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Canadian Mining Journal, Vol. 31.

JANUARY 1st, 1910 TO DECEMBER 31st, 1910

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THE CANADIAN MINING JOURNAL

VOL. XXXI. TORONTO, January 1, 1910 No. 1

The Canadian Mining Journal

With which is incorporated the

"CANADIAN MINING REVIEW"

Devoted to Mining, Metallurgy and Allied Industries in Canada

Published fortnightly by the

MINES PUBLISHING CO., LIMITED

Head Office - - Confederation Life Building, Toronto.
Branch Offices Montreal, Halifax, Victoria, and London, Eng.

Editor:
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SUBSCRIPTIONS—Payable in advance, $2.00 a year of 24 numbers, including postage in Canada. In all other countries, including postage, $3.00 a year.

Advertising copy should reach the Toronto Office by the 8th, for the issues of the 15th of each month, and by the 23rd for the issues of the first of the following month. If proof is required, the copy should be sent so that the accepted proof will reach the Toronto Office by the above dates.

CIRCULATION.

During the year ending with March 1st, 1908, 91,750 copies of "The Canadian Mining Journal" were printed and distributed, an average of 3,822 per issue.

"Entered as second-class matter April 23rd, 1908, at the post-office at Buffalo, N.Y., under the Act of Congress of March 3, 1879."

CONTENTS.

THE YEAR 1909.

A Review.

When, one year ago, we reviewed the growth of Canadian mining during the previous twelve months, we expressed the belief that the year 1909 was to be a period of strong expansion. Events have proved this belief to have been well founded. The past year has brought health and strength to almost every department of mining in the Dominion. Indeed, the commercial and financial conditions have been excellent; and rich accessions, in the way of new mining territory, have been added to our stores of mineral wealth. As a nation, Canada looks forward to the coming year not only without misgivings but with sturdy confidence. Never before were the prospects so good for the industry that we represent; and, most certainly, never before have the people of Canada been so widely interested in that industry. For the past year we have much for which to be thankful; that the dawning year will bring us more is, humanly speaking, certain.

We shall survey now the salient points in the history of each mining Province during 1909.

Nova Scotia.—Beginning with Nova Scotia, the events that centred round Glace Bay first command attention. Whilst early in the year all things pointed to a heavy shipping year for the Dominion Coal Company, even then a cloud, the size of a man's hand, had gathered in the horizon. The intention of the United Mine Workers of America to paralyze the company's business by precipitating a strike at the opening of navigation was rumoured. The strike became an accomplished fact in July. The U.M.W.A. prepared its campaign in a manner peculiar to itself. Throughout the United States, for instance, it worked upon the sympathies of its adherents by disseminating grotesque fictions as to the conditions of labour at Glace Bay. To its followers in the employ of the Dominion Coal Company, it held out promises equally grotesque. But the U.M.W.A. made a sad mistake in underestimating the strength of the local Provincial Workmen's Association, a body that the foreign organization had resolved to disrupt. After a few months of costly and absolutely needless "strike," the U.M.W.A found itself in a humiliating position. By its own action it had given assured and lucrative employment to the members of its rival, the P.W.A.; and, after depriving two or three thousand of its own followers of work, it was quite unable to assume the responsibility of supporting them. The outcome was inevitable. After a period of light shipments, the Dominion Coal Company gradually resumed its normal outputs. This was made possible by the fact that throughout the strike the leaders and men

of the P.W.A stuck fearlessly to their colours and refused to be dominated by imported demagogues.

Throughout the year the U.M.W.A. succeeded in shutting down several coal mines, including the collieries of the Cumberland Railway and Coal Company. In no sense, however, was the agitation finally successful. The net effect was a loss to the Province, to the companies, and, especially to the miners, of several millions of dollars. While the experience has been expensive, we have no hesitation in stating that the the U.M.W.A. has lost its hold upon Nova Scotia. And for this blessing hardly any price is too high.

That long-desired consummation, the amalgamation of the Dominion Iron and Steel and Dominion Coal is now assured. The legal victory of Steel over Coal led, by perceptible degrees, to this momentous step. This victory, the consequent improvement in Dominion Steel finances, the re-organization of its huge plant, together with a successful year, helped to balance matters. From geographical and industrial reasons the two concerns were always intended for each other. May the union prove fruitful.

Gold mining in Nova Scotia has not yet been galvanized into life. The whole Province outputs scarcely as much as comes from a few Rhodesian prospects; and this despite ideal working conditions, favourable legislation, and extensive unprospected territory. On this subject we shall touch in a later editorial. We shall, however, record here our conviction that the gold mines of Nova Scotia, maugre all reports to the contrary, will repay proper investigation.

At this date official returns as to iron ore, gypsum, limestone, etc., are not available. But indications point to a sustained output in all minerals save coal. The falling off in this commodity is due entirely to the action of the U.M.W.A.

Nova Scotia's present needs, from the point of view of mining, are, firstly, the services of a competent, commercially-trained mining geologist; secondly, discriminate publicity; and, thirdly, a complete diagnosis of the present condition of its mining industry generally by a commission of unimpeachable specialists.

New Brunswick.—Except for gypsum and limestone quarries, and a light production of coal, New Brunswick has hardly qualified as a mining province. The iron deposits of the Canada Iron Corporation, Ltd., are to be a large asset. Antimony mining, recommenced this year on a small scale, has been suspended temporarily. Near Moncton, gas and oil prospects, under the management of English interests, are showing up encouragingly.

Indifference to her mineral wealth is the prime cause of New Brunswick's backwardness. A well-organized Bureau of Mines is badly needed.

Quebec.—Quebec has been the scene of many changes. The organization and flotation of Amalgamated Asbestos, which embraces under one administration the bulk of the chief asbestos-producing mines, have been sufficiently commented upon. The excessive capitalization of this consolidation will require to be offset by close technical management and by comprehensive marketing facilities. Black Lake Consolidated, a consolidation of several asbestos mines that are not at present producing, has been favourably reported upon as to ore in reserve and ore indicated.

The erection at Lachine of a large plant for the manufacture of finished asbestos products, marks a departure. This will assuredly bring about an increased demand.

The mining of mica has been quiet. For chrome ore the market has been sporadic.

The attempt to create interest in alluvial gold in Eastern Quebec appears to have been but a flash in the pan. Of silver in the Ville Marie district it is hard to obtain definite news.

The Province of Quebec, since the resignation of Mr. J. Obalski, has been without a technical officer in the local Department of Mines. Good men are scarce, but they are obtainable. The man to fill Quebec's requirements must have special knowledge of the land and of the people. Also, unless his energies are to be unprofitably dissipated, he must have a corps of assistants. The late changes and amendments in the Quebec mining laws give the prospector and investor a much better chance. But the public require more authentic information as to the whole Province. A strong Department of Mines is, therefore, a pre-requisite.

Ontario.—The mining industry of Ontario is waxing fat. Cobalt has contributed about twelve million dollars worth of silver during the year, and has abated not a jot or tittle of her vigour. South Lorrain is coming to the front. Gowganda, wounded almost mortally by over-capitalization, still shows signs of life. The Elk Lake region is holding its own. To the west and south of Gowganda, many new prospects await development. Cobalt money has been invested in one or two of the old Thunder Bay mines—not unwisely. The cobalt-silver smelters are all doing well. On the whole, the outlook for silver is most hopeful.

Ontario gold-mining, always an uncertain quantity, has received a decided fillip. The reports that come from Porcupine, north-east of Cobalt, are, to say the least, very interesting. Although opinion must be based upon insufficient data, there seems to be reason to regard the Porcupine region as one of exceptional promise. Wide ore-bodies, in which are spectacular superficial showings of gold, have been stripped. Men who have made their money in Cobalt are buying claims at fancy prices and, strange to relate, one English concern is already on the spot. This is as enterprising as it is exceptional.

The mining of iron-ore is progressing slowly. Several large purchases of mines and prospects have been made in Eastern Ontario, and a number of smaller

transactions have been arranged in the western ranges. At least two new blast furnaces will be put in commission during 1910.

Copper and nickel, as usual, form the backbone of Ontario's mineral production—although, to make the figure apposite, silver will have to be compared to some more important part of the Province's anatomy, possibly the heart and lungs.

We cannot here do more than mention a few of the other minerals of the Province. Mispickel, iron pyrites, talc, marble, feldspar, and corundum are the bases of growing industries. The decrease in oil production is counter-balanced by an increase in the supply and use of natural gas. The clay and cement industries are thriving.

As a whole, mining in Ontario is in good shape. Its mining administration, though by no means inerrant, is honest. Its mining laws, complicated to a most exasperating degree, must soon be revised and simplified. But not even the most wretched laws can stem the tide of prosperity that has set in.

Alberta.—The coal-mines of Alberta, from all indications, will have produced considerably more coal during 1909 than during the preceding year. And this despite the strike of the miners employed in the southern part of the Province—a strike that for a time embarrassed copper smelters in south-eastern British Columbia.

The plans of the German Development Company, and of several other large concerns, are maturing. When railway connections shall have been completed, Alberta's coal output will rapidly assume proportions incomparably larger than its present production.

Exploration for natural gas, particularly at Bow Island, has developed large flows. Oil has not been encountered as yet.

British Columbia.—Our westernmost Province, British Columbia, is dealt with preliminarily on another page. The events that stand out with prominence may, however, be noticed here. In the Boundary country, copper smelting has made headway. Although the total tonnage for the year will be lessened by the fuel shortage that affected the British Columbia Copper Company, and by the suspension of work at the mines of the Dominion Copper Company, yet the activities of the Granby and of the Consolidated mining and smelting companies helped to fill the gap. Dominion has now been reorganized and is in operation. Granby has increased its furnace capacity considerably, and Consolidated Mining and Smelting is handling more ore than ever.

Rossland gold-copper mines are in good condition, although shipments have dropped as compared with 1908. Sheep Creek gold-mining is coming to the front. Considerable capital from London and from Montreal has found its way into the camp.

Renewed activity has been observable on the Queen Charlotte Islands and in the Portland Canal district.

Zinc mining will probably take a new lease on life as a result of the Convention held at Nelson on Dec. 15th. Concerted action of this kind is infinitely more effectual than is the advocacy of any number of individuals.

On the coast, coal outputs have increased. To the east, the Crow's Nest Pass Collieries are getting into normal condition. Other collieries have had fair seasons.

British Columbia is yet pre-eminently the mining Province of the Dominion, mainly because of a measure of co-operation amongst mine-managers and because, also, of a lively appreciation on the part of the Local Government of what successful mining means to any country.

Yukon.—Sufficient evidence is already to hand to prove that the gold returns from the Yukon for 1909 will exceed those for 1908 by a considerable quantity. The cheap electric power, generated at a colliery 43 miles north of Dawson, is now available. This will bring into the category of payable propositions much untouched placer ground. The achievement of Yukon Gold, which company succeeded in getting a flow of water in its fifty-mile long ditch, is worthy of record. The approaching dividend on Yukon Gold shares, incidentally, may be an isolated occurrence. Shareholders should enquire carefully into costs and reserves.

Technical Education.—Following the example of Nova Scotia, Quebec has adopted measures to provide useful technical training for the rising generation. New Brunswick lags behind. Ontario's elaborate system needs modification. The western Provinces are evolving institutions of their own. We rejoice to notice that the subject of technical training is engaging the thoughts of several members of the House of Commons.

Conservation of Natural Resources.—Canada's new sense of nationhood has broadened her in several directions. It has opened her eyes to the advisability of following the lead of other nations in conserving her resources. Our Federal Government is wisely looking into problems of forestry and kindred questions; but, so far, no steps have been taken to apply the principles of conservation to mining. This will and must come.

Legislation.—Two Provinces, Nova Scotia and Quebec, have effected notable changes in their mining laws. In both cases the changes have been improvements.

A Select Standing Committee of the House of Commons deliberated during last session on subjects pertaining to mining laws. Little was accomplished. More is hoped for this year, especially in the direction of codifying a Dominion mining law and placing the administration of that law in competent hands. The present situation is intolerable.

Departmental.—The two branches of the Federal

Department of Mines, the Geological Survey and the Mines Bureau, have grown in grace in the past twelve-months. The Survey, being the parent stem, is, of course, superior in organization, larger in scope, and incomparably more important than the newer limb. But to each credit is due. Publications have been improved. Work has been systematized, and much will be expected of both branches during the coming year.

THE ZINC PROBLEM.

The mining convention, held in Nelson, B.C., on December 15th, should be fruitful of good. On another page is given extended notice of the proceedings. A few general points require discussion.

The convention was called for the purpose of defining the present condition of zinc ore mining in the Kootenays, and to formulate a memorial to the Dominion Government setting forth the needs of the industry..

The present annual production of zinc ore in British Columbia is small and uncertain. The electric smelting plant at Nelson has failed to produce the metal on a commercial scale. Hence the market must be found in the United States.

But the annual consumption of zinc and zinc products in Canada represents an outlay of nearly eight hundred thousand dollars. Much of this material is imported from the United States. Practically none of it is manufactured in Canada.

The metallurgical treatment of the lead-zinc and other zinc-bearing ores of southeastern British Columbia is the crux of the question. Could this be solved, British Columbia could readily supply the whole of Canada and, probably, compete in foreign markets.

Recognizing this, the convention memorialized the Dominion Government, requesting that the Federal Mines Branch be authorized to undertake the investigation of the electro-thermic reduction of zinc ores.

For several reasons it was thought that to ask assistance in the shape of a bounty would be impolitic. In the first place, the zinc-smelting industry is not yet established; secondly, a clause in the Payne tariff provides for the imposition of additional duties against goods produced in other countries under a system of bounties.

While it was suggested during the meeting that the plant of the Canada Zinc Company, at Nelson, might be put at the disposal of the Mines Branch for experi mental work, it was clearly understood that the Canada Zinc Company, as a company, had had nothing to do with bringing about the convention.

A strong committee of five has the whole matter in hand. Funds have been raised to defray expenses; and there is every appearance of earnestness about the movement.

We endorse most heartily the request embodied in the memorial. The Dominion Government can, and, no doubt, will, come to the aid of the Kootenay operators. The Mines Branch has never been called upon by more responsible men. Its services are needed. It has a splendid opportunity of proving its usefulness.

"INSPECTION OF MINES."

Our attention has been drawn to the fact that a sentence in one of our editorials, November 1st, is open to misconstruction. The sentence occurs in an editorial headed "Inspection of Mines." It reads thus: "So long as inspection is left entirely to provincial officials it will be neither adequate nor effective."

Isolated from its context, this sentence might be interpreted as a harsh criticism of our various provincial inspectorates. This we did not intend. The editorial in question referred specifically to inspection of coal mines, and to the need that exists of the co-operation of the Dominion Department of Mines.

As regards the inspection of our metalliferous mines, and we now refer particularly to Ontario, the only criticism that we can make is that there is not enough of it. What there is of it is surprisingly effective. But the Ontario Government is slow in appreciating the situation. Its one inspector has given intelligent, devoted and constant service for four years. The results of his labours are shown in largely decreased death-rates amongst mine employees. With a small staff of deputies, the Ontario Inspector of Mines would be at liberty to attend more closely to the higher phases of his duties.

This, we hope, will appeal to the common sense of Ontario's not unintelligent administration.

A HAPPY NEW YEAR.

To our readers we extend the season's greetings. We hope that during the year 1910 each will arrive closer to the desire and purpose of his days. Further, we hope that every day of the New Year will bring some new delight.

Dr. Ludwig Mond, one of the most notable figures in modern industrial chemistry, died in London, England, on December 10th. Canadians will remember Dr. Mond more particularly for the process of copper-nickel reduction and separation of which he was the inventor.

REVIEW OF MINING IN THE PROVINCE OF BRITISH COLUMBIA IN 1908.

By George A. Ohren.

The calendar year 1909, in all its varied aspects, now lies behind us. The interesting sequence of events that have transpired in the growing mining industry of British Columbia at this moment but remain a mere matter of history; these events having their influence upon the future, of course, but, nevertheless, being relegated to the dead past. Part of the general scheme of advancement, looked forward to as the year was ushered in, has become a realized fact; many expectations that were sanguine during the early months have been hopelessly shattered. Horizons that then appeared nebulous and cloudy have since cleared and brightened, and despite the several little retrogressions in some quarters the year was fraught with the elements of progress and it can be truthfully said that another step forward has been taken.

In the Boundary, the premier mining district of the Province, substantial advancement was looked for during 1909. While some of the marks of progress, outlined at that time, have been duly passed, others are still lying before us in the impending future. The disabling of the electric power system that supplies the mines, by the cold weather of early January, caused somewhat of a set-back. The strike of coal miners in Southern Alberta was the occasion of a grave depression in the tonnage shipped from the mines of the B. C. Copper Co. for nearly four months. Activity in the affairs of the Dominion Copper Co. was mostly confined to reorganization and untangling legal knots, and little or no work was done on the mines until near the last of the year, when diamond drill exploration was started on the Rawhide, the leading mine controlled by that company.

The Granby Consolidated M. S. & P. Co., taking advantage of the low price of copper, augmented, in turn, each of its eight big furnaces at the Grand Forks smelter. The last furnace was completed and blown in during the early part of December. The furnaces were lengthened from 18 to 22 feet and made four feet wider. This increased the capacity of the smelter from 3,500 to 4,500 tons per day. The lately completed convertor plant has a capacity of 40,000,000 lbs. copper per annum. The total receipts of the Granby smelter in 1908 amounted to 1,049,670 tons, and the receipts for the year 1909 will just about equal or slightly surpass these figures. A 2% dividend was paid in December. The management of this company has not tried to make an extraordinary year's production, but has worked along on a sane basis and taken steps to improve conditions for times when metal prices will be stronger.

Although the mines of the British Columbia Copper Co. were closed down for several months on account of fuel shortage, the ore shipments from its mines to the company's Greenwood smelter will total approximately the figure of 1908, or about 360,000 tons. A change in the mine management took place October 1st, when P. S. Couldrey, erstwhile manager, Le Roi 2, Ltd., Rossland, took charge. The ore shipments were noticeably heavier shortly after this change. On the Oro Denoro mine operated by this company, extensive development work was done and much ore located.

The Consolidated Mining & Smelting Co. of Canada, Ltd., operating the Snowshoe-Phoenix Amalgamated, will ship over 100,000 tons more from the Snowshoe in 1909 than during the previous year. A tramway has been built on the Amalgamated and the railway spur will soon be completed, so that the output for this group in 1910 will be record-breaking.

The Greenwood-Phoenix tunnel was driven a couple of hundred feet; the Argo tunnel, at Greenwood, is in nearly 300 feet, and one 20-inch galena vein cut. The Sally shipped 130 tons of $125 ore. The Golden Eagle sent 330 tons to Grand Forks smelter. The Bruce mine shipped 210 tons, and the Crescent 20 tons of select ore: Little Bertha, 30 tons.

It will be seen that had the Dominion mines shipped an average tonnage and the B. C. Copper Co. not been compelled to shut down, that the total output of the Boundary would have greatly exceeded that of 1908, but, as it is, the matter has been deferred, and with the new equipment of the Granby smelter it will be possible in 1910 to exceed all past records, which will easily be the case if things in general are only normally favourable.

While the Great Northern Railway Company pushed its branch as far as Princeton in the Similkameen during the past year, this move did not lead to the shipping of ore that will likely take place in 1910. The Nickle Plate mine was lately bought by a New York development syndicate, new machinery added to the old plant, and extensive production for next year is planned. The Vermilion Forks M. & D. Co. has opened up its coal mines and will produce on a moderate scale from the present. The Kingston, Golden Zone, Number Four, and Bear Creek mines were under development all year.

In the Rossland gold-copper district, the Consolidated smelter and refinery at Trail will show an increase of nearly $1,000,000, or approximately $6,000,000 in production of gold, silver, copper and lead, over 1908. An addition to the refining plant was made during the year and a new copper furnace put to work. At the Centre Star-War Eagle group of the Consolidated M. & S. Co. of Canada, Rossland, the ore production for 1909 will approximate 175,000 tons, 10,000 or 15,000 tons below 1908. The company acquired the City of Spokane, Mugwump, and other mines contiguous to the Centre Star during the year and has a large reserve of ore. The production of the Le Roi 2, Ltd., will also fall a few thousands below 1908, but this is not surprising as the main shaft was retimbered and sunk from the 950 to the 1,350 level. This concern paid six shillings ($1.44) per share in three equal dividends during the year, and it is expected will pay another two-shilling dividend from the net profits of 1909. As the Le Roi mine was not shipping from the middle of March until the last week in October, the output of that mine this year will only total about 10,000 tons. The property was inactive for nearly five months while

a plan of development and financial policy was being outlined in London. Two diamond drills are at work as the year closes, probing the ground from the 1,650-level downward—possibly the work will be extended to the 2,650-level. A crew of about 80 men is at work, and mining and shipping on a small scale going on. Several of the smaller mines were worked under lease during the early months but with indifferent success. It is to be hoped that 1910 holds better things for this camp than 1909 did, but the outlook is none too bright just now, taking the camp as a whole. Rossland shipments will fall nearly 100,000 tons below 1908 for the past year, or approximately 200,000 tons, that would probably average close to $11 per ton.

The Sheep Creek gold district, near Nelson, is principally responsible for an increase in Slocan-Kootenay shipments of about 50,000 tons of rather high-grade. The quantity of ore mined and sent to concentrator and smelter during 1909 will figure, roughly, 350,000 tons, whereas for 1908 the total was about 295,000 tons. The big Blue Bell lead-zinc property doubled its output, milling 46,000 tons. The big St. Eugene silver-lead property of the Consolidated held its own, but has lowered its ore reserve by nearly one-third. The Silver King, at Nelson, was operated from April until shut down by fire in August, resuming shipments in November. In the Slocan the Richmond-Eureka and the Van-Roi took a more stable position on the shipping list. It was in the Sheep Creek-Ymir district, however, that substantial tonnages were taken from the Queen, Nugget, Kootenay Bell, and Yankee Girl. The Second Relief also doubled its previous yearly output. Steps are being taken to place the growing zinc mining industry of this district on a more substantial basis. Government aid will be invoked toward experimental work, a bounty on zinc mined will be sought and a higher tariff advocated on manufactures of zinc now coming into this country. The bounty now existing on lead mined here has been a great stimulus to the industry, and it is thought the fostering of the zinc industry would tend to open large mines now idle and help the smaller mines. It would probably solve the great object in the zinc question here, and that is a commercial zinc smelter in this district.

In East Kootenay the Sullivan group was taken over by a new company, the Fort Steele M. & S. Co., during the year, and while there were many rumours of the resumption of work active operations were not begun. It is likely, though, that work on this big lead-zinc mine will be started early in 1910.

It was in the coal fields of this district that good progress was made during 1909, although the tonnage shipped may not surpass that of 1908 by very much. The Crows Nest Pass Coal Co. operated almost without interruption during the year, erected a new 3,000-ton tipple at Michel and installed two high pressure (1200) and one low pressure compressors. Also began the installation of another 1,000 coke ovens. The Hesmer Mines (C.P.R.), capacity 3,000 tons per day, also made a substantial output. The Corbin Coal & Coke Co., Corbin, installed a high pressure compressor, boilers, air locomotives, etc., and maintained a small output, which will be materially increased in 1910. The McGillivray Creek Coal Co., near Coleman, opened up its property and spent over $200,000 on tipple, buildings, and plant, and will show a good output for next year. The output of the International Coal & Coke Co., Coleman, will be somewhat reduced on account of the three months' strike of its miners. As it is, the figures will be about 390,000 tons of coal and 53,000 tons of coke. Two 7 in. x 14 in. compound air locomotives were added to the up-to-date plant of this company during the year.

The Canadian-American C. & C. Co., Frank, shipped approximately 100,000 tons of coal and will begin the production of coke in 1910. The West Canadian Collieries was also affected by the strike and the output reduced over twenty per cent. A new compressor plant was installed at the Bellevue mine of this concern. The Alberta Ry. & Irrigation Co., Lethbridge, shipped nearly 3,000 tons per day, excepting through the strike; opened up No. 5 mine and equipped it with steel tipple, 3,384 cu. ft. compressor, etc. At the Royal mine a 14 in. x 22 in. compressor and 14½ in. x 20 in. hoist were installed, and an output of about 300 tons per day maintained. The Nicola Valley C. & C. Co., Merritt, kept up a good output and installed a new air compressor plant, to be used for operating coal cutters, engines, etc.

So it will be seen despite the strike the coal output this year will be a good one and several new substantial mines have been opened up and equipped with modern machinery, ready for a heavy production in 1910.

In the Kamloops copper camp, a little work was done on three of the leading properties; and the B.C. Copper Co. bonded 33 claims on which it is expected development will be begun in 1910.

On the Coast the mines have not prospered as they should have and mismanagement is blamed for a lot of trouble. The Tyee Copper Co. is reported in considerable debt. The Vancouver Island coal properties have made a big production and the South Wellington mines have entered the market.

In the Portland Canal district the Red Cliff has ordered an air compressor, boilers, and mining plant, and will be a shipper in 1910. The Stewart and Portland Canal M. Co. properties are showing up well and will install plants in the Spring. The Consolidated M. & S. Co. of Canada has secured the Ikeda copper property, Queen Charlotte Island; the Granby Consolidated M. S. & P. Co. is interested in the contact group, in the same district and it is rumoured that the Le Roi and Le Roi 2, Ltd., are negotiating for copper claims of a promising character in the island mining districts, and will likely operate on the Coast during the coming summer.

The second section of the G. T. P. Ry, is being built up the Skeena River toward Hazelton, within a radius of 100 miles of which place are to be found the promising Telkwa (copper-coal), Babine (silver-lead), and 9-mile mountain (silver-lead), mining districts. Extensive development was carried out in these districts during the past year. The country is rich in mineral wealth. The third section of the G. T. P. Ry. is building from Yellowhead pass, westward. The Provincial government is behind a move to aid the Canadian Northern railway in building from Vancouver to Yellowhead pass. The G. T. P. Ry. is planning a branch from near Yellowhead pass to Vancouver. These railways will open up a country rich beyond comprehension in mineral wealth, including the famous Cariboo gold district. The extension of the C. P. Ry. from Midway to Nicola and of the C. N. Ry. from Princeton to Vancouver, will give the boundary two outlets to the Coast within the next year or so.

The total mineral production in British Columbia during 1908 was $23,851,277 and there is little doubt but that these figures will be exceeded in 1909. The total recorded production from 1852 to 1908 was $323,377,559, in annual figures that have increased year by year, although there was a reduction in 1908. B. C. coal deposits

are among the most extensive in the world and work has hardly been begun on them; there are big iron deposits awaiting development. The province still contains practically 300,000 miles of unprospected territory.

There is now a movement to better the zinc mining industry here, one thing asked being higher duty on zinc manufactures entering Canada, tending to encourage Canadian manufacture of zinc. The revision is upward and the consumer will have to pay for it. It seems to rest upon the United States, being the larger manufacturing country, to start reciprocity between the two countries. Of course, this is a question that can be argued from many a different point of view, but from that of a miner, in the final analysis, the boundary line, the tariff wall, red tape, etc., are a costly and inconvenient necessity (?) and it would seem more desirable to work toward reciprocity than away from it.

As far as the coal fields are concerned, reciprocity with the United States would no doubt be beneficial if they had more complete railway connection with that country, independent of existing roads; but until such time as this is the case, the main competition is with coal shipped in via the Great Lakes.

To sum up, it will be seen that the ore shipments from the boundary and Sheep Creek districts have increased, while the Rossland shipments have dropped; the net increase running over 100,000 tons. The coal fields will just about equal, or slightly surpass, the shipments of 1908, but have made unprecedented progress in the way of development and preparation for future work. Railway development has been all that could be asked for. The Portland Canal, Queen Charlotte Islands and Rabine-Telkwa districts have received the attention that is due them from the mining interests and much development work done. Taking everything into consideration, the production has been conservative and the work progressive and along the lines of good mining practice. The industry will show a far better balance sheet than was that for 1908 and another stone has been built into the foundation that is to support the better things to come in 1910 and in other years that are yet enveloped in the womb of time.

A PRIMER ON EXPLOSIVES.

The United States Geological Survey is about to issue a "Primer on Explosives" as an aid to the coal miner in particular and also to all who handle explosives. J. A. Holmes, expert in charge of the mine accidents investigations of the Survey, gives the purpose of the primer in the following words: "Of the common causes of the larger mine accidents, such as the falls of roof and coal, gas and dust explosions, mine fires, and the misuse of explosives, all of which are often closely related, each must be studied and fought in a manner peculiar to itself. The last mentioned—the misuse of black powder and other explosives—is sometimes considered the least important of these causes of mine accidents; but its importance is much greater than the statistics indicate, for the reason that this misuse of explosives may itself be the cause of many of the mine fires, gas or dust explosions, or falls of roof, and thus be responsible for a death roll often credited to other causes.

"The use of explosives is increasing both in quantity and in the variety of purposes to which they are applied. They are now made at no less than 150 plants in different parts of the United States, and the annual product approaches 500,000,000 pounds. Of all this material there is no such thing as a safe or safety explosive when in the hands of a careless or ignorant person. This statement is true whether considered in connection with the transportation or use of these explosives in mining. In addition to the large losses of life and property resulting from an improper use of explosives in mining, the recent statistics of the Railway Bureau for the Safe Transportation of Explosives have shown more than 400 persons killed or injured and over $2,000,000 worth of property destroyed from accidents from this source. The fact that through co-operative effort under the wise supervision of this bureau during the three years of its existence these losses have been reduced to almost nothing should encourage the hope that similar co-operative effort may likewise greatly reduce losses of life and property from the use of explosives in mining.

"This little book on explosives is published in the hope that it may aid in accomplishing this purpose. The aim has been to tell what explosives are and how they should be handled with a view toward greater safety, and to do this in language free from unnecessary technicalities. It has been prepared by Charles E. Munroe, explosives expert, and Clarence Hall, explosives engineer, of the Technologic branch of the United States Geological Survey. It has been revised in the light of suggestions made by the mining engineers associated with the Survey, by several mine managers, by the experts associated with the manufacture of explosives, and by Col. B. W. Dunn, Chief of the Bureau for the Safe Transportation of Explosives.

"Much of the information for this primer has been obtained from experiments conducted at the Mine Accidents station of the United States Geological Survey at Pittsburg, authorized by Congress, May, 1908, for investigations as to the 'causes of mine explosions.' These investigations have shown the recent development of a new type of quick flame explosives designated as 'Permissible Explosives,' which can be used with greater safety than black powder in mines where gas or inflammable dust exists under conditions indicative of danger, for the reason that the flame from the explosion of black powder lasts from 1,000 to 4,000 times as long as the flame from those newer explosives and is therefore more likely to ignite the gas or dust in these mines.

"Lists of permissible explosives were issued by the Geological Survey on May 15, and October 1st, of the present year, the latter list containing the names of thirty-one explosives, and with these lists is to be found a statement of the conditions under which these explosives have been selected from a larger number presented for examination. There are also in course of publication, and soon to be issued, bulletins dealing with other phases of the subject, such as methods and results of using permissible explosives in coal mining operations, the results of Tests of Explosives, and concerning the dust problem in coal mining.

"The large death roll of American mines is an oft recurring appeal to the miner and the management that they co-operate in every possible effort for greater safety. It may never be possible under conditions such as exist to-day to prevent mine accidents. Little may be accomplished in that direction by either the operators or miners working alone, but experience in all countries shows that through the hearty, determined co-operation of the two, these accidents may be greatly reduced."

THE EXTENSION EXPLOSION

Written for the Canadian Mining Journal by E. Jacobs.

An explosion which resulted in the loss of 32 lives took place on the morning of October 5th in No. 2 mine of the Wellington Colliery Company's Extension colliery, situated about ten miles from the town of Ladysmith, Vancouver Island, British Columbia. An exhaustive enquiry, extending over eight days was held, with the object of ascertaining the cause of the disaster. The Provincial Government secured the services of Mr. James Ashworth, a well-known English coal mining engineer, to give expert testimony, and was represented as well by Mr. Wm. Fleet Robertson, Provincial Mineralogist; Mr. F. H. Shepherd, Chief Inspector of Mines; Mr. Archibald Dick, Inspector of Mines for the Coast District, and by counsel. The Wellington Colliery Company also had counsel in attendance, while Messrs. J. H. Hawthornthwaite and Parker Williams took part in the enquiry on behalf of the miners.

During the enquiry a mass of evidence was taken. A brief summary of that given by Mr. Andrew Bryden, colliery manager at Extension; Mr. Alexander Shaw, overman at the mine in which the explosion occurred; Mr. F. F. Shepherd, Mr. W. F. Robertson and Mr. Jas. Ashworth follows, also the finding of the coroner's jury:—

Mr. Shaw deposed that at the time the explosion took place he was in the mine, on the slope, accompanied by a fireman. This was about 8.45 o'clock on the morning of October 5th. He felt at first as if the air had been taken completely from him. As no gas had been reported in No. 2 mine that morning, he could not understand what had occurred. He and the fireman at once went into some of the mine workings to investigate but were soon met by afterdamp. After going back they entered the counter level, and eventually found some of the miners, whom they directed out to the slope. He worked in the mine until 3 p.m.; meanwhile it had been fairly well determined where the trouble had occurred. After half an hour's respite he returned to the mine, but could not stand further effort in the mine, so left it, Mr. Andrew Bryden remaining in charge of operations. Mr. Shaw was submitted to a long cross-examination.

Mr. Andrew Bryden was also closely cross-questioned. In the course of his evidence he told of his investigations in company with Inspectors Shepherd and Dick, and Mr. Thos Graham, general superintendent of the Western Fuel Company, Nanaimo. In all there were probably 50 or 60 men working in the part of the mine where the explosion took place. Of these 32 were killed, 17 bodies having been recovered on Wednesday and the remainder early Thursday morning. He stated that a "cave" had occurred in the mine, and gave as his opinion of how the explosion had occurred as follows: "When the cave occurred there was a certain amount of gas, about half an inch or so, and the breaking of the coal during the caving process, created probably, a certain amount of dust. It may or may not have come in contact with a naked light, because, wherever a force may have struck a blind end, heat was generally there to a considerable extent. My reason for believing that the cave was the cause was because evidence of force extended from both ends of the cave and at two widely separated points. These blind ends are the only places where any scorchings are shown on the timbers."

Chief Inspector Shepherd gave very full evidence, first as to the preliminary investigations he and others made, and afterwards of the examination of the working places in the part of the mine where the cave and explosion occurred. Much detailed information of this examination was included in this testimony. The ventilation was dealt with and deductions were stated, these supported by indications of the direction of force and indications of flame. After stating that the mine was universally damp, as shown by hygroscopic observations mentioned in evidence, the probable condition of the atmosphere was thus indicated: "The evidence would tend to show that on the morning of the explosion the percentage of gas in the atmosphere of the mine was something below two per cent., but there was no evidence to show how much below. It might be conceded that marsh gas was present in the atmosphere of the mine that morning, but there was no body of standing gas or explosive gas reported that morning, nor more recently than August 14th." After quoting at length from an article on "Pressure as Affecting Explosive Conditions," and giving information on "Flame in Compressed Air Pipe," and other relevant matter, Mr. Shepherd continued: "I am of the opinion that such conditions obtained in the present case. A large cave had occurred, as shown, in No. 2½ level, extending along the level for more than 500 feet. This cave contains about 1,000 tons of fallen material, principally coal, which fell about seven feet. This represents a dynamic force of 7,000 tons, or a sudden displacement of 27.000 cubic feet of air, transmitting its velocity through the narrow drivages of the mine, which, upon meeting resistance at the dead ends, or sul de sacs of the mine, created a compression of the mine atmosphere, which converted the partly charged atmosphere, which under other circumstances, would not be considered dangerous, into an explosive condition. * * * The character of the explosion was of low intensity, which fact was, in my opinion, due to the absence of contributing factors, such as coal dust, to the damp condition of the mine, and the large area into which the explosion could take place." Mr. Shepherd was submitted to a long cross-examination by Mr. Hawthornthwaite.

Mr. W. F. Robertson, Provincial Mineralogist, corroborated the evidence of Mr. Shepherd regarding the condition of the working faces and, generally other conditions stated by the Chief Inspector of Mines. In his opinion the cause of the explosion was directly connected with the cave in No. 2½ level. The cave, he thought, occurred before the explosion, as there are none of the timbers left that show any evidence of heat in any shape. All the indications point to the explosion following. Dust blown on the top of the cave would indicate that the cave was down before the explosion occurred. The caved area is in the neighbourhood of 515 to 520 feet. There is no doubt in his mind that, by evidence given, previous to October 5th there had been no sagging or weighing on the timbers. He

Fig. 1.

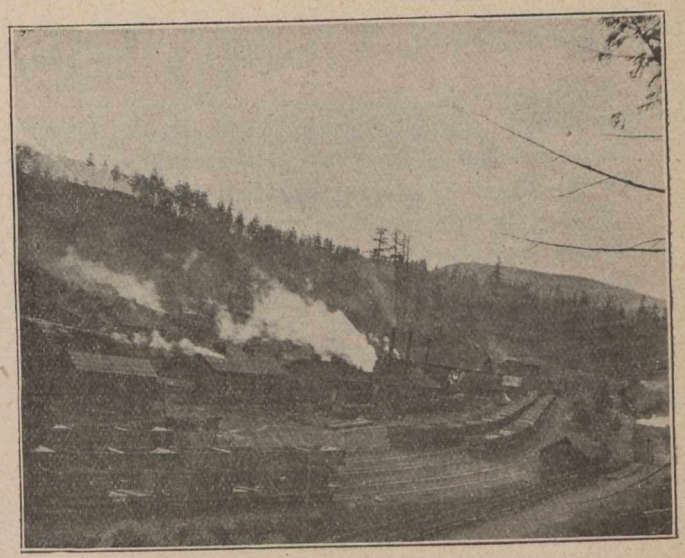


Fig. 2.

SCENES AT EXTENSION COLLIERY

went on top of the cave and examined it very carefully and found a geological condition which, to a considerable extent, accounted for the suddenness of the caving. In this particular part of the roof there is a roll. In this cave it does not come up regularly; it commences to steepen at this point, and gradually increases in pitch until it takes a sudden roll, and seems to extend the whole length of the cave. It seems to have been a coincidence that the roll follows the level right along. Much other testimony was also given by Mr. Robertson.

Mr. James Ashworth, mining engineer, said that he was one sent by the Department of Mines to give expert testimony with regard to this explosion. He corroborated Mr. Shepherd's evidence in regard to the conditions of the faces of each stall and the positions of the different bodies found. He had seen, though, in one place, a hole and evidence of a badly blown out shot. After going into some detail as to conditions, he stated that the force which came along with the cave was followed by the fall of the roof, which brought down gas, and a man having a naked light the gas was ignited at a point he indicated. He was of the opinion that the cave occurred before the explosion. Dust was deposited on the top of the cave after the explosion.

At the request of Chief Inspector Shepherd, the coroner appointed two competent miners to investigate the place where Mr. Ashworth considered there was evidence of a blown put shot, but their testimony did not agree with that of the expert engineer.

After a lengthy consideration of the evidence, the coroners jury returned the following verdict:

"We, the jury empanelled to enquire into the cause of the explosion which took place in No. 2 Extension mine on October 5th, 1909, have come to the conclusion, after investigating the evidence of the different sworn witnesses, that the explosion was caused by the cave in No. 2½ level. Gas being present in its atmosphere, gas and dust being liberated by the cave, the sudden displacement of the air creating the compression, causing the partly charged atmosphere to become dangerous, and coming in contact with naked lights, exploded.

"Taking into consideration the unnatural and faulty conditions of the roof of this particular cave, and in view of the fact of no evidence to show bad timbering, we can in no way hold the company responsible, and therefore exonerate the company from criminal negligence.

Recommendations.

"(1) Taking into consideration the volume of work entailed in this particular department, and after taking from the statements of the Chief Inspector of Mines, and evidence in general, we are of opinion that the Coast District, being so large, it is impossible to make as thorough or systematic inspection as is absolutely necessary. We therefore recommend that the staff be increased.

"(2) That Rule 9a, Sec. 1, Coal Mines Regulation Act, be strictly enforced.

"(3) That every collier in British Columbia be compelled to equip its mines with up-to-date oxygen life-saving apparatus.

"(4) That where safety lamps are necessary, only re-lighting lamps of the Wolff principle be used.

"(5) That the maps of the mines be extended and kept up-to-date, and that index hand boards be placed in conspicuous places in different parts of the mines, showing the nearest way to the face, and that the management see that the men are instructed regarding them.

"(6) That greater precautionary measures be taken by the Inspector of Mines when gas of approximately 2 per cent. exists.

"(7) That coroner's juries, in cases where enquiries extend over one day, should be reasonably compensated. This enquiry having lasted eight days, we respectfully petition the Minister of Mines to consider our case, and compensate us accordingly."

"William G. Fraser, Foreman."

WOLFRAM MINING AND SMELTING CO., LTD.

Figures adduced at a shareholders' meeting of the above company are instructive. During July and August the company's mines produced 40 tons of tungsten concentrates, which sold at 28 shillings per unit. The ore mined ranges in tungsten contents from 1.7 per cent. to 2.2 per cent., which, apparently, is considered quite satisfactory. A very ready market is found for the mineral, despite current belief to the contrary.

OUR LONDON LETTER

British Miners and Mining Royalties in the General Election—Heavy Gravitation Stamp Development on the Rand—Powerful Three-throw Ram Pumps for Mine Draining in New Zealand—English Views on the Reverberatory Practice in Mexico—Copper Position and Rumours—Lead Prospects and a Canadian Proposal—Big British Zinc Plant Described—Successful Vacuum Process in Cornish Mine.

Special Correspondence to the Canadian Mining Journal.

The miners of Great Britain, organized, as they are, into trade union associations in each county and then into a National Federation, are proposing to take a big part in the general election which is looked forward to in January. Besides the ordinary Labour programme, they specifically ask for a Ministry of Mines, and are in favour of the minerals and mines of the country being under and managed by the state. As a matter of more practical politics, they ask for the legislative enactment of a minimum daily wage of $2 per day for miners. At the present time they say there are thousands of miners working in this country for $1.25, 75 cents and even 50 cents per day.

In the new taxes contained in the budget which has been thrown out by the House of Lords and which has therefore brought about this general election, there was a tax on mining rents and royalties coming as a result of the general taxes on land values. Mining royalties consist of royalties on each ton produced, practically a dead rent for the protection of the rent owner, with an accompanying compensating system of "shorts" for the protection of the mine owner, and of way-leaves above and below ground. Besides coal, they are charged upon other minerals, but coal is by far the most important.

The royalties and way-leaves on coal amount to about $21,000,000 per annum, while all other metals and ores only pay about $4,000,000 per annum. Upon coal these royalty charges vary in different coalfields from a minimum of 5 cents per ton in Northumberland and Durham to a maximum of 30 cents per ton in West Scotland. The average in each district varies from 6 cents per ton in the Forest of Dean, South Wales, to 14 cents per ton in West Scotland, this showing that mining royalties are not so much a tax as a rent for superior advantages of seam, situation, or both.

It is held by supporters of royalties that all that can be said to enter into the cost of coal is the minimum royalty of 6 cents per ton on the Forest of Dean. It is a well-known fact that coal owners would rather pay 60 cents per ton royalty for some mines than be compelled to work others without royalty.

As a perfect illustration of the way in which the royalty system has grown up in this country, although it is now part and parcel of the ordinary business results of our civilization, take the case of the coal mines held by the Dowlais Company. In the year 1748 the then Marquis of Bute leased to Anthony Brown eight miles of mineral property in Merthyr, Glamorganshire, for 99 years at $500 royalty per year. Some years later this lease was transferred to the Dowlais Company, which held it until its expiry in 1848. The Dowlais Company then re-leased it from the Butes at $100,000 per year, and apparently considered that even at that hugely enhanced figure they had struck a good bargain.

Popular opinion seems to have attached rather more importance to the question of mining rents and royalties than the subject deserves. Undoubtedly mining rents and royalties are a nuisance to the persons who have to pay them, and the total sums paid, as we have shown, are considerable. But these promises are by no means sufficient to authorize the popular conclusion that the system of royalties is an oppressive tax on one of the staple industries of the kingdom.

The Liberal Government proposed to put an annual tax of 5 per cent. on the rental value of all rights to work minerals, and on all mineral way-leaves, excluding brick, clay and earth, sand, chalk, limestone and gravel. The financial result of the mineral rights duty was estimated by Mr. Lloyd-George to add $875,000 a year to the revenue. It was urged by the Government that this was not a tax on minerals, but a tax on the landlords, who make a levy on the mine owners for the right to work minerals. The Government regards mining royalties as a tax on the springs of national wealth.

As the budget forms the real fighting centre of the election, it is interesting to point out these mineral and mining factors.

At the opening meeting of the winter session of the Institution of Mining and Metallurgy, Mr. W. A. Caldecott, discussing the development of the heavy gravitation stamps, said that the history of ore crushing by means of gravitation stamps showed a progressive increase in their weight and in corresponding efficiency. He had carried out a series of milling tests at the Knights Deep battery, which was equipped with stamps weighing 1,350 pounds when new, with the object of discovering some means whereby stamp-milling efficiency could be increased. Encouraged by the results of these and many other tests, including a duty of approximately 6½ tons through 1,500-mesh screening with stamps weighted up to 1,622 pounds, he recommended that the next stamps erected by the Consolidated Goldfield Companies should have a weight of 1,550 pounds each when new. Such a departure excited much adverse comment among experienced millmen generally, but the mills were satisfactorily at work today after periods of service ranging up to three years.

In accordance with the present changed state of professional opinion, he said, all Rand batteries lately erected or designed had stamps of a weight not long ago deemed extravagant, and, aided by the installation of tube mills, stamp duties of eight tons were now as common as those of four tons a few years ago. In order to employ heavy gravitation stamps to full advantage, it was absolutely necessary that a uniform speed should be maintained. That, in spite of certain obvious disadvantages, they still held their own was probably due to the fact that pneumatic and steam stamps as hitherto designed had proved wasteful of power and liable to derangement under the vibrations and shocks inevitable during crushing.

A serious effort was, however, now being made to utilize a new type of Holman pneumatic stamp at New

Kleinfontein mill. The day of the stamp as a unit of crushing capacity had passed away. The unit of the present basis was the tonnage per month or per day. The future limit of stamp weight was difficult to foretell, but it would probably be determined more by the mechanical considerations involved, as in the cam system of lifting, than by any decreased relative efficiency as a device for pulverizing ore. The advantages of heavy stamps as compared with lighter ones were: Reduction of the initial capital expenditure in erecting 200 stamps at 1,750 pounds with accessories, in place of 270 stamps at 1,250 pounds each; reduction in size of mill building, almost proportionate to the less number of stamps, 30 per cent. less shafting, belts, and other moving parts to maintain, and 30 per cent. less labour required.

Messrs. Hathorn, Davey & Co., of Leeds, have constructed for the Waihi Gold Mining Company of New Zealand two sets of powerful three-throw ram pumps for mine draining purposes. Each pump is capable of raising 1,500 gallons of water per minute, against a head of 800 feet, and has rams 12 inches in diameter by 2 feet 6 inches stroke. They are driven by variable speed, direct-current, 500-volt motors of 420 b.h.p., which have a speed variation of 50 per cent. The power is transmitted from the motor to both ends of the crankshaft through two stages of machine-cut gearing. The slides are loose and independent, so that should they be damaged by a fall of the mine roof or from any other cause, they could be readily replaced. This type also allows of easy adjustment. The bed-plate is built up in sections for easy lowering into the mine.

The water valves comprise a nest of small-sized valves, allowing ample waterway, which can be easily taken out for examination or repair. They are mounted on a valve-plate adjustable externally, and are of the makers' improved type for dealing with gritty mine water. Each valve is of gunmetal, with a leather joint ring. There is a vacuum vessel directly below each pump, and an air vessel immediately above. A large by-pass is provided in order to reduce the load on the motor at starting. This, of course, can be closed as soon as the pump is in motion. There is a bearing between and outside each crank, and each bearing is adjustable in four directions. In addition to the 12-inch rams, a separate set of interchangeable rams is provided. These are 10 inches in diameter to enable the pumps to deal with a smaller quantity of water against a correspondingly higher head, if it should be necessary to move them to a lower position in the mine.

Mr. L. D. Ricketts has been speaking in this country on recent developments, and especially experiments in reverberatory practice at Cananea, Mexico. He tells us how for the purpose of matting their flue dust from the blast furnaces and roasted concentrates a very large reverberatory furnace was installed in 1896, but this 100-foot structure had to be closed down until recently owing to the difficulty of firing with ordinary fuel. Powdered coal was tried unsuccessfully, and now finally oil is being used with special burners, and over the 72,000 tons of material smelted in the last eighteen months a very considerable saving has been effected in costs. Even the $1.68 per ton now ruling is thought to be capable of reduction in three ways: (a) Decreasing the excessive stack temperature at present existing, although three Stirling boilers are used to absorb waste heat; (b) decreasing cost of material and labour for repairs; (c) increasing the average daily capacity by fewer delays for repairs, and by decreasing the flue dust produced in the blast furnaces and increasing the amount of calcines from the McDougal roasting furnaces.

Mr. Ricketts expressed the belief that the introduction of large reverberatories would aid most copper smelters, as found at Cananea, by admirably seconding the blast furnace practice, in using up the flue dust and fine concentrates at low cost, and by removing the fine material from the charge, lessen the blast furnace cost also.

The latest copper market movements here show a great curtailment of speculative operations compared with the huge turnover recorded recently. The statistical position on this side has again grown appreciably worse, and renewed selling pressure has become manifest. The statistics for the second half of November disclosed a fresh notable increase in the European visible supply. Practically no disposition is shown to force forward sales.

Circumstantial reports have been circulated here to the effect that a London offer of $25,000,000 has been made for the property of the Arizona Copper Company in Edinburgh on behalf of the American capitalists who are behind the negotiations for the great copper combine. The chairman and another director of the Arizona Copper Company have sailed for New York, and no official information is obtainable. The Arizona has an ordinary share capital of $1,899,870, and its output is 17,000 tons of copper per annum.

The lead market on this side, like that devoted to copper, benefits by the great development of electrical enterprises. Unlike the more important metal, however, lead has not a serious overproduction and generally unstable statistical condition to contend against. Over here stocks are not unduly large, and the arrivals are well within the capacity of the market. Many lead mines sell their output at average prices for a year ahead; hence when the Convention came into existence some months ago the output of these for this year was already virtually disposed of. A few weeks ago the Convention's brokers bought freely in London, raising the price of prompt delivery from about $64 to $67, selling heavily at the same time to consumers everywhere. Contracts for 1910 will shortly be arranged, and the course of events in this connection may be interesting.

Messrs. Lindgens & Sohne and Messrs. Bergman & Simons, of Mulheim, Germany, have purchased from the Lead Products Syndicate, of Liverpool, Barton's patents for manufacturing litharge and red lead for Germany, Luxemburg, Austria, Russia, France, Italy, Sweden, Norway and Denmark. A company is in course of formation to work the Canadian patents in the neighbourhood of Niagara, where cheap electrical power is available. It is also intended to establish factories, as soon as possible, in the United States and Australia, and probably in Japan. In Barton's process the finished litharge is produced in one operation from metallic lead, at a temperature far below the point of fusion. No sifting, grinding or after-treatment is required.

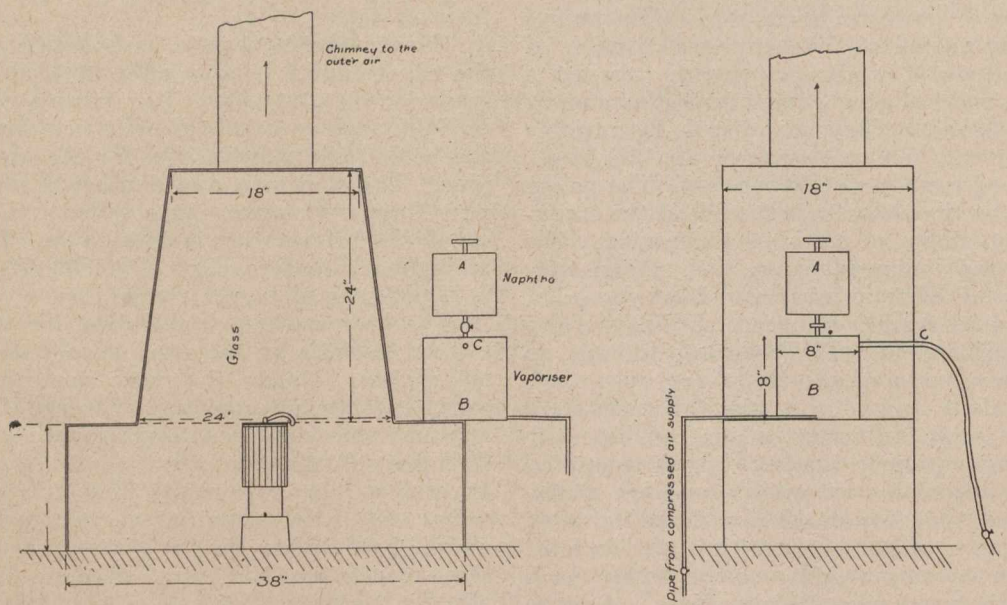
The Central Zinc Company has organized a big plant at Seaton Carew, West Hartlepool, which has a smelting capacity of about 35,000 tons of zinc blende per annum, which should produce about 10,000 tons of spelter. This company is a subsidiary of the Sulphide Corporation, formed to treat the Broken Hill Central mine's zinc blende. It was formed in 1906, since which time extensive experiments have been carried on prior

to the starting of the plant at West Carew in May, 1908. The distillation furnaces are of the recuperative type. The pottery is 315 feet long, the upper floor of which is constructed of reinforced concrete. The roasting furnace is steel-panelled, 105 feet long by 75 feet wide, and the distillation works are 415 feet long by 56 feet wide. All the latest developments for zinc blende treatment have been adopted.

For the past two years the Elmore vacuum process has been in operation at the Dolcoath mine on its complex ores, with the result that practically all the sulphides are removed as a concentrate almost free from tin, leaving the tin in the tailings, which is passed on to the usual water concentrating appliances for the recovery of the tin practically free from sulphides. Where tin ore contains only copper sulphides, the vacuum process produces a high-grade copper concentrate readily salable to the copper smelters. This gets rid of the copper impurity, and at the same time purifies the tin ore so as to make it valuable to the smelter. Following this success, I understand, this process is about to be applied to similar ores found in two other widely separated parts of the world, namely, the Straits Settlements and South Africa.

TESTING SAFETY LAMPS

Written for the Canadian Mini ng Journal by James Ashworth.



The British Columbia Coal Mines Regulation Act of 1897, Chapter 138, Rule 8-A, enacts that in addition to the requirements of Rule 8, every safety lamp so in use shall be tested in an explosive mixture of gas and tar at least once every week. This rule came into force on the 1st of January, 1905, but by the written consent of the Minister of Mines, a further reasonable time might be allowed in which to prepare such testing of lamps. Up to quite recently it has not been possible for outlying collieries, where lighting gas is not available, to make this test more than once a week. The required test, where lighting gas is available, does not entail any very great or practicable difficulty, but where the gas has been specially prepared, the process of testing has been very tedious and expensive. The onerous nature of this rule became accentuated when the Inspector of Mines decided that a weekly test did not entirely fulfil the requirements of Rule 8-A. The rule further enacts that "should the glass, washers, gauze or any essential part of such lamp have been renewed, or removed and replaced after the lamp has been so tested, then such lamp shall be again tested, and any lamp which shall be shown by such tests to be imperfect or inefficient, shall not be allowed in any mine to which this Act applies, until such imperfection or inefficiency shall have been remedied and the lamp shall have passed a satisfactory test. And every colliery so using safety lamps shall be equipped with apparatus for making such tests of some such form as shall be approved of by the Minister of Mines, and such tests shall be of such a character as may from time to time be approved by the Minister of Mines.

It is quite clear that no double gauze lamp could be properly cleaned without the removal of all the parts from the lamp case, and, therefore, the literal observance of this rule means that the lamps must be tested daily. Although this rule came into operation in January, 1905, its observance has not been precisely insisted upon until recently, because of the want of a suitable arrangement to expeditiously pass the safety lamps through a practical test. Some firms using the Wolff Spirit Lamp adopted an arrangement consisting of an air tank, a gas generator and a gas cylinder, such as supplied by the Wolff Company. This apparatus has a tank similar to a gasometer filled with air, and this air is forced through a rubber tube into the gas generator, which is a sheet iron box divided in the inside into several horizontal compartments, on which absorbent cotton is placed. The shelves forming the compartments are slightly inclined, so that the excess of naptha (76°) on one shelf may run down on to the one below. The naptha is placed in a glass reservoir fixed on the top of the generator, and the supply of naptha is regulated by a tap. Air from the tank being forced into the bottom of the generator and zigzagged by the shelves, becomes charged with any desired percentage of gas.

The explosive mixture thus produced is then passed through a coiled pipe, perforated on its inner side and surrounded by a metal case, having a pane of glass on one side, through which the action of the mixture on the safety lamp placed within the coil can be observed. In the event of the mixture containing too much gas, more air can be admitted through a shutter arrangement at the base of the testing box. The main objection to this arrangement is that the process is very slow, and the man operating the test is exposed to the fumes of the gas.

The British Columbia Government. through its Chief Inspector, advised the coal operators that they were expected to observe the law, and must devise an apparatus which, if satisfactory, would be approved by the Minister of Mines. The writer having, therefore, taken the matter in hand, designed the arrangement shown by the accompanying drawings. Thus there is a box made of sheet iron, the bottom part where the lamp is shown being open on the front side, and the upper part enclosed by a glass plate, whilst entirely protected from the gas fumes. A constant current of air passing through the case goes right out to the open air up the chimney. Ten or more lamps are placed in the box at once, and after the cylindrical vessel "A" has been filled with naptha, the spirit is allowed to run through into the vaporizer "B," where there are shelves covered with cotton wool, so placed as to zigzag the compressed air, which is regulated by a tap and admitted at the bottom, as in the Wolff arrangement The operator then takes the flexible tube "C" into his hands, and after opening the tap applies the gas to the top or bottom part of the lamp, as he may desire, and the explosive mixture of gas and air is thus forced into the lamp. If the gauzes are sound the lamp may be extinguished, but if faulty, the gas issuing from the tube is at once ignited, and the lamp is then known to be dangerous.

These tests can be made very quickly and economically, and being in full accord with the Coal Mines Regulation Act, will doubtless receive the approval of the Minister of Mines very shortly.

In conclusion the writer hopes that this apparatus may be of use to other mining men who have had, or may have a similar difficulty to face.

THE UNITED MINE WORKERS IN NOVA SCOTIA DURING 1909

(By our Glace Bay Correspondent.)

The resume of conditions attending the coal-mining industry of Nova Scotia during the year 1908 which appeared in the Canadian Mining Journal of 15th January 1909, recorded a steady progress in all things connected therewith, and this year stood out as one marked by unusual advances in tonnage, legislation, technical education, and precautions for safety. The year just past unfortunately presents a very different aspect. It has been a year of stagnation and reaction. At the end of the 1908 resume it was stated that: "In any case there is no justification for any glowing forecasts of the progress of the coal industry in 1909," but the most pessimistic of men could hardly have foreseen that the tonnage of coal mined for the year would be less than in any year since 1903. At the date of writing it is not possible to compile any correct statistics of tonnage to compare with previous years, but it is within the mark to say that the coal production of Nova Scotia for 1909 will be almost one million tons less than it would have been had the delegates of the United Mine Workers of America not been able to bring about the several strikes which have marked the summer. The strike situation has so dominated the year's work, that its history must be to a large extent a retrospect of the U. M. W. A. trouble.

It has long been the policy of the leaders of the United Mine Workers of America to obtain control of all the coal workers in Canada, a policy that is expressed in the name of the organization. The miners, organizations which existed previous to the formation of the United Mine Workers of America, were the "American Miners' Association," the "Workingmen's Benevolent Association," and the "Miners' National Association." When these organizations were eventually superseded by the United Mine Workers of America, there can be no doubt that the territorial limitation which was inferred from such a title as the "Miners' National Association," occurred to the leaders of the U. M. W. A., and the title which they chose for the new organization is probably as wide and comprehensive a description of the ultimate aims of this Union as could have been devised. These aims are doubtless the absolute domination of all coal mines in the American continent from the headquarters of this union in the United States. It is particularly the desire of this organization to control the mine workers of Nova Scotia in order to consolidate their powers througout the whole of the great coal field which occupies the eastern half of North America.

Since 1904 the leaders of the U. M. W. A. have had agents actively working in Nova Scotia. In September 1905, a district president of the U. M. W. A. addressed the Grand Council of the Provincial Workmen's Association of Nova Scotia in Halifax, and at the Annual Convention of the U. M. W. A. early in 1906 the Dominion Coal Company and the P. W. A. were fiercely assailed for having entered into the Three Years Contract, particular exception being taken to a clause in that Contract which provided that "The employees shall not attempt to restrict the sale of the coal of the Company to any person, firm or corporation." This clause was objected to because it precluded a sympathetic strike by the Dominion Coal Company's workmen.

At the expiration of the Three Years Contract, the P. W. A. and the Dominion Coal Company were unable to agree upon new terms, and a conciliation board was called for by the workmen. The award of this board was accepted by both parties, and in March 1908 a contract was signed accepting the terms of the award until the end of 1909. After the signing of this contract the leaders of the U. M. W. A. grew very active and

commenced to organize locals of the American union, and vigorously attacked the Grand Officers of the P. W. A, chiefly by instituting a series of vexatious legal actions, in all of which the U. M. W. A. were nonsuited by the Courts. This fratricidal warfare did not interest the coal companies until at the beginning of 1909 the U. M. W. A. commenced to initiate into membership certain minor colliery officials of the Dominion Coal Company, who were forthwith discharged, in accordance with a long standing rule that no official who has the direction of other men can belong to a labour union. The constitution of the U. M. W. A. provides that all persons employed at collieries where that union is in control shall be members of the Union, with the single exception of the "Manager and the top-boss," and the "closed shop" in its most intolerable shape marks the U. M. W. A. wherever it is in power.

The U. M. W. A. workmen of the Dominion Coal Company applied for a Board of Conciliation, alleging discrimination against members of the U. M. W. A. as such. The award of the board found that no discrimination had occurred, and that there was no ground for any of the charges made by the representatives of the U. M. W. A. At the mines of other companies in Nova Scotia, Conciliation boards were called by the U. M. W. on various pretexts; namely, at Sydney Mines and Springhill. The award of the board in each case was adverse to the U. M. W. A. After the sitting of the various boards, various members of the International Executive of the U.M.W.A. came to Nova Scotia and paid organizers were put in the field throughout the mining districts of the province. These men spent money with great freedom throughout the first six months of 1909, and they prepared the ground for future events in a skillful manner, showing a considerable knowledge of human nature and the methods of bringing about labour troubles. The coal trade in the early part of this year was in an exceedingly slack condition and there was a shortage of work. The officers of the U. M. W. A. dispensed a large amount of money in what was called "relief" and put themselves into touch with the various religious and political organizations; they made especial endeavours to win the good-will of the wives and families of the miners through the medium of ladies related to the U. M. W. A. organizers. The U. M. W. A. leaders appeared to identify themselves with every form of advanced social legislation; they particularly laid themselves out to influence the men from Great Britain and various parts of Europe, and they appropriated as part of the platform of the U. M. W. A. most of the labour and social legislation which has been slowly evolved by the legislatures of the old world. Not a word was spoken about the possibilities of a strike, and the propaganda of this American organization was so designed that it was hailed as a new gospel and, unconsciously, a great number of people became enthused with it who were in absolute ignorance of the ultimate aims of the campaign—aims which to-day are unfortunately only too apparent.

The campaign among the general public was such as we have outlined, but among the workmen the bait held out was more specific, including, as it did, the eight hour day, a large increase in wages, reduction of house rent and the price of workmen's coal, certain minimum wages for certain classes at work, the collection of dues through the company's office, the establishment of a completely "closed shop," and the utter humiliation of the leaders of the Provincial Workmen's Association, accompanied by the extinction of the local union. The men were given to understand that all these things would automatically follow recognition of the U. M. W. A., but until the last moment these men did not think that a strike would be called.

At the end of June a circular letter was dispatched to all the operators in Nova Scotia, demanding their attendance at a joint convention with leaders of the United Mine Workers at Sydney. This demand was, of course, entirely ignored by every coal company. At the beginning of July the Dominion Coal Company was notified that unless it met leaders of the U. M. W. "To discuss the matters of difference between your company and ourselves" a strike would be called. By purposely omitting to make any specific demands upon the company in their ultimatum, the U. M. W. endeavoured to escape the penalties of the Industrial Disputes Act for calling a strike without legal notice.

The day before the strike local president of the U. M. W. A. gave an interview to the press, stating that his organization controlled 95 per cent. of the Coal Company's workmen, and there can be no doubt that the men who went on strike took this statement as being correct. Many of the men who went on strike had been members of the U. M. W. A. for a few days only, having been induced to join that union by a combination of coercion, cajolery and deceit, and when these men joined the U. M. W. locals they had not the slightest intention of going on strike. They were induced to strike by a series of falsehoods, and they have been kept out on strike by falsehood invented after falsehood. A newspaper was started by the help of U. M. W. funds to keep alive and foster the agitation, and this paper has been of great assistance to the leaders by disseminating among the strikers the falsehoods which have been necessary to prolong the abstention from work. This was rendered the easier to arrange as those strikers who could read English were counselled not to read those newspapers which disagreed with the position of the U. M. W. The agents of the U. M. W. have carried on a persistent misrepresentation of the number of men at work and the output produced from the mines of the Coal Company, and even at this late date very few of the men on strike believe the output figures which are given out by the company. The unwitting foreigners have been shamefully deluded. They were assured that the strike could not last more than a few weeks, and were promised large rewards if they would come out. They were also told that when the strike was over, and the U. M. W. had won, their wages would be increased up to $6.00 and $9.00 per day. All through the strike violent attacks have been made on the personnel of the company's management, on H. M. Inspectors of Mines, on the Government, and on the magistracy and judiciary in their administration of the law. Lying reports were disseminated the world over regarding the condition of the mines underground, the rate of wages and the conditions of living on the surface. Bribes have been offered to men holding important positions in the company's employ to defect at critical moments, attempts were made to intercept letters and telegrams in transit, and many overt and illegal acts have been committed in secret, apart altogether from the open and violent intimidation which has been carried on under the direction of the leaders in Glace Bay, and the funds of the U. M. W. have been used without stint to defend members of that union who have broken the law.

An exceedingly large sum of money has been disbursed from the International treasury of the U. M. W. during this strike. It is not a labour trouble that has arisen out of intolerable grievances, for as yet the strik-

ers have not formulated a single grievance, but it was brought about by "malice aforethought" by the campaign of the trained organizers of the U. M. W., and it has been maintained by a lavish expenditure of union funds. It is a well-known fact that many of those who have drawn upon the funds of this union had no right to do so. Many men have been in receipt of strike allowance who had not worked in the mine for years, and there are men living on their own farms in Cape Breton who are drawing strike pay. In some parts of the island it has been a recurring subject for joking when the farmers from the country came into the mining towns to draw their strike pay.

The Deputy Minister of Labour's report on the U. M. W. A. situation stated that at Glace Bay the strike was practically broken, and that most of the strikers would be "surplus labour through the winter months." At Inverness he found the strike was never at any time an effective one, and at Springhill the situation has resolved itself into a deadlock. This summing up can hardly be improved upon. An interesting sidelight on the Glace Bay strike is that on the 14th of December, the date on which the U. M. W. A. members voted for the presidental election of that union, the output was over 11,000 tons. What this means is shown by a comparison with previous years. In December 1906 the average daily output was 8,500 tons, in the same month of 1907 and 1908, it was 10,800 and 7,000 tons respectively.

The operators of Nova Scotia opposed the coming of the U. M. W. consistently and from the first, and the reason is not far to seek. The U. M. W. has a record of the worst kind in the United States, and their operations have always been attended by violent breaches of the peace. It was feared the same results would follow in Nova Scotia, and the fear has been more than justified. We have also witnessed in Halifax the General Manager of a large coal company forced to testify on the witness stand to the price of coal in Montreal at the very time when large coal contracts are pending there, for which the keenest competition is going on between the American coal mines and our own. This gentleman was asked to disclose in public the very secrets which our American competitors are spending money to get, in order to underbid our Canadian business just sufficiently to get the orders. There seems something anomalous in a state of affairs which allows an unincorporated foreign union to prosecute our operators because it is suspected they have tried to prevent ruinous cut-throat competition, while at the same time this union is pouring American money into the Province which is being used to gain American domination of our coalfields. Our coal companies have been compelled to spend large amounts in protecting their properties against physical violence and incendiary fires, and some 5,000 men have had to suffer contumely and bodily danger from a body of men numbering less than 2,000, because the latter were incited by American strike-breeders, and defended by American money. As the law stands to-day every Canadian corporation is apparently at the mercy of any United States labour union which sees fit to send into our country its heralds of discord to spend money in engineering strikes, and we have no protection should these funds get into the hands of an ill-advised or foolish man, or should the power of calling strikes be given to men whose integrity is not unimpeachable. The records of many United States labour leaders are not such that Canadians can contemplate with equanimity their present unchecked powers in the Dominion. Our Canadian industries and our national labour organizations may justly ask that protection shall be given them from the marauding and irresponsible actions of International organizations controlled from the United States, and from the scenes of lawlessness and bloodshed for which these bodies have been responsible in the Dominion.

EXCHANGES.

The Mining World, December 4th, 1909.—Editorially The Mining World credits 113 United States mines and metallurgical works with $55,398,429 paid in dividends during the 11 months ending Nov. 30th, 1909. Fifteen Canadian companies, thirteen of which operate in Cobalt, paid during the same period $6,120,188 to shareholders. By a curious misprint Crown Reserve is rendered "Crown Point."

Economic Geology, October-November, 1909.—In an article "On the Origin of Petroleum," Mr. L. V. Dalton comes to the conclusion that the great majority of oils are derived from the decomposition during long ages at comparatively low temperatures of the fatty matters of plants and animals, the nitrogenous portions of both being eliminated by bacterial action soon after the death of the organism. The fats and oils from terrestrial fauna and flora may have taken part in petroleum formation; but the principal role must, from the nature of most petroliferous deposits, have been played by marine life.

We fear that Mr. Dalton's point of view is one-sided.

Mining Science, December 2nd, 1909.—"The Application of Steel to Mine Timbering" is the title of an article by R. B. Woodworth. Among the advantages claimed for steel is the matter of re-use. Isolated props are now very seldom withdrawn and are utterly worthless when the time comes for their replacement. In English mines steel roof supports have been taken out, turned and used 200 times over. Experience in the United States has corroborated this.

A curious peculiarity of the new ferro-titanium rails, which have been made experimentally in the United States for a little more than a year, is that they may be entirely free from titanium, and at most they contain but little. In this respect the "alloy" differs from all others. The properties of nickel-steel, for instance, depend upon the presence of a material percentage of nickel, and manganese-steel must have a carefully adjusted proportion of manganese, for the new metal, the steel is made in a convertor and blown in the usual way, when it receives a charge of titanium alloy. This is a product of the electric furnace, and is a mixture containing 10 to 15 per cent. of titanium and 5 to 7 per cent. of carbon, the remaining portion being iron. Each ton of steel receives a charge of about 8 pounds of 10 per cent. alloy, the effect being to increase the slag removed from the metal in the ladle, while the ingots are free from blow-holes. The titanium unless in excess of what is necessary to remove the impurities, all passes off in the slag. The treatment gives special durability to rails for curves, and at the Grand Central Station in New York an ordinary rail lost 3.03 pounds per yard in four months, while a titanium alloy rail of the same composition was worn away only 1.01 pounds per yard in six months. The few dollars increase per ton of Bessemer rails is expected to be much more than offset by added durability.

HIGH POWER DIRECT CURRENT CENTRIFUGAL MINING PUMPS

By Frank C. Perkins.

One of the most important installations connected with mines is undoubtedly the drainage plant, and the recent development of direct current machines for steam turbines service requiring dynamos of high

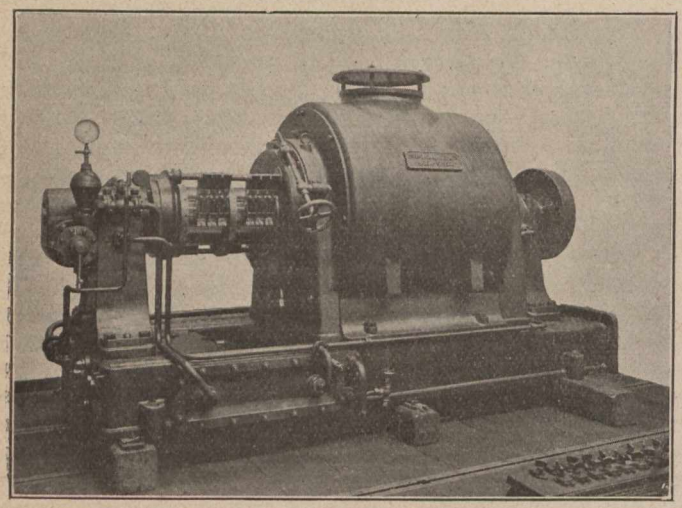


Fig. 1. Direct Current Motor for Driving a High Speed Centrifugal Pump of the Merles Mining Co.

speed and special design has resulted in the construction of similar machines to act as special high speed direct current motors for coupling two centrifugal pumps.

The accompanying illustration (Fig. 1) shows a new Swiss direct current motor for coupling to a mining pump operating at a speed of 1,320 revolutions per minute.

In driving the same at full load, it develops 450 horse power and is operated on the 550-volt mining power circuit. Another similar electric centrifugal pump for mining service is shown in the accompanying illustration (Fig. 2), having a capacity of 55 horse power, normal rating, but being able to carry overloads continuously up to 75 horse power without injury. It runs at a speed of from 2,500 to 3,150 revolutions per minute, with a speed regulation of 50 per cent. up and 20 per cent. down.

These Swiss direct current high speed motors for mining pump service were designed and constructed

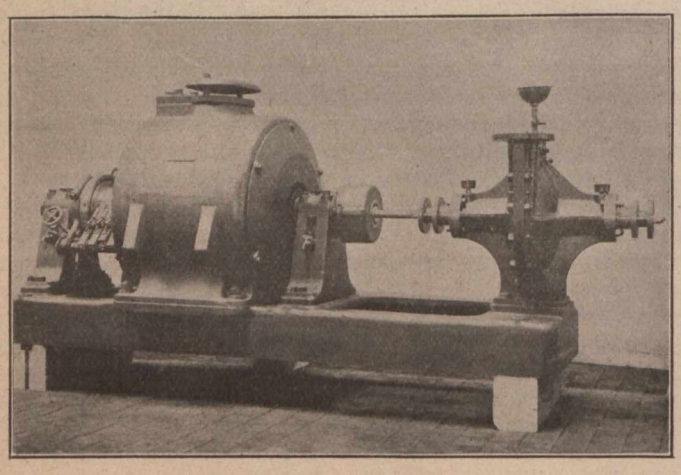


Fig. 2. Direct Current Electric Mine Pump of 75 H.P. maximum capacity

at Baden, by Brown, Boveri & Co. The 500 horsepower motor operates at a speed of 2,600 revolutions per minute, and the 40 horse power drives the centrifugal pump at a speed of 4,000 revolutions per minute, while the largest electric direct current motor for pumping service has an output of 2,300 horse power working under a speed of 900 revolutions per minute.

These high speed Swiss direct current mine pump motors are provided with a series compensating winding as well as a shunt winding, and can operate over a wide range of speed with the help of a variable resistance in series with the latter.

It may be stated that forced lubrication is employed, the oil being forced continuously through the bearings by means of a pump worked from the motor shaft. The oil returns to the reservoir, where it is cooled by means of a water spiral and from which it is taken by the pump and fed to the bearings.

It is held that the principal advantage of this type of motor for the above class of work over the usual type of three-phase motor is the great speed variation obtainable without loss of efficiency when desired while otherwise the speed is constant, irrespective of the load. The efficiency of these machines is high and the ventilation in a similar manner to that employed for the turbo-dynamo. The air enters from underneath the leaves at the chimney-shaped opening at the top, the ends being completely enclosed, the machine being thus particularly adapted for use in mines.

The construction of the commutator is also the same as that employed for the turbo-dynamos, heavy shrinking rings being used, insulated from the commutator by means of solid mica the brushes remain fixed at all loads and speeds without sparking.

The hardening and strengthening influence of a minute proportion of some element in an alloy, which is a marvel and mystery of metallurgy, is not confined to the various steels. Arsenic is a hardly appreciable impurity of furnace copper, but it now appears that the electrolytic copper coming so generally into use is too pure for certain purposes. On the Prussian railways it has been noticed in recent years that the number of fractured locomotive staybolts was strangely increasing. Investigation shows that this has followed the increasing use of electrolytic copper, and that of 23 broken staybolts collected, 21 were of this metal, and only 2 of furnace copper. Of the electrolytic samples, only one contained arsenic, which was present in all furnace copper bolts tested. The high quality of copper containing traces of arsenic had been already recognized, and railways in Italy and the British Colonies specify 0.15 to 0.55 per cent. of arsenic as necessary in all copper bought.

Mr. H. H. Sutherland, formerly of Nova Scotia, recently disposed of several properties in the new Porcupine Gold District. The first sale was made to Mr. Noah Timmins, of Montreal. Another property, the Reamsbottom, was sold by Mr. Sutherland to a Montreal syndicate, and the Davison was acquired from him by a very wealthy Montreal investor who is already largely interested in Northern Ontario.

THE NORTH THOMPSON VALLEY, B.C.

By J. C. Gwillim.

(Continued from last issue.)

GEOLOGICAL AND MINERAL RESOURCES.

Concerning the geology and mineral resources of the district between Yellowhead Pass and Kamloops, several reports have been issued by the Canadian Geological Survey, but none of these gives much information of the central portion of the route along the upper North Thompson.

Dr. Dawson, in his Kamloops Map Sheet report of the years preceding 1890, covers the ground as far as the small coal field 50 miles north of Kamloops, and McEvoy, in his Report of 1898, covers the ground south of Yellowhead Pass to the Albreda summit, about 30 miles south of the "Cache." Between these mapped, examined areas is a stretch of over 150 miles, traversed in 1871 by Dr. Selwyn; but his report gives very little information beyond the occurrence throughout the district of mica schists and gneiss—an Archean series which he affiliates with the talcose micaceous schists of Old Cariboo, but which Dr. Dawson later describes as the Shuswap.

As far as known, the geology of the lower North Thompson, south of Raft River, is similar to that of Dr. Dawson's Shuswap sheet—a mixture of Archean gneiss, Cambrian schists, carboniferous cherts, and limestone, with a few small areas of greenstone, and Tertiary sedimentaries.

Some placer gold has been found on the bars of the river up to Clearwater junction, also on some of the tributaries. In 1901 a modern dredge, built by F. Satchill Clarke, of Vancouver, was operating at a point 12 miles above Kamloops; but the work was discontinued owing to the shallow nature of these bar deposits. Several fair showings of mineral in place have been made on Jamieson Creek, on Lewis Creek, and on Barriere River. Also at a point a little above Raft River some quartz and galena have been found. Galena, zinc blende, pyrites, and quartz with fair gold and silver values appear to constitute the prevailing ore. These are probably similar to the known occurrences about Adams and Stump Lakes eastwards and southwards.

With reference to the occurrences of mineral at these places, they seem to have been forgotten since Southern Kootenay came forward as a producer of metals. Many people may be astonished to learn that prior to 1890, or even as late as 1896, the deepest mine shaft in British Columbia was one of 400 feet at Stump Lake, 22 miles south of Kamloops. Some of the samples from this district are cited as carrying up to 6 ounces of gold and 90 ounces of silver; also several running $15 in gold with from 15 to 400 ounces of silver per ton.

Another promising district, according to Dr. Dawson, was Jamieson Creek, 15 miles up the North Thompson from Kamloops, with gold values from $11 to $22, and silver from 2 ounces to 34 ounces per ton. The quartz-galena ore from near Raft River assays: silver, 60 ozs.; Lead, 35%; gold $7 per ton.

From such occurrences there appears to be some promise of mineral development along the North Thompson, on its lower portion at least. Into this portion of the district drain several fairly large streams—such as Clearwater and Raft Rivers from the plateau country to the north-west; Lewis Creek, Barriere River, and Lost Creek from the eastwards. The Clearwater especially leads a long way into the district between the North Thompson and Quesnelle Lakes. Some placer gold has been reported from its upper waters, and good timber lands are abundant. All of these streams are clear, while the trunk stream, the North Thompson, is muddy with glacial waters derived from the much more mountainous country further north.

Beyond Raft River, at the head of boat navigation, a barrier of granitic and gneiss-mica schists crosses the country, and thence indefinitely, probably to the heads of Peace River, these crystalline Archean rocks form the first range west of the Rocky Mountains proper. The only mineral occurrences so far reported are some gold in quartz at Mad River; and various showings of white mica at the Big Bend on the Columbia, at High Bank, on the North Thompson, and at Canoe River and Mien Mountain near Tete Jaune Cache. Similar deposits were found far to the north-west on Finlay River by some of the Klondike gold-seekers on their way up by the Edmonton route.

The principal tributary of the North Thompson north of the sharp turn at the Raft River, is Blue River, coming in from the west. Looking up this rather straight, long low valley, one is impressed with a rapid change in topography on the northern side, the comparatively low, wooded mountains of the plateau give place to rugged, high peaks, with exceedingly green-coloured slopes to timber line.

At the same time the climate changes to a damp one, similar to that of the northern Selkirks about Revelstoke and Big Bend. Tributary mountain torrents bring down much glacial debris, amongst which is some limestone and a micaceous sandstone. Otherwise the evidence points to a persistence of the gneiss and mica schist, so far almost totally unprospected, except by hunters, who sometimes bring in good specimens of white mica, which go to show a wide distribution of this mineral for over one hundred miles along the route.

The best-known deposits of this mica are at Mica Mountain, and near Canoe River, in the range of mountains immediately west of the great open valley between the Cache and the Canoe River. These are said to have been found by an Indian, Alexis, while goat hunting. He brought specimens to the Hudson Bay people at Kamloops, after which the properties passed into other hands. Several expeditions have been made from Kamloops to these deposits from time to time, and two shipments made, one of half a ton in 1896, and another of 600 lbs. in 1898. The mica is of good quality and sometimes cuts in dimensions of 8 by 10 inches. It is found in spots along very wide and very feldspathic pigmatite dikes, which are mostly conformable with the enclosing mica schists and gneiss. These deposits are described in Mr. McEvoy's report of 1898. Also there is some account of them, and of the North Thompson route, in the B.C. Minister of Mines Report for 1901. At that time the properties were examined and Crown granted. Since then, so far as known, little has been done.

THE ELECTROCHEMICAL SYSTEM OF AMALGAMATION AND CYANIDATION.

By Elmer Ellsworth Carey, San Jose, Cal.

ABSTRACT PUBLISHED BY SPECIAL ARRANGEMENT WITH THE ENGINEERING MAGAZINE.

In the recovery of precious metals the three methods most generally used by miners, are: (1) The gravity system, used in sluicing, rocking, panning, etc. (2) The amalgamation system, in which values are recovered in the form of amalgams; this system calls for mercury riffles, mercury baths, pan amalgamation or plate amalgamation. (3) The chemical system, in which values are dissolved in certain solutions from which they are recovered by various systems of precipitation. The leaching of values from ore is known as lixiviation and the solvent most generally used is cyanide of potassium, although other solvents are known to metallurgists.

In the gravity system only the particles of gold and platinum heavy enough to be caught in riffles can be saved; the values in placer slimes, all miscroscopic and float gold, and all the values associated with the heavy sands are lost.

When we come to consider the saving of values by amalgamation we find hundreds of devices and machines which are designed to force sand, pulp, etc., into close contact with mercury; hundreds of patents have been issued for devices in which the gangue is passed through a mercury bath; but in practical milling operations only two devices are generally used—the copper plate coated with mercury, and the mercury riffle or mercury well. Only free, clean gold will alloy with mercury ordinarily, and only clean mercury has an affinity for gold. Gold in slimes will not amalgamate under ordinary conditions, and miscroscopic, rusty and coated gold cannot be saved by standard methods of amalgamation. Gold associated with sulphur, arsenic, lead, zinc, iron and tellurium amalgamates with difficulty or not at all, owing to the fouling and sickening of the mercury. Values in slimes cannot be saved on the standard mill plate by usual methods.

In milling operations when mercury wells are used the surface of the mercury often becomes covered with a coating of fine sulphides, which diminishes its alloying properties; for this reason mercury wells are not found in many mines in the United States although they are generally used in Australia.

In lixiviation we find endless difficulties; only when certain conditions are present can cyaniding be profitably employed; there are large areas, such as are found in Idaho, where there are hundreds of mines in which the ore is not amenable to cyanide treatment. While in lixiviation theoretically we have an ideal method of gold extraction, yet in practice we find the system hedged about by a multitude of exasperating troubles; generally speaking, cyanide plants are expensive to install, difficult to operate, and the average extraction is not over 85 per cent.

In view of the above very conservative statements regarding the shortcomings of the three popular systems of gold extraction, it is not strange that investigators have long sought improved methods in the metallurgy of precious metals.

Electrochemical science has devised improved methods for the reduction and refining of the useful materials, and it is not unreasonable to suppose that the same science will point the way to even greater improvements in the metallurgy of gold.

We will suppose that both the positive and negative electrodes or wires of a battery or dynamo are immersed in water, the two electrodes being an inch apart. The positive electrode is known as the anode, the negative pole as the cathode, and the separating water is called the electrolyte. When the battery or dynamo is in operation, lines of electrical force pass between the anode and cathode through the water, and there take place in the electrolyte a number of reactions; in other words, electrochemical conditions are present in the water, and these conditions form the key to the electrochemical system of amalgamation and lixiviation. An interesting experiment can be tried by any one. Pour a few ounces of mercury into a flat glass or porcelain dish, pour over the mercury half an inch of water containing a pinch of salt or a few drops of acid; immerse the negative wire from a dry battery in the mercury. Now touch the water only with the positive wire and note the activity that at once is manifest. Try this experiment with dirty mercury and note the instantaneous brightening and cleaning of the mercury. Place the positive pole in the mercury and the negative in the water, and the mercury soon becomes foul. Restore the wires to their original positions and note that the mercury clears at once. Grind the mercury in a small mortar with some sulphur or oil and it becomes foul. Now return the foul mercury to the dish and apply the current as at first. Note the clearing of the mercury and see how quickly the detached globules coalesce. Then remove the mercury and add a pinch of bichloride of mercury to the water; immerse both wires and note how quickly there is a deposition of mercury on the cathode or negative wire. In this simple experiment is the germ of the electrolytic system for the recovery of precious metals. While the theory of electrochemical action has been known for many decades, it is only within the last few years that methods and machines for making a practical use of the theoretical knowledge have been devised.

A distinction should be made between electrochemical amalgamation and electrochemical lixiviation. In the first place no solvent is used, and the values are recovered directly in the form of amalgam. In electrochemical lixiviation the action of the solution is hastened by the presence of the electric current, and the values are deposited by electro-deposition on suitable cathodes; the cathode may be lead, copper, aluminium or mercury.

Electrochemical amalgamation may be used in connection with (a) the standard mill plate, (b) mercury wells, or (c) the mercury bath (pan amalgamation.)

When the usual copper plate is used, anodes are suspended above it close enough to come in contact with the passing flow of water and pulp, which acts as an electrolyte. The copper plate is connected as the cathode.

Electrolytic sluices with suspended anodes require more water than the usual mill plate. Mercury may be supplied as in the usual practice, or it may be supplied to the water in the form of a solution of bichloride of mercury. A solution of common salt added to the water greatly increases the efficiency of the device. High-grade graphite anodes give the most satisfactory results; there is a grade of graphite made especially for anodes which is superior to the ordinary carbon. A current density of one-tenth to one-quarter ampere per square foot of cathode surface is ample.

Mercury wells such as are described in the second volume of Richard's work on Ore Dressing can be connected electrolytically and their efficiency greatly increased, some tests were made some years ago in South Africa with mercury wells in which the baffle plates were connected as anodes, and I am informed that a similar construction is now being successfully used in California. There are several methods of constructing electrochemical mercury wells and many experiments have shown that the electrolytic mercury well is a very efficient gold saver; there is no fouling or flouring, and no scums or coating of sulphurets collects on the mercury. Electrolytic mercury wells will extract values from slimes and will recover gold that cannot be amalgamated by the usual methods; they require no skilled attention and possess many advantages over plates.

In pan amalgamation, anodes are suspended from the stirrers and the mercury is connected with the negative wire; various systems of pan amalgamation have been described especially in connection with cyanidation (Parks, Pelatan-Clerici, Molloy, Hannay, etc.) but there is no essential difference in these various processes.

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

Within the next few years, I expect to see the electrochemical cyanidation process perfected to such an extent that it will become automatic and continuous; pulp from the mill will continuously enter a series of tanks, and from the lower end of the system the tailings will be continuously discharged. In fact plans for such a continuous system have already been prepared.

At present electro-cyanidation is in the experimental state, although it was once used quite successfully for several months at the De Lamar mine in Idaho; electro-deposition (Siemens-Halske process) is successfully employed in many mines in South Africa.

Let us consider again electrolytic amalgamation, taking as a text the so-called base or rebellious ore. When low-grade pyritic ore is crushed to 100, 150, or 200 mesh, practically all the gold is released as free gold; but only a small percentage of the assay value can be recovered by the usual mill plate. Gold when in a very finely divided state quickly becomes coated with argillaceous, talcose, sulphurous, or arsenious coverings, and it will not amalgamate; very fine gold easily acquires coatings, gaseous or otherwise, which effectually prevent the amalgamation contact; values in slimes cannot be extracted by the usual mill plate; particles of gold in placer deposits sometimes become coated by local galvanic action, and we have rusty, silicious, or cupreous coatings which effectually prevent amalgamation. With electrochemical conditions, all these difficulties are automatically overcome, and the broad statement can be made without fear of successful challenge that all values not encased are recovered, including platinum and the values associated with black sand.

In electrochemical amalgamation and cyanidation, a few pounds of common salt should be added to every ton of ore or pulp; by electrolysis the chloride of sodium is reduced to nascent chlorine and nascent sodium. Bichloride of mercury is also added to the water or solution; this salt under electrolytic action evolves nascent chlorine and mercury. As a result of these reactions, an alloy of nascent sodium and mercury is formed; this alloy absorbs nascent hydrogen produced by the decomposition of the water, and the resulting compound, known as hydrogen-sodium amalgam, has a powerful affinity for gold; in fact no compound known to science has a more powerful amalgamating action. The water and solutions become charged with nascent chlorine and hydrogen; these gases instantly destroy foul or greasy substances in the pulp; rusty or coated gold is quickly cleaned, the gases mentioned reducing all oxides. Nascent hydrogen reduces oxides at normal temperature. As a result of this cleaning and reducing action, gold particles have been freed from all substances that would prevent amalgamation, and amalgamation takes place at the first contact with the mercurial surface. Electrochemical action keeps the mercury in a perfect state, and it also prepares the gold for amalgamation; in the mercury riffle or well we have the necessary fall to bring every particle of gold into intimate contact with the mercury surface. And as the quickened mercury surface is at all times exposed to the passing pulp, we have the most perfect conditions possible for effective amalgamation. We have therefore all the specifications which would be called for in an ideal amalgamation device—simplicity, low cost, ease of installation and operation, absence of skilled attendance, large capacity, and high percentage of extraction.

In using the electrolytic system in placer and dredge operations, the auriferous material is at first passed through a series of screens until a 10 or 12 mesh concentrate is obtained; the coarser particles of gold will be saved by the usual riffle system. The 12-mesh concentrate, containing the values ordinarily lost, is then

passed over the electrolytically connected plate or riffles of suitable length and 95 per cent. of all values not encased are recovered at a trifling expense. The successful application of the electrolytic system on gold dredges would double the net savings. Under the present system the fine tailings of the dredges generally contain greater assay values per ton than the amount of gold recovered; that is, on ground where 15 cents per yard is recovered it will generally be found that the assay value of the tailings is 25 or 30 cents per ton. In ten years I estimate that gold and platinum to the amount of $25,000,000 have passed through the tail sluices of California dredges and have been forever lost. Within the next ten years the value of the lost gold in the dredge tailings will exceed $40,000,000, unless some new system of successfully extracting these elusive values is discovered.

THE ZINC MINING INDUSTRY IN BRITISH COLUMBIA.

A convention of mine managers and others directly interested in the mining industry, especially in lead-zinc mining, was held at Nelson, British Columbia, on December 15. There was an attendance of between 40 and 50, including most of the managers of the larger lead and zinc mines of the Kootenay district. Among those present were: W. H. Aldridge, managing director of the Consolidated Mining and Smelting Company of Canada, Ltd.; J. S. Airheart, general manager, and Geo. B. Squire, general superintendent, of the Highland-United Mines, and R. A. Airheart, superintendent of the United mine, all of Ainsworth; James Anderson, of the Ruth Mines, Ltd., Sandon; A. J. Becker, manager of the Lucky Jim and Sunset mines, Slocan; G. O. Buchanan, Dominion Supervisor of Lead Bounty, Kaslo; G. F. Caldwell, Utica mine, Kaslo; A. Fournier, manager of the Selkirk Mining Co., Ltd. (Cork mine), Kaslo; S. S. Fowler, general manager the Canadian Metal Co. (Blue Bell mine), Riondel; H. Giegerich, No. 1 mine, Ainsworth, and Province Mine, South Fork of Kaslo Creek; A. H. Gracey, Nugget Mines, Ltd., Sheep Creek, Salmo; Chas. J. Greenstreet, Big Ledge mine, Upper Arrow Lake; F. W. Guernsey, Consolidated Mining and Smelting Company, Trail; Robert R. Hedley; E. Jacobs; A. H. Kelly, Dandy mine, Nelson; John Keen, Goodenough mine, Kaslo; G. Weaver Loper, vice-president Lucky Jim Mines; D. H. Nellis, Woodberry Creek, Ainsworth; T. G. Procter, Nelson; A. D. Wheeler, Gallagher mine, Ainsworth, and W. E. Zwicky, manager Rambler-Cariboo Mines, Ltd., Kaslo.

The holding of the convention was proposed by W. R. Haldane, district freight agent for the Canadian Pacific Railway Company, who interested prominent Nelson men in the matter. F. A. Starkey, president of the Nelson Board of Trade, and E. K. Beeston, secretary, then took the matter in hand and made all arrangements for the meeting in Nelson, which, after it had been called to order by Mr. Starkey, elected Mr. Keen chairman and Mr. Beeston secretary. Numerous letters of apology for inability to attend and of hearty sympathy with the chief object of the meeting, were read by the secretary, the writers including R. F. Tolmie, Deputy Minister of Mines for British Columbia; R. W. Brock, Director of the Geological Survey of Canada; Dr. Robert Bell, Ottawa; J. L. Retallack, of Kaslo (who is at present in Ottawa), and Thos. Kiddie, Vancouver.

The question of how best to bring about the provision of facilities for the profitable reduction of zinc ores so that the immense quantity of low-grade zincky ore occurring in British Columbia, particularly in Ainsworth and Slocan districts, was first freely discussed. Mr. Fowler gave the meeting some information relative to the present market for zinc in Canada. He quoted customs statistics showing that the imports into Canada of zinc in all forms—spelter, blocks and sheets, zinc white, oxide, etc., amounts annually to about 7000 tons, of a total value of about $752,000.. While this consumption may be small in comparison with that of some other countries, it is worth looking after. It is questionable whether it would be wise to ask the Dominion Government for aid in the shape of a bounty on zinc produced in Canada, similar to that now given on lead, or for higher custom duties on zinc and its products. The granting of a bounty on zinc ores might have the effect of destroying the existing market in the United States for Canadian zinc ores, and this without providing any other way for the disposal of such zinc ores and concentrates from this province. He advocated requesting the Dominion Government to make experiments in connection with the smelting of zinc ores by electro-thermic process. It was known to all that Dr. Haanel, director of the Mines Branch of the Department of Mines of Canada, had successfully carried out experiments in the smelting of iron by electricity. If the government would authorize similar experiments in connection with zinc, the Canada Zinc Company's plant in Nelson would be at its disposal, if required, or another plant could be provided by the government if thought preferable. The demonstration of the possibility of making the electric smelting of zinc commercially successful, would be a great boon to the mining industry of the Kootenay.

Mr. Loper directed attention to a provision in the United States tariff, under which the amount of any bounty paid would be added to the customs duty to be paid on articles or merchandise sent into that country, and he opposed the suggestion to seek government assistance in the shape of bounty. He advocated rather the proposal to ask for assistance in the electric smelting of zinc.

Mr. Greenstreet supported Mr. Loper's views, and added that if the electro-thermic smelting of zinc can be made commercially successful, then British Columbia, with its large quantities of zinc-bearing ores will be in a position to control the situation.

Mr. Aldridge thought the first step should be to ask the government to adopt a similar policy in regard to zinc in the West to that it had so successfully done in the East in connection with iron. The government will, no doubt, if properly approached, be prepared to make the necessary investigation and carry out the proposed experiments. The presence of zinc in lead ores is a detriment to lead smelting, so his company which has trouble in smelting ores in which there is much zinc, will be glad to co-operate with others interested in getting something practical done. In his opinion the sum of $50,000 would go a long way towards proving whether the smelting of zinc ores by electro-thermic

methods can be made to compete successfully with the present methods of making spelter.

Mr. Buchanan narrated the history of earlier movements in connection with seeking the aid of the Dominion government for the lead and zinc industries, pointing out that the Associated Boards of Trade of Eastern British Columbia had led in these matters, and the government had generally met them in a very friendly spirit. In connection with the establishment of the Dominion Department of Mines, the appointment of Hon. Mr. Templeman as Minister of Mines the appointment of a Zinc Commission and the naming those who constituted that commission—in all these things their representations had been acted upon by the government, so he thought a similar friendly attitude would be adopted towards them in the matter of assistance to the zinc mining industry.

Mr. Caldwell urged that the question of the desirability of asking for a bounty on zinc ores be thoroughly discussed at the afternoon session the convention would hold. He had benefitted repeatedly from the lead bounty, and thought many other small operators would find a bounty on zinc of similar assistance.

Mr. Zwicky informed the meeting what was done when the Dominion parliament was last in session towards securing $50.000 from the unearned lead bounty for use in experimenting with the electro-thermic smelting of zinc. He had no doubt the Canada Zinc company would place its plant at the disposal of the government for the purpose of making the proposed experiments.

After further discussion, Mr. Fowler again submitted that the chief object in view is to establish zinc smelting by the electro-thermic process on a commercial basis. He reminded the meeting that spelter is being produced electrically in Europe. The question is, can it be produced commercially here? The work already done by the Canada Zinc Company seems to indicate that success is possible.

It was then resolved that the Dominion government should be asked to make experiments, as advocated by several of the speakers and the following committee was appointed to draft a resolution for presentation to the government: Messrs. Aldridge, Anderson, Aylard, Buchanan, Fowler, Greenstreet, Loper, and Squire.

At the afternoon session this committee presented the following report; which was adopted:

"Nelson, B. C., Dec. 15, 1909.

"Mr. Chairman and Gentlemen of the Convention:

"Your committee appointed to draft a memorial to be presented to the honorable minister of mines upon the subject of aid to the zinc industry begs to report:

"We recommend that a memorial in the terms following be prepared to be signed on behalf of this convention by the chairman and secretary for transmission to the honorable minister.

"This convention, consisting of some 50 gentlemen, representing mining smelting and commercial interests in Kootenay, B. C., begs to submit to the honorable minister the following facts in regard to the industry of the production of zinc:

"That the smelter erected by the Canadian Metal Company at Frank has been pronounced a commercial failure and its operation as a zinc smelter has been abandoned.

"That the plant established by the Canada Zinc Company at Nelson for the treatment of zinc ores by an electrical process has been idle for one year, with apparently no prospect of its resumption.

"That for the year 1909 11,000 tons of zinc ores with average contents of 50 per cent. of zinc have been shipped from Kootenay points to the United States.

"That a very large quantity of zinc necessarily mined in connection with the production of lead ores has been wasted, or remains piled up on the dumps.

"The developments during the year, particularly upon the property known as the Big Ledge, on Arrow Lake, indicate that the supply of zinc ores in sight calling for treatment is very much larger than has heretofore been supposed.

"That the Payne tariff of the United States adopted this year imposes a duty of 1 cent per pound upon the zinc contents of ores carrying more than 25 per cent. zinc.

"That railway rates upon ores from Kootenay points to United States zinc smelters are very much higher than are the rates upon Mexican ores.

"That these conditions, which may now be considered as permanently fixed, render impossible the export to the United States of any but very high-class zinc ores, and upon these latter absorb the greater part of the profit to the producer.

"That from the returns of the Customs Department of Canada it appears that there are imported into Canada annually zinc products to the amount of over 7,000 tons, worth, according to customs valuation, over $750.000.

"That it is highly desirable that we should have established a smelting plant capable of treating our own ores and of turning out manufactured products of zinc at least to the extent of supplying our own market.

"That this convention therefore begs respectfully to request that the Department of Mines of the Dominion Government will take this matter up and conduct experimental work upon such a scale as will determine definitely the practicability of the economical treatment by electro-thermic or electro-chemical process of these zinc ores."

It was decided that a copy of the memorial contained in the report of the committee should be sent, not only to the Hon. the Minister of Mines, but as well to the Right Hon. the Prime Minister (Sir Wilfrid Laurier) and other members of the Dominion Government; A. S. Goodeve, M.P. for Kootenay, and Martin Burrell, M.P. for Yale-Cariboo; also to members of the Provincial Government for their information.

A committee, consisting of Messrs. Keen (chairman), Fowler, Greenstreet, Loper, and Beeston (secretary), was appointed to forward the memorial to the Dominion Minister of Mines, and, in case necessity shall arise, to reply to any enquiries that shall be made in connection with the subject matter thereof.

Mr. J. C. Harris, New Denver, urged the desirability of endeavouring to induce the Provincial Government to reconsider the two per cent. mineral tax with a view to adopting some more equitable method of taxing mines and mineral claims. He argued at length in favour of this course, and submitted a resolution accordingly.

Mr. Jacobs stated that in 1904 a committee was appointed by the then existing Provincial Mining Association to suggest to the Government an equitable substitute for this tax, but had failed to agree upon anything practicable. He reminded the meeting that plant, machinery, buildings, etc., on mines are not taxed, as is similar property at smelteries, lumber mills, and other industrial establishments. He mentioned the method followed in another country, in which he had

lived, in meeting the evil of unworked mining properties, against which Mr. Harris had so strongly urged action, but those were leased mining lands, and forfeiture, if the work clauses of the lease were not lived up to, was the customary penalty. He did not think mining men in this country would support such a revolutionary change, even were the Government asked to adopt it.

This resolution met with a similar fate to that of Mr. Caldwell—it was given a six months' hoist.

On motion of Mr. Jacobs, seconded by Mr. Fowler, the meeting adopted a resolution of appreciation of the valuable work the Dominion Department of Mines, especially the Geological Survey branch, has done and is doing in the West, particularly in British Columbia. The meeting was then adjourned.

T. L. WILLSON

THE McCHARLES PRIZE.

To Mr. Thomas Leopold Willson, of Ottawa, Ont., has been made the first award of the McCharles Prize. Mr. Willson was the pioneer in the manufacture of calcium carbide upon a commercial scale. He is a native of Canada. His inventions are the basis of a large industry.

The committee appointed to award this prize was made up of representatives from the Faculties of Applied Science of the University of Toronto, the Kingston School of Mining, and McGill University.

SOUTH LORRAIN.

Written for the Canadian Mining Journal by Frank C. Loring.

The pioneer company in the way of extensive improvements is the Keeley Mine, Limited. This company has erected a gas producer plant, furnishing power for a 10-drill compressor, 50 h.p. electric hoist, pumps, etc. Mine buildings are extensive and electric lighted. Entire plant is in excellent shape. Development consists of shaft 130 feet deep, with about 300 feet of drifts, shaft 100 feet deep, also many open cuts and trenches. Three carloads of ore have been shipped. These figures are approximate.

The Wettlaufer Mine has a 5-drill compressor, two 60 h.p. boilers, and other machinery to correspond, and extensive, well-constructed buildings, all electric lighted, capable of accommodating 80 men. Development consists of a shaft 140 feet deep, and about 500 feet of levels. Shipments to date, all since July, are 80 tons of first-class and 30 tons of second-class ore. This mine has a large quantity of ore in reserve, and will be a steady shipper.

The Montrose, Harris Lorrain, Lounsbury, and Murray have steam plants. Among other mines in operation are the Newman, Little Keeley, Keeley-Jowsie-Woods, Haileybury Silver, Clear Lake, William, Maiden and other properties with which I am not familiar. All of these are in the Keewatin greenstone or diabase rocks, and generally not further than two claims from lines of contact.

Work has been materially stimulated during the past year by the remarkable development on one of the mines above mentioned, as well as sensational surface discoveries on other properties.

Some of the veins in South Lorrain are characterized by great strength, sometimes being traceable for three or four claims. They often follow well-defined lines of faulting. They should consequently be deep seated, and although there is at present slight evidence as to depth at which ore can be found, there are possibilities in excess of some of the mines in the superficial Huronian slates and conglomerates. The advent of comparatively cheap electric power during the next few months will greatly stimulate development. There is evidence of much more extensive operation for the future.

Summer transportation is by steamer to Silver Center, on Lake Temiskaming, thence by wretched wagon roads to the mines. No effort has been made to assist the miners in maintaining good roads. During the winter snow roads from Haileybury and Cobalt, or Temagami, are used.

Personal and General

Major R. G. Edwards Leckie will spend the winter in Vancouver, B.C.

Mr. C. H. Macnutt has assumed the general management of the Poderosa Mining Co., Ltd., in Chile.

Mr. J. D. Hurd has resigned his position as general manager of the Crow's Nest Pass Coal Company.

Messrs. Eugene Coste, R. W. Leonard and G. R. Mickle have been elected members of the Institution of Mining and Metallurgy.

The following gentlemen were elected to membership in this institute at a council meeting held on Dec. 3rd:—

Members

Adsit, L. M., Eustis Mining Co., Eustis, Que.

Annable, H. W. C., Grisham House, Egham Surrey, England.

Bateman, G. C., Supt. Hudson Bay Mines, Ltd., Cobalt, Ont.

Frecheville, Wm., 35 Queen Victoria St., London, E.C., England.

Lathe, Frank E., Granby Con. .M. S. & P. Co., Grand Forks, B.C.

Macaulay, D. A., International Coal & Coke Co., Coleman, Alta.

McLellan, J., Skidegate, B. C.

Miles, Arthur D., Sudbury, Ont.

Passow, F. M., Eustis Mining Co., Eustis, Que.

Rogers, R. P., Box 587, Cobalt, Ont.

Shillington, Robt. T., Haileybury, Ont.

Wilson, David G., Supt. Crow's Nest Pass Coal Co., Hosmer, B.C.,

Winckler, A. Lange, Box 609, Gow Ganda, Ont.

Young, Jacob W., Mgr. Cobalt Central Mines, Cobalt, Ont.

Student

Rayner, Geo. W., Thorold, Ont.

Yours faithfully,

H. Mortimer-Lamb,
Secretary

Book Reviews

Index of Mining Engineering Literature. By Walter R. Crane, Ph.D. 8vo., 812 pages. Cloth, $4.00 net. Morocco, $5.00 net. John Wiley & Sons, New York; Renouf Publishing Co., 61 Union Avenue, Montreal.

Professor Crane has made a place for himself in technical literature. He possesses industry, erudition, and ambition. But we fear that, in the parlance of the vulgar, he has bitten off more than he should have.

The elaborate analytical index issued last year by the American Institute of Mining Engineers purported merely to cover the transactions of that society. It was elaborately complete. Professor Crane's index, it is claimed, covers eighteen engineering publications—and more also.

Professor Crane's index is neither complete nor exact. He has confined his references to periodicals with which he happened to be familiar. And his field has been narrow. Not a few of the most useful periodicals are not indexed at all. To our sorrow, for instance, we find that the Canadian Mining Journal is not indexed at all. Also we find that our predecessor, the Canadian Mining Review, is indexed under an inaccurate title. Other sins of omission and of commission we have noticed. Therefore we feel justified in stating that Professor Crane should not have rushed into print; he should have held his manuscript by him for another five years.

Possibly the author's initial mistake is indicated in his preface. "It [the index] represents," says Mr. Crane, "the unaided labour of the author for a period of about five years." We contend that the author was guilty of a lapse in judgment in trying to bring out any such volume by himself. To this may be attributed the imperfections of the book.

However, having said our worst concerning Professor Crane's "Index," we may be permitted to say that in several respects it is very worthy of commendation. Particularly praiseworthy is the subdivision of subjects. Incomplete as each section must necessarily be, it will prove instructive to the engineer to find, grouped under heads, numerous references to subjects such as "Mill Machinery," "Animals in Mines," "Ventilation," "Tunneling," etc., etc.

We have, perhaps, said our best and our worst of the book under discussion. At worst it represents the faithful though inaccurate labours of a diligent student and reader; at best it is a compact work of reference for the engineer who reads and wishes to remember. It will do no harm to add this book to the reader's library.

CORRESPONDENCE

NASCENT GOLD AGAIN.

Probably more than the usual number of men with questionable processes for the recovery of gold and silver are at present abroad in the land. One of these, Mr. Eden, recently visited the School of Mining, and proposed that he should demonstrate his method. He claimed that it would extract more gold from an ore than any of the ordinary assay or metallurgical methods.

As such an opportunity might not come our way again, we thought it advisable to give his process a fair trial. We thought it our duty to give the public as convincing proof as we could that there was nothing in Mr. Eden's claim. We approached the subject with as nearly unprejudiced minds as was possible under the circumstances.

His method, as used here on a laboratory scale, was to take 1 A.T. of pulverized ore, add 10 c.c. of his solution, and a small quantity of mercury, and rub all together in an agate mortar for a few minutes; then to dissolve the mercury in nitric acid, and thus recover the gold.

The following is a statement of the tests made, by whom made, and the results obtained:—

Tuesday, Nov 23rd—A test made by Mr. Eden, without supervision of any kind, on a sample of Larder Lake ore, finer than 100 mesh, gave 1.25 oz. per ton.

Wednesday, Nov. 24th—Tests made on same sample as above:—

(1) Fire assay (by McKay)—average of five, checking satisfactorily—0.202 oz. per ton.

(2) Mr. Eden's method (by McKay)—0.28, 0.16, 0.19 (2 A.T. gave 0.38 m.g.), 0.05 (omitted), and 0.11 oz. Average of four results, 0.185 oz. per ton.

Total weight of four beads, 0.98 m.g. After adding silver and parting, 0.95 m.g.

These five samples were weighed alternately with the five taken for fire assay. Mr. Eden expressed his satisfaction with the way in which the tests were carried out.

(3) Mr. Eden's method (by Eden, with close supervision), 0.20 oz. per ton.

Tests made on sample of Belmont ore:—

(1) Result of mill run by students on two tons of ore, of which this was a sample, made some weeks earlier, 0.226 oz. per ton.

(2) Mr. Eden's method (by Eden, closely watched), (2 A.T. gave 0.26 m.g.), 0.13 oz. per ton.

Tests made on slimes from above mill run:—

(1) Fire assay (by McKay), 0.03 oz. per ton (3 assays).

(2) Mr. Eden's method (by Eden, closely watched), (2 A.T. gave 0.03 m.g.), 0.015 oz. per ton.

A gentleman who was with Mr. Eden throughout these tests was given a sample of this Larder Lake ore, which assayed, as above stated, $4 per ton. He wrote us that, in Toronto, he, using Mr. Eden's method, got results of $17, $15, and $12 per ton, respectively, on three 1 A.T. samples.

A glance over the above results will show that although it was possible to obtain almost any quantity of gold on unsupervised tests, yet in no case did we get a greater saving of gold than might be expected from amalgamation with the aid of intimate contact between the pulp and the mercury. Needless to say, this was all we expected to prove.

Kingston, Dec. 20th, 1909. G. J. McKAY.

Editor Canadian Mining Journal:

Sir,—The following extract from the proceedings of the Select Standing Committee of the House of Commons on Mines and Minerals, recently issued, should not pass without a challenge. This extract reads:—

"Mr. Congdon.—I would like to ask the Minister if he thinks it desirable to endeavour to get a conference with the different provinces with the view to securing, to a certain extent at all events, uniform laws. Although it is impossible to get them entirely uniform, it would be of enormous advantage if the backbone, so to speak, of the legislation with regard to mining, was similar throughout the Dominion. There is one matter especially that is worthy of consideration; take the Yukon, for instance, occasionally a geologist comes in there, he spends the summer there, but he will not tell any one that he has discovered anything. About two years later we discover in some report that he has found something that is valuable—after the information has absolutely ceased to be of any value to any one. It seems to me that one of the most important things to be done in that connection would be to have one man in your department whose duty it would be to collect all the information in regard to that particular section of the country, who would spend most of his time in that country, and who would not wait for the publication of his report before giving out any information, but who would publish it as he goes along. Then it would be of some use to the people for whom it is intended. My own experience of geologists is that they are so infernally careful of their reputation that they are of no use to themselves or any one else, and that is the case with mining experts generally as a rule. They are very careful about making any definite statements that there is mineral of value there; it does not hurt a man's reputation if, after he has reported adversely, a property should turn out to be of some value, but if he should report favourably and it should not turn out to be valuable, it would injure his reputation. The whole of those geologists who have gone out from the department are so frightened of their reputations that they will not give out any information until they get back here and spend a considerable amount of time in eliminating every valuable feature from their report until they get something so commonplace that when it is published it is no good to anybody. I believe that in the Yukon, say, if there was a man of experience in the rock mining industry sent in there and allowed to remain there and to give out information to the people, and I believe the same is true of other sections of the country, such a man would be of invaluable service to the mining industry; more valuable than all the other portion of the Geological Department has been. I would call attention to the valuable work of Mr. A. H. Brooks, of the United States staff last year in the American territory. Although he was working in the American territory, he has done more good to the Yukon territory than all the men we have had in there, simply because his life is devoted to pointing out the value of the resources of the northern country, and of course there is not much difference between the Yukon and Alaska."

Mr. Congdon praises the work of A. H. Brooks in Alaska for the U. S. Government. What has this, good as it is, to do with the Canadian Yukon. His reports and information are given after mature consideration, very much in the same way as those of our own men. I think Mr. Brooks himself would hasten to disclaim the praise of Mr. Congdon.

When the people poured into the Yukon in 1898 they had with them, if they cared to carry them, Dr. Dawson's maps and report of 1887. A special revised edition of this being hastened for delivery in 1898. In that same year two parties, under Tyrrell and McConnell, were sent into the Yukon, and from that day to this field exploration has been especially active, followed each winter by reports which conveyed useful information to the general public, who paid for getting it.

If our Canadian geologists gave judgments in the field to more or less local interests, it would be hard to draw the line as to how small a coterie might receive such news. Moreover, as the Minister, Mr. Templeman, pointed out, the officers have no option in this matter. Nor is it desirable.

As to the deliberation used in getting out reports, mineral wealth is more than a summer harvest; it will keep a while, and these same reports will become very useful to those stable mining concerns and prospectors who stay in the business.

If those who call for redhot reports would heed them when they appear, we should not have the troublesome inflations of the Kootenay, Yukon and Cobalt. Who should be better able to criticize the work of the Geological Survey than the members of the Canadian Mining Institute? Yet we find that Institute steadily supporting and trying to magnify their work.

My own travels have been so continually through districts where the work of the survey is appreciated, and so dependent upon the reports and maps issued from the Geological Survey that Mr. Congdon's attitude amazes me. In fact, I do not think he would find condemnation of this work a good plank in the platform of any mining constituency in Canada.

An allusion is made to "mining experts." These may be, what they may be, the common "mining expert" is only too ready to be the opposite of "infernally careful." Experience in the boom camps of Canada shows him to be only too ready to talk and to be as infernally dishonest as the geologists would be if they followed the plan of giving early information on the spot.

J. C. GWILLIM.

Kingston School of Mining.

SPECIAL CORRESPONDENCE

ONTARIO

Cobalt, Dec. 18.—Two more properties in the North Cobalt district have recommenced operations. These are the Red Rock and Green-Meehan, which are now operated by the same company, known as the Cobalt Consolidated Silver Mining Company. During the past summer all the work was confined to surface prospecting, and it is understood that some good indications were discovered. These will be developed by a continuation of the underground workings. It had been the intention of the management to wait for the power which is being brought in, but as so many false reports have been sent out regarding the date of its arrival, it was decided to start work with their own steam plants.

Recent developments on the Lawson have shown that the course recently pursued by the new directorate in cutting the dividend was warranted. A short time ago an upraise was started from the 88-foot level on the main vein, commonly known as the "Silver Sidewalk." This upraise was continued to the surface, and it was found that the rich silver values as seen on the surface did not extend to a much greater depth than fifteen feet. The action of the directorate in cutting the dividend so soon after coming into control aroused a storm of criticism from all over, but it has been shown that this course was probably the wisest that they could have pursued. Some high-grade ore, however, has been found on the 88-foot level of the Lawson No. 5 vein. The failure of the phenomenal values of the "Silver Sidewalk" to extend to depth should not be taken as a criterion for estimating the value of the contents of the other veins, as it is necessary to carry out an extensive course of development work. Unfortunately, progress in this direction has been greatly retarded by the failure of the power companies to deliver air.

In sinking the shaft on the Silver Cross property, the diabase was encountered below the Keewatin at a depth of 123 feet.

Good reports are coming from the Beaver. A short time ago they shipped a car of high-grade ore, and they will have another ready before long. The vein from which this ore is being taken has been in the past extremely irregular, but lately it has been very regular, and has carried high-grade values throughout. Another property which has lately resumed shipments is the Townsite. This company was reorganized some months ago, and working capital furnished by English capitalists. Since that time the outlook has been steadily improving, and now the management is considering the erection of a mill to treat the large tonnage of milling ore that they have in the mine.

In connection with the recent purchase of 54,550 shares of the treasury stock of the Trethewey Mining Co., A. E. Osler & Co. have issued a statement as to the reserves of the Trethewey. The report states that the ore in sight is estimated at about five million ounces. Reports like this, however, should not be considered too seriously, as the man sent by the brokerage house to look into the property did not even see underground.

Some good ore is being taken out of the new vein found on the Maiden Silver property in South Lorrain.

Another rich ore shoot has been struck in the No. 14 vein on the Crown Reserve. For some time past the silver values have been small, but in the ore shoot just encountered they run several thousand ounces per ton. On the Silver Leaf property a large amount of development work is being carried on with favourable results. The old Silver Leaf shaft on the Crown Reserve boundary will shortly be connected with the Crown Reserve workings.

Work has been started on the foundations of the sampling plant which is being put up by a firm of local engineers. This plant will handle both low and high grade ore, and if the smelters will agree to abide by its results, it would prove to be of great assistance to the mining companies, as they will then be able to find out the value of the ore before it is shipped. This will be particularly advantageous with regard to low-grade ores, as on the value of its silver contents depends very often the smelter to which it will be sent.

A few days ago the thaw-house at the Farah was blown up, but fortunately no one was injured. This is the third dynamite explosion that has occurred within the last six weeks, the others being of a similar nature. None of them, however, was attended by any fatalities.

The district of South Lorrain is beginning to come in for a good deal of attention lately, influenced largely by the shipments made from the Keely and the Wettlaufer. A total of four cars of ore has been shipped by the latter property for this year, and it is probable that more or less regular shipments will now be maintained, as developments on the 100-foot level have shown the veins to continue fully as good as on the upper levels.

In drifting on the main vein from the No. 6 shaft on the 75-foot level of the O'Brien mine, a very rich shoot of ore was found. The vein had been lean for some distance, but at a distance of 500 feet from the shaft the values came in again. The wall rock is also well mineralized, which will give considerable tonnage of ore for milling purposes.

A concern known as the Ontario & Quebec Reduction Company is putting up buildings for a plant on the shores of Lake Temiscaming, to treat the high-grade ores of Cobalt. It is stated that the capacity will be 25 tons a day. The company is financed by Montreal capitalists. The Nipissing Central Railway when in operation will connect the mines and smelter.

A good many of the Gillies Limit claims purchased in the recent sale are now being actively developed. It is understood, however, that many of the purchasers are already regretting the high prices paid for these lots, as it is believed that they were out of proportion to their value. Development is, and will be, retarded, however, on account of the lack of power, but as soon as the power companies are in a position to distribute air and electricity, development will be carried on on a large scale, and underground work will be started on many of the claims now lying idle. Although the Hydraulic Company has promised air for the middle of January, it is very improbable that they will be able to deliver it till about a month or two after that date, as there still remains a large amount of rock work to be done in the 1,000-foot tunnel between the intake and outlet shafts.

The Waldman has struck its big vein in the east drift, and from that point an upraise will be started. The shaft on this property is now down 90 feet, and drifts are being run on the 75-foot level. The new plant on the Wyandoh is being rapidly installed, and there will now be on the ground a six-drill compressor and two 60 h.p. boilers. It is stated that the plant will be in operation about Christmas time.

The Mount Royal Silver Company has called a special meeting for Dec. 22nd to discuss the advisability of issuing 200,000 shares of stock at 25 cents. At the present time there are 700,000 shares in the treasury. The money raised by the sale of stock will be used to buy machinery to develop some of the veins found on the surface. This property is situated at Elk Lake.

A short time ago a deputation waited on the Premier of the Province to ask for a reduction of the excessive royalties which some of the mines are forced to pay. In the past the royalties were based on the gross value of the ore as it came from the mine. In future, however, the royalty will be based on the net profits accruing to those companies that were so fortunate as to have their royalties reduced. The Government has announced

that they have decided to make some alterations with the mining companies in the townsite of Cobalt and also Chambers-Ferland, and instead of having a flat rate of 25 per cent., they will charge a royalty of 25 per cent. on the net profits of the mines, which will be ascertained under the provisions of the Supplementary Revenue Act. The mines that will be benefitted will be the Townsite, Nancy Helen, City of Cobalt, Wright Mining Company, Railway Reserve, J. Harris, McCrae, Ontario Development and Mining Co., Chambers-Ferland, and the Cobalt Station Grounds. All of these properties, with the exception of the Chambers-Ferland, pay royalties to the T. & N. O. Commission. The Chambers-Ferland will pay directly to the Ontario Government. The properties affected that are shippers, and therefore directly benefitted by the reduction, are the City of Cobalt, Cobalt Townsite, Nancy Helen and Chambers-Ferland. It would appear that the Government has made these reductions without going very deeply into the rights or wrongs of the case, and only those companies are affected that are unable to pay dividends under the present excessive charges.

The chief topic of interest at the present time in this district is the new gold discoveries around Porcupine Lake. The country has been staked for miles, and as far as can be seen, it would appear that there will be a stampede into this country similar to the one into Gowganda a year ago. So far the lack of transportation facilities has discouraged many from going in, although a large number of prospectors have gone in on foot. Supplies are being concentrated in Matheson, so that they will be available when the road, which is going through to Night Hawk Lake, is completed. A large number of dog teams and horses are already on the ground, and more are arriving daily. A deputation of prospectors and miners interviewed the T. & N. O. Commission at Matheson, and were assured that every facility will be offered them for handling the freight and passengers from that point. Many sales have already been reported, and several well-known concerns have acquired property in the new district. A party of Pittsburgh men have purchased six claims for twenty thousand dollars, and a force of men will be sent in at once to develop these claims. The big firm of McArthur & Co., of Glasgow, Scotland, has also purchased six claims for a large sum, and already men and supplies are being sent in. This company proposes to sink four shafts to a depth of 200 feet each. The Timmins Syndicate has also left for this district with thirty men to erect camps on the Hollinger claim, and the O'Brien interests have also sent in a gang to help get the road in shape and take in supplies. Gifford Gold Fields, Limited, is also preparing to develop its holdings and has made provision for sending in men and the necessary supplies. It is understood that during the winter several companies will install plants. The development of this new section is being looked forward to with unusual interest, and unfortunately gold mining in Ontario has usually proved to be a rather unprofitable investment. This, however, has been due, to some considerable extent, to mismanagement, which unfortunately is so often apparent in gold mining. Many of the properties which will be developed this winter are, however, under the control of men familiar with mining in this district, and good results can be expected if it is possible to obtain them.

It is unfortunate for the Gowganda district at the present time that the Bartlett mine should have made such a poor showing. The wide publicity which was unfortunately given to this property last winter was responsible to a considerable extent for the boom which resulted, and the ensuing depression was much greater in consequence. If this property had been properly worked it might have had a good chance, but as it was, a plant which cost in the neighbourhood of $125,000 to install was put in before even a test pit of any extent had been sunk. The company is now unfortunately rather short of funds, and it is understood that unless money can be raised in some manner, work is likely to be discontinued.

BRITISH COLUMBIA.

Rossland.—The mining outlook here is certainly brighter than it was a few months ago. The Le Roi is continuing to make weekly shipments of good ore, although the output is not large. The lessee of the Velvet Portland mine has already shipped 71 tons of ore that will return over $32 per ton while shipments from the Le Roi 2, Ltd., and the Consolidated group continue to run up a good average. The output of the camp is 4,600 to 5,000 tons per week.

The two diamond drills at work in the depths of the Le Roi have encountered some good ore, and drifting on these prospects is the present order of things.

The shaft of the Josie claim of the Le Roi 2, Ltd., is now down to the 1,300 foot level. It will be driven about 50 feet more when the work of drifting on and opening up the ore from the 950-level downward will be started. The mill at the Le Roi 2, Ltd., is treating 260 tons of second class ore per week regularly.

A good find of free gold has been made in the ledge now being worked in the I. X. L. mine here by Evans & Brokenshire. The ledge is about two feet wide and some rock has been extracted carrying coarse gold. The operators are in hopes that they are approaching one of the bonanza shoots that were frequently found in the property in early days..

Phoenix.—The ore shipments from the B. C. Copper Co. Mother Lode mine reached a new record figure during the week ending Nov. 27th, the company sending 11,616 tons to the Greenwood smelter from that property. The week following the Oro Denoro mine dropped from the shipping list. The crew has been reduced while certain development work is being done.

The eighth and last big furnace at the Grand Forks smelter of the Granby Co. was put into commission last week, completing the work of augmenting the eight furnaces started early in the year. By this means the capacity of the smelter has been increased from 1,000 tons per day to 4,000 to 4,500 tons. No doubt, with this complete equipment, the Granby will make some record shipments and smelter runs in the near future.

There is a rumour afloat here that the men behind the Granby Co. are making an effort to secure control of the B. C. Copper. Co. (which now controls the New Dominion Copper) and thus place all of the big copper producers of the Boundary proper under one control. It is said that the proposal has been made by the Granby in the Eastern States of one share of Granby stock for ten shares of B. C. Copper, equivalent to nearly $10 per share for B. C. Copper. This proposal was not enticing enough to lure the control from the present owners who say, however, that they might entertain an offer of about double that amount.

It is a difficult matter for the ordinary individual to see what great advantage would be gained from this move, aside from a reduction of certain expense items, the benefit of large areas of ground for future use, that is known to contain prodigious low-grade ore bodies, and those many advantages that accrue from having such low-grade properties under one able management. It may be the New York copper clique want to make the Granby one of the big going concerns. It would prove the placing of the old Dominion Copper relics a step farther away from those dissatisfied shareholders who still keep feebly rapping away at what seems a hopeless cause. The thing has not taken any perceptibly tangible form as yet, however, and when a little more is known of the real situation, much that is now nebulous may be cleared up.

Application has been made in the Supreme Court at Vancouver that the money in the hands of the liquidator of the Dominion Copper Co. be paid into court and the liquidator released, on the ground that he failed to advertise for creditors.

Diamond drill exploration has been started on the Rawhide claim of the New Dominion Copper Co. This is the first work that has been done in this mine since the old company ceased work when in financial trouble.

In the Argo tunnel at Greenwood a 20-inch galena ledge was cut last week 260 feet from the portal. The compressor from the Crescent mine is being moved to a point near the mouth of the Phoenix-Greenwood adit and machine drills will be working in that tunnel in a couple of weeks in place of hand drills as of late.

During the month of November the Granby smelter treated over 120,000 tons of copper-gold ore, equivalent to approximately 31,680,000 lbs. copper per annum. There is no good reason, however, at the present time, why the Granby smelter is not treating nearly 100,000 tons per month, and it is possible the figures will reach this mark in December. This ore, which yields about 22 lbs. copper per ton, (it was 21.81 for the year ending June 30, 1909), can be mined, smelted, converted to blister copper and loaded on the cars at Grand Forks for approximately $2.50 per ton. The unsteady coke supply has in the past been the bane of local smelters—the Granby has forfeited itself in this direction by investing over a million dollars in the Crow's Nest Pass Coal Coo. This, no doubt, had something to do with the C. N. P. Co. continuing to work while the other mines were tied up with strikes last spring.

Nelson.—On the 15th of December a convention of mining men and delegates from the surrounding associated boards of trade will be held in this city to consider the several phases of the zinc situation as it presents itself to local zinc-lead miners, with a view to improving and aiding this industry. The chief market for the product of local mines, at the present time, is found in the United States, the freight charges to distant zinc smelters amounting to about $10 per ton, and the duty entering the States being practically double this amount. The points that will especially be touched upon and discussed will be the establishment of a commercial zinc smelter in this district; encouragement of zinc manufactories in Canada; the invocation of Dominion Government aid toward experimental work in electrical and other zinc smelting; bounty on zinc mined; and the increase of duty on manufactured zinc products from foreign countries.

The Provincial Government has aided the Nelson experimental electric smelter with from $20,000 to $25,000. The local men interested say that if they had the money on hand they could make the plant a commercial success. The zinc problem in this district is a difficult one. Concentration is only partly successful. Ore and concentrates now have to be shipped to Kansas, Missouri, and even Germany, for treatment. As depth is gained in the lead mines of the district, the zinc becomes blended with the silver and lead, whereas on the surface it often runs in narrow veins and is somewhat easier to cope with.

The influence of the big zinc pools, the competition of big producers and other factors all count against the growing industry of the Slocan-E. Kootenay district, in addition to the troubles they have at home, and it would be a laudable move on the part of the Government if it would take action to foster the industry. There is no doubt but that it would be amply repaid in the years that are to come.

A 20-ft. vein of good milling ore has been opened up on the limited property of the Highland-Buckeye Mining Co. The ore was located at 200 ft. depth in the shaft. A 250 gallon pump is being installed to cope with the heavy influx of water on this ground. This is characteristic of many local properties and has been found a costly inconvenience. A tramway is to be built from the United mine to the Highland mill.

GENERAL MINING NEWS.

NOVA SCOTIA.

Sydney, N.S., Dec. 15.—The steamer Cape Breton, of Glasgow, left here to-day for Prince Rupert with 6,800 tons of steel rails. Besides this, it is understood that several foreign ships will take cargoes of rails from Sydney to Prince Rupert.

The Dominion Iron & Steel Company have been for some time negotiating for a modification of the order-in-council prohibiting foreign vessels from engaging in the coast trading trade to enable these foreign ships to engage in the Sydney-Prince Rupert trade. To that extent a modification has been secured.

Halifax, N.S., Dec. 17.—Thos. Cantley, general manager of the Nova Scotia Steel Company, positively refused to tell the prices realized in Montreal in 1909. Mr. Cantley's reason for declining to reply to the question was that he would be seeking to get contracts for the sale of 300,000 tons of coal in that market within a few weeks and to give this information would mean that he would seriously injure his company. Eventually after counsel on both sides had argued the matter at length, the stipendiary ruled that the information seemed necessary and must be given. Mr. Cantley still was obdurate. Application was then made for his committal to jail, and then witness rose and reiterated his previous statements. He said that if the strong American competition that they were meeting in the St. Lawrence now could learn their prices beforehand, it might mean that the Nova Scotia Company would lose their contracts. Holding these views and without meaning any disrespect to the court, he must still decline to answer. Counsel for the prosecution still pressed the motion for Cantley's committal to jail, but the stipendiary suggested that the answer be written out, sealed and placed in the custody of the court.

This was eventually agreed to by Mr. Cantley, but not until he had been definitely assured that no one but the stipendiary would see the document.

G. H. Duggan, second vice-president and general manager of the Dominion Coal Company, was a witness to-day. He had with him a quantity of correspondence between his company and the Cumberland Railway and Coal Company during the past three months, which he was subpoenaed to produce. The letters were submitted to the magistrate, and it was found they did not relate to matters covered by the inquiry.

Mr. Duggan also produced letters between his company and the Nova Scotia Steel Company. Two of these referred to some English coal coming to the St. Lawrence, and were tendered to show there was some agreement between the two companies. A long discussion of counsel followed as to admission of the letters.

NEW BRUNSWICK.

Fredericton, Dec. 20.—The Canadian Antimony Co., Ltd., has closed its mines at Lake George. There was a bad fire at the mines some time ago, and that, coupled with the poor outlook of the market, has caused a temporary shutdown.

ONTARIO.

Sudbury.—Work on the stamp mill of the Canadian Exploration Company at Long Lake has been vigourously pushed, and it is expected that stamps will be dropping before Christmas. The success of this enterprise will be of much importance to this district. Mr. R. W. Brigstocke is engineer for the company, and has given his personal attention to the equipment of mine and installation of plant.

Toronto, Dec. 17.—As a result of representations of large deputations of mining men who have waited on the Minister of Mines, the Ontario Government has decided to grant a measure of relief to certain mining companies now operating on the townsite of Cobalt and vicinity. It was found on investigation that these mines could not be operated under the excessive royalty exacted.

The Government has therefore decided to reduce the royalty from 25 per cent. on gross output to 25 per cent. on net profit of the mines, which is to be ascertained under provisions of the Supplementary Revenue Act.

The companies affected are Townsite, Nancy Helen, City of Cobalt, Wright Silver Mining, Railway Reserve, Jackpot Mining, J. Harris McCrae, Ontario Development, Cobalt Station Grounds and Chambers-Ferland. All the companies in question obtained their lands from the T. & N. O. Commission.

Toronto, Dec. 18.—Ten men were arrested in connection with the Cobalt ore stealing conspiracy. On Thursday two arrests were made, and yesterday eight more were made, six in Toronto, and two in Cobalt. Shortly after 8 o'clock Inspector of Detectives Duncan received word from Chief Geo. Caldbrek, of Cobalt, that two of the many men who were being looked for there had been apprehended.

By what the police learned from the men arrested in Toronto yesterday, it would appear that Dr. J. E. Wilkinson, President of the J. E. Wilkinson Refining Co., who is on remand and out on bail for $20,000, purchased from men in town as well as from men in Cobalt. The local men in the "Ward," who, it is alleged, were buying from the go-betweens who came down regularly from Cobalt, admitted yesterday that they sold their ore to Wilkinson, and the cheques found in Wilkinson's office on Lombard Street after his arrest Thursday afternoon go to show that he had paid out a good amount of money to the men who are now under arrest.

The men arrested in Toronto were:—

Nicholas Zojotz, Austrian, miner, charged with receiving stolen property.

Dynamtis Antras, Austrian, miner, charged with receiving.

Jacob Cohen, 78 Agnes Street, Hebrew, charged with receiving.

Morris Robshensky, 93 Elizabeth Street, Hebrew, charged with receiving.

William Jansen, Cobalt, bartender, charged with selling stolen property.

Jaakka Heikkik, Cobalt, miner, charged with selling stolen property.

The men arrested in Cobalt last night were: J. H. McGale, hotelkeeper, charged with receiving; H. A. Vanwinkle, insurance agent, charged with receiving.

Toronto.—Dr. J. E. Wilkinson, whose name is implicated in the ore-stealing incident claimed to be ignorant of the recent change in the Criminal Code, Section 424. The change is as follows:—

"Everyone is guilty of an indictable offence and liable to two years' imprisonment who

"(a) Being the holder of any lease or license issued under the provisions of any act relating to gold or silver mining, or by any persons owning land supposed to contain any gold or silver, by fraudulent device or contrivance defrauds or attempts to defraud His Majesty, or any person, of any gold or silver or money payable or reserved for such lease, or, with such intent as aforesaid, conceals or makes a false statement as to the amount of gold or silver procured by him; or,

"(b) Not being the owner or agent of the owner of mining claims then being worked, and not being thereunto authorized in writing by the proper officer in that behalf named in any act relating to mines in force in the province in which the offence is alleged to have been committed, sells or purchases, except to or from such owner or authorized person, any rock, ore, mineral, stone, quartz or other substance containing gold or silver, or any unsmelted or untreated, or unmanufactured, or partly smelted, partly treated, or partly manufactured gold or silver: or

"(c) Purchases any rock, ore, mineral stone, quartz or other substance containing gold or silver, or any unsmelted, or untreated, or unmanufactured, or partly smelted, partly treated, or partly manufactured gold or silver, except from such owner or authorized person, and does not, at the same time, execute and triplicate an instrument in writing, stating the place and time of purchase, and the quantity, quality of gold and silver so purchased, and the name or names of the person or persons from whom the same was purchased, and within ten days file the same with the clerk of the county or district court of the county or district in which the purchase was made, or with the officer with whom in the said county or district bills of sale or mortgage of personal property are filed or deposited."

BRITISH COLUMBIA.

Nelson.—A convention of mine owners and others interested in the production and marketing of zinc ores to discuss ways and means of improving the marketing and disposing of the products, will be held in Nelson on Wednesday, Dec. 15th. The presence of zinc in ores, especially in the Kootenay district (except in a few special cases) has been a detriment rather than a benefit to mine owners. At the same time the only market is practically in the United States, the average freight being $10 per ton, and the duty about the same, making a charge of some $20 per ton to place the zinc ores of this district at the smelter.

It is felt that the time has arrived when these conditions might be improved, and that some action towards promoting this might be brought about by a conference of those interested.

In the first place, in order to present the question in all its bearings it will be necessary to have some authentic information regarding the present production of zinc ores and other matters in connection therewith, and this can be gathered at such a meeting.

The matters which present themselves as being worthy of discussion if a meeting can be convened are:—

1. The establishment of a zinc smelter in this country.

2. The establishment of home manufactories of zinc products.

3. The asking for government aid for assistance in experiments.

4. The asking for a bounty on zinc similar to that at present in force for lead.

5. The asking for the increase of the duty on zinc ore products, such as spelter oxides, etc., which now come into this country, principally from the United States, either free of duty or at a low tariff.

MINING NEWS OF THE WORLD.

EUROPE.

Spain.

In view of the likelihood of the Spanish oil fields assuming an important position in the world's production, some remarks by Senor Don Claudis Sanz, of the Company Petrolifera de Villamartin, are of considerable interest. The property is situated less than two kilometres from Villamartin, and Senor Sanz was able to report that the work being carried on is meeting with excellent results. Boring is in progress, and at depths of 75 to 110 metres and also from 250 to 300 metres petroleum has been proved to be good and abundant.

Roumania.

For the first nine months of the current year the production of oil in the Roumanian fields amounted to 956,614 tons, while for the corresponding period of 1908 the output was only 866,762 tons.

Turkey.

The Sublime Porte has well received the proposition of the Minister of Mines concerning the suppression of all duties for the obtainment of mining concession Firmans. This will contribute towards the progress of the mining industry in the country.

Russia.

Recent reports of activity in the oil district of Maikop in Southern Russia have been quickly followed by the flotation of the Anglo-Maikop Corporation, Ltd. The capital is £200,000, only take up such as are approved. Reports on the properties are of a highly favourable character, and already the company has received a good offer to purchase a single plot over which it holds an option.

Another concern formed to deal with oil properties in Russia is the Russian Eastern and General Petroleum Trust, Ltd., which has just been registered with a capital of £50,000 in £1 shares. At present it is only a private company, but no doubt the public will be invited to participate in due course.

SOUTH AFRICA

The suggestion made by Mr. Reyersback, a member of the firm of Wernher, Beit & Co., before the Chamber of Mines at Johannesburg, recommending the discontinuance of monthly returns of the output and labour, met with a storm of protests. Particularly effective is the signed statement of a group of prominent London Stock Exchange firms, which in part is as follows:—

As dealers for many years in the African mining section of the Stock Exchange we shall be obliged if you will spare us space to protest against the preposterous proposal of Mr. Reyersbach, at the late meeting of the Chamber of Mines at Johannesburg to discontinue the monthly returns of output and labour.

In the note published in a financial paper Messrs Wernher Beit & Co., appear to favour Mr. Reyersbach's proposal, which they say would, if adopted, be beneficial. We are strongly of the contrary opinion, and consider that it would be highly detrimental to the interests of the shareholding public. The mere suggestion of it coming from such a source came as a coup de grace to an otherwise demoralized market, and the only parties to whom in our opinion it might be beneficial are the large mining houses who are every day dealing in the shares of the companies, in competition with the members of the Stock Exchange, whilst in many cases partners in the various mining firms are acting as directors of the companies in whose shares they deal.

The shareholders and the dealers on the Stock Exchange would be left in the dark as to the position of the mines for twelve months, whilst the outside mining firms were continually supplied with the latest developments, which they would doubtless make use of for their own benefit.

A committee was formed last year of technical representatives of the mining groups of the Rand for the purpose of conducting experiments in connection with the metallurgy of the Rand. The object was to test promising devices and methods on producing mines, the cost of the investigations being borne by the groups. One of the questions taken up this year by the trials committee has been the economic ore reduction by means of gravity stamps and tube mills. The trials carried out at the Simmers East mine upon the combined duty of gravity stamps and the tube mills have shown that by enlarging the size of the screen mesh the efficiency of the combination was regularly increased until the limit with stamps weighing 1,400 lbs. was reached with a mesh of nine holes to the square inch, when a duty of 15 tons per day was recorded. It was found that on a larger quantity of material being put through the overflow was unsatisfactory in grade with respect to subsequent operations. Conducted within the average range of the appliances as used upon the Rand, the experiments have been of incalculable value, not only from the practical point of view, but also in the matter of mathematical data referring to the subject, which have been prepared at some length by Mr. Stadler. The investigation has been a long and costly one, but the committee are pleased to be able to say that the results have quite come up to their expectations. There still remains much work in improving the efficiency of the stamps and tubes separately.

RHODESIA

The general position is again brighter and the outlook more promising on developments at numerous points. Exploration work is being actively prosecuted over wide areas, and business in claims is again brisker.

The Rhodesia Exploration Company has secured a large number of claims in the Enterprise district on a line of auriferous schist formation extending several miles. Excellent milling and assaying results have been obtained. The acquisition is regarded as important generally and of particular value.

A line of country extending eighteen miles has been pegged on the Rusapi tin belt, 80 miles to the south-east of Salisbury. The assays are stated to give an average of 1½ per cent. over a width of 110 ft. The belt is in kopje formation and only the simple and inexpensive method of quarrying will be necessary in mining. Bunches of ore have given high assays.

AUSTRALIA

The State Colliery at Powlett River is working. It is estimated that in a month's time it will produce 400 tons daily.

It is understood that the Victorian railways are ordering coal in England.

The Commissioners announce that they will be able to handle the grain traffic during the approaching harvest without further curtailment of services, even on holidays.

The coal lumpers have struck as a protest against the arrest of their leaders. The Government has rejected a suggestion

made by the Lord Mayor that it should take over and work certain mines.

The question of the establishment of State smelting works in Queensland has lately been occupying attention, and the Chief Inspector of Mines has been instructed to report upon the proposals which have been put forward. Owing to the more or less scattered nature of the mineral deposits in Queensland, there are in some districts no treatment works at all available for small quantities of silver, lead or copper ore, and the main objects to determine are whether material assistance to the mining industry will follow as a result of the establishment of smelting works, and whether this industrial field can be entered by the Government without financial loss. The bulk of the State's annual output of gold concentrates results from the treatment of Charters Towers and Ravenswood ore.

UNITED STATES.

California.

The gravel-mining districts in Eldorado county are being more actively worked.

Montana.

An effort is to be made to introduce legislation that will lessen accidents, improve sanitary conditions, and generally regulate the operations of the larger mines of the State. The State Mine Inspector, in his annual report, asserts that of the forty-seven fatalities recorded, the greater number were due to carelessness on the part of the miners.

The strike of the switchmen on the Great Northern and the Northern Pacific is still on. As both roads run into Butte, the mines depending upon these roads, about twelve in all, have been forced to close.

Missouri and Kansas.

During November the Kansas mines produced 3,487,650 lbs. zinc and 302,470 lbs. lead, having a total value of $97,467.

Arizona.

The United States Smelting, Refining and Mining Company has purchased the entire holdings of the Arizona-Mexican Mining and Smelting Company, which consists of a copper and lead smelter at Needles, Ariz., with a number of developed and semi-developed mines tributary thereto.

In addition to the holdings of the Arizona-Mexican Mining and Smelting Company, the United States Smelting, Refining and Mining Company has acquired a large number of claims in the same neighbourhood. The smelter is so situated as to handle the ore of Southern and Central Nevada, Southern California, Southern Utah and Northern Arizona more economically than any other plant. The ores in the mines that have been taken by this company are mainly silver and lead, and some copper.

Company Notes

The Right of Way Mining Company has declared another dividend of 6 per cent. on the old stock, which is equivalent to .02 per cent. on the new capitalization. Books close on Dec. 20, and dividends are payable on Jan. 1.

CROWN RESERVE MINING CO., LIMITED.

Dividend No. 6.

Notice is hereby given that a special bonus dividend of 10 per cent. has been declared and will be payable on the 20th of December, 1909, to shareholders of record the 10th of December, 1909. Transfer books will be closed from the 11th to the 18th of December, both days inclusive.

Dividend No. 7.

Notice is hereby given that the regular quarterly dividend of 6 per cent. for the three months ending the 31st of December, 1909, and a bonus in addition of 9 per cent. for the same term, making a total payment of 15 per cent., has been declared, and will be payable on the 15th of January, 1910, to shareholders of record the 31st day of December, 1909. Transfer books will be closed from the 1st to the 14th of January, both days inclusive.

STATISTICS AND RETURNS

BRITISH MINERAL OUTPUT IN 1908.

The report on mines and quarries in the United Kingdom for 1908 has just been issued, and places the total value of minerals mined during the year at £130,003,670. During that period 261,528,795 tons of coal were mined with a value of £116,598,884. Of this over 65,500,000 tons were exported.

For the 36 years from 1873 to 1908 inclusive, the total value of the coal output was £2,361,701,000, while the value of other minerals was £500,021,000. The exports of coal have been steadily increasing during the 36 years. In the period 1873 to 1877 the amount exported was 13.8 per cent. of the total output. In the third 1903 to 1907 the exports had increased to 61.1 per cent., while in 1908 the exports declined to 32.6 per cent.

The depression in trade in 1908 was marked, and had its influence on the mineral output for the year, which was £2,275,418 less than in the year 1907. Of the total decrease in the value of minerals produced in 1908, coal accounted for £3,928,530. The amount of coal retained for home consumption was 176,222,650 tons, or a little less than four tons per head of the population.

The blast furnaces for the manufacture of pig iron consumed 18,842,464 tons, as compared with 21,119,547 tons in 1907.

NIPISSING NOVEMBER OUTPUT

The Nipissing company's output of ore for November had an estimated value of $177,731. Nearly half of the ore was mined from the Kendall vein. The monthly production and shipments for five months were:

	Ore Mined	Ore Shipped
November	$177,731	$222,294
October	178,197	167,075
September	150,668	240,270
August	152,449	201,817
July	150,078	116,428

President dividends at the rate of 30 per cent. call for the payment of $150,000 per month.

COBALT ORE SHIPMENTS.

The following are the shipments from the Cobalt camp for the week ending December 17th, and those from January 1st, 1909, to date:—

	Ore in lbs. Dec. 17.	Ore in lbs. Since Jan. 1.
Buffalo	41,826	1,094,017
Beaver	51,470	101,470
Carnegie	.....	63,410
Chambers-Ferland	.....	961,010
City of Cobalt	.....	1,204,927
Cobalt Central	43,120	815,267
Cobalt Lake	.....	141,340
Cobalt Townsite	.....	54,369
Coniagas	.....	1,504,378
Crown Reserve	102,504	5,940,217
Drummond	.....	1,962,100
Foster	.....	187,800
Hudson Bay	.....	1,287,220
Keeley	.....	96,000
Kerr Lake	180,360	2,555,641
King Eward	42,500	275,522
La Rose	524,896	13,209,166
McKinley-Darragh	.....	1,980,535
Nipissing	257,781	12,313,116
North Cobalt	.....	40,000
Nova Scotia	.....	480,810
Nancy Helen	.....	124,700
Peterson Lake	.....	324,040
O'Brien	64,100	2,791,753
Right of Way	64,491	2,917,846
Silver Queen	.....	684,844
Silver Cliff	.....	241,820
Stewart H. J.	.....	62,392
Timiskaming	.....	1,806,000
Trethewey	.....	2,010,823
Wettlaufer	116,700	224,700

Ore shipments to Dec. 17th from Jan. 1st are 57,457,293 pounds, or 28,728 tons.

Total shipments for week ending December 17th are 1,489,748 pounds, or 744 tons.

The total shipments for 1908 were 25,463 tons, valued at $10,000,000.

B. C. ORE SHIPMENTS.

Nelson, December 4th.—The following are the details of ore shipments and smelter receipts for the week and year to date:—

Ore Shipments.

Boundary—	Week.	Year.
Granby	25,020	968,036
Snowshoe	3,687	148,259
Mother Lode	11,528	298,414
Other mines	.....	8,218
Total	40,235	1,422,927
Rossland—		
Centre Star	2,646	164,854
Le Roi No. 2	603	28,597
Le Roi No. 2 (Milled)	260	12,320
Le Roi	105	10,748
Velvet	23	61
Other mines	....	260
Total	3,637	216,840
Slocan-Kootenay—		
Queen (milled)	420	19,950
Granite-Poorman (milled)	250	11,850
Whitewater Deep (milled)	700	33,400
Kootenay Bell (milled)	70	3,330
Second Relief (milled)	145	6,890
Nugget (milled)	110	5,230
Bluebell (milled)	900	42,800
Silver King	60	3,217
St. Eugene	319	19,498
Alice	24	78
North Star	132	2,606
Blue Bell	83	4,507
Van Roi	65	1,049
Granite-Poorman	33	416
Standard	68	508
Richmond-Eureka	100	2,539
Eastmount	34	166
Whitewater Deep	21	2,901
Whitewater	22	1,442
Ferguson	33	164
Rambler Cariboo	21	944
Other mines	..	12,686
Totals	3,610	176,171

Total shipments for the week, 47,482 tons; and for the year to date, 1,815,938 tons.

Smelter Receipts.

Granby, Grand Forks	25,020	968,486
Consolidated Co. Trail	8,173	393,881
B. C. Cop. Co., Greenwood	11,528	305,947
Le Roi, Northport		12,761
Total	44,721	1,681,075

B. C. Ore shipments, week ending Dec. 11, 1909.

ORE SHIPMENTS.

Boundary.

	Week.	Year.
Granby	25,554	993,590
Mother Lode	11,792	310,206
Snowshoe	2,821	151,080
Oro Denoro	100	7,633
Other Fines		705
Total	40,267	1,463,214

Rossland.

	Week.	Year.
Centre Star	4,273	169,127
Le Roi No. 2	364	28,961
Do. milled	260	12,580
Le Roi	101	10,849
Other Mines		331
Total	4,998	221,848

Slocan-Kootenay.

	Week.	Year.
St. Eugene	438	19,936
Blue Bell	179	4,696
Richmond-Eureka	197	2,736
North Star	34	2,640
Whitewater	148	1,590
Rambler-Cariboo	21	930
Ruth	95	930
Ohio	9	9
Meteor	14	14
Pay-Day	8	8
Golden Cup	6	6
Blue Bell, milled	900	43,700
Whitewater, milled	700	35,100
W. Deep, milled	420	20,370
Granite-P., milled	250	12,300
S. Relief, milled	145	7,069
Nugget, milled	110	5,340
K. Bell, milled	70	3,495
Other Mines		20,659
Total	3,844	181,554
Grand total	49,109	1,866,616

SMELTER RECEIPTS.

	Week.	Year.
Granby	25,554	994,081
Consolidated Co.	8,771	403,562
B. C. Copper Co.	11,892	317,839
Le Roi		12,761
Total	46,217	1,728,243

The Consolidated Mining & Smelting Company of Canada, Limited, ore received at Trail Smelter for week ending Dec. 11, and year to date, in tons, follow:

Company's Mines—

Centre Star	4,273	169,127
Snowshoe	2,821	151,080
St. Eugene (concentrates)	438	19,936
Richmond-Eureka	197	2,736
Other Mines	1,042	60,683
Total	8,771	403,562

The imports of petroleum into Germany in the first nine months of this year are estimated at 634,476 tons, of which 493,604 tons were from America, 93,966 tons from Galicia, 26,238 tons from Russia and 20,668 tons from Roumania. During the corresponding period of last year the quantity imported was 684,047 tons.

TORONTO MARKETS.

Metals.

(Quotations from Canada Metal Co., Toronto.)

Dec. 22.—Spelter, 6½ cents per lb.

Lead, 3.75 cents per lb.

Antimony, 8½ to 9¼ cents per lb.

Tin 36 cents per lb. (market advancing. We look for higher prices.)

Copper, casting, 14 cents per lb.

Electrolytic, 14 cents per lb.

Ingot Brass, 9 to 12 cents per lb.

Dec. 22.—Pig Iron, (Quotations from Drummond FeCall Co.)

Summerlee, No. 1, $24.00, (f.o.b. Toronto).

Summerlee, No. 2, $23.50, (f.o.b. Toronto).

Midland, No. 1, $21.50 (f.o.b. furnace).

Coal, Anthracite, $5.50 to $6.75.

Bituminous, $3.50 ao $4.50 for 1¼ inch lump.

Coke.

Dec. 17.—Connellsville coke, (f.o.b. ovens).

Furnace coke, prompt, $2.80 to $2.90 per ton.

Foundry coke, prompt, $3.00 to $3.25 per ton.

Dec. 17.—Tin, (Straits), 33.05 cents.

Copper, prime Lake, 13.50 to 13.75 cents.

Lead, 4.60 cents.

Electrolytic copper, 13.37½ to 13.50 cents.

Copper wire, 15.25 cents.

Spelter, 6.30 cents.

Sheet zinc, 8.50 cents.

Antimony, Cookson's 8.37½ cents.

Aluminium, 23.00 to 24.00 cents.

Nickel, 40.00 to 49.00 cents.

Platinum, 29.50 to 33.25 per oz.

Bismuth, $1.75 per lb.

Quicksilver, $52.50 per 75-lb. flask.

SILVER PRICES.

	New York cents	London pence
December 8	51⅝	23¾
" 9	51⅞	23⅞
" 10	52	24
" 11	52	23 15-16
" 13	52⅝	24 3-16
" 14	52⅞	24 5-16
" 15	52⅜	24⅛
" 16	52⅝	24 3-16
" 17	52⅝	24 3-16

Nova Scotia Steel had a good month during November.

November was indeed the banner month in the company's history.

The output was 81,200 tons. Exceeding the previous record by about 4,000 tons.

The output of pig iron was 5,400 tons; steel, 6,500 tons.

Coal shipments to date are about 125,000 tons ahead of last year.