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### RECIPROCITY IN COAL.

A pamphlet entitled "Memoranda Respecting Reciprocity in Coal," has been issued conjointly by nine coal companies operating in Nova Scotia. It comprises a memorandum submitted to the Government of Nova Scotia by all nine companies; a memorandum submitted to the Federal Minister of Finance by the Dominion Coal Company, Limited; a letter written by the Nova Scotia Steel & Coal Company, Limited, to the Minister; similar letters from the Acadia Coal Company, Limited, and the International Coal Mining Company, Limited; and, in conclusion, a characteristic paper by the Hon. Robert Drummond.

Time was when the coal operators of Nova Scotia were popularly looked upon as bold, bad barons. And they did little to discourage this view. Now, however, times have changed, and the mine owners recognize the final importance of engaging public sympathy by a full and open statement of their case.

That case can be set forth in a few paragraphs.

The main contentions of the operators are, in effect, that reciprocity in coal will assuredly throw out of employment between 17,000 and 20,000 men and boys, who, with their families, are directly dependent upon coal mining; and, further, that a much larger number of persons will be indirectly affected. This, if we may accept as facts the statements of the operators, is an obvious proposition. How they substantiate their assertions we shall see later.

Other arguments against reciprocity are that, since the sum of \$50,000,000 is invested in Nova Scotian coal mines, and since this is preponderatingly Canadian money, and, also, since some millions of dollars have been spent in providing transportation and dockage facilities for the present channels of trade, therefore any re-adjustment of markets would be disastrous. This argument is supported by the fact that the trade with New England ports is constantly decreasing. Moreover, it is pointed out that the United States operator is able, even now, against a heavy duty, to seize an ever-increasing proportion of the St. Lawrence and Quebec trade.

But possibly the most cogent argument of all is the flat assertion that the removal of duties guarantees no reduction in price. In fact, if we may accept the arguments of those opposed to reciprocity, it means merely that Quebec and Eastern Ontario will place themselves at the mercy of United States producers who may at any time cease dumping into Canada when they happen to find a more profitable market elsewhere. It were superfluous here to enter into particulars. It is sufficient to state that there is little chance of Nova Scotia securing

a footing in the New England markets. Nova Scotia's shipments to the United States are constantly diminishing. The recently enacted legislation as to smoke nuisance tends to complete the United States control of these manufacturing centres. Moreover, Nova Scotia cannot compete except in rare instances with the cheaper labour, the more perfect transportation, and the immensely larger organizations that characterize coal mining in the States.

Over and above all these considerations, one fact obtrudes itself. Even if it be costlier at present, and this is a matter of debate, it is demonstrably wiser for Eastern Canada to be self-sufficient as regards coal supplies. A terminable arrangement with a much richer and more powerful nation is decidedly dangerous. We can be afforded no guarantee as to the continuity or as to the prices of coal supplies from the south. Is it not distinctly more advisable to depend upon our own developed resources? How can we safely place hostages in the hands of our commercial rivals?

This, however, is obviously presenting one side of the case. Western coal operators are as ardent for reciprocity as eastern operators are against. The case for the West must not be overlooked. It is quite distinct from the East in principle. But in practice, the same factors obtain, though positions are reversed. The West keenly desires reciprocity. Western operators believe firmly that their future depends upon free access to United States markets. This belief may be modified by the speedy development of local demand, but the physical advantages of West Canadian collieries are such that free trade means expansion.

Looking at the question from a broad viewpoint, it is evident that there is danger of emphasizing special interests at the expense of the country generally. It would be interesting to learn why Nova Scotian collieries could not hold the St. Lawrence market if the present duty were removed. Water carriage, loading and trans-shipping facilities, and established markets are a few of the advantages that cannot be created rapidly. It is hard to see, therefore, that this heavy part of the market would be lost to Nova Scotia were the present duty to be removed. Neither does it seem probable that the Maritime Province market could not be held. In fact, there seems to be something radically wrong in the contention that Nova Scotian coal cannot on its own merits compete with the United States product. This point needs further explication.

With the statement that a fair share of trade with the United States is not obtainable we are entirely in accord. The position of American collieries is too commanding to encourage intrusion. On the other hand, the assertion that the present duty is the only safeguard against ruinous competition is going too far. Doubtless Nova Scotia would suffer loss were reciprocity to become an established fact. But the probable extent of that loss has been greatly exaggerated.

Western operators have much to gain through free trade in coal. Eastern operators have something to lose. The country as a whole may secure slightly cheaper fuel. Just how far lower prices will obtain can only be guessed. But, judging by past history, it is safe to bet that the reduction in prices will be considerably less than the amount of the duty.

It is well to give respectful attention to such documents as that under consideration. It is well also to keep ever before one's mind the fact that special interests are pleading. It is our deliberate opinion that were our economic conditions sound we would have little to fear from free trade in coal. As it is, the whole problem cannot be dismissed lightly. The situation is by no means a simple one. One of the first requisites is a plain statement of facts and a clear presentation of comparative costs and profits. Such work could well be taken up by the Canadian Mining Institute.

We cannot fairly accept the pamphlet issued by the Nova Scotian operators as conclusive. More facts are needed. Meanwhile, we may take it for granted that there are two sides to the problem. The burden of proof is distinctly on the East.

#### THE LORD'S DAY ALLIANCE AND THE MINING INDUSTRY.

The institutional church of to-day is the conservator of much good. The efforts of religious societies, and the work of certain non-denominational bodies are manifestations of an earnest desire to cleanse the body politic. But there is something profoundly irritating in the misdirected zeal of that inept aggregation known as the Lord's Day Alliance.

This association has with unbridled vigour fought the insidious Sunday ice-cream. It has sought, not without success, to suppress such unspeakable sins as bathing on Sunday. In fact, its prime aim is to impose upon all of us the joyless Sabbatical traditions of the Puritan.

In Nova Scotia, in Ontario, and in British Columbia, mining men have suffered from the interference of agents of the Alliance. The latest instance comes from Cobalt, where the Alliance sought to close all concentrating mills at midnight on Saturday, instead of at seven o'clock on Sunday morning. Incidentally, this could do no good to the workmen, and would inflict loss on both employers and employees. Such a consideration does not in the least deter the Alliance.

There is humour in the situation. The Alliance no doubt is honestly convinced that Sunday ice-cream, and Saturday night-work are sapping our national health. But it overlooks certain diseased conditions that may not fall far short of both these horrid crimes. For instance, new mining camps are usually infested with women of ill-repute and with purveyors of unspeakably bad liquor. These cater to a small but reckless part of the community. To the majority of operators and workmen they are unwelcome. We have yet to hear of the

Lord's Day Alliance helping a new mining camp to remove the human carrion that so often soils its skirts. That task is left to public spirited citizens.

Were it worth while, which it distinctly is not, we could point out to the Alliance several channels in which it might forget about ice-cream. We fear, however, that the gentlemen in charge of its vagaries are too detached from real life to grasp the most significant hint. But we most humbly request them to ponder long before they interfere with men who have the good of the nation quite as much at heart as has the Alliance, and whose only fault is that they must continue to be controlled by common sense.

### PORCUPINE AT PRESENT.

Porcupine is in a transition stage. Snow has fallen. The rivers and lakes will soon be frozen strongly enough to warrant heavy traffic. Navigation has already ceased. And now, with local transportation charges reduced to a reasonable figure, machinery and supplies can be rushed in as required.

But the snow brings with it not only relief to the operators, but also that type of promoter that can be denominated the "snow-bird." He it is who, availing himself of Canada's winter mantle, becomes the centre of flurries in shares—shares whose value evaporates with the spring sun. The "snow-bird" is always in season and should be shot on sight.

Our remarks in our last issue on Ontario's duty to Porcupine were based upon the fact that the present Government has reaped a rich harvest from the north-land. The auction sales of Cobalt Lake and other properties, and the imposition of royalties have swelled the provincial exchequer. The Government cannot confine itself to the passive role of receiver. It has invited the public to take chances; it cannot refuse to take a few chances itself. The rule works both ways. Hence it is obligatory upon the Government to support and assist Porcupine operators in all legitimate ways. The most important need at present is for postal, railway, and telegraphic communication. The spring will bring other needs.

In the wake of every successful enterprise in Porcupine will follow a number of doubtful or worthless projects. This is a law of human nature. Sometimes unwisdom, sometimes crookedness is the prevailing factor. For the interested outsider it should be easy to distinguish between spurious and genuine publicity. Advertisement seldom is indicative of merit.

Beside the multitudinous optioning and giving in options; the vast volume of hotel talk; the hurrying and scurrying of purchasers, and go-betweens, and vendors; there is solid thoughtful work being done in Porcupine. Never before has an Ontario field offered so much professional employment to reputable engineers. Never

before have cautious investors shown such willingness to put money promptly into a Canadian mining camp. Thus a strong backbone has been created at the stage when it is most needed.

Over and above the expenditure in development and equipment, other large projects are on foot. Certain of the most enterprising operators, the Timmins—McMartin—Dunlap group, are providing for the development and distribution of hydro-electric power. Private capital is tackling railway construction, though in a somewhat farcical manner. Machinery companies are making strong efforts to place equipment. Supply houses in Toronto even now feel the benefit of Porcupine money. The telegraph companies are in clover and hotels are doing a rushing business.

Ore treatment has been the subject of much experiment. On one large property it has been practically decided to cut out concentration, and to cyanide direct after the stamps. Here much of the schist is heavily impregnated with sulphides. On others where the ore is relatively free from sulphides, concentration will probably be part of the flow-sheet. Fully one hundred and fifty stamps are being or are about to be ordered. This number will be multiplied indefinitely in the near future.

As in Goldfields, Nevada, so in Porcupine, the disintegrated material affords the best panning. In the early days of Goldfield the gold pan was not a usual part of the prospector's outfit. In Porcupine the pan is perhaps too much in evidence. Except in experienced hands it is misleading. At best it gives but a qualification idea of the gold content.

Numerous transactions are under way and are being closed or dropped every day. The nomadic engineer, the speculator, the adventurer, the ubiquitous newspaper correspondent are all in evidence. Everyone is taking a turn at option-mongering. Money is being spent feverishly—especially by the lesser fry. Possibly a boom is impending. We hope not. In any case, much of the interest that is now aroused is distinctly susceptible of good use. Clean publicity never does harm. Exaggeration never does good.

Porcupine means much to mining in general. Its successful exploitation will set capital flowing in all directions and will create additional capital. We intend to make every effort to keep our readers informed as to its progress. This does not imply neglect of other districts. On the contrary, it will do good all round.

### GOLD IN QUEBEC.

One of the first authentic discoveries of gold in the Province of Quebec was made by a young girl, Claudine Gilbert, in 1834. She came upon a nugget of gold as

large as a pigeon's egg at a spot near the junction of the Gilbert and Chaudiere rivers. For many years after that the Chaudiere Valley was the scene of occasional activity. Amongst the most active investigators was Dr. James Douglas, now of New York.

In 1866, another large nugget was found on the Gilbert River, on lot 16 of the DeLery Concession. It weighed 45 ounces, 12 dwt., and was valued at \$851.26. It is now in the museum of the Geological Survey, Ottawa. The St. Onge nugget, also found on the Gilbert River, in 1877, weighed 42 ounces and is valued at \$756. The Geological Survey secured this. A collection of smaller nuggets from the same locality is in the same keeping.

The only fairly reliable estimate of gold won, both by milling and washing, from the Chaudiere Valley districts, from the first discovery up to about twenty years ago, was compiled by Mr. J. Obalski. He places the total at about \$2,000,000. It would seem possible that at least as much more could be obtained by modern methods.

We shall have more to say on the subject in our next issue.

#### PHOTOGRAPHY.

One of the most neglected of arts is photography. At least it is misunderstood and neglected by the mining engineer. A camera is looked upon as a mechanical contraption with which aim is taken as with a rifle. The photographer is content if a few good shots occur in a multitude of poor ones.

The University of McGill, recognizing the value of photography to the engineer, has begun a course of instruction in the use of the camera. In other countries this has long been part of the curriculum. McGill is, we believe, the first Canadian educational institution to move in this direction.

#### EDITORIAL NOTES.

Sheep Creek (B.C.) mining properties are changing hands rapidly. The Nugget mine, for which \$40,000 was paid, is now being operated by its new owners. Mr. John MacMartin, of Cobalt fame, will soon have completed payments on the Mother Lode mine. A consolidated plant is proposed for four adjacent mines.

The annual report of the Department of the Interior for the year ending March 31st, 1910, gives the receipts on account of Dominion Lands Revenue as \$3,007,390.82. On this sum refunds amounted to \$121,391.15. Hence the net receipts were \$2,885,999.67. Of the amount the items such as sales of coal lands, mining fees and leases, etc., totalled \$453,342.60. In other words, the revenue from mining lands and operations amounted to more than 15 per cent. of the total.

#### CORRESPONDENCE.

Quebec, November 8th, 1910.

To the Editor CANADIAN MINING JOURNAL:

Sir,—In such a letter as Mr. Jennison's, published in your issue of November 1st, re my notes on "Some Manganese ore-deposits of the Maritime Provinces," the underlying current of spite and disappointment is too thinly veiled to mislead your readers.

When I was in Nova Scotia last autumn, I met Mr. Jennison, and at that time, this gentleman stated to me that it was rather unfortunate that I had been given this work, as it was his intention to offer a continuance of his services to the Mines Branch, to take up the subject of Manganese as soon as he got through with his investigations on the gypsum deposits. Enquiry at the Mines Branch elicited the fact that he has not been given the work.

Mr. Jennison states that my field work consisted in obtaining information from local farmers and lumbermen, and of casual glances at a few abandoned mines; he also implies that, had I to rely on my reputation for a living, I would soon starve to death. While your columns are always very hospitable, Mr. Editor, don't you think that it would at times save a great deal of useless unpleasantness and ill-feeling if, before publishing such uncalled-for and idle statements, you exercised your well-known diplomatic tact in advising your correspondents to round off the angles and asperities, and to polish the roughnesses of such letters as Mr. Jennison's?

It would be a waste of time and of space to take up seriatim the various points of your Truro correspondent's letter. I consider my unpretentious and honest notes, as published in the summary report of the Mines Branch, a sufficient answer to his misrepresentations of them.

Yours very sincerely,

THEO C. DENIS.

Cobalt has, up to date, paid \$17,500,000 in dividends.

There are about 4,000 shareholders in the Calumet and Hecla Copper Company.

At the mill of the Miami Copper Company, Globe, Ariz., there are 48 Deister concentrating tables installed. The Deister slimers are on the ground and will soon be put in place.

Mr. S. S. Fowler has leased the Enterprise mine, near Slocan Lake, from the English owners. Though once a large shipper, the Enterprise has not been worked since 1905. Smelter returns showed at one time 150 ounces of silver.

The Buffalo mill, Cobalt, is doing satisfactory work. According to the returns for August, ore amounting to 3,303 tons was put through. This contained 41.39 ounces of silver per ton, an aggregate of 136,711 ounces. Of this amount the total recovery was 113,204 ounces or 82.8 per cent.

# GRANBY COMPANY ENLARGING ITS FIELD OF OPERATIONS

(By E. JACOBS, VICTORIA, B.C.)

From Spokane, Washington, has been received information concerning an intended early enlargement of its field of mining operations by the Granby Consolidated Mining, Smelting & Power Company, Limited. As Mr. Jay P. Graves, vice-president and general manager of the Granby Company, has his headquarters in Spokane, and, further, as it has been known to me for several months that the Hidden Creek Copper Company's mine was under offer to the Granby Company, I am assuming that the following statement, received from a publicity agent resident in Spokane, gives a generally correct outline of the transaction under notice. The statement is, in part, as under:

"Eighty per cent. of the capital stock of the Hidden Creek Copper Company, which owns the largest copper deposit in northern British Columbia, was acquired for \$400,000 by the Granby Company in Spokane on October 25th, when the deal was closed and a substantial payment made to J. M. Hodgens and Ralph Hodgens, of Butte and New York. M. K. Rodgers, manager of the property, who owns the remaining 20 per cent. of the stock, refused to sell his interest. Mr. Jay P. Graves announced that a matting plant will be erected as soon as sufficient tonnage is developed, and added:

"It is our intention to reduce the ore to a low-grade matte, say 20 or 30 per cent. copper, and to ship the matte to Grand Forks, B.C., to be smelted and converted there in conjunction with our Phoenix ore. By so doing we expect to cheapen our cost of operation, through increased tonnage, and at the same time reduce our metal losses in the slag owing to the larger percentage of iron in the charge. The increase in sulphur will enable us to reduce the percentage of coke consumed. The addition of this matte to our smelter charge also will admit of our treating a larger quantity of silicious ore than we can do at present.

"We feel confident that in acquiring the Hidden Creek mine we have secured one of the greatest copper mines on the Pacific coast. The main ore body appears to be fully 100 feet wide and, allowing for the considerable mass of low grade ore it contains, we feel we are conservative in placing the copper content at the low average of 3 1-2 per cent. In area the property is nearly as large as that of the Granby mines at Phoenix."

The remainder of the Spokane communication is descriptive of the property but since it was visited by Mr. Herbert Carmichael, provincial assayer, in 1909, and his account of it was included in an official bulletin published by the British Columbia Bureau of Mines, it will, perhaps, be better to quote from that publication, which thus deals with Observatory Inlet:

## Observatory Inlet.

"Observatory Inlet is a branch of Portland Inlet running practically parallel with Portland Canal but 15 or 20 miles apart. Thirty-five miles from the entrance, Observatory Inlet splits into two arms, namely, Hastings and Alice Arms, the former heading north and south and the latter east and west. Goose Bay is a large sheltered inlet, the outlet being on the west shore of Observatory Inlet, at the entrance to Hastings Arm. While there is a deep waterway of ample width, no de-

tailed survey has been made of these waters and the chart should be used with caution.

## Hidden Creek Copper Company.

"This company owns nine mineral claims in the neighbourhood of Goose Bay, namely, Rudge, Revenge, Donald, Alpha, Manson, McKinley, Kenneth, Salamander, and Bunker. The principal work has been done on the Alpha and Revenge. There is an excellent plank road two miles long extending from the deep water at Goose Bay to the main tunnel, which is 530 feet above sea level.

"Prospectors were first attracted by a round-topped hill, about 1,000 feet high, which was more or less covered by a typical 'gossan' or iron cap. Prospecting showed that this gossan was thicker and more strongly marked in some places than in others, and attention was specially directed to these points. The first of this work was done on a large exposure of these oxidized ores, which proved to be 5 feet thick. This gossan was cut with a number of trenches which disclosed a body of mixed pyrite and chalcopyrite ore, and this was prospected by four tunnels, aggregating 200 feet. These tunnels developed a large body of ore carrying 4 to 6 per cent. copper, which was called the 'Cabin Bluff,' and is at an altitude of 700 feet.

"About 500 feet back round the hill and 200 feet higher than the 'Cabin Bluff,' another and larger exposure of ore was discovered and named the 'Mammoth Bluff.' This has been cleared off to a large extent by surface stripping and shows a height of 300 feet of mixed pyrite and chalcopyrite ore, carrying 4 1-2 to 5 per cent. copper. This ore deposit has been prospected by several tunnels, in all 350 feet in length.

"There are several smaller showings on this hill, and these, with the 'Cabin' and 'Mammoth' bluffs, have been prospected by 2,000 feet of open-cut, beside the tunnels. To tap these ore bodies at depth and form a main working tunnel, a long drift has been started on the hillside 200 feet vertically below the 'Cabin Bluff,' and when the property was visited this drift was in 732 feet. At 430 feet in, the ore seen in the 'Cabin Bluff' above was struck, the tunnel cutting through it, the strike of the ore being N. 10 deg. W., dip 65 deg. W. The thickness of the ore body is estimated at from 25 to 40 feet, running from 4 to 5 per cent. copper. Drifts 70 feet long have been run on either side of the tunnel in ore all the way, the direction of the tunnel being 90 deg. from the strike of the ore.

"Round the hill to the south 285 feet, and at an elevation of 100 feet above the main tunnel, a drift known as the 'Pyrites tunnel,' is being run in to connect with an upraise from the main tunnel. For the first 100 feet this tunnel runs through loose granular pyrites, made up of small detached iron pyrites crystals, similar to those found on the Ecstall pyrites deposit, near the Skeena River. At 100 feet in, solid mixed iron and copper pyrites ore was struck, carrying 4 per cent. copper for 10 feet, when a lower grade iron sulphide ore was met, and the tunnel is still in this ore at 200 feet from the portal.

"The vertical height between the main tunnel and the top of the 'Mammoth Bluff' deposit is 450 feet, and with the prospecting done it is reasonable to infer that

the ore shoot is continuous for this vertical distance. The horizontal boundaries of this ore body have not been clearly defined, but it is probably some 600 feet in length by 20 to 25 feet in thickness, carrying 3 to 4 per cent. copper.

"At the 'Cabin Bluff' showing there is a considerable depression in the ground, which appears to have been caused by oxidizing and dissolving out of the pyrites ore body, and there is a large deposit of hematite in a small flat of 10 acres south of the ore showings, where this dissolved ore has been redeposited. Samples of this deposit gave the following assay: Iron, 60 per cent.; gold, 0.10 ounces; copper, 0.2 per cent.

"The country rock in the vicinity of the ore body is made up of altered argillites or shales, traversed by felsite, diabase and porphyrite dikes, these dikes being of later origin than the ore. In some parts of the deposits there is a vein filling of quartz, but the main body is composed of solid sulphide ores.

"There is an 87-foot waterfall on a small creek 1 3-4 miles northward of the main tunnel, where 600 horsepower is developed by an impact wheel of Pelton type. This runs an 8-drill Rand compressor; also a small saw-mill capable of cutting 7,000 feet a day of rough lumber.

"Transportation facilities are being provided by the installation of 2,500 feet of gravity tramway and one mile of an electric tramroad on a seven-tenths of one per cent. grade. This will bring the ore to deep water, where it can be shipped to any of the coast smelters.

"The property is under the general direction of Mr. M. K. Rodgers, American Bank Building, Seattle, Washington."

Last summer I was given the following information relative to this property by one who claimed to be well

informed concerning it: "The developed ore zone has been opened for a little more than 2,000 feet in length, and from 200 to 500 feet in width. Beside some 1,500 feet of open-cut work, about 1,000 feet of tunnelling has been done. This work has opened a large body of copper sulphide ore, running from 4 to 8 per cent. (with some as high as 12 per cent.) in copper, and \$1 to \$3 per ton in gold and silver. It is a very favourable ore for smelting, carrying an excess of iron over silica. Much of it is pure copper and iron sulphide, high in both iron and sulphur, so making it a desirable smelting ore, less coke being required for its reduction than for other ores having constituents less favourable from a metal-liferous point of view.

"The ore has been cut for a width of 125 feet and down to a depth of between 400 and 500 feet, and it is known to be good to below the 400-foot level. The quantity of ore blocked out is more than 300,000 tons, and the mine is sufficiently developed to warrant the erection of a 300-ton smelter."

The foregoing information will serve to give a general idea of the property the Granby Company has taken under bond. It is probable Mr. Graves is not quite correctly quoted in the statement attributed to him, in effect that the Hidden Creek property is "one of the greatest mines on the Pacific coast." It is likely that his comparison was intended to be restricted to the British Columbia coast district. If not, then the opinion may be expressed that it is premature to express any such opinion in the present state of development of the Hidden Creek mine. Nevertheless, there seems some good reason to believe there is in that mine a large tonnage of copper ore, but of general average grade somewhat lower than the stated 3 1-2 per cent. copper.

## OUR LONDON LETTER

**British Interests in Canadian Affairs—The Asbestos Trouble—The Tin Market and the Coming of Nigerian Tin—Oil Developments—The "War" With Some Further News of Maikop—Russia's Abounding Copper Production—Copper in Asia Minor and China—Rand Conservatism—Important New Reduction Works on the Rand.**

(Exclusive correspondence of CANADIAN MINING JOURNAL.)

Despite the interest that things Canadian on the whole excite in Great Britain that interest does not extend to the Dominion's mines as a rule. In the days of Whittaker Wright there was a boom started by the forming of the British American Corporation and somewhere about \$25,000,000 were raised with the utmost ease and companies like Le Roi and others were floated, the shares going easily and big premiums being secured. A few years passed by and there came the Whittaker Wright smash with the suicide of the promoter on the eve of his conviction for fraud. The companies that owed their origin to his skilful manipulation dragged on during the succeeding years and have gradually faded away one by one, Le Roi being practically the last to disappear. This company is now being wound up.

Turning to one Canadian matter that deeply interests English investors the news was definitely published on October 20th here that the Amalgamated Asbestos Corporation was in an unsatisfactory position. This corporation endeavoured to place \$15,000,000 in 5,000 first mortgage bonds in London some seven months ago

but the response was very small and so far as concerns this country interest in the affairs of the corporation centres in the effect which its fortunes may have upon the United Asbestos Company which is an English undertaking. I understand that no ill effects are anticipated for this English company and that in so far as there is likely to be some alleviation of the intense competition which has prevailed recently the position of the United Company may possibly be improved.

The fierce competition in the asbestos industry has reached a level where it is almost impossible for matters to become any worse. During recent years the English United Asbestos Company, like its predecessor, has adopted a very conservative policy, and the directors have made every endeavour to husband their resources. It seems likely, therefore, that in the event of any revival in business the company would benefit substantially. On this side the position of the Amalgamated Corporation is rather obscure.

The tin market to which I made some reference in my last letter continues to provide plenty of excitement on the London Stock Exchange and in the metal market. Just prior to the date of writing there has been another jump in the price and the cash figure of the metal is practically \$100 higher per English ton than at the beginning of August. The Nigerian alluvial tin propositions to whose origin I have in an earlier article made some reference are getting more numerous on the London market. The most advanced company in production amongst them is the Naraguta, which has al-

ready attained an output of 45 tons of tin oxide a month.

The "Oil war" is well with us now. When the news first came to hand that the "Shell" Transport Company "whose interests are now combined with the Royal Dutch Petroleum Company," had torn up its agreement with the Standard Oil Company of America, considerable anxiety was caused among shareholders of European oil companies, especially the recently created Maikop concerns. More mature consideration caused many experts to declare, however, that no war exists and that the cut in prices was merely rendered necessary by the enormous accumulation of oil stocks.

The enormous surplus awaiting consumption, taken in conjunction with the development of the new Russian field at Maikop and the threatened intrusion of further new fields such as that just being exploited in Persia and the deposits discovered in the northern part of the Island of Sakhalin in Siberia, has produced a situation which would practically compel reduced prices. Oil shares have therefore largely recovered the losses sustained when the war was first announced. Oil investors here are encouraged by the theory that the more oil there is produced the more the demand for it will spread. This theory is supported by the results of the use of oil on steamships and on railways where the only difficulty has lain in obtaining regular supplies. It is held, therefore, that if the ultimate result of the oil war is to increase consumption of oil as fuel it will prove a blessing in disguise to those producers who are in a position to readily market their crude oil.

With regard to Maikop most conflicting statements continue to be issued. An interview with the Russian Minister of Finance declares that it is quite a mistaken impression that the Russian Government does not favour foreign enterprise in Russia. With regard to British Maikop companies, the Russian Government may, however, consider it necessary to require some guarantee that the work of prospecting with oil will be substantially carried out. It is possible that some standard of requirements may be fixed to which all companies applying for recognition must conform.

A "Times" correspondent who has recently gone all over the oil field comes to the conclusion that the country is satisfactory. An important factor is, however, developing. It was thought originally by geologists and experts that the Maikop field had a length of some 20 or more miles and a width of at least four or five miles. As the result of sinking wells the latest expert opinion is that for all practical drilling purposes the width of the field may not be more than a mile. In the course of the next few months a great deal of valuable information will be obtainable as the results of many borings become known. Of course, even if the field were to be only a mile in length instead of four or five miles, it could still be a great oil field. What we are waiting for, however, are trustworthy data.

All kinds of delays are taking place in connection with the official recognition of titles, the definition of boundaries, and the right to work. Old and experienced drillers, however, from Baku, Galicia, Roumania and California are actively employed on the field. It is said that 60 wells are sunk or in the process of drilling, with derricks being erected.

Whilst on Russia a word might be said of that empire's rapidly advancing copper production. From being an importer Russia is gradually turning into an exporter, her production having increased in ten years from 445,000 poods to 1,116,920 poods. The imports of copper have shrunk in five years from 1,262,000 poods to 213,000 poods. Electrolysis has been the critical

question, but it is now being got over, the production of electrolytic copper advancing by leaps and bounds. The great Russian copper fields are the Urals, the Caucasus and Siberia. The production for the first half of this year shows a further rapid increase which, if continued, will make Russia's whole production for 1910 close upon one and a half million poods. The world's increasing consumption of copper will render it necessary to open up still further copper fields. (One pood equals 36 pounds.)

Many reports are to hand here with regard to fresh great deposits. In Asia Minor, in the neighbourhood of Diarbekir, there already are rich producing mines working one that has an average of 30 per cent. copper, 40 per cent. iron and 30 per cent. sulphur, but beyond these there are great deposits which have not been tapped extending along the Black Sea shore near to the port of Trebizonde in which copper ores exist to a great, but unknown, extent in conjunction with manganese. Further afield, on the borders of Thibet from the Kansu Province of China, one hears extraordinary accounts of immensely rich and widespread deposits. An experimental plant has been put down to the order of the Chinese Government under British management which may be the beginning of an industrial revolution in that remote part of the country. The spot selected is in a valley about 100 miles west of the city of Sanchowfu and the experimental plant is capable of treating 50 tons a day.

The obstacle to treatment earlier here lies in the fact that the ore has an enormous capping of "loess" which in some places is 200 feet thick. So high is the opinion of the Chinese Government with regard to the copper possibilities of Kansu Province that although gold mining concessions are freely granted there the imperial authorities intend to keep the control of the copper in their own hands.

A private cable from Johannesburg to London states that during September the Rand mines alone crushed 1,835,647 tons of gold, the total profit being \$4,711,650. The average yield per ton works out at 28 shillings and 3 pence and as the working costs figure out at 17 shillings and 11 pence, the profit per ton is 10 shillings and 4 pence. It will be observed that in the 30 days of September the tonnage crushed was slightly more than in the 31 days of August with an increase also in the daily average profit as compared with that month.

A special event on the field was the virtual completion of the new reduction works of the City Deep mine. It is curious to note how conservative the Rand has been and what a long time it was in taking the tube mill from Australia and the Butters Vacuum Filter process from the United States and Mexico. Returning to the City Deep, the present plant is designed to handle 65,000 tons per month. Ore coming from the western shaft is dumped by five-ton skips over grizzlies into fine and coarse ore bins up against the steel headgear. The main ore bin has a capacity of 1,000 tons, and above it is the preliminary crushing plant. Hopper bottom doors operated by compressed air are fitted to the bin, and through these doors the crushed ore and fines are discharged into trucks for transport to the mill. A similar crusher station will be erected at the eastern shaft when the scale of crushing is increased.

The line up to the mill is over a mile long, mostly on embankment. The train of ore will consist of four (or more) 40-ton all-steel Klussman trucks. They will be drawn by an electric locomotive consisting of two 25-ton, six-wheeled halves coupled, and will be of 150 h.p. The locomotive will operate on 2,000 volt, 50 cycle,

three-phase current as furnished by the power company. A general system of lines connects the mill stores, general yard, workshops and coal siding.

The mill consists of 200 stamps, arranged in units of ten, each unit being driven by a 50 h.p. motor. Weight of stamps when new, 2,000 pounds. The stamps have long heads and short stems. A layer of half-inch felt is placed between the mortar bases and the concrete foundations. There are no king-posts, as the concrete foundations are carried up 14 inches wide, with indented steel bar reinforcing to above the level of the mortar-box tops. On the tops of the foundations is bolted a heavy cast-steel frame, which carries the cam shaft and stem guides. Each cam-shaft rests on 11 bearings, as beside the three bearings there are bearings intermediate between the cams. This is to minimize, if not entirely obviate, cam-shaft breakages by reducing vibrations. The stems run in cast-iron guide blocks bolted to the steel guide girts, but with a wood cushion between. As these stamps are designed for very heavy duty, each set of five stamps is provided with two challenge feeders to feed behind the second and fourth stamps of each mortar-box.

Practically the whole mill is of steel, wood only being used for the bin lining, for minor purposes and for fastening on the corrugated iron. The mill pulp is ele-

vated twice, once between the batteries and tube mills, and second between the shaking tables and the sands collectors.

The tube mill plant comprises nine mills 5 feet 6 inches by 22 feet, driven by a slow-speed motor. In order to avoid crowding together of classifying cone and pebble feed, the driving arrangement is at the outlet end of the tube mill. It is at the inlet where most attention is required, and the presence of driving gear there is both inconvenient and dangerous. Behind the tube mills is the gold recovery house, where all the gold is recovered and handled. Each of the nine tube mills has seven shaking tables, with room left for an eighth if required. It will be understood that, in conformity with most modern practice, no amalgamation is done in the battery itself. There are 18 extractor boxes.

The sands collecting plant consists of one row of six vats built in reinforced concrete, which is the outstanding feature of the whole equipment. From the collectors the sand is taken to the leaching vats, of which there are 12, by means of conveyer elevator belts. Blaisdell distributors and excavators are used, and all power for the operation of the plant is purchased electricity.

## RECIPROCITY IN COAL

Its Probable Effect on Nova Scotia—An Eastern Point of View.

(See Editorial Pages for Comment.)

Through the courtesy of Mr. J. H. Plummer, president of the Dominion Coal Company, the CANADIAN MINING JOURNAL reproduces a memorandum concerning reciprocity in coal, which has been submitted to the Dominion Government on behalf of the company.

Following is the statement:

1. Such support as a policy of reciprocity in coal has received in Canada appears to be based on the theory that the Nova Scotia collieries would secure a large market in New England, to offset their loss of trade in Quebec and Ontario. It is assumed that the policy could not be discussed except on this theory.

2. The free access to the United States markets which the Nova Scotia collieries would gain under reciprocity would, however, be an almost empty privilege.

The coal trade in Boston and New England has in recent years been revolutionized by important developments in the mining and transportation of coal. The conditions which formerly existed have entirely been changed, and the ability of the Nova Scotia collieries to find a market there has steadily decreased.

The developments have been general, but are most marked in the West Virginia coal fields, whose products reach the seaboard at about the same distance from Boston as Louisburg. By the construction and equipment of railways, steamers, loading and discharging plants, and other modern transportation facilities of the most modern and most economical type, at an enormous cost, the West Virginia mines have gained a strong hold on the New England market. These developments still continue, and the cost of production and transportation may be further lessened.

The consolidation of the New England railroads has also affected the situation. Their enormous trade of 5,000,000 tons gross a year all goes to American channels, and so far as the supply of coal by rail is concerned, their influence cannot but be entirely in favour of American coal.

3. Nova Scotia coals are generally excellent steam coals, but those from West Virginia are less volatile and are freer from sulphur; they are, in fact, of a different class, make less smoke, and are generally more desirable. The appliances installed by the large consumers are adapted to the use of this coal, and they cannot without inconvenience and expense use Nova Scotia coals, which debar us from their trade.

4. Notwithstanding our efforts to sell coal in New England, our shipments have been steadily decreasing, and even with concessions in price equal to the amount of duty, we have recently found that we could not secure contracts. We made strenuous efforts to place coal in New England during the past year, chiefly to provide steadier employment for our men during the winter months, and were willing to work on a very small margin of profit, but were entirely unsuccessful.

5. These conditions arising out of the natural development of the trade are in themselves conclusive, but, in addition, an absolute bar to the sale of our coal has been created by the legislation passed by the State of Massachusetts in June last, to abate the smoke nuisance. By this legislation the State has practically closed its doors against Nova Scotia coal; the terms of the Act, which is supplemented by local regulations elsewhere, as at Springfield and Worcester, preclude



the use of the high volatile coals in the chief New England markets, except under conditions which are commercially unattainable.

6. So far as we can judge, reciprocity would give us nothing tangible to make up for the loss of other markets, and would lead directly to a decrease of production. It might be that with a lessened production of coal throughout the province, labour would be more plentiful, wages lower and supplies cheaper, and that the collieries capable of being most economically worked might thereby be able to avert the more serious consequences, but this would merely place the burden on other shoulders.

7. It is scarcely necessary that we should refer to the effect on the Province of Nova Scotia; on the provincial revenue from royalties on coal; on the miners and other workmen; on the trade of the province, both internal and with other provinces. The large coal carrying trade on the St. Lawrence would be curtailed, and its benefits to the ports on the St. Lawrence and in Nova Scotia correspondingly decreased.

8. Several objections of a practical nature may be briefly stated:

(a) There are obvious disadvantages inherent in a terminable arrangement; they cannot be eliminated, and a long term agreement would only defer them. During the period of reciprocity new and cheaper lines of carriage would be developed; new business connections and alliances built up; consumers would become used to and provide appliances for a different class of coal, etc. All these conditions would be the more developed as the period is lengthened; they would make the recovery of our lost markets very difficult, and tend to perpetuate the control of our markets by the American coal mines.

The lack of permanency would also affect the installation of the facilities for handling coal, without which the Nova Scotia collieries could not hope to enter the New England market. Wharves, discharging plants, railroad connections, etc., would involve a heavy investment of capital, which would be imprudent under a terminable arrangement, even if the other conditions would justify it.

(b) It must be expected that our American competitors will join with the railways and others to hold the home market; such an alliance would be more effective now than at any time in the history of the trade, because of the conditions referred to above.

(c) The mere removal of the duty would not place us on equal terms; we should be in a foreign market, with everyone who could be moved by patriotic, local or interested motives, working against us.

(d) As regards the anti-smoke legislation, which in itself seems to put the question of reciprocity outside the possibility of discussion, it may be argued that reciprocity would lead to a modification of this law, but the State Legislature and the municipal authorities are not controlled by the Federal Government, and we see every reason to look for a wider application of the principle rather than the reverse. It appeals to the ordinary American citizen as a distinct advance in civic conditions, which incidentally supports a home product, and he would be strongly influenced by both considerations.

10. This memorandum expresses the views of this company only, and does not assume to speak for others, but the judgment expressed above as to the disadvantages of reciprocity to the Nova Scotia collieries is concurred in by producers of 90 per cent. of the coal mined in the province.

Some general considerations bearing on the question are set out in an appendix in further support of our views, and the whole is respectfully submitted for the consideration of the Government.

For the Dominion Coal Company, Limited.

J. H. PLUMMER, President.

Montreal, 8th October, 1910.

#### Appendix.

The foregoing memorandum is directed to the situation as more particularly affecting Nova Scotia, but if our belief as to the effect of reciprocity in that province is well founded, it is fair to ask whether the conditions elsewhere call for such a sacrifice of Nova Scotia interests.

2. So far as we are aware no objection to the continuance of a duty on coal exists in the Province of Quebec, except of the most limited character.

Objection is said to exist in the Province of Ontario, which province largely benefits by the demand for machinery, food supplies, etc., created by the coal industries in Nova Scotia, and by the iron and steel industries which depend on and are bound up with them. The following comments on the position of purchasers of coal in Ontario are therefore respectfully submitted:

(a) The manufacturers of Ontario are not handicapped in their manufacturing costs by the duty; the cost of coal to them, duty paid, is about the same as to their eastern competitors. In the case of slack coal, which they use largely, the duty is so low that its removal would have no material effect.

(b) No tax is more fairly distributed. Manufacturers add it to their costs and prices, and, in theory, if it were removed the saving should go to their customers. Railways add it to their passenger and freight rates, and, theoretically again, if the duty were removed their rates should be reduced by precisely an equivalent amount, as the tariffs approved by the Railway Commission are based on the current cost of operation.

(c) It may be doubted whether the removal of the duty would decrease the price of coal in Ontario; it had not that effect in the case of anthracite. It is true that there is more competition in bituminous coal, but the business of mining soft coal in some of the districts which supply Ontario is known to be in a very unsatisfactory state, and carried on without a reasonable profit, and it may, therefore, be expected that with the removal of the duty, the mine owners would try to hold the market at current prices; it would be entirely within their control, and the Canadian consumer would be helpless against any combination that might be formed.

(d) The coal industry of Nova Scotia, with the iron and steel industries which directly depend on it, furnish the chief exports from the province to other parts of Canada, and are the foundation, in turn, of the large purchases made by Nova Scotia from the western provinces. The volume of this trade is unquestionably very great, and it is secured to the farmers and manufacturers of Ontario and Quebec by the tariff.

The cost of these imports is relatively high, and the prevailing wages paid to miners and steel workers are also high, due chiefly to the high cost of living. These conditions are accepted as equitable under a fiscal policy which seeks to protect all parts of Canada alike, but the same consideration requires that no changes which would disturb the general balance of trade, or injure one province to benefit another, should be considered.

3. The importance of the industry to the Province of Nova Scotia is very great. Its entire revenue in 1908 amounted in round figures to \$1,783,400, of which \$616,900 was derived from royalties on coal. The proportion

was somewhat smaller in 1909, because of labour troubles.

In 1907 the coal mining companies in Nova Scotia paid out for labour and supplies a sum slightly exceeding \$10,000,000; this is based on the actual figures furnished by the various collieries. The amounts paid out by the iron and steel manufacturers, whose ultimate prosperity is bound up with that of the coal companies, would not fall much short of the same amount.

4. A comparison of labour conditions may fitly be made. In the eastern and southern coal mining districts of the United States a large number of foreigners and negroes are employed, and from this and other causes the cost of mining as compared with Nova Scotia is much lower.

The men employed in the Nova Scotia collieries are of an excellent class; they are as a whole, very well paid; their standard of living is high, and the provisions for their safety and comfort are far beyond what is customary in the United States. The mining laws of Nova Scotia are as advanced in this respect as in any country in the world, and the coal companies find it to their interest as well as their duty to carry them out faithfully.

We respectfully submit that the difference in labour conditions should be considered when a proposal to wipe out our tariff protection is under discussion. The laws of the province respecting mining, the general influence of our Canadian standards, and the character of the population which supplies the greater part of our labour, make it impossible for us, even if we were willing to use the cheap labour which our competitors are able to employ.

### MINING—A BUSINESS.

(Written for the CANADIAN MINING JOURNAL.)

[EDITOR'S NOTE.—This short article was written at the express request of the CANADIAN MINING JOURNAL. To our mind it delimits admirably the function of the mining engineer—although this is not the theme. We are especially in accord with the writer's remarks anent the word "conservative." His strictures are just. That word has been used to cover much moral cowardice. The word that should supplant it is a homely English word—"honest." We earnestly invite comment on this article as we recognize the fact that on all such propositions there is room for difference of opinion. Moreover, we are diffident about forcing our own views upon our readers.]

The untutored have believed, and the general public suspected, that precious metal mining is in all its aspects a pure gamble like roulette. This impression has obtained partly through the sentimental side of human nature, and partly because of misconceptions on the part of those untrained to the business of getting gold and silver. These latter believe that little knowledge is necessary to win a fortune in mining fields. Nothing can be farther from the truth. It can be easily shown that a hard and careful training only can fit men to mine—with success.

In considering this matter, we may conveniently divide our subject into two parts. The indefinite, and the definite. It must be granted that any man or group of men wishing to make a business of mining must be possessed of the necessary capital, or be in a position to control and obtain this capital. And it must be further laid down that no mining operator (using the term operator in the sense of a single capitalist or a group of capitalists), will confine his risk to any one

prospect to insure a profitable outcome for his undertaking. In other words, if he is going to make mining a business he must be persuaded or determined to distribute his energies over sufficient number of mining risks (guided by proper advice) to insure obtaining what he seeks; namely, a profitable mine. Those prospects, which we know as mining risks, which fail to satisfy his expectations, must be consistently written off to business losses, and charged against the successful property which he will ultimately control if he prosecutes the business steadily and intelligently. That part of mining which we term the indefinite part, is the prospecting and geological work necessary in the early stages of a deposit giving evidence of some interest to the miner. There is no line of demarcation between the indefinite and the definite parts of the business. As the prospect becomes more developed, competent engineers will readily advise their clients whether it promises a profitable outcome, or whether the venture should be abandoned. The early part of any operator's work must necessarily therefore be regularly guided by the geologist and the engineer, and it will depend upon their advice how much and what kind of work will be carried on. Should the deposit prove commercially valuable, it will gradually pass to the definite stage, and will show profitable mineral in place, and ore reserves that can be determined and the value of which in metallic contents estimated. When we have arrived at the estimation of ore reserves, even at that stage which we know as prospective ore reserves, we may be right in saying that the prospect has passed from that stage into what we may reasonably term a developed mine. If the ore opened by this development would indicate that the amount of money already expended is covered by value existing in the mine, we are right in saying that the mine has passed to the definite stage, and all work done can be, and should be, well done on business lines, and all risk for the capital expended can be almost if not entirely eliminated by a combination of good financial management, good operating management, and proper technical skill.

In every mine we must realize that there is the co-operation of three kinds of talent necessary in the commercial outcome of any mining venture, namely, financial management, or the business of the financier or capitalist, the department of mining which demands the service of the skilled mining engineer and geologist, the equipment and treatment of the ore, or the skilled metallurgist. These latter two divisions may have a number of sub-divisions that merge one into the other, or may be efficiently found to exist in one man; but this is not often the case. In any case it is for the operator to call to his aid the necessary skill that these various departments demand in order to be sure of the outcome of the proposition. Should he fail to seek this advice, his neglect cannot be debited to the mining industry. Mining conducted in this fashion should, and does, recompense and reward those engaged in it very handsomely. In fact, if prospects which are only intended to be gambles from the start are eliminated, it will be found that the percentage of mining failures is less than in any other business that we are acquainted with, and the reward greater than in almost any other business. This fact is amply proved by the history of the Western States and Mexico, where have been built up splendid towns and cities from the profits of the surrounding mines, and it is possible that the mining industry in the snow covered woods of Ontario will do more in a shorter time to build up Eastern Canada than all the other industries combined.

It may be generally accepted as a fact that where a report, described as conservative, has been made, it means little or nothing. An engineer comes to a decision on the facts as they are presented, or as he sees them. That decision represents in the competent engineer a true statement of the conditions, and should indicate an exact valuation for the property, the engineer making the proper and necessary deductions from the result of his examination. It is therefore absurd to describe a report as conservative. A report is either right or it is wrong. It should be neither conservative nor liberal. It is exact within the limits of our knowledge at the present time, and it may be generally stated as correct that where a company is operating without the

services of competent engineers, it is not operating the mines in the interests of the investor, but in the interests of the stock market. A company that means to mine seriously is always willing and able to surround itself with competent talent, so that those engaged in its financial management shall not be called upon to explain and bear the burdens of its technical management. This can only be accomplished by employing engineers, geologists and metallurgists who have had not only the necessary training, but the necessary and varied experience that fits them to be competent associates and guides to the financiers who are responsible to the stockholders.

## A NEW ELECTRIC ARC PROCESS FOR PRODUCING AND REFINING STEEL

BY FRANK C. PERKINS.

The accompanying drawings indicate the construction and arrangement of electric ladles or furnaces with or without covers and composite electrodes for operating an improved process of producing and refining a high grade of steel low in phosphorus to analysis desired. It consists in electrically treating molten iron from a blast furnace or while cold, or low grade molten steel as taken from a Bessemer converter or open-hearth furnace with electric heat produced by an arc or arcs formed between the slag of the bath and specially designed electrodes. Several forms of composite electrodes are indicated in the drawings, one consisting of a cored carbon or a mixture of carbon, and lime and oxide of iron or other slag producing materials in the form of a pencil. Another shows the slag materials packed in an iron or steel tube, and still another surrounding a carbon or iron rod or rods with or without projections for supporting the slag materials with a binder, such as tar.

The use of the composite or combination electrode, instead of the usual carbon electrode or an electrode of pure iron, introduces the fresh and additional refining slag materials to the bath fused and in a highly fluid state at the hottest points which are at the arcs or at the points of contact of the electrodes and the layer of slag floating on the bath of molten steel.

When two of these electrodes are used in an electric furnace of the double pole type, the current passes from one electrode into the slag and through the slag as a resistance and out the other electrode, the two arcs operating at about 100 volts pressure. One electrode may extend into the slag or down into the molten steel below the slag, a single arc only being employed at this time formed at the other electrode, with a pressure of approximately 50 volts.

The double pole electric furnace is well adapted for practising this composite electrode process similar to the Heroult method, because when the two electrodes are introduced into the refining slag, the latter acts as the resistance and forms one or two arcs according as to whether one or both electrodes are out of contact with the bath and producing the arc or arcs. If one arc is used the other electrode may be raised and lowered by electric motor driven hoist stirring the molten bath by this action.

An ordinary basic lined ladle, crucible or pot, may be used as noted in the drawings without cover, which may be supplied in the same manner as a basic lined two pole electric furnace. This ladle having received the charge of molten steel from a Bessemer converter, is electrically refined by eliminating the phosphorus and sulphur, as far as desired, and is, if necessary, deoxidized and recarburized. The steel is then poured into the ingot molds, after an electric treatment of from a few minutes to an hour or more in the electric ladle, according to the degree of refining desired.

When only one of these electrodes is used in an electric furnace, this electrode extends into the refining slag forming the arc at this point, the current being conducted through the molten bath and out through the bottom of the ladle, similar to the Girod process.

Another construction shows double arc or single arc action taking place when a ring electrode is arranged on a level with the slag. A single arc action only at centre may be employed, the outer electrode dipping into the slag or molten steel.

By this electric arc process the molten metal continually circulates, all particles of the bath coming into contact with the refining slag at the arc or arcs and elsewhere and being rapidly refined, remaining at the highest temperature only a short time, then replaced by other particles of molten steel reaching the slag near the arcs.

It is held that in the Heroult arc steel furnace the circulation in the bath is always active and the average temperature may be kept as low as any other furnace and all parts of the bath come rapidly into contact with the slag. In case a deep bath of say 10 or 12 tons or more is used in the electric ladle and additional circulation is desired, one electrode may be plunged up and down in the metal by a hoist mechanism, as previously mentioned, while the other electrode produces the arc with the slag.

By the use of these special electrodes made with slag producing materials, the highly fluid slag at the arcs causes rapid circulation to take place and the bases are removed, which are often retained in the metal and cause bad steel when poured into the ingot molds directly from the Bessemer converter without electric refining.

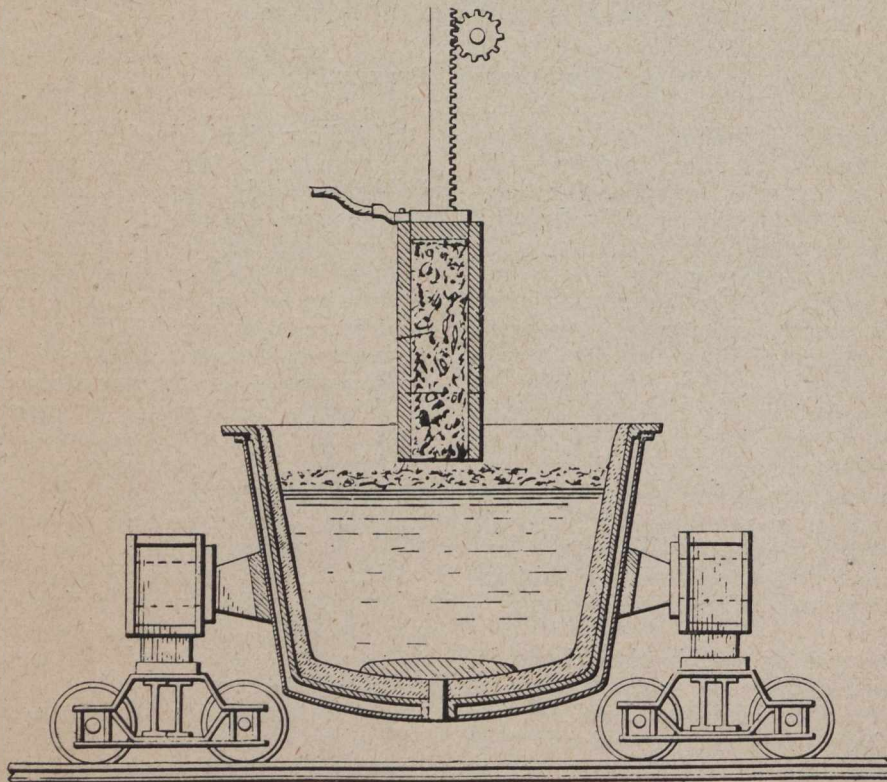
Furthermore, in this electric refining process segregation of sulphur and phosphorus are largely avoided, while any quality of steel may be produced regardless of the quality of the raw materials.

It is well known that the Bessemer converter process for making steel is far cheaper than the open-hearth process, but the quality very largely depends on the metal, ore and other materials available, and it is not possible to test the metal during the operation. The resulting steel, therefore, from high phosphorus and high sulphur charges, contains an injurious quantity of sulphur and phosphorus, which cannot be eliminated by the existing acid Bessemer process. Too much or not enough carbon, manganese, silicon or other elements can readily be corrected and gauged by the charge introduced into the converter and subsequent treatment, but phosphorus and sulphur less than .09 and preferably below .05 is desired and this is not attainable by the existing Bessemer process.

tending from 75 to 90 minutes or more, taking molten metal from an open-hearth furnace and electrically treating same with oxidizing and neutral slags, the phosphorus can be brought down to .003 per cent., and the sulphur down below .007 per cent.

By the use of the present invention with composite electrodes containing slag producing mixtures, it is possible to reduce the phosphorus to .03 or .05, which is 10 to 20 times as much as the above in a far shorter time and within practical limits for Bessemer working.

It is also well known that the carbon is always eliminated before the phosphorus, and if it is attempted to carry the reduction far enough to lower the phosphorus, in an open-hearth furnace, the metal is highly oxidized and decarburized. The present invention provides a means of taking the highly oxidized metal from the open-hearth furnace, if carried far enough to eliminate as much phosphorus as desired, and by the electric treatment with the electric arc and these special elec-



This new composite electrode process may be utilized as an auxiliary treatment to the Bessemer process for eliminating the phosphorus by employing an oxidizing slag in the bath as the molten metal is treated in the electric ladle with the arc, the auxiliary slag producing materials in the combination or composite electrode acting instantly on the metal and the slag being in a highly fluid state as it melts in the high temperature of the arc.

The highly oxidized metal from a Bessemer converter overblown may be utilized deoxidizing same in the electric ladle by this process. It may be stated that the desired end to be attained by this electric auxiliary process with the Bessemer converter for rail making, particularly, is the reduction of phosphorus to .05 or thereabouts by the oxidizing slag and electric arc, the other elements being easily controlled by existing Bessemer methods.

It is well known that with the Heroult electric furnace, having pure carbon electrodes and a treatment ex-

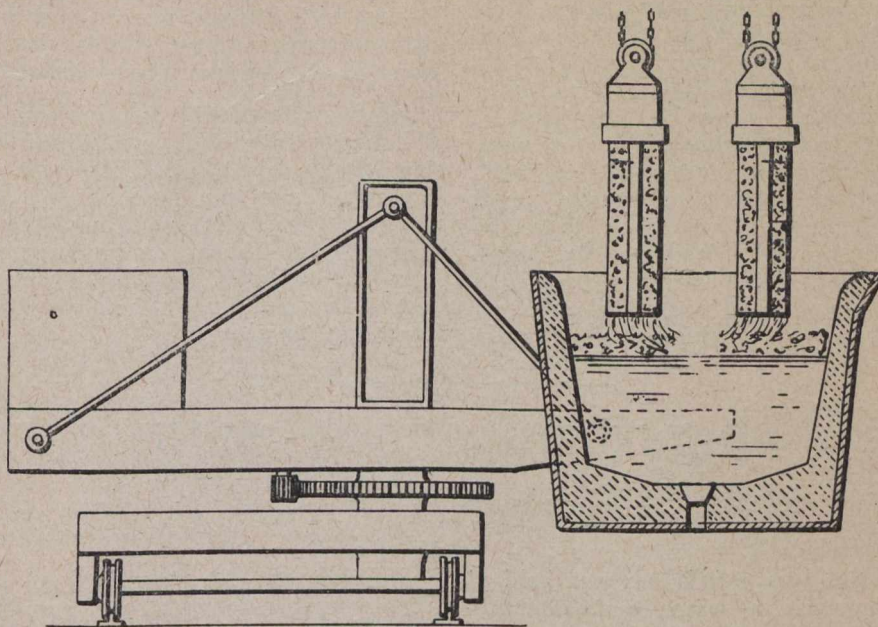
trodes having neutral slag mixtures, it is also possible to eliminate, if desired, nearly the last traces of sulphur, the metal being deoxidized and as much carbon being added as found desirable, producing a finished steel of any degree of perfection desired, according to the length of time the electric treatment is carried on.

It may be stated that in metal taken from an open-hearth furnace, if the reduction is carried on long enough to reduce the phosphorus to .01 per cent. or less than this amount, the carbon is eliminated. It is, of course, true that such a highly oxidized metal would be very unsatisfactory in practice, but by means of the electric furnace treatment with these composite or combination electrodes, the arc and proper slag mixtures, introduced in the molten bath, together with the proper mixture in the electrodes themselves acting as auxiliary slag producers, will bring most satisfactory results, eliminating the sulphur, adding the proper amount of carbon and deoxidizing the steel completely.

The proper mixtures can be introduced into the molten bath and also provided in the electrode mixture to remove the sulphur on account of the high temperature of the electric arc even though the slags selected could not be used by any other than the electric treatment without addition of other slag materials to lower the melting point, and this would interfere with the efficiency of operation. The slag mixture is also melted to a highly fluid state at the arc largely from the mixture in the electrode itself, placed there for this purpose,

of slag from oxygen in the air so that no further oxidation takes place.

The determining questions of the electric refining of steel are cost and output. By shortening the time of treatment with the special composite electrodes combined with slag producing mixtures, and refining only down to such percentages of phosphorus and sulphur as are essential for rails and structural steel, the electric power consumed is so low and the time required so short as to be practical for this work.



in addition to that supplied in the ordinary way on the top of the bath.

Ordinarily there is great trouble, and it is very costly to deoxidize the metal by existing processes, and it is claimed that the pipes and blow holes are produced in the ingot and other difficulties result from the presence of iron oxides. It is also maintained that when ferro-silicon and ferro-manganese are used to prevent these troubles, the oxides which result stay in the steel as an "emulsion" in a finely divided state.

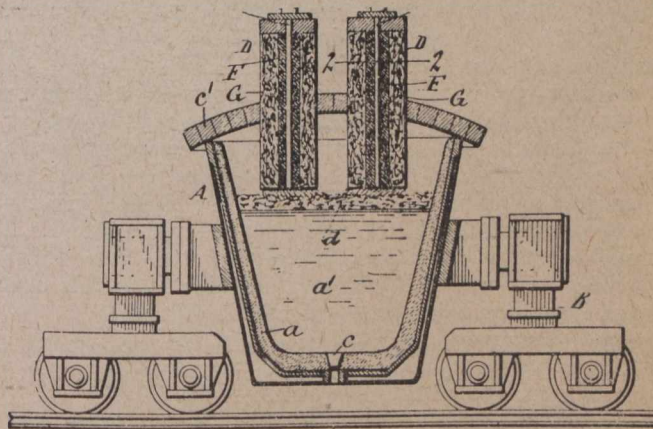
With these special electrodes and the use of an electric arc for refining purposes, materials can be used in the electrodes or added to the bath for a neutral slag, as it is maintained that a thorough deoxidation of the steel is not possible when there are iron oxides in the slag, as they will react to a certain extent with the molten bath of steel.

It is held that adding carbon under ordinary conditions will not result in complete deoxidation, as both iron carbide and ferrous oxide readily exist together. By means of the electric process of steel refining with these combination or composite electrodes, however, carbon or a mixture of carbon and iron may be added to the slag as an auxiliary to the carbon mixture of the electrode, forming calcium carbide and resulting in deoxidation without the slightest difficulty at no great expense, and on any scale desired by providing electric arc apparatus for several electric furnace ladle cars arranged for serving various Bessemer converters or open-hearth furnaces.

The desired amount of manganese can be added for counteracting the bad effects from the ferrous oxide, the carbon reducing the manganese ore which has been added to the slag and taking out the last traces of ferrous-oxide, leaving the steel bath protected by the layer

By this process cheap ore can be used having higher phosphorus and sulphur, these ores being abundant, while high grade ores are nearly exhausted.

By this process of only taking the metal from the converter or open-hearth furnace when it is nearly finished steel and molten, only completing the refining operation electrically, only one-quarter of the electric power and less time is required than when electrically heating from cold metal. It is of value as an auxiliary process to the Bessemer converter and open-hearth fur-



nace, taking the molten metal with little loss of heat and refining same to any degree, according to time taken, the mixtures of carbon and iron or steel combination electrodes used and nature of slags employed.

While this process is specially adapted to the refining of molten steel taken from the Bessemer converter and open-hearth furnaces and treated in an electric furnace

or ladle, it is not confined to this, as the identical process will convert iron into steel from the molten or cold state without being previously treated in a Bessemer converter. Any grade of steel may be made regardless of quality of raw materials, and carbon may be eliminated from electrodes for special steel making, the current being conducted to the arc by the iron rod instead of carbon and iron oxide, or composite electrode.

The neutral slag electrodes may work with a low current arc or dipping into slag and heating by resistance, and the steel may be kept for hours under this molten neutral slag without changing its quality. The metal may be cast, remelted or worked over to a higher or lower grade, or it may be cooled, chilled and melted a second time without injuring the quality of the steel.

The cost of production in this process is low, as most of the work of steel-making is done by the Bessemer converter or open-hearth furnace, only the removal of small percentages of the phosphorus or sulphur from the steel being attempted or the deoxidation of the metal, this being a good product for the larger rolling mills which supply demand of rail, and structural steel interests. The partial removal of the injurious phos-

phorus and sulphur reduces the time to a few minutes instead of hours, hence reduces the current required per ton.

It may be stated that the shorter time also lowers cost of linings and refractory materials per ton of metal, as many charges may be treated in same time required for treating one open-hearth charge. This shorter time process only reducing phosphorus from .09 to .05 for rail steel instead of to .003, which is possible by longer treatment, makes it a practical process for rail mills dealing with Bessemer converters treating full charges of fifteen tons in electric ladles, handled by cranes taking same to positions where electrodes are inserted.

After treatment the metal is drawn from the bottom of ladles or tilted and poured into the ingot molds after slag has been removed. These easy methods are of vital importance, as any new process for removing phosphorus and sulphur should not greatly increase the cost of power; should not cause excessive cost of basic linings or electrodes, or slag producing materials, and should be readily used as an auxiliary process in existing Bessemer plants.

## ALBERTA PROVINCIAL COAL MINE OFFICIALS EXAMINATIONS

An examination for fire boss certificates was held at Banff and Frank on June 2nd, at which eighteen candidates presented themselves for examination, eleven of whom passed, and the regular examination for mine managers, pit bosses and fire bosses was held at Banff, Frank and Edmonton on November 3rd, 4th and 5th. At the latter examination 86 candidates sat for examination, 58 of whom passed, as follows: Managers, 27 sat for examination, 16 passed; pit bosses, 27 sat for examination, 20 passed; fire bosses, 32 sat for examination, 22 passed.

In previous years the custom has been that the fire boss examination occupied one day and the pit boss and mine managers' examination two days. In connection with the November examination, however, the time occupied by the mine managers' examination was extended to three days, in order to more thoroughly cover the wide range of general mining subjects necessarily included in this class of examination.

The number of candidates who presented themselves for examination during 1909 shows a considerable increase over previous years, and with the steadily increasing number of mine officials qualifying each year, the operators should soon have no difficulty in securing certificated men to fill all official positions at the mines. A number of provisional certificates have been issued during the year, but the number of certificates of this class issued each year is gradually decreasing.

The following are the questions set at the examinations held at Banff, Frank and Edmonton on November 3rd, 4th and 5th, 1909:

### Mine Manager Examination.

Paper No. 1. Time allowed, one and one-half hours.

The value attached to each question is given in parenthesis. Candidates must obtain 70 per cent. of the allotted marks to pass.

#### COAL MINES ACT.

1. What is the interpretation of "mine" as laid down by The Coal Mines Act? (10)

2. What are the provisions of The Coal Mines Act with reference to register of employees? (10)

3. What are the provisions of The Coal Mines Act with reference to the employment of boys in or about the mine? (10)

4. What are the provisions of The Coal Mines Act with reference to the reporting of accidents? (15)

5. What are the requirements of the Act with regard to keeping a mine plan? (15)

6. Name the different registers and report books to be kept at the mine under The Coal Mines Act, 1906, and The Coal Mines Act, 1908? (20)

7. What are the requirements of the Act regarding ambulances, etc.? (10)

8. What does The Coal Mines Act state regarding the inspection of machinery? (10)

### Mine Manager Examination.

Paper No. 2. Time allotted, two and one-half hours.

The value attached to each question is given in parenthesis. Candidates must obtain 70 per cent. of the allotted marks to pass.

#### GASES AND SHOT-FIRING.

1. Give the names, composition, specific gravity and chemical symbol of each of the four different gases commonly found in coal mines. (15)

2. Where are the gases mentioned in Question No. 1 found, and how are they produced? (10)

3. What noxious gases are produced by fires and explosions of firedamp in mines? (10)

4. Name six essential features of a good safety lamp for general work. (10)

5. What principles are involved in the construction of a safety lamp that would render one lamp more sensitive in the detection of gas than another? (10)

6. What instructions would you give in reference to the care and preparation of safety lamps before giving them to the workmen, and how would you instruct the workmen as to their use? (15)

7. Explain the proper method of thawing dynamite cartridges. (10)

8. What are the dangers arising from the use of powder in dry and dusty mines, and how would you guard against them? (10)

9. Do you think coal dust will explode without the presence of inflammable gas; if so, what would you do to prevent such an explosion? (10)

#### Mine Manager Examination.

Paper No. 3. Time allowed, three and one-half hours.

The value attached to each question is given in parenthesis. Candidates must obtain 70 per cent. of the allotted marks to pass.

#### VENTILATION.

Coefficient of Friction, .00000002.

1. Define the terms motive column, regulator, coefficient of friction, ventilating pressure. (10)

2. Explain the principal features to be considered when contemplating the erection of a ventilating fan? (10)

3. What are the advantages of frequent splitting of the air current, and when is the limit in the number of separate ventilating sections reached? (10)

4. Find the rubbing surfaces of three airways each 6,000 feet long and all of the same sectional area, namely, 75 square feet. The forms of the three sections are as follows: The first, A, is rectangular, and is 5 feet high and 15 feet wide; the second, B, is square; and the third, C, is circular. (15)

5. (a) Determine the length of the motive column when the temperature of the downcast is 50 deg. F., and that of the upcast 130 deg. F., the depth of each shaft being 300 feet. (b) If the barometer reading in each is 29 inches, what is the pressure producing ventilation? (10)

6. If, with a water gauge of 1 inch, 40,000 cubic feet of air are obtained in an airway 10,000 feet long, what should be the water gauge when the length of the airway is extended to 20,000 feet, all other things being the same? (10)

7. If it is necessary to double the amount of air in a mine, how should the pressure and power be increased, respectively? (10)

8. What power will be required to give a current of 60,000 cubic feet of air per minute in a mine having four equal splits, the airway in each split being 6 feet by 8 feet by 5,000 feet? (10)

9. To find the percentage of mine gases given off by a mine the air at the inlet was measured and found to be 137,500 cubic feet per minute at a temperature of 61 deg. F., the air at the outlet measured 150,200 cubic feet per minute at a temperature of 76 deg. F., what is the percentage of mine gases present in the air leaving the mine? (15)

#### Mine Manager Examination.

Paper No. 4. Time allowed, three and one-half hours.

The value attached to each question is given in parenthesis. Candidates must obtain 60 per cent. of the allotted marks to pass.

#### PRACTICAL WORK.

1. If you had a number of men in a certain district and fire was to take place in an intake airway, state how you would proceed to rescue the men. (10)

2. If you were in charge of a gaseous mine and an explosion should occur during working hours: (a) What would be your first action? (b) Describe in detail how you would proceed into the mine to recover dead bodies or rescue persons still living. (10)

3. Make a sketch showing how you would construct an overcast. (10)

4. What useful purpose do overcasts and undercasts serve in mine ventilation, and which kind would you approve of and why? (10)

5. Show by sketch how you would divide a shaft you were sinking into the various necessary compartments, one compartment to be used for water, air pipes, and ventilation until connection with the escapement shaft is made. Answer fully. (10)

6. In developing a flat seam of coal, opened up by a shaft, and which is giving off a large quantity of explosive gas, how should the mine be planned in regard to ventilation and haulage so as to insure the greatest degree of safety to the employees? (15)

7. How do mine fires originate, and what precautions are necessary to prevent them? (10)

8. Give your reasons why different methods of mining are used and why one method will not answer for all mines. (10)

9. Describe by sketch some of the methods used in working incline seams. (15)

#### Mine Manager Examination.

Paper No. 5. Time allowed, three and one-half hours.

The value attached to each question is given in parenthesis. Candidates must obtain 60 per cent. of the allotted marks to pass.

#### MACHINERY.

1. What is a unit of work and how many are there in a horse-power? (5)

2. What care should be taken of steam boilers to secure the best results from their use? (10)

3. How may radiation from boiler pipes and engine cylinders be prevented? (10)

4. What is mean effective pressure? (5)

5. The diameter of the piston of an engine is 10 inches and the length of stroke is 15 inches. The engine makes 250 revolutions per minute with a mean effective pressure of 40 pounds per square inch. What is the horse-power of the engine? (10)

6. At a shaft 200 feet deep, there is a sump 250 feet long, 20 feet wide and 6 feet deep. If this sump fills in three hours' time, find the horse-power of the pump that should be installed to handle the water. (10)

7. A 300 horse-power engine has a cylinder 22 inches in diameter, and a stroke of 18 inches. When making 200 revolutions per minute, what must be the mean effective pressure (M.E.P.)? (10)

8. What weight will a double cylinder engine of the following dimensions lift (allowing one cylinder to overcome friction): Diameter of cylinder, 10 inches; length of stroke, 15 inches; average steam pressure on pistons, 40 pounds per square inch; engine shaft geared 5 to 1 on drum; diameter of drum, 5 feet? (10)

9. To what use is electricity applied in a coal mine? What are the names of the four electrical units in common use and explain their meaning? (10)

10. What in your opinion constitutes an efficient and safe hoisting appliance for a coal mine? Describe in detail from the foundation of the engine to the delivery of the carriage at the tippie. (10)

11. What classes of air compressors are best adapted to operate haulage locomotives? Give reasons. (5)

12. Using compressed air of 60 pounds gauge pressure, if there is required 1,100 cubic feet of free air for the operation of twenty-five 2-inch drills at sea level what quantity of free air would be required for the same work at an elevation of 5,000 feet above sea level where the barometer reads 25 inches? (5)

**Mine Manager Examination.**

Paper No. 6. Time allowed, three hours.

The value attached to each question is given in parenthesis. Candidates must obtain 60 per cent. of the allotted marks to pass.

**LEVELLING.**

1. Describe a levelling rod and its use. (15)
2. Describe an engineer's level and its use. (15)
3. Fill in the following level notes, showing the height of instrument and the elevation of each station. Stations are 100 feet apart: (20)

Station	B.S.	H.I.	I.S.	F.S.	Eleva- tion.	Grade.	Re- marks.
	feet.		feet.	feet.	feet.		
0 B.M...	7.50	.....	.....	.....	20.00	.....	.....
1.....	.....	.....	5.00	.....	.....	.....	.....
2.....	.....	.....	2.50	.....	.....	.....	.....
3.....	.....	.....	2.00	.....	.....	.....	.....
4 T.P....	.....	.....	.....	1.50	.....	.....	.....
.....	8.00	.....	.....	.....	.....	.....	.....
5.....	.....	.....	7.50	.....	.....	.....	.....
6.....	.....	.....	6.00	.....	.....	.....	.....
7.....	.....	.....	4.00	.....	.....	.....	.....
8.....	.....	.....	2.00	.....	.....	.....	.....
9.....	.....	.....	2.50	.....	.....	.....	.....
10.....	.....	.....	4.00	.....	.....	.....	.....
11.....	.....	.....	6.00	.....	.....	.....	.....
12.....	.....	.....	4.50	.....	.....	.....	.....
13.....	.....	.....	3.50	.....	.....	.....	.....
14.....	.....	.....	2.00	.....	.....	.....	.....
15 T.P....	.....	.....	.....	0.00	.....	.....	.....
.....	7.50	.....	.....	.....	.....	.....	.....
16.....	.....	.....	8.50	.....	.....	.....	.....
17.....	.....	.....	7.00	.....	.....	.....	.....
18.....	.....	.....	4.00	.....	.....	.....	.....
19.....	.....	.....	2.50	.....	.....	.....	.....

4. Draw a profile from the above notes, using a scale of 10 feet to the inch for heights and a scale of 100 feet to the inch for horizontal distances. Mark on the profile the number and elevation of each station. (20)
5. What is the average grade from Station 0 to Station 19? Show grade by line drawn on profile. (15)
6. How would you determine whether your instrument was in proper adjustment? (15)

**Mine Manager Examination.**

Paper No. 7. Time allowed, three and one-half hours.

The value attached to each question is given in parenthesis. Candidates must obtain 60 per cent. of the allotted marks to pass.

**SURVEYING AND MAPPING.**

1. On starting to make a survey underground, what instruments, tools and materials are used? State fully how you would proceed to make an underground survey. (10)
2. Why are stations invariably placed in the roof? (10)
3. In setting up a transit, how do you determine the exact place to set the instrument when the point is in the roof? (10)
4. In starting from a true base line OON, you turn an angle to the right 23 degrees 15 min. What is the bearing of this course? On the next station you turn an angle to the right of 87 deg. 10 min. What is the bearing of this course? Is there any way by which these bearings can be checked? (10)
5. A distance measured on a pitch of 35 deg. is 150 feet. What is the horizontal distance? (10)
6. Plot the following survey, reducing angles to corresponding bearings. This survey commences at Sta-

tion O on an established base line which is true north and south, and the readings are as follows: (10)

Station 0-1	Right	31 degrees 15 min.	Dist., 590 feet.
Station 1-2	Right	1 degree 38 min.	Dist., 505 feet.
Station 2-3	Right	127 degrees 04 min.	Dist., 190 feet.
Station 3-4	Right	61 degrees 29 min.	Dist., 102 feet.
Station 4-5	Left	1 degree 58 min.	Dist., 190 feet.
Station 5-6	Left	5 degrees 25 min.	Dist., 600 feet.
Station 6-0			

7. Calculate by sines and cosines the bearing and distance from Station 6 to Station 0. (10)
8. How would you plot the mine workings of a pitching seam on a plan to be used by the pit boss? Give your reasons for such. (10)
9. What is the deflection of the needle in this locality? Why is the needle weighted? (10)
10. Why is it advisable to make a contour map before planning the development of a mine? (10)

**Pit Boss Examination.**

Paper No. 1. Time allowed, one and one-half hours.

The value attached to each question is given in parenthesis. Candidates must obtain 60 per cent. of the allotted marks to pass.

**COAL MINES ACT.**

1. What is the interpretation of "pit boss" as laid down by The Coal Mines Act? (5)
2. What are the provisions of The Coal Mines Act regarding an adequate amount of ventilation in a mine? (10)
3. (a) How often does the Act require the air current to be measured? (b) By whom measured? (c) When must the air reports be sent to the office of the Mine Inspector? (10)
4. What does The Coal Mines Act state with regard to the withdrawal of workmen in case of danger? (15)
5. State what dangers are met in approaching old abandoned workings and what precautions are necessary under The Coal Mines Act. (15)
6. What does The Coal Mines Act state about signals and manholes on underground planes which are self-acting or worked by machinery? (10)
7. What are the requirements of The Coal Mines Act regarding manholes on travelling roads where the produce of the mine exceeds 10 tons in one hour? (10)
8. What does The Coal Mines Act state about a person having charge of machinery in a mine where persons are lowered and raised by such machinery? (10)
9. What does The Coal Mines Act state regarding a supply of suitable timber? (10)
10. What are the requirements of the Act regarding the fencing of machinery? (5)

**Pit Boss Examination.**

Paper No. 2. Time allowed, two and one-half hours.

The value attached to each question is given in parenthesis. Candidates must obtain 60 per cent. of the allotted marks to pass.

**VENTILATION.**

1. Name the gases met with in mines, giving, also, the symbol and specific gravity of the same. (10)
2. What proportion of atmospheric air and carburetted hydrogen are necessary to form a highly explosive mixture? (10)
3. What are the most common causes of ignition of gases in coal mines? (10)
4. The ventilating fan of a mine is of ample capacity but the ventilation at the face of the workings is insufficient. What would be the probable cause of the fan's inefficiency in producing sufficient air at the face of the



workings? How would you proceed to overcome the difficulties or defects? Explain fully. (10)

5. A rectangular airway is 6 feet high, 12 feet wide, and 2,500 feet long; what is the rubbing surface in square feet? (10)

6. Which is the more effective, the exhaust or forcing fan? Give your reasons. (5)

7. In a gangway having a 7-foot collar, 12-foot spread, and 7 feet high, what is the area and what quantity of air is passing when the velocity is 375 feet per minute? (10)

8. The velocity of the air passing in a circular shaft 8 feet in diameter is 300 feet per minute; what is the quantity of air passing per minute? (10)

9. The water gauge is 1.5 inches, the quantity of air in circulation is 85,000 cubic feet per minute; find the horse-power in the air. (10)

10. Explain the principle discovered by Sir Humphrey Davy and embodied in the safety lamp. What is the standard size of wire gauze used in the Davy lamp? (5)

11. What instructions would you give in reference to the care and preparation of safety lamps before giving them out to the workmen and how would you instruct the workmen as to their use? (10)

#### Pit Boss Examination.

Paper No. 3. Time allowed, three and one-half hours.

The value attached to each question is given in parenthesis. Candidates must obtain 50 per cent. of the allotted marks to pass.

#### PRACTICAL WORK.

1. When would you consider that the coal in a seam is properly mined where blasting the coal is necessary? State your views fully. (10)

2. When the fire boss reports in the record book certain dangers that he has discovered during his examination, what would be your duty as pit boss? (5)

3. Assuming that falls of roof, slate, coal and sides are the cause of the greatest number of accidents in mines, what precautionary measures would you adopt as a pit boss to reduce their number? (10)

4. An entry is rising at the rate of 7 feet in 100 feet and the ventilating current of air is flowing up the grade where you are compelled to place a door on the pitch of said entry near its entrance, and the height of the door is equal to the height of the entry; explain how you would prepare the place so the door would close by gravity and show by sketch how door is placed. (10)

5. Make a sketch of an overcast. (10)

6. Show by sketch how you would timber a roadway having a bad roof and sides, also soft fireclay bottom that heaves. (10)

7. What method is the safest for using dynamite in sinking a shaft and what will give the least danger to life or limb? Explain fully. (5)

8. Describe a creep, its effect, and the precautions necessary to prevent and check it. (10)

9. A dam in a tunnel supports a vertical head of 80 feet of water; the sectional area of the tunnel is 70 square feet. Find the total pressure on the dam. (5)

10. Do you consider coal dust an element of danger in a non-gaseous mine? If you found much dust in the mine what precautions would you adopt to prevent any danger to life and destruction of property that might occur from its presence while mining operations were being carried on? (10)

11. What are the causes that lead to mine fires, not taking into consideration spontaneous combustion, and how would you guard against them? In dealing with mine fires what dangers are likely to arise to life pro-

vided care is not exercised by the persons dealing with them, and what precautionary measures should be adopted to insure safety? (5)

12. Explain in detail the causes of accumulations of fire damp, and the probable effects of allowing such accumulations to exist in a mine. What precautions should be taken to avoid such accumulations of gas? (10)

#### Pit Boss Examination.

Paper No. 4. Time allowed, three and one-half hours.

The value attached to each question is given in parenthesis. Candidates must obtain 50 per cent. of the allotted marks to pass.

#### MACHINERY.

1. What is the principle of the siphon and to what height can it be applied to raise water? How would you start the flow in a siphon? (10)

2. What is it that causes a pump to raise water through a suction pipe 20 or 25 feet? (10)

3. For what purpose are bearings bushed? What metals are generally used and why? (5)

4. What is a unit of work and how many are there in a horse-power? (10)

5. What is the horse-power of an engine with cylinder 20 inches in diameter, length of stroke 30 inches, making 50 revolutions per minute, with an average steam pressure of 30 pounds per square inch?

6. State the method you would employ in making an examination of the rope, cage, and safety catches in use at a coal mine. (10)

7. In laying out a siding or main parting where mechanical haulage is in use, what are the chief points to be considered with reference to safety, economy, and the speedy handling of the coal? (10)

8. Give a sketch showing various forms of rope capping. Which form would you prefer and why? (10)

9. Name the different kinds of safety valves and give the characteristics of each. (5)

10. If the diameter of the water cylinder of a pump is 10 inches and the discharge column is 150 feet in height, what would be the total pressure in pounds on the piston, disregarding friction? (10)

11. A pipe running full of water is one foot in diameter and is leading from the mine to a surface opening that is draining said mine of its water; the velocity of the water in the pipe is 4 feet per second, how many gallons of water would be discharged therefrom in one minute? (10)

#### Pit Boss Examination.

Paper No. 5. Time allowed, three and one-half hours.

The value attached to each question is given in parenthesis. Candidates must obtain 50 per cent. of the allotted marks to pass.

#### SURVEYING.

1. Give the order of the letters on the face of a compass and the reason for such arrangement. (15)

2. What is meant by the declination of the needle? (10)

3. What is the most suitable and accurate instrument for measuring distances? (10)

4. Where are stations in mine surveying generally placed and why are they so placed? (10)

5. In setting up a compass, how do you determine the exact place to set the instrument when the station is placed in the roof? (15)

6. Plot the following compass survey to a scale of 100 feet to the inch:

Stations 1-2 N. 15 degrees, E. 220 feet.

Stations 2-3 N. 40 degrees, E. 160 feet.

Stations 3-4 S.  $12\frac{1}{2}$  degrees, E. 300 feet.

Stations 4-5 S. 50 degrees, W. 140 feet. (20)

7. Find the bearing and length of the closing line from Station 5 to Station 1. (10)

8. How often should a mine be surveyed and mine plan brought up to date? (10)

#### Fire Boss Examination.

Paper No. 1. Time allowed, one and one-half hours.

The value attached to each question is given in parenthesis. Candidates must obtain 60 per cent. of the allotted marks to pass.

##### COAL MINES ACT.

1. What is the interpretation of "fire boss" as laid down by The Coal Mines Act? (10)

2. What is the interpretation of "shotlighter" as laid down by The Coal Mines Act? (10)

3. Give a detailed account of the duties of a fire boss from the time he reaches the mine at the beginning of his shift until he leaves at the end of his shift. (20)

4. What does The Coal Mines Act state with reference to places not in the actual course of working? (10)

5. State fully the provisions of General Rule 8 regarding the use of any explosive in the mine? (20)

6. State the provisions of General Rule 7 regarding the use of safety lamps, also state under what conditions the use of safety lamps is required. (20)

7. What does The Coal Mines Act state regarding the appointment of stations at the mine? (10)

#### Fire Boss Examination.

Paper No. 2. Time allowed, two and one-half hours.

The value attached to each question is given in parenthesis. Candidates must obtain 60 per cent. of the allotted marks to pass.

##### VENTILATION.

1. Name the different gases found in mines. Which are explosive and which non-explosive? State where you would look for them and how they are detected. (10)

2. If an explosion of gas occurred in your safety lamp, what would you do? (10)

3. What are the dangers arising from the improper care and handling of safety lamps by the workmen? (10)

4. In case the light in your safety lamp became extinguished while you were making an examination of a gaseous mine, how would you proceed and what provisions would you make for such emergency? (10)

5. What care and attention should safety lamps receive in the lamp room and how should lamps be inspected before they are handed over to the workmen for use? (10)

6. State the use of the water gauge and where you would apply it. (10)

7. What are the advantages of splitting air currents and for what purpose are regulators used? (10)

8. What are the anemometer, barometer and thermometer used for in coal mining? (10)

9. In an airway 10 feet 6 inches wide, 4 feet 6 inches high, we find the velocity of the air to be 300 feet per minute; what is the area of the airway, and how many cubic feet of air per minute are passing in the airway? (10)

10. Find the number of square feet of rubbing surface in an airway 4 feet high by 9 feet wide and 1,000 feet long. (10)

#### Fire Boss Examination.

Paper No. 3. Time allowed, two hours. The value attached to each question is given in paren-

thesis. Candidates must obtain 50 per cent. of the allotted marks to pass.

##### PRACTICAL WORK.

1. What, in your opinion, is a miner's first duty on entering his working place in the morning? Who should have preceded him there according to law? (10)

2. Name the precautions you would require a miner to take when about to restand a prop knocked out by flying coal from a blast? (10)

3. Show by sketch how to set props in a level seam. (10)

4. How would you set a single post on a pitching seam? (10)

5. State how you would commence to remove a large body of fire damp, and what precautions you would take. State what danger there may be in doing the work. (10)

6. State the character of brattices to be used in gaseous mines, and how should they be constructed? (10)

7. What are the principal things to be looked after in haulage roads? (10)

8. What dangers arise from lack of judgment in placing shots in coal mining? (15)

9. What is coal dust? State what dangers arise from the same when blasting is carried on where it is present; also, what you would do to prevent a possible accident due to the presence of coal dust. (15)

#### Fire Boss Examination.

Paper No. 4. Time allowed, one and one-half hours.

The value attached to each question is given in parenthesis. Candidates must obtain 50 per cent. of the allotted marks to pass.

##### ARITHMETIC.

1. Multiply twenty thousand and seven by eighteen thousand seven hundred and four. (15)

2. Add the following numbers together: 768, 9476, 8, 93268, 396, 18, 64538, 9654, 9273642, 7. (15)

3. Divide 9878546 by 298 and work the answer to three decimal places. (15)

4. From 9350008 subtract 8370109. (10)

5. The velocity of the air in an airway 7 feet wide by 5 feet high is 750 feet per minute. What is the volume of air passing in the airway in an hour? (15)

6. From an entry 9 feet 6 inches wide and 5 feet 6 inches high, driven at the rate of 4 1-2 feet per day, how many cubic yards of material are taken out in five days? (15)

7. A shaft measures 7 feet by 15 feet and is sunk to a depth of 160 feet. How many cubic yards of material were removed in sinking it? What did the work cost at 15 cents per cubic foot? (15)

An underground lake, discovered in exploiting the Campine coalfields in Lower Belgium, is to be used as a source of supply for the country round about. The region is ill supplied with water. What available surface water there is, is often contaminated. The water from the underground lake is pure except for the presence of a small proportion of ferruginous matter. This can easily be removed. At present rain water is the principal direct source of supply.

The report of the Alaska Treadwell Gold Mining Company for the year ending May 31st, 1910, shows record results. The tonnage crushed was 744,226 tons. The yield per ton was \$2.79, 58 cents higher than the average for the year previous. The cost of mining and milling per ton was \$1.57, but the profit per ton was \$1.22, almost twice as much as heretofore. The ore reserves are calculated at 5,899,364 tons.

**ELECTRIC STEEL REFINING.**

BY D. F. CAMPBELL (London).

(Paper read before the Iron and Steel Institute.)

The use of electricity for the refining of steel has now taken its place amongst established metallurgical processes, and many papers have been written on the subject of electric furnaces, but the author proposes to discuss briefly the general aspects of the subject, and what he considers the probable and possible developments in the immediate future in England. The electric furnace is at present used in various works for the refining of steel from the Bessemer converter in the manufacture of rails and all classes of railway material and castings, and more commonly in connection with the basic open-hearth process for the manufacture of various products of intermediate quality, castings and tool steel of all kinds. These are the purposes for which it has been most widely adopted, notably in America, Germany and France, although it is also used for melting and refining charges of cold scrap of cheap quality for the manufacture of tool steel and small castings, and its high efficiency is now generally acknowledged. The refining of steel that had been previously melted was the first use to which the electric furnace was applied commercially; but now that single furnaces have been producing over 200 tons a day for more than sixteen months, it is obvious that the field for the process has widened, and already many furnaces are in construction or operation in this country.

The author is of opinion that the electric furnace is especially suitable, and will be widely adopted, for any class of work in which raw materials of a high degree of purity are now used.

A wider application for rails and sections may occur when working in connection with the Talbot furnace, for the charge can be taken to the electric furnace as soon as the carbon is down, and the necessity of removing the sulphur and getting a teeming heat is avoided, as this is done in the electric furnace both economically and completely. Thus the capacity of the Talbot furnace is substantially increased, and this covers the greater cost of electric refining.

Again, in the case of a basic open-hearth plant, using 60 per cent. of molten pig iron and 40 per cent. of scrap, a 40-ton furnace might have 15 tons removed to the electric furnace for refining, and a similar charge put in every two hours. Thus the capacity would be increased, the quality improved, and, in addition, a reduction in the cost of raw materials can also be made in some cases, as a low quality of pig iron can be used.

Similar conditions occur when working in conjunction with an open-hearth plant for making castings, and a thoroughly dead melt and extreme fluidity can be obtained, while the commonest raw materials can be used, and refined completely. This gives economy both in the amount of gits and runners, and also in the reduction of wasters. Even in the case of foundries engaged in ordinary open-hearth casting work, in which the margin of profit is now exceedingly small, the electric furnace is considered necessary for an improvement in quality, while in a small foundry making light and intricate castings from crucible steel, an economy of several pounds per ton may be expected to result from the adoption of the electric furnace, judging from the reduction of the costs in works in Germany where crucible furnaces were replaced by this process.

There is little doubt that crucible steel, Swedish billets and products of intermediate quality, such as are used for the Sheffield trade and by tubemakers of Staffordshire and South Wales, can be econo-

mically replaced by steel refined by electricity, and made in Middlesbrough, Cumberland, or the larger steel works in the Sheffield and Rotherham districts.

The use of the electric furnace is not likely to become general for rail steel manufacture at the present time, except in cases where the conditions are exceptional. In certain cases, such as at South Chicago, it has been adopted for that purpose owing to the economic conditions, notably the scarcity of good Bessemer ores and the demand for better rails. The electric furnace in such cases may save Bessemer plants from the scrap heap, or, at any rate, prolong the life of present installations, and at the same time make it possible to produce rails of a quality better than the best open-hearth steel, thus avoiding heavy capital expenditure.

In the electric furnace, almost any degree of refining can be economically effected, and the removal of sulphur, phosphorus, and oxygen is especially easy. This is probably due to at least three causes:

1. The intense heating of the slag, which is the place at which refining takes place. Owing to this high temperature and the extreme fluidity of the slag, the rate of the refining reaction is very great, because the velocity of reaction rises very quickly for high temperatures, and not in direct proportion to the temperature.

2. The extremely basic slag that can be kept in a very fluid state, and the calcium carbide formed by the action of the arc on the calcareous slag, are especially advantageous for desulphurization.

3. The violent motion of the steel, which results from the convection currents produced in the bath, due to the two intensely hot areas caused by the arc below the electrodes, increases the volume of steel exposed to the hot and fluid slag area, and hence the rate of refining.

The usual procedure for the use of the electric furnace in connection with the Bessemer converter is to charge the steel, holding back all slag in the ladle, after putting on the bottom of the furnace, lime and mill scale or iron ore. This produces an oxidizing or dephosphorizing slag, which may be carefully skimmed or poured off. On the bath of steel carbon is thrown to carburize to any required degree, and then a second highly basic and desulphurizing slag is added. The arc acting on the calcareous slag produces calcium carbide, which may combine with sulphur to form calcium sulphide. As neither gases nor air enter the furnace, and the conditions are almost completely reducing, no sulphates are formed, a dead melt is easily obtained, and when the slag is molten and the requisite heat obtained, the steel is teemed. In the open-hearth or any oxidizing furnace these reactions cannot take place so completely and efficiently.

With steel from the basic open-hearth furnace, the procedure is similar, but when the quantity of phosphorus to be removed is small, it is only necessary to use one refining slag for the elimination of sulphur and any small amount of phosphorus remaining. The usual practice is to put the carbon necessary for carburizing in the bottom of the furnace and then add the steel, and the basic slag materials. As soon as the teeming heat is obtained, the necessary ferro-alloys are added and the steel will be completely refined.

Another point of interest is the rarity of blow-holes in electric steel when properly made, and this leads to the question of the cause of these troubles. It is well known that any ingot of steel when placed in a vacuum evolves nitrogen, and this is about equally true whether it be made in the crucible, the Bessemer converter, or the electric furnace. Blow-holes contain nitrogen, but this is probably not the cause. It is far more probable

that they are due to the combination of oxides with the carbon in the process of cooling, and that the carbon monoxide so formed at a high temperature causes blow-holes in the cooling steel, and owing to the diminution of volume of the carbon monoxide on cooling, a partial vacuum is formed, and nitrogen is sucked into the blow-holes. In electric steel, oxides do not occur in any quantity, and consequently the prime cause of blow-holes is reduced.

Again, the quality of electrically refined steel is better than a material of similar chemical composition made in any oxidizing furnace. This is probably due to the reducing conditions under which it is finished.

It must not be forgotten in discussing these special qualities of electrically refined steel, that some inferior material has been made by incompetent melters or in ineffective furnaces, and that the electric, just as much as any other furnace, requires trained men, and most careful designing by metallurgists who have made a special study and had practical experience in this subject.

The question of the cost of applying this process, which must be considered before all others, is more difficult to discuss generally, owing to the great variety of conditions. The following are the chief points, all of which must be carefully considered in each particular case:

1. The possibility of saving in cost of raw materials, since the best qualities of steel can be made from impure raw materials. For example, in the case of refining steel from open-hearth furnaces in the South Staffordshire district, the use of local pig iron as compared with hematite iron would effect a saving of several shillings per ton owing to the high railway rates.

2. Possibility of increasing the output of present furnaces with improvement of product. For example, in the case of Talbot and other open-hearth furnaces, where a large expense is incurred in the removal of sulphur and getting a teeming heat, the steel can be advantageously transferred to an electric furnace for desulphurization and the output materially increased. The Talbot or other tilting furnace is especially satisfactory owing to the facility with which charges can be transferred to the electric furnace, whenever required.

3. The cost of power and possibility of using blast-furnace or coke-oven gas, exhaust steam, etc., will be the determining factor in regard to deciding whether, in the manufacture of steel, electric refining can be economically adopted. In the case of cheap power or valuable products scrap may be economically melted and refined in the electric furnace at a current consumption of 700 to 800 kilowatt-hours per ton, or if the price of power be high, the steel may be merely desulphurized and deoxidized, after melting and dephosphorizing in a basic furnace, with a power consumption of 100 to 150 kilowatt-hours per ton.

4. The possible reduction of capital expenditure at certain works where the present products are not sufficiently good for modern specifications. This may involve the entire re-organization of the works, but it is often cheaper and more efficient to add an electric furnace to a Bessemer plant, than to replace the latter by open-hearth furnaces.

The author does not wish to compare the different types of electric furnace in this paper, but the figures given are taken chiefly from Heroult furnaces in America, England, Germany and France, as this type has been far more widely adopted, and is used in larger units than any other, and single furnaces are now refining 250 tons per day. This furnace is similar to a basic open-hearth furnace, and seems to present more simpli-

city and to embody more of the desirable features of electric furnace design than any other, which, in the author's opinion, are—

1. The best basic open-hearth design should be followed as closely as possible. A bottom homogeneous and solid and banks free from embedded electrodes are important, and above all simplicity of design.

2. All electric mechanism, in the form of generators, transformers, etc., should be entirely separate from the furnace, should work under ordinary conditions of standard electrical practice, and should be of standard design, so as to avoid all unnecessary risks and complications.

3. A high-power factor must be maintained, thus reducing the capital cost of machinery, and increasing the general efficiency of the power house.

4. To avoid excessive cost of refractory materials, the roof should be protected from the direct radiation of the arcs by the electrodes themselves, and the intensely heated area of slag should be as large as possible, to increase the surface of refining action. The Heroult furnace has an advantage over the open-hearth furnace in that the heat is applied to the centre of the bath, so that the banks are not quite so hot as the middle of the furnace and the wear of refractories is consequently less.

5. The heat should be applied to the slag, as in the basic open-hearth furnace, and the temperature of the slag should be maintained above that of the steel, which allows of extreme basicity and fluidity being obtained and gives an intensely active refining action. The conditions in the furnace should be oxidizing, neutral or reducing, at will.

The adoption of electric refining will cause some re-adjustment in the steel trade. As soon as the Sheffield steel smelter has become acquainted with the process, and accustomed to the working of electric furnaces, electrically refined steel will largely replace crucible steel. This has already occurred in Germany and America, where electric furnaces are used to make all classes of special and high-speed steels, the usual practice being to refine metal from a basic open-hearth furnace. Large crucible plants and small open-hearth furnaces engaged in the manufacture of small and intricate castings, such as motor-car parts, etc., may be replaced by electric furnaces, because the high degree of fluidity and dead melt obtained is especially advantageous.

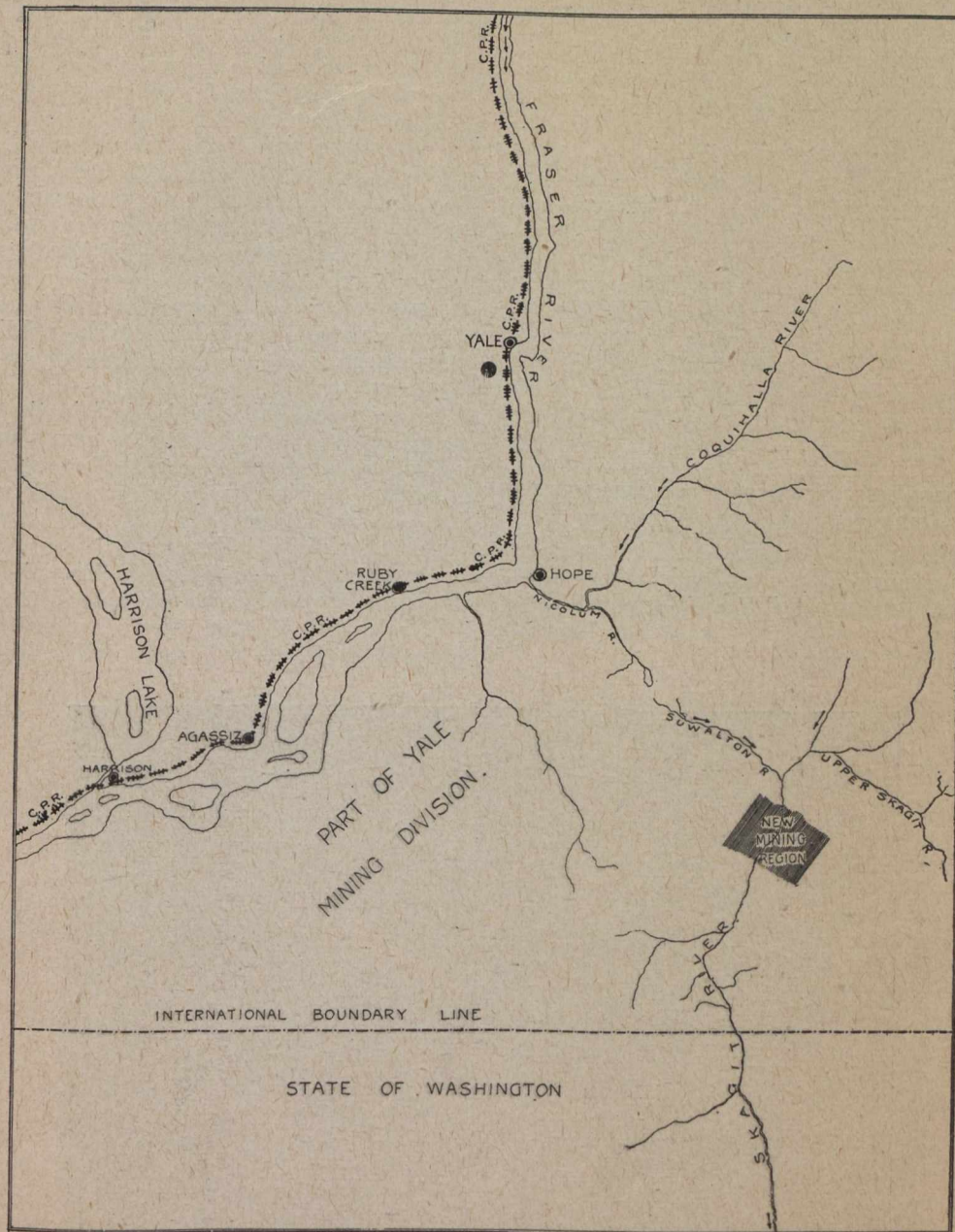
In many cases manufacturers of axles, guns and tubes will abandon the use of Swedish raw materials, and refine steel made from low-grade ores, thus reducing the value of high-grade ore deposits and the quantity imported; for, by the use of electricity, Cleveland stone will produce a steel equal to the best hematite ores. The capacity of many Talbot and basic open-hearth plants will be increased and the quality of the product improved, while much of the power that is now going to waste will be utilized for steel refining.

From the electrical engineer's point of view, the electric furnace is an attractive load, as it is more or less in continuous operation. In the case of the Heroult furnace the power factor is 0.88 to 0.90, though much less with large induction furnaces. Single, two or three phase current of any frequency from 20 to 60 has been used without any difficulty, though it is preferable in the case of a two-phase system to transform to three-phase current, which can be done without additional difficulty or expense. The load factor will be most favourable, the usual practice when refining, for example, in a 15-ton furnace, being to use 2,000 kilowatts for 20 minutes after charging, while the steel is being heated. The current is then reduced to about 1,500

kilowatts for 45 to 75 minutes until the steel is ready for teeming. There is then an interval of ten to fifteen minutes during which the furnace is teemed, fettled and charged, which allows the transformers or generators time to cool before the period of overload commences. Current fluctuations occur for a few minutes, while there is an evolution of gas from the steel, which makes the bath boil up and touch the electrodes. This, however, is not sufficient to be objectionable, provided that the

#### NEW MINING FIELD IN BRITISH COLUMBIA.

Vancouver newspapers have lately published accounts of a new mining field in which mineral discoveries, said to be promising, have been made during the last three or four months. The locality is in Yale mining division, which is a small subdivision of the district of Yale, the latter embracing a large area in the central southern part of the Province of British Columbia. The first locations of mineral claims in connection with the



electrical machinery is properly designed for the purpose, and the extent of these variations is not so great as in the case of many rolling mills, the fluctuations in voltage being only about 3 per cent. in the South Chicago works, where a 2,000 kilowatt furnace has been working steadily since May, 1909.

The subject of electric steel refining is now receiving the attention of many steel makers, and it is hoped that these notes may lead to a stimulating discussion, not only of the many interesting and debatable questions in relation to the operation and design of these furnaces, but also of the more important and far-reaching economic and commercial problems which this process has created.

recent local excitement were made on what is known as Steamboat Mountain, but some of the later locations are in other parts of the Hope Mountains, scattered over the country for several miles around the claims first staked.

A newspaper account states that the field is easy of access, but now that snow has fallen it is difficult to get about the mountains and, of course, there can not be any effective surface prospecting done until next spring. The Steamboat Mountain field is described as being on the Skagit River about 40 miles south of Hope, and it is reached from Hope by the Sumallow River trail and thence down the Skagit. The last-mentioned stream flows south, into the adjoining State of Washington. Hope is on the Fraser River; it is distant from Vancouver 89

miles by C.P.R., and is 13 miles south of the town of Yale. Both Hope and Yale were centres of placer mining activity in the time of the great gold excitement of the Fraser 50 years ago.

No official information is yet available relative to the new field, for it has not yet been visited by either Federal or provincial officials of the respective departments of mines. It has been stated, though, in published accounts of the district, that the formation is andesite, with intrusive sheets of quartz porphyry, with visible free gold sometimes occurring in the latter. Generally speaking the ore is, so it is stated, of a milling character; assay returns from specimens have given value ranging from \$15 to \$200.

Of course, it is yet early to offer an opinion as to the merits of the new field, for little prospecting has been done, and no development of importance. It is not unlikely, though, that some payable mines will be opened, but this may not now be taken for granted. From the notice the field has already attracted, it is probable some of those who have acquired claims will develop them next season. Meanwhile this is only a preliminary intimation of the fact that this new district is receiving the attention of prospectors, and a suggestion of the possibility of its eventually being developed into a camp of some importance.

#### A MINING MACHINERY EXHIBIT AT WESTERN PENNSYLVANIA MINING EXPOSITION.

Thousands of daily visitors, including a large number of coal operators and mine superintendents, were afforded in their visit to the Jeffrey exhibit, a view of modern mining machinery, the feature exhibit at the Western Pennsylvania Mining Exposition.

in underground workings. Every operation is explained by the demonstrators.

This mine room had a coal face 45 feet long and 6 feet high, constructed of large lumps of bituminous coal, which were brought from the Hazel mine of the Pittsburg-Buffalo Company. Practical demonstrations were daily conducted by the operators actually undercutting and drilling the coal and hauling it out of the room.

Photograph No. 1 shows a 28-A Short Wall Machine undercutting the coal across the face. At the left of this machine is a self-propelling steel truck, equipped with an automatic cable reel, which winds up the electric cable, as the truck moves out of the room. This machine unloads itself from the truck, makes the sumping cut at the right hand rib, from which point it cuts across the face until the left hand rib is reached. A steel feed cable wound on a power-driven drum at the front end of the machine pulls it across the face of the coal at a speed regulated by the hardness of the cutting and upon the nature of the coal or rock in which the cutting is done. Another cable which has no connection with the power, serves as a guide, holding the machine to its work and at a proper angle for its greatest cutting efficiency.

When the machine is finished in the room, it can be loaded on to the truck with its own power. Its narrow cutter-head and short length of machine from the coal face when cutting, make it especially valuable for cutting ribs and pillars of coal which have a tendency to come down when undercut.

Photograph No. 2 shows a Jeffrey A-5 Electric Augur Drill in operation, drilling a hole in the coal face. This drill is operated by an electric motor and will drill any material in which an augur drill will stand up. The



No. 1.

This exhibit, occupying a space of over 3,000 square feet, reaching over 100 feet in length by 30 feet wide, was placed in the northwestern corner of Machinery Hall. It was designed and built entirely by the Jeffrey Manufacturing Company, Columbus, Ohio, being in the form of a model mine room, showing their latest and most improved types of mining machines, electric drills, as well as electric mine locomotives, in actual operation; and for all practical purposes as they would be operated

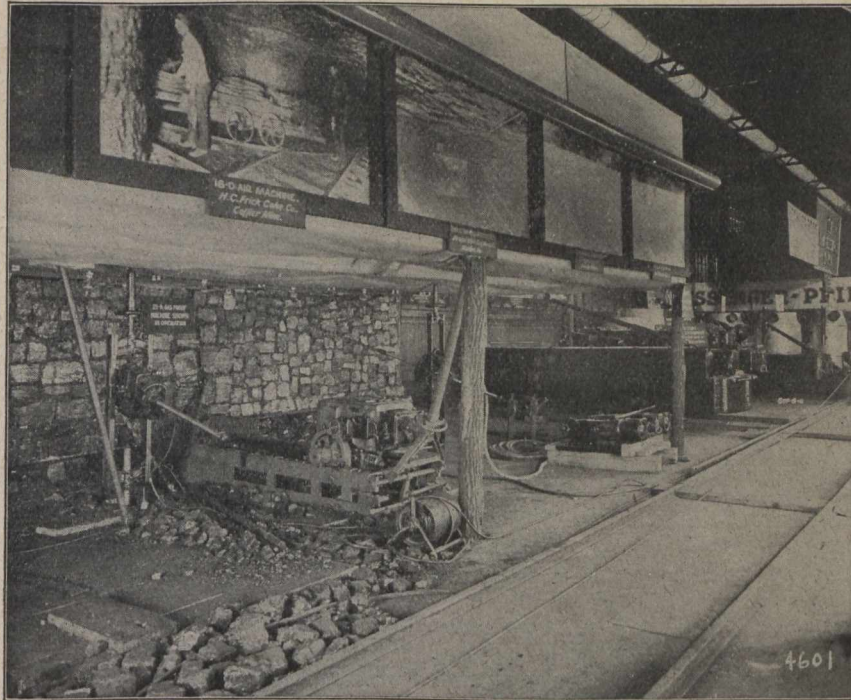
photograph also shows another corner of the mine room with a 21-A mining machine equipped with a flame and gas-proof motor and starting box. In other respects, it is similar to the well-known Jeffrey 17-A electric coal cutting machine, being especially adapted for the hardest cutting encountered in any coal mine.

Another distinctive feature about the exhibit was the fact that it was the first public exhibition of any Jeffrey "Armorplate" Electric Mine Locomotive; designed and

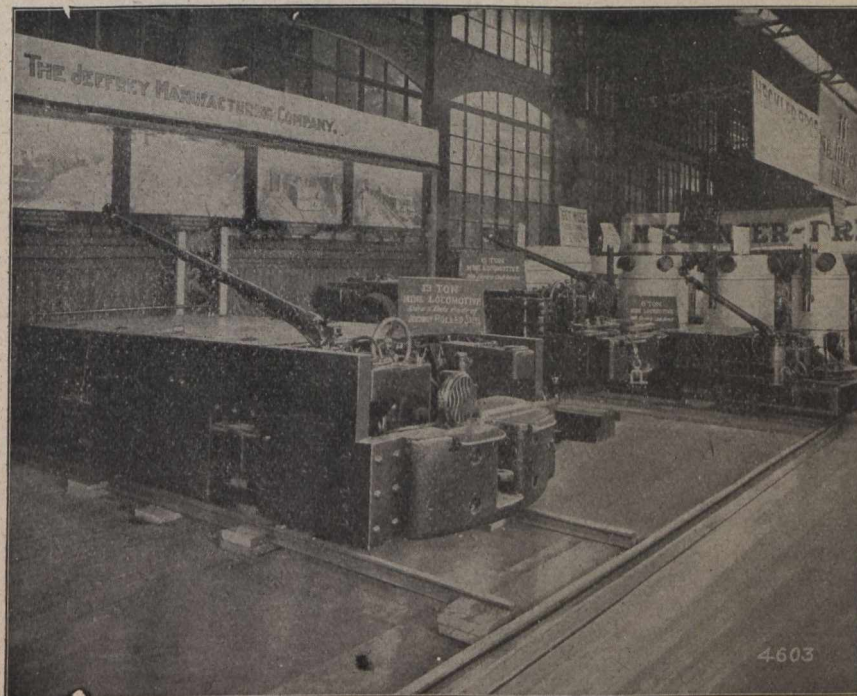
constructed for surface or underground mine haulage.

Photograph No. 3 shows a view of a locomotive on the foreground. The complete frames on all sides are made of solid steel armor plate, which is made to special Jeffrey specifications, practically making this type of loco-

an independent motor driven crab, having a drum which holds 300 feet of 3-8-inch flexible steel rope. Daily demonstrations were made with the use of this crab device. A pressed steel car was hauled from one end of the room to the other end, demonstrating how loaded



No. 2.



No. 3.

motive indestructible, as well as adapting it for the most severe service encountered in mine haulage.

Two other Jeffrey locomotives are also shown in this photograph, being built entirely of structural steel frames and equipped with motor capacity sufficient to slip the wheels and to stand continuous mine service. Each of these locomotives has mounted on the front end

mine cars are pulled from the face of the mine room while the locomotive remains in the entry.

China's silver coinage in 1908 amounted to \$24,498,653. In the same year India's silver coinage ran up to \$58,773,220, whilst that of the United States totalled \$12,391,777.

**PERSONAL AND GENERAL.**

Mr. Wm. Fleet Robertson, provincial mineralogist for British Columbia, has returned to Victoria from an official visit to the Portland Canal district.

Mr. W. F. Ferrier, of Toronto, has been visiting British Columbia. While in that province he investigated mining conditions and prospects in the Portland Canal district.

Dr. Eugene Haanel, Dominion director of mines, was in British Columbia late in October, in connection with the investigations his branch of the Canada Department of Mines is making relative to the treatment and profitable utilization of zinc ores, of which there are known to be large quantities in several districts of that province, especially in the Kootenay.

Mr. Elias Rogers, president of the Crow's Nest Pass Coal Company, was in British Columbia last month. After spending a short time at Fernie, southeast Kootenay, he paid a brief visit to Victoria.

Mr. Anthony J. McMillan, liquidator of Le Roi Mining Company, has returned to British Columbia from London, having reached Rossland during October.

Mr. W. J. Elmendorf, manager of the Portland Canal Mining Company, was in Victoria, B.C., early in November, after having been to Tacoma, Washington, with Mr. C. H. Dickie, president of the company, to discuss with the smelting company there matters connected with the treatment of silver-lead concentrate from the mining company's mine in Portland Canal camp.

Mr. W. H. Aldridge, managing director of the Consolidated Mining & Smelting Company of Canada, Limited, has returned to Trail, B.C., from a business visit to Toronto and Montreal.

Mr. Edmund B. Kirby, of St. Louis, Missouri, who during the time of the Gooderham-Blackstock control of those mines was general manager of the Centre Star and War Eagle, at Rossland, B.C., has returned to the United States from the Skeena district of British Columbia, where he had been examining mineral claims.

Mr. John McMartin, formerly of Cobalt, who is developing a gold mine at Sheep Creek, Nelson mining-

division, B. C., went to San Francisco lately with his consulting engineer, Mr. W. Watson, of New York, in connection with the intended early erection of a stamp mill at the Mother Lode, Sheep Creek.

Mr. H. H. Webb, consulting engineer of the Consolidated Gold Fields of South Africa, is in Porcupine, and has assumed active direction of the Rea Mines properties, recently taken over by the Consolidated Gold Fields Company.

Mr. Frank G. Stevens, who for the past ten years has been mining in British Columbia and Mexico, is taking special work in economic geology and metallurgy at Queen's University. His present address is 95 Clergy Street West, Kingston, Ont.

The action brought by Mr. Clifford E. Smith against Dr. Milton L. Hersey, et al, has been dropped. The words of Mr. Smith's counsel sum up the position: "I feel in duty bound, as counsel, to say that I am convinced that there is nothing in the charges spread out on the record . . . The plaintiff authorizes me to . . . withdraw entirely in the fullest and freest and frankest way, all charges of wrong-doing or fraud against Mr. Brook, Dr. Hersey, and the other defendants in this action. Both action and counter claim were dismissed without costs.

Mr. J. B. Tyrrell brought to this office a large specimen of native copper found on the Coppermine River, Mackenzie district, draining into the Arctic Ocean. The specimen weighs about two pounds.

Mr. J. B. Tyrrell has opened up an office in Porcupine for the Anglo-French Company.

Twenty-one members were present at a dinner of the Montreal Branch of the Canadian Mining Institute, held on Friday, November 4th. Mr. John E. Hardman occupied the chair, and Professor Dulieux acted as vice-chairman. At the close of the dinner the following nominations were made for next year's council:—For president, Dr. F. D. Adams; for vice-presidents, Mr. Thos. Cantley and Dr. A. E. Barlow; for councillors, Messrs. Dulieux, Denis, and Bancroft.

**SPECIAL CORRESPONDENCE****NOVA SCOTIA.**

**Glace Bay: Dominion Coal Output.**—The output for October was lower than was anticipated, reaching only 329,000 tons. The decrease was occasioned by delays to shipping caused by bad weather conditions. The month was exceptionally stormy, and a succession of gales and rainstorms in the Gulf greatly hindered shipping.

Consequent upon the death of the manager of No. 2 Colliery, a number of changes have been made in the appointments of colliery managers. Mr. Alex. S. McNeill, formerly manager of Dominion No. 9 Colliery, is now manager of No. 2 Colliery; Mr. D. L. Mackay removes from No. 7 Colliery to become manager of No. 9, and Mr. P. Pendergast, formerly manager of No. 8, is appointed manager of No. 7 Colliery. Mr. Michael McIntosh is promoted from the position of underground manager at No. 5 Colliery to the managership of No. 8 Colliery.

A portion of the general office staff of the Coal Company has been moved to the general office of the Dominion Iron & Steel Company in Sydney. The heads of Coal Company departments now in Sydney are the general manager, the superintendent of shipping and general freight agent, and the comptroller. Mr. Plummer, the president of the two companies, recently spent a week in Cape Breton.

A correspondent in the United Mine Workers' Journal refers to Hon. Robert Drummond, the editor of the "Mining Record," in the following pleasant terms: "A bi-monthly jaundiced journal, edited by an old, unnatural, green-eyed putrescence of antiquity, who, with rotten heart and gangrenous brain, can jabber and grimace against all discontent, etc., etc." This is a fair sample of the language which the leaders of the U. M. W. A. cause have been in the habit of using in Cape Breton. Those who know the editor of the "Mining Record" and his power of repartee will await with interest the retort courteous. It is quite apparent that the feelings of the correspondent of the U. M. W. Journal must have been hurt in some way.

**Reciprocity and Nova Scotian Coal Mines.**—To those whose interests are bound up with the coal trade of Nova Scotia, the desire that is now being manifested in the West to deprive our coal mines of the protective duties under which they have grown and prospered carries with it the gravest menace. Reciprocity, so called, or the free admission of United States coal into Canada, does not present itself to the miner of Nova Scotia as a question in political economy. With him it is a question of existence—a matter concerning his bread and butter. The reasons that prompt the coal companies to oppose any change in the present tariff are concisely summed up in a letter addressed to



the Dominion Government by the president of the Dominion Coal Company, which is re-printed in full elsewhere in this issue of the Journal. The president of the Nova Scotia Steel & Coal Company also has written to the Government protesting against any change in the coal duties, and he makes the very serious pronouncement that reciprocity in coal with the United States would mean "not only the closing of the coal mines, but the ruin of the steel industry."

These letters cover so completely and definitely the reasons against a change in the coal duties, that it is unnecessary to detail these reasons here. Both Mr. Plummer and Mr. Harris oppose strongly the main argument of those who favour free coal, which is that the removal of the duties would give to Nova Scotia the New England coal market. Mr. Plummer writes: "Notwithstanding our efforts to sell coal in New England, our shipments have been steadily decreasing, and, even with concessions in price equal to the amount of duty, we have recently found that we could not secure contracts." This is the experience of the Dominion Coal Company, and, if that corporation cannot sell coal in New England, it is certain that no other Nova Scotia coal company can hope to succeed.

There is also a national aspect in connection with reciprocal free trade in coal with the United States which has not as yet been greatly urged. Canada, in comparison with her great stretch of territory, is but poorly provided with coal seams. In modern times no country has achieved greatness that has not been well provided with coal. The United States, Great Britain, Germany, and France are the world powers of to-day, and they are also the four greatest coal producers. One of the best guarantees for the continued prosperity of great Britain is that new coal-fields are being discovered even in that old and travelled country. This insures her against a shortage of that fuel without which her factories would be idle and her ships rust in port. The United States produces over three hundred million tons of coal per annum, and one coal company in the Union alone has a yearly output three times larger than the entire coal production of Canada. Few countries have been so favoured with natural stores of coal as the United States; but, even there, the tremendous depletion of the coal-fields is being viewed with alarm, and the suggestion has even been made that an export duty should be imposed on coal sent out of the United States—a measure, by the way, which was long ago taken by the British Parliament.

In a recent publication of the Canadian Geological Survey it was stated that the main stores of Canadian coal were situated at a distance from the great centres of population. But some day the population will move to the coal-fields, and these, as in all other parts of the world, will become the foci of industry and the great producers of national wealth. If Canada desires to become a self-contained and completely autonomous nation and to hold her ground with the great nation to the south of us, she must develop and yet conserve her own national stores of coal. Glancing at the map of the United States, nothing would appear more natural than that Nova Scotia coal should supply New England and that Pennsylvania coal should supply the territory round the head waters of the St. Lawrence. But, for various reasons, sometimes referred to as history, Canada is politically detached from the United States, and, in national affairs, boundaries and frontiers oftentimes take precedence of natural facilities. Even supposing that under free trade in coal the Nova Scotian mines secured a market in the United States as great or greater than the one they now have, would it be for the ultimate benefit of Canada to exhaust the only coal-field she possesses between the Atlantic and Saskatchewan to supply the homes and factories of a rival nation?

**QUEBEC.**

**Buckingham.**—The Buckingham Graphite Company is now operating its mill to full capacity, 60 tons of ore per day, producing about 5 tons of all grades of flake graphite. A ready

market is found for the whole output in the United States. The mining plant and the mill are modern in all respects. A considerable profit is already being made.

The property, covering 400 acres, is situated 7 miles due west of Buckingham. During the coming winter the mill will be enlarged to a daily capacity of 100 tons of ore.

The same syndicate that controls the Buckingham Graphite Company, also owns and controls about 12,000 acres in the Townships of Buckingham and Lochaber. At a point 3 miles west of Buckingham a new 200-ton mill is in course of erection. It is hoped that this mill will be completed by May 1st, 1911.

The products at present being turned out are as follows:—

	Per Cent.
Crucible graphite .....	93 to 95
Lubricating graphite .....	85 to 92
Stove polish, facing, etc.....	70 to 80

These analyses indicate that the problem of separation has been solved. Everything about the re-organized venture is most encouraging. Much credit is due to Mr. H. P. H. Brumell, who has stuck to his guns through years of discouragement.

**ONTARIO.**

**Cobalt, Nov. 7.**—Within the past two weeks various strikes have been made or new developments have been made known that have changed the whole viewpoint of the Cobalt camp. The Lawson shows every evidence of coming back and several new leads have been struck on the Kerr Lake, which to all appearances, will for some time enable the Lewisohn Company to pay its ten per cent. per quarter.

The Northern Customs concentrator will add twenty stamps to their battery in order to handle the 50 tons per day of milling ore from the Cobalt Townsite. A year ago the Townsite appeared to be moribund; to-day it is shipping almost every week. A number of good surface finds have been made round the shaft near the Buffalo line and sufficient milling ore put in sight to make a year's contract with the Customs mill.

In a recently issued statement of the Trethewey Cobalt it is shown that the company had cash in the bank and due from smelters, \$207,740.73, ore sacked at mine, \$12,847, leaving \$220,587 after providing for dividends and all expenses.

The long drawn out suits between the Crown Reserve Mining Company and W. J. Parker and A. G. Fowler Ross, members of the promoting syndicate, have been settled out of court.

In spite of the unfavourable interpretation given to the annual report by various interests, the Kerr Lake Mining Company has declared its usual dividend of 10 per cent. per quarter to be paid on Dec. 15.

The physical condition of the Kerr Lake mine has materially improved since the issuance of the annual report. From the No. 3 shaft in the diabase entirely new ground has been opened up at the fifth level and good high grade has been discovered. Under Kerr Lake to the east towards the Drummond six new leads have been cut, some of them carrying good ore. This is practically unexplored ground, as the company would not drift under water until they had attained considerable depth.

The Thelma Gold Mining Company has let a contract for the sinking of a shaft to the depth of 75 feet. Some spectacular gold has been taken from this claim, which is situated between Elk Lake and Earleton on the T. & N. O. Railway. The company is formed of Montreal merchants.

The Bailey Cobalt has run into a shoot of rich ore on the 232-foot level in the west drift. They are also mining from the Cobalt Central workings on the other side of the line in order to reach the Bailey vein at the fourth level. All the ore is being milled at the Central mill with, it is understood, good results. Four and a half tons of table concentrates have produced 1,645 pounds of jig concentrates and 94 pounds of bullion.

After working their optioned claims at Hangingstone Lake in the Gowganda district, the Temiskaming and Hudson's Bay Company has decided to make the first substantial payment. It is understood that development so far has been quite satisfactory.

At the City of Cobalt's annual meeting it was definitely decided that no dividend should be paid. The balance for 1909 was shown as \$179,900. This year 361 tons have been shipped, six cars of screenings and low grade, and six cars of high grade and concentrates.

The mill report of the Buffalo Mines for September reads: Mill ran 556 hours, ore milled, 3,718 tons; average assay per ton before milling, 28.35; ounces silver recovered, 82,639; milling expenses, labour, \$3,450; power, \$1,414.43; ounces of silver paid for during the month, 120,695.

The Drummond has commenced to mine again. A contract has been let to sink a 100-foot shaft near the Hargrave line to catch the Hargrave vein, which has been traced definitely on to their property. The Hargrave has mined high grade ore within 40 feet of their boundary. It has also commenced to ship and has sent out 400,000 pounds of low grade ore in one week.

That there is an increased demand for Cobalt's ores is proven by the number of firms who are now striving to obtain contracts or have got them. The Swansea Smelting & Refining Company of Toronto is now definitely an active in the market, and several other new incorporations are looking over the situation.

On their south Coleman claim the Black Consolidated Mines have commenced work again. They are sinking again on their massive smaltite vein.

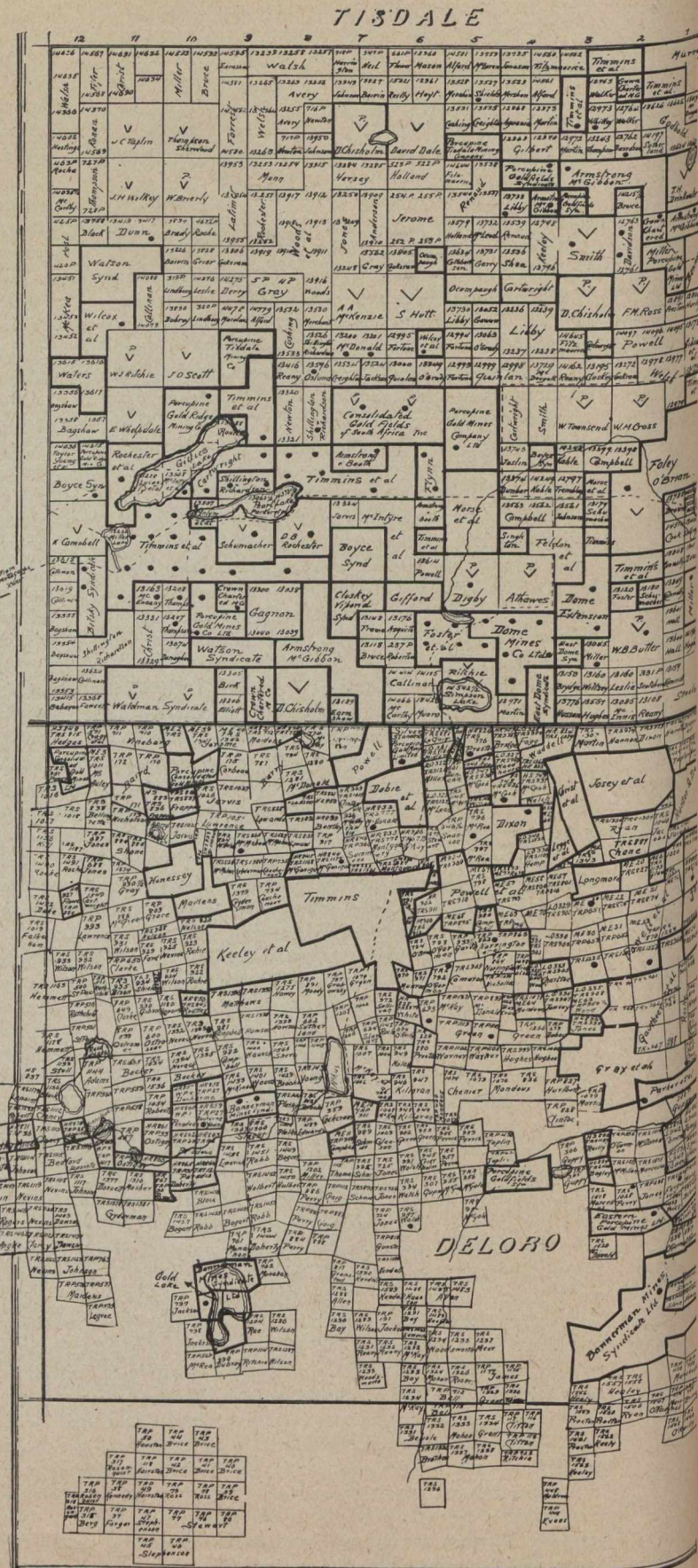
At 200 feet, forty feet from the bottom of the No. 8 shaft, a body of high grade ore was encountered on the Lawson. Now it has been driven on for 20 feet and the ore of the richness seen on the surface averages nine inches of solid metal. So far all ore bodies on the Lawson (with the exception of No. 2) had pinched out at the 88-foot level. No. 8 vein, in which the good ore was found at depth, was no exception. There are so many and so rich veins on the Lawson that the indication that they may make at depth alters the complexion of the Lawson situation very greatly.

The bullion shipments for the camp read:

	Ounces.	Value.
O'Brien .....	288,406	\$153,928
Nova Scotia .....	120,483	71,670
Temiskaming .....	86,691	42,629
Buffalo .....	98,012	50,990
Crown Reserve .....	15,931	8,620
La Rose .....	44,057	23,330
Cobalt Gem .....	10,000	5,800
Beaver .....	3,168	1,820
Colonial .....	1,008	623
	668,556	\$359,431

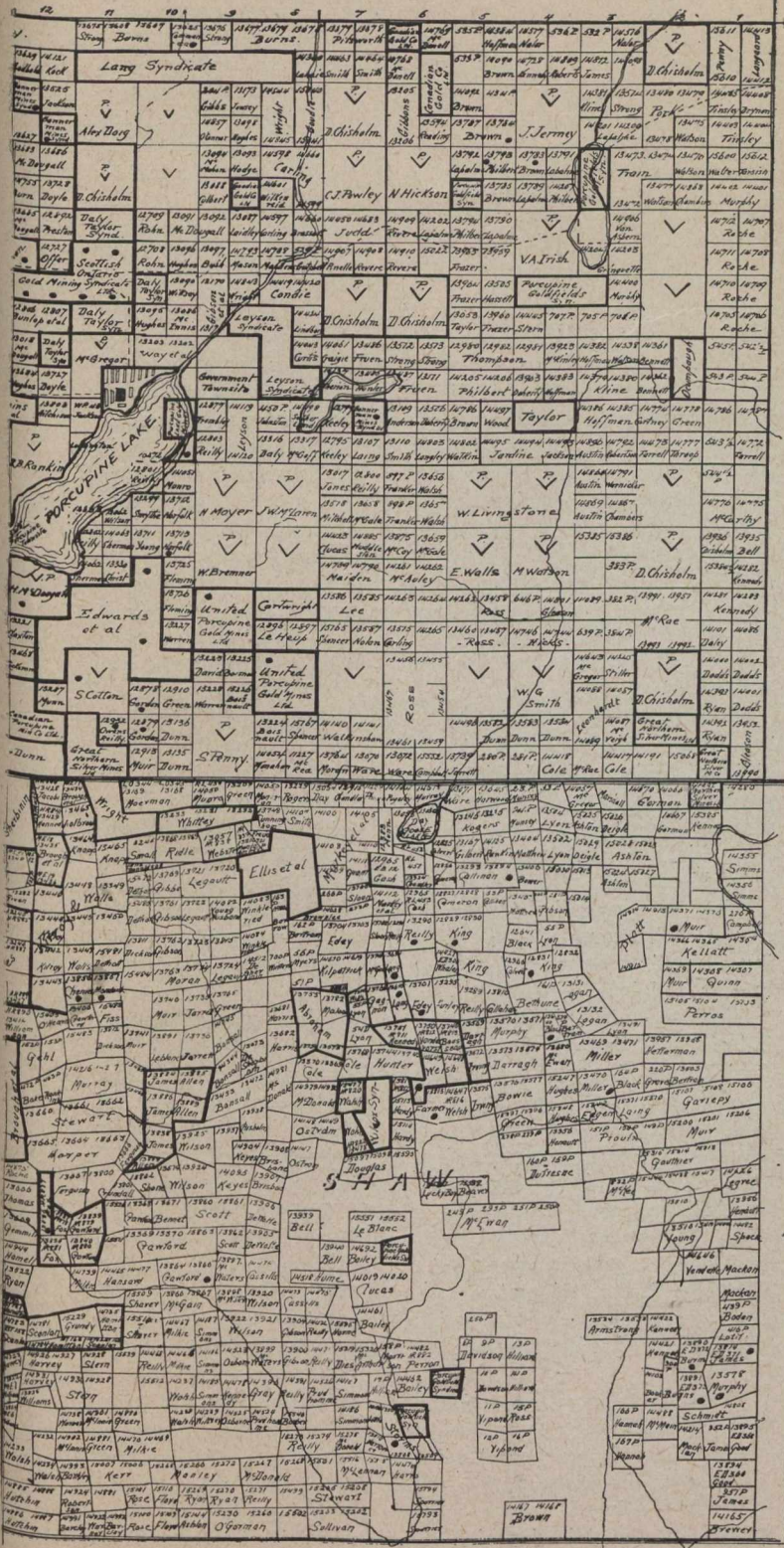
Since the O'Brien plant commenced operations they have made fourteen bullion shipments worth \$153,928. Last month, the most successful in the history of the mill an extraction of 93.4 per cent. was obtained, the heads averaging 40 ounces. On an average 20 tons of ore per day are treated and the only ore shipments made are of jig and table concentrates and an occasional bunch of high grade. All this winter ore from the various shafts will be trammed to the central shaft near the mill and raised there, instead of being transported by surface cars. Some interesting new ore bodies have been opened up at the old No. 1 shaft.

At the Cobalt Provincial mine 200 feet of continuous ore has been opened up at the 175-foot level. The excavations for the foundation for a small 40-ton mill have been commenced near the shaft and camps to accommodate 40 men are being rushed up.



The old shaft house built by the Government has been dismantled, as this section of the ground will be worked from the Savage shaft. A car of high grade ore has been assembled and will be shipped before the end of the year.

WHITNEY



GOUDIE'S MAPS  
OF  
THE PORCUPINE GOLD FIELDS.  
ISSUED BY A. C. GOUDIE.  
621 TRADERS BANK  
TORONTO.

NOV. 8 1910

The statement of the Temiskaming which accompanied the dividend cheques shows a profit for the nine months of the present fiscal year of \$579,364.30. The profits for the quarter ended October 31 were \$284,762.93, or at the rate of \$94,920.98 per

month. Of the 1,531,096 ounces produced, 1,104,532 were obtained by hand sorting and 426,564 ounces recovered at the mill. At the 500-foot level it is reported the No. 1 vein has been drifted on for 162 feet and silver values have been encountered throughout interspersed with shoots of rich ore.

South Lorrain.—It is most likely that by the end of this month or the beginning of next the companies in the camp will be taking power from the Mines Power Company. Two 375 h.p. transformers have been moved from the Kerr Lake substation to South Lorrain and are now being set up. Service lines to several of the mines have already been run, so that it is probable that power will not be much longer delayed.

The Lewishons have taken up their option on a large block of Wettlaufer stock, but it is understood not sufficient to give them control. From the 190-foot level a winze has been sunk to the 250-foot and the shaft will be put down to that depth to connect. From the winze level another winze has been sunk 22 feet and at the bottom of this the ore has widened out into six inches of 3,000 ounce. Three or four cars, two at least of high grade, are being shipped before the waterway transportation is closed up.

The Keeley mine also expects to ship before the closing of navigation. It is now mining good ore at the 100 foot level and has struck good high grade at the 170 foot.

Porcupine.—Development on the purchase of the Gold Fields Consolidated of South Africa has to date been most satisfactory, and it is stated on expert authority that it is now the third best surface showing in the camp. Free gold shows in some places sensationally for 220 feet in a two and a half foot vein and in the shafts sunk to date the values are equally as good at the depth attained as on the surface.

The British Canadian Power Company, at the head of which is Mr. A. E. Wallberg, of the Mines Power, has now secured control of the undertaking to run a railroad into Porcupine and work has already commenced, as the country offers few engineering difficulties, it is expected that it will be of use some time next summer.

The winter trail to Porcupine will be opened up in a few days. All navigation has ceased on the lakes and sleighs are running on the winter roads. Directly it is known that the winter roads are good for heavy freight there the trail will be almost as thronged as the Gowganda trail two years ago.

Till supplies can be taken in over the winter road the Dome Mining Company and the Timmins have laid off all the men they can. The stock of provisions laid in before the break up last spring has now run very low and the expense of replenishing them at once caused several properties to close down for the time being or reduce their staff.

Operations have been resumed on the Foster near the Dome and machinery will be taken in as soon as transportation allows. It is the intention of the management to sink two shafts 600 feet apart.

The only machinery to be taken in over the summer routes was the boilers and hoist of the Porcupine Gold Mines, the New York company working the Vipond or Flynn claims. They were drawn up the Porcupine River in big pointers drawn by gasolines. A small mill went with them.

In readiness for the time when transportation is good, the Dome Mining Company has ordered a 12-drill compressor from the Canadian Rand, while the Timmins people have ordered their mill equipment from the Allis-Chalmers Company.

Mr. A. B. Stewart, who was formerly at the Nova Terra mine in Fabre Township, has sold the Carson-Hennessey Walker claims to English capitalists. There are many large English interests in the north country now bidding eagerly for promising claims, and Mr. Stewart has options on 60 for the London market.

With the near approach of better transportation much greater activity is apparent in the townships on the border of Porcupine. In Langmuir, Carmen, Thomas and Deloro there are many

men now working and many strikes reported, some of which are authentic. So far it has been almost impossible to do systematic work as it required half the labour of the gang to provide the camp with necessaries.

#### BRITISH COLUMBIA.

Exhibits of minerals from Kootenay, Boundary, Kamloops, and Nicola Valley districts have been made during recent months at several annual fairs. The largest display was at the Interstate Fair held at Spokane, Washington, where the display of specimens of minerals from British Columbia was particularly large and attractive. It has been claimed that recent displays were the best ever made of collections of minerals from this province, but it is probable those making this claim lost sight of the really large and thoroughly representative collection from British Columbia included in the unusually excellent exhibit of Canadian minerals made at the Alaska-Yukon-Pacific Exposition held at Seattle, Washington, last year. In quantity, variety, and quality, the splendid exhibit got together last year by Mr. R. L. Broadbent, of the Geological Survey branch of the Dominion Department of Mines, without doubt excelled any other collection of mineral specimens from British Columbia yet made. But having conceded this, as a simple matter of fact, it may be said that good exhibits were made this year at Nelson and Spokane, and in smaller measure at Vancouver. There was practically no competition at the last-mentioned place, but at the Spokane fair, held recently, conditions were the opposite. From a published account of the latter it has been ascertained that the British Columbia display included mineral specimens from 148 mines; that from Idaho, 110 mines; from Montana, 38 mines; from Alberta, 11 mines; from Oregon, one mine; and from various other sources, 29 exhibits. The general excellence of the British Columbia exhibits is indicated by the number of awards made to them. Of seven silver cups offered for competition, four were won by British Columbia, while the exhibits from this province were awarded twelve of the 22 silver medals offered. Most of these awards were made to exhibits from West Kootenay, ores from which constituted by far the greater part of the British Columbia collection. The cup for the best mineral display at the fair was won by British Columbia; other cups were won as follows: By Ainsworth, for silver and lead ores; by the Lucky Jim mine, Slocan, for zinc ores; and by the Crow's Nest Pass Coal Company, for coal. Among the exhibits awarded silver medals was one of nickel-cobalt ore from East Kootenay, and one of gypsum from Nicola Valley. Medals were also won by the following British Columbia mines: Nugget, Sheep Creek; Lucky Boy and Arlington, Erie, Eureka, Eagle Creek (all in Nelson mining division); Iron Mask, Kamloops; Standard, Silvertown camp, Slocan; Highland, Ainsworth; Centre Star-War Eagle group, Rossland; Granby, Boundary; and Copper Chief, Trout Lake. Montana, Idaho, and Washington States each won a silver cup, while silver medals fell to those states in the following proportions: Montana, one; Idaho, five; Washington, four (including one to the First Thought mine, at Orient, which ships ore to the smelters at Trail and Grand Forks, both in British Columbia).

**Ymir.**—There is now more activity in this part of Nelson mining division than at any previous time for years. Among the active mines are the Yankee Girl, which has shipped much ore during the last two years, Wilcox, Dundee, and several others. It has been reported that the old Ymir mine, formerly a dividend payer, is to be re-opened, and development at lower levels than those already worked to be undertaken.

**Rossland.**—Ore production is being well maintained at the Consolidated Mining & Smelting Company's Centre Star-War Eagle group of mines, and in less quantity at those of Le Roi No. 2, Limited. Among the smaller properties an encouraging feature is the recent finding of a fine shoot of ore of good value in the Blue Bird mine.

**Slocan.**—The mines that were deprived of railway transportation facilities last summer by the burning of many trestles and bridges of the Kaslo & Slocan Railway, have not yet resumed ore production on a normal scale, but some are making provision for the shipment of ore soon. Those chiefly affected are the Whitewater group, Lucky Jim, and Rambler-Cariboo. As the Whitewater mines shipped little crude ore, the great bulk of their product being concentrates, they must await the building of a concentrating mill, to replace that destroyed by fire in July, before they will again be in a position to make shipments. Mines situated near Sandon, which are provided with an outlet for their products over the Nakusp & Slocan Railway, are being operated as usual. In the Slocan Lake part of the district there is little change to note.

**Lardeau.**—There is an improved outlook for more development and production in this district, which has been neglected of late years to a considerable extent. It has been announced that the Ferguson Mines, Limited, an English company which has for years worked the Silver Cup and Sunshine mines with little intermission, sending out about 100 tons of high-grade silver-lead ore monthly, will again also work its Nettie L. mine, situated near Ferguson. Preparations are being made for a resumption of ore production at the Beatrice mine, near Cambridge, Lardeau mining division; while reports are to the effect that several other properties in Lardeau division, and still others in Trout Lake division, will also be worked during the ensuing winter.

**Similkameen.**—In addition to the good progress made in Hedley camp, where is situated the Hedley Gold Mining Company's dividend-paying Nickel Plate mine, there is gratifying advancement in connection with the development of the coal resources of the Similkameen. The output of coal from the Princeton colliery is being steadily increased. At Granite Creek, the Columbia Coal & Coke Company is putting in a power plant and making other provision for the development of the several coal seams on its property. The Osoyoos Coal Company is prospecting its coal measures and opening coal reported to be of good quality and in considerable quantity.

**Nicola.**—Coal mining is becoming a more and more important industry in Nicola Valley as time passes. The Nicola Valley Coal & Coke Company is the only comparatively large producer of coal at present operating in the district, but development of other properties than that of this company is being steadily advanced. Railway construction is being proceeded with, the chief object in view being the connection, by as direct a route as shall be found practicable, of this fuel-producing locality with the Boundary mining camps which are looked to as an eventual market for much coal and coke from Nicola Valley. The metalliferous mineral resources of the country about Nicola have not yet been largely developed, but it is believed copper mining and smelting will yet be added to the industries of the district.

**Coast.**—While ore production continues small in this district, there is much work being done, so that it is reasonable to look for a much enlarged output within a year or two. At the Britannia mine, on Howe Sound, exploration of the big ore bodies is being continued, though only a restricted production of ore is being made while the price of copper remains low. At Green Lake, in about 30 miles from the head of Howe Sound, some large copper showings are being exploited. On Vancouver Island mining is chiefly for coal, and a greatly enlarged output of this mineral is planned for the early future. Texada Island has two valuable mines in the Marble Bay and Cornell, both of which have been producing fairly large tonnage of copper-gold ore of good average value. Lasqueti and Valdes Islands continue to have attention, development being in progress on both. Farther north, on Princess Royal Island, a locality in which some Maritime Provinces people were interested from five to ten years ago, a syndicate, including several Vancouver city men, is about to reopen a mining property. Other Coast dis-

tricts are dealt with under the several following heads:

**Portland Canal.**—The lower adit at the Red Cliff mine had been driven 1,013 feet from its portal by October 6. It is expected that before the end of November it will be under the ore cut in the upper adit about 300 feet vertically above the lower working. In the upper adit there is what has been described by the manager of the company as a chamber of chalcoppyrite, 8 by 8 by 10 feet, opened some months ago at 80 feet in from the portal of the adit. The Red Cliff Company has been operating since May a Canadian Rand 10-drill compressor, which was hauled over the snow last winter, the distance from the landing at Stewart to the claim being about 12 miles. Steam for power purposes is supplied by three 60 h.p. boilers, which, as well as an air receiver and 6,000 feet of 20-pound tram rails, was hauled in last winter. Other equipment at the mine includes a Canadian Westinghouse generator, belt-driven by a 25 h.p. Comstock engine and having a capacity of 250 electric lights. A trial shipment of 3,028 pounds of Red Cliff ore, sent recently to the Tye Copper Company's smeltery, gave a net return at the rate of 20 ounces per ton.

On October 8th the first trial shipment of high-grade silver-lead ore made from a mine in this camp was sent by the owners of the Lordigordy mine, of which Mr. H. B. Williams is manager. It consisted of four tons, practically one ton from each of four open-cuts. A local assayer's sampling gave a value

of \$220 per ton in gold, silver and lead. It is probable this ore will be treated at Trail.

**Skeena.**—Reports from reliable men concerning the occurrences of silver-lead ore in various parts of the district about Hazelton indicate that there is much promise of a productive mining field being opened there as soon as the Grand Trunk Pacific Railway, now being constructed, shall provide the transportation facilities requisite for conveying in the machinery and supplies, and carrying out the ore to smelting points. In the Babine range, east of Hazelton, development work has already been done on two or three properties, with results that seem to warrant the expenditure of more money when the cost of transportation shall be much less than now.

**Atlin.**—Beside the Engineer or Northern Partnership group of gold-quartz claims, situated on Taku arm, there is the Gleaner property, from which 75 sacks of free-milling quartz, believed to contain high gold value, reached Vancouver in October. Those interested in the Taku arm gold-quartz claims are confident profitable mines will be developed there.

**Queen Charlotte Islands.**—Not many particulars of mining work on the Queen Charlotte Islands have been printed in Coast newspapers lately. It is known, though, that development work is being proceeded with on both gold and copper claims on Moresby Island of this group, while in the coal measures of Graham Island prospecting is also in progress.

## MINING NEWS OF THE WORLD.

### GREAT BRITAIN.

**Cardiff, Wales, Nov. 8.**—Wild scenes were enacted in the disturbed colliery districts to-night where thirty thousand miners are on strike. Bands of youths, supported by women, stormed the colliery buildings and looted the stores in several towns, scattering the goods in the streets. The police, who were largely reinforced during the day, attacked the mobs with their batons, the rioters replying with showers of stones.

More than one hundred men were treated at the local hospital for scalp wounds. A number of the police also were injured, but they succeeded in getting the upper hand. Police reserves and troops arrived quickly at the scene of the greatest disturbances, and have been posted in the storm centres. They are prepared to prevent further disturbances, and should the strikers maintain their defiant attitude bloodshed is anticipated.

Mr. Winston Churchill, the Home Secretary, has offered his services to compose the differences between the men and their employers.

**Cardiff, Wales, Nov. 9.**—The action of the authorities in rushing troops and London police to the mining districts, where strike riots occurred last night, overawed the strikers, and the situation appeared to be well under control to-day.

### GERMANY.

Statistics of the petroleum import trade of Germany for the first eight months of the present year show that in all 849,398 tons of petroleum were imported, as compared with 815,054 tons in the corresponding period of 1909.

### ROUMANIA.

During August the Roumanian petroleum refineries treated 109,166 tons of crude oil, from which 18,769 tons of benzine, 26,394 tons of illuminating oil and 2,800 tons of lubricating oil were obtained. The remaining residues and coke amounted to 59,100 tons.

### SOUTH AFRICA.

A cablegram from Johannesburg states that during September the mines of the Rand alone—that is, excluding outside mines—crushed 1,835,647 tons. The average yield per ton was 28s 3d,

working costs 17s 11d, the profit per ton 10s 4d and the aggregate profit £942,330. In spite of the fact that September was a 30-day month the tonnage crushed was slightly more than for August, with an increase also in the daily average profit as compared with that month.

**Johannesburg.**—Shaft-sinking on the Springs' Mines is proceeding slowly, owing to the bad condition of the ground and the large amount of water which still percolates through the dolomite formation.

The Brakpan Mines, Limited, will start milling operations early in 1911. Good progress is being made with the equipment of the mine. Developments continue to show a good grade of ore, the reserves being now estimated at 1,503,135 tons, of an average value of 6.5 dwts.

A small test crushing has taken place at the Benoni mine, the machinery working well. It is expected that the mill will start crushing in April. The rumour of an intention to increase the capital of the company is denied. The cause of the recent fall in Benonis is unknown, but it is said to be due to a change of ownership in a large block of shares acquired under the recent reorganization scheme.

The oil shale deposits in the eastern districts of the Transvaal are causing considerable stir. In the Wakkerstroom district it is reported that the shale yields 90 gallons per ton, and in Ermelo 30 gallons per ton. The extent of the shale-bearing area is at present unproved.

### RHODESIA.

The total output of gold from Rhodesia for the month of September is cabled as 42,499 ounces, valued at £178,950, as against 45,458 ounces, valued at £191,423, in the previous month. This is a decrease on the month of 2,959 ounces. In explanation of the further falling off in the output the British South Africa Company states: "The number of producing mines decreased by 37 in consequence of the fact that several mines hitherto worked on a small scale by individuals have developed so satisfactorily that they have been taken over by large companies and are now closed down pending the erection of larger milling plants." There were 152 gold producers during September. The output of other minerals was: Silver, 16,848 ounces; lead, 62 tons; coal,

16,362 tons; copper, 18 tons; chrome ore, 1,334 tons; asbestos, 25 tons.

#### WEST AFRICA.

The West African Chamber of Mines states that the gold yield of the colony for September was 11,497 ounces, valued at £47,746, a decrease of 2,424 ounces, or £9,967, compared with the preceding month.

#### UNITED STATES.

Los Angeles, Cal., Nov. 1.—The opening bids by the harbour commissioners of San Francisco last week for the supply of fuel oil for one year revealed the fact that the Associated and Union-Independents have sent the price up to 85 cents per barrel for crude oil at bay points. The offer is generally regarded as the serving of notice on all consumers that important contracts will not be filled below this point. There are rumours of an understanding between the Associated-Union-Independent interests and Standard, by which the price of oil will be kept at a point not lower than this price.

Cripple Creek, Col., Nov. 1.—A partial list of dividend-paying mines—that is, owning concerns—has been compiled, which shows that twelve properties, now actively working, have paid dividends to stockholders within the last few months. This list of twelve includes several close corporations.

Cripple Creek, Colo., Nov. 3.—To-day will mark the commencement of Cripple Creek's new era—an era that is expected to stretch out for at least another 20 years, during which time the district will mine and ship as much high-grade ore as it did when its ore bodies were new to the world and the miner had but to remove the surface rock to reach it. The deep, rich mineral zones of the camp are almost within reach of the miner—will be before the end of the day. The first water of the pent-up underground courses will be released through the Roosevelt drainage tunnel and in another 48 hours it is thought that the El Paso lower levels will have been drained and a large force of miners actually breaking rock on the 900-foot level. Less than six feet of rock remain between the bottom of the shaft and the drainage tunnel, which the churn drill will shortly penetrate and the water will be finding its way out at the rate of thousands of gallons a minute.

In another week, unless unexpected obstacles prevent, the tunnel will reach the main water course, when all the mines affected will enjoy the same good fortune as that upon which the El Paso will enter within a few hours. Between the tunnel breast and the main course there are estimated to be 72 feet, which, according to the progress the tunnel has been making of late, should be removed in six days, when a flow of water will take place such as has probably never occurred in a mining camp before, and it means that a new Cripple Creek will arise—as great, as profitable and as wonderful as when it rejoiced in the glory of its first discovery.

The tunnel, which was begun three years and a half ago, is into the mountains a distance of 15,503 feet, having gained 386

feet last month, which is the best record yet made.

Whether or not the tapping of the water course, to which the tunnel is drawing near, will drain the properties of the eastern end of the district, is a question, as it is believed that two separate and distinct underground lakes or channels are separated by a hogback between Beacon and Bull hills. Should this condition exist, the tunnel will be extended on to the eastern section of the camp, but in the meantime the mines on the west side of the hogback, among them many of the larger producers, will be getting the benefit of the opening of one of the waterways and the output of the district, it is claimed, will be greatly increased before the other lake is tapped.

Trinidad, Col., Nov. 8.—Between 50 and 70 men are believed to be entombed in mine No. 3, of the Victor American Fuel Company, at Delagua, twenty-two miles northwest of Trinidad, as the result of an explosion to-day.

Fifty men came out unharmed through mine No. 2, which is connected with mine No. 3. According to reports to the mine officers, those men did not even know there had been an explosion in No. 3. If this report is true, the explosion, which caved the entrance to No. 3, did not extend far into the mine, and it is hoped that the men within the working are unharmed.

Boston, Mass., Nov. 5.—The shareholders of the Nevada Consolidated Copper Company, at their annual meeting held in Portland, Me., re-elected last year's board of directors with the exception of President James Phillips, jr., and C. Hartman Kuhn, who were succeeded by S. R. Guggenheim and J. M. Steele.

The annual report of the company, as presented to the meeting, gave the output of the company for the fiscal year ending September 30, 1910, as 62,772,342 pounds of refined copper, which was produced at a net cost of 6.42 cents per pound. The net profit for the year was \$3,580,787, from which \$2,982,644 in dividends were paid, leaving a surplus of \$598,142. The ore reserves on the property at the close of the year were estimated to amount to 40,360,823 tons, averaging 1.70 per cent. copper. The undivided profits, together with the surplus and quick assets at the close of the fiscal year amounted to \$2,633,617. The gross revenue from the copper produced—sold at an average price of 12.75 cents—was \$8,008,146, while the gold and silver returned \$472,982, making a total gross income of \$8,481,129. Operating expenses aggregated \$6,135,747, and the total net profit for the year, not including miscellaneous income—\$1,263,925—was \$2,

#### MEXICO.

Guadalajara, Mex., Nov. 5.—Carrizo Copper Company, operating in the Ayutla district of this state, has completed the work of remodelling and enlarging its concentrating plant, and milling has been resumed. The enlarged plant has a capacity of 100 tons daily, but so far the amount handled has not exceeded 75 tons a day. During the time that construction was in progress a supply of several thousand tons of ore was accumulated at the mill, and these reserves will be sufficient for the mill for some time.

## GENERAL MINING NEWS.

#### NOVA SCOTIA.

Halifax.—It is announced that Mr. J. R. Cowans is soon to leave the province and take up his residence in Montreal. This change is to take place at once. The Springhill Company will in future be carried on as most of the American collieries are, with a manager at the mine who has charge of underground and superintends bringing the coal to the bulkhead, and general officers who control the sales and administration at the head office.

Mr. Sharp, of West Virginia, will have control underground, and has been in Springhill for some weeks.

During Mr. Cowans' stay in Nova Scotia he has come into contact with business, professional and public men and is held in the highest esteem by them, and all will regret that he will no

longer be a resident of Nova Scotia. Of necessity Mr. Cowans will be a frequent visitor to this province, and the company will still be administered by him. Mr. Cowans has hosts of personal friends all over Nova Scotia, who appreciate his worth, and they join in wishing him all good things in his new home.

Halifax.—Efforts are being made to create sentiment against reciprocity in coal. This appears to be unnecessary, as the great bulk of Nova Scotians are strongly opposed to reciprocity in principle.

#### ONTARIO.

Cobalt.—A keg of bullion from the Silver Leaf mine left last week, consigned through the Dominion Express Company to

Messrs. Handy & Harman, Bridgeport, Conn., the weight being 3728 ounces, and the value \$1,172.72. The Silver Leaf mine being under lease to the Crown Reserve, who are working the property, the bullion naturally belongs to the latter company, but will be shown separately in the returns.

**Sault Ste. Marie.**—The recent discovery near Hobon on the main line of the C. P. R., has caused quite a stir among mining men throughout East Algoma, and up to date over fifty claims have been recorded. The site of the new gold field is township forty-nine, range twenty-seven, District of Algoma. It is easily accessible from the C. P. R. and the Algoma Central Railway and is almost due west from Porcupine, which fact causes mining men to think that the new field may be even richer than yet appears.

**Cobalt, November 4.**—Summonses have been served on the directors of the Standard Cobalt Company, charging them with misfeasance and the improvident disposition of 40,000 shares of the Standard Cobalt Mines, which, it is said, were made over to the Cobalt Central Company, the New York organization controlled by Thomas Nevins & Company.

The action is brought by the liquidator of the Standard Cobalt Mines and is signed by the official referee, J. A. McAndrew. It calls for the presence of the Standard Cobalt directors before the referee in Toronto on November 28. Meanwhile proceedings are being brought in New York whereby various important witnesses concerned in the case are being examined.

**Kenora.**—Satisfactory progress is being made on the Mikado mine by Manager McKuson. The buildings and equipment have

been thoroughly overhauled and the mine is being cleaned up. Rich ore will soon be mined on the 180-foot level.

**BRITISH COLUMBIA.**

**Victoria, November 5.**—Mr. R. F. Tolmie, Deputy Minister of Mines, and Mr. F. H. Shepherd, Chief Mine Inspector of the province, have just completed the establishment at Hosmer of the first coal mine live-saving station to be installed by the Provincial Government under the act authorizing the adoption of the system. Others will follow at Middleboro and at Nanaimo. The system consists chiefly of a Draeger oxygen apparatus for the purpose of resuscitating miners and others who may have become temporarily overcome by deadly gases in mines after explosions or other unforeseen accidents.

The station established at Hosmer consists of one of the Draeger oxygen apparatus, which has a two-hour capacity, flanked by two pulmotor, resuscitating devices, with a thirty-minute capacity each. These apparatus have cylinders of 100 cubic feet of oxygen capacity and are of the 1910 model. Four electric safety lamps, one recharging device, and a water gauge for testing device valves go with each apparatus.

These Government stations are to be supplemented by stations placed at each mine, in accordance with Government requirements, by the mining companies.

The system has been installed in many places in Europe, the United States, Japan and even in Siberia, over 4,000 being now established and ready for emergency.

**STATISTICS AND RETURNS**

**DOMINION STEEL OUTPUT.**

The Dominion Steel Company had a record output in October, the figures being as follows:—

	Tons.
Pig iron .....	22,058
Steel ingots .....	27,034
Blooms .....	26,113
Rails .....	15,375
Wire rods .....	4,743

The Dominion Coal Company also had a big month, the output being 329,000 tons.

**COBALT ORE SHIPMENTS.**

Following are the shipments from the Cobalt camp for the week ending November 4, and those from January 1, 1910, to date:—

	Nov. 4 Ore in lbs.	Since Jan. 1. Ore in lbs.
Beaver .....		226,217
Buffalo .....	56,920	2,006,348
City of Cobalt .....		548,875
Chambers-Ferland .....		1,527,300
Cobalt Central .....		293,286
Cobalt Lake .....		300,900
Cobalt Townsite .....		601,120
Colonial .....		245,580
Coniagas .....	102,460	1,816,436
Crown Reserve .....		5,314,140
Drummond .....	400,000	1,064,200
Hargraves .....	60,000	564,070
Hudson Bay .....		481,215
Kerr Lake .....	180,501	9,059,468
King Edward .....		263,406
La Rose .....		9,255,841
McKinley-Darragh .....	210,090	10,604,557
O'Brien .....	128,034	1,115,250
Peterson Lake (Little Nip) ..		497,420
Provincial .....		65,000

Right of Way .....	74,850	1,545,187
Rochester .....		60,750
Silver Cliff .....		268,720
Standard Cobalt .....		258,951
Temiskaming .....		1,913,350
Trethewey .....		853,620
Waldman .....		63,992
Wyandoh .....		48,300

One shipment for the week ending November 4 were 1,366,795 pounds, or 683 tons.

Total shipments from January 1 to November 4 were 54,462,948 pounds, or 27,231 tons.

**BRITISH COLUMBIA ORE SHIPMENTS.**

The following are the figures of the ore production and movement for the week ended October 22nd and for the year to date:

**Boundary Shipments.**

Granby .....	13,485	910,019
Mother Lode .....	7,887	284,050
Snowshoe .....	2,762	121,954
Jack Pot .....	791	11,261
Rawhide .....	3,000	9,700
Other mines .....		9,523

Total .....

**Rossland Shipments.**

Centre Star .....	4,333	155,014
LeRoi No. 2 .....	823	25,813
LeRoi No. 2, milled .....	300	12,600
Other mines .....		12,781

Total .....

**Slocan-Kootenay Shipments.**

St. Eugene, milled .....	2,775	116,550
Van Roi, milled .....	800	33,600
Queen, milled .....	420	17,640
Granite-Poorman, milled ..	250	10,500
Nugget, milled .....	110	4,620

Highland, milled	250	7,850
Wilcox, milled	75	675
Richmond-Eureka	67	3,438
Emerald	35	1,616
Yankee Girl	87	4,339
Sullivan	908	16,820
Hewitt	21	43
Number Seven	137	241
Eureka	45	45
Other mines		35,123
<b>Total</b>	<b>5,980</b>	<b>253,100</b>

The total shipments for the week, including the estimated amount milled, were 39,361 tons, and for the year to date, 1,805,815 tons.

### SHARE MARKET.

(Courtesy of Warrren, Gzowski & Co.)

Miscellaneous.—Nov. 9, 1910.

	Bid.	Ask.
Amalgamated Asbestos	..	12½
Black Lake Asbestos	..	17¼
Dominion Coal	63¾	..
Dominion Steel	62¾	..
Dominion Steel Corp.	61¼	61½
Granby	47	47¾
Consolidated Mining	58	61
Nova Scotia Steel	85½	86
Crow's Nest Pass	..	80

New York Curb.—November 9, 1910.

Brit. Col. Copper	6¾	7
Butte Coalition	20¾	21¼
Chino Copper	21	21¼
Davis-Daly Copper	17½	2
Ely Consolidated	25 cts	26 cts
Gila	30	33
Giroux Mining	7½	7½
Goldfield Consol.	8	8¼
Green-Can.	7½	7¾
Harcuvar Copper	11	11½
Inspiration Copper	9½	9¾
Miami Copper	20	20¼
New Baltic Copper	7½	7¼
Nevada Con. Copper	20¾	20¾
Ohio Copper	17½	2
Rawhide Coalition	4 cts	5 cts
Ray Central	2	2½
Ray Consolidated	20½	20¼
Union Mines	15/16	1
Yukon Gold	37½	4

Cobalt Stocks.—November 9, 1910.

Amalgamated	.01 bid	
Bailey	.07½	.07¾
Beaver Consolidated	.30	30¼
Bix Six		
Buffalo	2.00	2.20
Chambers-Ferland	.18½	.18½
City of Cobalt	.21	.23
Cobalt Central	.07½	.09
Cobalt Lake	.14¾	.15
Coniagas	4.40 bid	
Crown Reserve	2.81	2.84
Foster	.09	.12
Gifford	.057½	.06¾
Great Northern	.07¾	.08¼
Green-Meehan	.02½	.02¾
Hargraves	.30	.32
Hudson Bay	.93	.98
John Black	.02	.06
Kerr Lake	6.45	6.62½
La Rose	4.77	4.80
Little Nipissing	.21½	.21¾

McKinley	1.11	1.12
Nancy Helen	.02	.05
Nipissing	10.90	11.06¼
Nova Scotia	.24	.25½
Ophir	.26	.34
Otisse	.01¾	.02½
Peterson Lake	.21	.21¼
Right of Way	.30	.30¾
Rochester	.117½	.127½
Silver Leaf	.06	.07
Silver Bar	.02½	.06
Silver Queen	.06	.08
Temiskaming	.86¼	.86¾
Trethewey	1.24	1.24½
Watts	..½	.04
Wettlaufer	.91½	.92½

### SILVER PRICES.

	New York	London
	cents.	Pence.
Oct. 25	56½	257½
" 26	56¼	25 15/16
" 27	56½	257½
" 28	55¾	251½
" 29	55¾	251½
" 31	56	251½
Nov 1	56	251½
" 2	56	251½
" 3	56½	257½
" 4	55¾	25¾
" 5	55¾	25¾
" 7	56¾	26

### TORONTO MARKETS.

Nov. 9.—(Quotations from Canada Metal Co., Toronto.)

Spelter, 6 cents per lb.  
Lead, 3.65 cents per lb., strong.  
Antimony, 8 to 8½ cents per lb.  
Tin, 38½ cents per lb.  
Copper, casting, 13.50 cents per lb.  
Electrolytic, 13.50 cents per lb.  
Ingot brass, 8½ to 12½ cents per lb.

Nov. 9.—Pig Iron.—(Quotations from Drummond, McCall Co., Toronto.)

Summerlee No. 1, \$23.00 (f.o.b. Toronto).  
Summerlee No. 2, \$22.50 (f.o.b. Toronto).  
Midland No. 1, \$20.50 (f.o.b. Toronto).  
Hamilton No. 1, \$20.00 (f.o.b. Hamilton).  
Hamilton No. 2, \$19.50 (f.o.b. Hamilton).  
Clarence, \$20.00 (f.o.b. Toronto).  
Cleveland, \$20.00 (f.o.b. Toronto).  
Coal, anthracite, \$5.50 to \$6.75.  
Coal, bituminous, \$3.50 to \$4.50 for 1¼ inch lump.

### Coke.

Nov. 7.—Connellsville Coke (f.o.b. ovens).  
Furnace coke, prompt, \$1.50 to \$1.60 per ton.  
Foundry coke, prompt, \$2.00 to \$2.15 per ton.

Nov. 7.—Tin (Straits), 36.42½ cents.  
Copper, Prime Lake, 13.00 to 13.10 cents.  
Electrolytic copper, 12.87½ to 13.00 cents.  
Copper wire, 14.25 cents.  
Lead, 4.45 cents.  
Spelter, 5.95 cents.  
Sheet Zinc, (f.o.b. smelter), 7.75 cents.  
Antimony, Cookson's, 8.12½ cents.  
Aluminium, 22.50 to 23.00 cents.  
Nickel, 40.00 to 45.00 cents.  
Platinum, ordinary, \$38.50 per ounces.  
Platinum, hard, \$41.50 per ounce.  
Bismuth, \$1.95 per lb.  
Quicksilver, \$46.00 per 75 lb. flask.