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CIRCULATION.

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HASTINGS COUNTY, ONTARIO.

The steady white light of Cobalt; the intermittent glare of Gowganda, Elk Lake, and Lorrain; and the immediate glamour of Porcupine, have thrown an undeserved shadow upon other mining districts of Ontario.

Geographically, Ontario is a vast and rich empire. But the history of its older mining regions has not been written. It is recorded vaguely in the memories of men who have seen three generations come and go.

Last week's visit of the Hon. Frank Cochrane, Minister of Mines for Ontario, to various points in Hastings County, was his ministerial inspection of that district. He was accompanied by Dr. W. G. Miller, Provincial Geologist; Mr. E. T. Corkill, Inspector of Mines; and by the editor of the CANADIAN MINING JOURNAL.

It were out of place to give here an itinerary of the brief journey. Our wish is rather to seize the opportunity to allude to the wonderful variety of minerals, and the unusual number of mining opportunities that exist even in the small section of Hastings County, examined during this visit.

It has become the habit of investors to look upon the mining districts of eastern Ontario as being either dead or moribund. How far this is from the truth is easily discovered by any person who takes the trouble to see for himself. And in adducing illustrations we confine ourselves to a part of Hastings County merely because space will not permit us to do more.

Within a radius of less than thirty miles three flourishing industries are established. At Sulphide, 136 miles east of Toronto on the C. P. R., a large acid manufacturing plant is producing steadily. Four years ago the Nichols Chemical Company began work here. Iron pyrites is mined locally and is purchased from several operators throughout the neighbouring country. This is probably the nucleus of an industry that will in time be second to none of its kind in North America. Deposits of clean pyrites, free from arsenic, occur over a large stretch of country. They wait the advent of the investor.

At Madoc, about fourteen miles to the east of Sulphide, is situated the only talc mill in Canada. The raw material is of exceptional purity. It is mined within a short distance of the town. The ground product now competes with unqualified success in the markets of the United States and Europe. As at Sulphide, so here, the introduction of hydro-electric power has cheapened operations materially. The capacity of the Madoc mill is soon to be doubled. At present the demand largely exceeds the output. Incidentally we may mention that the 125-foot shaft at the talc mine is a gratifyingly clean

piece of engineering, quite beyond the usual standard (or lack of standard) as regards safety and workmanship.

At Deloro, a short distance north of Madoc, is situated the plant of the Deloro Mining & Reduction Company. Here are treated ores from Cobalt, Ont. The recent addition of a complete cobalt-oxide plant brings this establishment into line with the most modern smelters. Cheap hydro-electric power is used here also.

The three places mentioned, Sulphide, Madoc, and Deloro, were the three principal points visited. They represent the three most advantageous centres of industrial enterprise. But the whole surrounding country is rich in such minerals as iron pyrites, copper pyrites, mispickel (nearly always carrying gold), fluor spar, actinolite, iron ores, slate, etc., etc.

We are strongly of the opinion that the whole countryside is worth exploiting. In many respects unique advantages are offered. Labour is plentiful, intelligent, and cheap. Hydro-electric power is available at remarkably low cost. The country is well opened up by railways. Farming and dairying are the chief present activities. Consequently living is cheap. Moreover, the natural beauty of the district, the plentiful supplies of clean water, and the negligible number of mosquitoes and black flies, are features that are positive inducements.

Local mining men have already accomplished much. But there is a limit to their capabilities—a limit set by lack of funds and an absence of outside interest.

We feel no hesitation in recommending such of our readers as are seeking channels of profitable mining investment to look carefully into the mineral deposits and the mining possibilities of Hastings County.

THE COMPRESSED AIR QUESTION IN COBALT.

In fairness to the Cobalt Hydraulic Power Company it was our intention to withhold comment upon certain difficulties that have been encountered by the users of hydraulically compressed air until fuller data should have been secured. Unfortunately, several journals and newspapers have published foolishly exaggerated accounts of these difficulties. Therefore it is but just to place before our readers the facts, such facts, at least, as are now available.

In the first place, we learn that the compressed air supplied by the Cobalt Hydraulic Power Company has been found absolutely satisfactory, except in such drifts and small stopes as are remote from shafts and in which ventilation has always been defective. In these places the "Taylor" air, owing to its deficiency in oxygen, does not readily support the combustion of a candle. "Sunshine" lamps, however, have been proved to work satisfactorily.

As our readers will remember, the plant of the Cobalt Hydraulic Power Company is situated at Ragged Chutes, on the Montreal River, nine miles from Cobalt.

The Taylor system of air compression is employed, whereby advantage is taken of the huge volume of falling water to compress air hydraulically. The air is then transmitted to the mines of Cobalt through a system of 20-inch iron pipes.

When, some weeks ago, certain operators at Cobalt found that candles would not burn readily in restricted mine workings where this compressed air was used, it was thought that the asphaltum coating inside the pipe line was doing the damage. Brief reflection shewed that this explanation was untenable.

Light was thrown upon the question by the analysis of samples of air forwarded by the Hydraulic Company to Dr. J. T. Donald, of Montreal. It was found that the compressed air, instead of containing 20 to 21 per cent. of oxygen, contained only 17.7 per cent., the loss naturally being due to the solvent power of water in intimate and continued contact with finely divided air. This, in itself, is quite sufficient to account for the difficulty in using candles.

Upon the announcement of these analytical results alarmists at once predicted that the miners would not be able to work in air so deficient in oxygen. Not content with this, despatches were sent to the press describing purely imaginary instances of suffering. These had not even a colourable foundation in truth. No hardship has been experienced. Particular pains have been taken by those interested to investigate the effect of the air upon miners working in remote faces and stopes. Up to the present the unanimous verdict is that no evil effect is perceptible.

For the past four years "hydraulic" air has been in constant use at the Victoria copper mine, Michigan. Whilst here the same complication as to illuminants has been met and overcome, the miners have been in no way affected. Eighty-five analyses of samples of air from representative coal mines of Scotland have recently been published. Of these, twenty-six fall below 20 per cent. in oxygen contents. The lowest figure reported is 16.55 per cent. Hence conditions such as outlined are by no means unusual. But a marked difference exists in the case of Cobalt. Here air low in oxygen is encountered only in a few isolated workings. The condition is not general. Nor is it in any degree alarming.

Let us now look for a moment upon the other side of the question. The Cobalt Hydraulic Power Company has invested an enormous amount of money in installing the largest natural air compressor in the world. The boldness and vigour of its promoters are beyond praise. The undertaking was one that involved startling engineering difficulties. It has been carried to a successful issue. To Mr. Charles H. Taylor, the Canadian whose ingenuity made the whole thing possible; and to the men who put up the money, Cobalt is deeply indebted. To them, also, we take off our hat. They have supplied Cobalt with a better, cheaper source of power.

Of those persons who thoughtlessly or otherwise pub-

lish michievous untruths or damning half-truths concerning such an enterprise, we prefer to express no opinion. The postal authorities are decidedly more finnicky than they were in the palmy days of personal journalism.

LET THE PUNISHMENT FIT THE CRIME.

The punishment meted out to the men convicted of stealing Cobalt ores and to the local refiner convicted of purchasing these ores from unauthorized sellers, was totally inadequate. It consisted of nominal fines with light terms of imprisonment as alternatives.

We take it that legal punishment is inflicted as a deterrent of crime. Just how effective are the instances above quoted may be judged from the fact that as we go to press we learn that a large quantity of ore has been stolen from the Lucky Godfrey mine.

This miserable and demoralizing business will continue until a judge arises who is possessed of sufficient sense of proportion to make the punishment fit the crime. Anything short of this is inexcusable trifling.

CONCERNING ONE APPOINTMENT.

The appointment of Mr. H. E. Haultain to the position of Professor of Mining Engineering at the University of Toronto affords satisfaction to the mining public. During the past two sessions Mr. Haultain's position was that of associate professor. The translation, though necessarily tardy, is most welcome. The University is still far behind McGill and Queen's in its mining engineering department. Professor Haultain, vigorous though he may be, cannot do justice to the increasing number of students of mining. Toronto University is the largest and richest in the Dominion. The Province of Ontario derives more income from the mining industry than most of the other provinces put together. It should not require a surgical operation to convince both the Government and the University that a larger staff is required. Mining, ore-dressing, and metallurgy are totally distinct subjects of instruction. Were it not consumingly irritating, it would be laughable to observe that mineralogy and geology, two entirely subordinate sciences, are given far more attention than the industry that they are supposed to subserve.

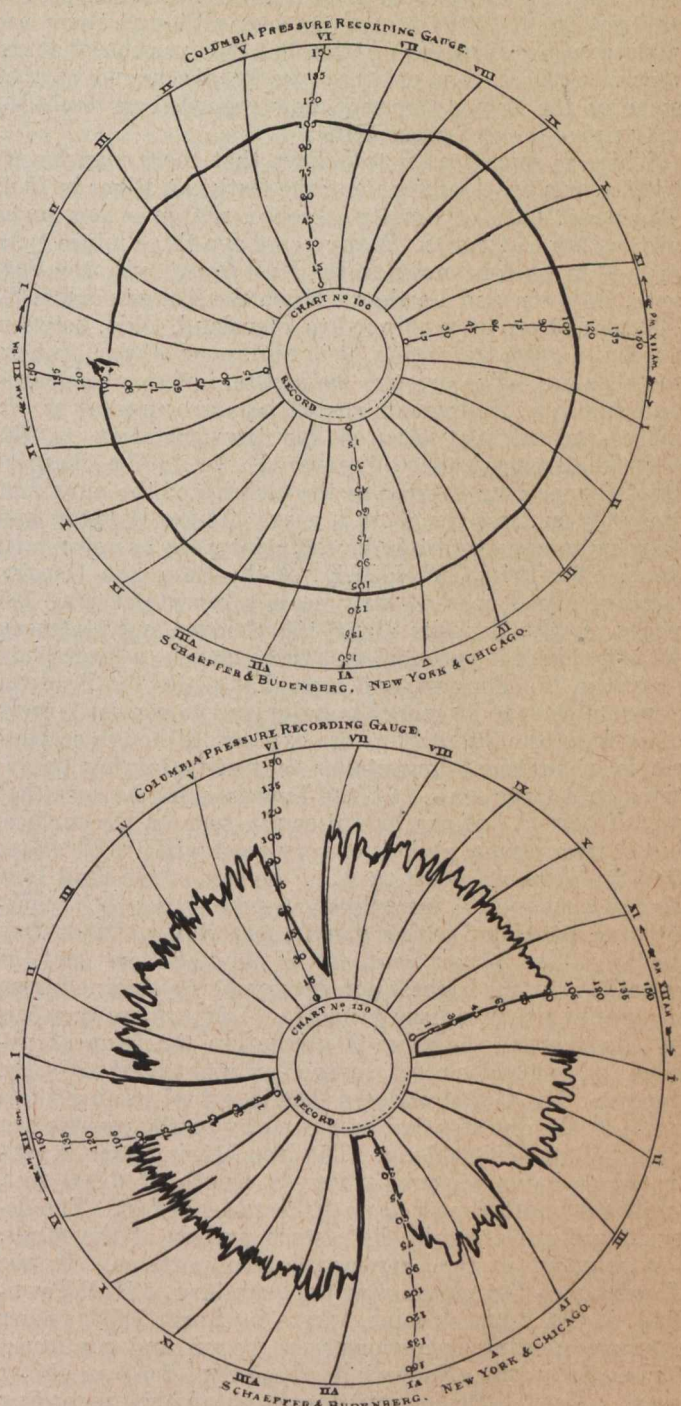
EDITORIAL NOTES.

A hammer drill is being used successfully in sinking a new shaft at Sulphide, Ont.

Spectacular finds of gold have recently been made at Fifteen Mile Stream, Halifax, Nova Scotia.

Before many weeks shall have elapsed we hope to announce the appearance of a special edition of the CANADIAN MINING JOURNAL to be devoted largely to the Province of Quebec. Preparations are now afoot.

In this issue is concluded a remarkable series of articles on the iron and steel industries of Canada. The writer, Mr. Watson Griffin, has for years made a close study of his subject. Perhaps no other Canadian journalist is so well qualified to write of these basic industries as is Mr. Griffin. At an early date these articles will be published in pamphlet form.



TWO CHARTS.

Fig. 1 is a reproduction of a pressure chart showing the daily record of air pressure from the Cobalt Hydraulic Company.

Fig. 2 is a pressure record from the same mine when an ordinary air compressor was being used. The contrast is obvious. Readers are referred to our editorial pages for further comment on this subject.

CANADIAN IRON AND STEEL.

BY WATSON GRIFFIN.

IV.

In my last article I described the location of the raw materials of iron-making, coal iron and limestone, in the Maritime Provinces.

No very large bodies of good iron ore have been proven to exist in the Province of Quebec, although there are widespread indications of iron, but it is possible that extensive beds of iron ore may yet be discovered or that some of the known deposits, now regarded as doubtful, may prove to be of great value.

There is some reason to believe that there may be extensive iron ore deposits along the Gatineau River in Hull Township, Ottawa County, Quebec, within a few miles of the City of Ottawa. Many years ago three mines were opened in what is known as the Hull Range, viz., the Forsyth, Baldwin and Lawless. From the Forsyth mine, 8,000 tons of ore were shipped to Cleveland, Ohio, between 1854 and 1858, averaging, it is said, over 60 per cent. in metallic ore. The ore was magnetite, low in phosphorus and sulphur. Shipments ceased because supplies of ore more conveniently situated for transportation to the Cleveland market, were discovered. In 1867 a charcoal blast furnace was started in the vicinity of the mine, but was only in blast for about a year. At the Baldwin and Lawless mines very little development work has ever been done. Mr. Fritz Cirkel, M.E., of the Dominion Department of Mines, who recently made a report covering 147 pages on the deposits along the Ottawa and Gatineau Rivers, thinks it probable that there may be a large body of ore in the Forsyth, and says that while the Baldwin deposits seem to be more irregular and to consist largely of pockets, the quantity of ore exposed, although scattered, is of sufficient importance to justify mining operations on a large scale. Of the Lawless mine he says that no solid ore bed of any extent can be seen on the surface, but there are some pockets of very good quality. He states that the principal constituent of the ores of the Hull Iron Range is magnetite, intermixed at some places with hematite and associated with a gangue material, and that they contain from 53 per cent. up to about 67 per cent. of metallic iron, the highest percentages being obtained from magnetite ores free from hematite. The ores are very low in phosphorus. Sulphur is present in the form of pyrites and is in some cases confined only to the edges of the deposit. Mr. Cirkel believes that in actual mining these parts of the deposits can be passed by or the pyrites can be eliminated by cobbing. The iron bearing area is estimated as having approximately a length of 6,800 feet, while the width ranges from 40 feet to 100 feet. The deposits are numerous in the eastern portion of the range, but thin out in the extreme western portions. In the Township of Templeton near the boundary of Hull Township, is the Haycock mine, where in April, 1873, rather extensive mining operations were begun and continued for several years. No work has been done for over thirty years. Very little information is obtainable regarding the old mining operations. Mr. Cirkel reports that all the deposits he examined so far as surface indications go are of limited extent, but he thinks it possible that large ore bodies may be found in the neighbourhood. The Haycock ore is hematite, having sometimes an admixture of magnetite, and samples taken from a number of pits indicate that it has a high percentage of iron, being low in both phosphorus and sulphur, but high in titanite acid. There are several other iron ore deposits in Templeton

Township, which appear to be of much the same character as the Haycock. Mr. Cirkel reports that there are many small outcrops of both magnetite and hematite in the different townships bordering on the Gatineau River, but the value of the deposits cannot be determined without development work.

The Bristol iron mines are in the Township of Bristol, County of Pontiac, about two miles north of the Ottawa River and a little over four miles from Wyman station on the Canadian Pacific Railway. Between 1885 and 1888 about 12,000 tons of magnetite iron ore are said to have been shipped, principally to Pennsylvania furnaces, but no mining has been done for twenty-one years. Samples of ore analyzed show that it is high in metallic iron, very low in phosphorus, somewhat high in sulphur, and contains a small percentage of titanite acid. Mr. Cirkel says that the ore, though generally called magnetite, is really a mixture of crystalline magnetite and hematite of varying proportions. Regarding the sulphur, he says: "In the Hull Iron Range, iron pyrites is met with mostly in a coarse form in certain portions of the ore bodies, and these can easily be separated by hand from the pure ore. The distribution of iron pyrites throughout certain masses of the ore bodies at the Bristol mines, in the form of fine irregular veins and disseminations, renders mechanical cleaving impossible, consequently such ores, which from outside appearance contain too much pyrites, must be submitted to a roasting process, in order to keep the contents of sulphur in the smelting ore below the admissible limit." However, Mr. John Birkenbine, M.E., who made a report on the Bristol mine in 1888, said that while the large quantity of pyrites in the upper levels of the mine necessitated roasting the ore, the pyrites had become so much diminished in the lower workings that roasting was no longer necessary.

The Bristol iron-bearing formation has an approximate length of about 1,500 feet and an approximate width of 500 feet. "As to the extension of the ore bodies in depth," says Mr. Cirkel, "it is known that in the main shaft a depth of 200 feet has been reached and that the ore there is still continuous. In another place a depth of seventy-five feet was reached and, according to the statement of the foreman who worked this pit, the bottom is still in good ore."

The Chats waterfall of the Ottawa River is within a few miles of the Bristol mine and electric power could be developed at very low cost.

There are a number of deposits of iron ore throughout the County of Pontiac. Some of them are evidently poor in quality and limited in extent. Others make a better showing, but only development work would prove whether they are of any value or not.

On Calumet Island, in the Ottawa River, both magnetite and hematite ores have been found, but no development work has been done and the quantity of ore is uncertain. An analysis of hematite ore showed it to be very low in both phosphorus and sulphur, but it contained a small percentage of titanite acid.

There are large supplies of limestone within easy reach of the iron ore deposits along both the Gatineau and the Ottawa Rivers, and there are a number of waterfalls not far distant, from which electric power could be obtained. It has been suggested that these ores might be smelted by electricity.

In Grenville Township of Argenteuil County, about half way between the cities of Montreal and Ottawa, are iron deposits which have been talked of for years, but little development work has been done. There are a number of pockets of magnetite, but no large bodies of ore have been discovered. Other iron ore deposits which have been favourably mentioned in government geological reports, but which may be described as "not proven" are the St. Jerome mine in Terrebonne; the Boniface mine in Shawenegan; the Leeds mine in Leeds and the Sherbrooke mine in Ascot.

It is estimated that there are many millions of tons of iron sands containing a high percentage of iron along the north shore of the St. Lawrence, at Moisie, Mingan, Natashkwan and other places. These sands could be briquetted for use in the blast furnace, but unfortunately they contain a high percentage of titanium. Titanium while not injurious to iron, as sulphur and phosphorus are, causes trouble in the furnace when present in quantity. A very small percentage may be handled without much trouble and it improves the quality of the iron. There are a number of deposits of bog iron ore in the St. Lawrence Valley remarkably free from sulphur and phosphorus and containing so small a percentage of titanium that it may be regarded as advantageous rather than injurious. Dr. Eugene Haanel, director of the Dominion Department of Mines, says of these bog ores: "The origin of these deposits is interesting since they are being continually found at the present time, and it is possible to obtain ore which has been deposited during the last ten or twenty years. The rocks are highly ferruginous and the iron is dissolved from them by the action of the rain-water containing organic acids resulting from decayed vegetation. The iron thus dissolved is transformed into salts of the protoxide. These mineralized waters stream down from the hills into the valleys and inland lakes, where the protoxide salts carried by the decomposed vegetation float on the surface of the water and are acted upon by the oxygen of the atmosphere; which converts the protoxide into the insoluble peroxide of iron. By a natural accretionary process, the iron oxides form into cakes of ore about 7 inches in diameter; then they drop to the bottom of the lake. This evolutionary process is so rapid that some of the lake bed deposits which have been worked out, are found after a rest of five years to have grown sufficiently to enable the owners to work them by dredge mining for ten years continuously on a commercial scale."

The use of these bog iron ores by the Canadian Iron Corporation in its furnaces at Radnor Forges and Drummondville has already been referred to.

The Provinces of Quebec and Ontario, south of the Height of Land, are entirely destitute of coal. Lignite is known to exist between the Height of Land and James Bay, and it is possible that good coal may yet be found in some part of that great country. Recent newspaper despatches have stated very positively that good coal has been found under the lignite in the vicinity of the Mattagami River, about 70 miles from Cochrane, the terminus of the Temiskaming & Northern Ontario Railway, but such statements will not be taken seriously unless supported by the report of the exploring party which the Ontario Government has sent to investigate.

For ordinary domestic and manufacturing purposes the Province of Quebec gets its supplies of coal largely from Nova Scotia, although considerable quantities of coal are imported from the United States. Whether it would be possible to use Nova Scotia coal for iron making in Quebec Province is doubtful. If abundant supplies of iron ore could be laid down cheaply at Montreal and

arrangements could be made with one of the Nova Scotia coal companies to supply coal at the mines at as low a price as the Dominion Iron & Steel Company secured its coal from the Dominion Coal Company, the cost of transportation to Montreal would probably not preclude its use for smelting purposes. There is deep water all the way and very large boats could be used for the transportation of the coal. It is not probable that coal could be obtained at so low a price from any of the existing coal companies, but it is possible that an iron and steel company with blast furnaces in Montreal might buy a Nova Scotia coal mine and so secure coal at the cost of mining and transportation. There are abundant supplies of limestone near at hand. The Drummond iron mine of the Canada Iron Corporation, near Bathurst, in Gloucester County, New Brunswick, is considerably nearer to Montreal than the iron mines of Michigan and Minnesota are to the blast furnaces in Buffalo and Hamilton. If the iron ore deposits along the Ottawa and Gatineau Rivers should prove to be important they could be economically transported to Montreal.

It has been announced that the Government will undertake the construction of the Montreal, Ottawa and Georgian Bay Canal as soon as the Grand Trunk Pacific Railway is completed, and as the leaders of both political parties have expressed themselves as in favour of the project there is little doubt that the work will eventually be carried out. In considering the present conditions of Canadian iron and steel industries it cannot be regarded as a factor, but in any estimate of the future it must be taken into account. When that canal is completed Montreal will be as near to all the iron ore ports of Lake Superior as Hamilton now is. Key Harbor, on Georgian Bay, the port of shipment of the Moose Mountain mines is within a few miles of the mouth of French River, where this short water route begins, a distance of 440 miles from Montreal.

Montreal is the commercial metropolis of the Dominion and it has many manufacturing industries using iron and steel as raw materials. It is the headquarters of the Canadian Pacific, the Grand Trunk and the Grand Trunk Pacific Railways, and the most important workshops of those companies will probably always be located there, so that the local demand for iron and steel will always be large. It is the meeting place of lake and ocean navigation. Situated 960 miles from the ocean, it has the unique position of being both an inland city and a port for ocean vessels, which gives it certain advantages as a distributing point over any other city in America during the season of navigation on the Great Lakes and the St. Lawrence River.

Under ordinary conditions it is much more economical to manufacture iron near the raw materials, but sometimes the advantage of being close to a large consuming centre partly offsets the disadvantage of being somewhat distant from all the raw materials. Thus the blast furnaces of Chicago get all their raw materials from a distance, Connellsville coke being carried 600 miles to that city, as shown in my last article. Professor Smith, of the University of Pennsylvania says regarding the economic location of blast furnaces: "In the making of iron it is usually necessary for the fuel or the ore to be transported to some common meeting place, and in the working out of the problem of transportation the location of the iron industry has usually responded to the motto that 'the ore goes to the fuel,' an example of this being the great movement of Lake Superior ores to the Pennsylvania coal fields. It is not, however, a maxim of absolute sway. The question is rather complex and is to be answered by weighing various freight factors involved in getting the

ore and the fuel to the furnace and the finished product to the market. It is, therefore, a triangular problem, and it sometimes works out to the moving of the fuel rather than of the ore. Examples of this are afforded by the present industry on Lake Champlain, and in Northern New Jersey. Here are ore fields of excellent character; in both fields iron is being made with coke from Western Pennsylvania. The reason they can afford to break the maxim and carry the fuel to the ore is found by noting the disposition of the finished product. It goes to New England and the East, and the fuel is therefore moving toward the final market of the iron.

Coal carried from Nova Scotia to Montreal would be "moving toward the final market of the iron," and this is true also of the United States coal or coke that goes to the Ontario furnaces at Hamilton, Midland, Sault Ste. Marie, and Port Arthur.

One advantage of having iron and steel works close to the market is that in case of a rush order delivery can be made in shorter time, and this is sometimes a factor in securing business.

All the blast furnaces in Ontario are distant from coal mines. Nova Scotia coal is sent in limited quantities to some of the most eastern counties of Ontario for domestic and ordinary manufacturing purposes, but the cost of transportation prevents it going farther west, and consequently almost all the coal used in Ontario is imported from the United States. Under present conditions the use of Nova Scotia coal for iron making could not be considered in any part of Ontario. If the Canada Iron Corporation owned a Nova Scotia coal mine it is possible that it might take coal as far as its blast furnaces at Midland, Ont., after the projected Montreal, Ottawa and Georgian Bay Canal is completed. It is not probable that Nova Scotia coal could be economically used for smelting purposes farther west than Georgian Bay ports, although Mr. Alex. Dick, the general sales-manager of the Dominion Coal Company, told me that if that canal were constructed so that large coal barges could go through from Cape Breton without breaking bulk, he believed they could sell large quantities of coal for domestic and ordinary manufacturing purposes as far west as Fort William. It may be noted that some of the iron ores of Northwestern Ontario are rather too high in sulphur for use with Nova Scotia coal. The blast furnaces at Port Arthur and Sault Ste. Marie use West Virginia coal, which has a very small percentage of sulphur. The Lake Superior Corporation recently purchased a coal mine in West Virginia in order to be in an independent position. The rail haul is between 330 and 340 miles from the West Virginian mines to Toledo on Lake Erie from which the coal can be shipped by water to the blast furnaces of the company at Sault Ste. Marie, Ont.

The blast furnaces of the Lake Superior Corporation at the Sault and the Atikokan Iron Company at Port Arthur, are distant from their fuel supply, but they have the advantage of being much closer to the great Northwest than furnaces farther east.

Midland blast furnaces at present use Connellsville coke, which has an all-rail haul of about 535 miles. When the coke ovens now projected by the Canada Iron Corporation at Midland are completed, coal will be imported instead of coke, and as it can be shipped a great part of the way by water the rail haul will be considerably reduced. The rail haul from Connellsville, Pa., to the blast furnaces of the Hamilton Steel & Iron Company is about 388 miles. Hamilton manufacturing industries consume large quantities of both iron and steel and it is the centre of a district in which are a number of manufacturing towns,

so that the fuel meets the iron ore where the finished product is sold.

There do not appear to be any iron ore deposits in Southwestern Ontario worth mentioning except the bog ores of Norfolk and Oxford Counties. At Normandale, in Norfolk County, Joseph Van Norman successfully operated from 1820 to 1847 a charcoal blast furnace using local bog iron ore. Small quantities of the Oxford County bog ores have been smelted at the Hamilton furnaces. Whether the bog ores of Ontario grow, as the Quebec deposits are reported to do, I am unable to state.

Anyone reading the Dominion Government geological reports published some years ago and the Report of the Royal Commission upon the Mineral Resources of Ontario, published in 1890, would be likely to suppose that there were a number of very extensive ore beds in Eastern Ontario containing high-grade ore. Witnesses before the Royal Commission were quite enthusiastic about the extent and value of some of these deposits, but there is reason to believe that exaggerated views prevailed at that time. Iron ore is found over wide areas in Frontenac, Lanark, Renfrew, Leeds, Hastings, Peterborough, and Haliburton counties, but most of the deposits are now believed to be merely pockets. Prospectors have been too ready to assume that when several deposits of ore are found in line with each other they must be outcrops of the same ore bed. There appear to be a great number of separate deposits, many of them containing considerable quantities of ore, but as yet no very extensive body of good ore has been proven to exist. Magnetites are more common than hematites, but about 150,000 tons of hematite ores are said to have been taken out of Eastern Ontario mines. Bog iron ore is reported to exist in Lanark County.

Considerable quantities of both magnetite and hematite iron ore were shipped to the United States many years ago, and very favourable reports of the quality of some of the ores were received from the smelting companies, but nearly all of these mines were abandoned long ago, and very little development work has been done in recent years. It is difficult now to ascertain what was proven by these old-time mining operations. It is certain that in some cases the analyses showed the ores to be high in iron, low in both phosphorus and sulphur, and free from titanium, but in other cases the ores were of low grade and contained considerable quantities of sulphur, phosphorus, or titanium. Some of the deposits seem to be irregular in quality, inferior ore being found in close proximity to first-class ore. It would probably be correct to say that in general the ores of Eastern Ontario have a high percentage of iron, are low in phosphorus and titanium, and rather high in sulphur, but that there are exceptions. In some localities there are considerable quantities of magnetite containing a high percentage of titanium.

The Ontario Government for some years offered a bounty of one dollar per ton for pig iron made from Ontario ore, and the Dominion Government iron bounties for a number of years discriminated to the extent of one dollar per ton in favour of pig iron smelted from Canadian ore. But these inducements brought out very little Eastern Ontario ore. However, it would be a mistake to assume too readily that no ore deposits of great value will ever be found in Eastern Ontario. It is probable that thousands of tons of good ore will be taken from some of the mines already opened, and development work in some of the localities yet unworked may reveal valuable ore

beds. The mine of the Canada Iron Corporation near Eganville in Renfrew County has been already referred to. Considerable quantities of ore were shipped to the United States from the Willbur Mine in Renfrew County many years ago, and ore from this mine has been used in Canadian blast furnaces in recent years, going as far west as the works of the Lake Superior Corporation at Sault Ste. Marie, Ont. The ore is magnetic, low in both phosphorus and sulphur and is suitable for making Bessemer pig iron. This mine has recently been acquired by a New York corporation, and it is stated that active development work is to be undertaken. There has been some talk of establishing a blast furnace at Kingston to use this ore.

Farther north in Ontario ore has been found at many points from Lakes Temagami and Temiskaming to Sault Ste. Marie, but no important iron ore bodies have been proven to exist in this region east of Sudbury. About 25 miles north of Sudbury in the Township of Hutton is the much talked of Moose Mountain iron range, which promises to yield large quantities of iron ore. The company owning the deposits has been incorporated under the name of Moose Mountain, Limited. J. W. Gates, the well-known New York capitalist, is president, and Donald D. Mann of Mackenzie & Mann is largely interested in the company, which owns forty-six hundred acres of land. There are said to be eleven well-defined bodies of iron ore on the property, which are numbered. No. 1, No. 3, and No. 4 are said to be high grade ore, while the others, so far as known, are low grade. The shipping point is Key Harbor, Georgian Bay, about eighty miles south of the mine, and transportation facilities are provided by the Canadian Northern Railway. The harbour has 24 feet of water, is well sheltered, and the dock equipment includes a thoroughly modern transfer loading plant.

I am indebted to Mr. C. E. Harrmann, assistant to the president of Moose Mountain, Limited, for the following statement:

"Not enough exploration work has been done on the property to permit making any accurate estimate of the tonnage or grade of ore available, except in the case of the Number One deposit. Diamond drill exploration on this deposit has developed over one million tons of concentrates of the present guaranteed grade, 54.50 per cent. metallic iron when dried at 212 degrees Fahr. The company is operating an open pit on this outcrop, and shipped between twenty-five and thirty thousand tons of concentrates during 1909. This ore was crushed to one inch maximum and magnetically cobbled, the average analysis for the season being, at 212 degrees Fahr.:

Silica	12.78	Manganese	.09
Iron	55.77	Lime	3.77
Phos.	.107	Magnesia	3.52
Alumina	1.58	Sulphur	.074
Loss by ignition			none
Moisture in natural ore			.77

"The plant and machinery used during the season of 1909 was largely of an experimental nature, the season's results demonstrated that the process used was entirely successful, and at the close of the year the company adopted a wider plan of operation. Construction work was carried on during the winter and a new mill, electrically operated and up to the minute in every particular, is nearing completion, and is, as far as is known to us, the only magnetic concentrating plant in Canada. Approximately one hundred thousand tons of concentrates will be shipped to the United

States during the present season, according to program.

"The company's efforts have been concentrated upon opening the Number One deposit, and according to present status of the work the end of this season will see the mine on a good round tonnage basis. As soon as this is accomplished the other deposits of high grade ore will be attacked, and meanwhile investigations and experiments are being carried out with the view of utilizing the lower grade of ores."

Shortly after the discovery of the Moose Mountain iron range was announced, the Toronto newspapers contained articles intimating that the interests in control proposed to establish great iron and steel works at Ashbridge Bay, Toronto, using Moose Mountain ore. Toronto is not quite so favourably situated as Hamilton for assembling the raw materials of iron-making. Hamilton has limestone close at hand and there is natural gas in the neighbourhood, which is piped to the city. The railway charges for transportation of coal or coke from the United States are ten cents per ton greater to Toronto than to Hamilton. The iron ores of Eastern Ontario are nearer to Toronto, but the Moose Mountain Mines, the Atikokan range, the ores of Michipicoten, and all the great Michigan and Minnesota mines are about forty miles nearer to Hamilton than to Toronto. Large quantities of iron and steel are consumed in both Hamilton and Toronto, and the two cities have almost equal advantages for the shipment of iron to other manufacturing towns in Ontario. When the Ottawa and Georgian Bay Canal is opened the Moose Mountain mines will be nearer to Montreal than to either Hamilton or Toronto by the water route.

The Atikokan iron range on the line of the Canadian Northern Railway, about 130 miles from Port Arthur, was described in my second article. It seems likely to afford an ample supply of ore for the blast furnace of the Atikokan Iron Company at Port Arthur. The United States Steel Corporation is said to have purchased another promising magnetite deposit, running low in phosphorus and sulphur, a few miles west of Atikokan.

The Helen iron mine of the Lake Superior Corporation, about eleven miles from Michipicoten harbour, has already been described. It is undoubtedly an immense ore body, and great quantities of ore have already been taken out. There is reason to believe that a number of other valuable ore bodies will be found in the great region north of Lake Huron and Lake Superior, and south of the Height of Land, but exploration and development work is expensive. It is said that the great American iron and steel companies, which have ample capital for such work, are beginning to explore this region. If the United States Steel Corporation should get control of large iron ore deposits in Ontario it might seriously interfere with the development of the Ontario iron and steel industry. It would seem worth while for the Ontario Government to expend a large amount of money in exploration work, and to adopt measures which would prevent iron ore properties passing under American control.

The country north of the Height of Land is almost unexplored. It is claimed that extensive iron ore beds have been found near the Mattagami River, but until further investigation no opinion can be formed of their value.

It is unfortunate that Ontario blast furnaces are

dependent upon the United States for supplies of coal or coke. It has been suggested that the United States Congress may at some future time levy an export tax on coal. However, the United States constitution provides that "no tax or duty shall be laid on articles exported from any State." An amendment to the United States constitution must be first approved by a two-thirds vote of both Houses of Congress, and afterward ratified by the Legislatures of three-fourths of the States or by conventions in three-fourths of the States.

Charcoal pig iron is for certain purposes much superior to coke pig iron, and Ontario ought to be able to produce sufficient charcoal to supply a number of furnaces. Yet it has been difficult in the past to get supplies for the one charcoal furnace of the province, which is located near Deseronto. Owing to the scarcity of charcoal it was converted into a coke furnace, but since it came into the possession of the Standard Chemical Company, which is a large producer of charcoal, the use of charcoal has been resumed. When the Canada Iron Furnace Company, now included in the Canada Iron Corporation, selected Midland as a blast furnace site it was at first proposed to use charcoal, but the owners of timber suitable for the purpose demanded such high prices that the use of coke as fuel was decided upon.

There are large areas of Ontario unsuitable for agriculture, but well adapted for growing timber. It would be well for the Ontario Government to make enquiry as to the best means of assuring cheap supplies of charcoal in the future.

A series of experiments were conducted at Sault Ste. Marie in 1905-6, under the direction of the Dominion Department of Mines, with the object of establishing the feasibility of electrical smelting of Canadian magnetic iron ores. Dr. Eugene Haanel, Director of Mines, was well satisfied with the results. Three young Swedish engineers, Assar Gionwall, Axel Lindblad, and Otto Stalhane, stimulated, it is said, by the results of the Sault Ste. Marie experiments, undertook to solve the problem of designing and constructing a commercial electric smelting furnace. Arrangements were made with the largest iron manufacturers in Sweden to carry on smelting experiments at the Domnarfvet iron works. After two years of experimenting a furnace was evolved which they are satisfied can be economically used in practice. In December, 1908, Dr. Eugene Haanel went to Sweden to witness the first practical test, and after watching the working of the furnace in a twelve days' trial run, he was most favourably impressed, and he has published a very interesting report. The fuel used was coke, but charcoal may be used. If Dr. Haanel's expectations should be realized, iron ores may yet be extensively smelted in Ontario and Quebec by the thermo-electric process, both provinces having many waterfalls from which electric power can be generated. It is claimed that in the electric process the quantity of coke or charcoal consumed is so small that the cost of fuel is greatly reduced, and that sulphur can be much more successfully eliminated than in ordinary blast furnace practice. That iron of very high quality can be produced by this process there is no doubt. Whether the electric furnace can ever successfully compete with the ordinary blast furnace using coke as fuel is a question for the future to decide.

So little is known of the country surrounding Hudson Bay that no one can say what may be discovered

there. It is possible that at some future time coal, iron and limestone may be found in locations from which they can be conveniently carried to Fort Churchill or Port Nelson for smelting. It is not probable that the Hudson Bay route to Europe will ever prove a great success, as Hudson Strait, at the far north, is blocked with ice for a great part of the year, but the great bay itself is open throughout the year and the harbours of Fort Churchill and Port Nelson are open for navigation for almost as long a period as Montreal is. There is no doubt that the vast prairie country will eventually have a population of many millions, and there will be a great demand for iron and steel. If raw materials could be cheaply assembled at one of the Hudson Bay ports this great market might be more accessible to works located there than to the works in Eastern Canada. However, this is not a problem for the present generation to consider.

Alberta has very extensive coal areas, lignite, bituminous and anthracite coal being already mined in considerable quantities. Much of the coal is unsuited for the manufacture of blast furnace coke, but the quality improves as the mountains are approached, and some of the bituminous and anthracite coal near the boundary of British Columbia will no doubt be suitable for iron making. So little exploration work has been done that nothing definite can be said about iron ores. The rule that iron ore can be carried a considerable distance to the coal when there is a market near at hand for the finished iron will apply in the west as well as in the east.

British Columbia has probably greater areas of first class coal than any other province of the Dominion. The mines in Vancouver Island and in the Crow's Nest Pass are well known to Canadians in general. The report of the Mines Department states that mines are being opened in various localities on the western slope of the Rocky Mountains, in the Nicola Valley, on the Thompson River, on the Queen Charlotte Islands, and in the valleys of the Skeena and Telkwa in the north. Other discoveries of coal will probably be made.

As there has in the past been no demand for iron ore in British Columbia very little exploration work has been done. The Mines Department reports that iron ore deposits of more or less value have been discovered in the following localities: Texada Island, between Vancouver Island and the mainland; West Redonda Island, in the Gulf of Georgia; Queen Charlotte Islands, Klaanch River, Quinsam River, Sarita River, Head Bay, Gordon River, Sechart, Kennedy Lake and Quatsino Sound on Vancouver Island; at Rivers and Knight Inlets on the mainland coast; Cherry Bluff, near Kamloops; Fort George, and in several localities of the mainland districts of Similkameen and Cariboo. As regards the value of these deposits no definite statement can be made until more development work has been done. The Puget Sound Iron Company, which has a property of 2,700 acres on the south-west side of Texada Island, has shipped small quantities of ore to Irondale, Washington, where it has been smelted with a mixture of one-ninth to three-tenths of bog ore, making an excellent foundry pig, which, according to the report of the Mines Department, was used by the Union Iron Works of San Francisco in the construction of the United States warships Olympia, Monterey, Charleston, and Oregon.

If iron and steel works on a large scale were located either on the mainland coast of British Columbia or on the islands they would be well situated for sending

the finished products to the markets of the Pacific, including the west coast of South America, Japan, China, Australia, and even to the Pacific coast cities of the United States, which are not favourably located for assembling the raw materials of iron making.

The building of steel steamships will probably become an important British Columbia industry, and

some of the warships of the Canadian navy will no doubt be built at Pacific coast shipyards.

In the ten years ending 1908, royalty to the extent of \$3,615,381 was collected on the gold production of Yukon Territory.

ELECTROLYTIC CYANIDATION AND AMALGAMATION.

By ELMER ELLSWORTH CAREY.*

Inventions and processes are frequently announced many years before the world is ready for them. The electrolytic cyanide process was described by Rae in 1867, but to-day only one part of that process—electro-deposition—is in use. The electrolytic system of separating and refining metals is now rapidly superseding all other metallurgical systems, and the electrochemical system will before long be used extensively in the metallurgy of gold. By the use of electricity the percentage of gold won will be increased, the cost of extraction diminished, and the area of mining operations greatly enlarged. As soon as the various colleges, institutes, technical schools, etc., teach the principles of electrochemical metallurgy, important modifications and changes will be made in mill operations. As cyanidation made slow progress till a new generation of engineers had been trained in the use of the chemical system, so the electrochemical metallurgical methods will languish till the schools have supplied the necessary electrochemical engineers.

It has been known theoretically for forty years that the amalgamating action of mercury and the energy of the cyanide solution could be increased by the introduction of certain electrochemical conditions, but many difficulties had to be overcome before this knowledge could be used in a practical manner. Within the last ten years the science of electrochemistry has been placed on a firm foundation, and the troubles of the early inventors have been surmounted. Low voltage generators are now manufactured that produce the required current at an insignificant cost; by the use of Acheson graphite, all anode trouble disappears; and the time of treatment has been reduced to a few hours, while in some systems the values pass into solution and are deposited simultaneously.

Metallurgical science took a great step forward when the chemical (cyanide) system was introduced, and the next important step will be the adoption of the electrochemical system. Many troubles, obstacles and difficulties of cyanidation disappear when electrochemical conditions are introduced; values which ordinarily are refractory readily pass into the solution; a weaker solution than usual may be used; the solution is constantly regenerated; the loss of cyanide is reduced; the values are automatically recovered in the form of amalgam; the refining processes, with their attendant losses, are unnecessary, and the cost of installation greatly reduced.

In "The Mining World," Chicago, January 23, 1909, may be found a description of the Parks electro-cyanide process. The process here described is extremely simple, effective and inexpensive, and has been found successful with ores which are not amenable to the usual cyanide treatment. In the works on cyanide practice by Bosqui,

Wilson, Smart and others, will be found descriptions of other systems of electro-cyanidation, all of which have similar basic features, differing only in detail, modes of construction, etc. Some years ago electro-cyanidation was successfully used for several months at the Delamar Mine in Idaho, and a description of the process there used will be found in Bosqui's work.

The recovery of values from a cyanide solution (after the usual leaching process) by electro-deposition has proved successful in many mills in South Africa; the Siemens and Halske process of electro-precipitation was introduced several years ago on the Rand, and despite the primitive apparatus used, the high cost of installation, and the five per cent. royalty, many companies have adopted the process.

To-day the special process in question is obsolete, as far better methods are known; Acheson graphite is much better for anodes than the clumsy iron anodes used in the German system, and amalgam plates can now be used instead of the lead cathodes. With the introduction of discoveries, methods, machinery and accessories which have been placed at our disposal by American inventors and investigators in the electrochemical field, the time has now arrived when the art of cyanidation can be completely revolutionized. Some of the advantages that may be expected from the improved system are mentioned in an article on "Electrochemical Amalgamation and Cyanidation" in the Engineering Magazine, for December, 1909, as follows:

"Turning to electrochemical lixiviation, the claim is made that under electrochemical conditions the cyanide solution is much more active than usual; values pass into the solution which are lost in the ordinary systems; the time of treatment is reduced and the extraction increased, while there is a decrease in the operating cost; precipitation by electro-deposition goes on simultaneously with the leaching process and the usual troubles are eliminated; a molecule of cyanogen after taking up a particle of gold, is released as nascent cyanogen, having greatly increased affinity for gold and silver. The solution is constantly regenerated, the loss of cyanogen being negligible. The larger particles of gold are amalgamated directly without passing into the solution. In electro-cyanidation the pulp and solution are agitated in a shallow tank having the bottom covered with quicksilver (cathode); revolving stirrers cause the pulp to travel with a circular motion over the quicksilver for an hour or two; this is equivalent to passing the pulp over several miles of mercury surface. During this period the values are amalgamated directly, or pass into the solution and are precipitated by electrolysis, the extraction averaging 97 per cent. All ores, so far as known, are capable of successful treatment by means of electro-cyanidation."

Regarding electro-amalgamation, it may be said that

* Member American Electrochemical Society, San Jose, California, U.S.A.

experimental work relating to electrochemical amalgamation began in 1859, the first patent being issued to Henry Brevoort, of San Francisco; some 75 patents for various electro-amalgamating devices have been issued by the United States patent office, but only within the last three years have machines been constructed which meet the requirements of mining men. The various engineering difficulties have been overcome and an electro-amalgamating device is now constructed which is very simple, inexpensive, has large capacity, is easy to operate, skilled attendance not being necessary, and which extracts all values not encased, regardless of refractory elements which may be present in the gangue. Such a device works equally well with mill pulp or screened placer material; in placer operations all rusty, coated and black sand values, as well as platinum, are amalgamated; fine, float and beach gold is readily amalgamated in the electrolytic device. Those who wish an authoritative statement as to the value and scope of electrochemical amalgamation are referred to a paper by Warnford Lock mentioned below, and also to the patent issued to Sir William Crookes.

Those who wish further to investigate electro-cyanidation are referred to the following:

"Mining World," Chicago, January 23, 1909; article by John R. Parks, E.M.

"Engineering Magazine," New York, December, 1909; article, "Electrochemical Amalgamation and Cyanidation."

Books:—"Cyanide Process," by E. B. Wilson, E.M.; "A Handbook of Practical Cyanide Operations," by Wm. H. Gage, M.D., F.R.S.; "Practical Notes on the Cyanide Process," by F. L. Bosqui; "Electric Smelting," by Dr. W. Borchers, and "Cyaniding Gold and Silver Ores," by H. Forbes Julian and Edgar Smart.

Additional references for data regarding electro-amalgamation are as follows:

"Electrochemical Amalgamation," C. G. Warnford-Lock, E.M., M.L.I.M., Vol. 1, page 205, "Proceedings of the (London) Institution of Mining and Metallurgy."

United States Patent, No. 462,535, issued to Sir Wm. Crookes for an electrolytic amalgamating process; the following numbers refer to other United States patents covering devices for saving gold by electrolytic methods:—328,532; 307,081; 342,421; 492,711; 590,524; 947,958; 757,557.

Copies of any of the above patent specifications may be obtained from the Commissioner of Patents, Washington, D.C., U. S. A.; send 10 cents (no stamps) for each specification desired.

Articles on electro-amalgamation have appeared as follows:

"The Canadian Mining Journal," November 1st, 1909; January 1st, 1910.

"The Mining Journal," London, May 15th and June 12th, 1909.

"The Mining World," Chicago, March 27th, April 17, and June 5th, 1909.

"Pacific Miner," San Francisco, Cal., April and August, 1909; also February, 1910.

"Electrochemical and Metallurgical Industry," New York, May, 1909.

"Scientific American," New York, August 7th, 1909.

"Scientific American Supplement," November 6th, 1909.

"The Engineering Magazine," New York, December, 1909.

"The Mexican Mining Journal," October, 1909, and January, 1910.

A SLOCAN, B.C., PIONEER AND HIS MINING PROPERTIES.

BY E. JACOBS.

The death of George W. Hughes, which took place at Portland, Oregon, U.S.A., on June 14, brings to mind remembrance of the active and very useful part he took in the development of the Slocan mining district of British Columbia, particularly in the nineties, in which Slocan mines made large production of silver and lead, and some of them paid considerable amounts of money in the shape of dividends to their then fortunate owners.

The late Mr. Hughes prior to going to the Slocan in 1892 was engaged in railway construction work in northeastern Washington and contiguous parts of the northwestern United States. He took to British Columbia a pack train of some 40 mules, to pack supplies in to the Slocan mines and ore out to Nakusp or Kaslo, for shipment thence to the United States. Becoming impressed with the great ore-producing capabilities of the Slocan, he took a prominent part in road-building, so that it might be practicable to transport larger quantities of ore to the waterways of the country than could well be done by pack train. The wagon road from the heart of the Slocan to Kaslo, on Kootenay Lake, was accordingly built, and this gave the district an outlet for its mineral products to the east, in addition to that to Nakusp, to the westward on Arrow Lake, Columbia River, pro-

vided about the same time. Later, railways were constructed from both those places to Sandon, thereby giving the numerous producing mines of the Slocan competing routes for the transportation of ore to smelters, and for getting in supplies.

After adequate transportation facilities had thus been provided, Mr. Hughes turned his attention to practical mining and for some years managed one or other of several of the mines of the Slocan. Later he acquired large interests in well-known properties, operating them successfully and thereby realizing a competence. Chief among these were the Sunset and Lucky Jim mines, respectively, both of which were important producers of ore, the former of high-grade silver-lead and the latter of zinc. Other properties in which Mr. Hughes became interested as owner or part owner were the Bell, in Jackson Basin; and the Mountain Chief, Apex, and Mammoth, near New Denver. The passing away of the late owner of these mining interests would appear to make the present an opportune time to give some information relative to these properties in the development of which he took so prominent a part, and incidentally contributed to the material progress of the Slocan district.

The Sunset Group.

The Sunset group of six mineral claims is situated on the divide between Jackson Basin and Cody Creek. The group embraces the Sunset, Trade Dollar, No. 3 Fraction, Nabob, Cashier, and Bell. The last-mentioned was not one of the original Sunset group, but was acquired later than the others; it is on the Jackson Basin side of the mountain and is a zinc more than a silver-lead mine.

From a return showing the quantity and value of the total production of the Sunset group, the following figures have been taken: Total output of ore, 2,663 net tons; average metal contents, 132.23 ounces silver per ton and 72.8 per cent. lead; total value of ore produced, \$263,358 gross; smelter, freight and treatment charges per ton, \$14.91; net value of ore per ton, \$83.95.

The first ore met with in the Sunset was on the floor of No. 1 tunnel and the shoot continued down to No. 5, which was the lowest level driven on the claim. This was on the Jackson Basin side of the divide. The best results were obtained in 1898-1899; after those years not nearly so much ore was shipped. The greatest bulk of the ore was taken from Nos. 2 and 3 levels. In the Trade Dollar, No. 1 level was practically non-productive. No. 4 proved a barren level, while No. 5 produced only a little ore. Nos. 6 and 7 were very productive especially the latter. The ore shoot in No. 7 was about three times as long as in No. 6; it has been stoped clear through from No. 7 to No. 6. There is not any connection between Nos. 6 and 5, but there are raises from 5 to 4, 4 to 3, and 3 to 2, respectively. Much of the known ore above No. 7 has been stoped out up to No. 1. The indications are that No. 8 will contain more ore than No. 7 did.

The Sunset mine was closed in the years 1903-1904. In 1905 Mr. A. J. Becker took charge as manager and resumed shipping ore, which he continued until October, 1908. On January 1, 1909, owing to the serious illness of Mr. Hughes, operations were discontinued for the time, and the mine was closed until the following September, by which time it had been conditionally purchased by the Sunset Silver Lead & Zinc Mines Company, incorporated under the laws of the State of Washington. This company has an authorized capital of \$1,000,000 in shares of the par value of \$1. The following constitute its board of directors: R. V. Montague, president; George Robertson, vice-president, and E. R. Locke, secretary-treasurer (all of Mexico, Missouri); A. J. Becker, of Kaslo, B.C., general manager, and J. H. Lothrop, of Spokane, Washington, assistant secretary and treasurer. Beside the Sunset group and Bell, the company acquired the late Mr. Hughes' interests in the New Denver mineral claims already mentioned. Other interests held in those claims are two-thirds in the Mountain Chief by A. W. McCune and associates, and a controlling interest in the Mammoth by Finch & Campbell, of Spokane, Washington.

Immediately after the organization of the Sunset Company and its arrangement to acquire the property, a contract was let for driving No. 8 tunnel on the Cody side of the mountain, with the object of cutting the vein at a lower level and opening up new ground for ore stoping. It was calculated that this adit would have to be driven between 500 and 600 feet to reach the vein at a vertical depth of 246 feet below No. 7 level. The breast of this drive is now 520 feet from the portal, so it will not be long until the vein shall be reached. Thereafter drifting for about 500 feet will be necessary to reach the ore shoot which proved so productive in No. 7, and which, it is believed, will prove to be still

longer on No. 8 level. There are good indications that another shoot of ore will be found in the vein between the point at which the cross-cut will enter it and the calculated position of the continuation of the ore body worked in No. 7. The reason for driving No. 8 from its chosen starting point was that in doing so an exit from the lowest level of the mine clear of snowslides would be thereby provided, and danger to men going to and fro would thus be avoided. In this connection it should be remembered that during nearly half the year there is much snow on Slocan mountains, even where the altitude is only about 6,000 feet, as in the case of the Sunset group, so that it is imperative, for considerations of safety to the miners, portals of tunnels shall if possible be out of the path of the snowslides which come down each recurring season.

The first ore shipped from the Sunset was rawhided over the Jackson Basin trail down to the Kaslo & Slocan Railway at Whitewater, a distance of seven miles. Later, after connection had been made between the Trade Dollar, on the Cody side of the divide, and the Sunset workings on the Jackson Basin side, the ore was sent down to the railway terminus at Cody, distant only two miles, and at an elevation about 2,000 feet lower than that of the Trade Dollar workings. The K. & S. Railway has not been operated beyond McGuigan, which is 10 to 12 miles from Cody, during the two years past, though the rails have been left down in case there shall be a sufficient tonnage of ore available for shipment from mines about Cody to make it worth while for the Great Northern to make the necessary renewals to bridges and trestles, damaged by snowslides, before traffic can be resumed. But even if the railway shall not again be operated, it will be practicable to provide for the transportation of Sunset ore by the construction of an aerial tramway down to the end of the wagon road the Provincial Government has had constructed up Cody Creek to within 2,000 feet of the Trade Dollar workings. This provision for facilitating the shipment of Sunset ore will most likely be made, if the ore shoots now being driven for shall prove up to expectations. Most of the work on the group has been done on the Cody side of the mountain, so that for this reason as well as considerations of cost, the tramway will be built on that side if at all.

The Sunset-Trade Dollar vein does not contain much concentrating ore; in fact the ore met with is practically all clean enough for shipment to the smeltery. What is not is of comparatively little value. An advantage here enjoyed is that when zinc is met with it is usually in bunches, not disseminated through the silver-lead ore, consequently the latter is clean. It is only in the slate country, though, that zinc occurs in the Sunset mine; the ore may be clean silver-lead and suddenly change to clean zinc. The present expectation is that in the future the Sunset mine will be found to contain much pay ore in the porphyry formation; if not, there is not much looked for in the slate. No. 7 tunnel crossed a porphyry dyke about 200 feet in width, and where the vein was in porphyry it produced freely ore of high grade. It is stated that the ore occurring in the porphyry runs higher in silver than that in the slate; it averages two ounces of silver or better per unit of lead in the former, while in the latter it runs only about one ounce and a half per unit.

One of the features of mining in the Slocan now rendering its future hopeful is that mine owners have recognized that in order to make the mines productive much well-considered development work must be done. In

earlier years the custom on most properties was to mine all the ore that could be reached without first having a lot of development work done, and to divide what profits there were, thus making no provision for ensuring the continued working of the mine after the shoot or shoots of ore should have been taken out. Recent years have witnessed a decided change in policy in this respect, and much development has been done, some of it at deep levels, and in several cases with most encouraging results. In degree the owners of the Sunset group have adopted this policy, and the outlook for their mine is that it will again be productive and leave a considerable margin of profit to reward them for their faith in its future and their enterprise.

The Bell Mine.

The following information concerning the Bell mine has been extracted from the "Report of the Commission Appointed to Investigate the Zinc Resources of British Columbia and the Conditions Affecting their Exploitation," published in 1906 by the Mines Branch of the Department of the Interior, Canada. The information was gathered by Mr. Philip Argall, M.E., of Denver, Colorado, U.S.A., one of the members of the Zinc Commission, who visited this mine, among others, in the autumn of 1905. Since that date the Bell has been inoperative, so there is little to add to Mr. Argall's report, in part as under:

"The Bell claim is situated at the head of Jackson Basin, on its eastern side, about three-quarters of a mile from the Jackson mine where the wagon road from Whitewater terminates. This road must be extended to the Bell before steady shipments can be made, except by pack or by rawhiding during the winter months.

"The upper, or No. 1 tunnel was started on a vein of zinc blende, one foot in width, continuing quite regular for ten feet from the portal, where an open fissure comes in, along which the blende widens out to ten feet and continues along the drift at a gradually decreasing width until a slip cuts it off, 30 feet from the portal, at which point the blende was only five feet wide. A stone in the roof from 10 to 25 feet from the portal shows a very good vein of zinc blende. A sample taken across the roof stope for a width of ten feet assayed, silver 2.2 ounces, lead nil, zinc 40 per cent. A small stope in the floor of the drift shows at a depth of five feet an almost solid vein of zinc blende eight feet in width, containing, however, some small ribs of slate, but showing in either end, nine feet apart, almost solid blende. This shoot or chimney of ore should go down for considerable depth and produce a fair tonnage.

"At a distance of 45 feet from the portal there is no vein to be seen, the slips that terminated the ore having reached the floor of the drift; but a cross-cut of 27 feet easterly reached what appears to be a parallel vein on which a drift extends 22 feet northerly, showing two small veinlets of zinc blende in very tight ground, and but a few feet in length. For 20 feet south of the cross-cut the drift is timbered, but from the end of the timbers to the face, a distance of 30 feet, a very solid lens of first-class zinc blende occurs that will average 30 inches in thickness. A sample taken from four cuts across this vein assayed, silver 2.1 ounces, lead 1 per cent., zinc 46.1 per cent. At the south face of the drift, 50 feet from the cross-cut, a porphyry dyke occurs which forms, or parallels, the hanging wall of the blende for some distance. About 30 feet south of the cross-cut a raise goes up ten feet, apparently reaching the top of the lens, which, however, continues strong

and regular in the bottom of the level for the entire distance of 30 feet.

"Two other tunnels are opened below No. 1, but the formation and ore occurrence are different, and I am doubtful if either of these tunnels is on the main deposit opened in the upper tunnel. Two approximately parallel lenses are opened in the upper tunnel, as described, but in the absence of any connecting raises, or even a survey of the workings, one is not justified in pronouncing a positive opinion. Tunnel No. 2 passes through dark slate for 50 feet and then turns northerly on an irregular deposit, showing small veinlets of zinc blende and galena. A short stope or raise has been started at the end of this drift, showing in one place a small lens of galena 10 inches maximum thickness. A winze was also started under the raise, following down the galena, but was full of water. Judging from the ore on the dump some good grade galena and zinc blende had been taken out of these workings.

"The lower, or No. 3 tunnel, goes in for about 100 feet through graphitic slate, and then turns northerly. At this point a streak of zinc blende four inches thick can be traced diagonally across the drift for a length of 15 feet. A little further on a 5-inch parallel streak of fine-grained crushed and slicken-sided blende occurs for a length of 20 feet. At the end of the drift, which is 30 feet from the turn in the main tunnel, a raise or a small stope was found. The platform in the raise, covered with loose rock, prevented one from passing through it. The rock is black slate and the footwall smooth and well-defined, with a southerly dip of 60 degrees.

"The ore lenses are very irregular and have a peculiarity of running diagonally with the vein walls and terminating on contact with them. The 20 foot lens was sampled in three places, which averaged a thickness of five inches, and assayed, silver 2.2 ounces, lead nil, zinc 48.5 per cent.

"This property gives promise, when opened up, of being a good producer of zinc blende. It will be noticed that No. 1 tunnel shows rather a large vein of high-grade zinc blende, with practically no galena, while the lower tunnels show small irregular lenses of both galena and zinc blende, like the average Slovan veins. The deposit of high-grade, almost lead-free, blende in No. 1 however, more nearly resembles the Lucky Jim type of ore deposit."

The Lucky Jim Mine.

Mr. Argall also examined the Lucky Jim mine, which last year shipped more zinc than any other mine in British Columbia. Extracts from his published report follow:

"This property, situated at Bear Lake, Slovan, is owned by Mr. G. W. Hughes and associate. It consists of 12 mining claims and fractions, aggregating about 350 acres. The Lucky Jim vein was discovered in 1892 and worked irregularly for some years for silver-lead ore; during the years 1896-1899 concentrating ore amounting to 5,641 tons was produced, from which 1,600 tons of zinc blende averaging 50 per cent. zinc was sorted out. The remainder, a zinc-lead product, was sold to the owners of the Pilot Bay concentrating and smelting works. The 1,600 tons of zinc ore assaying about six ounces of silver per ton, three per cent. lead, and 50 per cent. zinc, was shipped partly to Antwerp, Belgium, and partly to the Fry process works on the Manchester Ship Canal, England, a special freight rate of \$14.50 per ton having been secured from the mine to these works, but unfortunately the works, the process and its inventor all came to grief about the time the ore arriv-

ed in England and the shippers gained nothing but experience by the transaction.

"During 1901-2 the property was shut down, but it was re-opened in 1903 by Mr. G. W. Hughes, the present owner, who has declared dividends of \$100,000 as the result of zinc ore shipments during 1904 and 1905.

"The production under Mr. Hughes' management up to the end of 1905 amounted to 5,345 tons of zinc blende averaging 54 per cent. zinc, a small portion of the tonnage being concentrates from a trial shipment to the Payne concentrator at Sandon.

"Development.—The property is developed by five tunnels, the uppermost worked exclusively for silver-lead ore and now abandoned, being situated at an elevation of 4,551 feet above sea level. The Slide tunnel, so called because its portal is situated on the slide of the gulch, in the track of a large snowslide, is at an elevation of 4,474 feet. A second tunnel (Safety tunnel) was driven in at this same elevation from a sheltered point on the side of the mountain and connected with the workings of the Slide tunnel, so that men can enter or leave the mine in safety when slides are running in the gulch.

"Two tunnels, one on the east and one on the west side of the gulch, have their portals at an elevation of 4,366 feet. These tunnels (called No. 2) are connected with the Kaslo & Slocan Railway by a gravity tram 1,300 feet long, with a fall of 830 feet. These tunnels, together with the branch levels, aggregate about 3,000 feet of drifts.

"Geological.—The Lucky Jim ore deposit differs so much from the general run of the Slocan vein series, that a short note on the geological conditions is necessary to a clear understanding of the ore occurrence at this very interesting mine. In a word, the ore is found in a zone of limestone and calcareous slate where penetrated by fissures, and invariably in the purer crystalline limestone of the zone. The footwall of the limestone zone is a hard dark green fissile slate, more or less pyritiferous near the plane of contact with the limestone. Impure quartzite beds occur in the footwall slates, but not in the vicinity of the ore deposits. The hanging-wall country, as seen in No. 2 tunnel, appears to be the average graphitic slate of the Slocan series. The foot and hanging country is separated by about 100 feet of calcareous slates, limestone, etc., that make up what I shall call the limestone zone. The pay ore occurs in chimney-like columns in the purer limestone, invariably along some line of fissuring, or extending along the fissure in vein-like form, where limestone forms one or both of the fissure walls. The fissuring, like most of the Slocan series, is greatest at the present surface, and becomes less in depth, the minor fissures often disappearing in less than 100 feet from the surface. These latter, however, are confined to the limestone zone, and are more properly called incipient fissures. The key to this ore deposit is, however, the east-west fissures crossing the strike of the limestone zone and this fact should not be lost sight of in prospecting at the Jucky Jim, or other properties along the strike of the limestone zone to the south."

Mr. Argall's detailed description of the mine workings is too long for reproduction here. It may be found by those requiring to read it on pp. 201-6 of the Zinc Commission's report, above mentioned. Concluding, Mr. Argall observed: "The Lucky Jim ore deposits occur in a limestone zone in part interbedded with the slates. This zone consists of crystalline limestone of great purity, calcareous slates and dark impure limestone bands

which in some places follow the strike of the slates and in other places are of irregular form, more particularly the crystalline limestone in which the two developed ore chimneys occur. The ore deposits occur in association with a system of vertical fissures crossing the zone at about right angles to its strike. The fissuring is best and largest near the surface and does not continue very strong in depth. Future prospecting should therefore take the form of developing the cross fissures at a shallow or moderate depth in the limestone zone. Moreover, the shallow deposits carry galena and very clean blende, while in the deepest workings a fine-grained pyrites and pyrrhotite occur in quantity, mixed with the blende, and hence the deep ores will require a concentration mill and magnetic separator to handle them effectively. The Lucky Jim mine should produce large quantities of concentrating ore as well as the high-grade zinc for which it is famous. Further development along the strike of the limestone will in the fissured zones undoubtedly result in the discovery of other deposits of high-grade blende."

Since the Zinc Commission made its report the Lucky Jim property has passed into other hands. In 1909 it was acquired by Mr. G. Weaver Loper, of Spokane, Washington, U.S.A., and associates, who organized the Lucky Jim Mines, Limited, and have been operating the property for more than a year. In February of that year the new owners obtained possession of the mine, and they were reported to have spent during that year about \$50,000, including the cost of overhaul of machinery, erection of new buildings for the accommodation of the miners, and development work. The year's output of zinc ore exceeded 5,000 tons, averaging about 50 per cent. zinc. Besides cross-cutting, and sinking a winze from the upper workings, the driving of another tunnel was undertaken, at such a depth below the old workings as to give 300 feet more stoping ground on the dip of the ore. Production has thus far all been from ground above No. 4 tunnel. The new tunnel is 250 feet vertical depth below the lowest old tunnel in the mine. The present owners state that the ore occurs in fractures crossing the lime dyke, which varies in width up to 250 feet. The fractures are from 12 to 50 feet wide and in places are filled with zinc ore, and sometimes with lead and zinc ores mixed. The zinc ores run up to 54 per cent. zinc, and the lead ores 68 to 75 per cent. lead, with silver averaging about one ounce to the unit of lead. The quantity of milling ore available at the close of 1909 was estimated at about 60,000 tons, this containing 8 to 10 per cent. lead, 25 to 30 per cent. zinc, and 10 ounces silver per ton. This ore will not be utilized until after a concentrating mill shall have been erected and equipped. The proposal is to put in a plant that will supplement production up to a total of 1,500 tons of 50 per cent. zinc ore and concentrate. It could be noted that the estimated values of the ores as just given are higher than those quoted by Mr. Argall, but they are given as stated by a representative of the company.

Quite recent notes relative to this property are as follows: "An aerial tramway is being constructed from the portal of the lowest tunnel of the Lucky Jim mine down to the Kaslo & Slocan Railway below. Heretofore the zinc ore shipped has been sent down over a gravity tramway to the shipping bin alongside the railway. During the latter part of 1909 a tunnel was driven to cut one of the big ore shoots at greater depth. In December, at 380 feet in, this ore shoot was entered; now the tunnel is being extended towards a second big

shoot of ore distant between 800 and 900 feet from the mouth of the adit. This shoot should be reached by the end of June. About the same time the new tramway should be completed, for the cables are on the ground, timbers for the upper terminal and derricks are framed, and the ore bin at the lower terminal about finished. The length of this tramway will be approximately 1,000 feet. By the middle of July ore should be coming down from the lower tunnel, and thereafter shipments should amount to between 300 and 400 tons per week.

"The last winter's development work also included putting up two raises, each about 80 feet, from adit No. 4 to No. 3. One is through and the other within 10 feet of making connection. Between 30 and 35 men are employed, with Mr. Charles Norman as resident foreman. Mr. A. J. Becker, of Kaslo, is superintendent for the Lucky Jim Mines, Limited."

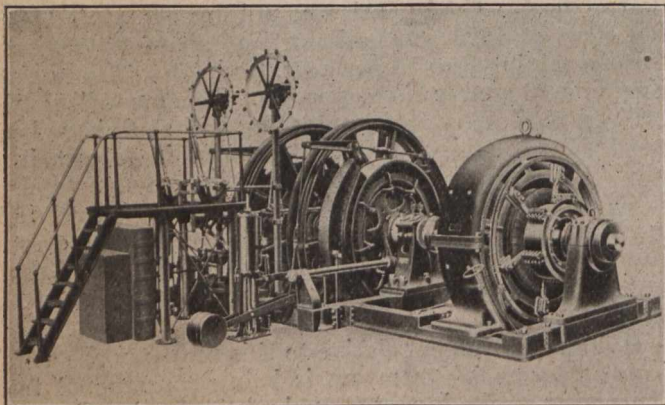
The Lucky Jim Company's head office is in Spokane, Washington, and Mr. G. Weaver Loper is managing director. He is at present energetically pushing the proposed concentrator erection scheme, and is determined to make the operations of the company both large and successful.

The Mountain Chief Group.

Not much information is available concerning this property, which is situated on the south side of Carpenter Creek, about a mile and a half from New Denver, this town being on Slocan Lake. There is an excellent wagon road to within a quarter of a mile of the principal tunnels, and thence to the mine there is a good pack trail. No work has been done on the property for several years, owing, it is said, to disagreement between two of the former owners. The ore lying on the dump, and some sacked at the mine, was assayed for the Zinc Commission, and showed that it contained fair value in silver, lead, and zinc. The value of the property as a prospective shipping mine is, however, under existing conditions, not ascertainable.

THE HECLA MINE HOIST.

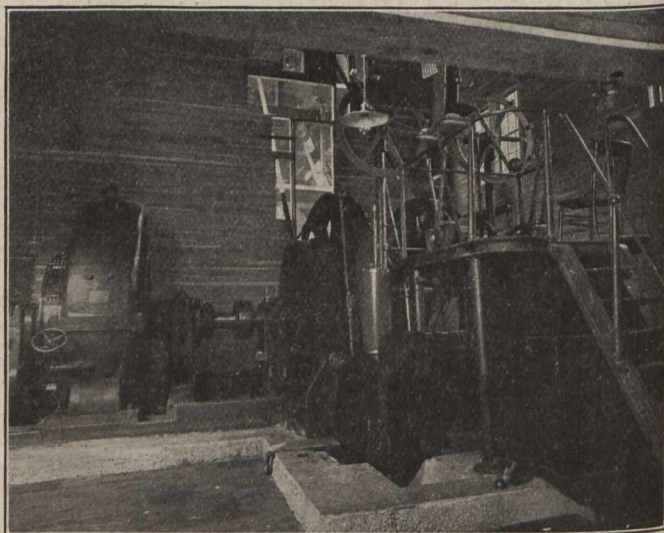
The operation of large electric hoists, with mutual satisfaction to the mining company and the power company, has, during the past few years, received very careful consideration, and to-day there is no question but that this problem has been satisfactorily solved.



Hoist—Shop View.

With the introduction of the polyphase alternating current generators and high tension transmission lines, electric power has become available in most of the great mining districts. The simplest method of utilizing this power for hoist work is through the direct

application of an alternating current induction motor. If the capacity of the hoist is comparatively small, this is quite satisfactory, but where heavy loads must be handled at high speed, the peak due to acceleration of the moving parts, is often far in excess of the average requirements of the hoist, in which case, if the current is purchased from a power company which also carries a lighting load, the voltage fluctuation at each recurrence of the hoist cycle peak will prove most objectionable. If the hoist is located at the end of a long transmission line, and excessive amount of copper must be installed to prevent an undue drop in the voltage during the maximum demand. In any case, the power company must install all its equipment with reference to the peak instead of the average load, and must



Hoist, as Installed.

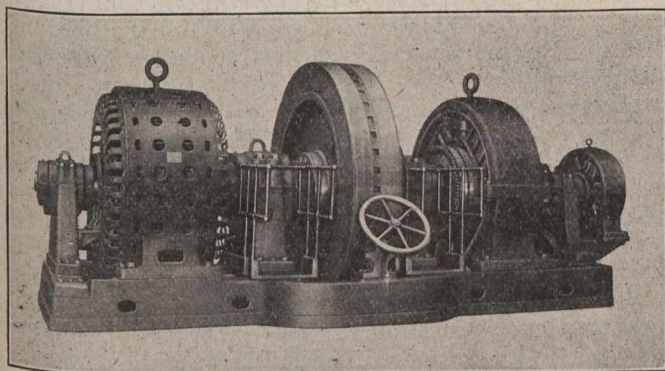
charge accordingly. To meet these conditions the fly-wheel motor-generator type of hoist has been developed. The essential parts of such a hoist system are:

- (A) A shunt wound direct current motor geared or coupled to the hoisting drums.
- (B) A fly-wheel motor-generator set, consisting of:
 - (a) An alternating current induction motor with variable external secondary resistance.
 - (b) A direct current shunt wound generator with auxiliary commutating poles.
 - (c) A heavy fly-wheel mounted on the motor-generator shaft.
 - (d) A direct current exciter for separately exciting both generator and hoist motor.
- (C) A slip regulator which by varying the secondary resistance of the A. C. motor causes it to slow down under heavy loads.
- (D) A suitable controller for varying and reversing the D. C. generator field current.

The armatures of the D. C. generator and hoist motor are connected in series and the field of each machine is separately excited, constant full field being maintained on the motor. The hoist is started by applying a gradually increasing field to the generator, thus causing a proportionate voltage to be impressed upon the armature of the hoist motor. When the load on the A. C. motor reaches a predetermined limit, resistance is automatically cut into its secondary circuit by means of the slip regulator. The speed of the motor-generator is thus reduced and a portion of the stored

energy in the fly-wheel utilized in overcoming the peak of the hoisting cycle, with a minimum demand on the power system. In stopping the hoist at the end of a cycle the generator field is gradually weakened so that any excess energy stored in the descending cage, rotating hoist motor, and drums, is returned to the fly-wheel through the D. C. generator, which momentarily acts as a motor, receiving electrical energy from the hoist motor, the functions of which are also momentarily reversed. To reverse the hoist, the field of the generator is reversed, causing the motor to rotate in the opposite direction. The heavy peak loads are thus eliminated from the line, and the wear on the mechanical brakes is very much reduced. Since the current handled by the controller is very small, a great many steps can be provided, giving the operator a very elastic and sensitive control under all conditions.

Perhaps no electric hoisting plant has attracted more attention from the mining men of the entire country than that of the Hecla Mining Company at Burke, Idaho; the American Institute of Mining Engineers during their 1909 tour, made the trip to this mine for the express purpose of inspecting the installation.



Motor, Generator Set.

The power available for this plant is 3 phase, 60 cycle current, ranging from 2,080 to 2,300 volts. The motor generator, Figure 1, is self-contained, having a cast iron base, four bearings, and shaft. A 450 h.p., 3 phase, 60 cycle motor drives the direct current generator, which is equipped with commutating poles to enable it to handle full load current at any voltage between 0 and 600 volts. The fly-wheel, weighing 30,000 lbs., is mounted on the shaft between the motor and generator, while the direct connected exciter is carried upon the shaft extension at the end of the set. The direct current 550-h.p., 600-volt hoist motor, operating at 60 r. p.m. (Figure 2), is direct connected to the main reel shaft by a flange coupling.

The control of the direct current circuit for operating the hoist is obtained by means of a lever, the forward movement of which starts the hoist in one direction, and the backward movement in the opposite direction. This lever is direct connected to a reversing field rheostat with a large number of points; since it is used to vary the generator voltage instead of cutting resistance into and out of the hoist motor armature circuit, economical operation is secured at all points, whenever conditions necessitate running at lower than normal speed. All the operating levers have the same direction of throw with a movement of less than thirty inches. They are conveniently grouped upon a raised platform, consisting of an iron frame and hardwood floor, with a suitable stairway leading from the engine

room floor to the platform, and a brass hand rail enclosing the stairway and platform. The entire electrical equipment described above was supplied by the Westinghouse Electric & Manufacturing Company.

The hoist, Figure 3, which was built by the Wellman-Seaver-Morgan Company, consists of two reels, each capable of holding 2,500 feet of 3-8-in. x 4-in. flat rope. Under normal conditions the hoist operates balanced; that is, the empty cage descends as the loaded cage is raised. If desired, however, either reel may be operated independently of the other. The winding diameter of the reel varies from a minimum of five feet when empty, to a maximum of thirteen feet when the entire 2,500 feet of rope is wound up. Each of these reels is fitted with a Webster, Camp & Lane band friction clutch, post brake, and indicator.

The brakes, which are operated by means of combined air and oil cylinders and heavy counterweights, are so designed that they are set by the weights and released by means of air cylinders.

This hoist has a maximum hoisting speed of 2,400 feet per minute, and will handle an unbalanced load of 16,000 lbs. including rope, from a depth of 2,500 feet, yet its operation is the acme of simplicity.

The complete equipment, including the motor-generator set, hoist motor, slip regulator, switchboard and hoist, weighs over 300,000 pounds.

ONTARIO MINERAL OUTPUT FIRST QUARTER OF 1910.

Returns to the Bureau of Mines show that the output of the metalliferous mines and works of Ontario for the three months ending 31st March, 1910, was as follows:

	Quantity.	Value.
Silver, ounces	6,399,927	\$3,041,158
Cobalt, tons	78*	14,485
Copper, tons	2,491	357,074
Nickel, tons	5,250	1,131,024
Iron ore, tons	6,735	15,034
Pig iron, tons	109,718	1,750,396

* Only cobalt paid for included.

Shipments from the silver mines of Cobalt and adjoining regions aggregate 7,155 tons, of which 6,094 tons were ore and 1,061 tons concentrates. The ore shipped averaged 864 ounces silver per ton, and the concentrates 1,066 ounces. Of the shipments, 271 tons of ore came from mines in the Gowganda region, containing 287,316 ounces of silver. For the corresponding quarter of 1909 shipments from Cobalt were 6,833 tons ore and 290 tons concentrates, containing together 5,628,860 ounces of silver, the increase for the quarter being about 14 per cent. During the three months there were treated at the silver reduction works of Ontario 2,053 tons of ore and concentrates, containing nearly 50 per cent. of the total yield of silver. Low grade ores continue to go to the United States, but the concentration of low grade material has become an established feature of the practice at Cobalt.

The nickel-copper mines of Sudbury were very active during the quarter, and turned out nearly double the quantity of nickel produced during the first three months of 1909, namely, 5,250 tons as compared with 2,794 tons. The output of copper was also larger, being 2,491 tons as against 1,906 tons during the first quarter of 1909. The movement of iron ore during the first quarter of the year is always small, as the season of navigation does not open until after the quarter closes. The output of pig iron was slightly greater than during the same period of 1909.

OUR EUROPEAN LETTER.

England at last steps into line on the question of providing proper mining rescue apparatus. Details of new proposals. Further colliery reports show big drop in profits but condition not unsatisfactory. Monks as early coal getters. Important opinions on electric power in collieries. A new oil mine locomotive. The Rand dividend season.

Exclusive correspondence of CANADIAN MINING JOURNAL

London, June 18th, 1910.

The reproach is at last to be removed from England that she is one of the backward countries of the world in the provision of proper rescue apparatus for mines. Winston Churchill, for the Home Office, admitted in Parliament on June 16th, that the Whitehaven disaster had lent a stimulus to the discussion of this question. He announced that within the last two years coal owners in this country had spent \$50,000 on experiments with life-saving appliances. While full recognition was paid to this enterprise, there was nevertheless a general agreement in Parliament that the work was one which should be undertaken by the Government rather than left to individual effort. Already in consultation with various experts, the Home Office has drawn up an important series of regulations which, if finally adopted, will have the effect of standardizing the work of rescue in coal mine accidents.

It is proposed that a central rescue station shall be established in each coal field, with sub-stations at each of the neighbouring mines. This central station will resemble a miniature coal mine, in which selected men from the mines of the district will be trained to use the oxygen breathing apparatus, and to make their way through all kinds of obstacles to reach the victims of a supposed disaster. At each central station there will be kept twenty complete sets of breathing apparatus, stocks of oxygen, and smoke helmets. A motor car also is to be kept in constant readiness to proceed wherever help may be needed.

At the sub-stations which will be established at each mine, there must be kept five complete sets of breathing apparatus, five electric hand lamps, one stretcher with oxygen appliance for bringing unconscious men safely through poisonous gases, one apparatus for reviving men overcome by choke-damp, and an ambulance outfit.

The central station is to be connected by telephone with all the mines in the district.

Annual reports of colliery companies that have come to hand since I dealt with the last group continue to show the effect of the drop in prices and of the coming into force of the Miners' Eight Hours Act in 1909. A decrease of about 11 per cent. in export values could not but fail to lower profits, and since it, unfortunately, happened that the cost of production increased through the readjustments rendered necessary by the new legislation, the industry has had to bear a double burden. Having regard to the cumulative influence of these factors, it is really a matter of congratulation that the various undertakings are able to make as excellent a showing as they do. The Welsh companies have undoubtedly been harder hit than any others, but the enormous extent of their trade has also enabled them better than most to stand the strain of the troublous times out of which they are now, one is emboldened to think, definitely emerging.

Taking thirteen concerns covering the whole country

whose reports are just to hand, I find the average decline in profit is about 36 per cent., but the individual showing varies considerably. In one or two instances earnings have advanced and losses have been converted into surpluses; in only two cases has a previous profit become a deficit.

The big Welsh firms, such as Partridge Jones & Company, the United National, Locket's Merthyr and the Penrikyher Navigation, register reduction in profits ranging from 48 per cent. in the case of the United National to 60 per cent. in the case of Locket's Merthyr. There is, however, barely 12 per cent. between the maximum and the minimum, which demonstrates how evenly the South Wales field was affected in contrast to the much more fluctuating character of changes in other parts of the country. In each of the above instances the ordinary distributions were naturally lowered, but as the amounts paid were not below 7 1-2 per cent. and went up to 15 per cent., it cannot be said that an undue part of the past year's burdens were transferred to the shoulders of the ordinary proprietors.

Amongst the earliest coal getters in this country were monks. When President Simpson of the Institution of Mining Engineers had occasion to investigate some titles of mining royalties near Newcastle-upon-Tyne, he discovered that the monks of Tynemouth had carried on coal mining in Northumberland in early times, dating from the latter part of the twelfth century. These records had induced him to study also the history of coal mining in the neighbouring County of Durham, where he found that under the auspices of the monks of the Palatinate the industry had been carried on in various places with great vigour, which led him to conclude that they had been more extensive workers of coal than was generally supposed. Further investigations had elucidated the fact that in other parts of England as well as in Scotland and in Wales where coal existed in the neighbourhood of monasteries it had been worked by the monks. It was generally surmised that the Romans during their occupation of Britain worked coal, but there was not much evidence to that effect. There was, however, abundant evidence that they worked ironstone and other minerals. The accounts of working coal in Saxon times were scanty and obscure. Little working seemed indeed to have taken place until after the Norman Conquest. The President proceeded to give many details of the information which he had gleaned of coal mining by the monks, and the source of revenue which was thus afforded to the monasteries up till the time of the dissolution of these institutions.

The Mining Institute of Scotland has been discussing electric power in collieries. Two important papers were read, one by Frank Anslow and one by Robert Crawford and Harold Moores in collaboration. Frank Anslow discussed the controversy which is raging just now as to the relative advantages of three-phase and direct current for colliery work. He did not propose to enter into discussion at this stage other than to say that when a supply is taken from a supply company there is no option but to adopt the system at which the supply is given, if capital expenditure is to be avoided. For all practical purposes each system is equally dangerous, or perhaps it is better to say equally safe if properly installed under conditions suitable for the system selected. One of the main objections raised to direct current plant was upon the score of sparking. The improvements in the design of this plant had resulted in prac-

tically sparkless commutation even under severe overload conditions, but it would not be disputed that the danger of ignition of gas or coal dust from this cause still existed. However, this danger was also present with alternating current slip ring motors, and also in a modified degree with those of the squirrel cage or short circuited type.

On the subject of coal cutters, Mr. Anslow said that from a working point of view direct current coal cutters were superior to those operated by alternating current, but the latter type had proved itself quite reliable and satisfactory in working. In conclusion he remarked that given these essentials which had been present in all the successful developments of electric power in other directions, and which were even more necessary in colliery work, they could look forward with all confidence to the future of the power in the knowledge that it would not only outlive the suspicion with which it was at present looked upon, but would further extend its field of usefulness.

Crawford & Moores dealt with power production at collieries with special reference to gas power and electric centralization. They pointed out that the production of cheap power at collieries was a question of vital importance demanding more and more attention year by year in proportion to the drop in price of the saleable article, due to the pressure of highly competitive times, the comparatively less efficiency of colliery plants in general, and the increased depth at which the coal was being worked. The growing need for economy made the subject of power cost one to which the colliery manager must devote considerable attention with a view to transmitting and generating his power in such a manner as would ensure the highest possible efficiency. The report of the Royal Commission on Coal Supplies pointed out that collieries were extremely wasteful in the amount of fuel consumed in driving their own plant, the annual consumption in British mines reaching the enormous total of 18,000,000 tons. This was equivalent to about 7 per cent of the total output, while it was an ascertained fact that in some individual cases the consumption in the colliery boilers reached the high proportion of 11 per cent. This proved the urgent need for economy, and the intention of the present paper was to demonstrate that very high economies could be obtained by various methods and in varying degrees, according to individual circumstances.

The authors at considerable length illustrated how in their opinion savings could be effected in regard to non-bituminous pressure gas plants, non-bituminous suction gas plants, bituminous suction gas plants, and bituminous pressure gas plants, while they called special attention to the Mond gas plant, a type of plant which they considered to be adapted for power installations of over 2,000 horse-power. Finally, they argued that a gas-driven central electrical power station for a group of collieries was the ideal arrangement where circumstances admitted of the outlay which such a scheme involved; and there appeared to be no doubt that many such would spring into existence during the next few years with a view to using to the best advantage the heat possibilities of the coal consumed.

A most efficient and well-designed mine locomotive of the internal combustion type is being supplied by an English firm to German and Austrian owners. Owing to its special design and small wheel base, it can traverse the most confined mines' roads and turn curves of very small radius without losing engine power. A skilful arrangement also exists for the condensation of

its exhaust gases. Powers run from 6 to 50 h.p., and they can haul loads varying from 15 to 150 tons at speeds from 4 to 14 miles per hour. The motor is an ordinary single cylinder one and ignition is effected by a low tension magneto. For underground haulage in fiery mines both terminals in accordance with Austrian regulations for coal mines are insulated and the current conveyed to and from the sparking points in special metallic woven tables. Further indication of the explosion proof character of the locomotive is given by the total elimination of any form of carburetter outside the cylinder. A 12 h.p. locomotive is found to consume during a ten hours' trip about 5 gallons of fuel and a saving of two-thirds in the cost can be shown as compared with horse haulage.

The Rand dividend announcement season has now well begun, and, roughly, about half the dividend payers have informed their shareholders what dividends are to accrue to them. The showing, as was expected, is not a very good one, and it becomes a matter of satisfaction to find so many companies maintaining the June distribution at the level paid in respect of the last half year of 1909. The only advances, so far, are the Consolidated Main Reef's 7 1-2 per cent. for the half year, and the new Goch 7 1-2 per cent. for the half year, as against its 10 per cent. for the preceding whole year. On the other hand, the Modderfontein goes back to the rate it paid in June last year, although something better than this had been expected in view of the provision of further working resources by the recent issue of shares at \$55 each. This time there is no bonus with the Ferreira's return. Perhaps the best picture of the Rand returns is shown by working out the approximate yield per annum on a basis of the last twelve months' dividend and the current market price. Here, however, the exceptionally high yields are usually due to the remarkable period of the mines' life being comparatively short, and the exceptionally low returns sometimes discount better things in the future. Prominent in the former category figure the Ferreira and the Meyer Consolidated, Knight's Durban Roodepoort, Kleinfontein, Langlaagte, Simmer and Witwatersrand Deep, show up well amongst the mines with a fairly long period of life still in front of them.

Yield per annum
to investor, p.c.

Village Deep	4
New Modderfontein	5
East Rand Proprietary	7½
New Goch	8
Main Reef West	8¼
Rose Deep ..	9
Geldenhuis Deep	9
Meyer & Charlton	9¼
Van Ryn	9½
Langlaagte Estate	10
New Kleinfontein	10
Witwatersrand Deep	10¼
Nigel	10½
Knight's Deep	11
Consolidated Main Reef	12
Simmer and Jack	12
New Heriot	12½
Princess Estate ..	12½
Durban Roodeport Gold	13
Village Main Reef	16
Ferreira Gold	21
May Consolidated	32

NEW EMERGENCY SIGNALING APPARATUS FOR MINES.

The great value of an emergency signaling system for mine use, whereby a signal may be given simultaneously in every mine working, on every mine level, and reaching every man, is acknowledged by all mine operators. In some states the installation of such a system for the protection of the workmen in the mines has been compulsory by special legislation.

The value of such a system, which is used only in case of fire, flood or accident, is that its signal is an indication of danger and a command for every man in the mine to leave his work immediately and come to the surface. The size of the gongs for such a signaling system is required by law to be not less than eight

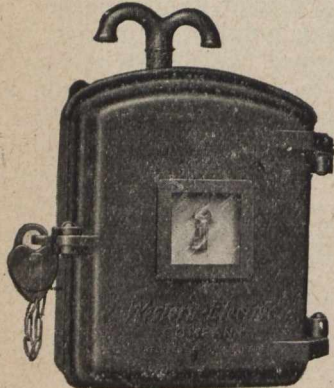


Fig. 1.

inches in diameter. The signal is thus made distinctive, differing greatly from the telephone and hoisting bell calls, and is so loud and clear as to reach for long distances in the mine levels.

The Western Electric Company has designed an emergency signaling system which meets the requirements of the laws of Illinois and other states for this service. It comprises a generator signaling set, as shown in Figs. 1, 2 and 3; emergency signal bells or gongs, as shown by Fig. 4, and the necessary wiring.

The generator signaling set consists of a strong metal case containing a hand generator and the line termi-

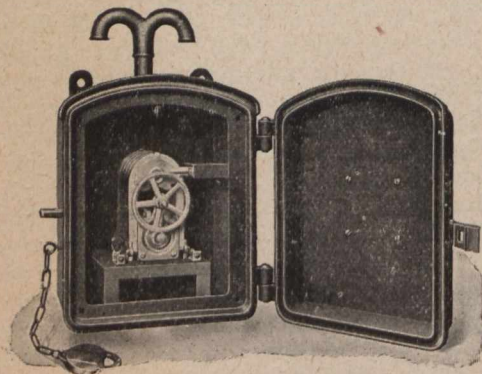


Fig. 2.

nals. It is provided with a strong hasp and staple and is locked with a padlock. On the front of the cover within a small box having a glass window, as shown by Fig. 1, hangs the key to the lock. Only in case of emergency the glass window is broken and the key used to open the set so that the crank which signals the alarm can be turned.

When the set is open for use a sheet metal partition protects the generator from injury, moisture, dust and

foreign particles. Through this partition only the handle of the generator projects. The metal case of this set is protected by special treatment from rust and corrosion, due to gases.

The most important part of this signaling set, and, in fact, any emergency signaling system is the generator that supplies the source of the signaling current. In such a system the failure of the signaling apparatus involves serious consequences. Dry batteries are unreliable and inadequate as they deteriorate even when not in use, and need frequent inspection and renewals. A generator is the most satisfactory means of furnishing signaling current, as it is always ready to deliver current for an indefinite length of time and does not deteriorate either in use or when standing idle.

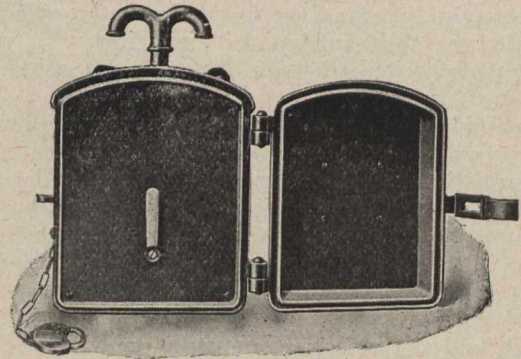


Fig. 3.

The hand generators used in the two new Western Electric signaling sets, come in five-bar and fourteen-bar sizes; each is a compact, durable and well-constructed generator, built for the most severe service. The magnets, both in the five-bar and fourteen-bar types, are of the highest grade tungsten steel and are hardened and aged to insure retaining their strength indefinitely. The bearings are large and well-proportioned. The five-bar generator is very efficient under practical working conditions and will ring perfectly the equivalent of twenty eight-inch loud ringing emergency signal gongs on an eight-mile full metallic line of No. 12 B. W. G. iron wire.

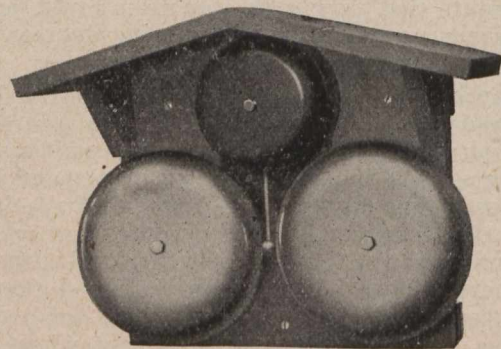


Fig. 4.

The larger generator equipment consists of a fourteen-magnet generator mounted in a metal case similar to that of the five-magnet equipment, but a little larger. This generator will ring the equivalent of sixty of the eight-inch gongs over an eight-mile line.

The generator of the signal set on this emergency system furnishes the current for ringing all the bells in the system. No batteries are needed and all the troubles of battery deterioration, failure and renewal are obviated. There are no switches to open and close—simply turning a handle rings all the bells. When

not in use the generator is on open circuit, and turning the crank automatically closes the circuit. The windings of each generator are specially treated with insulating material, making them moisture-proof and insuring continuous service.

The emergency signal bell, Fig. 4, of the Western Electric signal system, consists of a non-sparking bell provided with two eight-inch gongs mounted upon a backboard having a protecting canopy. The gongs are hot galvanized and have an especially loud, clear tone.

All metal parts are specially treated to adapt them for use in mines.

The signal system above described may be used with or independent of a telephone system. For mine telephone service the Western Electric Company has new designs of metal and wood sets, and also a new design of an intercommunicating metal mine set, all of which are fully up to the standard of the telephone apparatus furnished to the telephone companies in the "Bell" system, who are its principal customers.

A UNIQUE TUNNELING MACHINE.

By Frank C. Perkins.

A most interesting form of tunneling machine has recently been devised at Denver, Colorado, the details of construction being shown in illustration Fig. 1, and drawing Figs. 2 and 3, while the method of operation of the same in tunnel work with electric locomotives for conveying the material as excavated from the tunnel is indicated in the accompanying illustration, Fig.

4. There is no doubt a great field for a practical machine for tunneling through hard substances, for, although the present process of drilling and blasting is effective, it is slow and costly. A blast is a dangerous thing, especially when used in close proximity to foundation.

It may be stated that the success or failure of any

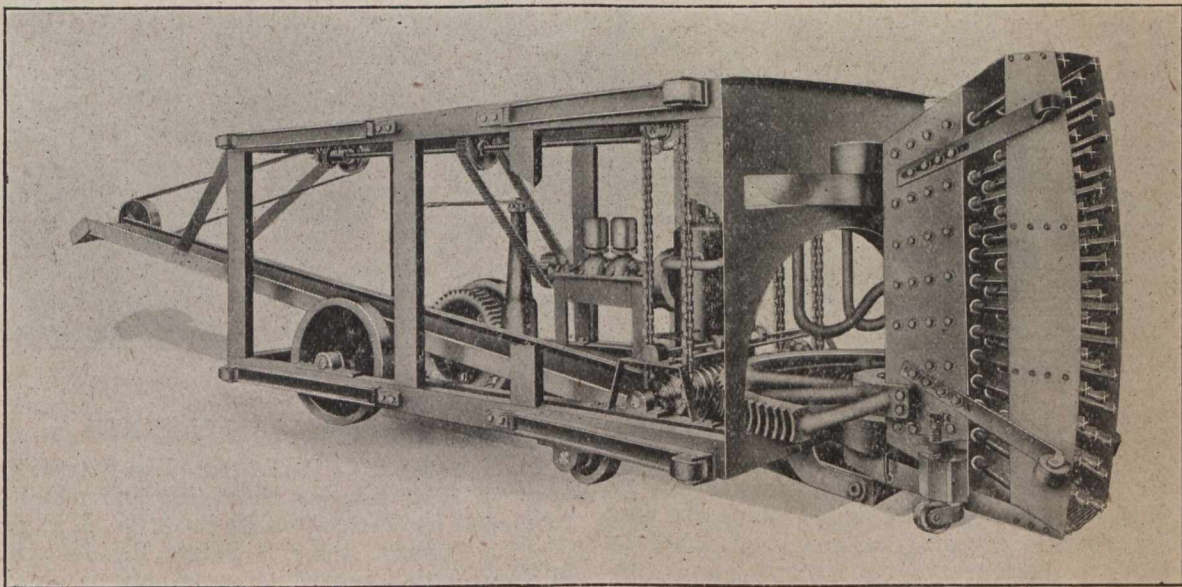


Fig. 1.

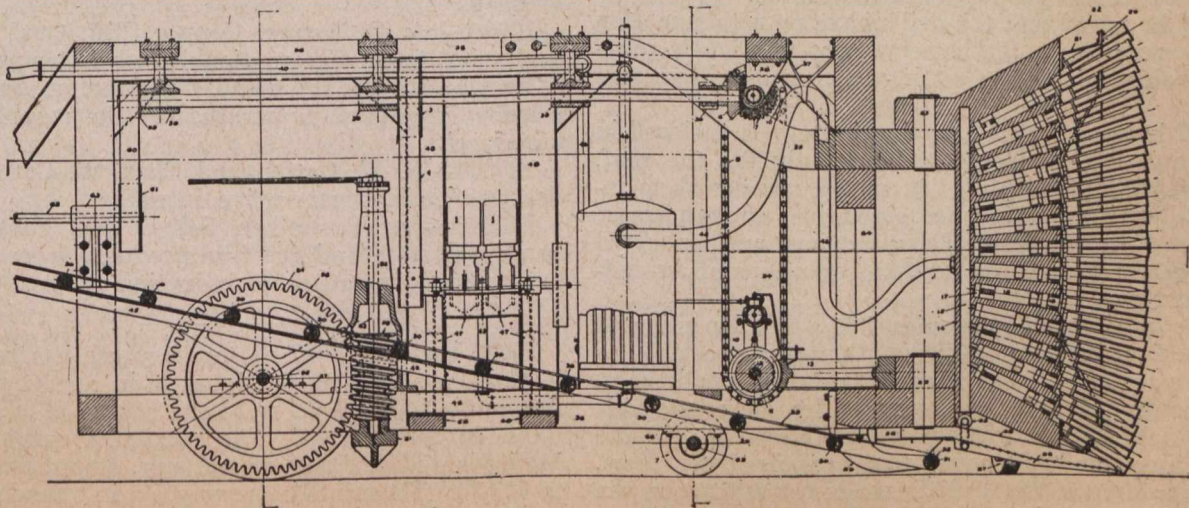


Fig. 2.

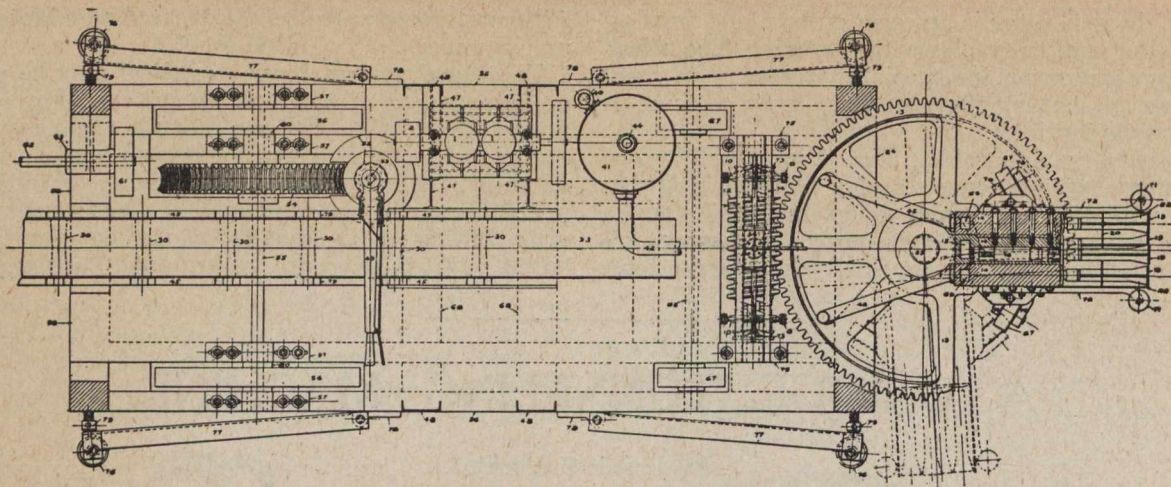


Fig. 3.

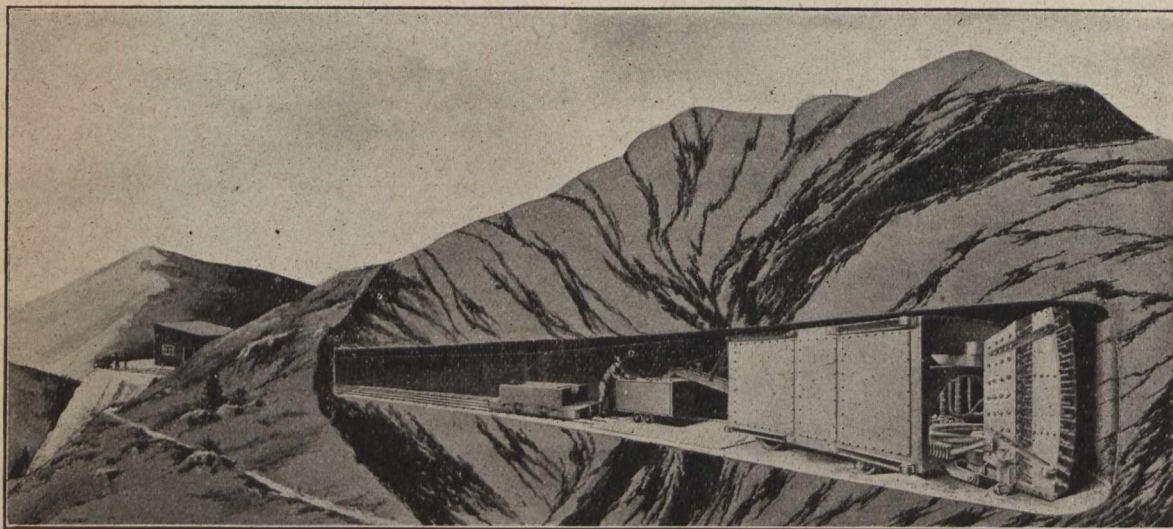


Fig. 4.

tunnel machine rests almost entirely in the effectiveness of its cutting head, which is the first consideration. The Fowler machine noted in the illustrations is equipped with forty-one hammer drills, which are used as a battery set into a casing of cast steel, hung by massive hinges to the frame of the machine. In operation, this battery of drills and the casing which incases it, is swung backward and forward, by means of a worm gear, across the breast of the tunnel.

It will be noted that the drills have no rotary motion but are arranged in the battery so as to slightly overlap in their work, as the cutting head swings from side to side.

It will be seen that the cutting battery is enclosed in a steel and rubber casing which snugly fits the roof, floor and face of the tunnel in such a manner as to inclose all cuttings, which are given just enough water to render them dustless. These cuttings are connected to cars at the rear of the machine by means of an endless conveyor.

As the cutting head occupies but a small portion of the breast of the tunnel, it is, therefore, possible to have free access to the surface of the breast at all times.

For power the drills are operated by compressed air and as each cutting unit strikes 600 blows per minute with a force of 1,150 pounds on each drill per blow, we have a force of 28,900,000 pounds per minute on the breast of the tunnel.

CANADIAN PATENTS.

The following is a list of Canadian patents granted on May 31, 1910, relating to mining and metallurgy, and furnished by Fetherstonhaugh & Co., 5 Elgin Street, Ottawa, Canada, Russel S. Smart, Resident, from whom all information regarding same may be obtained.

125961—T. L. Willson, and Maximilian Haff, Ottawa, Canada, metallurgical processes and products. T. L. Willson.

125969—A. P. Turner, Copper Cliff, Ont., converter hoods and flues. International Nickel Company.

125991—P. B. Martyn and Wm. Martyn, Audrie, Lanarkshire, Scotland, apparatus for the manufacture of metal grit.

125990—A. W. Catton and Chas. W. Cattons, West Seattle, Wash, regenerative furnaces.

126046—Jas. C. Kelker, Selby, Cal., apparatus for handling matte and the like products from blast furnaces, smelters and other reduction works.

Since the year 1897 no mercury ore has been mined in Canada. Pockets of cinnabar in quartz veins near Kamloops Lake, B.C., were the source of all recorded Canadian production. The maximum output, that of 1895, yielded 71 flasks of mercury, amounting in value to \$2,343. The annual consumption in Canada is valued at about \$100,000.

PLACER GOLD MINING IN BRITISH COLUMBIA.

Present indications are that this year there will be larger returns from placer gold mining in British Columbia than in 1909. This, by the way, is not saying a great deal for the industry, since the official records show that last year's production of placer gold in the province was the smallest in fifteen years, and less than one-half that of 1905, which in turn was smaller than that of any previous year since 1809.

There were exceptional reasons for the considerable falling off in production last year, but apart from these it is to be expected that the recovery of gold from old placer fields will show a gradual decrease under ordinary conditions, for the reason that the richer places soon become exhausted and as a result there is little inducement to individual miners to continue working where there is not much likelihood of returns being considerable to those working on the small scale on which as a rule individual miners must work. Generally speaking, the fields are thereafter either practically deserted or the gold-bearing gravel areas pass into the possession of companies or other large partnerships able to supply the capital requisite for the provision of plant and equipment for operating on a much larger scale than usually is practicable in the case of individuals. To the transition from individual to company ownership may in considerable measure be attributed the gradual yearly decrease in the quantity of placer gold recovered in British Columbia. Of course, there is also to be taken into account the great attraction new fields always have for the ordinary placer miner. Alaska has in recent years tempted many a miner from old placer fields on the Pacific coast to its far-off richer streams and beaches. The last, though, was not one of the reasons for last year's decreased production in British Columbia; rather was the decrease the result partly of the possession of the gold-bearing gravels by companies not then prepared to work them and partly the shortness of water and gravel-washing season for those who did operate their placer properties. It is believed, however, that the season now entered upon will see a change for the better, for not only are some of those whose operations last year were restricted by circumstances not then under their control now prepared for work on a larger scale, but there seems to be good reason to expect the water supply to be larger and the season's work proportionately longer.

In Cariboo.

The largest individual operator in Cariboo district in 1910 will be Mr. John Hopp, well known for years as a persistent believer in the eventual success of deep-drifting on Slough Creek, but who had finally to transfer his attention to the less costly hydraulic mining owing to the large amount of capital and lengthy period of work required to make the rich gravels of the old deep channel of Slough Creek accessible. During recent years Mr. Hopp has been gradually acquiring additional placer leases and water rights, chiefly in the vicinity of Barkerville, until now he has a property, or more correctly, several placer properties, which may be expected to be productive to an extent not reached for some time past in that district.

Last season was a very busy one on Mr. Hopp's properties and even after gravel-washing was at an end for the year work was continued, to get things in shape for extended operations this year. Bigger hydraulicking plants were placed on both Mosquito and Lowhee Creek properties. All the water as previously used for two small plants on Mosquito Creek is this year avail-

able for one larger system, and the ditches have been enlarged sufficiently to allow of their carrying the whole of the water any ordinary freshet will bring down. A No. 4 monitor was substituted for the two No. 1 size previously in use. The pressure on this plant is about 200 feet vertical head, with pipe 14 and 15 inches in diameter, and using 5 and 6-inch nozzles. It is planned to increase still further the supply of water by making another ditch, about four miles in length, which work will probably be undertaken this year. On Lowhee Creek the plant is larger than that on Mosquito Creek. Formerly a No. 2 Monitor was used on Lowhee, with pipe 11 and 15 inches in diameter; now a No. 6 Monitor does more effective work, having nozzles 6, 7 and 8 inches in diameter, and 16, 18, 22 and 30 inch pipe. For this property a new ditch, 5 1-2 miles in length, has been constructed, and the old ditch enlarged from 3 feet to 4 feet 6 inches in width for 2 1-2 miles. Capacity of ditch is now 2,750 miner's inches of water, under 400 feet vertical pressure to bottom of pit. In connection with the Lowhee plant a reservoir dam has been partly constructed; when completed it will be between 80 and 100 feet in height, but last winter it was built to a height of only 23 feet. It is estimated that the additional supply of water this reservoir will hold will increase the capacity of the plant for the season by at least one-third. About 2 1-2 miles of ditch have yet to be made to connect with the ditch completed last summer; also a flushing reservoir, the dam of which will be 15 feet high on Lowhee Creek a mile above the mine. When all shall have been completed as above outlined, the Lowhee, taking everything into consideration, will be, for its size, one of the best equipped hydraulic mines in British Columbia. Mr. Hopp is also working the Mucho Oro, on Stout's Gulch, and the Forest Rose, on the east branch of Williams Creek; operations on these properties are less important than those first above mentioned.

Other placer mining properties in Cariboo mining division are the following: Of the Lightning Creek Gold Gravels & Draining Company, on Lightning Creek; the Venture Mining Company, on Peters Creek; the Wormald Creek Mining Company, on a tributary of Lightning Creek; the Fountain Creek Mining Company, on Fountain Creek; the Thistle Gold Company, at Eight Mile Lake; the B. A. Lasell properties, on China Creek and Nugget Gulch; the Western Canadian Deep Leads, and a number of others on various creeks in the same division. There are also several deep-drift properties, on some of which much money has been spent in endeavouring to work the deep old channels of streams known to be gold-bearing.

In Quesnel mining division, Mr. John B. Hobson has an important hydraulic mine, which he will work this season, employing between 50 and 100 men. The biggest undertaking in this division, though, is that Mr. Howard W. DuBois is carrying out for Philadelphia capitalists, at an estimated total cost of about \$1,500,000. The work in progress is the construction of a ditch and flume twenty miles from Swift River to the ground to be worked, which is at Twenty Mile Creek, on Quesnel River, about 20 miles below Quesnel Forks. The capacity of the ditch will be from 6,000 to 7,000 miner's inches of water. Included in the works are a dam of considerable size, and an inverted syphon 6,000 feet in length and 60 inches in diameter, with a pressure of 90 feet at its deepest part.

Incidentally it may be noted that latterly more than half the placer gold recovered in the province has been obtained from mines in the Cariboo district.

In Cassiar.

Cassiar district during several years prior to 1908 produced more gold than did Cariboo, but for two years it has taken second place in this respect. Its chief gold field is Atlin, the other divisions — Liard, Stikine, Skeena, and Queen Charlotte—together contributing but a very small proportion of the total gold obtained yearly in the district. Atlin gold field was discovered in 1898. Official records show an aggregate value of about \$4,700,000 as that of the gold recovered on its streams during twelve years to the end of 1909, but unofficial estimates give a higher total—in excess of \$6,000,000. The highest yearly total on record was that of 1899, of \$800,000, while 1904 came next with \$530,000. Since the latter year there has been a steady decrease in production recorded, until that for last year reached the lowest on record since the year of discovery—only about one-third of the value of the production in 1904. However, it is thought the turning point has been reached and that the yield will be larger in this and following seasons than in quite recent years. The number of individual miners working on Atlin creeks has become quite small in comparison with that in the earlier years of the history of the camp. There are also fewer companies operating there than several years ago. The larger hydraulic operators are the North Columbia Gold Mining Co., Pine Creek; Amalgamated McKee Creek Mining Co., McKee Creek, and Societe Miniere de la Colombie Britannique, Boulder Creek. Much information relative to mining at Atlin is contained in a paper, by Mrs. Rosalind Watson Young, M.A., of Victoria, B.C., printed in the "Quarterly Bulletin of the Canadian Mining Institute," No. 7, July 1909. Mrs. Young wrote from personal observation and knowledge of placer mining operations and conditions in Atlin camp.

There is little of importance to mention concerning placer mining in other parts of Cassiar district. Two hydraulic enterprises in the Dease Lake Country, Liard division, from which good returns had been expected, have suspended operations, lacking money to continue necessary preliminary work. The Ingenika diggings, of which much was heard two years ago, seem to have proved of small value. Quite recently, however, reports have reached Victoria of gold in payable quantity having been found on a tributary of Taku River, but little is yet known beyond the fact that coarse gold has been discovered. The new find appears to be in country situated between Telegraph Creek and Atlin.

In Other Parts.

Placer mining is being continued on a small scale on White Horse and Perry Creeks, upper Moyie River, and other streams in East Kootenay. In the Big Bend of the Columbia district, north of Revelstoke, which is in the northern part of West Kootenay district, there will probably be more hydraulicking done this year than last. Not much is looked for from streams in the Similkameen, Yale, or Ashcroft divisions, but there may be better results in Lillooet district than during the last few years. Operations in the western part of the Boundary district will not add much to the year's production, nor is it expected that Vancouver Island will yield any quantity of placer gold worth noting.

Reviewing the situation as a whole it seems that first from Cariboo and next from Cassiar may larger returns be expected this year, but not from other parts to any considerable extent.

A MINISTERIAL VISIT TO SULPHIDE, MADOC AND DELORO.

For long it has been the desire of the Hon. Mr. Cochrane, Minister of Mines for Ontario, to inspect personally the mining industries of Eastern Ontario. Pressure of routine business (and the Minister of Mines is kept quite as busy as the hardest working deputy) has heretofore prevented this. But on the morning of Thursday, June 23rd, the decisive step was taken, the ships were burned, and the Minister, accompanied by Dr. W. G. Miller, Mr. E. T. Corkill, and Mr. J. C. Murray, editor of the CANADIAN MINING JOURNAL, boarded the train.

Taking the east-bound C. P. R. express at 9 a.m., the party reached Tweed shortly after noon. Here a motor car was in waiting. The spin to Sulphide was delightful. A detour was made round one of the lakes and Sulphide hove in view, surrounded by groves of shade trees. Manager Deblois showed the party over the works and the mining plant. A short inspection of Mr. B. A. C. Craig's pyrite mine, situate less than half a mile from Sulphide, concluded round one. A very pleasant breathing space was afforded when Mrs. Deblois, the manager's wife, entreated the party most hospitably at their charming residence at Tweed. The motor then took the road for Madoc.

The fourteen miles between Tweed and Madoc were all too short. All Canadian scenery is beautiful in summer; but the County of Hastings has a charm all its own. The country is dotted with farms, groves of hardwood, lakes, and quaint streams. Its topography is sufficiently varied to remind one sometimes of an ideal English landscape, and sometimes of the highlands of Nova Scotia. The roads are good, grades are not excessive, and there are long stretches where one's craving for speed can be amply gratified.

Several mild adventures befell the motorists. A company of young pigs performed astounding gymnastic feats in their attempt to climb a four-foot fence. Similarly a covey of hens acted in a manner truly feminine. But for sheer stupidity honours seemed to be equally divided between the casual cow and the male human being. Only few horses, mostly of the vintage of 1880, displayed a violent interest in the progress of the car. Their masters made much more fuss.

On the road from Tweed the first glimpse of Madoc is caught just as one passes the easterly corner of Moira Lake—a lake, by the way, that deserves its name. It is as lovely a sheet of water as the heart can desire. Some Christian re-christened it Moira. Formerly it was known as Hog Lake.

The party was safely bestowed at the St. Lawrence Hotel, an hotel with a reputation, shortly after 6 o'clock. News was received here that a formal dinner was impending. This turned out to be true, for at 9.30 p.m. the dining room of St. Lawrence Hotel was thrown open and sixty or seventy citizens sat down to a meal that will be long remembered.

The Madoc Board of Trade were the hosts, and the Hon. Mr. Cochrane and his party the guests of honour. Mr. W. A. Hungerford occupied the chair, and occupied it well. To say that the menu was varied is putting it mildly. But it was more than varied. Every dish was completely edible.

Amongst the principal speakers were: Mr. Hungerford, the Hon. Mr. Cochrane, Mr. Thomas Cross, Mr. Pearce, M.P.P., Mr. Dale, Dr. W. G. Miller, Mr. E. T. Corkill, Judge Fraleck, and Mr. J. C. Murray.

Judge Fraleck and others drew the Minister's attention to the disability under which the district laboured

on account of the fact that the Canada Company, an ancient and parasitic English growth, holds the mineral rights over enormous tracts. Mr. Dale, who is a prominent local banker, advocated the guaranteeing by the Government of bonds to facilitate the establishment of a local customs grinding plant for grinding all suitable classes of minerals. Dr. Miller referred felicitously to the plucky pioneer work done by the chairman, Mr. Hungerford, by Mr. D. K. Stewart, Mr. S. Wellington, Mr. William Cross, Mr. Arthur Coe, and other citizens. Mr. Corkill dwelt upon the business aspects of measures for preventing accidents. Mr. Thomas Cross, in a speech sparkling with true humour, harked back to the past and kept his audience spellbound. As Mr. Cross is an indefatigable prospector himself, his words of cheer were heartily received. Mr. J. C. Murray emphasized the point made by Judge Fraleck concerning the Canada Company. He also corrected a misapprehension on the part of one speaker, who had referred to the "unearned increment" that may accrue to miners. Mr. Murray asserted that the term was an absolute misnomer. The miner deserves all he gets.

The dinner wound up with a warm vote of thanks to Mr. John Cochran, the proprietor of the St. Lawrence, for the pains he had taken in preparing such an entertainment in so short a space of time. Hardly ten hours' notice had been given.

Friday morning was occupied in looking over the Henderson talc mine and G. H. Gillespie & Company's mill. A quick run was then made to Deloro, where Mr. P. Kirkegaard and Mr. S. Wright conducted the party through the extensive plant of the Deloro Mining & Reduction Company. After a delightful luncheon at Mr. Kirkegaard's residence, the road to Marmora was taken. At this mining town Mr. Pearce, M.P.P., showed the visitors the chief points of interest. At 3.30 p.m. the west-bound express was caught at Central Ontario Junction and the visitors returned to Toronto pleasantly wearied after two strenuous days of sight-seeing and hospitality.

Few Toronto people realize that within a short railroad journey there lies a mining country so fraught with historic interest and with present opportunity. Moreover, the motorist will find nowhere a more charming land wherein to risk his own and others' necks.

BOOK REVIEWS.

TELEPHONOLOGY--A DESCRIPTION OF MODERN TELEPHONE APPLIANCES, ETC., BY H. R. VAN DEVENTER, B.S., E.E. SPECIAL ARTICLES BY EMINENT EXPERTS. 586 PAGES, PROFUSELY ILLUSTRATED, PRICE \$4. MCGRAW-HILL BOOK COMPANY, 239 WEST 39TH STREET, NEW YORK.

The complicated science of telephony is the subject of this substantial volume. Every important phase of modern telephony is explained. Wireless telephony is not omitted. Although a large amount of detail as to construction and installation is presented, general principles are given a full share of attention.

The modern mine manager cannot afford to be ignorant of telephony. When he digests "Telephony" he will have mastered the science.

THE CORROSION AND PRESERVATION OF IRON AND STEEL, BY ALLERTON S. CUSHMAN AND HENRY A. GARDNER. 373 PAGES--NUMEROUS HALF-TONES AND DIAGRAMS--PRICE \$4.

MCGRAW-HILL BOOK COMPANY, 239 WEST 39TH STREET, NEW YORK, 1910.

Preservation is one of the first laws of engineering, and one of the fundaments of conservation. Conservation, in its narrow colloquial sense, is made to apply only to natural resources. But its meaning is fuller than that. Everywhere the observer can see unmistakable evidence pointing to waste and loss of finished materials. Nothing illustrates this better than the widespread custom of permitting iron and steel utensils, implements, structural parts, etc., etc., to remain without protection against the weather. On the other hand, the rapid depletion of our richest iron ore deposits accentuates the present need of directing our energies towards the efficient prevention of waste through corrosion.

The volume before us embodies the latest and most definitive knowledge of the phenomena of corrosion, and presents the best known methods of prevention and preservation. No effort, apparently, has been spared to mention or include all recent matter touching on the subject.

The extraordinary growth of what we may term industrial science and the evolution of practical chemical knowledge as applied to the manufacturing industries are nowhere better exemplified than in the book before us. It is now possible indefinitely to lengthen the life of steel and iron. Hence one step has been taken towards conserving our raw materials, our ores and metallurgical fuels.

The chapter-headings of "Corrosion and Prevention" will give the reader a bird's eye view of its scope.

CHAPTERS--

- I.—The Problem of Corrosion.
- II.—Theory of Solution.
- III.—Theory of Corrosion.
- IV.—Application of Electrolytic Theory.
- V.—The Inhibition and Stimulation of Corrosion.
- VI.—The Technical Protection of Iron and Steel.
- VII.—Relation of Pigments to the Corrosion of Iron.
- VIII.—Recent Field Tests on Protective Coatings.
- IX.—Paints for Various Purposes.
- X.—Testing and Design of Protective Paints.
- XI.—Properties of Pigments.
- XII.—Properties of Paint Vehicles.
- Appendices, etc.
- Bibliography.

Whilst the last word in scientific investigation is included, the book is also thoroughly practical. It will be found most helpful by all interested in the use of steel and iron.

One most commendable feature of the volume is an admirably arranged bibliography covering 63 pages.

PORTLAND CANAL ANALYSES.

Assays of some typical Portland Canal (B.C.) ores have been reported thus:

	1	2	3	4
Gold	0.20 oz.	0.20 oz.	0.24 oz.	1.20 oz.
Silver	20.00 oz.	18.0 oz.	26.66 oz.	48.80 oz.
Lead	7.96 p.c.	9.28 p.c.	11.61 p.c.	4.29 p.c.

All but No. 4 are run-of-mine ores. No. 4 is the assay of a rich streak.

The most abundant minerals are pyrite, pyrrhotite, galena, blende, and chalcopyrite, with which are associated gold and silver. Native silver is frequently encountered in considerable quantities. Gold, while it occurs persistently, appears to be irregularly disseminated. Apparently, also, gold fluctuates with the silver.

Correspondence.

QUEBEC PLACERS.

To the Editor of CANADIAN MINING JOURNAL:

Sir,—All legitimate prospecting, and the circulation of real mining news is to be commended, but such stuff as has been going the rounds of the press lately so evidently emanates from that class of prospectors whose experience is acquired in brokers' offices and around the fountain in Victoria Square that its purpose is easily seen, and it is sprung on the non-discriminating press with a view to the short-lived glory of the lime-light, or for the purpose of "seeing some capitalists."

The result, to mining men, of the appearance of such absurd items is to discredit all mining news that appears in the same papers. The art of discrimination in mining, as in other news, should be learned in the editorial sanctum sanctorum.

The class of prospector-promoters alluded to above is doing much to make this province appear ridiculous in the eyes of the mining world. Recently some New Englanders were enthused to the point of sending a man hundreds of miles to examine and report on one of these mares' nests which they had optioned for a high figure. He reported it absolutely without mineral values, and backed his opinion with assays—result, a cold wave in New England and a black frost in Montreal. The report, true to facts, pleased neither party. In this case the holders of the claims appeared to be sincere, but had been misled themselves by others.

Again, some of these metropolitan prospector-promoters with a pull got a few acres about 999 miles from Sherbrooke, and after the usual ebullition of super-heated caloric, hied them thither with a couple of young men in tow who had money to burn. A pan, taken from surface gravel, yielded a nugget as big as a soldier bean. The man who brought it from town for the purpose was the first to cast his cap in the air and yell with surprise. But capital was cautious, and demanded more nuggets—it was such easy money. Unfortunately, the jeweller from whom that one was bought had had only the one, and, as capital clung to that one, the prestidigitator couldn't produce.

And now the story of a remarkable find of what has long been known to exist along the Arnold and other small rivers in Woburn and all south-eastern Quebec has been going the rounds of the press in a way no mining news item was ever known to without propulsion from the rear.

The gold on these streams has never been found in quantities to pay for working by any method hitherto tried (though in some places solitary miners have made, perhaps, fair wages for a few days) except in Ditton, whence some thousands were taken by the crudest methods years ago, and by gouging out the cream of the ground. But the gravel on almost any stream in the valley of the St. Francis will yield colours. Imagine, then, 25, 50 or more pans worked down to the black sand and perhaps a few cents' worth of gold, in all say a half or a whole tea-cup full, sent for assay. Of course the returns will be thousands of dollars to the ton—of black sand—but they won't state how much gravel must be washed to get a ton of black sand. (This sand often contains minute jewels, such as garnets, but is of no appreciable value in itself or for the jewels). Such an absurd test as this made on ground that won't run 50 cents per cubic yard will show

values in thousands per ton of black sand. No mining man would write, take stock in or print such stuff, as is very evident when, in reference to placer ground, we read such phrases as "the richness of the ore," etc.

Rich or fair placer or other finds will be welcomed by all who have the mining interests of the Province at heart, but we want the truth, rightly told, not absurd and evanescent sensationalism that can do no possible good even to the originators.

Yours truly,

G. R. E. KENNEDY.

"THAT TIMMINS SAMPLE CAR."

To the Editor, CANADIAN MINING JOURNAL:

Sir,—While quite approving of your word of caution in regard to the Porcupine district, I think I can go you one better in the way of *hopes* and *beliefs*. After my visit to the district I have sufficient ground for *belief*, though I have not sufficient for definite *knowledge*.

I *believe* that Porcupine is going to give us a very important output of gold. I *believe* there are going to be paying mines in the district. I also believe that there are going to be many wild-cats and many disappointments, as there are in every healthy mining camp.

In regard to that sample car I have no special information on the subject, but I think I understand it. In the first place I have not heard anywhere that the owners of the carload have based any broad claims in regard to it. They have given the matter no publicity except to their intimates. They are not selling any stock to the public.

The car load was not supposed to be representative of the camp, nor even of any particular vein; but I believe the samples were taken without any sorting or picking, and were representative of those parts of the vein where the samples were taken, and not just of rich spots and seams. I have seen both the surface and the underground quartz from the veins on the Timmins Syndicate claims, and if they chose to sort or pick their ore they would have no difficulty whatever in shipping a car load that would assay many times as high as this shipment. A car load of three samples will not prove a camp, nor even a claim, but this shipment must have been a source of considerable satisfaction to the owners. My only regret is that it should go all the way to New York to be sampled, but that is a matter entirely at the pleasure and discretion of the owners. I am not in accord with this outfit in the matter of this very expensive sampling, nor in the idea of sampling a claim with a stamp mill—Tremain or otherwise—but the highest credit is due to them for the way they have tackled this new district. Two years ago I came away from the Laker Lake district thoroughly disgusted with the way operations were being conducted up there, as I explained at the time in this journal. My recent visit to the Timmins Syndicate camp gave me the keenest pleasure and satisfaction.

Yours faithfully,

H. E. T. HAULTAIN.

J. C. Murray, Esq.,

Editor, CANADIAN MINING JOURNAL,

Toronto, Ont.:

Sir,—I have before me the Toronto "Star" of June 11th, with an article on air supplied this camp by the Cobalt Hydraulic Power Co., in which they say, "it also causes the men to bleed at the nose, and suffer

from buzzing in the ears, headaches, and other symptoms of partial suffocation."

As we are not interested either directly or indirectly with this company, I think it only right that this should be denied. I have not heard of a single case in this camp of miners being affected in any way, except those on contract work, and it certainly has increased their footage considerably.

I have written the editor of the Toronto "Star" regarding this, and hope he will correct same.

Yours truly,

THE CONIAGAS MINES, LIMITED,
per R. H. Royce, Asst. to President.

PERSONAL AND GENERAL.

The Nelson Iron Works of Nelson, B.C., has taken over the business and stock of the Rossland Engineering Works, of Rossland, B.C., and will succeed that company as British Columbia agents for the Sullivan

Machinery Co., of Chicago. An increased stock of Sullivan rock drills, diamond drills, hammer drills, air compressors and supplies for these machines will be maintained at Nelson.

The latest circular issued by the Link-Belt Company, Booklet No. 95 (revised), covers a wide range of the products of that enterprising company. Tipples, retarding conveyors, car hauls, and coal washers are described and illustrated. The half-tones are taken from photographs of actual working installations. The pamphlet will prove useful to all workers in coal.

Mr. James Hargreaves, M. E., has opened an office at Room 34, 124 McDougall Avenue, Edmonton, Alberta. For more than twenty years Mr. Hargreaves has been identified with Canadian coal mining. His wide experience in the west was preceded by a long and thorough training in the coal mines of Nova Scotia.

Prof. J. C. Gwillim has been elected a Member, and Mr. Alex. Longwell an Associate, of the Institution of Mining and Metallurgy.

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

Glace Bay.—Following the return of the U.M.W.A. strikers to work, matters seem to be going smoothly enough. There has been dissatisfaction amongst those strikers who have not been able to obtain work, but this cause of complaint is being rapidly removed. Some 300 men were left over when all the vacant places had been filled, and to give work to these men the Coal Company are arranging to double-shift No. 6 Colliery. No. 3 Colliery is already on double-shift, and when No. 6 follows suit, the company will have the largest number of workmen at the collieries in the history of the mines. The number of strikers who returned to work tallied with the figures which from time to time were given out by the company. During the strike it was stated on several occasions by responsible officials of the United Mine Workers that the number of men who went on strike at the mines of the Dominion Coal Company was over 5,000. It may be of interest to state that even to-day, when the force of workmen at the collieries includes the P. W. A. members who remained at work, the bulk of the men imported during the strike, and the returned strikers, the total number of men at the collieries, surface and underground inclusive, does not exceed five thousand men. There must have been something wrong with the U. M. W. A. calculation. The United Mine Workers' Journal in its last issue states that 400 miners are on strike at Inverness. Actually there is no strike at Inverness, and the mine is fully manned.

A significant accompaniment of the U. M. W. A. agitation is the rise of the Socialist party in Nova Scotia. The Cumberland Labour party has been formally declared defunct, and those who were prominent in its leadership at one time are now avowed exponents of the social revolution. The Socialist Party is increasing in numbers in Glace Bay, and they intend to nominate a candidate for the next parliamentary elections. One of the most active of the local Socialists, in expressing his views in the U. M. W. Journal, uses as an argument in favour of socialism that "it is for the workingman, and him alone." No doubt it is just as well to be candid about it.

Dominion Coal Output.—The annual production of the Dominion Coal Company during the years 1906, 1907, and 1908 remained almost constant in the neighbourhood of 3,550,000 tons. But for the depression in the coal trade the production for 1908 would have been 3,750,000 tons, but although the mines of the company have a productive capacity of at least this tonnage, owing to trade depression and labour troubles, the three and

a half million has up to the present not been exceeded. Present indications point to an output for 1910 of between 3,400,000 and 3,500,000 tons. The production which will be necessary to reach these figures will be 300,000 tons in excess of the production during the second half of 1908, or in other words, the probable output of the Coal Company for the second half of this year will be at the rate of 4,000,000 tons per annum. The company has now in operation thirteen collieries, and two collieries in the construction and development stage. Out of the thirteen collieries in full operation, no less than seven are new and expanding mines. At one or two of the older mines, such as Reserve, Caledonia, and International, the outputs will gradually decrease, but this decrease will not become very marked for several years to come. In the meantime the new mines will have become large producers. It may therefore be expected, if labour troubles are averted, that the Coal Company's coal production during the next three years will reach very high figures indeed, when compared with past records. It would not be surprising during the present summer, indeed, to see daily outputs in the vicinity of 16,000 tons. To reach this figure, however, would require almost ideal conditions, and at colliery work, as one manager expressed it, "there's always something, or else going to be."

Colliery Explosions and Barometric Pressures.—In your correspondent's last letter reference was made to a statement, evidently inspired, that a "colliery warning" had been issued immediately before the Whitehaven Colliery explosion and fire, and the inference which some newspapers took that had attention been paid to this "warning" the disaster might have been averted. The imputation of carelessness has been hotly denied by most of the colliery journals in England, and the incident has occasioned much newspaper correspondence. It has been clearly demonstrated that the influence of changes in the atmospheric pressure varies with the local characteristics of a coal mine. In places where the surface cover is light and the strata is broken, it is evident that atmospheric pressure will act in a different manner than in a mine such as the one at Whitehaven, where the workings are five miles under the sea, where any changes in atmospheric pressure are modified or neutralized by the ventilating pressure. One of the writers quotes from the Report of the Royal Commission on Mines (1909), the following: "They (the 'Colliery warnings') are misleading, and so far as we can see, their publication serves no useful purpose. We do not wish to underrate in any way

the value attaching to an intelligent appreciation by colliery managers of barometric changes, but we think that more harm than good is done by the issue of irresponsible notices of this kind." This, from such a source, is strong language, and should effectually dispose of any further newspaper criticism. The same writer remarks: "Those officials are also more capable of forming an opinion as to what conditions affect the safety of the pits under their charge than an anonymous association which is shown, by the character of its utterances, to be innocent of that branch of scientific mining on which it professes authoritative knowledge."

The Whitehaven disaster has given an impetus to the agitation for the provision of breathing appliances for rescue and fire-fighting work at collieries. The Home Secretary shortly after the disaster asked the colliery company to provide such appliances, and to arrange for their men to be instructed in the use of the same. Commenting on this the "Colliery Guardian" remarks: "We have already expressed our opinion that, in order to be of use, the apparatus must be kept on the spot."

ONTARIO.

Cobalt.—A few years ago New Ontario was practically unknown to the outside world, and not until the discovery of the riches of Cobalt was much attention paid to it. Even then for several years the energies of the prospector were centred upon the search for silver, and this resulted in the discovery of South Lorrain, Gowganda, and other camps. As the possibilities of these fields became better defined, the prospectors were forced out into the hitherto unexplored parts, and then followed the discovery of the Porcupine gold district. The latest new development is the rediscovery of iron near the Grand Rapids on the Mattagami River. These deposits were first noticed by the Geological Survey over thirty years ago, and six years ago it was again reported on by the same department. It was stated to be a very important deposit of limonite, containing a high percentage of iron, and free from sulphur and phosphorus. A syndicate has recently become interested, and has staked a number of claims. These are within a few miles of some of the lignite claims which gives them additional importance. The present railroad expansion in this part of the country, coupled with the fact that the Hudson Bay line may be started before long, is responsible to a great extent for the increased interest in mining possibilities in New Ontario. The search for precious metals has retarded development in other directions, but the unexplored area is large, and chances for the future are brighter than ever before.

The McKinley-Darragh will in future pay quarterly dividends instead of half-yearly as formerly. The next dividend, which will be payable July 15th, is at the rate of three per cent. for the quarter, with a bonus of two per cent.

At the annual meeting of the Peterson Lake the following board of directors was elected:—Sir Henry M. Pellatt, Major Murray, Hugh Blain, W. F. Scott and A. M. Hay. With this new board it is to be hoped that there will be no more quarrelling and that the directors will get down to business.

It was pretty generally expected that when the camp was supplied with cheap power a great increase in mining activity would be the outcome, but so far this has failed to materialize. One feature however is the very much lower cost of concentrating, which in the case of the McKinley-Darragh, is now only \$1.30 a ton, while at one of the larger mills the management expects to be able to treat for about \$1.00 a ton. This of course is only about fifty per cent. of the milling costs of a year ago, and permits of the treatment of much lower grade ore.

The returns from ore royalties paid to the T. & N. O. Railway Commission for the month of March amounted to only \$375.00. This is a great falling off from the previous year, and is partially due to all the companies, with the exception of the Right

of Way, paying 25 per cent. of the net profits instead of the gross returns as formerly.

A deputation of local mining men waited on the Hon. Mr. Cochrane with a view to getting an extension of time for the performance of work on the claims staked on the iron deposits near Grand Rapids. As the district is over eighty miles from a railroad, and the trip is very hard, the Minister promised to allow them ample time.

The Crown Reserve has declared the regular quarterly dividend of six per cent., with a nine per cent. bonus. This is payable July 15th. The payment of dividends at this rate means that the shareholders are receiving practically \$3,000 a day. This property has already paid and declared 120 per cent. on its capital of \$2,000,000.

The shaft of the Bailey is now down 160 feet, and at that point a station is being cut. A cross-cut will be run to cut several small veins that are showing in the tunnel. Another will be driven about 200 feet in an effort to locate the Bailey vein.

Porcupine.—The transportation facilities into this district are very bad, and it is believed that they will eventually lead to a shortage of supplies. Provisions are quite scarce now, and prices are very high, and there appears to be no immediate prospect of their bettering. This condition is partly accounted for by the larger number of men employed than was anticipated, and also by the early break up, which destroyed the roads a full month ahead of the usual time. Although active representations have been made to the Government to construct a road, and there is no question of the needs of the district, work was only started a short time ago. A small sum of money has been voted, and some prisoners from the North Bay jail are to be sent up to cut out the road. Several good discoveries have been reported lately, two of which are on the Reserve. On the silver properties a good vein was uncovered, and another strike was made on the Novak claim. A Boston syndicate has taken options on over fifty properties in Tisdale. These claims are owned by several people, but they are in almost a solid block. On about twenty of these good showings are reported. It has been decided to start work again on Gold Island, in Night Hawk Lake, the first property in the district on which work was done. A number of surveyors are in the bush running out the lines for twenty-seven new townships. The boundaries of the mineralized area have become so extended that it is necessary to have new points to which to tie the claims. On the Timmins property the small stamp mill will soon be erected and running, and will be used to treat the ore that comes from development work. By this means the owners will gain a much better idea of the average value of the vein. Negotiations are under way for the purchase of several claims, and there is a great deal of activity throughout the camp. It is stated that there will be twenty-four companies operating during the summer that will spend a minimum of \$15,000 each. It is stated that a contractor has offered to grade a line into Porcupine from mile post 222 on the T. & N. O., for \$10,000 a mile. This would be only for the grading, and the Government would have to lay the steel and put the line in shape. It is very doubtful, however, if the matter will be taken up. A couple of lines of boats are now operating, so that accommodations for travellers have much improved. There appears to be a renewal of interest in the finds in Bryce Township, and some good finds have been reported lately. The Martin claims have been purchased by a Montreal company known as the Thelona Gold Mines Co. and work is to be started immediately. The property consists of six claims, and on the principal vein a number of test pits are to be sunk. In order to gain as much information regarding their properties in the shortest possible time the Dome Mining Company is sending in two diamond drills. Some very high grade ore is being produced, and high grading has become so common that it has been found necessary in some instances to employ guards.

South Lorrain.—A party of Buffalo men has lately gone into the district to look over several claims with a view to purchasing. It is a peculiar fact that fully two-thirds of the capital invested in this section is from the city of Buffalo. On the Fuller properties surface trenching has uncovered ten veins. These are largely calcite and cobalt, with low silver values. Another new company, known as the Alice Lorrain Mines, with a capital of \$500,000, has been formed. Its headquarters are Haileybury. At the annual meeting of the Maidens, recently held, the old board of directors was re-elected. The report on the conditions prevailing at the mine was satisfactory, and there is talk of putting in a new plant. Despite the handicap of bad roads throughout the district, things are progressing favourably, and there will be a large amount of work done this summer. The Mines Power Company expects to have its installation completed about the end of July, and this will very naturally help the district. The new power driven compressor for the Wettlaufer is still lying at the wharf, and on account of the bad roads there is no immediate prospect of getting it to its destination. Negotiations are under way for the purchase of the Beaver Lake property. Just before it shut down, for lack of power, silver was struck in the drift at the 110-foot level. The price asked is about \$300,000. The Mayflower Company has started a gang of men to work surface prospecting. Several promising veins have been found in the vicinity of this property. It is reported that Buffalo people have taken an option on a sixty per cent. interest in the Little Keeley, which adjoins the Haileybury Frontier. Last year a promising vein, carrying silver values was discovered. A shaft has been sunk some distance on another vein, but with this exception little work has been done. The Montrose company is pumping out the shaft preparatory to resuming underground operations. A promising vein has been traced from the Harris property adjoining, and shows considerable bloom with low values in silver.

GOWGANDA.

This season's work has already been productive of excellent results, and has helped to demonstrate the fact that the district shows every promise of becoming one of the important silver mining camps in New Ontario. Unlike Cobalt the area is of large extent, and there are many groups of mines scattered over a large territory. At the Bonsall property ore was discovered at a depth of 110 feet in the shaft, and at 140 feet the vein was carrying about 4,000 ounces in silver. The Hudson Bay Mining Co. of Cobalt is working two properties, one near Lost Lake and the other at Hanging Stone Lake, and good results are reported. The Rawhide property has good ore, but has been forced to practically suspend operations underground until a plant is installed. Excellent discoveries have also been made near Calcite Lake. At Maple Mountain a good find has been made on the Devine properties near Skull Lake. The vein was in one place twelve inches wide, and carried high values in silver. This section has never received much attention in comparison with other places, but is being quietly developed with satisfactory results. The extension of the Morrison vein is stated to have been cut at the 100-foot level of the McKay property, where it shows considerable high grade ore. The Silver Alliance at Elk Lake is reported to have sunk a small test pit on a new vein and opened up some rich ore.

BRITISH COLUMBIA.

The quantity of concentrate and crude ore shipped from the St. Eugene Mine, East Kootenay, to the Consolidated M. and S. Company's smeltery at Trail during four months ended April 30th was 5,860 tons. The greater part of this was lead-silver concentrate—approximately 5,000 tons.

The report that the North Star Mine had been sold to the Consolidated M. and S. Co. has been contradicted. Officials of the company state that, so far as they know, there have not been any negotiations for its purchase.

The Silver King Mine, near Nelson, has been closed, owing to

difficulties experienced in keeping the water down so as to allow of ore being mined below water level. Operations have latterly been unprofitable, so the Kootenay Development Syndicate, which was working it under lease, is not likely to do anything more on it.

The British Columbia Copper Co. has commenced to ship ore from its Wellington group mine to its smeltery at Greenwood, the railway spur to the mine having lately been completed. The same company is now in charge of operations at the Rawhide and other New Dominion Copper Co. mines, in Phoenix camp, following the purchase of a controlling interest in the latter company.

The old City of Paris Mine, situated south of Phoenix Boundary district, near the International Boundary line, will probably be prospected with a diamond drill shortly. In the early nineties approximately 7,000 tons of ore of good grade was shipped from this mine to the Granby Co.'s smeltery, but on the ore shoot becoming exhausted, operations were suspended and the mine has since remained closed.

Mining has been resumed at the Queen Victoria Mine, near Nelson, and ore is again being sent to the smeltery after about eighteen months inactivity. The ore is copper-gold and occurs in large quantity.

Swede Group, Poplar Creek.

Another effort is being made to test the value of mineral claims at Poplar Creek camp, which is near the boundary between the northern part of Ainsworth mining division and the adjoining Trout Lake division. A Scottish syndicate has taken an option on this property, which in 1903-4, when there was much local excitement concerning finds of rich surface specimens of free gold on the Swede group, Lucky Jack, and other claims, was regarded as one of the best in the camp. The syndicate referred to is represented in the province by Mr. W. J. Anderson, who has already been two months in the district, and has let a contract for driving 300 feet of tunneling, and good progress is being made with this prospecting work. It is stated that Mr. Anderson intends remaining in the district until next October, and that his principals will bond other mining properties should the results of the work undertaken on the Swede group be considered satisfactory.

In the Lardeau.

The Silver Cup Mine, owned by the Ferguson Mines, Ltd., is again being worked, after having been closed temporarily, owing to the great difficulty of getting supplies up to the mine during the depth of winter. This mine last year shipped to the Consolidated M. and S. Co.'s smeltery at Trail 1,631 tons of high-grade silver-lead ore, which also contained some gold. The Silver Cup group consists of nine mineral claims, situated on the north slope of Silver Cup Mountain, south of the south fork of Lardo Creek, and distant from the Town of Ferguson about six miles in a direct line. The altitude of the mine is 6,500 to 7,000 ft. above sea-level. The ore occurs in two leads striking nearly parallel to the formation. The northern lead is called the Silver Cup vein, and the southern one the blind lead, the latter not being exposed at the surface. Between the leads are cross fissures, one of which made a large shoot of ore. The ore body usually consists of a number of veins of quartz; the ore being localized in shoots, lenticular in form both horizontally and vertically. Some of these are of comparatively large size, one continuous stope being 275 feet in length. The quartz is usually heavily mineralized with grey copper, galena, blende, and some copper and iron pyrites. It seems evident that mining operations have been and continue to be profitable, for they have been carried on, with but little intermission, during about 14 years.

Improved Prospects for Kamloops Camp.

It has been learned on good authority that the sum of \$100,000 has been appropriated for the development of one metal mining property in Kamloops camp, and that there is reasonable probability of others being worked, as well.

Of one part of Kamloops camp, the following was written a few months ago: "Generally speaking, it may be said that south of Kamloops Lake, between Cherry Creek and about three miles east of Kamloops, there is an area of ore-bearing rocks extending some eight miles along the shore of the lake, and four to six miles south from it. The extent of surface mineralization, as regards copper, is considerable over a large part of this area. Taking the camp as a whole, however, the great mass of ores occurring in it is of too low a grade to admit of its being shipped to outside smelteries, unless extensive development shall prove that below the surface the average grade of the ore is much higher than has been demonstrated in that occurring nearer the outcrops. With its really immense mineralized areas, the district amply warrants much more investigation in the way of mining development than it has yet had. Its great extent, however, will involve a large expenditure before it will have had the thorough examination necessary to determine its general value. It offers advantages, though, for making it a smelting centre, conditionally, of course, that thorough development of its mineral claims shall warrant that being done. Among these advantages are its proximity to the Nicola Valley coal fields, which would most likely supply metallurgical coke of good quality, and the fact that within a few years Kamloops will be the meeting place of two or three transcontinental railways. Keeping in mind the several favourable factors, it may be concluded that Kamloops may yet become one of the important mining and smelting centres of British Columbia.

Emissions Minieres, Ltd.—A French company, named the Emissions Minieres, Limited, having offices in England, intends working the Joker Mine, situated in what was formerly known as Camp Mansfield, at the headwaters of the south fork of Kaslo Creek. Work was done in this camp about ten years ago, but since that time the claims have been allowed to remain unworked. Much money was spent on this property, but without profitable results to the former owners. The new company has appointed Mr. A. Fournier to superintend the installation of a power plant on or near the Joker claim, and to drive a tunnel an estimated distance of 800-ft. with the object of cutting the vein at a depth of between 300 and 400 feet. The machinery to be put in consists of a 5-ft. Pelton waterwheel and a Fraser & Chalmers 16 by 18-inch belt-driven air compressor, with the usual complement of accessories. The air compressor is designed to supply sufficient air to drive three machine drills. It is expected to shortly be received at Kaslo from England. Provision has been made for its enlargement should more power be required later. The Pelton wheel is already at Kaslo, whence it will be transported to the mine as soon after the Provincial Government road men shall have repaired the wagon road up the creek as shall be found practicable. The distance between the railway and the Joker mine is about 18 miles. There will also have to be taken up to the mine 1,500 to 2,000 feet of 10-in. pipe through which to convey water to the wheel. It is estimated that, with the 500-foot head available, from 600 to 800 horse-power will be developed by this wheel. There will hardly be sufficient time after putting in the machinery to do much development work before next winter, but it is hoped a start will be made at driving the adit, and all necessary supplies have been taken up to the mine to admit of operations being continued throughout the winter, during which period no communication can ordinarily be made with the mine, owing to its high altitude. The enterprise of the company is a plucky one, and merits success, but it is by no means sure that this will result, although it is known that ore of good value occurs in Camp Mansfield properties.

Slocan Mines Near Sandon.

Steady progress is being made at several of the mines in the vicinity of Sandon, Slocan district. Among the number are the Ruth-Hope, Slocan Star, and Richmond-Eureka groups, in the immediate neighbourhood of Sandon, and the Surprise, Noble Five, and Sunset, above Cody.

There is in the Ruth Mine a lot of milling ore ready for stopping, and preparations are being made to start the concentrator for the season's run on ore from this mine. Last year's output from the Ruth-Hope Mines was nearly 1,000 tons of silver-lead ore and concentrate, shipped to the smeltery at Trail, and 655 tons of zinc-silver concentrate sent to the United States.

The showing of ore in the Hope No. 4 tunnel, known locally as Malcolm's tunnel, is an excellent one, and from this shipments will shortly be made. The deep wash has been sluiced off the hillside below the portal of No. 4, and the vein exposed at a vertical depth of approximately 200 feet under that opening. The driving of an adit on the vein at this lower level will shortly be commenced, and this will provide another face from which to take out ore and, as well, admit of opening new stopes.

The Slocan Star mine, owned by the Byron N. White Company, and the Richmond-Eureka, by the Consolidated Mining & Smelting Company of Canada, are being worked so far as the Nos. 5 and 6 tunnels of the latter and the Slocan King tunnel of the former, under an arrangement mutually advantageous. Both Nos. 5 and 6 were started on the Eureka claim and passed thence into the Hidden Treasure claim of the Slocan Star group. No. 5 crosses one corner of the Hidden Treasure passing thence again into Richmond-Eureka ground. No. 6 is on the Eureka for about 500 feet, and has been extended a similar distance into the Hidden Treasure. At 1,200 feet from its portal it will enter the Consolidated Company's Summit claim. In Hidden Treasure ground an incline raise is being made in the vein from No. 6 to No. 5, a distance of 170 feet, rather more than half of which has been driven. It is expected this raise will be through to No. 5 early in July; thereafter the driving of No. 6 to the boundary of the Hidden Treasure will be proceeded with, and then the Consolidated Company will take up the work of its further extension so as to develop the Summit claim at that level. The adit opened on the Slocan King at about 200 feet below No. 6, is in approximately 1,600 feet on the vein, and is now in the Hidden Treasure. Three shoots of ore have been passed through, and it is expected another shoot, opened in Nos. 5 and 6 above, will be reached at 200 feet farther ahead. The chief purpose now is to get No. 6 and the King tunnels well into the mountain so as to cut on their downward extension several ore-shoots found in No. 5 and believed to go down, and to make raises in them so as to provide good ventilation. After this shall have been done the miners will be set to work cross-cutting from these main adits at several places where such work shall be deemed likely to lead to the finding of other shoots of ore. Stopes will be opened in the ore shoots and all ore of sufficiently good grade will be shipped to the smeltery. A baby tram is to be constructed from the portal of No. 6 up to the upper terminal of the aerial tramway from No. 5 level down to the railway in Sandon, the distance between the two portals being 500 feet. This will be a single-bucket tram, with one stationary and one hauling cable. The latter will be wound round a drum at the top attached by gearing to the main tramway, which will provide the power necessary to haul the ore up from No. 6 for both companies. As practically all the shipping ore from the above-mentioned workings will be of suitable grade for shipment crude to the smeltery, it is improbable the Slocan Star concentrating mill will be operated this season, not unless work shall be resumed in the older parts of the mine which were closed several years ago following extra lateral rights litigation, happily now settled.

On the several Cody properties already mentioned development work is being continued. The deep-level tunnel by which the Surprise is being developed is an extension of the Last Chance tunnel. It is a long cross-cut, and enters the Surprise vein at a depth of about 1,100 feet below the surface workings of that mine. The old workings of the Surprise are down about 300 feet, so a raise has to be put up 800 feet to make the necessary connection. About one-third of this raise has been driven, but the work is necessarily slow and difficult. Some good ore

has been met with, but no stoping will be done until after the raise shall have been put through and proper ventilation thereby provided.

No. 8 tunnel of the Sunset group is now in about 520 feet, and the vein should be reached in 50 to 80 feet further. It will then be necessary to drift something like 500 feet in order to get into

the ore shoot worked in No. 7 at a vertical distance of 246 feet above No. 8. Indications show that another shoot of ore should be encountered before that going down from No. 7 shall be reached. The portal of the tunnel is out of the way of snow-slides, so that there is no danger to men going to and fro when the snow lies deep above it.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

There was a further heavy decrease in the coal export trade of South Wales in May. This to some extent was contributed to by the fact that May contained one less working day, owing to the funeral of the late King Edward. Apart from this, however, the decrease in all respects is very disappointing, and it is quite clear that at least up to the end of the past month the coal trade had failed to throw off the serious after effects of the dispute in the coal-field. At Cardiff shipments in May totalled 1,411,770 tons, or a decrease of 123,364 tons on May of 1909. Newport, also accounted for a heavy falling-off, namely, 125,678 tons. This was largely due to the dispute of the general cargo workers and employers, resulting in a temporary stoppage of the whole of the dock workmen and the fears of shipowners that a prolonged strike would take place, and also the diversion of tonnage to South Wales ports which was resorted to in consequence. Swansea accounted for a decrease of 28,146 tons, but Port Talbot, unlike the other ports of South Wales, continues to retain the record of the preceding months of the year, and again shows an advance of 32,427 tons.

The shipments of Cheshire salt for the month of April, as disclosed in the official return prepared by the Salt Union, reached the comparatively large total of 39,418 tons, as against 30,318 tons a year ago, while the coastwise trade reached 12,539 tons, as against 6,530 tons, the total increase being slightly over 15,000 tons. In the foreign trade the chief improvement is with Calcutta, the increase being 9,000 tons, while in the home trade Scotland has taken 10,503 tons, as against 4,918 tons last year. There has also been a substantial improvement in the exports to Denmark, and in other directions trade was normal.

FRANCE.

The technical commission appointed by the British, French, German and Spanish Governments to draw up a scheme of mining regulations to be applicable to Morocco for submission to the Diplomatic Body at Tangier has concluded its labours, having agreed upon the terms of its report.

AUSTRIA.

In view of the resumption of the Petroleum Conference at Vienna, the Austrian Government is bringing pressure to bear on the Standard Oil Company in order to induce the latter to come to terms with the refiners in the dual monarchy and abandon the campaign of price-cutting in kerosene and other products.

Two of the points singled out by the Government for attack will probably be the quantity of oil refined by the Standard Oil Company—which is asserted to have been last year largely in excess of that for which it is licensed—and the system of tank-wagon delivery directly to the private consumer, which the Standard Oil Company has brought to a high pitch of organization.

Another well on the Tustanowice field has struck oil—the Dlu-goza well No. 4, which is yielding 60 tons a day, estimated to be worth over £80.

UNITED STATES.

New York City, June 18th.—The reports of the Greene Consolidated Copper Company and the Cananea Consolidated Copper Company for the year 1909 have been made public. The latter company, whose stock is owned by the former, shows a slight in-

crease in the cost of producing copper last year as compared with that of the previous year. The cost of mining was \$2.22 a ton, as against \$2.13 for the previous year and \$3.28 a ton for the 15 months ended October 31, 1907. Of this sum of \$2.22 nine and one-half cents per ton consists of improvements and equipments installed charged off during the year. This is most satisfactory, the report says, for the reason that the extra money spent in development has amounted to at least 20 cents per ton over the same cost the year previous, and for the reason that there has been a greater proportion of smelting ore mined in the new mines, where cost is necessarily higher. Copper production costs were 11.64 cents per pound, as against 10.51 cents in 1908. The average selling price was 13.11 cents.

New York City, June 15.—The report of Jay P. Graves, vice-president and general manager of the Granby Consolidated Mining, Smelting & Power Company, to the directors of the company, apparently is of such a nature that they do not care to make it public. The Granby board has just held its second meeting since Mr. Graves submitted his report on the condition of the property, and the statement was made after the meeting that no business of public interest was transacted.

Boston, Mass, June 18.—The Utah Copper Co'y is now earning from the operations of its own properties \$3.13 per share on its enlarged capital, against \$3 being paid. This is on the basis of 12 1-2 cent copper. The company therefore may regard as "velvet" the \$1,425,712 derived from its ownership of 950,476 shares of Nevada Consolidated stock, which is paying dividends of \$1,500,000 a year.

Spokane, Wash, June 15.—Reports compiled by the statistical department of the Spokane Chamber of Commerce show that mines in the Coeur d'Alene district in northern Idaho have produced ore of a total gross value of \$192,455,691 since the discovery of the placer ground late in 1882, and that, including the June disbursements, a total of \$39,391,200 has been paid in dividends, as follows: Bunker Hill & Sullivan, \$11,737,200; Standard-Mammoth, \$9,000,000; Empire State, now Last Chance, \$4,750,000; Hercules, \$3,750,000; Morning, \$2,000,000; Hecla, \$1,970,000; Snowstorm, \$1,300,000; Tiger-Poorman, \$1,250,000; Granite, now Success, and Gem, \$500,000 each; Hunter, \$250,000; Sierra Nevada, \$225,000; Pittsburg Lead, \$200,000; Caledonia, first dividend paid April 25, 1910, \$39,000; other gold mines, estimated, \$600,000.

Against this net earning there is chargeable as an offset approximately \$2,376,000 for 30 miles of non-productive development work. This shows that \$19 has been earned in actual profits for every dollar assumed to have been lost in opening new properties in the district.

Goldfield, Nev., June 14.—Despite its materially reduced mill capacity the Consolidated Mines Company is maintaining earnings upon a basis insuring its ability to continue dividend payments at the rate of \$2 per share annually. Immediately after the fire in the mill on April 8 officials of the company declared that no interruption in dividends would result and that earnings would continue at the rate of approximately \$700,000 monthly.

The report of Manager J. B. Finlay for the month of May shows that the net profits of that month have been surpassed in only three prior months of the company's history. The tonnage mined was above the average and total costs were still somewhat high owing to the charge for mill reconstruction.

The mill treated during May an average of nearly 640 tons daily

and all repairs will be completed before the end of the current month. Ten additional stamps, which were only slightly damaged, have been placed in commission, making 80 now operating. The gross value of ore mined in May was \$1,021,656, the total costs and losses \$298,260, and net profits \$723,396.

Parker, Ariz., June 18.—The old Planet mine is making good. According to the predictions of Dr. Harvey Weed, a large body of ore has been encountered in prospecting with churn drills.

Years ago this mine was made famous by the thousands of tons of high grade copper ore that was taken by primitive methods from the surface workings and shipped to Swansea, Wales, for treatment.

Los Angeles, Cal., May 28.—The Ventura oil fields are the centre of wide interest as a result of the steadily increasing demand for the high-gravity petroleum of this section. Approximately 40 strings of tools are in commission and dozens of new derricks are in course of erection. The product for April was about 20 per cent. in excess of the March yield, and the demand for the high-class oil has stimulated developments to a tremendous extent. In order to overcome the difficult transportation problems that have been the chief cause of holding back the district the Sagan-Loomis Company has placed in commission a 40-ton traction engine and two 10-ton wagons. These will facilitate the rapid and economical shipment of supplies and enable operations to be conducted along more rapid lines. The district is very hilly and the transportation question has been an important one.

MEXICO.

Evidence of the progress of the oil industry in Mexico is afforded by the news that early in May a tank steamer received, from the Oilfields of Mexico Company, whose property is situated at Finbero, in the State of Vera Cruz, a shipment of 22,000 barrels, equal to 924,000 gallons. The oil was passed through a pipe line from Finbero to the receiving tanks of the Eagle Company, which was floated in this country by Sir Westman Pearson a few weeks ago. The receiving tanks are some 60 miles from the fields, and are connected with them, both by railway and pipe line. After using the pipe line for the first shipment, early in May, it was found to be defective, but it has since been thoroughly tested and is now in perfect working order. Oil is now being pumped into the tanks at Tuxpan, and it is expected that regular shipments will now be made, another tank steamer being due to be loaded within the next few days.

SOUTH AFRICA.

As the April crushing returns from the Witwatersrand Mines exhibited an improvement upon the March figures, so do the results of May show an advance upon those of April, only in a greater degree. The aggregate profits of some fifty-five mines in May reached £966,000, as compared with the April figure of £938,000, and £923,000 in respect of March. If the results of one or two minor undertakings be included, and also those of concerns which operate in other sections of the Transvaal goldfields, the million pounds sterling mark would be passed for the first time this year. This attainment is all the more noteworthy when it is recalled that during May for various reasons more than one important mine had either to hang up a portion of its mill or to entirely suspend crushing for a time. Despite this fact, the ratio of operating costs as a whole shows no increase, and a small improvement in the mill grade is accordingly reflected in an increased profit per ton. Well over a score of the companies earned higher profits in May than during any other month this year, amongst them being four of the Rand Mines group.

Company Notes.

Notice is given that a quarterly dividend of 1 3/4 per cent. on the preferred shares of the capital stock of the Amalgamated Asbestos Corporation, Limited, has been declared payable on July 1st, 1910, to shareholders of record June 20th, 1910.

At the monthly meeting of the Board of the Lake Superior Corporation, held in New York June 22nd, the executive reported satisfactory earnings for the past month, and also for the ten months ending April 30th.

The president reported that, in pursuance of the present policy of the executive of making the steel department independent in regard to its requirements for raw materials, the Connellton Collieries in West Virginia have been purchased; the property consisting of about 6,000 acres and now producing about 1,000 tons of coal of high quality per day. The purchase was unanimously approved by the Board.

The steel department, through this purchase of coal properties and recent developments in iron ore properties on the line of the Algoma Central Railway, and through the securing of extensive limestone areas, is now fully assured of a practically unlimited supply for its necessities in raw materials.

The delivery of the Connellton Collieries as a going concern will be taken on July 1st next, and new machinery will be installed to double the present output, and further increase will be made in output as found necessary. The coal property carries three seams of high quality, and will be operated by a subsidiary company, which has been incorporated in West Virginia as the Connellton Coal & Coke Company; the stock being owned outright by the Lake Superior Corporation.

Good progress was also reported in connection with the construction of the Algoma Central Railway and of the new coke oven and by-product plants, rolling mills, blast furnaces, etc., at Sault Ste. Marie.

DOMINION IRON & STEEL ANNUAL MEETING.

The annual meeting of the shareholders of the Dominion Iron & Steel Company, Limited, was held on June 17th in the Bank of Commerce Building. Mr. J. H. Plummer, as president, was voted to the chair, and, after a few formalities, he presented the annual report, which has already been published.

In discussing the report, he reviewed at some length the events of the year in connection with the company. He referred to the purchase of the fifty thousand shares of Dominion Coal Company, and pointed out that, though there might be some criticism on the part of a few shareholders as to the deal, it must be remembered that when a thing is wanted, "you have to pay the price."

Mr. Plummer stated that the bounty on pig iron will cease in December next, and that on wire in June of next year. To make up for this he had every reason to believe that at the next session of Parliament increased protection would be given.

The new works of the company, such as the ovens, machinery, finishing mill and others will be ready in the near future, and it is the intention of the management to build new shops and foundry.

Mr. Plummer then referred to the various exceptional expenditure of the year, such as the \$160,000 above contract price which they had to pay for coal, and the \$300,000 loss in the battle with the Coal Company. The consolidation of the interests was, however, a source of great satisfaction all round, and was, of course, the feature of the year. It was also a matter of congratulation that the company holds ninety per cent. of the shares of the two companies. He said, with a smile, that if there are any shareholders holding out for an increased offer they will be disappointed, as the ninety per cent. is very satisfactory. The consolidation of the two companies removed all chance of trouble, and a bright future was looked forward to.

Resolution of thanks to the president, directors, management and employees were passed and responded to and the following board of directors was re-elected:

Sir H. Montagu Allan, George Caverhill, Hon. George A. Cox, H. F. Dimock, Hon. L. J. Forget, Hon. Robert Mackay, Hon. David MacKeen, William McMaster, Frederic Nicholls, J. H. Plummer, Elias Rogers, W. G. Ross, and Sir William Van Horne.

STATISTICS AND RETURNS

LA ROSE PRODUCTION.

The properties of the La Rose Consolidated Mines Company during the fiscal year ending May 31, 1910, produced 3,125,000 ounces of silver, compared with 3,010,831 ounces for the previous year.

COBALT ORE SHIPMENTS.

Following are the shipments from the Cobalt camp for the week ending June 17, and those from January 1, 1910, to date:

	June 18.	Since Jan. 1.
	Ore in lbs.	Ore in lbs.
Beaver .....	.....	120,450
Buffalo	80,000	963,368
City of Cobalt .....	.....	363,835
Chambers-Ferland	118,480	589,300
Cobalt Central .....	.....	293,286
Cobalt Lake	64,000	260,900
Cobalt Townsite .....	.....	68,000
Colonial .....	.....	148,900
Coniagas .....	.....	687,076
Crown Reserve	86,000	3,018,068
Drummond .....	.....	664,200
Hargraves .....	.....	101,800
Hudson Bay .....	.....	186,435
Kerr Lake	586,800	4,149,657
King Edward .. . . . .	.....	174,966
La Rose	238,020	5,962,951
McKinley-Darragh	90,480	1,488,199
Nipissing	367,670	4,923,797
O'Brien .....	.....	648,046
Peterson Lake .....	.....	330,710
Provincial (Govt.) .....	.....	65,000
Right of Way .....	.....	757,257
Silver Cliff .....	.....	117,510
Temiskaming	60,000	741,830
Trethewey .....	.....	503,950
Waldman .....	.....	63,992

Ore shipments for the week ending June 17 were 1,692,350 lbs., or 846 tons.

Total shipments from January 1 to June 17 were 27,393,483 lbs., or 13,696 tons.

Another unusually heavy output of ore from the Cobalt camp is recorded this week. Eleven mines are named in the list and they shipped during the week 1,808,869 pounds, or 904 tons. The feature of the shipments was Nipissing's consignment of 483,540 pounds, thus heading the list. The Kerr Lake property continues to ship largely, being second in the list this week, with 470,159 pounds. La Rose came third, with 272,790 pounds of ore. Both Chambers-Ferland and Crown Reserve sent out over 124,000 pounds each. The total shipments from Cobalt to date since January 1 are 14,601 tons.

	Week ending June 24.	Since Jan. 1
	Ore in lbs.	Ore in lbs.
Beaver .....	.....	120,450
Buffalo .....	.....	963,368
City of Cobalt .....	.....	363,835
Chambers-Ferland	124,300	713,300
Cobalt Central .....	.....	293,286
Cobalt Lake .....	.....	260,900
Cobalt Townsite .....	.....	68,000
Colonial .....	.....	148,900
Coniagas	58,100	747,176
Crown Reserve	124,170	3,142,238
Drummond .....	.....	664,200
Hargraves .....	.....	101,800

Hudson's Bay	55,000	241,435
Kerr Lake	470,159	4,619,816
King Edward .....	.....	174,966
La Rose	272,790	6,205,741
McKinley-Darragh .....	.....	1,488,199
Millerette	57,340	57,340
Nipissing	488,540	5,407,337
O'Brien .....	.....	648,046
Peterson Lake .....	.....	330,710
Provincial (Govt.) .....	.....	65,000
Right of Way	60,990	818,247
Silver Cliff	42,480	159,900
Temiskaming	60,000	801,880
Trethewey .....	.....	503,950
Waldman .....	.....	63,992
Total for week	1,808,869	

B. C. ORE SHIPMENTS.

Nelson, June 18.—Appended are ore shipments and smelter receipts to date:

Boundary.	Week.	Year.
Granby	21,571	586,078
Snowshoe	1,819	82,473
Mother Lode	3,300	149,705
Oro Denoro	360	6,013
Jack Pot	370	983
Other mines .....	.....	411
Total	27,480	825,663
Rossland.		
Centre Star	4,483	91,398
Le Roi	120	7,042
Le Roi No. 2	488	15,470
Le Roi No. 2 (milled)	300	7,200
Le Roi No. 2 (concentrates)	48	48
I. X. L.	8	129
Other mines .....	.....	229
Total	5,447	121,516
Slocan-Kootenay.		
St. Eugene (milled)	2,775	66,600
Whitewater (milled)	600	14,400
Van Roi (milled)	800	19,200
Kootenay Bell (milled)	70	1,680
Granite-Poorman (milled)	250	6,000
Queen (milled)	420	10,080
Nugget (milled)	110	2,640
St. Eugene	177	8,322
Sullivan	191	5,671
Richmond-Eureka	63	2,096
Queen Victoria	161	525
Silver King	41	1,589
Yankee Girl	81	2,714
Van Roi	31	636
Johnston	1	1
Athabasca	26	26
Queen	100	271
Standard	67	526
Other mines .....	.....	21,160
Total	5,964	164,740

Total shipments for the week, 38,891 tons, and for the year to date, 1,111,919 tons.

Smelter Receipts.

Granby, Grand Forks	21,571	586,198
Consolidated Co., Trail	8,026	231,783
B. C. Copper Co., Greenwood	4,030	156,701
Total tons	33,627	974,682

SHARE MARKET.

(Courtesy of Warren, Gzowski & Co.)

Miscellaneous,—June 23, 1910.

	Bid.	Ask.
Amalgamated Asbestos	20¾	22
Dominion Coal Company	63¾	..
Dominion Steel Company	64	..
N. S. Steel	81	82
Granby	39	40
Consol. Smelting	68½	80
Crow's Nest Pass .....	..	88

Cobalt Stocks—June 23, 1910.

Amalgamated .....	.03	.03¾
Beaver Consolidated .....	.26¾	.27
Buffalo	2.20	2.55
Chambers-Ferland .....	.21¾	.22
City of Cobalt .....	.24	.25
Cobalt Central .....	.10	.11
Cobalt Lake .....	.20¾	.22
Coniagas	4.90	5.25
Crown Reserve	2.97	3.01
Gifford .....	.07¼	.08
Foster .....	.13¼	.15
Green-Meehan .....	.02½	.03
Great Northern .....	.07¼	.07¾
Hudson Bay	97.00	101½
Hargraves .....	.22	.23
Kerr Lake	8.30	8.37½
La Rose	4.40	4.45
Little Nipissing .....	.18¾	.19
McKinley-Darragh-Savage .....	.97	.98
Nancy Helen .....	.04¾	.05½
Nipissing	11.45	11.57½
Nova Scotia .....	.37	.38
Otisse .....	.04	.04½
Peterson Lake .....	.21¼	.21½
Right of Way .....	...	...
Rochester .....	.18½	.18½
Silver Leaf .....	.07¼	.07½
Silver Bar .....	.06¾	.07
Silver Queen .....	.09	.12
Temiskaming .....	.65¾	.66¼
Trethewey	1.26	1.27
Watts .....	.05	.10
Wettlaufer .....	.72	.80
Ophir .....	.20	.48

New York Curb—June 23, 1910.

Boston Copper	15	20
Brit. Col. Copper	5¼	5½
Butte Coalition	19	19¾
Canadian Mines	6¼	6½
Chino Copper	11½	11¾
Davis-Daly Copper	1¼	1¾
Ely Consolidated .....	.50	.60
Gila Copper	5½	6
Giroux Mining	6¾	7¾
Goldfield Consol.	9½	9¾

Green-Can.....	7½	7¾
Harcuvar Copper	No Market.	
Inspiration Copper	8½	8¾
Miami Copper	20	20¼
New Baltic Copper	5	9
Nevada Con. Copper	19¾	19¾
Ohio Copper	1 15/16	2
Rawhide Coalition	20	21
Ray Central	2¾	2½
Ray Consolidated	16¾	17¼
Union Mines	1	1½
Yukon Gold	4¼	4¾

SILVER PRICES.

	New York cents.	London pence.
June 7.....	53¼	24½
“ 8.....	53½	24½
“ 9.....	53¼	24½
“ 10.....	53¼	24½
“ 11.....	53¼	24½
“ 13.....	53¼	24½
“ 14.....	53¾	24½
“ 15.....	53¾	24½
“ 16.....	53½	24½
“ 17.....	53½	24½
“ 18.....	53½	24½
“ 20.....	53¾	24¾

TORONTO MARKETS.

Metals.

June 23—(Quotations from Canada Metal Co., Toronto).
 Spelter, 5½ cents per lb.
 Lead, 3.65 cents per lb.
 Antimony, 8 to 8½ cents per lb.
 Tin, 34.25 cents per lb.
 Copper, casting, 13.25 cents per lb.
 Electrolytic, 13.25 cents per lb.
 Ingot Brass, 9 to 12½ cents per lb.

June 23.—Pig Iron.—(Quotations from Drummond McCall Co. Toronto).

Summerlee No. 1, \$23.50 to \$24.00 (f.o.b. Toronto).
 Summerlee No. 2, \$23.00 (f.o.b. Toronto).
 Midland No. 1, off the market.
 Hamilton No. 1, \$21.00 (f.o.b. Hamilton).
 Hamilton No. 2, \$20.50 (f.o.b. Hamilton).
 Clark's, \$20.75 (f.o.b. Toronto).
 Cleveland, \$21.00 (f.o.b. Toronto).
 Coal, anthracite, \$5.50 to \$6.75.
 Coal, bituminous, \$3.50 to \$4.50 for 1¼ inch lump.

Coke.

June 20.—Connellsville Coke (f.o.b. ovens).
 Furnace coke, prompt, \$1.65 to \$1.70 per ton.
 Foundry Coke, prompt, \$2.10 to \$2.25 per ton.
 June 20.—Tin (Straits), 32.82½ cents.
 Copper, Prime Lake, 12.75 to 12.87½ cents.
 Electrolytic Copper, 12.50 to 12.60 cents.
 Copper wire, 14.25 cents.
 Lead, 4.40 to 4.42½ cents.
 Spelter, 5.35 cents.
 Sheet Zinc (f.o.b. smelter), 7.50 cents.
 Antimony, Cookson's, 8.37½ cents.
 Aluminium, 22.75 to 23.25 cents.
 Nickel, 40.00 to 49.00 cents.
 Platinum, ordinary, 32.00 per ounce.
 Platinum, hard, \$34.00 per ounce.
 Bismuth, \$1.75 per lb.
 Quicksilver, 47.00 to 48.00 per 75 lb. flask.