have practically decided to accept the Gordon award as to wages, and the only thing they are now holding out for is the recognition of the check-off system, which, in short, means the recognition of their union. Whether they will stick out for this or not is not known, and the subject forms the main part of the discussion at the convention. President White, of the International Union, is present, and, it is believed, will have some settlement made before he leaves for Indianapolis.

BRITISH COLUMBIA.

Phoenix, B.C., Oct. 5.—The opening up of the Standard mine at Silverton has resulted in the operation of the Alpha and the Anacortes properties which were prospected by the Standard's four tunnels, which traversed the other's property. James McNaught, of New York, who is the principal owner of the Alpha and Anarcortes, has just paid the mine a visit, with the object of making suitable arrangements with the Standard Company to permit of his ore being shipped through the Standard's tunnel and over the latter's tramway.

Vancouver.—Nine thousand dollars was the jury's verdict for Peter Collins in the suit against the Britannia Mining & Smelting Company, for the loss of the sight of both eyes in an explosion at the mines. "An employer is not an insurer of his employees," said Mr. Justice Morrison to the jury, "but he must adopt reasonable precautions which will ensure the safety of his employees. You must also remember that an employee is not an inspector of his employer's plant." S. S. Taylor, K.C., appeared for the plaintiff.

The steamer British Empire is here from Prince Rupert with 500 tons of concentrates from the Portland Canal Mining Company's concentrating plant for the Tacoma smelter. The British Empire has been given a contract to carry fortnightly shipments of concentrates from the canal to Tacoma and this is the first trip.

UNITED STATES.

Salt Lake City, Utah, Sept. 20.—With but one shift operating the 30-ton mill at the old Ima mine in Idaho, during the past three weeks, 12 tons of tungsten concentrates, worth $400 a ton, or nearly $5,000 for the run, has been turned out and will be shipped to Denver.

The Ima was opened up about 10 years ago. It now has 3,000 feet of development work.

The mill is turning out about 1,200 pounds of concentrates in each eight-hour shift. This is 20 in one, and runs 65 to as high as 73 per cent. tungsten.

The Ima is situated 55 miles northerly from Mackay, up the Blackfoot branch. It is 25 miles from Ledora, on the Gilmore line, but an inaccessible mountain lies between. Already a wagon road is being constructed across this mountain, which will cut the wagon haul charge in two. At present this costs from $12 to as high as $20 a ton.

Boston, October 7.—The abandonment of the proposed merger of the Calumet & Hecla Mining Company with nine subsidiary Michigan companies was officially announced before the close of the stock market yesterdey.

Cripple Creek, Colo, Oct. 7.—From the portal of the Roosevelt deep drainage tunnel there is at this time, as in the last six months, a flow of 5,800 gallons pouring out each minute, which permits a recession throughout the camp of about six feet a month. The water has receded considerably in every mine during the last six months.

Goldfield, Nev., Oct. 7.—Preliminary estimates of the production made by the Consolidated Mines Company in September, just issued by J. F. Thorn, the general superintendent, placed the output at 26,766 dry tons, with an estimated net recovery of $650,000, operating costs amounting to $225,000, and net profits of $425,000. The average gross value of all ore treated was approximately $24.50 per ton.

Nevada.—The total value of the mine output of gold, silver, copper, lead, and zinc in Nevada in 1910, according to V. C. Heikes, of the United States Geological Survey, was $34,152,148, as against $30,072,932 in 1909, showing an increase of $4,079,216, or over 13.5 per cent.

The total production of gold in 1910 was 913,265.05 fine ounces, valued at $18,878,864, a gain of $2,638,901, or 14 per cent. over the 1909 production. Of the gold output 7,854.70 fine ounces came from placers (mainly in Nye County), 880,180.93 ounces from siliceous ores, 21,230.87 ounces from copper ores, and 3,998.55 ounces from lead, zinc, copper-lead, and lead-zinc ores. Siliceous ores yielded over 96 per cent. of the entire gold production. From bullion in gold and silver mills were recovered 728,139.67 fine ounces, concentrates produced 76,696.62 fine ounces, and crude ore shipped to smelters contained 100,574.06 fine ounces.

Colorado.—The total value of the mine output of gold, silver, copper, lead, and zinc in Colorado in 1910, according to

Charles W. Henderson, of the United States Geological Survey, was $33,673,879, against $33,907,140 in 1909, a decrease in value for 1910 of $233,261.

The production of gold showed a decrease of 71,505.20 fine ounces and of $1,482,278 in value; the output of silver, a decrease of 393,035 ounces and of $34,186 in value; the production of copper, a decrease of 2,632,511 pounds, and of $358,205 in value. The output of lead, however, showed an increase of 3,903,483 pounds and of $243,921 in value; and the production of zinc (figured as spelter), a notable increase of 25,879,388 pounds and of $1,397,487 in value.

COMPANY NOTES

CALUMET AND HECLA.

Directors Review Contest—Announcement of Plan Followed by Much Hostile Litigation—The Various Suits in Detail—Laurium Vote Purposely Held Back.

To the Stockholders of the Calumet & Hecla Mining Company:

Your directors submit the following statement in regard to the proposed consolidation of the Seneca Mining Company, Ahmeek Mining Company, Allouez Mining Company, Osceola Consolidated Mining Company, Centennial Copper Mining Company, Tamarack Mining Company, Laurium Mining Company, La Salle Copper Company, Superior Copper Company, and Calumet & Hecla Mining Company, which consolidation they have decided must now be abandoned.

On January 2nd, 1911, the directors of the several companies named caused to be sent out notices of special meetings of the stockholders, to be held on the 7th, 8th, and 9th days of March, to consider the question of the consolidation of those companies upon terms stated in circular letters sent with the notices of the meetings. Just prior to March 7th Godfrey M. Hyams brought suit as a stockholder of the Osceola Company in the United States Circuit Court, and obtained a restraining order forbidding the carrying through of the consolidation until a hearing should be had. Informal votes were taken at the meetings, and the result showed that the stockholders of the several companies favoured the consolidation, and the meetings were adjourned to the 24th, 25th, 26th, 27th, and 28th days of April, on which dates they were adjourned to the 1st, 2nd, 3rd, 4th, and 5th days of May.

A second suit was brought in the Circuit Court of Michigan for the County of Ingham by Charles M. Turner and others, also as stockholders of the Osceola Company, and later a third suit was brought by Frederick W. Denton as a stockholder of the Ahmeek Company in the Circuit Court of the State of Michigan for the County of Houghton, and similar orders obtained. On or about May 1st Waldemar A. Chadbourne, as special administrator of the estate of Thomas L. Chadbourne, intervened in the Denton suit.

The stockholders of all the companies except the Laurium Company then voted for the consolidation, and the meeting of the Laurium Company adjourned without action, so that the companies would not be so irrevocably committed that they could not be disentangled, if the opponents of the consolidation should be able to defeat it by interposing so much delay that it would become practically impossible to carry it into effect.

Hearings were had in each of the three suits mentioned, resulting in a denial of the application for a temporary injunction by Judge Swan in the Hyams suit and by Judge Streeter in the Denton-Chadbourne suit, and the granting of a temporary injunction in the Turner suit, Judge Wiest holding, contrary to the opinions of Judge Swan and Judge Streeter, that the questions involved in deciding whether the terms proposed were fair, were too difficult to be determined upon affidavit, and that, although the authorized capital stock of the new company was fixed at $10,000,000, inasmuch as the property with which it would begin business would have a value largely in excess of $10,000,000, the consolidation would be a violation of the statute which fixes a maximum limit of $10,000,000 upon the capital stock of mining companies.

After the decision by Judge Streeter in the Denton-Chadbourne suit, that case was taken by the complainants to the Supreme Court of Michigan by a petition for a writ of mandamus, and a restraining order issued pending the decision of the court.

On August 10th a fourth suit was brought by John F. Jackson as a stockholder in the Ahmeek Company in the United States Circuit Court, and a restraining order obtained, and an order to show cause why a temporary injunction should not issue was made, the hearing on which is now pending.

Your directors are advised by counsel that they cannot state when final decisions either for or against the proposed consolidation may be had.

The consolidation was proposed to the stockholders of the several companies because through a consolidation, and only through a consolidation, could certain large economies in operation and the greatest conservation of mineral resources be obtained. It has, however, been manifest from the beginning that delay in carrying out the consolidation would alone, if of sufficient length, compel the abandonment of the plan. One method of operating should be adopted if the properties are to be managed as one large enterprise, and another method if the properties are to remain as single units. In fairness to the individual properties the decision as to which method is to be adopted cannot be delayed beyond a certain time. In voting for the consolidation, some date had to be fixed as of which the consolidation should take effect. From this date all dividends upon the stock of the consolidated company had to be equalized, and, if the consolidation could not be put into operation and if the savings therefrom could not be made, then then payment of such equalizing dividends on the consolidated stock allotted to the now unprofitable mines would shortly put a serious and unfair burden on certain of the profitable companies. The date fixed from which this equalization should take place was March 15, 1911.

Moreover, since the proposed plan of consolidation was submitted to the stockholders, the work incident to the various suits has taken such a large part of the time of the officers of the company as to amount to a serious interference with their work in operating the properties, and further continuation of the litigation promises to involve even greater sacrifices of time.

Because of the great advantages that would result from a consolidation your directors have felt it their duty to the stockholders of all the companies to go on with the plan until it became entirely clear that it should be abandoned. This time, in the opinion of your directors, has now arrived, and they have therefore, instructed Messrs. Shaw, Agassiz, and Flagg, as proxies of this company, to vote against the consolidation at the meeting of the stockholders of the Laurium Com-

pany called for November 16th, 1911, and have instructed the officers of this company to take such steps as may be necessary to wind up the present litigation.

In the course of the litigation sensational statements have been made, in affidavits and elsewhere, attacking the value of the property of this company. These statements have been made by persons unfamiliar with the conditions and operations of this company and are without foundation in fact. They need cause the stockholders no uneasiness. The further study of the subject made necessary by the allegations in the several bills of complaint has confirmed your directors in the belief that the valuation of this company's property as compared with the valuations placed upon the properties of the other companies was conservative and fully borne out by the actual conditions.

The statements that have been made attacking the value of the property of certain of the other companies have not changed the opinion of your directors as to the wisdom of this company's continuing as a stockholder in the various mines. Every effort will be made to secure the best results from the individual properties.

Copies of the several bills of complaint and the answers thereto will shortly be on file at the office of the company and open to inspection by the stockholders of all the companies.

Quincy A. Shaw,
Rodolphe L. Agassiz,
Francis W. Hunnewell,
Francis L. Higginson,
James MacNaughton.

Boston, October 6th, 1911.

HILLCREST DIVIDEND.

The regular 1¾ per cent. dividend has been declared on Hillcrest Collieries, preferred.

It is payable on October 14th to holders of September 30th.

Some time ago some of the directors had apparently made up their minds that no dividend would be paid, although there was sufficient money in the treasury to meet it.

As is well known, the company has been tied up for months as a result of the strike, but once the labour troubles are over it is figured that the concern will be a good money-maker.

CROWN RESERVE DIVIDEND.

Crown Reserve has declared the usual monthly dividend of 2 per cent., with 3 per cent. bonus, payable November 15th to holders of October 31st.

TEMISKAMING-HUDSON BAY'S ANNUAL REPORT.

For the fiscal year ending August 31st, the Temiskaming and Hudson's Bay Mining Company shipped 676.32 tons of ore, with an average assay of 1,191.10 ounces to the ton, a total of 805,572.88 ounces. Of this amount 214.08 tons were estimated as high-grade ore with an average assay of 2,417.87 ounces, while the balance of 462.24 tons is classed as low grade, with an average assay of 587.88 ounces to the ton, which latter figures are rather high for low grade shipments from the camp. In addition to this 16,884.47 ounces of bullion was sent away from the property.

During the year the new mill, which was running since March, treated 11,109.6 tons of ore. The table of concentrates produced is as follows:

	Tons.	Silver contents.
Jigs	153.18	168,271.40
Sands	146.99	111,267.70
Slimes	109.01	35,681.70
Nuggets ..lbs.	240	2,400.00

The average assay a ton of this mill production was 776.23 ounces, and the total value was $147,409.36.

In concluding his report to the directors at the annual meeting Manager Horace G. Young says: "I may say that your properties are in good order. There is sufficient ore in sight to warrant an equally good production this year as the one just ended."

ONTARIO EXPLORATION STATEMENT.

Canadian shareholders of the Northern Ontario Exploration Company, Limited, have been supplied by the secretary of the company in London, with a copy of the balance sheet at June 30th last and the profit and loss account from the registration of the company on January 17th to the same date.

The covering letter states that since June 30th options at par have been exercised on 9,100 more shares of the stock, and that the balance of the unissued capital (280,571, one-pound shares) is under option to the subscribers of the original working capital, also at par. Also since June 30th the company has taken a $25,000 interest in the Porcupine Veterans Exploration Company and other important deals are under negotiation.

It will be noted that no general information is vouchsafed as to the identity of large shareholders. The full statement is as follows:—

Balance Sheet, June 30th, 1911.

Dr.

To Share Capital—Authorized—			
400,000 shares of £1 each	£400,000	0	0
Issued—			
110,325 shares subscribed and fully called up	£110,325	0	0
Less calls in arear	8,932	10	0
	£101,392	10	0
Sundry creditors—			
London	£ 2,531	10	5
Ontario	1,541	19	7
	£ 4,073	10	0
Profit and Loss—			
Balance as per Account, subject to provision for Management Commission	63,021	12	4
	£168,487	12	4
To Contingent Liability on shares held	£ 56,177	10	0

Cr.

By shares in companies at cast	£ 86,011	7	10
By buildings—			
Canada	1,561	17	1
By Debtors—			
London	£ 30,407	15	9
Ontario	19,927	9	1
	£ 50,335	4	10
By cash at Bank—			
London	£ 25,921	16	10
Canada (Montreal)	4,657	5	9
	£ 30,579	2	7
	£168,487	12	4

Dr.

To General Expenses, London and Ontario:

London—

	£	s.	d.
Directors' fees	759	13	6
Salaries and office rent	143	4	3
Cables	141	14	0
Law charges	109	13	10
Stationery and printing	100	10	8
Miscellaneous charges	92	15	3
	£1,347	11	6

Ontario—			
Office rent and salaries, travelling expenses, printing and stationery, cables, postage and miscellaneous charges	628	16	4
To advertising	957	8	5
To interest	148	10	7
To preliminary and formation expenses	1,203	8	6
To balance carried to balance sheet	63,021	12	4
	£67,307	7	8
Cr.			
By profit on sales of shares	67,211	19	3
By exchange and commission	82	0	11
By transfer fees	13	7	6
	£67,307	7	8

LAKE SUPERIOR CORPORATION.

The Lake Superior Corporation has issued its annual report for year ending June 30th, 1911. It shows that the yearly operations of the subsidiary companies resulted in a surplus of $1,200,216, subject to depreciation and other charges.

The output of the steel plant was very satisfactory and compares with 1910 as follows:

	1910	1911
Pig iron	$ 53,528	$170,359
Steel rails	201,615	208,283

The production is the highest ever attained, despite certain difficulties. The entire programme of new construction, as originally planned having been carried out, the directors do not contemplate for the moment moving to any great extent in the direction of making further capital expenditure, except what must be incurred to put the finishing touches to what they believe to be one of the best equipped and well balanced plants on the continent. The outlook is decidedly encouraging.

GLOBE AND PHOENIX.

The Globe and Phoeniix issues an interim report for the half year to June last, at which date the ore reserves were estimated at 179,000 tons, of a gross value of £1,356,238. The mine would appear to be developing satisfactoriily, and during the half year the substantial gross profit of £181,868 was secured. The machinery is working satisfactorily, with the exception of the sands plant, but this has been closed down pending the erection of a new roasting plant, which is to cost £34,500. Mr. Piper's concluding remarks are: "From the report you will see that the prospects of the mine leave nothing to be desired, and that substantial profits are assured for some years." Under these circumstances we can only congratulate the holders of Globe and Phoenix.

STATISTICS AND RETURNS

COBALT ORE SHIPMENTS.

Following are the shipments from the Cobalt camp for the week ending September 29th, and those from January 1, 1911, to date:—

	Sept. 29. Ore in lbs.	Since Jan. 1. Ore in lbs.
Badger	.....	55,200
Bailey	.....	40,000
Barber	.....	6,000
Beaver	60,785	1,401,458
Buffalo	.....	1,968,274
Chambers-Ferland	63,900	1,086,900
City of Cobalt	.....	663,980
Cobalt Lake	183,450	3,123,596
Cobalt Townsite	65,100	985,420
Colonial	.....	135,410
Coniagas	58,500	3,176,943
Crown Reserve	.....	1,842,489
Drummond	120,000	660,000
Green-Meehan	.....	60,000
Hargraves	.....	161,100
Hudson Bay	63,000	1,129,340
Kerr Lake	60,930	2,049,509
King Edward	.....	40,000
La Rose	279,380	5,682,068
McKinley Darragh	120,600	4,787,359
Nipissing	63,980	4,621,388
O'Brien	.....	1,072,898
O'Brien, M.J	.....	47,000
Peterson Lake, Little Nip	.....	58,430
Provincial	.....	151,950
Right of Way	61,500	1,069,095
Silver Cliff	.....	106,680
Standard	.....	102,813
Temiskaming	.....	1,284,432
Thethewey	.....	1,000,180
Wettlaufer	.....	117,232

The shipments for the week were 1,200,125 pounds, or 600 tons, against 664 tons the previous week.

The shipments from Jan. 1 to September 29 were 38,687,444 pounds, or 19,343 tons.

B. C. ORE SHIPMENTS.

The ore shipments for the past week totalled 17,629 tons, and for the year to date 1,237,708 tons. The smelter receipts for the week ending September 30th and year to date are respectively 15,122 tons and 1,039,444 tons.

Boundary Shipments.

Mother Lode	5,290	230,933
Rawhide	3,111	25,975
Jackpot	314	20,641
Athelston	249	6,300
Unnamed	629	4,665
Other mines	.....	630,792
Totals	9,593	919,306

Rossland Shipments.

Centre Star	3,837	150,353
Le Roi No. 2	334	20,273
Le Roi No. 2, milled	300	11,700
Le Roi	558	11,979
Other mines	.....	467
Totals	5,029	194,772

Slocan-Kootenay Shipments.

Van Roi, milled	800	29,049
Molly Gibson, milled	300	3,300
Sullivan	247	14,350
St. Eugene, milled	420	21,036
Richmond-Eureka	31	1,821
Silver Cup	31	383
Rambler-Cariboo	28	1,267
Hewitt	34	280

Queen, milled	420	16,170
Granite-Poorman, milled	250	9,760
Nugget, milled	110	4,290
Emerald	50	1,568
Knob Hill	286	3,852
Other mines	.....	6,524
Totals	3,007	113,630

B. C. Copper Company's Receipts.
Greenwood, B.C.

Mother Lode	5,290	230,933
Rawhide	3,111	25,975
Jackpot	314	20,641
Athelston	249	6,300
Unnamed	629	4,665
Other mines	.....	10,112
Totals	9,593	298,626

Consolidated Company's Receipts.
Trail, B.C.

Centre Star	3,837	150,353
Le Roi No. 2	334	20,273
Sullivan	247	14,350
St. Eugene	61	5,621
Le Roi	558	11,979
Knob Hill	286	3,852
Richmond-Eureka	31	1,821
Van Roi	32	1,122
Rambler-Cariboo	28	1,267
Hewitt	34	280
Emerald	50	1,568
Ferguson	31	383
Other mines	.....	37,536
Total	5,529	250,405

B. C. ORE SHIPMENTS.

The ore shipments for the week ending September 23rd totalled 16,952 tons, making the total for the year to date 1,213,281 tons. The smelter receipts were 15,560 tons for the week and 1,126,208 tons for the year to date.

Boundary Shipments.

Mother Lode	5,658	225,643
Rawhide	2,983	25,864
Athelstan	301	6,051
Unnamed	498	4,036
Jack Pot	441	20,327
Other mines	.....	630,702
Total	9,881	912,623

Rossland Shipments.

Centre Star	3,658	146,516
Le Roi No. 2	492	19,939
Le Roi No. 2, milled	300	11,400
Le Roi	579	11,421
Other mines	.....	457
Total	4,029	189,733

Slocan-Kootenay Shipments.

Sullivan	307	14,103
St. Eugene, milled	420	20,616
Richmond-Eureka	66	1,790
Rambler-Cariboo	32	1,239
Queen, milled	420	15,750
Granite-Poorman, milled	250	9,510
Nugget, milled	110	4,180
Emerald	34	1,518
Hope	32	546
Evening	6	50
Knob Hill	228	3,566
Van Roi, milled	800	28,249
Arlington	37	102
Molly Gibson, milled	300	3,000
Other mines	.....	6,706
Total	3,042	110,925

B. C. Copper Co.'s Receipts.
Greenwood, B.C.

Mother Lode	5,658	225,643
Rawhide	2,983	25,864
Jack Pot	441	20,327
Athelstan	301	6,051
Unnamed	498	4,036
Other mines	.....	10,612
Total	9,881	292,533

Consolidated Co.'s Receipts.
Trail, B. C.

Evening	6	50
Knob Hill	228	3,566
Van Roi	64	1,090
Arlington	37	102
Centre Star	3,658	146,516
Sullivan	307	14,103
Le Roi No. 2	492	19,939
Le Roi	579	11,421
Richmond-Eureka	66	1,790
St. Eugene	65	5,560
Rambler-Cariboo	32	1,239
Emerald	34	1,518
Hope	32	546
Granite-Poorman	79	463
Other mines	.....	35,353
Total	5,679	243,262

SILVER PRICES.

	New York. cents.	London pence
Sep. 27	52⅝	24¼
" 28	52⅝	24¼
" 29	52¾	24⅝
" 30	52¾	24⅝
Oct. 2	52½	24¼
" 3	52½	24¼
" 4	52½	24¼
" 5	52¾	24 5/16

NEW YORK METAL MARKETS.

October 6th—

Tin, Straits, 40.3 cents.
Copper, Prime Lake, 12.45 cents.
Electrolytic Copper, 12.25 to 12.37½ cents.
Copper Wire, 13.50 cents.
Lead, 4.35 to 4.40 cents.
Spelter, 6.10 cents.
Sheet zinc (f.o.b. smelter), 8 cents.
Antimony, Cookson's, 8.12½ cents.
Aluminium, 19.25 to 19.75 cents.
Nickel, 40 to 45 cents.
Platinum, $48.50 per ounce.
Bismuth, $1.80 to $2 per pound.
Quicksilver, $46 per 75-pound flask.

MINERAL MARKETS.

Acids—

Muriatic, tank cars, $1.15 to $1.55 per 100 pounds.
Nitric, $0.04 to $0.05 per pound.
Sulphuric, $0.01 per pound.

Chrome Ore, 50 per cent., ton of 2,240 lbs., $15.

Fire Clay, $2.50 to $5 per short ton.
Fluorspar, lump, $9 per long ton.
Fluorspar, ground, $12 to $15 per long ton.
Graphite, lump, 4 cents to 10 cents per pound.
Gypsum, short ton, ground, $4 to $7.50 per ton.
Magnesite, crude, 95 per cent., $7 to $8.50 per long ton.
Molybdenite, commercially pure, 25 to 30 cents per lb.
Pyrite, lump, arsenic free, 10 to 12½ cents per unit.
Pyrite, fines, arsenic free, 8 to 11 cents per unit.
Tungsten ore, 50 per cent., $7.70 per unit.

MARKET NOTES.

October 10.—(Quotations from Canada Metal Co., Toronto):
Spelter, 6.50 cents per pound.
Lead, 4.25 cents per pound.
Antimony, 8 to 9 cents per pound.
Tin, 43 cents per pound.
Copper, casting, 12.75 cents per pound.
Electrolytic, 12.75 cents per pound.
Ingot Brass, 7 to 12 cents per pound.

October 10.—Quotations from Drummond, McCall Company, Toronto):
Summerlee, No. 1, $23.00 (f.o.b. Toronto).
Summerlee, No. 2, $22.50 (f.o.b. Toronto).
Midland, No. 1, $19.50 (f.o.b. Toronto).
Midland, No. 2, $19.00 (f.o.b. Toronto).

SHARE MARKET.

(Courtesy of Warren, Gzowski & Co.)

COBALT STOCKS.

Bailey	.02¼	.02¾
Beaver Consolidated	.49	.49½
Buffalo	1.40	1.50
Chambers-Ferland	.10	.10½
City of Cobalt	...	.10
Cobalt Central	...	...
Cobalt Lake	.27¾	.28
Coniagas	5.90	...
Crown Reserve	2.66	2.71
Foster	...	...
Gifford	...	...
Great Northern	.10½	.11½
Green Meehan	.01	.01⅜
Hargraves	.04	.07
Hudson Bay	...	.90
John Black	...	...
Kerr Lake	3.50	4.00
La Rose	4.00	4.05
Little Nipissing	.02½	.03⅛
McKinley	1.62	1.63
Nancy Helen	...	...
Nipissing	7.50	7.75
Nova Scotia	...	...
Ophir	...	...
Otisse	...	...
Peterson Lake	.06¾	.07⅛
Right of Way	.06½	.08
Rochester	.02	.02¼
Silver Leaf	...	...
Silver Bar	...	...
Silver Queen	...	...
Temiskaming	.35	.35½
Trethewey	.65	...
Watts	...	...
Wettlaufer	.83	.84

PORCUPINE STOCKS.

	Bid	Asked.
American Gold	...	...
Apex	...	.15
Coronation	...	.06
Nor. Exploration	...	4.00
Dobie	...	1.62
Dome Ex.	.75½	.75¾
Foley-O'Brien	.60	.65
Rea	2.53	2.55
Hollinger	12.00	12.20
Monita	...	.18
Pearl Lake	...	.43
Central	3.06¼	3.48¾
Imperial	...	.10
Northern	.87	.88
Tisdale	.05	.06
Preston East Dome	.19⅞	.20
Standard	.09	...
Swastika	.35	.36½
United	.02½	.03½
Porcupine Gold	.46	.46½
West Dome	.85	.90
Crown Chartered	.36	.37
Eldorado	.10¼	.10½
Gold Reef	.15	.20
Porcupine Canada	.90	1.00

NEW YORK CURB.

Braden	4½	4¾
B. C. Copper	3½	3¾
Butte Coalition	14½	15¼
Ely Central	.01	.02
Ely Cons.	5/16	⅜
First National	⅞	1⅛
Giroux	3 11/16	3 13/16
Green-Can.	5½	5¾
Inspiration	6⅜	6½
Nevada Hills	2 15/16	3
Ohio	1⅜	1 7/16
United Cop.	1	1⅜
New Baltic	...	...
Ray Central	1¼	1⅜
Union Mines	⅛	¼
Yukon Gold	3 7/16	3 9/16
Goldfields	5¼	5⅜
Nevada Cons.	16⅛	16¼
Miami	16⅞	17½
Granby	off	60.
Con. Min. & Smelt.	40	45
Davis-Daly	⅞	1
Con. Arizona	11/16	¾
Rawhide Coalition	...	...
Ray Cons.	12¾	12⅞
Chino	17⅝	17⅞

L. Vogelstein & Company, New York, forward to us the following figures of German consumption of foreign copper for the months January to August, 1911:

Imports of copper,	tons	125,298
Exports of copper	tons	5,793
Consumption	tons	119,505

as compared with consumption during the same period in 1910 of 108,876 tons.

Of the above quantity 109,441 tons were imported from the United States.