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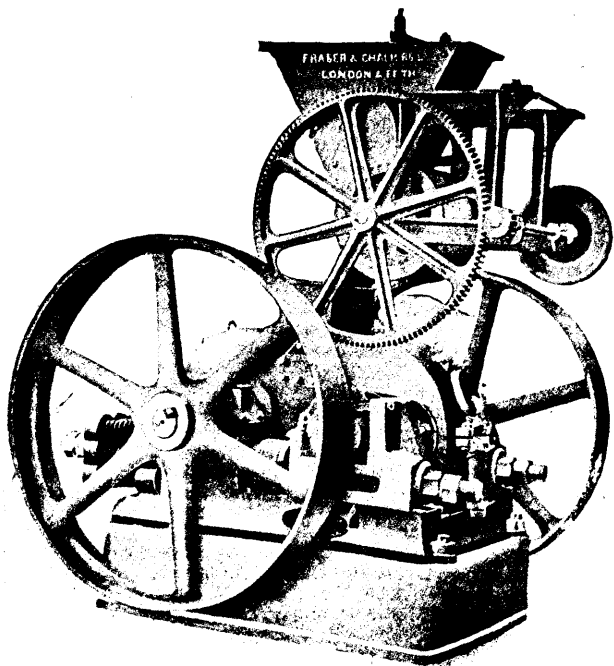
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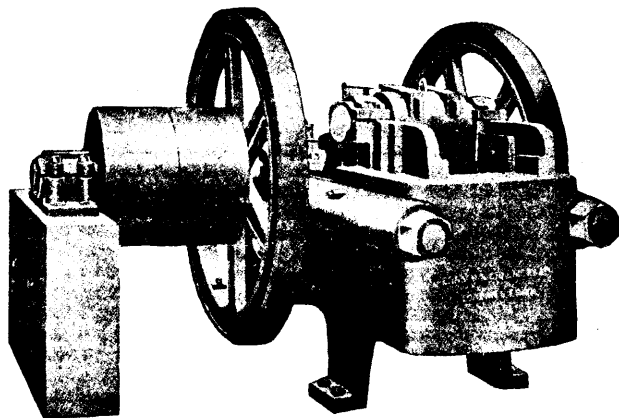
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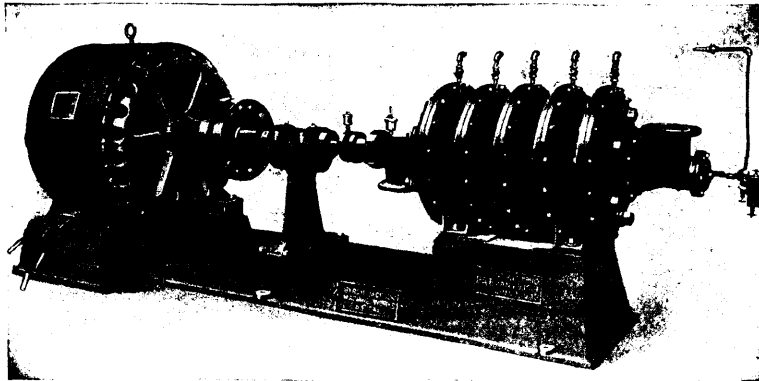
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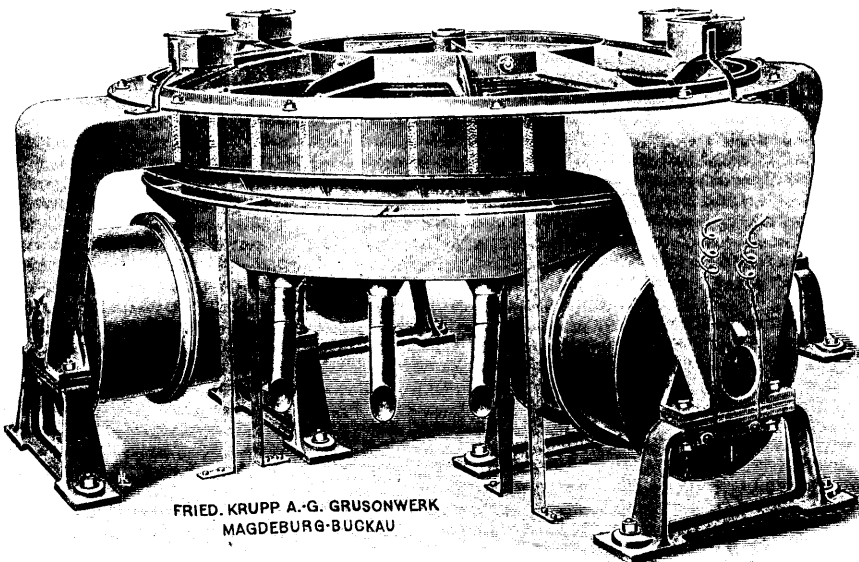
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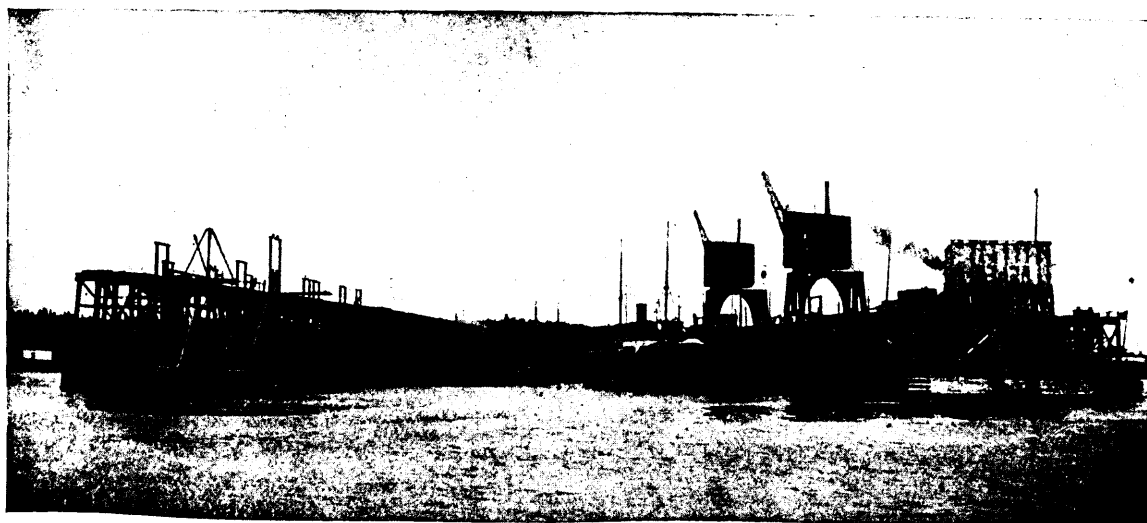
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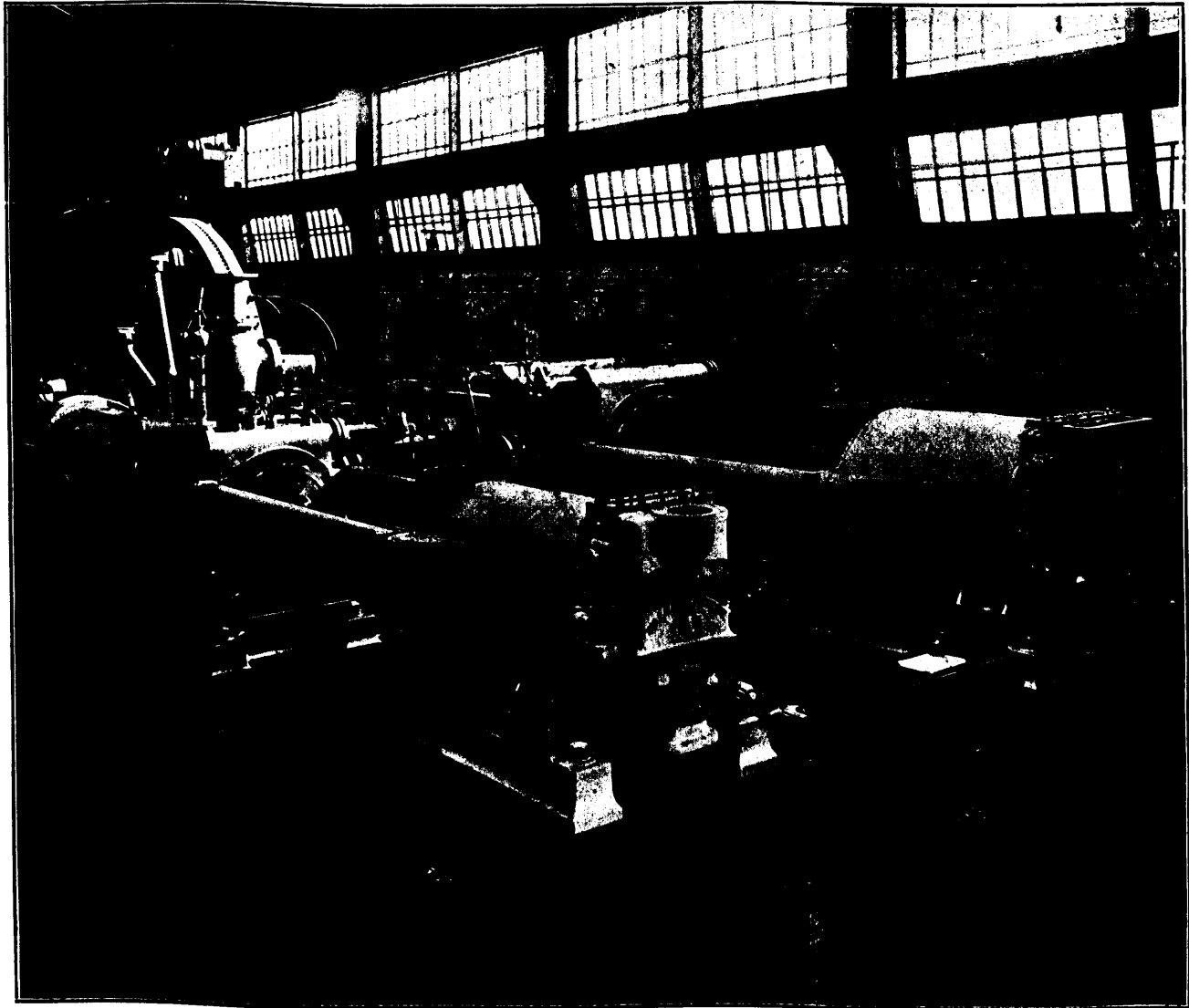
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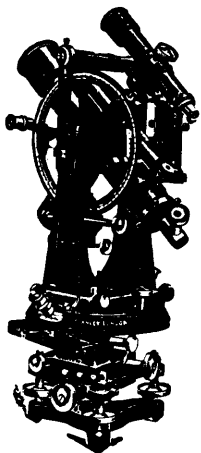
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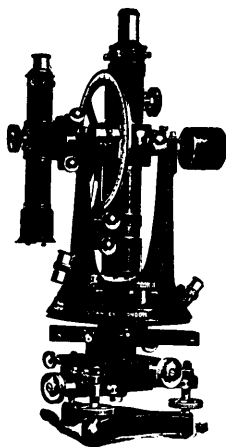
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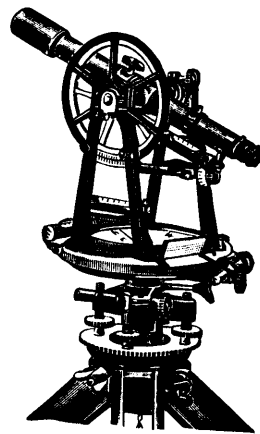
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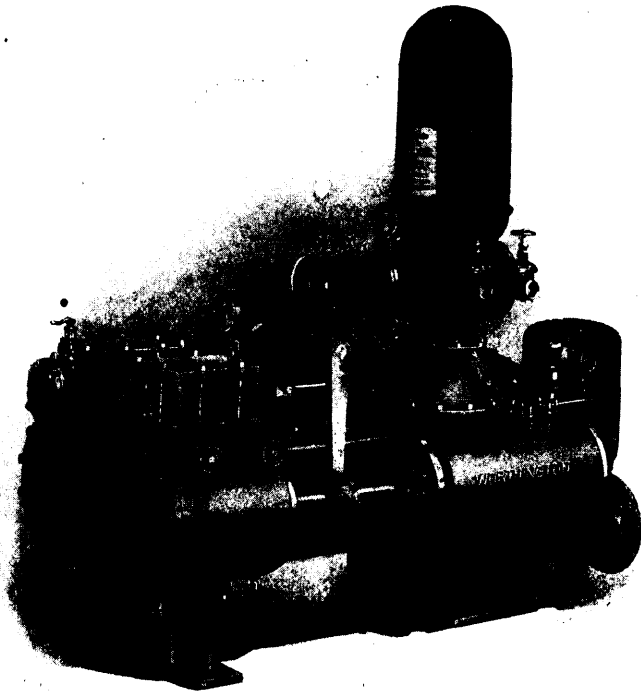
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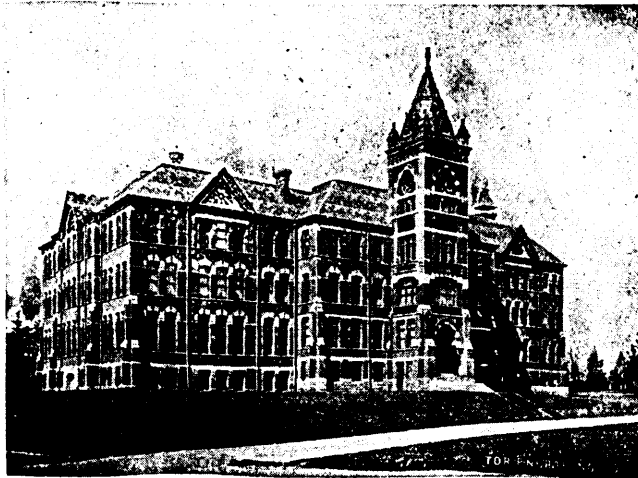
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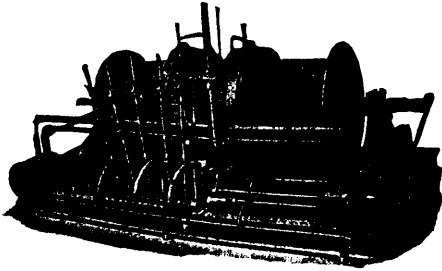
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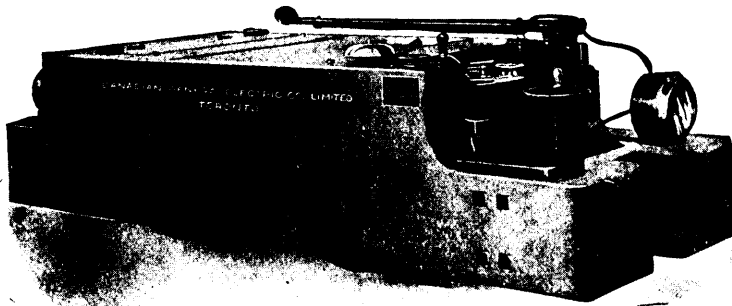
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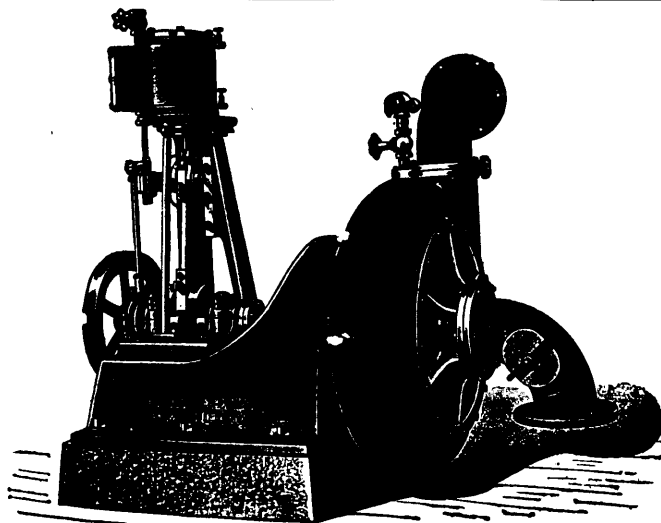
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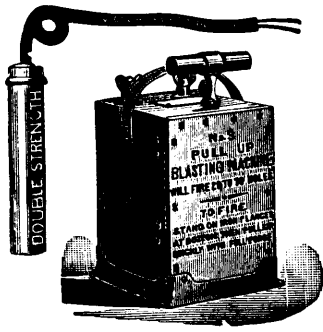
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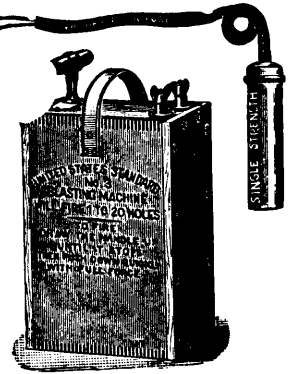
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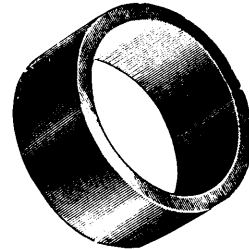
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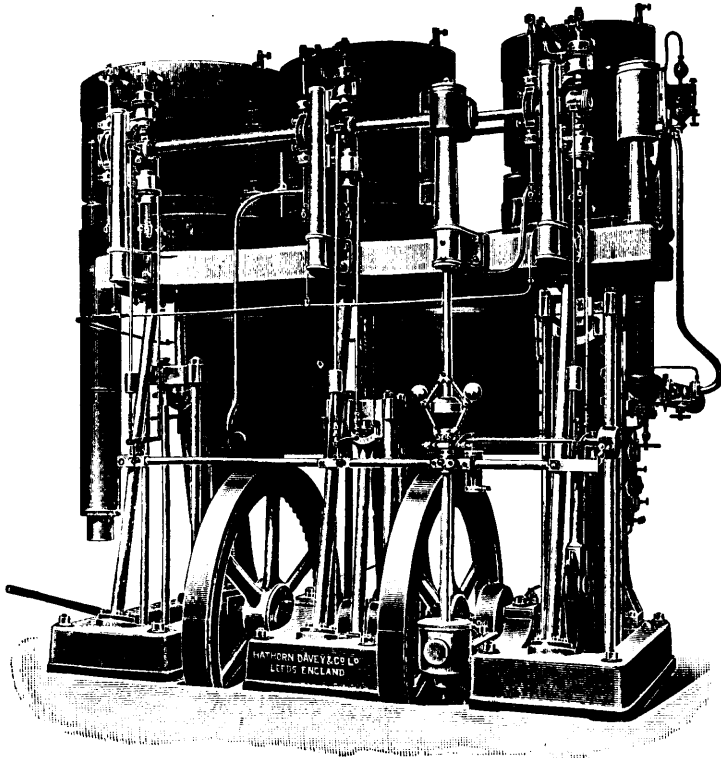
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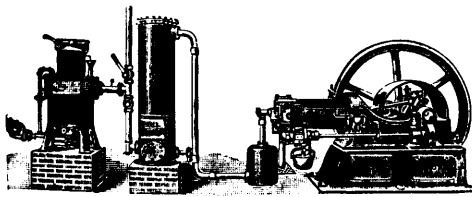
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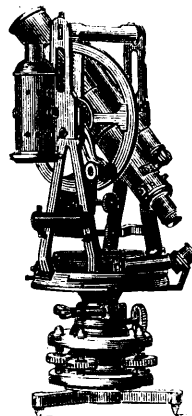
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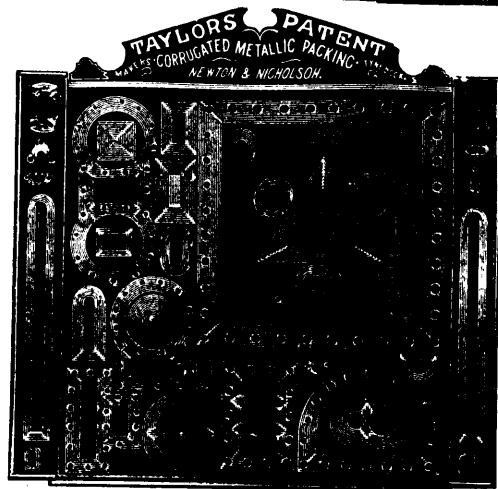
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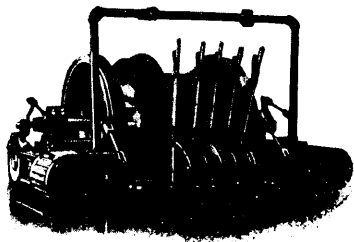
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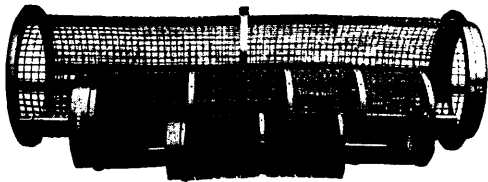
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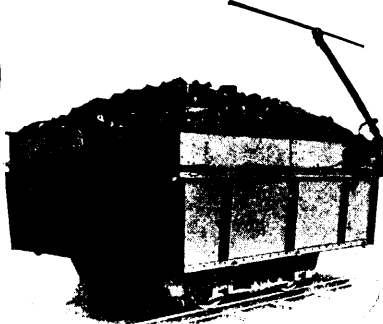
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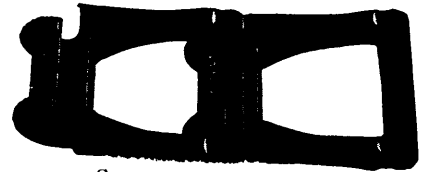
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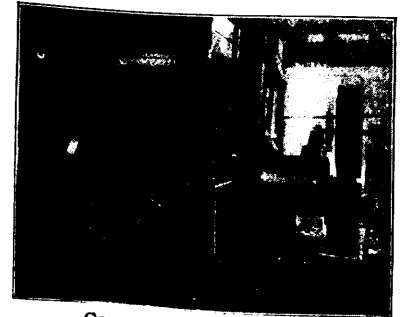
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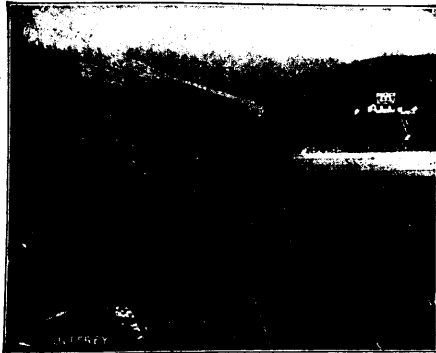
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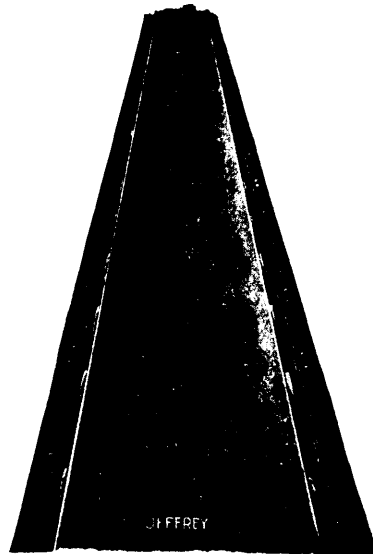
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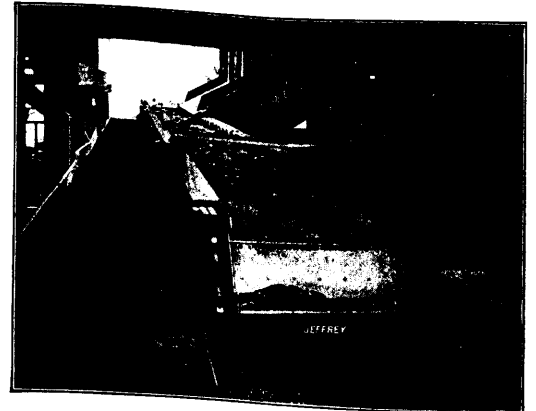
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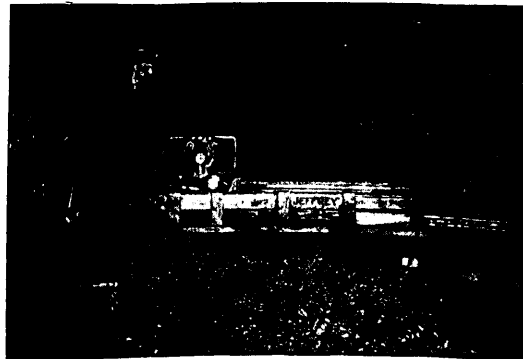
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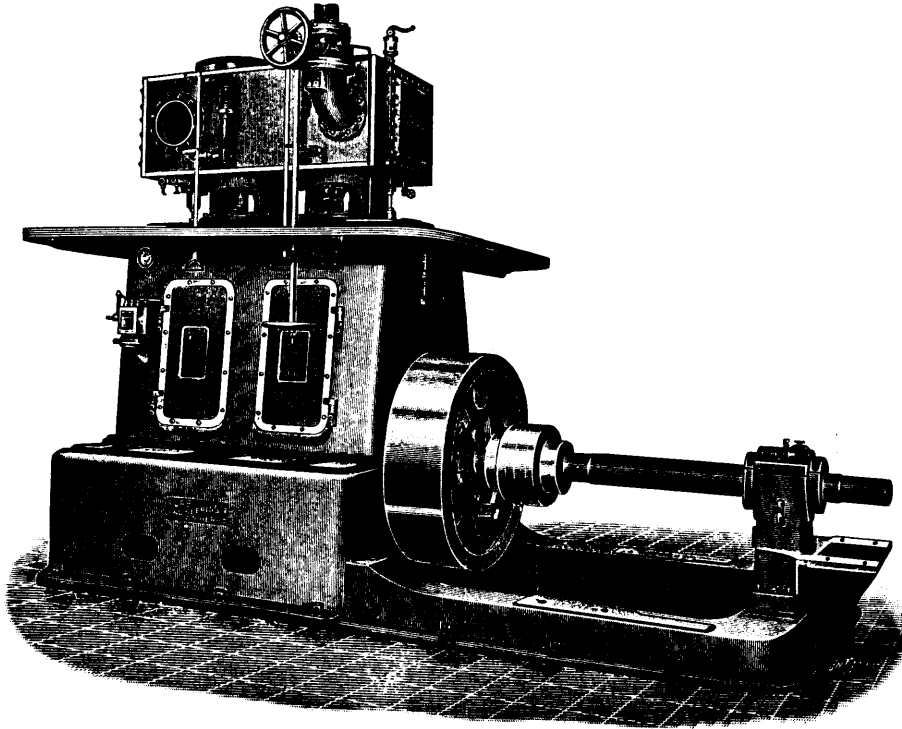
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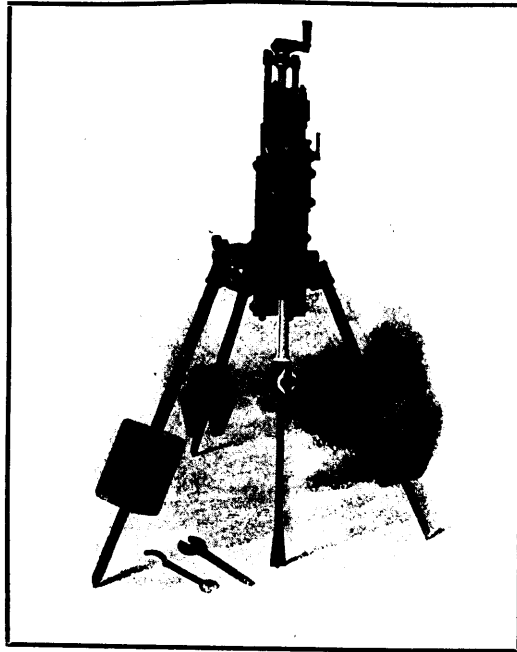
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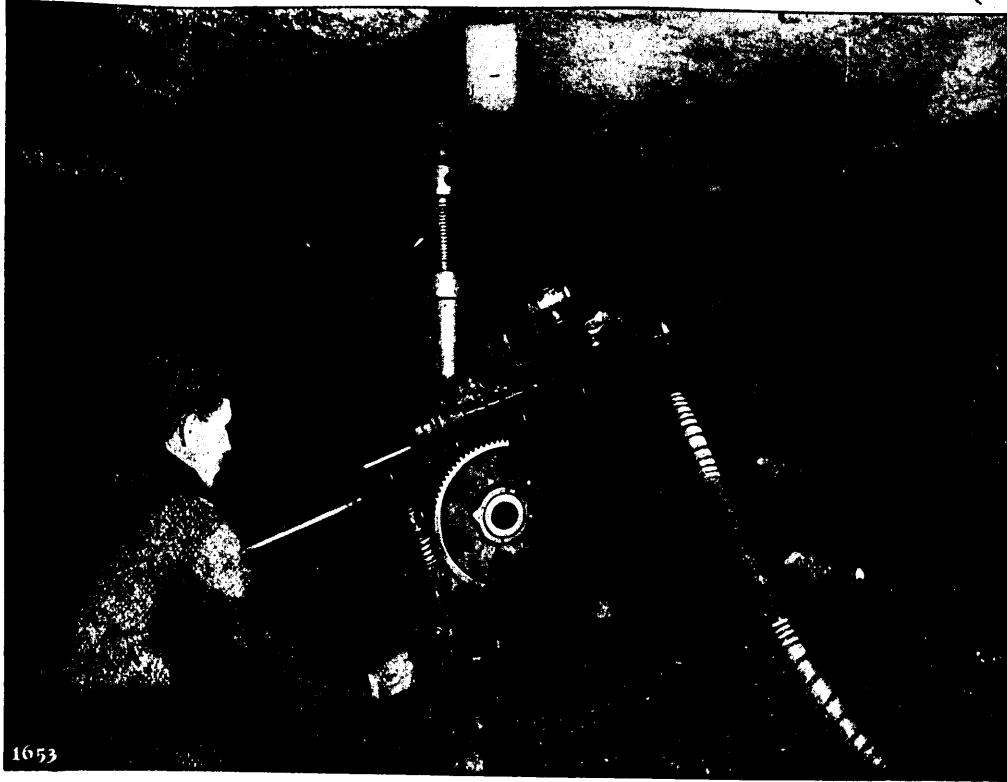
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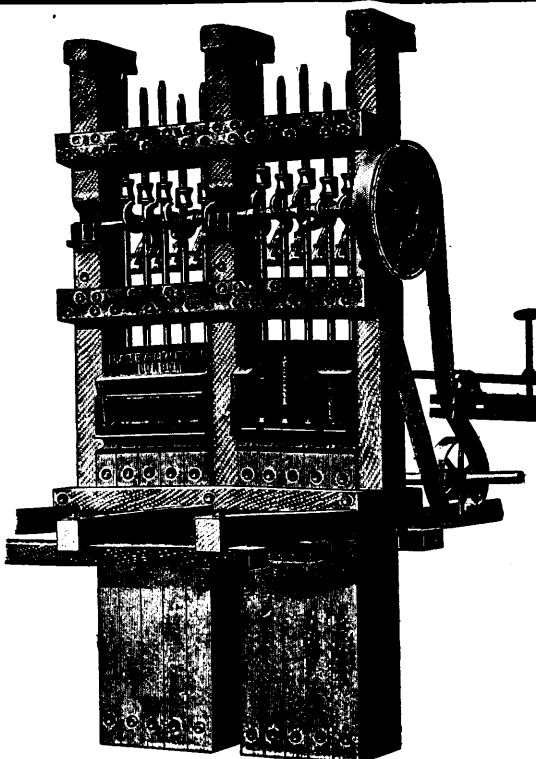
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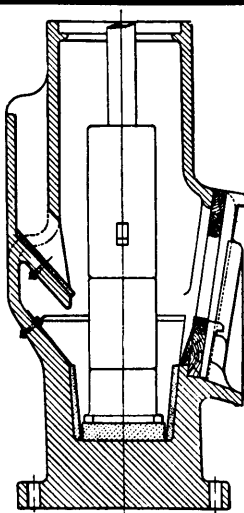
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We have no reasons to advance for the drop of a certain Cobalt stock from over \$30.00 to under \$11.00. We rather pride ourselves upon such peculiarity; because we think that we are, perhaps, almost singular in this respect. We do not know why the Guggenheims threw up their option on 40,000 shares—thereby depressing the stock some 20 points—because they have not told us. Others claim inside knowledge, but as there are as many versions as there are informants, we feel that a certain amount of caution, respecting each and all these statements, is justified. One thing, we do know, however, which is that Cobalt camp contains a great deal of silver; that about fifty of the mines are shipping; and, that, notwithstanding the horrible fluctuations of the New York curb, and the hysterical excitement of the small investors in Toronto, the miners of Northern Ontario are plugging away and gradually building up a camp that will assist in spreading Canada's fame to the uttermost parts of the earth.

The stock of some of the best mines is not on the market; while the stock of very many mines, that are not, strictly speaking, mines, is being dealt in gleefully and freely. We are of the opinion the situation was well summed up by a Toronto scribe when he wrote: "Many of the Cobalt mines are lying idle and their owners are lying furiously."

We anticipate that there will be quite a development of the Larder Lake gold field next summer. In fact, it would not be a surprise, if there should be as much interest displayed in Larder Lake a year or two hence as has been the case with Cobalt during the past six months. Moreover, we feel a fatherly interest in Larder Lake, because the Editor of this Review had the honor of naming it, and also of making the first reconnaissance survey of the lake and adjacent waterways.

It happened in this wise: During the summer of 1901, the writer found himself on the White, or Blanche, River, in company with John Wabie, a North Timiskaming Indian, and his son. When we reached the point where Tomstown is now situated,

honest old John, an Indian of great respectability and sterling merit, pointed out that, owing to the unusual lowness of the water, our projected journey to Matachewan would inevitably be a hard one; instead of poling several miles up a small creek, we should have to carry our belongings about 15 miles from the White River waters to those of the Montreal River. This was rather more than we had bargained for, and, as there was no particular reason why we should go to Matachewan in preference to any other place, we said to him, "John, where can we go, if I give up my trip to the Montreal River?" We had about three weeks to spare.

"You go to Tegousiewabie," replied John; "find him big lake, lots fish; just like Timagami."

Now, this was just what I wanted, so I took out my map, and, behold, the place where Tegousiewabie was reported to be, was blank! Here was a chance for exploration—fine scenery, good fishing, and goodness knows what beside—all in one trip. So, I gave the word, and the bow of the canoe was turned up the North-East branch of the White River.

"What is the meaning of Tegousiewabie, John?"

"Place where we put our grub," explained he. "When Indian run short grub, he says 'let's go Tegousiewabie, sure find him there.'" Which, being translated into English, is evidently Larder; because that is the place where families of distinction who have any food, especially game, to preserve, keep it.

After putting in several days on the lake, though, alas, without finding any gold mines, perhaps, because we were not looking for them, being much occupied with latitude, bearings and distances, we returned to civilization by way of the North branch. The Geographic Board accepted courteously our suggestion as to the name of the Lake, after Dr. Robert Bell had satisfied himself that the translation of the Indian name was correct, and our sketch map was also incorporated in later publications issued by the Department of the Interior.

SUGGESTIONS FROM THE GEOLOGICAL SURVEY FOR A COBALT COINAGE.

The discovery of Cobalt ore in large quantities in Northern Ontario and the limited market for that metal, have had a disastrous effect upon its price, which has fallen from three dollars to thirty-seven cents a pound.

At the present time cobalt and its compounds are almost wholly used for pigments, chiefly for coloring glass, or the glaze for pottery, beautiful blue, green, yellow, and bronze colors, suitable for these purposes being obtained from a cobalt base. The metal is said to be very effective for electrical storage batteries, while as a plating material it is much superior to nickel, the coating being harder, brighter and more tenacious. Experiments conducted with a view to the use of cobalt in a manner

similar to nickel as an alloy of iron have not proved successful up to the present, notwithstanding that cobalt from its hardness and high magnetic properties would naturally be expected to give superior results.

The market for cobalt colors is a limited one, and in competition with cheaper artificial colors it is not rapidly increasing. The improvements in storage batteries will probably cause an increased demand for the metal while the cheapening of cobalt consequent to the new discoveries may greatly increase its use as a superior plating material.

The present small silver coinage of Canada, especially the five-cent pieces, is inconvenient and is easily lost; in the place of these it is proposed to substitute a larger coin of cobalt approximating in size the nickel five-cent pieces of the United States, while a smaller coin might replace the present bronze cents. Owing to its hardness; malleability and lack of tarnish cobalt is an ideal metal for these coins of low value. It would furnish a unique coinage and would assist greatly in absorbing the surplus of cobalt now being mined. The issue of these coins would secure a considerable profit to the Government, and their introduction would fittingly mark the establishment of the new Canadian mint at Ottawa.

THE GEOLOGICAL SURVEY.

When an up-to-date Geology of Canada comes to be written, one of the principal features of the work will be, we hope, a series of chapters showing the practical good that has resulted from the explorations and examinations of the Geological Survey. There is hardly a mineral industry in Canada that has not directly benefited from the work of the Survey, and this is the more to be appreciated when we remember that the officers of that institution are speaking, as it were, for the Government, and are naturally constrained to be more careful than if they were reporting independently. In the former case, the Survey is responsible for what they write, in the latter they alone are responsible.

It is many years since the Survey pointed out the metalliferous character of the Huronian rocks, and the opinions then stated were so soon acknowledged by all mining men and prospectors to be accurate, that any maps published by the department depicting an Huronian area, are always eagerly sought after.

When we review the nickel, copper and gold deposits of the vicinity of Sudbury and Sault Ste. Marie, and especially the silver and cobalt veins of the Timiskaming region, the economic and metalliferous character of the rocks of the Huronian system becomes even more apparent. This fact was recognized and the importance of the geological conditions insisted on by Sir William Logan, in reports of the Survey made nearly fifty

years ago, and it is gratifying to observe that the practical miner has begun to appreciate the value of the large amount of geological work carried out in the districts of Nipissing and Thunder Bay,—work which, a few years ago, might have appeared difficult in the light of any economic results up to that time achieved.

More than ten years ago the late George M. Dawson, then Director of the Geological Survey, made this very definite prophecy—a prophecy that, as we all know, has been so amply fulfilled:—“There can be very little doubt that every square mile of the Huronian formation of Canada will sooner or later become an object of interest to the prospector, and that industries of considerable importance may yet be planted upon this formation far to the north, or for other reasons at present regarded as barren and useless. . . . Upon Lake Timiskaming is one of the typical Huronian areas.”

THE METRIC SYSTEM.

The Metric System is steadily gaining support, and the Dominion Government showed wisdom in issuing a pamphlet descriptive of it. In Great Britain, one of the largest manufacturing firms—Kynoch, of Birmingham—has done away with the complicated English standards, and is adopting in its entirety the French metric system of weights and measures, of which the meter is the unit. In their calculations of costs they are adopting the pound sterling as the unit and are working down to four places of decimals. Tables have been prepared, by which every employee will be able to convert the expressions of English currency into a French or any other unit at a moment's notice.

Lord Kelvin, whose dictum should certainly carry weight, has expressed himself as thoroughly won over by the metric system. In the course of a recent speech, he said: “I believe engineers of every branch will find the metric system exceedingly satisfactory and convenient, when once they begin using it. For measures of length, large or small, the French system is vastly more convenient, in every respect, than our unfortunate British inches, feet, yards, rods, poles, perches (the perch five-and-a-half yards), chains, furlongs and miles. In a mechanical workshop, whether for large machines or small scientific instruments, the smallest named unit, the inch, is much less convenient than the centimeter with its named sub-division, the millimeter.

“The British workman will be much happier at his work with a folding fifty-centimeter rule, graduated to millimeters, than with the folding two foot rule, graduated to eighths, sixteenths or thirty-seconds of an inch. For the smallest division of a workman's scale, the millimeter is particularly easy to read and use, and is thoroughly convenient for the smallest named unit of length.

“I believe if a fifty-centimeter folding rule was presented to each workman in a workshop of 100 or 1,000 highly skilled workmen, the employer would be more than reimbursed in a fortnight by the increase and the improved quality of the produce of his men. Anyone who knows the troublesome character of handwork prescribed in such terms as 1 in. and 3-8 in. and 7-11 in. and 17-32 in. will see that there will be a considerable saving of time when the workman has his job stated to him in so much more easily understood terms, as 59 1-2 mm. Work of the highest accuracy in an engineering workshop is, of course, ultimately controlled by accurately standardised gauges, and for these the designation, whether in inches or centimeters, is of comparatively little importance. But it is of considerable importance to notice that the British engineer leaves thirty-seconds and jumps down to “mils.” (thousandths of an inch) in specifying gauges, or in actual work finer than the thirty-second of an inch. Not one of the accurately standardised gauges at present in use in engineering workshops will need to be changed when the metric system is adopted.

“A very large proportion of the work in a drawing office of a civil or mechanical engineer, in this country and in America, is entailed by the monstrously and absurdly inconvenient, and unsystematic sets of measures of length, area, bulk, and weight imposed by bondage to the present British measures. I could give you many examples of the waste of good work under which we now suffer.”

It appears to us that most of the arguments against the metric system are extremely weak. They certainly are not more forcible than were those of the old stage-coach man when railways were introduced, and are akin to those of the late Mr. Greener, who in 1858, wrote an elaborate work mainly to prove that the breech-loading system as applied to firearms, could not successfully compete with the time-honored muzzle loader.

We feel that mining men, especially, will find a great benefit through the universal introduction of the metric system. A great deal of the best technical literature comes from the pens of foreign engineers, and all measurements are given according to the metric system; at present, these are not readily translated into their English equivalents by the average mining man.

THE CANADIAN ARCTIC.

A more fascinating subject than Arctic exploration does not exist. There is a fascination about the silent, icy wastes of the North, which once felt is never forgotten; even the stay-at-home traveller, the man who does his explorations in fancy, in a comfortable arm-chair, becomes absorbed by the snowdrifts, and ice fighting, and long, dark months, the sledge travelling, and all the other novel features that go to make up such stories of adventure. We

have seen the sun at midnight and the moon at mid-day, and have a fair acquaintance with most things that have been written upon Arctic exploration, but, we think, especially for Canadians, one of the most interesting, if not the most interesting account ever published, is the report of the Dominion Government expedition to Hudson's Bay in the Arctic Islands by the D.G.S. Neptune during 1903 and 1904, of which Mr. A. P. Low, the present head of the Geological Survey, was in charge. This has just been issued by the Government Printer, at Ottawa.

Its value is, largely, owing to the leader of the expedition being a geologist whose scientific attainments are beyond question, who had made a reputation during years of plucky, persevering work in Labrador, and whose previous training rendered him peculiarly fitted to be the leader of such a party. Instead of mere guesses at the geology of the places visited, we find concise, clear statements, which enable us to understand a good deal of the geological sequence of the formations adjoining Hudson's Bay and of the various Arctic Islands north of that sheet of water.

It appears, that the chances of finding economic minerals under conditions that will permit of their exploitation are good. The great Huronian rocks that have been found to stretch from Lake Superior to Mistissini are now known to be duplicated through the north. Copper, iron, mica, gold, silver, graphite, molybdenite, and coal have been found: of these copper, iron and mica seem to be abundant. It is, probable, one of the largest copper-producing regions in Canada will eventually be that lying between Chesterfield Inlet and the mouth of the Mackenzie along the shores of the Arctic sea. This will not be a very difficult country to work in, as vessels can penetrate to Chesterfield Inlet and Fullerton during three months out of the twelve, and railway building across the barren lands would be a simple matter.

Mr. Low's description of the Eskimo is most valuable, and we do not remember to have read anything so thorough by other Arctic travellers. Moreover, he takes a broad, comprehensive view of the situation, such as one would expect from a man of the world, with a scientific education: being liberal enough to realize that social customs and natural habits must depend largely upon environment.

He also throws out some hints that the Government would be wise to take note of. In order to protect the natives living in the more distant regions, it will be advisable, undoubtedly, to prohibit any encroachment upon their hunting-ground by Eskimo, who, through contact with whites, have acquired fire-arms.

The meteorological observations taken on board the Neptune, during 1903 and 1904, by Messrs. C. F. King, J. E. Borden, and G. B. Caldwell, show that the climate, as far as mere cold goes, compares favorably with many parts of the Dominion that are

inhabited by the Anglo-Saxon race. The coldest day experienced was the 25th February, 1904, when the temperature was -40.7 , the minimum being -46 and the maximum being -38 . As a rule, however, even in the depth of winter the thermometer was frequently hovering about the zero point. Of course the harbour ice attained an extraordinary thickness, reaching 75 inches by the 22nd day of May, after which it began to melt. The most objectionable points about the Arctic climate are the long winter nights, and the dampness and fog prevalent during a great part of the summer.

If we may be permitted a criticism of a book that is almost flawless, we should say that the natural history notes are less complete than might have been expected. One cannot accept the list of 44 birds as a comprehensive one. If these were all the species the expedition met with, it was, certainly, peculiarly unfortunate. Land animals are hardly touched upon. On the other hand, the geological collection, made by the Commander himself, is particularly valuable, and shows the importance of having a recognized authority in charge of each Department of such an expedition. We believe the Dominion Government would act wisely in building a vessel for Arctic service and in keeping it constantly in commission; two years' cruises with competent commanders and staffs, would enable us to know in a few years the actual resources of the Northern Archipelago, and of the Arctic shores of the Dominion.

A GEOLOGICAL A. B. C.*

A is for Alfred E.—why did he go?

He'd make us the best of directors,—Bar Low.

B's for the Boom that we all were too late in;

C's the Collapse when they Cut the Keewatin.

Nov. 4th., 1906. Nipissing, \$34.00.

" 4th., 1908. " 00.34.

D's Dr. Reginald; D is our Doubt

That Dozens Don't know what he's writing about.

E is for him who is well known to fame—

He can write by the yard and a fourth to his name.

Long measure.

12 in. = 1 ft.

3 ft. = 1 yd.

1¼ yds. = 1 ell.

F is dear Hugh, of late there's a rumor

We're to have some more Hugh—then let's have some hu-mor.

G for Geologists, ladies included—

A veteran Belle has accomplished all you did.

H for you Heathens—you'll all go to H—

Here's Hoping our Christian won't go there as well.

I's for Mines Section; an artist he's, too.

Though I fancy his salary's all Elfric Drew.

* Contributed by the Poet Laureate of the C. G. S., whose worth is only equalled by his modesty—wherefore the above is unsigned.—EDITOR.

J is for Joseph, as trusty as steel,
 But most of us much prefer lead for a Keele.
 L's for Director and Labrador too;
 M's Mistassini he travelled all through;
 N's for the Neptune, so much to his credit, or
 N is the nuisance we know as the editor.
 O' for O'S. n, strange you should get
 A man who is Owen, yet never in debt.
 P is for Printing,—and Patience,—so few, though
 Can Practise much Patience who Print with the
 Bureau.
 Q for the Quibbles the editor raises;
 R our Replies when we send him to blazes.
 "Trifles light as air."—Othello.
 S is the Survey, the pride of us all;
 s is our salary—note that it's small;
 T is the Minister, Heaven be praised
 We're All Taught To Trust he'll Take care that
 it's raised!
 "It may well wait for a century. . ."
 Brewster's Martyrs of Science, p. 197.
 U are the people these verses are writ for;
 V are the Verses,—(it's all they are fit for).
 "Neither cast ye your pearls before swine."
 —Matt. vii., 6.
 W's the Work on Museum so neat;
 x is the time it will take to complete.
 Y's not so Young as he was Years ago;
 And Z—well, for Z, I'm darned if I know.
 "When still in his socks
 He descanted on rocks."
 —Bab Ballads.

EXAMINATION OF MINES.*

By R. Gilman Brown, E.M.

I feel myself fortunate in enjoying this opportunity of elaborating before such a representative body some of the fundamentals of mine examination; the more so because they have not always been fundamentals, because it has been largely due to the dispassionate business sense of business men that fundamentals they now are, and because, more than anything else, to the observance of such fundamentals by the investor and engineer alike, is the view of mining as a business and not a speculation to be attributed.

But in these matters the business man is the mainspring. Where there is a demand there will be a product to satisfy it, and the modern mining report is made to answer a simple business question: "What will be the profit?" Stated at length, my subject is: "The Examination of Mines Preliminary to Purchase; To-day as Compared with Twenty-five Years Ago."

It is naturally "to-day" that has the most practical interest for us, but all advance is relative, and if any of you will take the pains to "dig up" some

of the reports upon which mines were bought in the early '80s and compare them with modern ones, the advance towards definiteness will be the most impressive point of difference. Then, more stress was laid upon generalities, more weight given to empirical conditions; ore reserves and net values were less considered; a telegram from the man in the field stating that the mine was worth it, would be sufficient to make the capitalist pay out his thousands, by hundreds. Engineers, the best of them, cheerfully advised their clients to take all sorts of chances on persistency in depth on the various uncertainties attendant upon underground work.

It is not that people are now less ready "to take chances," but that it has gradually come to be the belief of engineer and capitalist alike that the chances should be recognized as taken; that if the buyer wishes to speculate for big returns, he should have the opportunity, so long as he is posted on what he is doing. Along with this belief has come the particular recognition of the general law, applicable not alone to mining, that those who would participate in a "dead sure thing" must be satisfied with a small percentum of returns; that those who wish to "plunge," stand to lose all or to gain fabulously, with the whole gamut of intervening possibilities.

I would here pay my tribute to the pioneer engineers with a text-book assistance that was meagre as compared with to-day; with little besides their individual experience and good sense, they were wonderfully successful in their prognostications. Their work is to be no more disparaged than should an engineer now venture to ignore the use of the extensive kit of tools, the accumulated experience of the past quarter of a century has provided for him.

So far as this paper is concerned, the last phase can be dismissed in a few words. It is to-day by no means an infrequent occurrence for business men to "take flyers" in undeveloped mining claims; rich and poor, those who can afford to lose the money and those who can not, seem equally addicted to this sort of thing, but I must emphasize, and all must agree that this is not investment in mines; it is a venture, pure and simple, a speculation without reserve (and without reserves), and though the competent engineer with his wide knowledge of costs, of various regions and of what goes to make up a mine, can, undoubtedly, lessen the percentage of loss in such transactions, it is not to-day his most useful sphere. The most he can do in such a case is to tell his client whether he will have a run for his money, whether the possibilities are such as to constitute a good mining chance. The pity of it is that the lay capitalist does not recognize, as a rule, the essential difference between this game and the sober business of legitimate mining investment.

This is particularly bad because the business man, turning for the first time to mines, is more likely to take up with some such long shot of this

* A paper read at the Eighth Annual Session of the American Mining Congress.

category than with the other. He pays small attention to the details of the matter—not a fraction of what he would if the same sum were to be put into a warehouse scheme, say, outside, of his regular line—and if the time comes when he must either abandon his “investment” or put up more funds, whichever course he follows, he feels he has been bitten, and in the future views the word “mining” askance. This works another way as well, for he has come to look on mining as outside of business laws, and should he get into a mine that is really an investment, he is still apt to view it loosely as such, and not to inquire too closely into the business details of the management.

Doubly important then is it that the lines be sharply drawn between the two classes of mining, and that the layman in mining matters does not settle down to his layness as the end of the matter. The investigation of one class may take an engineer a week; of the other, months. In the case of the prospect, the report is largely a brief statement of possibilities, with the pros and cons clearly given. In the case of the mine, it is an exhaustive study, an exposition of facts and conditions, with carefully drawn conclusions. It is this latter that particularly concerns us.

The fundamentals of the modern mining report—foal of engineering out of geology; broken by that most exacting of trainers, business sense—demand that the examination should have been conducted on certain lines; that certain matters should have been investigated; that certain tests should have been made; and when a report comes to hand not matching, point by point, with this formula, with some of these fundamentals slighted or missing, the investor will do well to refer it to independent engineering scrutiny, or, failing this, to send it back by the first mail.

These fundamentals are by no means esoteric; in their recital they are not formidable, and to the uninitiated give small evidence of the weeks and months of laborious investigation they have cost the engineer.

They are: The assay plan, showing the tonnage and assay value of the ore reserves; the table of costs; the summary of profits; the chances for the future; the question of title, and, if in the United States, the safety against litigation, arising from our deleterious law of the apex. It will not be without interest to see roughly how these are determined.

The assay plan is the multum in parvo of the report; to its production has gone more plodding work than to all the rest of the examination. It is an accurate, large scale map showing ore bodies with their average values. Average values can only be truly determined by thorough and painstaking sampling, going over the workings yard by yard and laboriously breaking down rock that will represent

the whole mass at each point. It is a tedious job at best, but can not safely be slighted. It is frequently claimed that milling tests are better; that tests of the ore as it comes out from the drifts and raises of development work are better, that this, that or the other short cut to the result is better, as well as easier. All of us who have sweated in this sampling of mines will admit that there are many things easier, but the general consensus of those mining engineers who have been conspicuously successful in their prognostications is that there is no short cut that does not involve long and perilous leaps. From this it results that if the property is not in shape to be sampled, it is not in shape to be bought as a mine and it is only a prospect.

Strictly, I should close the paragraph right here, but I am so anxious to carry conviction on this point that I venture a word more. It is plausible to claim that from a tunnel driven on a vein of ore must come ore that will give a fair average of that vein; and this would be the case were the tunnel of uniform height from end to end, but it happens to be almost the rule that were the ore has been more valuable the tunnel has been run higher in accordance with the law of human conduct that puts the best foot forward, with the result that a certain proportion more of the better ore has been included in that coming from the tunnel. What becomes, then, of our average value?

Each of the assay values must be tabled with the width of ore it represents, and for each block in the mine averaged. Here no mere arithmetical average will do, summing the results and dividing by the number of them, for that would give the same weight to a six-inch high-grade streak and the six-foot low grade. The true average must be gotten: For each sample, width is multiplied by value, these products are added and divided by the sum of the widths. This is kindergarten teaching so far as engineers are concerned, but hardly so, I fear, as regards the investor, to whom particularly I am speaking.

The determination of the tonnage, represented by the ore blocked out, is largely simple surveying work, but the engineer must use great caution in what he includes as ore reserves. Fortunately, the old, easy term of “ore in sight” is passing into disuse, thanks to the influence of a prominent mining society, and the modern engineer is expected to designate closely just what degree of certainty he has about the tonnage of each block. It is obvious that a tunnel driven one thousand feet in ores does not in rigid interpretation block out any ore, though an engineer is frequently justified in assuming certain distances above and below as “probable” or “reasonably to be expected;” but each such estimate is in its own category. The ore blocked out, as commonly understood, is ore with three or four sides showing in the workings. All of these data are collated on

the assay plan; on the map showing the tunnels and workings to scale, are plotted in proper position, each sample with its width; the value for each block is given and the tons and average width, the one determined by multiplying the average width by the area of the block measured on the vein and dividing by the cubic feet going to make up a ton of ore in place; the other being the true average of the assays for that block. I venture to insist here, with an insistence that may to some savor of dogmatism, that an assay plan should be prepared in every case where a mine is being bought for its ore; nothing better than this shows whether the examination has been slighted, nothing is more readily comprehensible to the lay purchaser.

The costs of extraction in the case of an operating mine might seem to be a mere determination of results that a competent bookkeeper could prepare and to a certain extent this is so. But more often than not, the value of a particular mine hinges upon the introduction of improvements, increasing the capacity of the plant, and on economies to be gained in the present scale of operation. Light can be shed on these only by a proper segregation of the items of cost.

To a varying degree, each mine is a lonely entity, with strong individual characteristics at times amounting to eccentricities. This is true even of mines in a single district, even in a district of the South African Rand, and thus it results that the engineer can not safely say costs will be so and so because these have been attained elsewhere.

In the case of an operating mine the engineer segregates the items over an extended period into reasonably narrow categories. A comparison of each of these with the work of other mines may give him a hint as to what items are normal and what are not, but for definite figures he goes out through the works and mine, noting the duties of the men and their efficiency, both eyes open, his mind bent to a big interrogation point. In the light of this investigation, he makes fresh calculations of what ought to be the costs on the present scale of working. Then he proceeds to a fresh segregation that will separate from the whole mass the fixed general expenditures, those that do not depend upon the yearly tonnage. As these will be practically the same in total, they will obviously be less per ton with a larger tonnage, so that, when the ore reserves are big enough, increasing the scope of operations, affords a most profitable field for the investment of capital. The importance of this warrants reiteration in a different form: general fixed costs are constant in total, and inversely proportional to tonnage in per ton figures. Other costs are directly proportional to tonnage in total and constant in per ton figures.

This estimate tests most severely the ability and judgment of the engineer, and everything depends upon its correctness. It can not be ignored and yet

in the hands of the mere office man becomes academic and a snare. An error here is quite as serious as in the sampling, and, as examinations are now-a-days conducted, it is easier to "salt" the cost sheets than the mine—and fully as effective.

The profit in the ore reserves of various kinds is a plain calculation from these premises, and, notwithstanding the serious drawback that the sampling can physically only represent the real values of the boundaries of the blocks of ore, has been found, except in unusual cases, to closely approximate the facts.

I have reserved until now speaking of the interval at which samples are taken because the importance of this factor is now more clearly to be seen. The experience of the engineer and his preliminary inspection of the mine and assay books has told him what is likely to be the proper interval for his sampling. If the ore is high grade and spotted, he naturally takes a closer spacing, and two-foot intervals are by no means unknown. Such close spacing is at times called for by even low grade mines if the values are very irregular. The engineer recognizes that in a multitude of samples lies safety and, very frequently, as the work progresses, finds that the interval selected is too wide and has to go back over his work and interpolate other samples. But he considers it an absolute essential that the distance apart shall be uniform for each individual block, it being obvious that if he has twenty high grade samples from a 100-foot tunnel and ten low grade ones from another 100-foot length, by even correct averaging, the result for the 200 feet will be too high. At times it happens that the high grade ore will be more erratic in its sampling than the low and that it would be a waste of time and expense to sample the low grade at as close an interval as the high. In these cases he is frequently justified in estimating each separately and then combining the two in the proportion of length that each represents. There is more than one way of doing this and it will hardly be interesting to explain fully such merely technical things.

It is rarely, however, that a mine is sold for merely the profits in the reserves; certain assumptions are made about continuance of ore, and it is the difficult task of the engineer to decide what assumptions are justified, by the conditions. Indeed, it may be pertinently asked why anyone should sell at all for only as much as he has already assured, and, on the other hand, why another should care to buy if he only expects to get back what he pays out. The answer to this question is outside the scope of this paper, but it can be briefly said that in the answer is involved the essential difference between the buyer and seller in any transaction, as well as certain peculiarities inherent in mining transactions alone. The vendor's knowledge of his mine is more sketchy than that of the buyer after his examination

and while he is apt to be more hopeful of the prospects, this may be more than offset by imperfect realization of the possibilities of improvement. Aside from this, and in the case of the professional promoter, he is apt to figure on a price that will give him a good profit on his outlay and trouble. Logically and practically, then, it is the prospect that is bought and we here come into close contact with the work of the engineers of the '80s and with that of the man who sets out to value a prospect.

A moment's consideration, however, shows that there are certain facts that here help out. The history of the mine affords certain clues to the future. The workings give vast advantages for the study of the particular geology. Moreover, almost a new science has been elaborated in recent years, that of economic geology. The servants of this have been enthusiastic and earnest and are opening out avenues of discovery that make our resources of twenty-five years ago appear, by comparison, sophomoric. This branch of geology is, however, only new so far as its general use is now common to the engineer. The painstaking studies of a generation of students go far to make it now possible, but what was being done in the '80s was the devoted work of a few; that of the present is being done by an army of investigators. By this the examining engineer now profits; indeed, he is very frequently assisted by a geological specialist in his investigations.

All the data of the assay plan are studied for the light to be thrown on the future as to change in dimensions of the ore bodies and of tenor in their contents and to these questions of persistence, they give prompt, if empirical, answers. The geological study of the vein, the existence of dikes, of cross-veins, of changes in wall rock, all of these have a bearing on the future. Then there is the pertinent inquiry as to the extent the deposit owes its value to surface conditions, which are now recognized as often reaching to profound depths. It is practically impossible to do more here than state the prime factors in the case which must all be combined into a trustworthy opinion. This is a severe test of judgment. No mine examination is to be lightly approached but when the engineer reaches this consummation of all his work, the responsibilities of his position have, in truth, come home to him. He is now to form his conclusions, the answer to the question with which he began: "What will be the profit?" He has certain definite facts arrived at by painstaking investigation. He has a number of facts of less definite demonstration and he has a swarm of the small impressions that have buzzed around him during the examination. He must give due weight to each and combine the whole into a decision with logical sequence of conclusion to premise, so that no one can say "non sequitur." Just how this is done constitutes the personal factor, and who shall declare its course of operation? It is far removed from

mere guess work, it is the special faculty of the well balanced mind; with no direct relation to personal predilection, we know it as but that imponderable quality of "judgment."

But this talk about judgment must not blind us to the clear separation of fact from future.

With all his innate habits of mind, the engineer strives to give to his report the one, distinct from the other; and this is made clear no less in the use of his data than in the deduction of his conclusions. He virtually says: "These are the facts as nearly as they can be determined; there are the uncertainties; the true weight of the uncertainties is thus and so, the chances are such and such. The problem is before you, make your decisions, what will you do? With this the scope of the engineer is reached, his work is done; he has investigated, and found the facts." He has studied, and evolved the probabilities; he has stated the one and the other with logical succinctness, and it is now up to the other man, as it always must be up to the man who provides the funds. When all is said and done, his decision is final.

I started out with the aim of showing what were the recognized fundamentals of the mining report of to-day, devised by experience to lessen the hazards of purchase; I have tried to show how guess work has been eliminated, how certainty has been sought, whenever attainable; what the limits of definite information are and what degree of reliance is placed on the purely personal factor of judgment. I have explained how the mining engineer, in his appraisal, makes the practice of separating the positive from the tentative factors, of presenting the one categorically, imperatively, as becomes the expression of ascertained physical facts, the other modestly, as things probable but concerning which the best judgment may be at fault.

If this serves to give the investor a better idea of what to look for in a mining report, I shall be pleased; if it aids him to place due value on the work of the engineer, I shall be gratified. If it leads some few to appreciate the essential qualities of mining as business without inordinate risk, I shall be more than satisfied.

THE OCCURRENCE OF PLATINUM.*

Platinum is largely employed in chemical industries for the construction of vessels in which corrosive liquids such as strong acids are to be dealt with. The metal is sparsely distributed, and in recent years, owing to the great extension in industrial chemistry which has taken place, the demand for platinum has exceeded the supply and its price is rapidly becoming almost prohibitive. In addition to its use in chemical industries the metal is also employed in electrical work and to a small extent in

* From the Bulletin of the Imperial Institute.

photography. It has also been used in jewellery. In view of the increasing demand for the metal special interest attaches to its occurrence in hitherto unexploited situations.

Platinum Minerals.

The mineral known as "native platinum" consists of an alloy of platinum, iridium, palladium, and sometimes osmium, gold, iron and copper. The usual forms of the mineral are nuggets, scales or irregular grains. In color it varies from silvery-white to dark-gray and it has a metallic lustre. The hardness varies from 4 to 6; the fracture is hackly, cleavage none. It is malleable, ductile and sectile, and has a specific gravity of 14 to 18.

The composition of platinum nuggets from various localities is shown in the following table:—

Source.	Russia.	British Columbia.	New South Wales.
Platinum	76.40	72.07	75.90
Iridium	4.30	1.14	1.30
Rhodium	0.30	2.57	1.30
Palladium	1.40	0.19	trace.
Osmium .. . . .	.....	.....	.....
Ruthenium .. . . .	.....	.....	.....
Iridosmine	0.50	10.51	9.30
Gold	0.40	.....	.....
Iron	11.70	8.59	10.15
Copper	4.10	3.59	0.41
Sand	1.40	1.69	1.22

The metal also occurs in some few localities as the mineral sperrylite, an arsenide of platinum ($PtAs_2$) containing a little rhodium and antimony. This mineral has been found at Sudbury, Ontario; North Carolina, and at the Rambler Mine, Wyoming, U.S.A.

Sperrylite is of a tin-white color, has a metallic lustre and gives a black streak. Its hardness varies from 6 to 7; specific gravity 10.6. It crystallizes in the pyritohedral class of the cubic system presenting considerable resemblance in form to iron pyrites. When slowly roasted in an open tube sperrylite gives a sublimate of white arsenic and melts easily. At present this source of platinum is of little or no commercial importance.

Mode of Occurrence.

(1) "Placers."—Almost the entire output of platinum is obtained from "placer" deposits, typical examples of which are those of the Urals, Columbia and Brazil and British Columbia. The platinum "placer" deposits is probably in most cases derived from basic igneous rocks.

(2) "Veins."—Platinum (as sperrylite) has been found associated with covellite at the Rambler Mine, Wyoming. It occurs native with gold at Tilkerode in the Hartz Mountains, Minas Geraes in Brazil, Santa Rosa, California, and Beresovsk, Russia, also with tetrahedrite and bournonite at Guadalcanal, Spain.

(3) Platinum disseminated in eruptive rocks.—
(a) It occurs associated with nickeliferous pyrrhotite, copper pyrites and other nickel-copper ores in a hypersthene gabbro or norite at Sudbury, in Ontario.
(b) Native platinum is met with in peridotite and other basic eruptive rocks rich in olivine intimately associated with chromite.

Localities From Which Platinum Has Been Obtained.

EUROPE.

Platinum has been found in very small quantities in Austria, Hungary, France, Germany, Great Britain and Norway.

Russia.—Over 90 per cent. of the world's output of platinum is obtained from Russia. The production in 1904 amounted to 161,139 ounces troy of the crude product. The metal is known to occur over a wide area, but the districts in which it is obtained on a commercial scale are comparatively few; the chief of these are situated along the eastern watershed of the Urals, the eastern portion of Perm and on the western watershed further south. The most important are the Nijni-Tagilsk, Goroblagodat and Bisersk districts.

The richest deposits of the two latter districts lie along the river Iss. The area is largely composed of peridotites, olivine-gabbros and their serpentine products.

The deposits, which average 4 feet in thickness, are of the "placer" type, and extend from 200 to 800 feet on each side of the present river. They have an overburden of peat or turf which varies from 5 to 20 feet in thickness.

In extracting the mineral the turf is stripped off, and the gravel transported to the sluices or to the mechanical washers, the latter being more usually employed in operations on a large scale.

The washer consists of a cylindrical tub at the bottom of which is a circular iron pan 15 inches deep, perforated with holes five-eighths of an inch in diameter. Round the top of the pan runs a cast-iron pipe from which jets of water play into it. In the centre is a vertical shaft carrying a stirrer, which revolves about twenty-five times per minute. The gravel is fed continuously, and while the large stones remain on the pan the sands and clayey matter pass with the water through the holes direct to the riffle tables. Washing is carried on without intermission for about eleven hours, the concentrates are then washed on the tables several times, until reduced to a fine gray slime from which the gold is removed by means of mercury.

The residual material is sold as crude platinum. Dredges have recently come into use in the Iss valley in connection with this industry.

Spain. — Platinum in small amount has been found at the silver mines of Guadalcanal.

ASIA.

Burma.—Platinum is known to be associated with the gold of the "placer" deposits at Ava in Upper Burma.

Borneo.—It also occurs at Goenoeng, Lawack, in south-eastern Borneo, and is occasionally obtained in gold washings.

Japan.—Platinum together with iridosmine is reported to occur in the sands of the river Yubari, Ishikari.

AFRICA.

Algiers.—Platinum is said to occur with galena near Algiers, but the report lacks confirmation.

British Central Africa.—Traces of platinum have been found in a nickeliferous pyrrhotite received recently at the Imperial Institute from British Central Africa. No information as to the amount of this ore obtainable is available.

AMERICA.

Canada.—Platinum has been found in the sands obtained near Edmonton on the North Saskatchewan River in Alberta province. The gold washings of south-west British Columbia yield platinum in small quantities. The production in 1904 amounted to 35 ounces of the crude material valued at £2 10s. per ounce. This quantity was obtained from one working, viz., Granite Creek in the Similkameen, from the sluice boxes employed in washing for "placer" gold. In 1902 platinum was found in the black sands at several points on the Quesnel River, Cariboo district. Assays of these sands showed gold to be present in amounts varying from 0.2 to 121 ounces per ton and platinum from 0.14 to 7.8 ounces per ton. The Consolidated Cariboo Co. in 1904 reported the presence of appreciable quantities of platinum in the heavy concentrates remaining in the sluice boxes after the "clean up," and they are now taking steps to collect and treat these concentrates. The platinum, palladium and osmiridium occur in minute metallic grains which are enclosed in fragments of chromite and magnetite.

Platinum has also been found in the copper sulphide obtained from the Yale district; the amount present, however, would not admit of its commercial extraction, unless it were recovered from the slimes after electrolytically refining the copper.

Platinum occurs as sperrylite in the copper-nickel ores of Sudbury, Ontario. The nickel-copper matte, as exported contains about one ounce of platinum per 1,000 lb. Some of this is now recovered by the Oxford Copper Co., of Constable Hook, N.J., in refining this matte.

The metal is reported to occur on the south bank of the St. Lawrence river in the Eastern Townships of Quebec.

United States.—The United States in 1904 produced 200 ounces of platinum valued at \$2,600. The

greater quantity of the metal was obtained from the gold "placer" deposits in Trinity and Shasta counties, California. Platinum is known to occur in the "placer" deposits of Washington, Oregon, Idaho, Montana, Colorado, and Alaska, but in quantities insufficient for commercial working.

It also occurs as sperrylite ($PtAs_2$) associated with covellite (CuS) in the Rambler District, Wyoming, and it was estimated that platinum to the value of \$6,000 was contained in the slimes from the copper ore raised in 1904.

South America.—The production in 1904 amounted to 9,625 ounces; this was largely obtained from Colombia. This country ranks second to Russia as a producer of the metal. The most productive district is El Choco in the provinces of Atrato and San Juan, the latter being the larger producer.

AUSTRALASIA.

New South Wales. — The production of crude platinum in 1904 was 535 ounces valued at \$10 per ounce as compared with 530 ounces in 1903.

This yield was almost entirely obtained from an area of about two square miles at Fifield. The working is a deep alluvial lead containing platinum and gold, the sinking being through 60 or 70 feet of loam, having some bands of barren quartz and drift. The wash dirt contains 5 to 12 dwts. of platinum and 1 to 3 dwts. of gold per ton, but owing to the scarcity of water the deposits are only worked during a few months of the year.

Platinum has also been found in the sands at Aberfoil river, on the sea coast between Richmond and Clarence rivers, and in felsite and granite at Broken Hill.

Queensland.—Traces of platinum together with gold and tin-stone have recently been reported in the beach sands of the south-east coast. The sands contain from 0.12 to 0.64 per cent. of tin-stone (3.4 to 8.12 lb. per ton), and from 5 grains to 1 dwt. 10 grains of gold per ton and 3 dwts. to 7 dwts. 2 grains of silver.

Tasmania.—Platiniridium is obtained along the Savage river and platinum from the sands of the Wilson river. The "placer deposits" of western Tasmania are of commercial importance on account of the iridosmine they yield. Platinum has been reported to occur together with vanadium in the ash of certain Australian coals.

New Zealand.—Platinum is known to occur over a wide area, usually associated with gold washings.

Some of the river sands in the southern part of Middle Island and those of the east coast of Otago are said to yield the metal; it has been reported also to occur in eruptive rock near the Takaka river.

The following observations made by Mr. J. F. Kemp, of the U.S. Geological Survey, as to the indications of the occurrence of platinum give a useful summary of what is known on this subject:—

(1) Experience so far gained leads to the conclusion that platinum is very sparsely distributed in its mother rock and the chances of finding it in quantities sufficient to mine are small.

(2) Large and permanent "placers" are to be looked for only in very old land areas which have been subjected to protracted degradation and concentration.

(3) In the assay of antimonial, arsenical and other copper ores, but especially of tetraherdite (gray copper or "fahlerz"), it is worth while to look for small percentages of platinum.

(4) Deposits of chromite deserve similar testing.

It may be stated that pyrrhotite, the lower sulphide of iron, often contains traces of platinum, especially when nickel, copper and cobalt are present.

It must be remembered that mercury does not readily amalgamate with platinum. Therefore in methods of working auriferous "placer" deposits in which the gold is saved by means of mercury, the platinum is liable to be lost unless special means are taken to preserve it. If, therefore, traces of platinum are suspected or known to occur, the gold and platinum should, as in Siberia, first be collected by riffles or "blanketing" and the separation subsequently effected by means of mercury.

Even in the use of riffles or other mechanical means of retaining platinum more care is required than in the case of gold.

PROSPECTING WITH CHURN DRILLS.

By F. S. Pheby.

Several diamond drills are at work in the Cobalt district, but, it is quite possible, under certain conditions, churn drills would serve the purpose. In this connection, a very useful paper by Mr. F. S. Pheby, may be read. It was contributed to the Mining and Scientific Press of San Francisco. Of course, the items of expense would differ very considerably in Cobalt, and, on the whole, the cost should be less in Northern Ontario than in Nevada. Mr. Pheby writes:

Believing that the great horizontal ore-bodies of the Ely district could be more cheaply and expeditiously tested by the use of the drill rather than through the usual tedious and expensive method of shaft-sinking, the Ely Central Copper Co. purchased two drills, manufactured by the Keystone Drill Co., Beaver Falls, Pennsylvania. These drills were hauled from Cherry Creek, to the mines, a distance of sixty miles. These machines are type No. 3 and weight 12,000 lbs. each. A complete outfit of tools and equipment for recovering any parts of the drills lost in boring the holes, were included in the order.

The first drill was installed on the property in August and we had a hole completed to a depth of 308 ft. within 23 days, although but one shift was engaged in this work. It is far more economical in

wood and water to keep the drills running continuously with three shifts. More than three times the sinking can be done in the same number of days, as steaming up in the morning generally comes out of the one shift. The drill averaged 13.3 ft. per shift for the 23 shifts, but if shut-downs are deducted, the drill averaged 19.6 ft. per shift of actual operation.

We have found in all our work that casing is necessary in every hole. At times we have sunk 200 ft. without casing, but to go deeper casing was necessary, which meant that the hole had to be rimmed out at an expense of more than the original cost of the hole for the 200 ft. I caution anyone contemplating the purchase of a drill, to provide $7\frac{5}{8}$ casing for one-third the depth contemplated, $5\frac{5}{8}$ casing for two-thirds the depth, and $4\frac{1}{4}$ casing for full depth. This we had not done, and probably 25 per cent. has been added to the cost of each hole, worked without sufficient casing. Trouble may not be encountered in several hundred feet, but a soft stratum of ten feet will require casing for the entire hole.

We soon learned that the wear and tear on the drilling cable was severe. Under ordinary circumstances, each rope is safe for 1,500 feet of drilling. When we appreciated that our ropes were deteriorating, an order was placed at once. By October 1 the cable had not arrived, and we were compelled to order by express from Ohio a coil of rope weighing 1,850 lb. With each drill, two ropes of the same length as the depth of the hole contemplated should be ordered.

Water is required for both the boiler and for diluting the drillings so that the sand-pump may bale them. The greater quantity is required for the boiler. This item of expense is local with each hole. It is advisable to haul water in a good wagon-tank, as the drills may be moved many times, and the cost of pipe might be greater than the cost of hauling. A drill-man and helper are required on each shift; the former receiving \$4 for eight hours' work and the latter \$3.25. The item of fuel and water is wholly relative, but will be given in our particular case, and may be taken as an average for this district.

The following is the tabulated costs for a certain hole which we have taken as an average:

Shifts of sinking (eight hours each)	23 days.
Depth of hole	308 feet.
One drill-man, wages	\$ 82.69
One helper and assistance while handling casing	81.08
$\frac{3}{4}$ cord of wood each shift, at \$4.50 p. cord	77.51
12 bbls. water at \$6.50 for hauling, 8 days	52.00
12 bbls. per day (when running two rigs), 15 days	48.75
Coal and oil	7.60
Miscellaneous charges	12.20
Superintendence	50.00
Cost of 308-ft. hole	\$411.83
Cost per foot	\$ 1.33

Some water was encountered in this hole, and I may say roughly, that a two-compartment shaft for

the same depth with equipment, would have cost about \$12,000, or \$40 per foot.

The question has often been raised concerning the character and accuracy of the sample obtained from this work. With small rich veins there may be an objection to the use of drills, but in ore-bodies like those found at Ely, I believe as good a sample can only be taken with great care. Most of the sludge or drillings will pass a 20-mesh screen, and a good method is to provide a large box with a capacity equal to several screw-lengths. I might say that a screw is three feet long, and when fed out, the clamps are changed on the rope, and the hole baled, or sand pumped. By settling and decanting the water, the entire product of the hole may be saved and sampled. In ordinary practice it is sufficient to dip a sample from the box and pour the same into a box partitioned off in compartments about the size of common brick. This sample, when dried in the sun, is compact enough to be sampled by chipping, and can be shipped and carried about without breaking.

In a hole carried down without casing, there is danger of knocking down particles from the upper portions of the hole. This will vitiate the sample, but the harm done is more theoretical than actual. As is well known, the ore-bodies of Ely are the impregnation of a great stockwork of porphyry, and an ore-body of much value must be a hundred or more feet thick. While actually in ore, the sampling must be done with extreme care, but often the hole, all or in part, may be in barren country rock, and only a knowledge of the formation penetrated is desired.

The best test, where not in ore, is obtained by panning the sample. This concentrates the coarse particles, which are clear to the eye if a magnifying glass of low power is used. In oxidized formations some doubt often arises as to whether the drillings are composed of porphyry or limestone. A small bottle of dilute hydrochloric acid will soon settle this question with entire satisfaction. We have made a practice of saving a sample of each formation penetrated, in four-ounce bottles. This gives a clear picture of the hole, and is valuable for future reference.

Our drills are provided with traction gears, and may be moved at will over the roughest ground. This saves the expense and trouble of procuring teams. The winter weather is severe for outside work, and sectional houses, so made as to be readily knocked down and moved, have been constructed to enclose the drills, and within these houses the men work in comfort.

The cost of a No. 3 drill is as follows:

Drill f. o. b. Beaver Falls	\$1,400
Cost of casing for 400 ft. and fishing tools.....	350
Freight to Cherry Creek, Nevada	328
Hauling 60 miles from Cherry Creek	225

Cost of No. 3 drill, good for 500 ft., laid down on the ground

A drill of this size is light for holes of greater depth than 500 ft. The size recommended is a No. 5, good for 1,200 ft., and the cost of the same with traction gear, is about \$2,500 laid down at Ely. Should five holes of 500 ft. each be sunk, the cost of equipment per hole will be \$500, about the price of a good whim outfit. The cost of \$1.50 per foot is so much cheaper than any shaft work as not to be comparable. Water does not retard the work of drilling; in fact, it is a benefit.

I can heartily recommend the use of three drills for prospecting in this region. Apart from the cost per foot, the time in which a good working knowledge of the ground can be obtained, is a great factor. The sample is quite as good as a core, and most ground can be penetrated at 25 per cent. of the cost incurred with a diamond drill; while the expense of equipment will not exceed 30 per cent. that of the diamond-drilling outfit.

THE PRODUCTION OF PLATINUM*

By F. W. Horton.

The year 1905 saw a phenomenal rise in the price of platinum and a greatly increased production in the United States. The annual report of the United States Geological Survey on the production of platinum, shows that early in March, 1905, the price of ingot platinum advanced from \$19.50 an ounce to \$21 an ounce, surpassing gold in value. On April 1, 1905, the price fell to \$20.50, and remained firm at this quotation until February 1, 1906, when it jumped to \$25 an ounce, where it remained until Sept. 1, or about six weeks ago, when it leaped to the unprecedented value of \$34 an ounce. The production of platinum in the United States increased from 200 ounces in 1904 to 318 ounces in 1905.

The rise in the price of platinum and its increased production in this country may be ascribed to two causes; the growing demand for the metal and the reduced yield of the Russian platinum placers, which usually furnish about 90 per cent. of the world's supply.

The anxiety felt by the platinum dealers during the Japanese-Russian war has not abated since the settlement of international difficulties, but has rather increased as Russia's internal dissensions have developed. Even before the uprisings, it is said, the large Russian mines were purposely curtailing their production. This reduction of the output is due to the fact that the entire product for a varying term of years was bought up under contract and at prices that now seem ridiculously low. As the mine owners receive only the fixed price, they do not participate in any gain due to rise in value, and are therefore not desirous of a large production, but are husbanding the limited resources of their mines until

* From Advance Sheets, Mineral Resources of the U.S.

such time as they can dispose of their product to better advantage. Meanwhile the small mines, which, generally speaking, are not hampered by such agreements, are working to their full capacity to take advantage of the stimulated prices; but their entire output is only a small percentage of what is usually produced. A greatly increased consumption of platinum in the electrical and chemical industries, together with this stringency of supply, accounts for the prevailing high prices.

The exhaustive tests and examinations of black sands commenced early in 1905 in connection with the Lewis and Clark Exposition, and still being carried on at Portland, Oregon, by the United States Geological Survey, have done much toward placing platinum mining in this country upon a stable footing and developing it into a permanent and profitable industry. Not only have many discoveries of platinum in new localities been made, but the tests have revealed the fact that there are in this country districts which contain surprising quantities of platinum, and they have also given much valuable data as to the best method of obtaining it.

Platinum is now known to exist in 15 counties in California: Butte, Calaveras, Del Norte, Humboldt, Mendocino, Nevada, Placer, Plumas, Santa Barbara, San Luis Obispo, San Bernardino, Shasta, Siskiyou, Trinity and Yuba; in nine counties in Oregon: Baker, Coos, Curry, Douglas, Jackson, Josephine, Lincoln, Linn and Union; in eight counties in Idaho: Ada, Bingham, Boise, Elmore, Idaho, Nez Perces, Oneida and Shoshone; in four counties in Colorado: Chaffee, Park, Saguache and San Miguel; in three counties in Washington: King, Skagit and Whatcom; in two counties in Montana: Custer and Granite; in Utah, in Garfield County; in Arizona, in Yavapai County; and in Wyoming, in Albany County. The metal is also rarely found in Alaska and in the gold-bearing sands of Corozal river, Porto Rico. Isolated occurrences of single nuggets or mere traces of the metal have been found in many other counties of these states, as well as in four of the eastern states, namely, New York, Pennsylvania, North Carolina, and Georgia. In many of these localities the metal occurs but sparingly. The most promising fields are in the counties of Southern Oregon and Northern California. Here the metal has been found in commercial quantities. With proper methods a considerable annual output should be obtained.

The platinum metals are usually found in working gold placers, especially where the gravels are derived from peridotites. Many managers of placer mines have been convinced for a long time that it would pay to save the platinum in gravels, if it could be done by some inexpensive method. The experiments of the Geological Survey which were conducted under the supervision of Dr. David T. Day, have shown conclusively that 95 per cent. to 98 per cent. of the precious metals, both gold and platinum, contained in the sluice box sands can be saved on

concentrating tables of the Pinder or Wilfley type, such as are used in every day practice; and that in most cases the concentrates thus obtained will represent less than 1 per cent. of the total weight of sand fed to the table.

Besides discussing the experiments made in the recovery of platinum in this country, Mr. Horton describes the methods of extraction in vogue in Russia. He also reviews the localities in which platinum-bearing gravels have been noted in Russia, Colombia, British Columbia and other countries, describes the physical properties of platinum and its associated metals, and sets forth their uses. A brief bibliography of platinum, with which the report closes, is not its least valuable feature.

It should be noted that the imports of platinum during 1905 were valued at \$2,173,263, as against \$1,879,155 in 1904, an increase in value of \$294,108. Considering the increased demand for platinum, the gain in importation is slight, but if the high price and scarcity of the metal be taken into account the wonder is that there was not a large decrease in the quantity imported.

A STORY OF ENDEAVOR.

By Nemo.

This untrue and most unveracious narrative has to do with the activities, methods, success and failures of certain brainy and adventurous men, who, with all the qualities for greatness, lacked but one element of success, as mining promoters,—they really tried to get a mine. There were three. Money they had none, work they would not, and to beg, well, perhaps, they were not ashamed, but they were ambitious, and they had probably hit every man who could be "broke up" for a small loan; that occurred to them, so often, that this well was dry.

And they had to do something last spring, not from choice or the working of an unquiet spirit, but because they had to.

It was about the time the ice had broken up on the Timiskaming Railway, and the first crop of Cobalt promoters, with their slabs of silver, had struck Montreal, before the Nipissing cargo, in the charge of an expert, had moved on Cobalt. But these three men saw that the bait was good, they knew the crop of suckers was large, even in staid, hard-headed Montreal, and they had to do something. They did it.

They organized the Cobalt Unlimited, with a capital stock of \$7,000,000, under their hats, so to speak—(let it be trusted they were new)—and they at once started off to sell rights to stock. They had neither a mine, a charter, a company nor a stock certificate, but they sold rights that netted them a cool \$3,000. Could the names of the gentlemen, who parted with this sum of good, cold dollars, be but printed in full, this issue of the MINING REVIEW

would displace every alleged humorous publication that at ordinary times comes to Montreal. The very babies would cry for it, and if there wasn't such a cruel law of libel in this country the list would be printed. We believe that it would be possible to prove the truth of the list, and that it was in the public interest, but it would take too much time to do it. Let this be enough. There are names on the cheques that were parted with for "rights" "when issued" to stock in Cobalt Unlimited, that are supposed to mean close-fisted, shrewd, hard-headed, conservative, thoroughgoing business, with big profits and big sales, in the commercial world.

With three thousand dollars in their hands, the business went on gloriously. The gentlemen felt that they had found the goose that laid golden eggs at last, and they rejoiced much and proceeded to spread things. They paid back some of their "loans," bought new overcoats, smoked twenty-five cent cigars, instead of six for a quarter, and were prosperous, very. Incidentally, they took an office, got in a typewriter on 30 days' trial, and proceeded to cultivate the goose. Perhaps the office and the typewriter frightened the gentle and sensitive bird, perhaps it was the fact that the \$3,000 (minus expenses) behind them affected their husbandry. Whatever was the cause, from the time they started in with "an organization," the eggs ceased to arrive. Instead of recognizing that there was a perhaps, these three bold and energetic souls pitched in on the organization side. They applied for and obtained a charter for the "Cobalt Unlimited." We believe that this charter is a work of art that discounts Byam Shaw, the Canadian archives, or the Bucket Shop Code: that it stands a monument to what can be done, when you try. They contracted for a block of stock certificates, something in aluminum dust and purple ink, which if used for wall paper would stop a clock, and, incidentally, about this time they got in another typewriter on 30 days' trial, and "threw down" a hard working and enterprising typewriter man, after using his machine for thirty days. About this time, also, the inroads of a month's hilarious organization made itself felt on the bank account, and the goose was behaving worse than ever. What should they do?

Still working on the organization idea, they decided that they had better buy a mine, and one of their number actually went up to Cobalt, and bought it. More than that, he paid for it, that is, he paid \$1,000 for an option to pay \$100,000, more or less, for a forty-acre section of fine looking rock, within the traditional sixty days. And not satisfied with this cruel devastation of the company's funds, he allowed a man with some letters after his name, to do him out of \$250.00 for a "report" on the magnificent property.

This report was not an exhaustive or wordy document. It was a simple statement that the property in question consisted of a mass of funda-

mental granite without any particular crack or flaw in it, and if any mineral was ever to be found thereon, it would have to be put there first.

By this time there wasn't any of the \$3,000 left, not even enough to pay the printer for the certificates. The first fine, careless rapture was gone; the man who had put in the third typewriter on trial wanted his money; the weather was warm, and there was a taint of Nipissing in the air; and the adventurous three forsook their organization, abandoned their charter, and vanished, as far as possible, from the usual haunts of certain gentlemen anxious to get something for "rights," followed by "when issued."

This is the sad tale, so it is. Had these adventurous souls gone on as they began, they might be endowing colleges by this time.

ASSAYING COBALT CAMP ORES.*

By F. F. Colcord.†

The ores from the Cobalt district are extremely varied, both in the metal contents and in the character of the gangue. Below are some typical analyses of ores from different parts of the district.

Ag.	Oz. per Ton.	SiO ₂ p.c.	Fe p.c.	CaO p.c.	As p.c.	Ni & Co p.c.
	300	4.0	4.0	5.0	55.0	14.1
	350	53.0	12.4	2.2	5.7	4.1
	400	46.1	5.8	4.0	6.2	....
	3,000	10.0	6.0	5.0	41.0	....
	3,000	28.3	....	21.7	2.4	....
	5,600	8.3	....	10.3	27.8	....

The one point of similarity in these ores is that on grinding and sifting, metallics remain on the sieve. These metallics, as a rule, contain about 70 per cent. of silver. In some ores large pieces of native silver are present. All this makes sampling an extremely difficult task. The method of sampling used is a form of the alternate shovel, combined with the coning and quartering method

Sampling.

The whole lot to be sampled is crushed and rolled to 0.25 in size and thoroughly mixed. It is then piled in a ridge about 30 ft. long, and again turned over and mixed. The ridge is then halved by alternately shovelling to either side, forming two parallel ridges, of which one is rejected and the other halved as before. This is continued until a 5,000- to 6,000-lb. sample is obtained. This sample is then coned and quartered to about 1,000 lb., which is put through the rolls until it all passes an 8-mesh sieve. If any metallics show on the sieve they are ground in a drug mill and mixed with the fines. The sample is next worked down to about 40 lb. with a Jones sampler, and sifted through 20-mesh. The metal-

* From the Engineering and Mining Journal.

† Chief chemist, American Smelting and Refining Co., Maurer, N.J.

lics, if any remain on the sieve, are ground and then thoroughly mixed with the fines. The 40-lb. sample is halved once with the sampler, one half being reserved and the other prepared for the final sampling by again sifting on a 20-mesh sieve and treating any metallics as before. The sample is then quartered down with the sampler to about 5 lb. and accurately weighed. The 5-lb. sample is sifted on an 80-mesh sieve, the oversize, consisting of ore and metallics remaining on the sieve, is ground for two hours in a pebble mill. After grinding, this portion is again sifted. The oversize is pounded in an iron mortar to free it from adhering fines and then sifted. The oversize (metallics) is weighed, mixed and divided into the requisite number of samples. The fines likewise are thoroughly mixed and divided.

All the rejected portions are again shovelled to the original ridge formation and the entire operation repeated three times. Thus four separate and distinct samplings are made of the lot from start to finish. The four samplings should agree within reasonable limits.

Assaying.

Two methods of assaying the fines are used according to the grade and character of the ore. The first method is usually applicable to ores under 400 oz. in silver and is as follows: Four $\frac{1}{2}$ A. T. portions are fused in F Denver crucibles with 200 grams to each charge of the following flux: Bicarbonate of soda, 10 parts; litharge, 20 parts; potassium carbonate, 3 parts; silica, 3 parts; borax glass, 4 parts. Enough reducing agent is added to each charge to reduce a 30-to 40-gram button. A cover of salt is used.

The lead button obtained is scorified once in a 2 $\frac{1}{2}$ -in. scorifier, cupelled and weighed as usual.

The second method for ores over 400 oz. in silver is a variation of the combination method for silver. Six to eight $\frac{1}{2}$ A. T. portions are weighed into 1000-c.c. beakers. The ore is covered with 100 c.c. of nitric acid and heated to boiling. The boiling is continued for 20 minutes or until decomposition is completed. When decomposed, 300 c.c. of water is added to each, the solution stirred and allowed to settle. The solution is filtered and residues washed. The residues thus obtained, containing most of the arsenic and only a small amount of the silver, are burned, scorified and cupelled as is customary. The silver in the filtrates is precipitated with salt solution, stirred, allowed to stand over night, and washed. The precipitates are burned, scorified and cupelled as usual. The special point is that the residues and the precipitated silver are run separately. The weights of the silver buttons from the residues are added to those obtained from the precipitation and their total reported.

The metallics are assayed by weighing six to 10 portions of 1-10 A. T. each into 2-in. scorifiers. They are mixed with 15 grams of test lead, two grams of

borax glass and silica (equal parts) and covered with 10 grams of test lead. They are then scorified and cupelled in the usual manner.

The final assay is calculated from the assays of the fines and the metallics according to their respective percentages in the ore.

THE CANADIAN ROCKIES.*

In point of area, if not as certainly in point of total volume above sea, the western mountains of North America constitute by far the greatest system of the earth. This vast region has always been very sparsely inhabited. In the orographic features it is generally complicated, often to the uttermost. Its exploration is only well begun. There are thus excellent reasons why the mountain units of this region are so inadequately named and systematized in geographical works, whether issued as official Government reports, as educational text-books, or atlases, or as popular records of travel. Yet, whether he will or no, the explorer responsible for a report on any part of this region must confront the question of names. He returns from his rugged field, to tell of his findings, must use common nouns to indicate what kinds of land-relief he has found, and proper names to aid in individualizing and locating those reliefs in the huge backbone of the continent.

This duty has fallen to the writer in the task of reporting on the geology of the mountains crossed by the 49th parallel boundary between Canada and the United States. Though the same transmontane section has been described by the geologists attached to the 1857-61 commission, though it occurs along the most thickly settled part of British Columbia, and though it is nowhere very far from the lines of two transcontinental railroads, a complete and systematic grouping of the mountains on the boundary was never been made. The difficulty of supplying the lack was felt by the writer in the first of five seasons devoted to the geology of the boundary, but the difficulty was more fully realized as the dire confusion of the nomenclature already in vogue became apparent.

It is manifest that any attempt to develop a constructive view of the boundary mountains should be founded as far as possible upon established units already understood and named. The literature has, therefore, been carefully searched to furnish this required foundation. The result has shown a truly surprising variety of usages in names and in concepts of the topography. The course of compilation inevitably led to the study of the nomenclature of western ranges even far away from the 49th parallel of latitude. Examples of the differences of usage are recorded in the first part of the following paper.

* Published by permission of the Canadian Commissioner, International Boundary Surveys.

The record may serve in some degree to illustrate the need of a consistent scheme of nomenclature, possibly to suggest partial grounds on which uniformity may some day be established.

The second part of this paper is concerned with a brief account of the nomenclature that seems most appropriate for the ranges crossed by the international boundary.

The search for the variations of nomenclature was made both among authorities responsible on the ground of priority and among authorities influential as standard compilers from original sources. For the present purpose of indicating the lack of uniformity and the confusion into which the great mass of the people may be led by consulting existing works of reference, it is not sufficient to record names found only in Government map or careful scientific monograph. Perhaps more important still in this connection is the record to be made from standard atlases, from school geographies, and from standard influential guide-books. In reality, it has required the examination of but a very limited number of each kind of authoritative works to point the moral. With few exceptions the only works consulted were printed in the English language.

The question of the best general title for the western mountains may be considered as trite by

those who do not feel the immediate need of its solution in their professional work. The writer by no means believes it to be trite, as he now completely realizes the wide latitude in naming among the recent influential publications dealing with North American geography. It is scarcely to the credit of our geographical societies and alpine clubs that they will publish at length the statement of one traveller that he found mosquitoes in Newfoundland, of another that his hotel accommodation in Manila was bad, and leave undiscussed the suggestive paper of Prof. Russell and his correspondents on the names of the larger geographical features of North America. There would be no advantage to the European geographers if the Alps masqueraded under a dozen different general titles dependent on the personal tastes of individual writers on those mountains.

(To be continued.)

COBALT SHIPMENTS DURING DECEMBER.

The Canadian Mining Review has been favored with the following detailed statement of Cobalt shipments during the month of December through the courtesy of the Minister of Public Works for the Province of Ontario.

Car No.	Init.	Weight.	Consignor.	Destination.	Date.
27200	G.T.	41,600	Nipissing Mine	New York	December 1.
27475	"	43,100	Nipissing Mine	New York	December 1.
13005	"	62,500	Trethewey Mine	Bergen Junc.	December 1.
5871	"	66,300	La Rose Mine	New York	December 2.
10274	"	60,000	Foster Mine	Bergen Junc.	December 5.
60501	L.V.	60,000	Coniagus Mine	Perth Amboy	December 7.
27082	G.T.	41,380	Nipissing Mine	New York	December 11.
60159	C.V.	60,020	Nipissing Mine	New York	December 11.
23039	G.T.	40,110	Coniagus Mine	Bergen Junc.	December 12.
28017	"	40,120	Nipissing Mine	New York	December 12.
29407	"	40,200	Nipissing Mine	New York	December 13.
26022	"	40,000	Buffalo Mine	Perth Amboy	December 13.
7066	Soo	43,540	Drummond Mine	Copper Cliff	December 13.
1840	N.D.	38,300	Kerr Lake Mine	Copper Cliff	December 13.
36164	C.P.	36,000	Kerr Lake Mine	Copper Cliff	December 13.
21870	G.T.	61,260	Nipissing Mine	New York	December 14.
10931	"	60,080	Nipissing Mine	New York	December 14.
616	C.R. & C.W.	103,530	O'Brien Mine	Copper Cliff	December 14.
21771	G.T.	5,850	Coniagus Mine	Toronto	December 14.
8013	"	60,000	Buffalo Mine	Perth Amboy	December 15.
9879	"	65,000	La Rose Mine	New York	December 15.
9700	"	66,520	Nipissing Mine	New York	December 17.
13960	"	60,830	Nipissing Mine	New York	December 17.
21368	"	56,490	Coniagus Mine	Perth Amboy	December 20.
14141	"	61,110	Nipissing Mine	New York	December 20.
11523	"	60,460	Nipissing Mine	New York	December 20.
14077	"	41,000	La Rose Mine	New York	December 21.
27933	"	46,100	Trethewey Mine	New York	December 21.
13261	"	63,610	Trethewey Mine	Bergen Junc.	December 21.
144182	C.P.	1,000	Silver Queen	Bergen Junc.	December 21.
18732	"	42,500	Right of Way Mine	Toronto	December 21.
43862	"	59,000	Right of Way Mine	Copper Cliff	December 21.
6871	G.T.	60,202	Nipissing Mine	Copper Cliff	December 21.
26357	"	40,451	Nipissing Mine	New York City	December 22.
12053	"	61,313	Nipissing Mine	New York City	December 22.
39734	C.P.	36,653	Drummond Mine	New York City	December 22.
56876	"	64,825	O'Brien Mine	Copper Cliff	December 22.
14639	G.T.	60,000	Buffalo Mine	Copper Cliff	December 26.
5849	"	60,000	O'Brien Mine	Perth Amboy	December 26.
				Bergen Junc.	December 31.

Shipments from Haileybury were nil.

THE WAY OF THE NORTH.

On the first day of the year the merry Cobalters held a dinner at the Cobalt Opera House.

Milton Carr was master of ceremonies and introduced the speaking by proposing toasts to King Edward and President Roosevelt, which were drunk while the appropriate national anthems were rendered. Dr. W. H. Drummond responded for "Our Country," W. H. Linney and C. F. Loring for "Our Guests," H. V. P. Adler and H. H. Lang for "The Mining Industry," and J. W. Osborne for "The Ladies."

After the repast the assembled guests broke into song, one of the contributions being an adaptation of new words to a well known air "The Good Old Summer Time."

A man named La Rose stubbed the end of his toes
On a rock he was blasting one day,
He said, "this is silver, I'll send it to Miller,
And get him to take an assay."
When Miller received it he scarcely believed it,
He cried, "This is surely sublime!"
So the mining commission got out an edition,
Describing Cobalt in its prime.

Chorus:

The good old summer time, the good old summer time,
Strolling up and down the hills, looking for a mine,
Searching for a calcite vein, or any other old sign,
And that's the way we spend our coin in the good old
summer time.

THE TRETHERWEY.

There are forty acres in the Trethewey property, but the development work to date has been done entirely on three veins and only about four acres of their holding have been prospected.

Six veins have been uncovered, and one of these, where practically no work has been done, has been traced and uncovered for 400 feet and has high silver values.

The early work at the Trethewey consisted of huge open cuts, and stoping. Stopping has been done on vein No. 1 to the east of the shaft for a distance of 45 feet and a depth of 50 feet.

This stope is about ten feet wide, and from it \$250,000 worth of ore has been removed. The distance between the foot and the hanging walls was between five and six feet, and a rich ore body here had a consistent width of from six to eight inches.

Since taking out this vein matter the stope has been widened five feet, as the silver shot wall rock was too valuable to leave in place. It is intended to take out still more of this country rock as it will continue to be profitable.

To the west of the shaft stoping was also done to a depth of twenty-five feet, and the ore from this stope and the open cut about seventy-five feet distant realized about \$200,000.

Vein No. 1, on which the shaft has been sunk, and where the above stoping and open-cut are, has been traced for several hundred feet. The shaft has reached a depth of 120 feet and drifting done at the fifty-foot and 100-foot levels.

The east drift at the former level is 160 feet long and to the west a distance has been reached of sixty feet. At the 100-foot level about fifty feet of drifting has been done.

Cross Cut Strikes Coniagas Vein.

At the fifty foot level a cross cut has been started to encounter two veins which have been located about sixty feet away on the surface. One of these is a continuation of the Coniagas vein "A," which runs almost into the corner of the present Trethewey office. The other is

within a few feet and nearer the line between the two properties.

Before the cut had been carried twenty feet a blind lead was encountered, and even in the cross-cut a little seam or calcite stringer was discovered, which is a most remarkable occurrence, and makes this part of the property look as if every crack were mineralized.

From the same fifty foot level there will be another cross-cut to the tunnel, from which rich ore was taken to the value of \$30,000. At the most, only about one acre has been thoroughly prospected, and to the north of where the above development has taken place there lies 1,000 feet at least, running the width of the location, so that it looks as if there was a long future for the mine.

Daily Assays Are Made.

Systematic daily assays are made of the ore taken out and records kept. The first class ore averages 2,000 oz. of silver to the ton. The second grade ore runs sometimes as high as 1,100 oz., but averages about 250 oz., and the screenings have to date shown the same value as the second grade ore. Even an assay is made of the dump twice a week. So far it has run about 16 oz. per ton.

Ninety men are at present employed, but with the completion of the buildings large additions to the force will be made. At present men are crowded together in the sorting-room. A large ore house and sorting rooms are being built behind the shaft house. When completed a crusher and a sampler will be installed and the ore will be sorted on three tables, each thirty feet long, being washed with warm water as the work is being done.

METALS.

The average price of metals during 1906 was as follows:

Silver—New York, 60,352 cents per oz. fine; London, 27,839 pence per oz., .925 fine.

Copper.—New York, electrolytic, 15.590 cents per lb.; Lake, 15.699 cents per lb.; London, £69.465 per ton of 2,240 lbs.

Tin.—New York, October price; latest quotation obtainable, 42.852c per lb.

Lead.—New York, October price; latest quotation obtainable, 5.750c per lb. London, the London average per ton of 2,240 lbs., was £19.350.

Spelter.—New York, October price, 6.222c per lb. London, £28.075 (Oct. price), per ton of 2,240 lbs.

IS MATTER ELECTRICITY?

Hitherto, that is to say, until the discovery of radium and its marvels, matter was considered as composed of atoms, and atoms, of course, were thought to be the smallest particles of matter. All this is now changed, as we have often pointed out, and the atom itself is now composed of much smaller particles called electrons, or corpuscles.

The corpuscle, we are now told, is in reality nothing but a disembodied electrical charge. A corpuscle contains nothing material. It is electricity. It is nothing else. Instead of speaking of the corpuscle we should speak of the electron. The electron is, then, a disembodied electrical charge, containing no matter, and is the term which will yet be employed to designate this ultimate unit of which all so-called matter is probably composed. And if the electron contains nothing that corresponds to our ordinary conception of matter, and since the same electron can be split off from atoms or from the molecules of all substances, the question naturally arises: Is not all so-called matter of an electrical nature?

This query, set forth by Dr. Harry C. Jones, Professor of Physical Chemistry, is answered boldly by him. There

is a large and increasing mass of evidence, says Professor Jones, warranting the belief that the line separating matter from electricity is on the point of disappearing. Indeed, this conclusion is accepted, at least tentatively, he says, by a considerable number of the leading physicists and physical chemists the world over.

This theory makes the electron—the corpuscle, as some prefer to call it—the ultimate unit of all matter. The atoms are made up of electrons or disembodied electrical charges in rapid motion. The atom of one elementary substance differs from the atom of another elementary substance only in the number and arrangement of electrons contained in it. Thus, we have at last the ultimate unit of matter, of which all forms of matter are composed. The remarkable circumstance is, says Professor Jones, that this ultimate unit of matter—of which all matter is composed—is not matter at all, as we ordinarily understand that term. It is electricity.

It cannot be too strongly insisted upon, Professor Jones is represented in Popular Science Siftings as saying, that matter is a pure hypothesis. What we know in the universe, and all that we know, is change in energy. In order to have something to which we can mentally attach the energy, we have created, in our imagination, matter. Matter, then, is a pure hypothesis. Energy is the only reality. We are accustomed to take exactly the opposite view and to regard matter as the reality and energy as hypothetical. But not only is matter a pure hypothesis, but we have not the least evidence for its existence, as we ordinarily understand the term. And it is interesting to note that Ostwald and Thomson have reached the same conclusion on a point of far-reaching importance in connection with any theory of matter that may finally prevail.

All atoms of whatsoever kind, if all that has preceded be correctly presented, are made up of electrons. Electrons are nothing but negative charges of electricity in rapid motion. In accepting this wonderfully simple and beautiful theory that the nature of all matter is essentially the same, we must not forget, proceeds Professor Jones, that the facts of chemistry and of physics have to be accounted for. We must remember that we have over seventy apparently different forms of matter which cannot be decomposed into anything simpler or into one another, by any agent known to man.

We must, to quote Dr. Jones, also remember that these elements of the chemist have each their definite and distinctive properties, both physical and chemical. They enter into combination with one another in perfectly distinctive ways and form compounds with definite and characteristic properties. In a word, we must remember the almost unlimited facts of chemical science, which are facts, regardless of whatever conception of the ultimate nature of the matter we may hold.

WHAT IS MEANT BY "ARTESIAN."

The significance of the term "artesian" is discussed with great care by Mr. Myron L. Fuller, of the United States Geological Survey in Water-Supply and Irrigation Paper No. 160. While there is considerable diversity of practice there is nevertheless a general tendency to give the term one or other of two meanings, and about fifty geologists throughout the country have expressed their willingness to accept any definition agreed on by the majority of active workers on underground-water problems.

Discussing the original use of the term artesian (as applied to flowing wells first observed in the town of Artois, France), the use of the word in recent scientific literature, in Europe, and the present scientific and popular use of the term in this country, Mr. Fuller makes clear that no definite meaning can be assigned to the word artesian in a publication unless a definition is given in the same paper. It is even found that the same writer employs it differently in the different publications.

The predominant scientific usage of the term is for all wells in which the water rises; in other words, for those

exhibiting the hydrostatic or artesian principle. In popular practice it is applied, in addition to the uses previously mentioned, to deep wells in general, especially those in rock, and to a certain extent to any drilled wells yielding water of good sanitary quality.

After discussing the arguments for these various uses, Mr. Fuller gives the following definitions which were agreed on by the members of the Division of Hydrology of the Survey as the most expedient at the present time

Artesian principle.—The artesian principle, which may be considered as identical with what is often known as the hydrostatic principle, is defined as the principle in virtue of which water confined in the materials of the earth's crust tends to rise to the level of the water surface at the highest point from which pressure is transmitted. Gas as an agent in causing the water to rise is expressly excluded from the definition.

Artesian pressure.—Artesian pressure is defined as the pressure exhibited by water confined in the earth's crust at a level lower than its static head.

Artesian water.—Artesian water is defined as that portion of the underground water which is under artesian pressure and will rise if encountered by a well or other passage affording an outlet.

Artesian system.—An artesian system is any combination of geologic structures, such as basins, planes, joints, faults etc., in which waters are confined under artesian pressure.

Artesian basin.—An artesian basin is defined as a basin of porous bedded rock in which, as a result of the synclinal structure the water is confined under artesian pressure.

Artesian slope.—An artesian slope is defined as a monoclinical slope of bedded rocks in which water is confined beneath relatively impervious covers owing to the obstruction to its downward passage by the pinching out of the porous beds, by their change from a pervious to an impervious character, by internal friction, or by dikes or other obstructions.

Artesian area.—An artesian area is an area underlain by water under artesian pressure

Artesian well.—An artesian well is any well in which the water rises under artesian pressure when encountered.

Mr. Francis F. Coleman, formerly with the Westinghouse and Allis-Chalmers companies and recently with the Traylor Engineering Co., has joined the Lidgerwood Mfg. Co. as publicity manager. Mr. Coleman takes to the service of the Lidgerwood Mfg. Co. not only a large amount of experience gained in the service of the companies mentioned but an interesting literary style acquired during many years of experience on the New York Sun and other metropolitan newspapers. Mr. Coleman was for a time the editor of the Electrical Age before the late Louis Cassier bought that publication. While with the Westinghouse Company he wrote the catalogue of the Westinghouse Steam Turbine. During his engagement with the Allis-Chalmers Company he designed and edited the new series of catalogues and bulletins which that company issues and wrote the two admirable special publications issued by the company in 1904-5, "The Book of the Four Powers" and "The Power of the Subway." During the existence of the Louisiana Purchase Exposition at St. Louis, Mr. Coleman was in charge of the three large exhibits there of the Allis-Chalmers Company, making his headquarters at the "Big Engine" in Machinery Hall. He was the organizer and first vice-president of the Machinery Club and was active in bringing about the organization of the United Exhibitors' Association at the fair. He is a member of the Technical Exhibitors' Association. Mr. Coleman's headquarters are at the main office of the Lidgerwood Mfg. Co., 96 Liberty street, New York, where he will be pleased to receive visits from both business office and editorial representatives of the trade and technical periodicals.

COPPER STATISTICS.

Messrs. James Lewis & Son say in their December report on copper:

"In the United States the scarcity of railroad cars in Montana and a flood in Arizona delays deliveries and the quotation for Lake has advanced $\frac{1}{2}$ cent per lb. and is now 23 to 23 $\frac{1}{4}$ cents, or £106 to £107 3s. per ton.

"Our statistics show that the consumption of England during the past eleven months has been only 248 tons more than the average of the same period during the two previous years, while the export of manufactured copper and sulphate is 11,090 tons less. The consumption of France has increased 4,512 tons, and that of foreign copper in Italy, Austria and Russia has decreased 6,530 tons, but in Germany the increase in ten months has been 16,364 tons. The total increased consumption of foreign copper in Europe and of manufactured copper exported from England, is, therefore, only 3,504 tons so far this year, as compared with the average of the same period in 1904 and 1905.

"The United States Geological Survey publishes the following statistics for the year 1905:—

	Tons.
Total domestic production	422,637
Imports	94,073
Exports	246,708
Consumption	259,378

"The increase in the production for 1906 is estimated at about 31,250 tons. Imports will show an increase of approximately 10,000 tons, and exports a decrease of 32,000 tons, making the consumption nearly 333,000 tons—an increase of 28 $\frac{1}{2}$ per cent. over 1905—assuming there is no change in the stock.

"Stocks in England and France and the 'visible supply' show a considerable increase—840 and 815 tons respectively. The former are now 50 per cent. larger than on the 1st January, when the price of Standard was 35 per cent. lower."

THE COBALT DISTRICT*.

If the visitor to Cobalt expects to find a mining camp, the streets of which are lined with gambling places, dance halls, and saloons, with rough characters carrying belts filled with cartridges, revolvers, and all the accessories of the early Western mining camps, he will be greatly disappointed. It is true that when the discoveries were first made in Cobalt, a few individuals appeared equipped to uphold their rights by the "law of the six-shooters," but in less than a week armament of all kinds disappeared, and the camp took on the orderly, quiet and law-respecting attitude it has ever since maintained. If gambling and drinking exist at all to-day they do so behind closed doors, and the visitor sees nothing to cause him to change his opinion with regard to the orderliness of the district.

The hotels furnish meeting places for all, and deals for property, passed claims, etc., are put through in the quietest manner.

When one remembers that previous to February, 1906, there were no buildings except a few log cabins, the rest of the people living in tents, he is naturally surprised to step from a Pullman car and register at a hotel, heated by steam and lighted by acetylene gas. In the hotels the beaver coat of the capitalist rubs against the "mackinaw" of the prospector and the moccasins and coonskin coat seen so frequently may belong to the man who has sold a claim for a fabulous price.

In all mining camps there exists a varied assemblage of men always searching for the precious metals, and Cobalt is no exception. Mining men from Rosslund, Alaska, South Africa, New Zealand, Colorado, Utah, Nevada, California, and every section of the world are there either on their own behalf or in the interests of capitalists. When the rush first started store-keepers, farmers,

business men and professional prospectors hurried to the scene and claims were soon staked and applied for. Then began squabbles and litigation over claims, some of which have not been settled to this day. The case concerning the Lawson controversy is very interesting, and will be described in a future issue of the Journal.

First Mineral Discovery.

The discovery of mineral wealth was primarily due to the advance of the railroad through the country. There seems to be a discrepancy with regard to the first discovery. The McKinley-Darragh people claim that the men laying ties discovered silver in the swamp adjoining the railroad, and on their present property, while others maintain that La Rose, a blacksmith employed by the railway, discovered the precious metal and filed the first claim. La Rose is one of the owners of the famous La Rose Mine, for which, it is rumored, \$10,000,000 has been offered and refused.

In other camps the miners are offered every opportunity to spend their hard-earned wages. In Cobalt the men live at the camps, and there is comparatively little opportunity to spend their money. It is the rule for companies to furnish board and lodging in comfortable quarters, and the wages paid include living expenses. The food at the camps is exceedingly good and in abundance. Wages range from \$1.75 to \$3.50 per day, depending upon the kind of work. Under these conditions the men fare very well. There is always a good demand for men owing to increasing development work in all the mines.

Possibilities of Claims.

The district as a whole is probably the most peculiar ever brought to the notice of mining engineers, investors, and the public. All claims have their element of interest, because, while there may be only enough showing of valuable mineral to warrant passing by the inspector, still no man can state, because of the peculiar conditions existing in this country, that there will be none at depth. This gives the "wild-cat" promoter a chance of which he has promptly availed himself, and the man who may have paid \$1,500 for his 20 or 40 acres, will calmly ask from \$50,000 to \$100,000 for it, and in many cases such prices were paid. The loss or profit to the buyer can only be decided by time and development.

The occurrence of the veins in Coleman township has been likened to the cracks on a dry mud flat. While the general trend seems to be northeast and southwest, still there are strikes having a north-south and also an east-west direction. Veins are liable to swell and pinch, twist and turn, and it is doubtful if there are many in the camp which have shown any marked continuity.

A vein existing strongly in one property may or may not continue in the adjoining claim, as is seen on the Lawson Lot. Here the vein shows up right to the surface at a width of from 6 to 12 in., but when it reaches the Silver Leaf boundary the vein branches out into stringers. To the south it pinches out, and fails to enter the Silver Nugget property so far as is known. And so it is too uncertain for anyone to try to predict or to lay down any rules for the district. Geologists have advanced theories only to have them upset in a short time.

The salvation of the camp is that rich mineral deposits are found in every direction. When we stop to consider that two men with practically no equipment, can work a vein no wider than 0.5 in., and realize more for their labor than they could at any trade, we can obtain some idea of the wealth contained in a vein from 4 to 12 in. in width. It is not uncommon to see rock running as high as 15,000 oz. of silver per ton, but, of course, this is by no means the run of the camp.

Production of the Camp.

A glance at the figures obtained by the Bureau of Mines of Ontario will give a more accurate idea of the actual wealth. In 1904 only 158 tons were shipped from the district. This shipment realized \$136,217 or \$862 per

*From the Engineering and Mining Journal.

ton. The following year returns show 2,144 tons, valued at \$1,473,196, or \$691 per ton. During the present year (1906) there have been shipped, from Jan. 1 to Sept. 30, 2,305 tons, the value of which was \$1,750,000. For October and November no values are available, but the tonnage is a matter of record. During these two months 1,864 tons were shipped to the smelters, and estimating their value according to existing data, we would find that the total shipments from the beginning of the camp to Nov. 30, 1906, amounted to 6,453 tons, valued at \$4,700,000, or \$729 per ton. This average price includes all ore shipped and does not show the high values of the first-grade ore.

The Nipissing Mines.

During the present time rumor is busy and one hears surprising reports from all quarters. The Nipissing Mine has been made the subject of more rumor than probably any other mine in the district. Since the announcement was made that the Guggenheims had decided to throw over their option reports were circulated that the mine had decreased in value owing to the pinching out of vein No. 49, that this vein had changed into antimony, that in sinking, slate had been encountered, that only thirty men were working on the property, that the title was to be revoked, and that a new attack was to be made on certain claims held by the Nipissing Company. These rumors were circulated by people who either knew nothing of the actual conditions existing at the mine or else were maliciously endeavoring to depress the stock. That this result was accomplished is evident to all. There is no doubt, whatever, that the mine, so far as has been shown, is in a healthy condition, and that values are apparent even to the lay mind. An inspection of the property, during the week ending Dec. 15, showed active mining operations and veins of great richness.

Vein 49, the vein that has been chiefly talked about, has been stripped for a distance of 110 ft., and broken down by underhand stoping to a depth of approximately 25 ft. The work has been done in three steps, and that valuable ore exists is apparent even without assay results. The vein is almost solid argentite, containing native silver and calcite, and the wall rocks contain a workable amount of leaf silver. The width of the vein appears to vary from about 20 in. to 48 in. At the bottom there was exposed a little decomposed calcite, but that the vein has changed materially in character, width or value may be emphatically denied.

There are from 175 to 180 men employed on the property, 75 of whom are on underground operations. A more detailed description of the property will be given in a subsequent issue.

HASTINGS (B.C.) EXPLORATION SYNDICATE, LIMITED.

DIRECTORS' REPORT.

The Directors beg to submit the eighth statement of accounts and balance sheet for the year ended 31st May, 1906. Shareholders will find in the Manager's advices an explanation of the short delay which has occurred on this occasion in the issue of the annual report.

The financial condition of the Company shows—Cash on hand at Bankers, London and Nelson, British Columbia, £3,032 7s. 7d. The administration expenses for the year, in London and British Columbia are substantially the same as those for the previous twelve months, but the cost of development work at the mines during the same period has increased to the extent of £777 17s. 1d., and this was incurred on the Arlington Group.

The ore shipped to the smelters during the year under review realized £10,070 5s. 8d. net, this compares with £10,099 16s. net in 1905. The returns show an increased output, but owing to the lower grade of ore, the average

value was nearly \$5 per ton less than that for the preceding year, otherwise the result would have been more advantageous.

From the carefully compiled statements furnished by Mr. Leslie Hill, the Company's local manager and consulting engineer in British Columbia, your Directors have extracted the following from the advices of 23rd of August, which they consider will be interesting to Shareholders:—

"Arlington Mine—

"During the year 1,470 feet of development work was done at the Arlington Mine, consisting of drifts 929 feet, crosscuts 47 feet, winzes 44 feet, and raises 450 feet. Of this work 369 feet was done on the 770-foot north level, 14 feet on the 500-foot north level, 101 feet on the head Arlington adit, and 986 feet on the No. 2 Prospect adit. The total cost of this development work was \$8,700.37, or an average cost of \$5.98 per foot.

"The 770-foot north level was continued for 224 feet, and the No. 2 Prospect adit was driven 428 feet, and these levels were connected by two raises. The vein between the No. 2 Prospect adit and the 770-foot north level formed a sag or roll, and an intermediate level was driven from the second upraise 113 feet north and 88 feet south. The shoots of ore found on the 770-foot north level continue to the intermediate level, and are from 2 to 6 inches thick, and occasionally thicker. In the south intermediate level the porphyry in the vein is distorted and irregular, and the ore is uncertain. The north intermediate drift looked very promising, but the ore became broken up and irregular. It has now widened out and become more solid and regular, there being two seams of ore,—that next the hanging wall being about 18 inches, and that next the porphyry about 30 inches thick.

"Some small seams of ore were met with in the No. 2 Prospect adit, but crosscutting on these failed to disclose any shoots of ore which can be stoped.

"The head Arlington level was driven 62 feet, and crosscuts aggregating 39 feet were driven. The vein is entirely cut off by the fault plane, and all the ore disclosed has been stoped out.

"The track from the head Arlington adit has been taken up and relaid in the old 365-foot level. Some high grade ore was left in the workings on this level, and I propose to follow this up and take out all ore which will pay for stoping.

"A new ore-bin was built at the No. 2 Prospect adit, and is now being used. An ore bin of three bents and with a capacity of 60 tons was built, together with a high trestle for dumping the waste. The cribbing was built with a view to enlarging the ore-bin, and four more bents will be added this season, making the total capacity about 140 tons. All the ore below the 770-foot level will be brought to this ore-bin.

"The ore shipped during the year was stoped chiefly from the ground below, or to the west of the 770-foot north level. Some ore which had been left in the upper workings was also followed up and stoped out, and now practically all the ore above the 770-foot level is stoped out.

"During the year 1,231.94 tons of ore were shipped to the Hall Mining and Smelting Company, at Nelson, which yielded net smelter returns amounting to \$52,352.90, and also a lead bounty amounting to \$382.43, was paid by the Government, making the total receipts \$52,735.33, or \$42.81 per ton. The average value of the ore sent to the smelter was \$4.94 per ton less than the average value of the ore shipped during the previous year.

"The cost per ton of ore shipped was as follows:—

Development	\$7.14
Stoping	11.08
Sorting and Trammig	4.56
Timbering .....	.14
Supplies	2.61
General Expenses	2.34

\$27.87

" 1,370 mine-cars of ore were taken out and 12,327 mine-cars of waste were put on the waste-dump; adding the waste broken and used to fill up the stopes, the average would be 10 tons of waste to one ton of ore, which would make the average cost of the rock mined \$2.53 per ton.

" The 770-foot north level has been driven to within a short distance of the boundary line of the Arlington claim. The No. 2 Prospect adit is in the 'Directorate' mineral claim, but if the ore continues it will be advisable to drive the 770-foot north level into and through the ground of the 'Canadian King' mineral claim, and to connect these levels in order to secure a supply of air. For this purpose I have obtained a lease of the latter claim for two years from the 1st of July, 1906, at a royalty of 10 per cent., direct from the 'Canadian King' Consolidated Mining Co.

" The ore body on the north intermediate drift has not been developed sufficiently to form an estimate of the amount of ore exposed, but if it continues to develop in length and width, and of equal thickness, the supply of ore for the coming winter is assured."

In a later letter Mr. Hill advises that the foreman at the mine had informed him the ore was still holding its own, and if anything improving, and says:—

" I delayed sending you the annual report in order to be able to give fuller information in regard to the ore in the north intermediate drift, as the shipments this year will depend principally upon the development of this shoot."

Nothing has been done during the year on any other of the mineral properties owned by the Company, but renewed activity is reported at the "North Star" mine, and there are rumors of a valuable discovery on the "Stem-winder" claim, both of which are adjacent to the Company's properties in the East Kootenay District, and any discoveries made by them are likely favorably to affect this Company's holdings there.

Blairmore Coal Lands.

The payment of the second instalment of the purchase price of these properties, due to the Dominion Government of Canada, has been completed, and all interest paid up to the 1st April, 1906; these absorbed £915 of the Company's funds. It will be necessary to provide a sum of about £1,300 for the third instalment, due in June, 1907, and a like amount for the final payment in 1908.

No satisfactory offers have been received for the properties, but your Directors are taking further steps toward negotiations, which they trust will lead to a satisfactory result.

In accordance with Clause 69 of the Articles of Association, Mr. G. L. Whately retires by rotation from the Board, and being eligible, offers himself for re-election as a Director.

By order of the Board,

E. HOLT,
Secretary.

163-4, Dashwood House,
New Broad Street,
London, E.C.

29th October, 1906.

Balance Sheet, 31st May, 1906.

Capital and Liabilities.

Capital Account—	£	s.	d.	£	s.	d.
Nominal	£100,000	0	0			
(100,000 shares of £1 each)						
Issued—						
60,375 shares of £1 each, fully called up ...		60,375	0	0		
Sundry creditors in British Columbia			780	18	11	
Carried forward			£61,155	18	11	

Assets and Expenditure.

	£	s.	d.	£	s.	d.
Purchase Account				3,500	0	0
Property Account—						
Mining Claims at East and West Kootenay, as per last Balance Sheet				10,481	6	3
Blairmore Coal Lands (expenditure in respect of interest in)				5,103	6	2
Plant, Machinery, Buildings, Live and Dead Stock				9,623	2	5
Sundry Debtors — British Columbia ..				278	1	7
Cash at Bank, London (Current Account)	319	3	1			
Cash at Bank, British Columbia (Deposit Account).	2,191	12	4			
Cash at Bank, British Columbia (Current Account)	517	17	2			
Cash in hand, London		3	15			
				3,032	7	7
Expenditure—						
Balance brought forward from last Balance Sheet, 31st May, 1905	23,338	16	5			
Expenditure (London) from 1st June, 1905, to 31st May, 1906 and (British Columbia) from 1st May, 1905, to 30th April, 1906:						
London Office Expenses ...	350	0	0			
Directors' Fees as voted ...	500	0	0			
Audit Fee, 1905 (London) ..	36	15	0			
Petty Cash, Stationery, Cablegrams and Legal Expenses (London)	69	7	2			
Income Tax	30	0	0			
Insurance, Accident and Fire (British Columbia)	160	10	2			
Government Ore Tax (British Columbia)	184	9	9			
Salaries in British Columbia and Nelson Office Expenses	1,571	10	7			
General Expenses (British Columbia) including £300 Bonus to Employees	285	3	9			
Development Expenses—						
Fort Steele Claims		15	17	0		
Arlington Group	6,575	9	7			
Head Arlington	148	14	2			
	33,266	13	7			
Deduct—Interest		96	3	0		
				33,170	10	7
Less Bullion Account, proceeds of Ore shipped to Smelters. . . .	10,622	19	8			
Deduct Expenses. . . .	664	5	8			
	9,958	14	0			
Lead Bounty. . . .	111	11	8			
				10,070	5	8
Dividend of 1s. per Share on 60,375 Shares (March, 1902)	3,018	15	0			
Do., (March, 1905)	3,018	15	0			
				6,037	10	0
				£61,155	18	11

JAS. HEAD, Chairman.
E. HOLT, Secretary.

Auditors' Certificate.

In accordance with the provisions of the Companies' Act, 1900, we certify that all our requirements as auditors have been complied with.

TINGLE, COMBER & Co.,
Chartered Accountants.

To the shareholders of the Hastings (British Columbia) Exploration Syndicate, Ltd.

Auditors' Report.

We have audited the above balance sheet, and, in our opinion, such balance sheet is properly drawn up so as to exhibit a true and correct view of the company's affairs, as shown by the books of the company.

TINGLE, COMBER & Co.,
Chartered Accountants.

110, Cannon street, London, E.C.,
23rd October, 1906.

GERMAN CONSUMPTION OF COPPER.

Messrs. L. Vogelstein & Co., 90-96 Wall street, New York, write: We herewith beg to give you the figures of German consumption of foreign copper for the months January to October, 1906, as compared with 1905:— Imports during October, 11,321 tons; exports during October, 946 tons; consumption, 10,375 tons. Imports of copper January to September, 99,230 tons; do. October 11,321 tons. Total 110,551 tons. Exports of copper January to September, 7,890 tons; do. October, 946 tons; total, 8,836 tons. Consumption of copper January to October, 1906, 101,715 tons; do. to October, 1905, 82, 215 tons. Out of the above 9,623 tons of copper were imported from the United States during the month of October.

THE MINING SHARE MARKET.

Messrs. Robert Meredith & Co., 57 St. Francois Xavier street, Montreal, have sent out a circular letter to their clients that contains some most timely information. They say:—

The Cobalt boom has undoubtedly been the most striking feature of the past year, centering on the remarkable advance and as remarkable decline in the price of Nipissing stock. The output of Cobalt for the year has been \$2,400,000, and the total capitalization of the Cobalt companies is \$250,000,000. The mineralized area, which at the beginning of the year was believed to be only about five square miles in extent, has now been proved to be nearly 100 miles square, and a great deal of development has been done with very good results, particularly in the case of certain privately owned properties, such as the Drummond, La Rose, Jacobs, Hudson Bay, Coniagas, University, etc.

We have advised, and still recommend, great caution and conservatism in dealing in Cobalt stocks. The old mining stock rule, that money paid for Treasury stock should go into the mine, and that not more than fifty per cent. of the total stock issue should go into promoters' hands does not seem to apply to many Cobalt propositions. At the same time, at current prices, some of the Cobalt stocks appear very attractive. The prices, dividends and yields of the principal Cobalt dividend payers are as follows:—

Name.	Capitaliza- tion.	Par Share.	Market Value.	Divi- dend.	Yield.
Nipissing ..	\$6,000,000	\$5.00	\$14.00	20 p.c.	7.14 p.c.
Trethewey ..	1,000,000	1.00	1.85	16	9.22
Silver Queen ..	1,500,000	1.00	1.95	20	10.26
Foster Cobalt ..	1,000,000	1.00	2.25	8	3.00

Interesting possibilities.

Green Meehan ..	1.40
Kerr Lake ..	5.25
Peterson Lake ..	.48
Red Rock ..	1.20
Right of Way ..	7.00
Silver Leaf ..	.18½
McKinley-Darragh-Savage	1.75

BRITISH COLUMBIA.

The formation of the Consolidated Mining and Smelting Company has put the Rossland Camp on its feet, and the continued prosperity of this mining district seems now assured. The high prices of copper and silver have made all the working mines in British Columbia highly prosperous this year, and Granby, Dominion Copper and B. C. Copper, and a number of smaller properties, have done well. We recommend purchases of Consolidated Mines, Canadian Gold Fields, Dominion and B. C. Copper as investments. The current prices, dividends and earning power of the dividend paying B. C. stocks are as follows:

Name.	Capitaliza- tion.	Par Share.	Market Value.	Divi- dend.	Yield.
Consol. Mines ..	\$4,698,800	\$100	\$145	10 p.c.	7 p.c.
Can. Gold Fields ..	600,000	.10	.08	7	8.75
Granby ..	13,363,030	100	135	12	8.89
Domin. Copper ..	5,000,000	10	7		
B. C. Copper ..	2,000,000	10	14		

Canadian Gold Fields is a very attractive stock to small investors. Its dividends are paid from the dividends on its holding of the Consolidated Mines, and its large holding of mineral lands gives it good speculative possibilities. The total production of gold, silver, lead and copper from British Columbia during the year has been \$26,000,000, an output that a few years ago would have been regarded as phenomenal.

There has been a renewal of interest in a number of the lower priced B. C. stocks, the demand coming mainly from the West. We look for a decided movement during the present year, and consider the following as being the most attractive:—

Capitaliza- tion.	Par Value.	Market Price.	Value at M'k. Price.
California ..	\$2,500,000	\$1.00	5½c. \$126,250
Monte Cristo ..	2,500,000	1.00	2½c. 62,500
Virginia ..	500,000	1.00	7½c. 375,000
Novelty ..	150,000	.10	.3c. 45,000
Ramb'r-Cariboo	1,000,000	1.00	.29c. 290,000

WESTERN COAL.

Several of the Western Coal Companies have come prominently to the front. The stock of the International Coal Company has doubled in value, and a dividend of 1 per cent. a quarter has been declared. A good deal of interest is also taken in Diamond Vale and Alberta Coal and Coke, and we feel inclined to advise purchasers of these stocks, particularly regarding the following:—

Capital.	Par Value.	Market Price.	Divi- dend.	Yield.
International Coal ..	\$3,000,000	\$1.00	.66	4 p.c. 5.93 p.c.
Diamond Vale ..	3,000,000	1.00	.30	
Alberta ..	3,500,000	1.00	.27½	

THE CHIBOUGAMAU.

During the year 1906, 200 prospectors made their way into the new Lake Chibougamau Mining District, north of Lake St. John, in the Province of Quebec, and new finds of rich gold, silver and copper ores have been made. The formation of the country, which has been gone into pretty thoroughly, seems to be one, that encourages the belief, that there is a large mineralized area and that quantities of rich minerals, in trace fissure veins, will be discovered. A quartz vein that has been proved to be 1,100 feet in length, from 40 to 80 feet in width, and which at a depth of 34 feet over the whole area of the bottom of the shaft, goes \$24 to the ton in fine gold, and 15 p.c. copper, has been opened up on Paint Island, and, together with a large deposit of very fine asbestos in the vicinity, is now the property of the Chibougamo Gold and Asbestos Mining Company, a close corporation, with a capital stock of \$6,000,000. Some other very rich strikes have been made in this district, and assays of \$24.00 and of \$28.00 to the ton from hand samples of ore, brought from this country, have been obtained. It is confidently expected that before

Parliament adjourns, subsidies that will ensure the building of a railway into this district will be granted. In all our long experience we have never known a more favorable outlook for the future than seems to be presented by these mineral discoveries, and we advise that due attention be given to legitimate mining propositions based upon them.

Yours truly,
R. MEREDITH & CO.

COBALT COMPANIES.

The Toronto Globe of January 3 contained a tabulated statement of all the Cobalt companies incorporated up to the close of 1906. In its introductory discussion of the subject the Globe said:—

Cobalt capitalized arrays itself in ciphers which almost defy comprehension. To talk of Cobalt capitalized is to talk of millions. Ontario has granted incorporation up to date to companies bearing an aggregate capitalization of \$171,148,000. Some of the best of the properties represented have been sold to the public at prices double or treble their capitalization. New York, Maine, Arizona and New Jersey have organized and are exploiting mining and exploration companies, and they all talk in millions. The market at present calls upon Cobalt to give returns on an estimated aggregate of \$250,000,000. Some of the companies originally incorporated on a modest basis have altered their figures from hundreds of thousands to millions, and the tendency always is towards inflated figures. People who have studied Cobalt at all carefully admit that the potentialities of the camp are great. It has been pronounced by disinterested expert mining men as the greatest silver camp on the globe. It is the great value of the silver deposits there that constitutes the greatest danger for the unthinking public. The exploiting of "wild cat" companies is a consequence. In the matter of investment the Canadian public must be its own best judge.

Some mining companies operating in Ontario under State incorporation have not complied with the Provincial requirements in taking out a license to do business here. Some of these companies assert that they are not legally required to do so, and the Provincial Secretary's Department is now giving the question of the standing of these alien combinations consideration that foreshadows the adoption of some course of action at an early date.

Companies Incorporated in 1903.

Temiskaming & Hudson's Bay Mining Co., Limited, New Liskeard\$ 25,000

Companies Incorporated in 1904.

Montreal & Boston Consolidated Mining & Smelting Co., Limited, Toronto 7,500,000
Nipissing Mining Company, Limited, Toronto. 250,000
Silver King Gold and Copper Co., Limited, Toronto. 2,000,000
Syndicate Mining, Limited, Toronto..... 50,000

Companies Incorporated in 1905.

Annie Mining Company, Limited, Toronto 40,000
Annabella Mining Company, Limited, Toronto.. 40,000
Buffalo Mining Company, Limited, Fort Erie.. 50,000
Blanche River Mining Company, Limited, New Liskeard 40,000
Coleman Development Company, Limited, Haileybury 300,000
Chester Silver Mining Company, Limited, New Liskeard 25,000
Cobalt Development Company, Limited, Toronto. 1,000,000
Cobalt Canadian Mining & Milling Co., Kingsville 500,000
Cobalt Merchants' Mining Company, Limited, Toronto 200,000
Coleman and Bucke Consolidated Cobalt Silver Mining Company, Limited, Ottawa 1,000,000

Coleman Cobalt Mining Company, Limited, Toronto 250,000
Dymond & Abitibi Mining & Development Co., Limited, New Liskeard 25,000
Dymond Development Co., Limited, Ottawa. ... 250,000
Gordon-Cobalt Silver Mining Co., Limited, Toronto 200,000
Imperial Silver Mining Company of New Liskeard, Limited, New Liskeard 250,000
Isa Mining Company, Limited, Toronto..... 40,000
Kerr Lake Mining Co., Limited, Toronto 40,000
Louise Mining Co., Limited, Toronto..... 40,000
McCormack Cobalt Silver Mining Co., of Toronto, Limited, Toronto 500,000
Mac Mining Co., Limited, Toronto 350,000
Margaret Mining Co., Limited, Toronto..... 40,000
New Liskeard & Northern Ontario Mining & Development Co., Limited, New Liskeard.. 25,000
New Ontario Ore Refining Company, Limited, Toronto 500,000
New Ontario, Cobalt & Silver Mining Co., Limited, Ottawa 1,000,000
Northern Exploration Co., Limited, Haileybury. 100,000
Ontario Cobalt Developing Co., Limited, Toronto. 350,000
Pittsburg Cobalt Co., Limited, Toronto..... 75,000
Rothschild Cobalt Co., Limited, Haileybury.... 500,000
Silver Five Mining Co., Limited, New Liskeard. 40,000
Sovereign Cobalt Mining Co., Limited, Toronto. 200,000
Silver Bar Mining Co., Limited, Ottawa..... 500,000
Savage Cobalt Silver Mining Co., Limited, Toronto. 250,000
Standard Silver & Cobalt Mining Co., Limited, New Liskeard 40,000
Sliver Hill Mining Co., Limited, Mattawa..... 50,000
Silver Gulch Mining & Prospecting Co., Cobalt. 75,000
Terrill Cobalt Mining Co., Limited, Sault Ste. Marie 100,000
Temiskaming Mining Co., Limited, Haileybury. 100,000
Temagami Mining & Milling Co., Limited, Toronto 40,000
Temiskaming Brokerage Co., Limited, New Liskeard 10,000
Temiskamingue Reduction Works, Limited, Cobalt. 166,000
Toronto Cobalt Mining Co., Limited, Toronto.. 300,000
Windsor & Cobalt Mining Co., Limited, Windsor 150,000
Wendigo Progressive Mining & Development Co., Limited, New Liskeard 40,000

Companies Incorporated in 1906.

Abitibi Mining & Development Co., Limited, Finch 100,000
Abitibi & Cobalt Mining Co., Limited, Sault Ste. Marie, Mich. 2,500,000
Argente Mining & Smelting Co., Limited, Toronto. 1,000,000
Albert Mining Co., Limited, Toronto. 375,000
American Silver King Mining Co., Limited, Haileybury 500,000
Amalgamated Cobalt Mines, Limited, Toronto.. 1,000,000
Buffalo Mines, Limited, Toronto..... 1,000,000
Beaver Silver Cobalt Mining Co., Limited, New Liskeard 500,000
B. B. Harlan & Co., Limited, Toronto 40,000
Boston Mines, Limited, Toronto..... 50,000
British American Silver Co., Limited, Toronto.. 50,000
Bailey Mining Co., Limited, Windsor 500,000
Canadian Cobalt & Silver Mining Co., Limited, Ottawa 250,000
Crown Mining Co., Limited, Leamington..... 1,000,000
Croesus Mining Co., Limited, Ottawa 500,000
Clark's Standard Developing Co., Limited, New Liskeard 40,000
Cobalt Silver Queen & Copper Mining Co., Limited, Sault Ste. Marie 500,000
Cobalt-North Ontario Mining Co., Limited, Haileybury 40,000

Cobalt Consolidated Mines, Cobalt	2,500,000	Mining and Lands Development Co., Limited, Toronto	40,000
Cobalt Open Call Mining Exchange, Limited, Cobalt	40,000	McKinley-Darragh-Savage Mines of Cobalt, Limited, Toronto	2,500,000
Cobalt Townsite Mining Co., Limited, North Bay	100,000	Montreal River Silver Syndicate, Limited, To- ronto	200,000
Cobalt Silver Queen, Limited, Cobalt.....	1,500,000	Mining Development and Securities Co., Limited, Toronto	150,000
Cross Lake Consolidated Mining & Milling Co., Limited, Toronto	1,000,000	York and Canadian Mining Co., Limited, To- ronto	40,000
Cobalt Chartered Co., Limited, Haileybury	350,000	Northern American Cobalt Refining Co., Limited, Hamilton	1,000,000
Cobalt & Hudson Bay Development Co., Limited, Haileybury	100,000	Norwalk Refining Co., Limited, Sault Ste. Marie	300,000
Cobalt Standard Mining Exchange, Limited, Cobalt	40,000	North Cobalt Land Corporation, Limited, To- ronto	40,000
Columbus Cobalt Silver Co., Limited, Toronto..	450,000	North Ontario Reduction and Refining Co., Limited, Toronto	500,000
Cobalt Smelting & Refining Co., Limited, To- ronto	250,000	National Mining and Developing Co., Limited, New Liskeard	40,000
Cobalt Nugget Silver, Limited, Haileybury	40,000	Nancy Helen Mines, Limited, Cobalt	500,000
Cobalt Central Silver Mining Co., Limited, New Liskeard	500,000	Ohio Cobalt Mining Co., Limited, Toronto.....	500,000
Clear Lake Mining Co., Limited, Toronto.....	650,000	Ottawa Cobalt and Silver Mining Co., Limited, Ottawa	250,000
Cobalt Diamond Drilling & Development Co., Limited, Toronto	50,000	Peterson Lake Silver Cobalt Mining Company, Limited, Toronto	3,000,000
Canada Mines, Limited, Toronto	100,000	Progress Cobalt Silver Mining Co., Limited, Cobalt	500,000
Canada Minerals, Limited, Toronto	100,000	Queen City Mining and Developing Co., Limited, Toronto	150,000
City of Cobalt Mining Co., Limited, Cobalt.....	500,000	Red Rock Silver Mining Co., Limited, Hailey- bury	1,000,000
Cleveland Cobalt Silver Mines, Limited, Toronto	1,000,000	Right of Way Mining Co., Limited, Ottawa	500,000
Colonial Mining Co., Limited, Cobalt.....	100,000	Rochester Mining Co., Limited, Toronto.....	40,000
Cobalt Diamond Drilling & Development Co., Limited, Toronto	50,000	Silver Leaf Mining Co., Limited, Toronto	5,000,000
Dwyer Mining Co., Limited, Toronto	100,000	Silver Star Mining Co., Limited, New Liskeard.	40,000
Detroit & Cobalt Development Co., Limited, Windsor	25,000	Savage Mine of Cobalt, Limited, Toronto	500,000
Dominion Cobalt Mining & Developing Co., Limited, Cobalt	450,000	Silverland Development Co., Limited, Toronto..	1,000,000
Detroit & Algoma Silver Mining Co., Limited, Windsor	100,000	Sterling Silver Cobalt Mining Co., Limited, Toronto	600,000
Eureka Silver Mining Co., Limited, New Liskeard	100,000	Silver City Mining Co., Limited, Toronto	350,000
Erie Cobalt Silver Mining Co., Limited, Toronto.	1,000,000	Silver Horn Mining Co., Limited, Toronto.....	50,000
Foster Cobalt Mining Co., Limited, Toronto....	1,000,000	Silver Bell Mining Co., Limited, North Bay....	250,000
Florence Mining Co., Limited, Toronto	100,000	Silver Cliff Mining Co., Limited, Ottawa	2,000,000
Findlay Mining Co., Limited, Windsor.....	20,000	Silver Cobalt Mining Co., Limited, Toronto.....	2,000,000
Gillies Silver Mining Co., Limited, Haileybury..	500,000	Silver Wonder Mining Co., Limited, Toronto ..	300,000
Green Silver Mining Co., Limited, Haileybury..	500,000	Silver Ledge, Limited, Toronto	20,000
Green Silver Mines Co., Limited, Toronto	300,000	Silver Crown Mining Co., Limited, North Bay...	500,000
Green Rock Mining Co., Limited, Sault Ste. Marie	600,000	Steep Rock Development Co., Limited, Fort Frances	150,000
Gilpin Silver Cobalt Mining Co., Limited, To- ronto	500,000	Sudbury Cobalt Mining Co., Limited, Sudbury..	300,000
Giant Silver Nugget Mines, Limited, Haileybury.	1,000,000	Soo-Cobalt Mining Co., Limited, Cobalt.....	50,000
German-Canadian Smelting & Refining Co., Limited, Toronto	1,000,000	Sasanga Mining Co., Limited, Cobalt	250,000
Gordon Benson Cobalt Mining Co., Limited, Sarnia	300,000	Silver Lion Mining and Developing Co., Limited, Cobalt	500,000
Golden Park Mining Company, Limited, Wind- sor	100,000	Temagami Silver Mining Co., Limited, Sturgeon Falls	150,000
Hudson Bay Extended, Limited, Toronto	50,000	Tarentoris Mining Co., Limited, Sault Ste. Marie	700,000
Hudson Cobalt Mining Company, Limited, Barrie	300,000	Temagami Iron Mining Co., Limited, Toronto..	40,000
Huronian Cobalt Silver Mining Company, Limited, Cobalt	500,000	Temiskaming Sterling Mining Co., Limited, Milberta	40,000
Heathcock Mining Company, Limited, Dresden.	100,000	Trethewey Silver Cobalt Mine, Limited, Toronto	1,000,000
Iroquois Cobalt Silver Mining Co., Limited, Haileybury	100,000	Twin Lake Mining Co., Limited, New Liskeard.	500,000
Interprovincial Mining Co., Limited, Haileybury.	1,500,000	Temiskaming Hematite Iron Co., Limited, To- ronto	42,000
International Cobalt and Silver Mining Co., Limited, Sault Ste. Marie	500,000	Two Lakes Lapper Mining Co., Limited, Sowerby	500,000
Jessie Fraser Copper Mining Co., Limited, Ni- agara Falls, Ont.	250,000	University Mines, Limited, Toronto	1,000,000
King Cobalt Mining Co., Limited, Toronto....	300,000	Violet Mining Co., Limited, Toronto	250,000
Long Lake Co., Limited, Cobalt.....	100,000	Williamson-Marks Mines, Limited, Toronto.....	300,000
Lawson Cobalt Silver Mining Co., Limited, Eganville	500,000	Windigo Lake Co., Limited, New Liskeard.....	50,000
Larder Lake Gold Mining Co., Limited, Hailey- bury	500,000	Wonderland Silver Mining Co., Limited, Wind- sor	250,000
McConnell and Prospectors' Exploration Co., Limited, Ottawa	200,000	Walstress Cobalt Silver Mining Co., Limited, Windsor	250,000
Montreal Cobalt Mining Co., Limited, Toronto..	100,000	Wendigon Silver and Copper Mining Co., Limited, Windsor	400,000
		Wabi Cobalt Silver Mining Co., Limited, Cobalt.	500,000
		Wright Silver Mining Co., Limited, Toronto...	200,000

Williams Copper Mining Co., Limited, Toronto.	100,000
Watts Mines, Limited, Toronto	1,000,000
Waterloo Mining Co., Limited, Berlin.....	200,000

Gazetted Since Nov. 1, 1906.

Golden Park Mining Co., Limited, Windsor	100,000
Colonial Mining Co., Limited, Cobalt.....	100,000
Waterloo Mining Co., Limited, Berlin	200,000
Bailey Mining Co., Limited, permission to increase capital, \$500,000 to	1,000,000
Heathcock Mining Co., Limited, Dresden	100,000
Larder Lake Gold Mining Co., Limited, Haileybury	500,000
Rochester-Cobalt Mines, Limited, Cobalt	1,000,000
New York Silver Mines, Limited, Toronto.....	1,000,000
Cobalt Portage Mines, Limited, Toronto	1,000,000
Manhattan Cobalt Mining Co., Limited, Toronto.	100,000
Little Nipissing Silver Cobalt Mining Co., Limited, Toronto	650,000
Victoria Silver Cobalt Mines, Limited, Toronto.	1,000,000
Cross Lake Consolidated Mining and Milling Co., Limited, permitted to increase capital from \$1,000,000 to	1,500,000
Green-Meehan Mining Co., Limited, Toronto....	2,500,000
Exploration Company of Canada, Limited, Toronto	100,000
North Cobalt Mining Co., Limited, Cobalt	50,000
Cobalt Native Silver Mining Co., Limited, Haileybury	500,000
Ruby Silver Mining & Developing Co., Limited, Hamilton	500,000
Hunter Cobalt Silver Mining Co., Limited, Ottawa	1,000,000
Nova Scotia Silver Cobalt Mining Co., Limited, Toronto	2,000,000
Cobalt Union Mines, Limited, Toronto	1,000,000
Douglas Mining Co., Limited, Toronto	500,000
Lorrain Mining Company, Limited, Toronto....	400,000
Cobalt & New Ontario Prospectors, Developers and Investors, Limited, Toronto	500,000
Empress Cobalt Silver Mining Co., Limited, Toronto	500,000
Temiskaming Mining Co., Limited, Toronto....	2,500,000
Forest Reserve Mining Co., Limited, Toronto..	100,000
Cobalt Annex Silver Mines, Limited, Haileybury.	500,000
Imperial Cobalt Silver Mining Co., Limited, Toronto	1,000,000
Edward Cobalt Mines, Limited, Toronto	100,000
Cobalt Smiley Mining Co., Limited, Toronto....	40,000
Cobalt Monarch Mining Co., Limited, Toronto.	1,000,000
Coin Silver Mining Co., Limited, Windsor	300,000
United Silver Co., Limited, Cobalt	1,000,000
Cobalt Electrical Development Co., Limited, Haileybury	500,000
Calumet Cobalt Mining Co., Limited, Haileybury	500,000
Esperanza-Cobalt Mines Co., Limited, Windsor.	1,000,000
Cobalt Silver Ores, Limited, Toronto	1,000,000
Latchford Silver Mining Co., Limited, Toronto.	100,000
Ross Cobalt Silver Mines Co., Limited, Cobalt..	1,500,000
Anima-Nipissing Silver Mines, Limited, Cobalt..	300,000
Cuyahoga Silver Cobalt Mines, Limited, Toronto	1,000,000
Coniagas Mines, Limited, St. Catharines	4,000,000
Southern Belle Cobalt Silver Mining Co., Limited, Cobalt	1,000,000
Northland Mining Co., Limited, London.....	250,000
British American Cobalt Mines, Limited, Toronto	3,000,000
Cobalt Bullion Mines, Limited, Haileybury....	1,000,000
Isa Mining Co., permitted to increase capital from \$40,000 to	1,000,000
St. Paul Cobalt Mining Co., Limited, Cobalt....	600,000
Dufferin Cobalt Silver Mining Co., Limited, Ottawa	1,000,000
Anthony Blum Gold Mines, Limited, Toronto....	100,000
Coleman & Quebec Mining Co., Limited, Ottawa	1,000,000
Algoma Custom Smelting & Refining Co., Limited, Sault Ste. Marie	250,000
Stellar Silver Cobalt Corporation, Limited, Sudbury	1,000,000

Old Chap Mining Co., Limited, Cobalt.....	1,000,000
Cobalt Silver Prince, Limited, Cobalt	1,000,000
Cobalt Silver Chief Mining, Limited, Toronto ..	600,000
Canadian Cobalt Corporation, Limited, Toronto.	1,000,000
Cobalt Merger, Limited, Toronto.....	3,000,000
Nepigon Mines Co., Limited, Toronto.....	5,000,000
Keewatin Silver Cobalt Mining Co., Limited, Toronto	1,000,000
Silverado Cobalt Mines, Limited, Cobalt	1,500,000
United States Cobalt Company, Limited, Toronto	3,000,000
Peerless Larder Lake Mines, Limited, Toronto..	1,000,000
Davis Silver Cobalt Mines, Limited, Toronto ..	2,000,000
Jury Copper Mines, Limited, Sault Ste. Marie..	1,000,000
Gold & Silver Mountain Mining Co., Limited, Cobalt	1,000,000
Burroughs Larder Lake Gold Mining Co., Limited, New Liskeard	500,000
Big Six Silver Cobalt Mines, Limited, Cobalt..	1,750,000
Brooks Hudson Silver Mining Co., Limited, Haileybury	500,000
St. Anthony Cobalt Mining Co., Limited, Haileybury	100,000
United Mines of Cobalt, Limited, Toronto	1,000,000
Trout Lake Cobalt Mining Co., Limited, Montreal	3,000,000
Campbell-Crawford Cobalt Silver Mining Co., Limited, Cobalt.	1,000,000
Cobalt Lake Mining Co., Limited, (not yet gazetted), Toronto (probably)	5,000,000

Companies Licensed.

The Pioneer Mining Co., Arizona.
 J. B. & J. C. Mining, Devel & Smelting, Illinois.
 Drummond Mines, Limited, Canada.
 Verona Mining Co., New Jersey.
 Northern Engineering & Supply Co., Canada.
 Manitou Mines Co., Arizona.
 Kerry Mining Co., New York.
 Consolidated Mining & Smelting, Canada.
 Arizona Cobalt Silver Co., Arizona.
 Cobalt Securities Co., New York.
 Can.-American Mining & Development Co., New York.
 Braddock Development Co., Oklahoma.
 Amalgamated Silver Mines, Maine.
 Olympia Gold Mining Co., Arizona.

BOOK REVIEWS.

Messrs. Hayden, Stone & Co., 25 Broad street, New York, have issued a pamphlet, "Record of Curb Transactions for the Year 1906." It is worth reading.

"Electrical Wiring and Construction Tables." by H. T. Horstmann and Victor H. Tousley comes in neat pocket size, with round corners. It contains hundreds of easy, up-to-date tables, covering everything on electric wiring. It is published by Frederick J. Drake & Co., 350-352 Wabash avenue, Chicago, at \$1.50 net.

"After Earthquake and Fire," has been published by the Mining and Scientific Press of San Francisco. It is a reprint of the articles and editorial comment appearing in that journal following the destruction of San Francisco on April 18th, 1906. Like everything that its talented editor, Mr. T. A. Rickard, pens, those articles and editorials, for which he is responsible, are well written. Several of the other contributions are also worth reading.

Y? is the title of a pamphlet issued by the Canadian Rand Drill Company, of Sherbrooke, P.Q., descriptive of the Little Giant drill which they manufacture. Why are these drills being used exclusively by the Grand Trunk Pacific; in Cobalt; at Niagara; on the C.P.R. track; at Quebec asbestos mines; in the Sudbury nickel district; in British Columbia and elsewhere? For an answer to these questions, you should apply to the before-mentioned company.

The Geological Survey of the State of Ohio has published a bibliography of Ohio geology.

Part 1, contains a subject index of the publications of the Geological Survey of Ohio, from its inception to and including Bulletin 8 of the fourth series, by Allis Greenwood Derby, B.P.H. and B.A.

Part 2, contains a bibliography of the publications relating to the geology of Ohio, other than those of the State Geological Survey by Mary Wilson Prosser.

The annual report of the Department of Indian Affairs for the year ending January 31st, 1906, has been issued. A perusal of this interesting volume shows that the Indians are increasing at the rate of about 2,000 a year; such increase being mostly in the older provinces, and the total gain would have been yet larger had it not been for the terrible mortalities in the Northwest provinces and beyond the treaty limits. There is no doubt that our Indians are gradually adapting themselves to civilized living, and those that have been longest in contact with white men, are, naturally, farthest on the road to safety.

A Compressed Air, issued by the Kobbe Company of 90-92 West Broadway, New York, contains in its issue for December, 1906, an extract of a paper read before the Engineers' Society of Pennsylvania by Mr. Lucius I. Wightman upon compressed air, which contains much information dealing not only with the past history of air compression, but with its present development. Mr. Wightman points out that high pressure compressors are no longer freak machines, unreliable and largely experimental. Increased use of air under high pressure urgently demand a solution of the problems involved, and the pneumatic engineer has been equal to the task.

PERSONALS.

Messrs James and J. K. L. Ross and F. L. Wanklyn have been visiting Cape Breton.

Sir Henry M. Pellatt has been appointed president of the Cobalt Lake Mining Company.

Mr. Rekeker, of H. B. Wills, Toronto, has returned from the Trethewey Mine in Cobalt.

Mr. D. C. Rochester has been appointed managing director of the Cobalt Lake Mining Company.

Mr. P. J. Flynn, of Cobalt, has been visiting Toronto in the interests of the Cobalt Central Mining Company.

Mr. J. W. Osborne, of the Standard Bank, has gone to Cobalt to take charge of the new branch being opened there.

Mr. Henry G. Adler has been appointed general manager of the Foster Cobalt mine in place of "Lucky Scott," resigned.

Mr. J. Eastwood, mine broker, of Toronto, has been visiting Cobalt. He inspected the Green-Meehan, Foster and Silver Leaf properties.

Mr. A. G. Browning, barrister, North Bay, has visited Toronto in connection with Silver Leaf business. He is the president of this company.

Mr. J. H. Stevens, retiring manager of the Silver Queen Mining Company, was given a dinner at North Bay recently, at which one hundred of his friends were present.

Mr. Frank C. Loring has resigned his position as general manager of the Trethewey Silver-Cobalt Mine, Limited, but he will remain with the mine as its consulting engineer.

Mr. H. Mortimer-Lamb, secretary of the Canadian Mining Institute, has been in Toronto arranging for the holding of the annual meeting of the Institute in that city next March.

Mr. Henry Roy, President of the Canadian Ore Refining Company, appeared recently before the Hull Town Council, in regard to the proposed establishment of a refinery at Hull.

Provincial Mineralogist Robertson, of British Columbia, has returned from a long journey through the northern parts of that province. He is very optimistic as to the future of the territory he visited.

Finance Minister Fielding, accompanied by Premier Murray, of Nova Scotia; Hon. Wm. Templeman, Mr. A. C. Ross, M.P. for Cape Breton; and B. F. Pearson, of Halifax, went to Cobalt on Jan. 7, on an inspection tour.

Among recent visitors to Cobalt Camp were Byron E. Walker and E. G. Jemmett, of the Canadian Bank of Commerce. They were accompanied by Mr. Cassels of the Yonge street branch of the bank, and Mr. Walker's son. The party visited the Nipissing, McKinley-Darrah, Buffalo, Jacobs and other prominent mines.

MINING NOTES.

The Imperial Coal Company, operating at Beersville, New Brunswick, are planning to establish a brick-making plant with a capacity of twenty thousand a day. Henry O'Neil, the New York dry goods magnate, is the president of the company.

The striking advances lately made in Canadian Pacific have led to many enquiries as to the reason. It is well-known that the company is making money, and that the ratio of expenses has been declining when there constantly is an increase in the cost of operation on American lines. But this cannot altogether account for the recent heavy investments in Canadian Pacific.

Information leads to the belief that this line has in anticipation a heavy increase in a most profitable form of traffic, and from a reliable authority it was learned that within seven months the road will be hauling iron ore in large quantities from the newly-discovered beds on the south shore of Lake Superior on Thunder Bay, not far from Port Arthur. An expert estimate is that by July next the road will be carrying perhaps 100,000 a month from Port Arthur to Quebec, and double that tonnage by the summer of 1908. What the Canadian Pacific will get out of it is more or less conjectural, but it is thought that it will not be less than \$1 a ton.

It is said that the firm of M. A. Hanna & Co., of Cleveland, will handle the ore taken from the Thunder Bay deposits, which fact will tend to give the enterprise a sort of international flavor. Ore shipped to Quebec will be put on to vessels at that port and transported to England, which is ready to receive all it can get. That country now obtains its iron ore from Norway and Sweden and Spain, having none of its own and being compelled to buy abroad.

In return for this ore England will ship coke back to Canada, the all-water route to be taken from Quebec to Thunder Bay, where a huge plant will be erected for the purpose of turning the ore into pig iron. It is the intention, also, to erect a steel plant at Port Arthur.

NEW BRUNSWICK.

Charles N. Crowe, of Nova Scotia, Arthur S. Basker, of London, England; C. J. Coster, J. H. A. L. Fairweather, and H. H. Brittain, of St. John, are applying for incorporation as the Canadian Antimony Co., Ltd., with a capitalization of \$250,000, with head offices at Lake George, York County, New Brunswick.

The company proposes to take over from C. Noble Crowe, Mine Manager of North Brookfield, Queens County, Nova Scotia, the option to purchase certain

lands and real estate acquired from the trustees of the Brunswick Antimony Company, and gold mining areas covering said lands, acquired from the Province of New Brunswick, and the option to purchase certain mineral and mining rights other than gold covering said lands, acquired from Mary Matilda McCallum, situate at Lake George, York County, province of New Brunswick, Canada.

ONTARIO.

Another attempt is being made to work the McGowan and Willcocks copper mines, near Parry Sound. McKeown & Co., Pittsburg capitalists, have taken an option, and are now at work opening up the mines. A year ago considerable gold and copper was taken out of the McGowan mine. The Willcocks mine contains considerable lower grade ore.

Work on the Atikokan Iron Co.'s plant is progressing very satisfactorily. When completed this blast furnace will be of immense value to this section of the country. The Canada Bridge Co., and the Canada Furnace Co. are both entirely through with their contracts and the L. S. Shiner Construction Co., of Cleveland, who have the contract for the installation of the coke ovens and roaster expect to finish up their work in about two weeks. Kelly & Co., of Minneapolis, the contractors for the steam and gas fittings, now have nearly a hundred men employed, the purpose to push their end being that the plant may go into operation next April.

The Larder Lake region is situated 75 miles north of Cobalt, and is within three miles of the Quebec boundary, being ten miles to the east of Temiskaming Railway. Prospectors, and there are dozens of them leaving Cobalt daily, it is asserted, have to cover the ground by means of snowshoes, but when the frost king has loosened up his grip the work of the voyageur will begin.

Starting from Temiskaming Lake he will steer his canoe up the Blanche River to Tomstown and an overland jaunt of six miles will bring him to the shores of Windego Lake, where is a stopping place at which his supply of provisions may be replenished. Continuing his trip up a claim of small lakes he will arrive at his goal after having made ten portages.

The decision of Messrs. J. S. and W. S. Kuhn, the Pittsburg millionaire mine-owners, to spend five millions in exploiting the copper mines of the Parry Sound district, as authoritatively announced lately, has drawn considerable attention to that comparatively new copper country. It is understood that the Kuhns will include the McGowan, Wilcox, and Spider Lake claims, Mr. Thomas A. Wood of Parry Sound, has been busy all summer, making tests, and demonstrating the wonderful value of the copper mines in the Parry Sound District, on behalf of the Kuhns. The opening of the Canadian Northern Railway between Toronto and Parry Sound town, has given a new impetus to the work. Again, the Parry Sounders are projecting a big smelter.

"Folks have been so busy with Cobalt," said a prominent mining man the other day, "that they haven't had time or inclination to investigate the resources of the province, in the matter of copper. With the growing demand for copper wire, and all kinds of copper utilities and utensils, the value of the mineral is soaring. I wouldn't be surprised if we have a big rush to the Parry Sound copper country shortly. Where there are big deposits of copper, it has frequently been shown that gold is also to be found in paying quantities."

Existence of copper in quantities has been known for years, but the difficulties of exploitation were too great for the Canadians. It remained for the Kuhns to see enough in the prospects of the Parry Sound District as a copper producer to put any amount of work and capital in it.

The McGowan mine is 140 acres in extent. From this mine a quantity of bornite or purple copper ore was taken, and the assay was over 60 p.c. copper. Three shafts

have been sunk on the McGowan, one on the incline, one straight down 140 feet, and another 300 feet. The Wilcox covers 160 acres and is six miles south of Parry Sound. There are three shafts on the property, 130, 30 and 20 feet deep, respectively. This is a producer of low grade, which assays about five to six per cent. copper. Adjoining to the west is the Spider Lake mine, and it carries practically a continuation of the Wilcox veins. A lot of development work is also taking place in the Moon River country, twelve miles south of Parry Sound.

The shipments forming the output of the silver-cobalt mines of the Cobalt region have recently been issued by the Ontario Bureau of Mines for the nine months ending September 30th last.

The cobalt, nickel and arsenic contents of the shipments are to some extent estimated, since the purchasers of ore in most cases pay nothing for these constituents, and no assays for them are made.

The fact remains, however, that for the nine months there has been shipped 2,542,827 ounces of silver, worth \$1,609,554, and in October 1,120 tons additional ore has been shipped. Averaging the price of this 1,120 tons at the same rate as for the 2,305 tons shipped in the preceding nine months it would come close on \$800,000, or, say, a total of \$2,400,000 in round figures for the ten months of 1906.

The figures for the Cobalt shipments are as follows:

	Quantity.	Value.
Ore mined, tons	3,198	
Ore shipped, tons	2,305	
Silver in ore shipped, ounces	2,542,827	\$1,609,554
Cobalt in ore shipped, tons	138	110,400
Nickel in ore shipped, tons.....	69	16,560
Arsenic in ore shipped, tons	691	13,830

Total for nine months\$1,750,344

The output of other metalliferous mines and works in Ontario, in addition to the Cobalt table, includes chiefly the nickel and copper from Sudbury and the iron ore of the Helen Mines. This is reckoned over again in the manufactured state as pig iron and steel. These items are, of course, increased by imported material.

The return for the nine months ending Sept. 30 follows:

	Quantity.	Value.
Gold, ounces	2,015	\$34,377
Silver, ounces	2,542,827	1,609,400
Cobalt, tons	138	110,400
Nickel, tons	8,037	2,856,223
Copper, tons	3,900	600,000
Iron ore, tons	93,159	117,466
Pig iron, tons	208,094	3,194,206
Steel, tons	123,257	3,059,070
Zinc, tons	300	4,500
Arsenic, tons	691	13,830

These figures show a considerable advance over those for the same period of 1905, and indicate that the production for 1906 will be much the largest of any year in the history of metalliferous mining in Ontario.

COBALT.

A carload of silver ore from the West End Mine, now known as Hanson Consolidated Mines, was shipped to Omaha on Dec. 27, from Port Arthur. The car represented \$15,000.

Cobalt mining suits are almost as numerous as Cobalt mosquitoes, or Cobalt nuggets—which shows, at least, that the camp is very much alive. There are few suits in "has been" camps.

The directors of the Coniagas Company are issuing a statement to shareholders, reporting progress. This company's output nets a profit of about \$100,000 per month, and if this continued, a dividend would be expected in March or April.

The New Liskeard Speaker repeats the denial of the directors of the Clark Standard that they have sold their property to an English syndicate for \$500,000. The story arose out of the fact that Messrs. Armstrong and Grills went to Toronto to negotiate a sale, but did not succeed.

Henry G. Adler has been appointed general manager of the Foster mine, to take the position recently filled by "Lucky" Scott. The new general manager was for three months in charge of the University mine. He is regarded as an excellent selection, having had considerable experience in that line in South Africa.

A proclamation from the Ontario Government was issued on Dec. 20, declaring the incorporation of Cobalt as a town. The nominations for the first municipal elections took place on Dec. 31, and the elections on Jan. 7. This action was taken by the Administration in consequence of a petition from the residents of the famous silver camp.

The Nipissing Mines Co. has declared a total of \$780,000 in dividends since its organization. In view of the fact that the company in its recent statement asserts that earnings will not be as large over the next three months as they have been since Sept. 1, and the fact that the principal vein, No. 49, has shown a decided decrease in values with depth, it can hardly be said that the quarterly dividend of 3 per cent. and 2 per cent. extra, declared this month was conservative.

On March 31st the Nipissing Mines Co. reported net earnings available for dividends at \$600,000, as compared with \$794,288 at present, an increase of \$194,288. Out of the \$794,288 reported, a dividend of 5 per cent., or \$300,000, is payable on Jan. 2, leaving a balance of \$494,288. Of course this balance will be increased by returns from now until the dividend of 5 per cent. is paid. It would seem, however, that the balance on hand after the payment of 5 per cent. to stockholders will not be much greater than reported nine months ago. As a result of the deterioration of the ore, operating expenses hereafter are more likely to show an increase than a decrease.

A contact of the Huronian with the Keewatin, dipping at an angle of about 25 degrees, occurs on the surface of the Trethewey near the open-cut west of the shaft house. This contact is next encountered in the shaft at a depth of about 60 feet. Predictions had been made that values would cease when the Huronian was reached. These have been shown to be false. The contact has long since been passed, and the shaft right on the vein sunk for a further depth of 60 feet wholly in the Huronian. The width and values of the vein have been steadily maintained. In a few days this contact will be struck again in the drift at the 100 foot level and will be followed from the Huronian into the Keewatin.

The discovery of a large body of low-grade ore at the 12-foot level on the Trethewey is regarded as a matter of importance by mining men. It is claimed that it goes far towards insuring the permanency of the Cobalt camp, and will afford profitable mining for years to come, without regard to the high-grade product which has made Cobalt famous. This low-grade ore will assay from 40 to 100 ounces to the ton, and its average value will be about \$30 to the ton. In quantity it is stated that nothing in the Cobalt district that will at all compare with it has as yet been uncovered. Quite a little quantity of native silver is scattered about in this low-grade ore. The discovery is of great importance to Trethewey, which has shipped \$500,000 of high-grade material since the property was first worked.

The Cobalt Lake Mining Company was organized in Toronto on December 27. The capitalization is \$5,000,000, divided into 5,000,000 one dollar shares. The issue of

treasury stock will total 400,000 to 600,000 shares, and these will be taken up by the shareholders, and not issued to the general public. The stock will be listed on the New York, Montreal, and Toronto stock exchanges. It is expected that the over-subscribers will take up all the treasury stock.

The election of directors resulted as follows: Sir H. M. Pellatt, president; George H. Henderson, Ottawa, vice-president; F. Latchford, Ottawa; H. S. Southam, Ottawa; John H. Avery, Detroit; D. B. Rochester, Ottawa; George E. Drummond, Montreal; Thomas Birkett, Ottawa; and Mr. Britton Osler.

A Cobalt despatch says: The Victoria Silver Cobalt Mines, Limited, has made a good strike on its property. It has 29 acres lying south of the Colonial, west of the King Edward, north of the Nova Scotia, and west of the Nipissing, and has been working the property for some weeks. Two shafts have been sunk in two different veins, each to a depth of 20 feet, and the quality of the ore body improves with depth. A large bunk house and cook camp have been built, and 26 men are now steadily employed. Nine veins have been uncovered, and test shafts will be sunk on each. Nickel bloom has been encountered in large quantity from the surface. The find was made a short distance from the Nova Scotia. Cross Lake mines are known to be rich, and veins are being worked on the four properties adjacent to the Victoria, by two steam hoists, a six-drill compressor, and two 60-horse power boilers have been ordered. Charles Giffard, formerly of Spokane, is superintendent; M. E. Deaguere, member of the New York Stock Exchange, is president; G. O. Van Ness, vice-president, and M. O. Gildersleeve, secretary.

The Ontario Government has accepted a tender for a bonus of \$178,500, in addition to a royalty of ten per cent. on the gross value of the ores mined, for the unalienated portion of the bed of Kerr Lake, in the Cobalt district, an area of twenty-three acres.

The successful tenderers are Messrs. C. E. Potter, general manager of the City Dairy Company, Toronto, and G. F. Ross, of Montreal, acting on behalf of themselves and a number of other people in both of these cities.

There were six other tenders, their respective amounts being \$176,000, \$132,000, \$122,200, \$105,050, \$101,000 and \$23,000.

The time for receiving tenders, which were accepted at the Lands, Forests and Mines Department, expired at one o'clock January 9.

When the tenders were opened and laid before the Cabinet, the members had no difficulty in deciding as to which should be accepted. All the tenders were devoid of any qualifications, adhering strictly to the form as laid down in the advertisement, being accompanied in every case by a marked cheque for ten per cent. of the amount of the tender.

The purchase of Cobalt Lake by a large and representative syndicate of Canadians for over a million dollars is a good answer to the Guggenheims. The personnel of the syndicate is so numerous that it almost resembles a popular subscription. It shows that Canadian confidence in the big camp is not only unshaken, but stronger than ever, and it will have a good effect. The slump which followed the Guggenheim stock-broking "knock" will be an advantage to both Cobalt and Canadians. It cooled the heads of the unreasoning investors and stock gamblers, and is now giving Canadians an opportunity to get their money up on really good investments at moderate values. Cobalt is just as good, or better, to-day than it was before the Guggenheims heard of it, but the evidence accumulates that there has been a systematic attempt to "bear" it for a purpose. That attempt has in a large measure failed. The latest feature of the campaign is the assertion that the rich surface values cannot possibly go deep. This chestnut has been in circulation ever since the first discovery was made and

has just as much reason behind it as the reverse proposition that the veins will get richer as they go down. There is only one answer to it. The only mine in Cobalt that has a shaft down over 300 feet is the Larose, and stock in the Larose cannot be bought for love or money.—Ottawa Citizen.

Control of the McKinley-Darragh-Savage Mines of Cobalt, Limited, has just passed into the hands of New York capitalists, the deal involving a consideration of \$3,750,000, which represents a few shares in excess of 1,250,000, half the authorized issue. The deal is one of the largest to be consummated since the first discovery of silver in the Cobalt district.

McKinley-Darragh-Savage is incorporated under the laws of Ontario at \$2,500,000, in shares of \$1 each. The officers and directors include F. B. Chapin, president; Thos. W. Finucane, vice-president; W. L. Thompson, treasurer; A. E. Osler, secretary; H. W. Sibley, J. S. Hunn and C. A. Masten. The head office is in Toronto.

The first discovery of silver was made at the Cobalt camp on this property. It was also the first lot to be surveyed. The company owns lot J. B. 1, consisting of 40 acres at the southerly end of Cobalt Lake, four acres being under water. They also own the property of the Savage Cobalt Silver Mining Company, Limited, consisting of 42 acres, acquired some months ago, in the Kerr Lake district. A claim in Bucke is said to be part of the company's holdings also. According to a mining engineer who was interviewed recently the outlook on this property is of an exceptionally high order. His statement is that on the main working the vein has dropped through the conglomerate into the diabase, a volcanic formation, which goes down deeper than it will ever be humanly possibly to mine. This assertion, if well substantiated, is of great importance to the future of the camp. Up to the date of consolidation, the mine has shipped \$160,000 worth of ore, and last July the new company shipped its first carload of forty tons. It has been shipping steadily since that time. There is said to be some five hundred tons of low-grade ore on the dump that average 100 ounces to the ton.

The decline in Nipissing shares has been responsible, says the Wall Street Journal, for many erroneous statements as to the treatment of Cobalt ores. It is true that these ores are refractory and difficult to treat, and that it is still an open question as to the best methods of treating them, but these difficulties have not prevented the winning of the full values. Cobalt ores run on an average of 40 per cent. arsenic, which is the chief obstacle in their proper treatment. The entire output of the Cobalt camp is now about 30 tons of ore per day. There is probably a loss of \$600 per ton in the treatment of the high-grade Cobalt ores in the smelting which naturally comes out of the producer. The smelters make no treatment charge. They buy the ores on the cars at Cobalt, allowing the producer 91 to 95 per cent. of the silver values in the ores. In addition, the shipper pays the freight and the sampling charge. Nine-tenths of all the ore shipped to Jersey City has been going to the Balbach smelter, and the ore has been sampled by Dr. Ladoux. Both shipper and smelter take his assays as final. It is understood that comparatively few shipments have been made to the American Smelting and Refining Co., but when the Guggenheims arranged to take over the Nipissing property they had prepared plans for building a smelter at Perth Amboy to treat the Cobalt ores exclusively.

The leading handler of Cobalt ores is the Canadian Copper Co., which is the operating company of the International Nickel Co. That company has built a smelter at Sudbury, Ont., with a capacity of ten tons per day to treat Cobalt ores exclusively. It has a secret process whereby it saves the cobalt and nickel from the ores. It has been giving better returns to the shippers than the Jersey City smelters, but many of the shippers prefer to ship to Jersey City than to Sudbury. It is apparent that

there is sufficient smelter capacity to treat the Cobalt ores now coming on the market, and that while they may be refractory in nature they are so rich in silver values that the producers can afford to stand the heavy losses that now occur in the present method of ore treatment.

According to Mr. Frank C. Loring, consulting engineer of the Trethewey Cobalt Mining Company, it would not be surprising if in 1907 the production of the camp were 20,000,000 ounces or more of silver. Unfortunately the mines receive no settlement for cobalt and nickel; should they do so the returns of the district would largely increase.

During the past season the area upon which ore has been discovered has widened materially, especially to the southeast of Kerr Lake, to the west of Cobalt and in the neighborhood of New Liskeard.

There is no doubt that the silver producing territory in the neighborhood of Cobalt will widen, but that other districts will be discovered in the region of the northeast and west.

Geological conditions at Cobalt repeat themselves many times, and although prospecting, owing to the carpet of underbrush, is difficult, it is only a question of time when there will be many rich mining districts developed in that region.

It has been the impression that all of the veins at Cobalt are simply gash veins and have no great extent either laterally or at depth. Although it is undoubtedly true that some great number of these veins may exist, many of them are limited in their extent and there is no doubt but that there are extensive systems of strong fault fissures, wherein the rich ore is simply an incident, and wherein there also exists other ore of a lower grade, but still of value. These fissures have much greater extent than have the ordinary gash veins, and so long as they exist the extent of the rich ore for a considerable distance, is more certain.

The Cobalt Lake Mining Company, which was organized on Dec. 27, with Sir Henry M. Pellatt as president, was relieved two days later from an injunction by Mr. Justice Mabee restraining the transfer of mining privileges by the trustees of the Cobalt Lake property to the new company. The injunction is dissolved, on the understanding that sufficient capital stock be left in the treasury to satisfy all claims of those who state they subscribed to the syndicate after the books closed. It reads as follows:—

“Upon the defendants, the Cobalt Lake Company, undertaking to retain in the treasury sufficient of the capital stock of the company for distribution among such persons as subscribed to the syndicate or syndicates in question after the closing of the books, if the plaintiff, or such persons is or are able to establish any rights by reason of such subscriptions, without prejudice to the plaintiff proceeding in this action for the recovery of damages for any of the alleged breaches of trust committed by the defendants or any of them, otherwise as the plaintiff may claim, it is ordered that the injunction be dissolved. Costs in the cause, unless otherwise ordered by the trial judge.”

BRITISH COLUMBIA.

The Northport smelter resumed operation during the last week of 1906. The intention at Le Roi mine, now that the smelter has resumed operation, is to increase the daily output of ore to about double what it is at present.

The supply of coke is increasing at Trail and during the week ending December 24, another copper furnace was blown in, making three in operation. It is anticipated that soon all of the five copper furnaces will be blown in and then the plant will be reducing 1,700 tons daily.

The smelters of Kootenay are overstocked with ore taken in during the coal strike at Crow's Nest. The Nelson smelter has half a million dollars in stock. The lead mines are negotiating with Everett, Ymir and Laplate, for they have nearly fifteen hundred tons of lead and concentrates.

Everett offers more favorable freight and treatment rates than either the C.P.R. smelter, Trail or Hall mines at Nelson, but now cars are unprocurable. Shipments from Krao, recently purchased by Butte capitalists, will be delayed. A big deal near Nelson will be shut out because American purchasers find themselves unable to ship.

In the shaft of the Grand Prize property located north of Rossland, a find of free gold has been made. One piece of ore is impregnated with free gold in nugget form. The extent of the find has not yet been determined, although the ledge is about four and a half feet in width. By many it is considered important, as it reveals that another section of the Trail coke division promises to develop valuable mines.

Information has been received in Rossland from the east that the officials of the Dominion Copper Company at a meeting held a few days ago in New York, were so well pleased with the work being done at the company's mines at Phoenix and at the smelter at Boundary Falls that it had been decided by the board to enlarge the smelting works with three more furnaces, giving the plant a total capacity of 3,400 tons of ore per day. With two furnaces now in commission and a third now being erected this will make six blast furnaces at this smelter. The improvements will cost in the neighborhood of \$150,000 and will be paid for from earnings. It will require the better part of 1907 probably to get the new furnaces installed.

E. A. Ritter, M.E., of Colorado, has returned from Cariboo. He is reported to have said:

"There are 28 different hydraulic mines working in the Cariboo district properly, around Barkerville. I have simply given the salient features of the more important to show that all the mines are working in old pre-glacial channels, different from the river beds of to-day. These channels are very much alike and the characteristics of the layers of sands and gravels, mixed with the big boulders scattered through the lower part of the bank are very uniform. These channels vary in width from 80 feet to 150 feet, and from 50 feet to 150 feet in height. The average values per cubic yard range from 5 cents or 6 cents to 40 cents. Almost all these mines wash from 10,000 to 100,000 yards annually.

"There is only the Hobson mine of the Consolidated Cariboo Hydraulic Company recently bought by the Guggenheim Exploration Company for \$1,500,000, which has a very large yardage washed to its credit. But this mine is really in the Quesnel mining division and not in the Cariboo. It has produced over \$1,250,000 in the past and is increasing tremendously its water supply, bringing from the railroad two steam shovels to dig ditches 22 miles long and 25 feet wide.

"The different sluice boxes of the various mines are paved with 8-inch riffle blocks; the width of the sluice flumes varies from 18 inches to 3 feet except at the Bear mine, where the two flumes are 4 feet and 6 feet wide, respectively.

"The past experience at the Bear mine is that 95 per cent. of the gold is recovered in the first 150 feet of the flumes. The same result is obtained at the Eight-Mile Lake mine. At the Waverley most of the gold stays in the ground-rock sluice, before reaching the flume and the same is true at China Creek. At the Bear, the Eight-Mile Lake and China Creek mines the gold is not very coarse and varies from fine gold to nuggets worth \$5 each. The average size of the nuggets is like a flaxseed; they are from 1½ to 5 cents in value. Stevens' Creek and Waverley recover coarser nuggets. The China Creek mine is the only one to have an undercurrent and this one has proved enough of a success to induce other mines to do likewise.

"There are several old channels not worked now, which promise good returns if properly equipped and managed. It is probable that during the next few years the Cariboo district will see several new mines opened up, equipped and worked successfully."

YUKON.

A Detroit despatch says that negotiations are being closed for the amalgamation of the Detroit-Yukon Mining Co., and the Canadian Klondike Co., with the Guggenheim Exploration Co., which means making them a part of one of the greatest mining syndicates in America. Since the companies were formed five years ago they have been accumulating gold-producing properties in the Canadian Yukon, until they now own 44½ square miles. Enough of exploring has been done to satisfy so eminent an authority as John Hays Hammond, the Guggenheims' chief engineer, that the land is exceedingly valuable. The Guggenheim Exploration Co. is a New Jersey corporation, formed in 1899, with \$17,000,000 capital, by Morris Guggenheim and his four sons.

COAL NOTES.

NOVA SCOTIA.

Shipments from the collieries of the Cumberland Railway and Coal Company for the month of December were 20,731 tons.

The approximate output of the Dominion Coal Company's mines for December was:—

No. 1.	
No. 2.	30,774
No. 3.	43,203
No. 4.	20,808
No. 5.	26,768
No. 6.	27,246
No. 7.	11,998
No. 8.	5,729
No. 9.	15,406
	24,777

Total 206,709

The approximate shipments for the same month were 130,968 tons.

The Dominion Iron and Steel Company claims \$15,000,000 from the Dominion Coal Company. The sum of \$400,000 is claimed for damages to the coke ovens, furnaces, loss of profits and increased cost of production up to 30th of November, 1906. The sum of \$68,580 is also claimed for the increased price of coal bought from outside sources, and actually delivered to the Steel Company up to the 30th November, 1906.

In addition to the above claim the Steel Company asks that the value of the ninety year contract to the Steel Company be assessed at the sum of \$15,000,000, and that the Coal Company be held liable to the Steel Company in that amount. The total amount of the claim is, therefore, \$15,468,580.

The statement of claim of the Steel Company against the Coal Company was delivered on January 8.

THE MINING AND INDUSTRIAL SHARE MARKET.

(Specially reported for the CANADIAN MINING REVIEW by
ROBERT MEREDITH & CO., Mining Brokers,
57 St. François Xavier St., Montreal.)

There is more interest being taken in mining stocks than for some time past, and it looks as if an active market in these securities is not far off.

In the western mines the feature is the strength and steady advance of the stocks of coal companies and the buying is chiefly by those at, or near the mines. Nearly all the companies are increasing their output and yet do not seem able to keep up with the demand. Some of the Cobalt companies' shares are coming into this market; the late wild trading in New York has spent itself, the volume is greatly reduced and transactions can be on a more reasonable basis.

Business in the industrial shares is still contracted, and the public appears to be leaving them alone. Prices are

irregular, and do not indicate intrinsic value, or the condition of the business.

The latest quotations are as follows:—

	Bid.	Asked.
Consolidated Mines...	140	145
Can. Gold Fields...	7	8
Granby Consolidated...	13½	14
Rembler-Cariboo...	28	33
North Star...	15	20
Monte Christo...	2	3
White Bear...	9	10½
California...		6
Virginia...	7½	12
Deer Trail...		2
International Coal...	62½	66
Sullivan...	8	10
Cariboo-McKinney...	3	5
Denoro...	10	13
Diamond Vale Coal...	30	35
Alberta Coal & Coke...	25½	30
Dominion Copper...	7¼	7¾
Novelty...	2	3
Nipissing...	13½	14
Foster...	2½	2¾
Silver Queen...	2¼	2¾
Tretheway...	1¾	2¾
Kerr Lake...	5¼	5¾
Silver Leaf...	25	28
Green Meehan...	17-16	1½
Peterson Lake...	47	51
Dominion Coal (com.)...	63	64
Dominion Coal (pref.)...		
Dominion Iron & Steel (com.)...	23¾	24
Dominion Iron & Steel (pref.)...	64½	66
Intercolonial Coal (com.)...		
Intercolonial Coal (pref.)...		
Nova Scotia Steel & Coal (com.)...	71	73
Nova Scotia Steel & Coal (pref.)...		

INDUSTRIAL NOTES.

We are in receipt of Mine and Quarry, volume 1, No. 3, which contains some useful papers. One on marble quarrying in Georgia, is lucid and well illustrated; another on Carbons or "black diamonds," gives a great deal of information as to the mining and marketing of this indispensable material. The reason for the high price of carbon is shown to be the increased demand, with a somewhat diminished production from the Brazilian placers.

Mine and Quarry is issued by the Sullivan Machinery Company, Railway Exchange Bldg., Chicago, Ill., and will be sent to any address upon request.

There is no more flattering endorsement of the excellence of the design and workmanship of a piece of apparatus than repeated orders for it received from a single purchaser. Allis-Chalmers Company's steam turbines and generators, although of comparatively recent introduction in this country, are now being built on the ninth successive order from a single consulting engineer of well-known standing, viz., Mr. Thos. E. Murray, of New York City, who has been instrumental in placing contracts for Allis-Chalmers turbo-generator sets, aggregating 26,000 k.w. in capacity at their normal rating.

The Power and Mining Machinery Company, of Cudahy (suburb of Milwaukee), Wis., in conjunction with The Snow Steam Pump Works of Buffalo, N.Y., has opened a new sales office at 719 White Building, Buffalo, where will be handled the several types of gas generating apparatus, such as the Loomis-Pettibone system, suction and pressure gas plants, built by the Power and Mining Machinery Company, and the Snow Gas engines, built by the Snow Steam Pump Works. Mr. Seward Babbitt, the sales manager of the first named concern, will make his headquarters at the Buffalo office, on account of the facility for conducting business from that point.

Commencing this new year, the firm name of W. H. C. Mussen & Co., railway, mining and contractors' supplies, becomes Mussen's, Limited, a joint stock company.

The change, which makes no difference in the personnel of the company, has been made in order to facilitate the handling of the business.

The company began business in 1901, and the growth has been very steady, until now it is one of the largest supply houses in Canada.

In 1905 a branch office was opened in Toronto, and subsequently in Vancouver and Winnipeg, and this year another branch office will be established in Quebec.

White Jacket Fuse, manufactured by Messrs. Beikford, Smith & Co., Ltd., is their latest invention and is the best fuse now on the market, being superior to the so-called gutta percha, single and double tape fuses. It stands twenty-four hours immersion in water, rough handling and rapid changes of climate and temperature.

The burning speed is very regular, it never runs, neither can the burning stop, as the new and perfected machinery by which it is made make it impossible for fuse to be shipped in which there is a break in the column. It never misses fire.

Messrs. Mussels, Limited, of Montreal, Toronto, Winnipeg and Vancouver are the agents in Canada.

The Canadian Westinghouse Co., Ltd., of Hamilton, Ontario, are distributing a descriptive pamphlet on "Type C Integrating Wattmeters." The returns for your service depend upon the reports of your meters. Westinghouse wattmeters have an unequalled record for accuracy in service and their registration is right at the start and remains right throughout the life of the instrument. The induction motor principle as the basis for its wattmeter design was first adopted by the Westinghouse Electric & Mfg. Company, and it is a significant fact that the original design, with the adoption of such minor changes as years of actual service have demonstrated to be desirable, has remained substantially the same and has so conclusively proved its superiority that its elements have been incorporated in all the successful instruments on the market. The type C wattmeter is the latest and most improved form but its difference from the earlier type is only in degree of development.

The new plant of the Iola Portland Cement Company at Dallas, Texas, is notable for the fact that it will have the largest producer gas power installation in the world. At other plants of the Iola Company, both gas engines and steam engines have been employed, so that in selecting the type of prime mover for their new plant, it was with a knowledge of the capabilities of the respective powers, and their decision was influenced by the saving in fuel consumption that was possible by the adoption of gas for power purposes.

The Loomis-Pettibone gas generating system, built by the Power and Mining Machinery Company, will be furnished in three units having a total capacity of 4,500 H.P. Bituminous coal and Texas lignite will be the fuels used, the Loomis-Pettibone system being adapted to the gasification of either fuel without changes in the apparatus, and the resultant gas is guaranteed to be fixed, clean and suitable for use in gas engines.

The Snow Steam Pump Works, of Buffalo, will furnish for this plant, four of their single-tandem double-acting gas engines, each with a normal capacity of 1,100 B.H.P. These engines will be directly connected to alternating-current 25-cycle electric generators of 819 K.W. capacity each, and will operate in parallel.

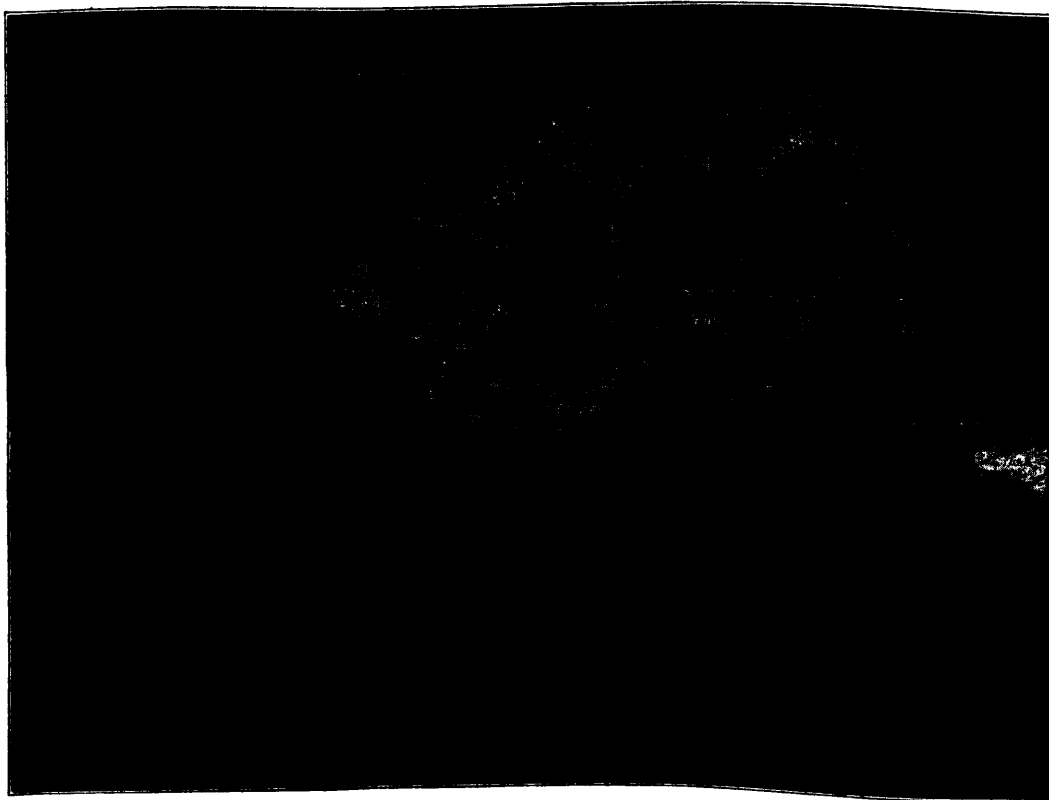
Continuous operation, twenty-four hours per day, seven days per week, is required of the power plant.

High efficiency is promised by the builders of the power apparatus, and their guarantees of a kilowatt per hour at the switchboard from 1½ to 1¾ lbs. of bituminous coal or from 2½ lbs. of lignite, when operating at three-quarters to full load, assures the Cement Company of cheap power.

INDUCTION MOTORS.

An admirable example of the application of electricity to mining and manufacturing is at Copper Cliff, Ont. There the enormous plant of the Canadian Copper Company is operated by electricity generated by the Huronian Power Company at Turbine on the Spanish River 25 miles away. Among the different uses to which electric power is now put is to drive blowing engines for facilitat-

skilled operators, with the least amount of care and attention. The motor is fitted with ground steel working parts throughout, and the transmission gear runs in an oil filled case. These hoists are built in capacities from 1,000 to 10,000 pounds, and are giving splendid satisfaction wherever they are in use. Further particulars and quotations will be given on application to the nearest office of the company.



A 600 h. p. Allis-Chalmers-Bullock Induction Motor driving a Blowing Engine at the Canadian Copper Co.'s Smelter, Copper Cliff, Ont.

ing the work of smelting. The illustration shows one of these 70 x 70 x 42 blowing engines driven by a 600 h.p. variable speed induction motor built by Allis-Chalmers-Bullock, Limited, Montreal. Additional induction motors built by the same firm are used for operating air compressors, pumps, cranes and other services in connection with the smelting works.

THE "IMPERIAL" MOTOR HOIST.

The "Imperial" Motor Hoist, manufactured by the Canadian Rand Drill Co., of Montreal, is designed for use in foundries and machine shops where the handling of flasks and the erection of machinery requires smoothness of action and accuracy of control. Simple in design and operation, moderate in weight and of small outside dimensions, it is especially suitable for shops where head room is limited.

The hoist consists of one of our high pressure, three-cylinder motors geared to a hoisting drum provided with lifting rope and hook. The controlling valve is positive in action and accurately controlled. An exclusive feature is the automatic lock which holds the load in any position without the use of a brake, and prevents it lowering if anything happens to the air supply.

Special attention has been paid to producing a machine which will stand the hardest usage at the hands of un-

MINING INCORPORATIONS.

ONTARIO.

Anthony Blum Gold Mines, Ltd. Capital, \$100,000, divided into ten thousand shares of ten dollars each. Head office, Toronto. Provisional directors: J. G. Shaw, Joseph Montgomery and James Graham, all of Toronto.

The Old Chap Mining Company, Ltd. Capital, \$1,000,000, divided into one million shares of one dollar each. Head office, Cobalt, Ont. Provisional directors: W. H. Francis, F. W. Libbey, R. G. Coan, all of Cobalt.

United Mines of Cobalt, Ltd. Capital, \$1,000,000, divided into one million shares of one dollar each. Head office, Toronto, Ont. Provisional directors: C. L. Dunbar, Guelph, Ont.; H. T. Smith and I. S. Fairty, Toronto.

Stellar Silver Cobalt Corporation, Ltd. Capital, \$1,000,000, divided into one million shares of one dollar each. Head office, Sudbury, Ont. Provisional directors: J. F. Black, J. H. Morin and Chas. McCrea, all of Sudbury, Ont.

The St. Paul Cobalt Mines Company, Ltd. Capital, \$600,000, divided into six hundred thousand shares of one dollar each. Head office, Cobalt, Ont. Provisional directors: A. G. Terrill, S. F. Nelson and Homer Gibson, all of Cobalt.

Keewatin Silver Cobalt Mining Company, Ltd. Capital, \$1,000,000, divided into one million shares of one dollar each. Head office, Toronto, Ont. Provisional directors: J. G. Shaw, J. Montgomery and W. R. Williams, all of Toronto.

The Kerr Lake Lawson Mining Company, Ltd. Capital, \$1,500,000, divided into one million five hundred thousand shares of one dollar each. Head office, Cobalt, Ont. Provisional directors: Walter Lawson, of Renfrew, Ont., and Wm. Fred. Powell and Robert Taylor Shillington, of Ottawa, Ont.

The Big Six Silver Cobalt Mines, Ltd. Capital, \$1,750,000, divided into one million seven hundred and fifty thousand shares of one dollar each. Provisional directors: W. H. Gates, W. D. Gregory and H. F. Gooderham, all of Toronto, Ont.

Calumet Cobalt Mining Company, Ltd. Capital, \$500,000, divided into five hundred thousand shares of one dollar each. Head office, Haileybury, Ont. Provisional directors: James Francis Gillies, Haileybury, Ont.; John McKay, Sault Ste. Marie, Ont., and John Francis Hope McCarthy, Toronto.

Larder Lake Gold Mining Company, Ltd. Capital, \$500,000, divided into five hundred thousand shares of one dollar each. Provisional directors: S. Read, the Younger, J. E. Whyte, D. Stewart, S. Greenwood, A. P. Morissette, all of Liskeard, Ont.

Peerless Larder Lake Mines, Ltd. Capital, \$1,000,000, divided into one million shares of one dollar each. Head office, Toronto. Provisional directors: F. Hicks, Duluth, Minn.; W. F. Thomson, W. G. Thomson, J. Moffatt and C. B. Jackes, all of Toronto.

Ore Contracting Company, Ltd. Capital, \$40,000, divided into four hundred shares of one hundred dollars each. Head office, Bessemer, Ont. Provisional directors: G. W. Wallace, Detroit, Mich.; H. B. Sturtevant, Delevan, Wis.; Frank Pottage, Toronto.

The Cuyahoga Silver Cobalt Mines, Ltd. Capital, \$1,000,000, divided into one million shares of one dollar each. Head office, Toronto, Ont. Provisional directors: Harry Sydney Pritchard, Frederic Watt and Frederic Clarence Jarvis, all of Toronto.

Anthony Cobalt Mining Company, Ltd. Capital, \$1,000,000, divided into one million shares of one dollar each. Head office, Haileybury, Ont. Provisional directors: R. J. Rowell, W. P. Wilkins, W. J. Quinn, F. W. Bowie and F. A. Day, Haileybury, Ont.

Davis Silver Cobalt Mines, Ltd. Capital, \$1,000,000, divided into one million shares of one dollar each. Head office, Toronto, Ont. Provisional directors: G. W. Kenyon, G. A. Stanton, G. G. T. Silsby, of Brooklyn, N.Y.; W. S. Silsby, of New York.

The Gold and Silver Mountain Mine, Ltd. Capital, \$1,000,000, divided into one million shares of one dollar each. Head office, Cobalt, Ont. Provisional directors: D. H. McAndrew, R. Russell, C. N. Roberts, J. D. McDonald, Thos. Logan, all, of Renfrew, Ont.

The Coniagas Mines, Ltd. Capital, \$4,000,000, divided into eight hundred thousand shares of five dollars each. Head office, St. Catharines, Ont. Provisional directors: Henry Smith Osler, John Francis Hope McCarthy and James Miller Ewing, all of Toronto.

Anima-Nipissing Silver Mines, Ltd. Capital, \$300,000, divided into three hundred thousand shares of one dollar each. Head office, Cobalt, Ont. Provisional directors: William Black, Sudbury, Ont.; Lewis Elwood Hambly and John Knox Leslie, both of Toronto.

Latchford Silver Mining Company, Ltd. Capital, \$100,000, divided into one hundred thousand shares of one dollar each. Head office, Toronto, Ont. Provisional directors: Percival John Montague, Robert Francis Wilks and Francis Pottage, all of Toronto.

Cobalt Silver Mines Company, Ltd. Capital, \$1,500,000, divided into one million five hundred thousand shares of one dollar each. Head office, Cobalt, Ont. Provisional directors: Daniel Ford, Walter Tylee Ross, of Montreal, and Phillip O'Reilly, of Ottawa, Ont.

The Jury Copper Mines, Ltd. Capital, \$1,000,000, divided into one million shares of one dollar each. Head office, Sault Ste. Marie, Ont. Provisional directors: C. R. Shaw, C. H. Williams, O. B. Jury, S. G. Stone and J. A. McPhail, all of Sault Ste. Marie, Ont.

The Southern Belle Cobalt Silver Mining Company, Ltd. Capital, \$1,000,000, divided into one million shares of one dollar each. Head office, Cobalt, Ont. Provisional directors: Thomas Langton the Younger, Michael John O'Neil and John Martin, all of Cobalt.

The Silverado Cobalt Mines, Ltd. Capital, \$1,500,000, divided into one million five hundred thousand shares of one dollar each. Head office, Cobalt, Ont. Provisional directors: A. S. Galosha, H. Wallace, P. J. Finlan, H. H. Lang and W. E. Running, all of Cobalt.

Casey Cobalt Silver Mining Company, Ltd. Capital, \$1,000,000, divided into one hundred thousand shares of one dollar each. Head office, Haileybury, Ont. Provisional directors: Frank Pottage, George Henry Schakleton and Bessie Mabel Cook, all of Toronto.

The Trout Lake Cobalt Mining Company, of Montreal, Ltd. Capital, \$3,000,000, divided into three millions shares of one dollar each. Head office, Ottawa, Ont. Provisional directors: A. C. Brown, B. Burland, J. R. Wright, F. F. Parkins and A. C. Porteous, all of Montreal.

Cobalt Chief Silver Mine, Ltd. Capital, \$600,000, divided into six hundred thousand shares of one dollar each. Head office, Toronto, Ont. Provisional directors: E. L. Bradley, John W. McDonald, Gertrude E. Cherpan, G. J. Valin and Thomas Brown, all of Toronto.

Nipissing Copper and Silver Company, Ltd. Capital, \$3,500,000, divided into three million five hundred thousand shares of one dollar each. Head office, Toronto, Ont. Provisional directors: Fred. Asa Hall, Samuel Hugh Bradford and Solomon Joseph Marshalleck, all of Toronto.

Cobalt Silver Prince, Ltd. Capital, \$1,000,000, divided into one million shares of one dollar each. Head office, Cobalt, Ont. Provisional directors: S. D. Maddin, Cobalt, Ont.; D. Crawford and H. Campbell, New Liskeard, Ont.; H. H. Lang, Ottawa; Matthew Finn, Detroit, Mich.

The Lake Abitibi Gold Mining Company, Ltd. Capital, \$200,000, divided into two thousand shares of one hundred dollars each. Head office, Toronto, Ont. Provisional directors: John Redmond Meredith, Matthew Crooks Cameron and Robert Stanley Waldie, all of Toronto.

Coleman and Quebec Mining Company, Ltd. Capital, \$1,000,000, divided into one million shares of one dollar each. Head office, Ottawa. Provisional directors: Daniel O'Connor the Younger, Robert Masson, J. Wilson, Adam Tozeland Shillington and J. Ogle Carss, all of Ottawa.

Cobalt Silver Ores, Ltd. Capital, \$1,000,000, divided into one million shares of one dollar each. Head office, Toronto, Ont. Provisional directors: James Russell Lovett Starr, James Houston Spence, Lilian Murray Heal, Ida May Duncan and Ida Agnes Rogers, all of Toronto.

Campbell-Crawford Cobalt Silver Mining Company, Ltd. Capital, \$1,000,000, divided into one million shares of one dollar each. Provisional directors: M. Finn, Detroit, Mich.; D. Crawford and H. Campbell, Liskeard, Ont.; Eustace Craven Bowman, Detroit, H. H. Lang, Cobalt, Ont.

The Dufferin Cobalt Silver Mines Company, Ltd. Capital, \$1,000,000, divided into one million shares of one dollar each. Head office, Ottawa, Ont. Provisional directors: R. A. Helmer, J. E. Hutcheson, Ernest Arthur Larmouth, George Harold Craig and F. H. Honeywell, all of Ottawa.

Northland Mining Company, Ltd. Capital, \$250,000, divided into two thousand five hundred shares of one hundred dollars each. Head office, London, Ont. Provisional directors: T. H. Smallman, John Smallman, Geo. Henry Ronalds Harris, and Emilia Archange Harris, all of London.

British American Cobalt Mines, Ltd. Capital, \$3,000,000, divided into three million shares of one dollar each. Head office, Toronto, Ont. Provisional directors: John Black, Cobalt; A. G. Fowler Ross, Montreal; Ziba Gallagher, Ethel Maud Wilson and J. S. Booth, all of Toronto.

Cobalt Bullion Mines, Ltd. Capital, \$1,000,000, divided into one million shares of one dollar each. Head office, Haileybury, Ont. Provisional directors: A. T. Budd, Haileybury; H. P. Glidden, Cobalt; John MacKay, Renfrew; P. J. Montague and Frank Pottage, both of Toronto.

Penn Cobalt Mining Company, Ltd. Capital, \$500,000, divided into five hundred thousand shares of one dollar each. Head office, Toronto, Ont. Provisional directors: James Edward Day, Edward Vincent O'Sullivan, Mary Donevan, Harry Jewell and James Henry Hallett, all of Toronto.

Banner Cobalt Mining Company, Ltd. Capital, \$1,000,000, divided into one million shares of one dollar each. Head office, Windsor, Ont. Provisional directors: Robert Schulenburg, Merton Lawson Rice, Irving Wesley Green, Warner Raphael Thompson and Timese Lemay, all of Detroit, Mich.

Cobalt Silver Crown, Ltd. Capital, \$1,000,000, divided into one million shares of one dollar each. Head office, Toronto, Ont. Provisional directors: John Walter McDonald, Gertrude Eleanor Cherpaw, Richard Stuart Dobbs Hartwick, Eva Lena Bradley and Thomas Brown, all of Toronto.

Pennsylvania Cobalt Silver Mines, Ltd. Capital, \$1,000,000, divided into one million shares of one dollar each. Head office, Toronto, Ont. Provisional directors: Eugene Van Portway, John George Adair, Emmett Ernest Gallagher, Eugene Coleman Spereman and Jeanette McKinnon, all of Toronto.

The Nepigon Mines Company, Ltd. Capital, \$5,000,000, divided into five million shares of one dollar each. Head office, Toronto, Ont. Provisional directors: J. H. Black and John Ferguson, North Bay, Ont.; L. P. Sandbach, Haileybury, Ont.; G. C. Campbell, New York; A. M. Wiley, Port Arthur, Ont.

Cobalt Mining Information Bureau, Ltd. Capital, \$40,000, divided into eight hundred shares of fifty dollars each. Head office, Toronto, Ont. Provisional directors: George Fifield Morton, Alexander Hector Beaton, Emmett Ernest Gallagher, Eleanor Jane Potts and Jeanette McKinnon, all of Toronto.

Consolidated Cobalt Mines, Ltd. Capital, \$2,000,000, divided into four hundred thousand shares of five dollars each. Head office, Toronto, Ont. Provisional directors: Harper Armstrong, Alexander Fasken, George Herbert Sedgewick, Archibald Thomas Struthers and William Henry Syms, all of Toronto.

Standard Cobalt Mines, Ltd. Capital, \$2,000,000, divided into four hundred thousand shares of five dollars each. Head office, Toronto, Ont. Provisional directors: Harper Armstrong, Alexander Fasken, George Herbert Sedgewick, Archibald Thomas Struthers and William Henry Syms, all of Toronto.

Dardanelles (Larder Lake) Gold Mines, Ltd. Capital, \$250,000, divided into two hundred and fifty thousand shares of one dollar each. Head office, Toronto, Ont. Provisional directors: Henry Stanyon, Frank Pottage, George Henry Shackleton, Bessie Mabel Cook and Frederick Napier Tennant, all of Toronto.

Freeda Larder Lake Gold Mining Company, Ltd. Capital, \$500,000, divided into five hundred thousand shares of one dollar each. Head office, Toronto, Ont. Provisional directors: James Edward Day, John Michael Ferguson, Edward Vincent O'Sullivan, Arthur Winlow Bixel and Mary Donevan, all of Toronto.

Harris-Maxwell Gold Mining Company, Ltd. Capital, \$100,000, divided into one hundred thousand shares of one dollar each. Head office, Toronto, Ont. Provisional directors: Walter Robert Wakefield, Edward Wakefield, Homer Mason, Robert Paterson and Matthew Moore Hulse, all of Toronto Junction, Ont.

The Lumsden Mining Company, Ltd. Capital, \$1,000,000, divided into one million shares of one dollar each. Head office, Toronto, Ont. Provisional directors: John Inkermann MacCraken, Ottawa; Alexander Hector Beaton, Emmett Ernest Gallagher, Eleanor Jane Potts and Jeanette MacKinnon, all of Toronto.

The Esperanza-Cobalt Mines Company, Ltd. Capital, \$1,000,000, divided into one million shares of one dollar each. Head office, Windsor, Ont. Provisional directors: Walter Edward Parker, Frederick Sealy Osborne, Harry Bromfield Bennett, Adams Milton Holden and Benjamin Streeter Warren, all of Detroit, Michigan.

The Brooks Hudson Silver Mining Company, Ltd. Capital, \$500,000, divided into five hundred thousand shares of one dollar each. Head office, New Liskeard, Ont. Provisional directors: T. H. Brooks, C. H. Fullerton, John B. Stallwood, Murdoch McLeod, F. W. Haynes, New Liskeard, Ont.; W. G. Otto, Vars, Ont.

The National Cobalt Silver Mining Company, Ltd. Capital, \$1,000,000, divided into one million shares of one dollar each. Provisional directors: William Gordon, Pembroke, Ont.; John Worthington Smith, Charles James Raitray, Bethune Norman Gordon, Larmouth and Godfrey, Benning Greene the Younger, all of Ottawa.

The Century Silver Mining Company, Ltd. Capital, \$1,000,000, divided into one million shares of one dollar each. Head office, Toronto, Ont. Provisional directors: Sidmoor Sager, George Laws, Alexander Cook Hynd, John Courtland Haskell, Morley Oscar Barnard, Gaius Barrett Rich the Younger and John Andrew Rogers, all of Buffalo, N.Y.

Cobalt Lake Mining Company, Ltd. Capital, \$5,000,000, divided into five million shares of one dollar each. Head office, Toronto, Ont. Provisional directors: Sir Henry Mill Pellatt, Norman Macrae, Britton Osler, George Charles Loveys, John Francis Hope McCarthy, Hugh Spence, Austin Gregory Ross, Molyneux Lockhart Gordon and James Miller Ewing, all of Toronto.

BRITISH COLUMBIA.

Chemainus Copper Mine Company, Limited. Capital, £200,000, divided into two hundred thousand shares of £1 each.

Old Dominion Copper Development Syndicate Company, Limited. Capital, \$35,000, divided into thirty-five thousand shares of one dollar each.

The Bay Gold Mining Company, Limited. Capital, \$200,000, divided into two hundred thousand shares of \$1 each.

CATALOGUES.

The Sullivan Machinery Company, of Chicago, U.S.A., has issued a booklet descriptive of the Sullivan Air Compressors. It is well illustrated and affords an idea of the scale upon which the Sullivan Machine Company works. A fuller catalogue is also issued. One of these books will be sent on application to the nearest branch office of the company. These are situated at Claremont, N.H.; New York, 42 Broadway; Pittsburg, Pa., Farmers' Bank Building; Knoxville, Tenn., Houston Building; St. Louis, Mo., Missouri Trust Building; Joplin, Mo., corner 4th and Virginia Ave.; Denver, Col., 1748 Broadway; Salt Lake City, Utah, Keith Building; San Francisco, Cal.; Butte, Mont., 48 E. Broadway; El Paso, Texas, 209 St. Louis street; Paris, France, 25 Rue Raffet. Agencies in all mining centres.

We are in receipt of a report of the total output and value by states of the mineral products of the United States in 1905. It was compiled by Mr. Taylor Thorn, and was issued by the Department of the Interior, U. S. Geological Survey, Chas. D. Walcott, director.

Catalogue No. 26, "The Diamond Drill and Its Work," has been issued by the American Diamond Drill Company, P.O. Box 1442, New York, N.Y.

CALENDARS.

The Morris Machine Works of Baldwinsville, New York, have sent out one of the handsomest calendars of the year. It will particularly appeal to all who love horses and dogs.

F. H. Hopkins & Co. have sent to the Mining Review a particularly useful calendar. It is large and very clear; such a calendar, in fact, as every business man wishes to have hanging in his office.

We are in receipt of a calendar from Mussels, Limited, which, in addition to the usual information, carries some convincing illustrations of Bucyrus steam shovels, Vulcan locomotives, "Smith" concrete mixers, and other machinery for which Mussels, Limited, Montreal, are the agents.

There are calendars and calendars. A truly artistic one is generally hard to find, but those that Miss Graham, the head of the Ladies' Business College, 345 Temple Building, Montreal, is sending out, with her compliments, are about as dainty as anything we have seen. They carry a reproduction of a painting by the French artist Langee entitled "Harvest Days."

The B. Greening Wire Co., Ltd., of Hamilton, Ont., have favored us with their annual calendar. They write: "It is the usual design showing portraits of the president and incorporator of the present firm, the founder of the business here and the founder of the present firm in Warrington, England, where the late Benjamin Greening came from to start this business here.

"From the cut of the buildings our friends will see that there has been no growth this year, but from the plans being laid down at the present time there will be considerable increase during the coming year to take care of the increased volume of business that this firm is sharing with the rest of the manufacturers in Canada.

MONTREAL STEEL WORKS, LTD.

Steel Castings | We make a specialty of Cast Steel WHEELS
Forgings | and other Steel Castings
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INTERLOCKING SWITCH AND SIGNAL PLANTS

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of London, Eng.)

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ELDER, DEMPSTER LINE ?

Our next sailing will be the SS. "Sokoto," from Halifax, on the 20th January, for the Bahamas, Cuba and Mexico.

Write for our illustrated booklet, "A Tour to the Bahamas, Cuba and Mexico"; also for particulars of our special 42-day Yachting Trip by the magnificent new R.M.S. "Sokoto," sailing from Halifax, January 20th, and again on March 15th. For further particulars and to book passage, apply to

NORMAN L. LUSHER, 178 St. James Street, MONTREAL.	W. H. HENRY, Temple Building, MONTREAL.
or to ELDER, DEMPSTER & CO., 319 Board of Trade Building, MONTREAL.	

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The standard of excellence in Bituminous Coal and Coke for Blast Furnaces, Foundries, Manufacturing and Domestic Use.

RELIABLE, UNIFORM and STRICTLY HIGH GRADE

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JAMES FLOYD, Superintendent.

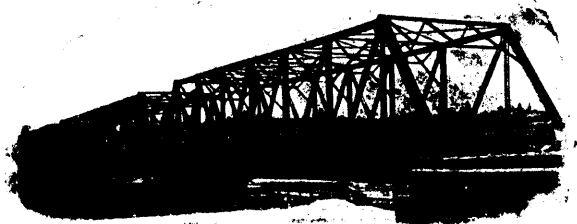
HEAD OFFICE, MONTREAL, QUE.

JAS. P. CLEGHORN, President. D. FORBES, ANGUS, Sec.-Treas.

BOOKS ON PROFESSIONAL SUBJECTS

Any work on Mining, Metallurgy, or associated industries, may be obtained through the **CANADIAN MINING REVIEW**, usually at a somewhat lower price than private individuals can buy it for.

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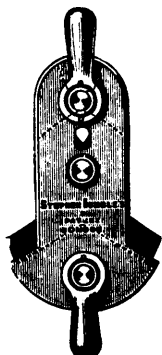
In use throughout the Mining World, owing to its Simplicity, Certainty of Action and Security. For the prevention of accidents by over-winding at Mine Shafts and Furnace Hoists.

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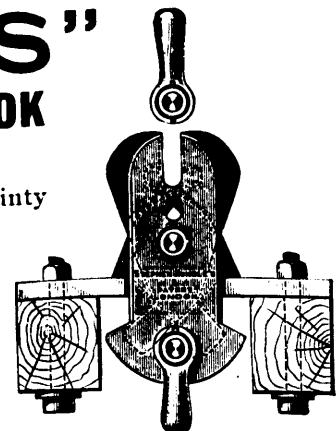
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PROVINCE OF QUEBEC

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

GREAT MINERAL TERRITORY

Open for Investment in the Province of Quebec.

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

ORNAMENTAL AND STRUCTURAL MATERIALS IN ABUNDANT VARIETY.

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

All mines belong to the government of the Province on all unsold lands and on all those sold since the 24th of July, 1880, but gold and silver are always reserved, whatever may be the date when the land was sold, unless it be otherwise mentioned in the patent.

The government grants PROSPECTING LICENSES for lands on which the mines belong to it, giving the holders of such licenses the first right to purchase the mines. In the case of lands where the surface alone is sold, the owner of the surface may be expropriated if he refuses an amicable settlement.

The price of prospecting licenses is \$5.00 per 100 acres on surveyed lands and per square mile on unsurveyed lands. If the surface has already been sold, the price is only \$2.00. They are valid for three months and are renewable at the discretion of the Minister.

When mines are discovered, they can be bought or leased from the government. The purchase price is as follows :

Mining for superior metals on lands situate more than 12 miles from a railway in operation, \$5.00 per acre, and on lands situate less than 12 miles from such a railway, \$10.00 per acre ;

Mining for inferior metals—the price and the area of the concessions are fixed by the Lieutenant-Governor in council.

The words "superior metals" include the ores of gold, silver, lead, copper, nickel and also graphite, asbestos and phosphate of lime ; and the words "inferior metals" mean and include all the minerals and ores not included in the foregoing definition and which are of appreciable value.

MINING CONCESSIONS are sold in entire lots in surveyed townships or in blocks of not less than 100 acres in unsurveyed territories.

Patents are obtained subject to the following conditions :
The full price must be paid in cash : specimens must be produced

and accompanied by an affidavit ; a survey at the cost of the applicant must be made on unsurveyed lands ; work must be bona fide begun within the two years.

Mining licenses giving the right to work the mine and dispose of its products, are granted on payment of a fee of \$5.00 and a rent of \$1.00 per acre per annum. Such licenses are valid for one year and are renewable on payment of the fee and of the same rent. They may cover from 1 to 200 acres for one and the same person and must be marked out on the ground by posts. The description or designation must, however, be made to the satisfaction of the Minister.

Persons working mines must send in yearly reports of their operations to the government.

The attention of the public is specially called to the new territory north of the height of land towards James Bay, which comprises an important mineral belt in which remarkable discoveries of minerals have already been made and through which the New Grand Trunk Pacific Railway will run.

The government has made special arrangements with Mr. Milton L. Hersey, 171 St. James Street, Montreal, for the assay and analysis of minerals at very reduced rates for the benefit of miners and prospectors in the Province of Quebec. Tariffs of assays can be obtained on application to him.

The Bureau of Mines at Quebec, under the direction of the Superintendent of Mines, will give all the information asked for in connection with the mines of the Province of Quebec and will supply maps, pamphlets, copies of the law, tariff of assays, etc., to all who apply for same.

Applications should be addressed to :

THE HON. MINISTER OF COLONIZATION, MINES & FISHERIES,

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Ontario's

MINING

LANDS

THE Crown domain of the Province of Ontario contains an area of over 100,000,000 acres, a large part of which is comprised in geological formations known to carry valuable minerals and extending northward from the great lakes and westward from the Ottawa river to the Manitoba boundary.

Iron in large bodies of magnetite and hematite; copper in sulphide and native form; gold, mostly in free milling quartz; silver, native and sulphides; zincblendes, galena, pyrites, mica, graphite, talc, marl, brick clay, building stones of all kinds and other useful minerals have been found in many places and are being worked at the present time.

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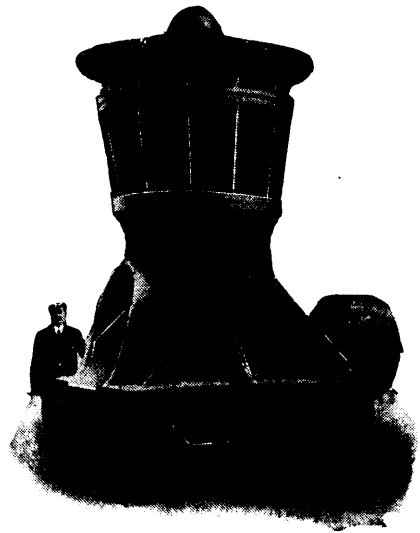
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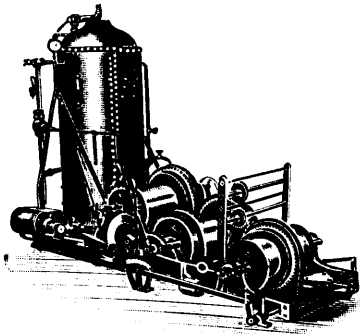


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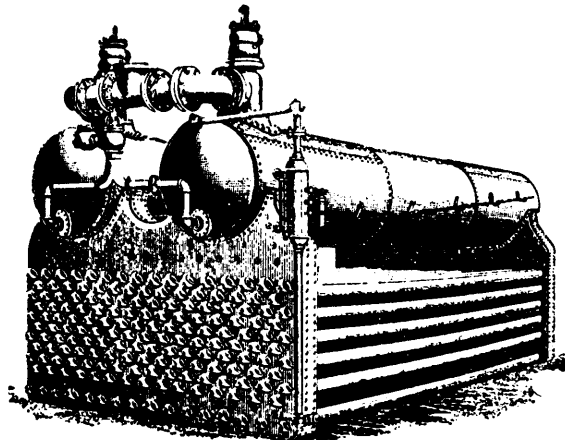
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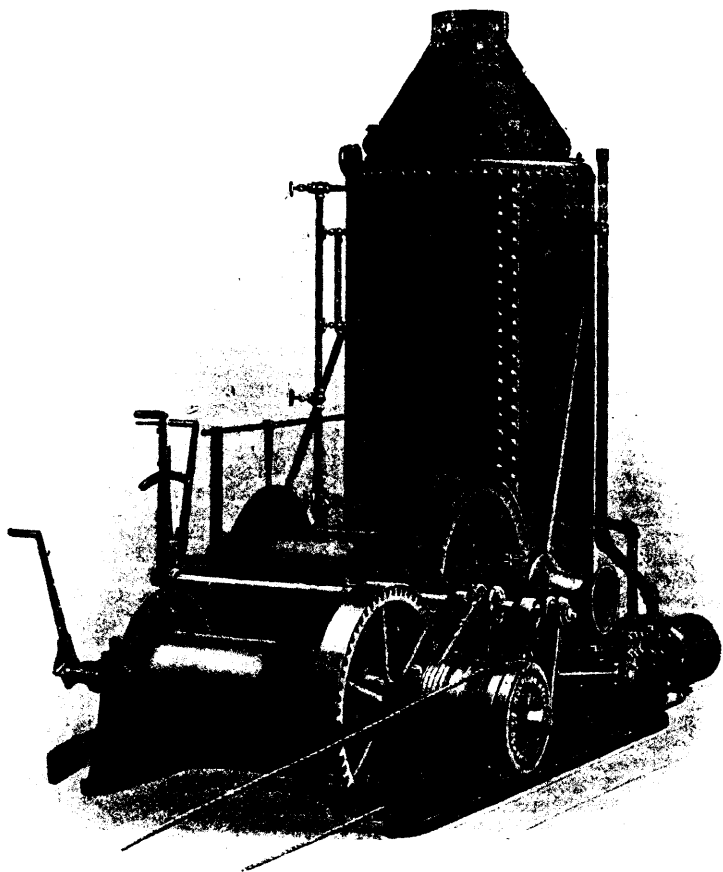
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