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CIRCULATION.

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THE PROCEEDINGS OF THE SELECT STANDING COMMITTEE OF THE HOUSE OF COMMONS ON MINES AND MINERALS.

Last winter a Select Standing Committee, composed of twenty-five members of the House of Commons, was appointed "to examine and inquire into all such matters and things as may be referred to it by the House; and report from time to time its observations and opinions thereon."

The appointment of the Committee was a compromise. Urgent requests from the Canadian Mining Institute for a Royal Commission had been put before the Government. There is little doubt that these requests would have been granted had mining interests sufficient representation in the House. As it was, the Government could not see its way clear to appoint a Royal Commission, largely, we believe, because of the outlay of money that would be entailed. In every sense this was a blunder, and a blunder that may be fairly attributed to a general lack of information on the part of the House as to the supreme importance of the mineral industries. However, the Select Standing Committee is better than nothing.

Throughout March, April and May the Committee held four meetings. Delegates from the Canadian Mining Institute gave evidence, chiefly on points connected with the granting of mineral rights. The heads of the two branches of the Department of Mines also were questioned. No other witnesses were called.

The printed account of the proceedings of the Standing Committee impresses the reader in several respects. In the first place it is apparent that the members during the first three sessions were bogged. From the minutes of discussions we gather that no one knew what was to be dealt with.

Receiving the evidence of the witnesses was the only work accomplished. At the fourth meeting, however, the Dominion mining regulations and the mining law affecting the Yukon were taken up section by section. Three important resolutions resulted from this meeting. They were:—

1. That there should be assigned to the Department of Mines the administration of mines, including the issue of title thereto, and of all mining laws.
2. That an Act should be passed consolidating all the laws relating to mines under Federal control.
3. That consideration should be given to a policy that will have for its object the re-acquisition by the Crown of mining rights heretofore granted in patents of land.

Of these resolutions, the first calls for most immediate attention. The present cumbrous system gives

rise to confusion and is an actual deterrent to investors. Moreover, there is ground for the belief that grave abuses exist in mining districts that are under Federal administration. This has been true of the Yukon; it is true, we fear, of Alberta. This resolution is timely.

The second resolution, referring to the consolidation of all Federal mining laws, might well be extended to embrace the laws of each Province. Naturally this is a matter that demands long debate and systematic study of the mining laws of foreign countries. Only thus can pitfalls be avoided. Essentially this is work that can best be done by the continuous efforts of a Royal Commission. It is doubtful if any committee, meeting twice or thrice a month, can cope successfully with a subject so large and so intricate.

The last resolution requires little comment. If our country is to reach its appointed goal, all restrictions and hindrances must be removed from the path of the prospector. To-day, thousands upon thousands of square miles of mineral territory may be regarded as lost to the prospector. This applies with equal force to lands administered by the Provincial Governments.

During the coming winter the Committee will continue its investigations. It has succeeded in starting on the right path. But it will require guidance and direction. Last year's delegation from the Canadian Mining Institute was hastily summoned, was by no means representative, and, individually, the delegates were given insufficient time to prepare themselves. Further, the Committee as a whole lacked knowledge of the mining industry.

The latter condition will remedy itself, and it is the duty of the Canadian Mining Institute to see that future delegates have ample time to prepare their evidence. In fact this is a subject that should engage the attention of the executive of the Institute throughout the winter. A strong committee should be appointed at once. The Institute can do more than any other body to enlighten Ottawa as to the requirements of mining.

Incidentally, we can see little use in having twenty-five members on the Select Standing Committee of the House. Ten carefully chosen members would accomplish more in a given time with less friction and with more effect. The attendance at the four meetings last session never exceeded fourteen, and once dwindled to five. What results can we expect in these circumstances?

A Royal Commission, consisting of five selected and representative men, adequately remunerated for their labours, would have arrived long before this at results that will not for many months be attained by the Committee as at present constituted.

Our hope is that the very meagreness of the reports under discussion will induce the Select Standing Committee itself to recommend a Royal Commission.

THE MINERS' MINE.

That capital and caste have their uses was demonstrated in a curiously effective manner by the failure of a socialistic venture in France.

It was in the year 1891 that a concession of about 200 acres of coal lands in the Loire coal basin was purchased, largely by public subscription, and placed in the hands of an association of workingmen, amongst whom all profits were to be equally divided.

With a tremendous flourish of trumpets the Miners' Mine became an active producer of coal.

Before affairs had got decently in working order trouble arose. Outside miners, not members of the society, were employed by the regular members. The outsiders claimed a share in the profits.

Another source of strife and heart-burnings was the fact that during the times of depression, a general reduction in wages had to be made. Against this the miners kicked violently. The logic of the situation did not appeal to them. The controlling power of capital was absent, and wages fluctuated with every temporary vicissitude.

The impatience of the miners (in this case the shareholders) and the ludicrous impossibility of the whole scheme, became most potent in 1905. In that year no less than five chairmen were successively elected and deposed.

The closing scenes in the history of the Miners' Mine were enacted in the autumn of 1908. An exhausted treasury, urgent creditors, two serious fires and severe trade depression, together with internal dissensions, were more than the shaky edifice could stand. The collieries were closed, a receiver was appointed, and the society breathed its last painful corporate breath.

It is not for us to say that all such experiments are foredoomed to failure. But there does appear to be an illustration here of the futility of attempting to apply the fantastic principles of socialism—the socialism that is expounded by labour agitators—to a modern business enterprise. We fear that before a Miners' Mine will have proved a commercial success coal will have been superseded as a source of energy.

INSPECTION OF MINES.

Already in the United States there are indications that mine inspection is to become a conjoint function of the Federal and State authorities. This has been proved the more imperative by last year's shocking coal mine catastrophes. The United States Geological Survey has taken the matter in hand, and has begun an educational campaign.

Doubtless this consummation will not be reached rapidly. Difficulties expected and difficulties as yet unforeseen will crop up. But it must be brought about sooner or later, for only thus can the highest degree of safety be guaranteed to those who labour underground.

What is true of the United States is doubly true of Canada. Uniformity in our mine inspection regulations

is needed. So long as inspection is left entirely to provincial officials it will be neither adequate nor effective. Working hand-in-hand with a well-organized Federal Bureau, the provincial departments would do infinitely better than is at present possible.

The Nanaimo disaster provides material for very serious thought. It is possible, nay, even probable, that proper inspection would have prevented the loss of 32 lives.

The civilized countries of the world not only insist upon the regular inspection of coal mines for the presence of dangerous quantities of gas, but they also regulate the use of safety lamps, prohibit certain explosions, investigate the hygienic conditions of collieries, investigate the causes of accidents, and encourage the use of rescue apparatus.

We fear that Canada has not done her duty in these respects. Apparently we are content to wait until the toll of human lives shall have become so inordinately large that indifference will no longer be possible.

DORIC RESERVE MINES, LIMITED.

In the Toronto World of October 11th, and in the Montreal Standard of October 16th, appeared advertisements of the Doric Reserve Mines, Limited. The name of Mr. A. A. Hassan, mining engineer, was used in these advertisements. We have been requested by Mr. Hassan to state that he has made no report for the Doric Company and that he could not possibly verify the statements advertised. Mr. Hassan is taking steps to force the offenders publicly to retract their misstatements.

Prompt action of this kind is to be commended. Liberties taken with the good name of mining engineers deserve severe punishment.

EDITORIAL NOTES.

We are informed, on excellent authority, that, in addition to the iron and steel works projected for Vancouver Island by the Irondale Syndicate, another large steel concern contemplates the erection of a plant. This will give Vancouver a solid industrial backbone.

An editorial in the November number of The Mining Magazine concludes thus: "Vendors and promoters should not report on mines; it is as honourable to be a promoter as to be an engineer, but the combination is prejudicial to sound business." This truth cannot be repeated too frequently. At the present stage of development it applies with especial force to Canadian mining engineers.

Estimates secured by the Royal Commission on Mines give the cost of watering the workings of large collieries by the "man and hose" system. In one Ger-

man mine the cost, over a period of 14 years, averaged 1 1-2d. per ton. At another German colliery the cost in material and wages was slightly over 1d. per ton. Costs in South Wales range all the way from 1.72d up to 5d per ton. The last figure includes repairs to roadways rendered necessary by the watering.

CORNISH TUNGSTEN ORE.

At the semi-annual meeting of South Crofty, Limited, a mining company operating at Carn Brea, Cornwall, some instructive figures were adduced bearing upon prices current for tungsten ores.

The ore-treatment is complex. Tin, tungsten, and arsenic are recovered. During the six months ending June 30th, 335 tons of tin, 72 tons of tungsten concentrate, and 304 tons of arsenic (200 tons of the arsenic being white refined) were recovered from 29,154 tons of ore; 31.8 pounds of tin and tungsten were recovered per ton of ore crushed. The total value of the three commodities was £34,056 19s 14d.

During the six months an arsenic refinery and twenty stamps were added to the surface plant. Including development and additions, the average working costs were 19s 3d per ton. Total profits amounted to £6,187 14s 1d; net profits, £5,187 14s 1d.

The average price for tin was £76 3s 2d; for tungsten, £78 9d. Tungsten showed a falling off of £10 per ton as compared with the previous six months. But latterly the price has improved substantially. The tungsten concentrate was kept constantly up to 64 per cent.

PLATE HOUSES.

The use of heavy stamps on the Rand has brought about one radical modification in mill design. The latest mills are constructed with separate houses for the amalgamation plates, as it has been found advantageous to remove entirely the plates from the crushing section of the mill.

This innovation permits of any desired arrangement of the plates. Inasmuch as the product of any one battery may be diverted to each of several plates, the necessity of hanging up a battery before cleaning the plates is obviated. The time saved by this is supposed to add at least 10 per cent. to the efficiency of the plant.

Another hardly less important result is the facility with which samples of the crushed ore may be taken by placing automatic samplers in the launder that conveys the pulp from the stamps to the plate-house.

Incidentally it is possible to watch the tables much more closely. In large plants this makes for better practice, and has the advantage of minimizing amalgam-stealing.

Detached plate-houses have much to recommend them even for small plants.

Gelignite is the most largely used explosive in the mines of Western Australia. Last year 3,251,928 lb. of gelignite were used, as compared with 438,500 lb. of blasting gelatine and 339,852 lb. of gelatine dynamite. For the storage of explosives there are 74 magazines in the state, having a total capacity of 11,190 tons. These are placed on reserved land, and are fitted with specially devised lightning conductors.

THE WINNIPEG MEETING OF THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

(Written for the Canadian Mining Journal by Cyril W. Knight.)

The seventy-ninth annual meeting of the British Association for the Advancement of Science opened in Winnipeg on the twenty-fifth of August. The society has during the last quarter of a century, held three meetings in Canada. In 1884 Montreal was the centre, while in 1897 Toronto was its headquarters. At the Montreal meeting the people of Winnipeg took the opportunity to invite the members to visit Manitoba. Those who did this, and who also this year attended the Winnipeg meeting, have been profoundly impressed with the strides the West has made. As a matter of fact this was one object of the meeting being held in Winnipeg this summer; and the splendidly arranged excursions across the golden prairies of our North-West to the mountains of British Columbia and the Pacific Coast must surely have aided to dispel the false impression given to the British people in Kipling's "Our Lady of the Snows."

It was natural, perhaps, that physics should dominate the meeting in view of the fact that Sir Joseph Thomson was president. He gave his memorable presidential address in the Walker Theatre on the evening of the twenty-fifth, and those who heard it are not apt to forget the occasion for many years. Sir Joseph Thomson has a startlingly clear and deep voice for a man of his stature, and this, combined with a perfect enunciation, made all of the address a delight, even to the layman. The address was of necessity largely technical, but the personality of the man always seemed to hold attention even when the listener could not follow, and the simplicity of his literary style was another added charm. The previous presidents at the meeting of the British Association in Canada were Lord Rayleigh and Sir John Evans. Without attempting to give any complete resume for the Canadian Mining Journal of an address on physics the parts bearing only on geological matters are here stated. But, in passing, it is interesting to note his urging of the deeper study of mathematics on all physicists, and the plea that mathematicians study physics. The billiard player need no longer regard his expertness as the sign of a wasted life. One of Sir Joseph's first pupils was in the beginning utterly indifferent to mathematics, but was an expert billiard player. Sir Joseph showed his pupil that the collision of elastic billiard balls illustrated profound mathematical laws. "From that time he was a changed man. He never before regarded mathematics as anything but a means of annoying innocent graduates. Now, when he saw what important results it could obtain he became enthusiastic about it, developed very considerable mathematical ability, and, though he had already wasted two out of three years at college took a good place in the mathematical Tripos."

The recent advances made in the study of radio-activity, and their bearing on geological problems were particularly interesting, and the following paragraphs are given in full.

"The properties of radium have consequences of enormous importance to the geologist as well as the physicist or chemist. In fact, the discovery of these proper-

ties has entirely altered the aspect of one of the most interesting geological problems, that of the age of the earth. Before the discovery of radium it was supposed that the supplies of heat furnished by chemical changes going on in the earth were quite insignificant, and that there was nothing to replace the heat which flows from the hot interior of the earth to the colder crust. Now, when the earth first solidified it only possessed a certain amount of capital in the form of heat, and if it is continually spending this capital and not gaining any fresh heat it is evident that the process could not have been going on for more than a certain number of years, otherwise the earth would have been colder than it is. Lord Kelvin in this way estimated the age of the earth to be less than 100 million years. Now, though the quan-



Sir J. J. Thomson, and wife President of the British Association for the Advancement of Science.

tity of radium in the earth is an exceedingly small fraction of the mass of the earth, the average amount of radium in the material of which the earth's crust is composed, according to the valuable determinations of Professors Strutt and Jolly, only amounts to about five grammes in a cube of the material whose side is 100 miles, yet the amount of heat given out by this small quantity of radium is so great that it is more than enough to replace the heat which flows from the inside to the outside of the earth.

"This, as Rutherford has pointed out, entirely vitiates the previous method of determining the age of the earth. The fact is that the radium gives so much heat that we do not quite know what to do with it, for if there was as much radium throughout the mass as there is in the earth's crust, the temperature of the earth

would increase much more rapidly than it does as we descend below the earth's surface. This, as Professor Strutt has shown, proves that if radium behaves in the interior of the earth as it does at the surface, then rocks similar to those in the earth's crust cannot extend to a depth of more than forty-five miles below the surface.

"It is remarkable that Prof. Milne from the study of earthquake phenomena had previously come to the conclusion that rocks similar to those at the earth's surface only descended a short distance below the surface; he estimates this distance at about thirty miles, and concludes that at a depth greater than this the earth is fairly homogeneous."

His concluding remarks were:

"The new discoveries made in physics in the last few years, and the ideas and potentialities suggested by them, have had an effect upon the workers in that subject akin to that produced in literature by the Renaissance. Enthusiasm has been quickened, and there is a hopeful, youthful, perhaps exuberant, spirit abroad which leads men to make with confidence experiments which would have been thought fantastic twenty years ago. It has quite dispelled the pessimistic feeling, not uncommon at that time, that all the interesting things had been discovered, and all that was left was to alter a decimal or two in some physical constant. There never was any justification for this feeling, there never were any signs of an approach to finality in science. The sum of knowledge is at present, at any rate, a diverging not a converging series. As we conquer peak after peak we see in front of us regions full of interest and beauty but we do not see our goal, we do not see the horizon. In the distance tower still higher peaks, which will yield to those who ascend them still wider prospects, and deepen the feeling, whose truth is emphasized by every advance in science, that "Great Are the Works of the Lord."

The meetings of the different sections of the society were begun on the twenty-sixth and continued until the last day of August. It was necessary to distribute the sections among the various public buildings of Winnipeg. In spite of the almost appalling number and variety of subjects taken up, only morning sessions were for the most part held. It would seem that the Canadian Mining Institute, which holds at times three sessions a day until one is dizzy with new ideas—and smoke—might well consider this arrangement. The scientific work of the Association is transacted under the following departments of knowledge:

- Section A—Mathematical and Physical Science.
- Section B—Chemistry.
- Section C—Geology.
- Section D—Zoology.
- Section E—Geography.
- Section F—Economic Science and Statistics.
- Section G—Engineering.
- Section H—Anthropology.
- Section I—Physiology.
- Section K—Botany.
- Section L—Educational Science.

The papers of Section C, Geology, only are here given:

President's Address—The Evolution of Vertebrate Animals as Shown by Fossils.

J. B. Tyrrell—The Geology of Western Canada.

A. P. Coleman—The Extent of the Ice Sheets in the Great Plains.

Warren Upham—The Glacial Lake Agassiz.

E. F. Chandler—The Rainfall Run-off Ratio in the Prairies of Central North America.

A. P. Coleman—The Bearing of Pre-Cambrian Geology on Uniformitarianism.

W. G. Miller—The Pre-Cambrian Rocks of Canada.

A. R. Derryhouse—An Outline of the Glacial Geology of Britain, illustrative of the work of the Committee on Erratic Blocks.

Aubrey Strahan—The Glacial Geology of South Wales.

David Woolacott—On the Classification of the Permian of the North of England.

Herbert Bolton—New Faunal Horizons in the Bristol Coalfields.

S. H. Reynolds—Description of the Avon Section, Bristol, in illustration of Dr. A. Vaughan's work on the English Carboniferous Limestone.

S. H. Reynolds—Lithology of the Carboniferous Limestone of Burrington Combe, Somerset.

Ernest Discon—On Some Structures in Limestone Formations.

PAPERS ON THE ORE DEPOSITS OF CANADA.

Prof. W. G. Miller—Gold and Silver.

Prof. A. P. Coleman, Ph.D.—Copper and Nickel.

Prof. W. G. Miller—Iron.

J. B. Tyrrell, M.A.—Placer Mining.

Prof. T. L. Walker, Ph.D.—Rare Metals.

Prof. J. W. Gregory, D.Sc., F.R.S.—Report of the Committee on South African Strata.

Charles F. Juritz, M.A., D.Sc.—Topographical and Geological Terms in South Africa.

Report of the Committee on Topographical and Geological Terms in South Africa.

Tempest Anderson, M.D.—The Volcano of Metavanu.

Prof. J. W. Gregory, D.Sc., F.R.S.—Exhibition of the Material described as Geyserite from the Mount Morgan Mine, Queensland.

A. Smith Woodward, LL.D., F.R.S.—Discovery of Dinosaurs in the Cretaceous of Australia.

A. Smith Woodward, LL.D., F.R.S.—Discovery of a Dinosaurian tooth in the Trias of Brazil.

Henry C. Beasley—Report on Footprints Found in the Trias of Great Britain (Lantern).

Prof. S. H. Reynolds, M.A.—Certain Aspects of British Scenery as illustrating the work of the Geological Photographs Committee (Lantern).

E. S. Cobbold—On Some Further Excavations Among the Cambrian Rocks of Comley, Shropshire, 1908.

Prof. S. H. Reynolds, M.A.—Report of the Committee on the Geology of Glensaul, Co. Galway (Lantern).

Report of the Committee on the Drift Deposits of Kirmington, etc.

Report on the Crystalline Rocks of Anglesey.

Report on the Chemical Composition of Charnwood Rocks.

Report on the Salt Lakes of Biskra, Algeria.

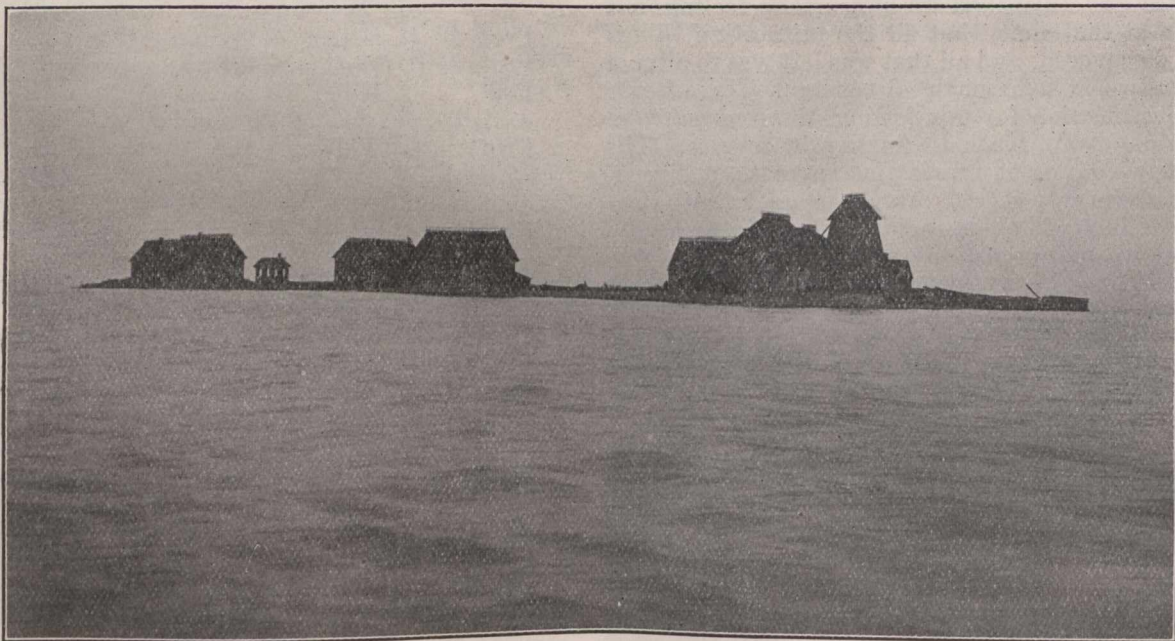
In his presidential address to the geological section, A. S. Woodward said there had been an unfortunate tendency during recent years for the majority of geologists to relinquish the study of fossils in absolute despair. More ample material for examination and more exact methods of research have altered many erroneous names that were originally used; while the admission to scientific publications of too many literary exercises on the so-called "law of priority" has made it necessary to learn not one, but several names for some

of the genera and species which are commonly met with. He finds that it is necessary to combat the mistaken popular belief that the main object of studying fossils is to discover "missing links" in the chain of life. The geologist, on the other hand, knowing well that he must remain satisfied with a knowledge of a few scattered episodes in the history of life which are always revealed by the merest accident, marvels that the discovery of "missing links" is so constant a feature of his work; and he is convinced that, if circumstances were more favourable, he would be able to satisfy the demand of the most exacting critic. He has found enough continuous series among the mollusca, for example, and so many suggestions of equally gradual series among the higher animals, that he does not hesitate to believe without further evidence in the process of descent with modification. The mere reader of books is often misled by the vagaries of nomenclature to suppose that the intervals between the links are greater than in reality; but for the actual student it is an everyday experience to find that fossils of slightly different ages which he

than chance-variation or response to environment however much these phenomena may have contributed to certain minor adaptations.

The paper by Warren Upham on the glacial Lake Agassiz was interesting because the city of Winnipeg is built on the bottom of this lake; and for many miles the country is to the eye perfectly flat. It attained an area of about 110,000 square miles, exceeding the combined areas of the five great lakes tributary to the St. Lawrence River, and at the present day it is represented by Lake Winnipeg. In its earliest and highest stage Lake Agassiz was more than five hundred feet deep above the site of the city of Winnipeg.

A. P. Coleman, in his paper on "The Bearing of Pre-Cambrian Geology on Uniformitarianism" would have us believe that a glacial period existed during the time in which the Homer Huronian conglomerates were laid down. On the Trethewey property at Cobalt he has found pebbles in the conglomerate which have scratches on them that are exactly similar to those scratches and markings found on pebbles and boulders



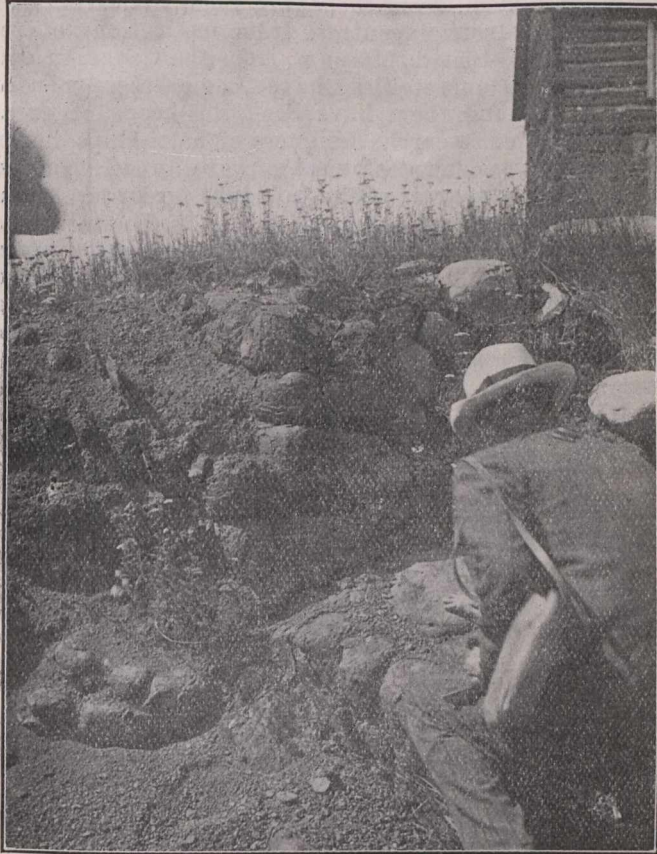
SILVER ISLET, LAKE SUPERIOR.

once thought distinct are linked together by a series of forms in which it is difficult to discover the feeblest lines of demarcation. He is therefore justified in proceeding on the assumption that in all cases the life of our geological period has passed by a natural process of descent into that of the next succeeding period; and, avoiding genealogical guesswork which proves to be more and more futile, he strives to obtain a broad view of the series of changes which have occurred, to distinguish between those which denote progress and those which lead to stagnation or extinction. When the general features of organic evolution are determined in this manner, it will be much easier than it is at present to decide where missing links in any particular case are most likely to be found.

Mr. Woodward desired especially to emphasize the interest and significance of the persistent progress of life to a higher plane, which we observe during the successive geological periods. For, he said, palaeontologists are now generally agreed that there is some principle underlying this progress much more fundamental

in glacial till or boulder clay. In the fine-grained greywacke large granite boulders occur, which apparently have been transported some miles from their source. A glacial origin, he thinks, can only explain their presence, and the widespread occurrence of the conglomerate is another point emphasized. Dr. Coleman read a similar paper a year ago last January before the Geological Society of America at Albuquerque. It was pointed out then by Van Hise and others that if these conglomerates are glacial in origin we ought somewhere to find the glaciated basement on which they rest. This has never been found. On the contrary, wherever the contact of the conglomerate with the underlying Laurentian granite and Keewatin greenstones has been studied the basement is breaking down in situ. Therefore it is certain that some of the Lower Huronian has been found in place and not transported by ice. To this it is replied by Dr. Coleman that the double-clay of to-day in many places rests on a surface which shows no glacial scratches and that further, the Dwyka, in South Africa, does not always have a glaciated

basement. Regarding the presence of the large granite boulders in the conglomerate, it was pointed out by Dr. Miller in his Cobalt report some years ago, that their presence could not be taken as proof of a glacial origin, because they might be transported by severe floods or freshets. Prof. Hobson, of Manchester, England, in summing up the case, remarked that the



Fine example of Spheroidal Weathering of Trap, Sudbury, Ont.

finding of scratched pebbles in one place only was hardly sufficient evidence of the glacial origin of the Lower Huronian conglomerate, because it was reasonable to suppose these scratches might be produced by other agencies. But that if in several widely separated areas scratched boulders and pebbles were discovered the case would have a different aspect. All geologists are quite willing to admit the probability of a glacial period in Pre-Cambrian times, and while several points have now been brought forward which support the theory, it has not as yet been accepted by all. Until a true glacial basement has been found the subject will remain an open question. Prof. Fairchild, on the other hand, considers that it is not surprising that the glaciated floor has been destroyed. Meanwhile the controversy has led to many interesting discussions.

W. G. Miller briefly reviewed the pre-Cambrian rocks in Canada. He pointed out that these occupied the largest area in America. In them occur the enormous iron and copper deposits of the Lake Superior region, the nickel, copper and silver deposits of Sudbury and Cobalt, and so on. An exceedingly small fraction of these pre-Cambrian rocks only has been prospected, so that an optimistic outlook of the future mining industry in these unexplored regions would seem justified.

On reading his paper on the glacial geology of Britain, A. R. Derryhouse remarked that it might seem

rather absurd to us in Canada that a committee should be organized to preserve the erratic blocks found in Britain. This was necessary, however, because they were being slowly destroyed in some parts. His paper showed the very complex nature of the glaciation in Britain.

Gold, silver, copper, nickel, iron, placer mining, and the rare metals in Canada were briefly reviewed by A. P. Coleman, W. A. Miller, J. B. Tyrrell, and T. L. Walker. In the discussion which followed on the origin of the Sudbury nickel deposits it was pointed out by Prof. Gregory that the work of Dickson, Campbell and others, who regard the economic bodies of ore to be largely of secondary, rather than igneous, origin, should not be ignored.

A paper which was most interesting to students of Keewatin lavas in America was read by Tempest Anderson, on the "Volcano of Metavanu." He discussed the actual forming of pillow or ellipsoidal lavas in water. As is well known our Keewatin series in the United States and Canada is regarded as being made up of submarine basic lava flows, one of whose characteristics is this pillow or ellipsoidal texture. So that the story of these structures in the making by a keen observer who had just returned from actually seeing was of great interest.

From Sudbury the party went to Fort William and there chartered a steam launch in order to spend a day



The old miners' cottages at Silver Islet have now been turned into haunts for the summer girl.

at Silver Islet. Here we found the piers and buildings fast falling to pieces and moss everywhere on them. The structure in which the Frue Vanner had its birth is still there, but of the original machines nothing remains. A new era has come. Along the mainland opposite the island a long row of miner's cottages have now been

turned into haunts for the summer girl, and excursion boats convey picnic parties to the celebrated spot where in former years old time miners and car-loads of machinery were launched. Even the rocks have changed. The dump from the underground working was thrown into the lake and the blocks and fragments of calcite and harder trap have now become rounded like the ordinary pebbles found on the sea shore. This was most interesting and instructive to the geologists, showing as it did the comparatively short time in which wave action destroys rock fragments.

After the meeting in Winnipeg about two hundred officers and guests of the Association left for the West in what was popularly spoken of as the science special train. The arrangements made by the Canadian Pacific and Canadian Northern were most satisfactory. The prairie country, that strange region of wonder and monotony, received its due share of attention, and short stops were made at Regina, Moose Jaw, Calgary and Edmonton. There must indeed be some strange fascination which holds men and women on these treeless, rolling plains, where houses are far apart and where the beauty of the East is not.

From the prairies the special was slowly pulled up into the snow-capped Rockies, from whose breasts at Banff flowed the hot sulphur springs, and the ice cold stream from the glaciers. They saw, nestling near the foot of a ridge, within sight of the hotel, the Alpine Club, that home of enthusiasts who climb to the dizzy heights of the rarer atmosphere for reasons other than the glory of God. While below, in the valley of the Bow River, a herd of buffalo preserved by the Dominion Government, looked up in quiet wonder at it all! At Laggan the point of interest was Lake Louise, some six thousand feet above sea level, and surrounded on three sides by abrupt mountains as high again. Further west still, in the heart of the Selkirks, the party stopped at Glacier, where within half an hour of the railway station and hotel the foot of a great glacier was examined.

From here to the Pacific Coast is a journey of about three-quarters of a day. A short time was spent at Vancouver, where Stanley Park, whose flora is almost tropical, was seen by some of the party. Then the fastest boats on the Pacific Coast, owned by the Canadian Pacific Railway, were taken to Victoria. Some of the members ran south to Seattle, in which city the Alaska-Yukon-Pacific Exposition is being held. Among the great number of buildings the forestry structure was, perhaps, the one most admired. It is built of enormous fir trees, all said to have been obtained within a radius of fifty miles of Seattle. The front part of the building, a photograph of which is here shown, is supported by fir trees several feet in diameter. The bark was allowed to remain on this timber, and the building will be preserved for the University of Washington.

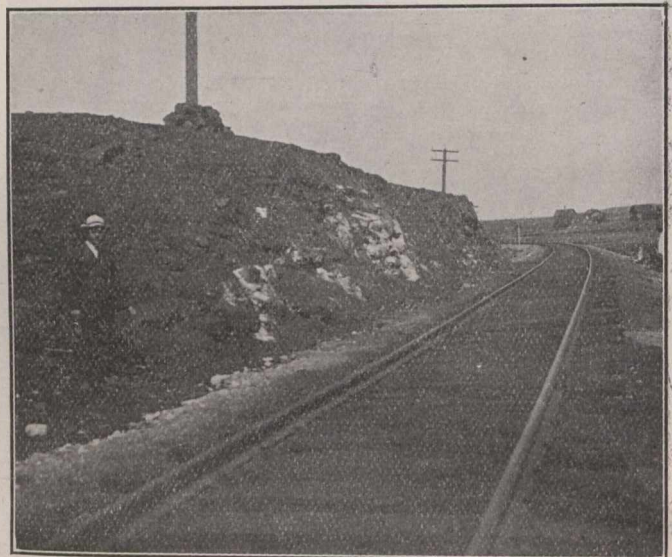
In the Canadian building there were many things to make the British subjects of Canada very much at home. Especially did this apply to the miner and geologist, for the familiar look of the silver ore from Cobalt, the nickel sulphides of Sudbury, the feldspar of Frontenac County, the coals of the Maritime Provinces and the gold and copper ores of British Columbia made one feel quite sure that he was in his native land.

The return journey over the prairies was made on the Canadian Northern Railway, and the main party reached Winnipeg on September the thirteenth. Several, however, went from Victoria to the gold fields of the

Yukon, others to California, and thence to New York via the Grand Canyon of Arizona.

A breezy writer in the Winnipeg Free Press Bulletin sums up the excursion in this manner:

"Assuredly no such train as the science special has ever before traversed the 1,500 miles between Winnipeg and Vancouver. From the historic universities of the United Kingdom, from the newer seats of learning of the great industrial centres, from institutions of renown like the British Museum, from the Canadian and the American universities have come these men of science. Among them have been the heads of great laboratories of research, designers of battleships, heads of geographical and geological surveys, great chemists, great physicists, great anthropologists, great mathematicians and great astronomers. These are the men who have been revising, and in many cases radically revising, their estimate of western Canada. In the old land amid much wealth and much sordidness, in the throng of the many who have failed and of a few who have



Canadian Pacific Railway Cut, Sudbury District, in which the nickel deposits were first discovered.

succeeded brilliantly, these men of science have lived and moved and had their being. There they pass to and fro within narrow limits. They are not seen or heard except by a sprinkling of their fellows. They pass down the streets of the great city unknown and unnoticed. They smile not upon the multitude. They conceal their look from the crowd.

"In Western Canada these self-same men have broadened, have expanded, have opened and unbent. They have gone through the train and strolled along the platform with smiling countenances. They have shaken hands and conversed with westerners whom they did not know and whom probably they will never see again, and they did it without being introduced.

"They have eaten onion salad and angel cake in a Methodist church in Calgary. They have waited their turn for washing and shaving, and have joked while they waited. They were approachable everywhere, and at all times. Indeed, they approached others. In brief they were sociable, genial and jocular. They told everyone they were enjoying themselves and they were."

ELECTROCHEMICAL PLATE AMALGAMATION.

(By Elmer Ellsworth Carey.)

[Note.—The original draft of the following article first appeared in the May, 1909, issue of the *Electrochemical and Metallurgical Industry*, of New York. For the purpose of explanation and to emphasize certain points, the author has added a few paragraphs, and made some changes in the text. The amended article appears below.—Editor.]

Within the last decade the problem of using electricity in a practical and efficient manner in the extraction of values in metallurgical processes has received the earnest attention of many investigators. It has long been known theoretically that the action of mercury and cyanide may be greatly intensified by the introduction of electrochemical conditions, and inventors have been at work on the problem of constructing suitable apparatus to make practical use of the powerful aid of the electric current.

One of the first applications of electrochemics to modern metallurgical methods consisted in suspending a plate (cathode) in a cyanide tank and recovering the values thereon directly by electro-deposition. This slight improvement was found to give an improved extraction, and it is strange that the matter did not receive more attention, as this advance, slight as it was, pointed the way to still greater improvements, and was a hint that should not have been overlooked.

The next step was to electrify the entire contents of the tank, thus reinforcing the cyanide with the powerful cleansing and reducing action of electrochemical forces; with proper electrolytic conditions it was found that the percentage of extraction is much higher and the time of treatment much shorter; and at the same time, as the values pass into the solution, they are simultaneously deposited on the amalgam plate by the electro-plating action of the current, and the cyanide released for another cycle. The great efficiency of this system over the usual cyanide methods has been fully demonstrated; it is quicker, more positive, extracts a higher percentage of values, costs less to install and to operate, and in addition will extract values from pulp which is not susceptible to the action of ordinary cyanide solutions.

Turning to the amalgamating practice, it may be said that electrochemical methods may now be successfully used in connection with the usual battery plate. After a long series of experiments, extending over a score of years, a very simple method of converting the standard plate into an electrochemical amalgamating device of remarkable efficiency has been devised. The electrochemical system of amalgamation is designed to extract from the sands or pulp all gold values not encased; it is entirely a new system of amalgamation, designed to do the work of the ordinary mill plate, including the treatment of slimes, and at the same time to extract values which cannot be saved by the usual mill practice and which otherwise would require cyanide treatment; to do all this in one single inexpensive and continuous operation, requiring practically no more outlay for installation and maintenance than the usual mill plate. The system also furnishes a method by which the Alaska beach deposits, black sands, hydraulic, placer and dredge tailings, mill tailings, desert deposits and many low grade propositions can all be profitably

worked. The broad claim made for the electrolytic system is that it will save all values not encased.

Preliminary Treatment.—It may be sometimes necessary to grind ore or sands to 100, 150 or even 200 mesh, before the values are released, but after this has been done, the pulp is simply passed over the amalgamating device, and the electrochemical forces automatically extract the values to such an extent that usually no further treatment is profitable. In ordinary cases, values are recovered at 80 mesh. In certain cases where the ore is unusually refractory, base or rebellious, it may be necessary to treat the tailings for an hour or two by the continuous electro-cyanide process, which is an exceedingly simple and inexpensive operation, but withal very efficient.

Mode of Construction.—The electrolytic method of amalgamating calls for a sluice box of suitable width, the length being 40 or 50 feet, or even longer, according to conditions. In the bottom of the box is an ordinary copper plate acting as a cathode. Graphite anodes of suitable construction are arranged to conduct the low voltage current into the water (electrolyte) passing over the device. Pulp of proper fineness, screened gravel or sand is passed into the apparatus by suitable means. Certain solutions are also added to the water. A critical low voltage current of proper amperage is passed into the anodes; the water, carrying pulp, etc., acts as an electrolyte, and makes the electric connection with the copper plate (cathode). In operation the water is at all times electrified and the copper plate is also constantly under electrical action. The device can be made of any desired capacity.

Essential Elements of the System.—So far as the electrochemical actions and processes are concerned, there are five cardinal conditions or points to consider:

- (a) The anodes.
- (b) The flowing body of water, pulp, slimes, etc. (electrolyte.)
- (c) The copper plate (cathode.)
- (d) Certain solutions added to the water: 1, Mercurial solution; 2, Sodium solution; 3, Hydrogen solution.
- (e) Low voltage current.

The anodes and cathodes are connected with a 5-10 volt generator in the usual manner; the usual volt meter rheostat and ammeter being in place. The current used has approximately the density of about five-tenths of an ampere per square foot of cathode surface.

In operating, the mercury solution is mixed with the water passing into the device. The amount of the solution, which is standardized, depending upon the values in the pulp. About the same amount of mercury is needed as in the ordinary practice. Practically all the mercury is recovered in the amalgam. Several chemical, electrical and electrochemical processes are constantly and simultaneously in operation. When the machine is once adjusted for given conditions, these processes and reactions are synchronous, automatic and mutually balanced, all of them combining perfectly to assist in the recovery of values. In this system, the various powers, affinities and laws of electro-chemics have been perfectly balanced and harmonized to produce certain desired results, and the system beautifully illustrates how nat-

ural laws may be used to serve mankind when intelligently adjusted and applied. A few more important reactions will now be mentioned.

Intensified Chemical Action.—All chemical action is greatly intensified under critical electrical conditions. Amalgamation is a chemical action, and the affinity of mercury for the metals is greatly quickened by the electrical current. The chemical processes described below are much more rapid and effective under the electrolytic conditions than they usually are. In a similar manner the action of a cyanide solution can be greatly augmented and intensified; in electro-cyanidation values are recovered which are refractory in the usual solutions; and the time of treatment is reduced to one or two hours, while the gold is recovered by electro-deposition in the form of amalgam.

Deposition of Mercury.—The even, constant and uniform deposition of virgin (nascent) mercury on the cathode plate is the crucial operation of the system. The mercury is deposited from the mercuric solution mentioned above by ordinary electrolytic action; an electroplating process is in operation, and we have the cathode plate covered with a bright, uniform and chemically pure coating of nascent mercury, which remains in a perfectly "healthy" state as long as working conditions continue. The deposition of mercury and the character of the amalgam are at all times under absolute control of the operator. The mercury coating or plating adheres tenaciously to the copper plate, and the passing volumes of water, sand, pulp, etc., have no effect upon it. With proper adjustment, no excess of mercury is possible, and no "floured" mercury is discernible in panning the tails. This coating or plating of mercury above mentioned will stand the action of a heavy volume of running water containing a full load of pulp; even water carrying a full load of magnetic iron has no injurious effect upon it.

The mercury deposited by electrolytic action is nascent or virgin mercury; its affinity for metals and gases is far greater than usual; its amalgam-forming powers are intensified to such a degree that rusty, greasy or pyritic gold is instantly amalgamated; platinum is absorbed as quickly as gold when sodium is present in the amalgam (see Sodium Amalgam). Grease, talc, silicious coatings or sulphurous conditions in connection with gold particles have no effect in preventing amalgamation, and "fouling" or "sickening" of the plate is impossible. The use of electrolytic amalgamation insures at all times a constantly bright, healthful and powerfully active mercurial surface, impossible under the usual practice. The behaviour of the mercury under electrolytic conditions is entirely different from its action in ordinary amalgamating practice; and conclusions based on the usual mill practice will not apply in the new method.

Nascent Hydrogen.—Hydrogen at the moment of its liberation from a compound is known as "nascent" hydrogen; the gas in this condition has much more powerful affinities than ordinary hydrogen; nascent hydrogen has increased powers as a reducing agent; it destroys instantly organic, greasy and foul conditions; it unites instantly with the oxygen of iron rust at ordinary temperatures, thus cleaning "rusty" gold; all impurities in the water are counteracted, and the action of nascent hydrogen on the mercury is such that fouling of the plates cannot occur. One authority states that in the presence of nascent hydrogen, mercury cannot "sicken" or oxidize or become sulphated.

The action of nascent hydrogen as a cleanser and reducing agent is used to advantage in the electrochemi-

cal amalgamator, and if the gold particles are unusually coated or rusty, additional volumes of hydrogen can be obtained through electrolysis by adding some inexpensive solution of potassium or sodium. Under the action of electrolysis, the mercury as fast as deposited, absorbs free hydrogen, which is occluded throughout the whole mass of mercury; large volumes of hydrogen are thus absorbed, and the gas is all the time exercising a powerful cleansing and reducing effect, and preparing the way for amalgamation. Mercury, which has absorbed hydrogen under these conditions, is in the best possible condition to form amalgams.

Formation of Sodium Amalgam.—When sea water is used in the electrolytic system of amalgamation, or when a solution of common salt, or some solution containing a sodium salt is mixed with the water entering the device, we have the deposition of nascent metallic sodium by electrolysis; nascent sodium is brought into contact with nascent mercury, and a sodium amalgam is formed, which is absolutely pure chemically; we may say sodium amalgam in its "nascent" state is formed, in which state it must always remain healthy; it also in this state, has a much stronger affinity for the metals than the usual sodium amalgam of the arts. Sodium amalgam will hold free gold in any condition; also platinum; at least hydrogen-sodium amalgam will amalgamate all metals not encased, which are in a comminuted state and sodium amalgam by electrolysis cannot be made without the presence of hydrogen. Free sodium also destroys organic substances, and acts as a general cleanser in the chain of operations.

Hydrogen-Sodium-Amalgam.—In Volume 1, Proceedings of the London Inst., Min. and Met., page 205, will be found an article by P. G. Warnford Lock, E.M., in which he describes the formation of hydrogen-sodium amalgam and mentions the powerful affinity between this amalgam and gold. In electrolytic amalgamation the hydrogen is formed in several ways:

- (a) By the electrolysis of H_2O .
- (b) By the electrolysis $HgCl_2$.
- (c) By the electrolysis of various salts, which may be used for the formation of hydrogen.

Part of the hydrogen liberated is occluded by the mercury forming hydrogen-sodium amalgam, and part is used in reducing oxides which form rusty coverings on gold particles; parts also act as a general cleanser and purifier as it escapes through the water. In leaving this paragraph, I would remark that in an amalgam of hydrogen, sodium and mercury formed under nascent conditions, we have a trinity of the most powerful amalgamating agents at present known, and amalgamation will take place even in the presence of silicious coatings, rusty, sulphurous, greasy, arsenical, pyritic conditions, or other adverse conditions which usually prevent amalgamation.

Formation of Gold Amalgam.—We have seen above how the presence of hydrogen and sodium prepares the way for amalgamation. So well has the work been done that amalgamation takes place as soon as a particle of gold touches the quickened mercurial surface. And it might be noted in passing that amalgam formed under the conditions which we have described (electrolytic amalgamation) is a different compound from the usual amalgam formed on mill plates. The amalgam as described holds to the plate very tenaciously as it is placed there by electrolytic action, and it is not easily dislodged. It is homogeneous, tenacious and free from foreign materials. Particles of amalgam under this system are not broken off by the passing volumes of

water. The larger particles of gold will come in contact with the mercury before passing many feet; microscopic values or float gold, or values in slimes will require a longer length of cathode surface; at times possibly 40, 50 or even 60 feet will be required, but any microscopic particles, or any of the values in slimes will be instantly arrested at the first contact with the mercurial surface. Microscopic values and fine particles of gold in suspension are coated with mercury the moment they enter the zone of electrical action, and the cathoretic action of the electrical current assists in forcing them into contact with the mercurial surfaces. Experiment has demonstrated that electrolytic amalgamation will recover from 95 to 99 per cent. of all gold not encased, and in many cases the extraction reaches 100 per cent. Usually when the pulp of refractory ores is ground to 100-200 mesh, the tailings after passing the electric amalgamator, do not contain enough values to make any form of supplementary gold saving devices necessary.

Electrolytic Amalgam.—Amalgam found under the above described conditions is electrolytic amalgam or "nascent amalgam"; it is formed by particles of gold which have been cleaned and coated with an electroplating of mercury, coming into contact with nascent mercury. The resulting amalgam has entirely different qualities from the usual mill plate amalgam. Electrolytic amalgam is soft, smooth, homogeneous, elastic, tenacious yet plastic; it cannot be eroded by passing volumes of water and pulp; it does not crumble; it is never sulphated; it contains no foul conditions; it forms an ideal surface for the absorption of any passing particle of gold or amalgam; it is "alive," has the greatest possible affinity for gold, and no mill man ever saw a more beautiful and perfectly "healthy" amalgamating surface, for the electrolytic amalgamating surface is, metallurgically considered, the acme of perfection.

Chlorine Gas.—Nascent chlorine is liberated when common salt or bi-chloride of mercury are electrolyzed in solution; chloride water is formed; chloride under such conditions cleans and brightens gold by reducing the oxides; chlorine and hydrogen also unite to form hydrochloric acid which attacks all kinds of impurities attached to the gold particles. Chlorine gas is the most powerful bleaching agent known. It is possible that microscopic particles of gold in slimes may unite with chlorine or hydrochloric acid and form compounds, from which gold is liberated, and deposited on the cathode plate by electrolysis.

Electrolysis of H₂O.—The decomposition of water has been mentioned and the action of free hydrogen described. Nascent oxygen is liberated which also assists in preparing values for amalgamation. Oxygen in this state is a powerful enemy of organic substances, and foul, greasy or dirty conditions are quickly eradicated by its action.

Mechanical Action of Gases.—At all times there are liberated from every portion of the surface of the cathode free gases which arise upward through the water. These constantly escaping gases have a tendency to act as a cushion over the newly formed amalgam, which cushion prevents in a measure any scouring effect on the part of both sand or gravel, thus rendering the system equally applicable to stamp mills, placer mines, gold dredges and beach mining. Gravel and black sand can be passed over the device, and freed from all values, no matter how small, which may be present.

Dynamic Electrical Action.—The claim is made that a critical electrical current when properly adjusted tends to force all gold particles to the cathode plate, and that such current actually does carry microscopic particles into contact with mercury; and that the efficiency of this force depends upon density, voltage and proper adjustment of the device. There is considerable evidence to support this contention that there is a dynamic action in the electrical current which carries gold particles to the cathode. As a rule, all values are deposited in the mercury in the first ten or twelve feet of plates; and it is hardly reasonable to suppose that gravity alone would be sufficient to force every particle of gold into an amalgamating contact in such a volume of water as is used. If the necessary contact for amalgamation was the result of chance and gravity, it would be reasonable to look for an occasional colour in the tailings; but not only is it impossible to find a colour there by the most careful pannings, but it is impossible to find any value of importance by the most careful assay. In view of this fact, and other facts which have been noted, it is reasonable to suppose that there is a dynamic quality in the electric flow which acts directly upon metallic particles of gold; and as Madam Curie and other scientists have pronounced electricity to consist of material ions, this view is not entirely without foundation.

In the system of gold extraction above outlined amalgamation proceeds under the most favourable conditions that can be provided. Every obstacle is removed, and every force that tends to assist is intensified and reinforced. Not in a laboratory could a more positive action be obtained. Instead of leaving the amalgamating process to chance and the uncertainties of the usual practice with all attendant difficulties, we have in the process in question, the formation of amalgam carried on under ideal conditions, where the highest possible efficiency is attained; and it should be remembered that the processes are constantly striving to hold the amalgam in place, and to resist any erosive tendencies of the water and pulp. The amalgam coating is the result of the electroplating action of the device and the amalgam is forced into a perfect contact with the copper plate. In view of these facts it is not unreasonable to believe, that in the near future, electrolytic amalgamation will supersede the older methods, and at the same time vast fields will be open for the miner that are now beyond his means.

There are vast ledges and mountains of low grade and refractory ore, which, with the improved grinding machinery, in connection with electrolytic amalgamation, may develop into immense mining fields. For locked up in the immense ledges and deposits of low grade ore, found in all gold-bearing countries, we have a treasure house containing values easily accessible, a thousand times greater than the combined wealth of the nations. When the limited supply of gold from the few high-grade veins is exhausted it is to these vast deposits that the world must turn for its supply of metals for monetary purposes.

The only special machinery required for the electrolytic system of amalgamation is a low voltage generator requiring from 2½ to 5 horse-power for operation. A 5-horse power generator will furnish sufficient current for the treatment of 500 tons daily.

Whenever the values are microscopic as in the case of slimes, or when the gold is extremely fine and flakey, it will be found that electrolytic mercury riffles or wells

will give excellent results. Electrochemical action can be easily obtained in connection with the standard Hungarian or Australian mercury wells; when such mercury riffles are electrically excited, there is no flouring

or fouling of the quicksilver, and no coating of sulphurets appears. Such riffles are also admirably adapted for recovering values in "black sand," and the fine values in placer and dredge tailings which are universally lost.

AMERICAN INSTITUTE OF MINING ENGINEERS.

Written for the Canadian Mining Journal by E. Jacobs.

The 97th meeting of the American Institute of Mining Engineers was held at Spokane, Washington, on September 28-29.

The special train conveying the excursion party, which numbered about 60, left Chicago on September 16th, and after a tour through Yellowstone Park, Wyoming; and visits to Butte and Anaconda, Montana; and the Coeur d'Alene district, Idaho; Spokane was reached on the evening of Monday, 27th.

Owing to lateness of arrival, the opening session was postponed from Monday evening to the following afternoon, Tuesday morning having been occupied by attending the reception of President Taft by the citizens of Spokane. The sessions were held in the Masonic Temple. E. J. Roberts, chairman of the local reception committee, opened the meeting, and J. C. Ralston, city engineer, in the unavoidable absence of the mayor, who was in attendance on the President's party, cordially welcomed the visitors. He commenced his address by stating that mining commenced on the American continent when Ferdinand and Isabella of Spain grubstaked Columbus, and later said that within the last two months an Irrigation Congress had been held in Spokane, attended by 1500 delegates. In this connection he mentioned that the agricultural produce from the country tributary to Spokane had an annual value of about \$14,000,000. On the present occasion, including their Canadian friends, there were less than 150 delegates representing mining which, over the same territory as that just referred to, has an annual mineral production of a value of about \$40,000,000.

Dr. R. W. Raymond, at the request of Dr. D. W. Brunton, president of the council of the A.I.M.E., responded to the address of welcome, and in the course of a characteristically appropriate reply, alluded to the individual enterprise, skill, and courage of the typical mining engineer. One of the happy remarks made by the venerable secretary of the A.I.M.E. was that the mining engineer "should overcome the resistance of nature, including human nature, and one of the greatest resistances of human nature he has to overcome is the board of directors."

Dr. Brunton read his presidential address, which was on "Modern Progress in Mining and Metallurgy in the Western United States." Those who took part in the lengthy discussion which ensued were: Prof. Wm. Kent, Charles Catlett, Dr. W.O. Snelling, E. S. Hutchinson, Chas. W. Goodale, W. L. Saunders, Ernest Levy (Rossland, B.C.) and Thomas Kiddie.

The evening session was opened by the reading of Dr. Brunton's paper on "Modern Practice of Ore Sampling." During the discussion that followed, Thomas Kiddie read his paper on "Causes of Variations in Ore Sampling," which he had presented at the meeting of the Canadian Mining Institute held the previous week in Nelson, B.C. A paper by Franklin Bache, Fort Smith, Ark., on "Dust Explosions in Coal

Mines," was read by the secretary, and after discussion an adjournment was made until next morning.

On Thursday morning the third and final session was held. This was a joint meeting with the western branch of the Canadian Mining Institute, so Dr. Brunton courteously invited Thomas Kiddie, chairman, and E. Jacobs, secretary of the branch, to sit with him on the dais. A paper on "The Ruble Hydraulic Elevator," by J. McD. Porter, Spokane, was first read, and was discussed by Professor Kent and Dr. Raymond.

In the paper, "How may we Conserve our Coal Supplies," by Edward W. Parker, Washington, D.C., the writer, after alluding to the almost universal interest lately manifested in conservation, offered a few suggestions regarding the possible necessity of some restraint or control of the coal mining industry, with which he had been somewhat closely associated for the last 20 years. Passing reference was made to the suits brought by the Government against the anthracite operators in Pennsylvania, and the opinion was expressed that the present situation in the anthracite region has been developed through sheer necessity if the conservation of the supply of anthracite and the prolongation of the life of the fields in the best interests of the people is to be attained in any other way than through Government control, which latter does not seem to be materializing. The past profligate waste in anthracite mining has only been remedied by the close control and conservative management brought about in recent years, due in no small measure to the efforts of Dr. Raymond, Eckley B. Coxe, P. W. Sheaffer, Franklin B. Gowan, William Griffith, and a few others, through whose efforts many reforms in the lessening of the waste of anthracite were effected. Under conditions prevailing prior to 1887, when the anthracite coal commission made its report, it was estimated that for every ton of coal mined and sold, 1 1-2 tons were lost—much of this in pillars left to protect the workings, and millions of tons of small coal or screenings thrown on the culm banks. Improved methods of mining and preparation have of late years reduced the percentage of waste, so that at present the recovery will average about 60 and the loss 40 per cent., while by means of washeries much usable coal is being saved from the culm banks.

While the securing of the close control existing in the anthracite region of Pennsylvania has been made possible by the comparatively limited area of the fields (less than 500 square miles, with conditions ideal for a natural monopoly), it is different with the bituminous fields. The latter are scattered over some 30 different States and Territories; they aggregate about 250,000 square miles in area, exclusive of approximately equal areas of lower grade coals and lignites; and are for the most part so easy of access that frequently but a small amount of capital is necessary to develop a mine. In 1907, its banner year of industrial activity, the United

States produced nearly 400,000,000 tons of bituminous coal (including about 8,250,000 tons of sub-bituminous coal and lignite). In 1908, in spite of the business depression, the production was 332,500,000 tons. If the railways were to supply cars and motive power it would be practicable to produce from mines already open 600,000,000 tons of coal annually, and this without working Sundays or holidays to do it, but the markets could not absorb this larger quantity, which if we produced would create a surplus and cause general demoralization in values. Yet new properties are being opened and demands made upon railway companies for additional transportation facilities. One effect is to scatter the miners, reducing the supply of labour and curtailing the productive capacity of the older mines, the reduction of output meaning increased cost of operation and the risk of closing down as unprofitable before all the available coal has been extracted from these mines. Under the existing system of government and control over mining operations, there does not seem to be any effective way of curbing the tendency to new development or protecting capital already invested in the industry, nor is there any hope that State legislatures will plan any restrictions upon the industry which will discourage new development. Yet every new mine opened has its influence on the creation of a surplus, which, while it may seem desirable to those who clamor for cheaper coal, is ultimately destructive of industry, lowers wages, and makes necessary the practice of economies that are prejudicial to safety, to life and property in the operation of the mines.

While the suggestion that the bituminous mines should be put under some sort of Government control is bold, the opinion was frankly expressed that before many decades it will be necessary, for the protection of capital already invested, to secure control by private enterprise certainly of the areas containing the higher grades of coal, and to regulate the production according to market requirements. The choice of three evils would seem to be open: (1) The continuation of existing conditions—a feasting for to-day and remorse for to-morrow; (2) ultimate control by a combination of interests that will make the “hard coal trust” appear insignificant, and the “water power trust” of even less importance; and (3) governmental supervision and regulation—not ownership, however. The first will continue to be bad, the second would be worse, the third is problematical. Control by the several States may be suggested as a fourth, and best, alternative, but under competitive conditions referred to it is not to be expected that the States will undertake to restrict developments in their respective jurisdictions any more than they will enact legislation restricting the miner in his personal liberty.

Apropos of the personal liberty of the miner, it was mentioned that not the least difficulty experienced in operating a coal mine is the enforcement of necessary discipline among the mine employees. The concluding part of the paper dealt with accidents and disasters in coal mines, and the frequent tendency to carelessness on the part of miners, which in some cases results in much loss of life.

E. Jacobs read “Notes on the Coal Resources of Southeast British Columbia and of Alberta.” He prefaced his subject by briefly reviewing the situation relative to the occurrence of coal in the northern parts of the United States and contiguous southern parts of Canada, showing that there are extensive areas of the latter country which now obtain, and will continue to

do so, their supply of coal from the States, and vice versa, there are parts of the States the most convenient and economical sources of fuel supply of which are in Canada. The desirability of free trade or reciprocity in coal between the two countries is, therefore, self-evident, duty on coal being a tax on industry, which hits consumers on both sides of the international boundary line, without giving any compensating advantage to either side. Generally, the position seems to be this: There is an enormous quantity of coal of excellent quality in Canada—in the Maritime Provinces, in the east; and in British Columbia and Alberta, in the west—but practically none in about 2000 miles of territory situated between Alberta and New Brunswick. On the other hand, there is no coal in the north-eastern States; none thence, immediately south of the international boundary line (excepting in Michigan) until North Dakota is reached, and here lignite coal occurs; then there is coal in the Rocky Mountain region—in Montana and Wyoming, and again coal (though not of nearly so good quality as that in British Columbia and Alberta) in the State of Washington. So it would appear, in these circumstances, that the natural position would be for the Maritime Provinces of Canada to be the chief source of fuel supply for the New England States, and for Alberta and British Columbia to stand in similar relation to the Pacific States, while Pennsylvania and other States’ coalfields should supply Ontario and adjacent portions of the other Canadian Provinces that lie immediately east or west.

The immense coal resources of south-eastern British Columbia and Alberta were indicated by numerous quotations of facts and figures from reports of officials of the Geological Survey of Canada—Dr. Selwyn, Dr. Geo. M. Dawson, D. B. Dowling, W. W. Leach, and Jas. McEvoy—and from other published accounts of these coalfields. Of the Crow’s Nest coalfield, in British Columbia, the late Dr. Dawson wrote (for the “Mineral Industry,” to the end of 1898, p. 200): “This field, although it has not yet been fully defined, must have an area of at least a couple of hundred square miles. There are numerous superposed seams, ranging in thickness from 2 to 30 feet, and although the whole series, supposed to comprise about 20 seams, covers only the central part of the field, it is already manifest that we have here one of the most remarkable coal basins known. Dr. Selwyn roughly estimated the coal underlying each square mile, in one part of the field, at 49,952,000 tons. Later explorations by Geological Survey officials and others have led to the discovery of other very important occurrences of coal, some of which appear to warrant the expectation that extensive development will disclose the existence of an enormous tonnage of bituminous coal suitable for steam or coking purposes.

Among other information quoted relative to coal in Alberta was the following (taken from an article by D. B. Dowling, in “Economic Geology,” vol iv., No. 1, Jan.-Feb., 1909): “The coal is found in three distinct horizons in the Cretaceous The estimate of area and coal content for these three formations may be summarized from the foregoing information thus:

	Sq. Miles.	Million Tons.
Kootanie formation	288	7,930
Belly River formation	6,000	26,000
Edmonton formation	12,800	71,000
Total	19,008	104,930

As an example of the quantity of coal a single company is estimated to possess, the following was taken from a report, by Jas. McEvoy, of the coal lands held by the German Development Company, Limited, of Ottawa, organized about two years ago: Kananaskis coal lands—area, 77.8 sq. miles or 5040 acres; 10 workable seams of coal aggregating over 70 feet; estimated total quantity of coal on the lands, 519,750,000 tons, of which 75 per cent. can be actually taken out, or 4000 tons a day for over 320 years. Bighorn coal lands: Area, 5 sq. miles or 3200 acres; 124,000,000 tons of coal, or at least 2000 tons a day for 175 years. Brazeau coal lands: Area, 4 sq. miles or 2560 acres; at least 198,000,000 tons of coal or 4000 tons a day for over 140 years. These lands are all in the western part of Alberta.

Brief particulars were given of anthracite mining at Bankhead and Canmore, Alberta, of the big breaker, and the coal briquetting plant at Bankhead; of the operations of a number of bituminous mines in the Blairmore-Frank district; of an enormous deposit of coal at the Corbin mine, in the Crow's Nest Pass district, where a thickness of quite 200 feet of clean steam coal occurs; coke making, in either beehive or Belgian ovens, at Fernie, Hosmer, Michel, Coleman, and Lille; and of modern tipples, power plants, general equipment and mining methods, at various collieries in the region under notice.

The last paper read was one by W. D. L. Hardie, of Lethbridge, Alberta, on "The Galt Coal Field." This field was described as extending from where the St. Mary River joins the Belly River, above Lethbridge, to Grand Forks, at the Bow and Belly Rivers, below Lethbridge; the workable and merchantable coal spreading out about two miles on each side of the Belly River. Throughout the merchantable area the coal averages 4 feet in thickness, though in the neighborhood of Lethbridge it averages 52 in. There are two distinct seams, almost invariably divided by one to two inches of fire-clay, or a streak of bone coal one to six inches thick.

Assuming that the coal extends only two miles on each side of the river, that it is 4 feet thick, and that the distance from the St. Mary to the Grand Forks is 75 miles, the area will produce, making liberal allowances for loss of coal in mining, 1,253,376,000 tons. Besides this main area, there are several known detached areas, and others are likely to be discovered.

An average of several analyses gives the following: Moisture, 7.75%; volatile matter, 30.72%; fixed carbon, ash, 10.71 per cent. These analyses, however, do not show the percentage of hydrogen in the volatile matter. Before the opening of the Crow's Nest field this coal was largely used by the Canadian Pacific Railway, in locomotives and stationary plants. There is still a heavy demand for coal.

At the present time there are plants in operation of a daily capacity of 4,000 to 5,000 tons of Galt coal, and others are under construction which in a few years will double this daily output. One of the finest coal handling plants in Canada is now being installed at the Galt No. 6 mine, where two shafts have been sunk to a depth of 410 feet—one a hoisting shaft 20 ft. 2 in., by 21 ft., 2½ in., and the other an air shaft 20 ft., 8 in. by 10 ft. in the clear, both timbered with 10x10 in. square sets, backed with 3-in. plank.

Following the reading of these papers, numerous questions were asked concerning mining in British Columbia. These were replied to by W. Fleet Robertson, of Victoria, Frederic Keffer, Greenwood, and

Thomas Kiddie. Prof. Milner Roberts, dean of the school of mining, at Washington State University, Seattle, gave some information relative to the Nicola Valley coal field, B. C., and Prof. F. A. Thomson, chief of the mining engineering department at the State College, Pullman, Wash., spoke on mining in other parts of British Columbia.

Before adjourning the meeting, Dr. Brunton thanked the Canadian visitors for the part they had taken in making the joint session of the two institutes interesting.

While in Spokane and vicinity, opportunity was afforded the visitors of inspecting the several hydroelectric and steam generating plants of the Washington Water Power Company. These are: At Post Falls, 6,600 kw., 11,500 h. p., height of fall 55 feet; at Spokane 8,250 kw., 11,000 h.p., height of fall 75 feet; total fall in the city, 144 feet. The steam plant in Spokane is 15,000 kw., 20,000 h.p. The new plant, in course of erection at Little Falls, is four 5,000-kw. units—20,000 kw., 27,000 h.p., height of fall 68 feet. The new W.W. P. sub-station at Post Street is for transforming and distributing 30,000 kw. The voltage of the high-tension transmission line to the mines in Coeur d'Alene district is 60,000 volts. The plant of the Inland Empire railway system at Nine Mile has a capacity of 6,000 kw. A number of the party examined a large and representative mineral exhibit, which had been left intact from the annual exhibition held a week previously. A few visited the tin mine, near Spokane. It is noteworthy that a badge presented to the visitors was made from Spokane tin.

A complimentary banquet to the visitors, tendered by the leading citizens of Spokane, was held on Wednesday evening; at this covers were laid for 200. On Thursday the A.I.M.E. party proceeded to Seattle, to visit there the Alaska-Yukon-Pacific Exposition.

The sixth general meeting of members of the western branch of the Canadian Mining Institute, was held at Nelson, B.C., on Saturday, September 25. Thomas Kiddie, chairman of the branch, presided, and there was a fair attendance of members and visitors.

Chairman's Address.

After calling the meeting to order, the chairman said: "You will remember, gentlemen, that it was here in Nelson, on Jan. 15, 1908, this branch of the Canadian Mining Institute was organized. The branch started with a membership of about 130, and the expectation then was that by the end of 1908 the number would be increased to 200. This was practically realized, but not quite; to-day, however, there are on the printed list of branch members 197 names, while several more are before the council for enrolment, so that we may now claim 200 as the number of members of the branch.

"It gives me much pleasure to welcome in Nelson to-day, Mr. R. W. Brock, director of the Geological Survey of Canada; also Mr. W. F. Robertson, provincial mineralogist for British Columbia. Both are valued members of the institute and active members of its council, and Mr. Robertson is the present senior vice-president of the institute. The Geological Survey, during many years past, has done and is continuing to do, valuable work in the west as in other parts of the Dominion—in Alberta, with its immense coal fields, now attracting increasing attention; in the Yukon, where there are coal and lode mines, as well as large areas of gold-bearing gravels for placer mining, and in British Columbia. In this province particularly the Survey is extending its useful work—this season in Sheep

Creek and the Slocan (in both of which the city of Nelson has considerable interest); in the big Similkameen district on Vancouver Island, and in the Skeena country in the northern part of the province. I hope Mr. Brock will this morning give us the benefit of hearing from him something relative to the excellent work his department is doing in the west, which is indeed fortunate in having as director of the Survey so good a friend to it as he is known to be—one with an intimate and practical knowledge, obtained during years of field work in this western country, of its great promise of immense mineral wealth, and who, further, is believed to be thoroughly in sympathy with the West. Again we are fortunate in that the Dominion minister of mines is a western man and a representative of a British Columbia constituency, so that this province may confidently look for the continued consideration of, and derive much benefit from, the work of the Geological Survey branch of the Dominion Department of Mines."

In the course of his opening address the chairman first called attention to the satisfactory increase in the number of western members of the institute, there now being about 200, as compared with 130 when the branch was organized in January, 1908. He next extended a cordial welcome to R. W. Brock, director of the Geological Survey of Canada, and W. Fleet Robertson, provincial mineralogist for British Columbia, both of whom had come to Nelson to attend the meeting. The valuable topographical and geological work the Survey has done and is continuing to do in the west was mentioned in terms of appreciation, as, too, was that of the British Columbia Bureau of Mines under the direction of the provincial mineralogist. Reference was next made to the forthcoming joint session of the western branch of the Canadian Mining Institute with the American Institute of Mining Engineers at Spokane, and the opinion was expressed that the reading in that city of papers on the coal resources of south-eastern British Columbia and Alberta, and the discussion that would follow, must prove of material service to the coal mining interests of the great coal districts to have the attention of the joint meeting. The sterling good work the Nelson Board of Trade is doing in furthering the interests of mining among other district industries was suitably acknowledged, and thanks were expressed for the kind courtesy of that body in placing its rooms at the disposal of the institute for the purpose of holding that day's meetings.

"It is also gratifying to see here Mr. Robertson, whose duties as provincial mineralogist have unfortunately heretofore prevented him from attending the meetings of the branch. Last autumn he made a special effort to get back to Victoria in time to be present at our meeting there on the occasion of our welcoming to the province the Canadian Mining Institute summer excursion party, which included many notable men from Europe as well as prominent geologists, mining engineers and metallurgists of North America. Notwithstanding, though, that a canoe journey of hundreds of miles was taken, Mr. Robertson was unable to reach Victoria while our meeting was being held, though he did succeed in arriving at Vancouver in time to spend a day there with our distinguished visitors. I am glad to find him this season engaged in doing field work in East and West Kootenay and I have no doubt these districts will be gainers as a result of his investigations.

"I have much pleasure, too, in mentioning the forthcoming joint session of this branch with the American Institute of Mining Engineers, to be held at Spokane,

Wash., next week, and I am hopeful quite a number of our members will be able to go to that city to attend the meeting and to assist in welcoming the A. I. M. E. party to the west. It is a matter for regret that that meeting has interfered to some extent with the attendance here to-day, but there are some of our busiest members who cannot spare sufficient time to admit of their attending both the Nelson and Spokane meetings, so they have chosen the latter. We cannot fail to realize that the reading in Spokane of papers on the coal resources of south-eastern British Columbia and of Alberta, and the discussion that will follow, must prove of material service to the coal mining interests of the great fields situated to the east of the metalliferous mining district in which we are to-day.

"On behalf of this branch I desire to express our appreciation of the thoughtful courtesy of the Nelson Board of Trade in placing at our disposal its rooms for the purpose of holding our meeting to-day. This board is doing sterling good work in directing widespread public attention to the great natural resources and advantages of the Nelson district. Its efforts in furthering the interests of those engaged in the mining industry are deserving of our thanks, and we, as members of the Canadian Mining Institute, may well express our thanks for the benefit the mining industry, among others, is deriving from the well-directed efforts of the board. By preparing the useful pamphlet on mining, copies of which are at your disposal to-day; by the very creditable displays of ores made at the Alaska-Yukon-Pacific Exposition, and at the respective exhibitions at Toronto, Spokane and here in Nelson, the mineral resources of the Kootenay are being well advertised by this board, and we take pleasure in expressing our appreciation of the value of the work thus being done."

E. Jacobs, of Victoria, B.C., secretary of the branch, then read the following review of the progress of mining in the province during the expired months of the current year.

"The third quarter of the year closes with the mining industry of British Columbia on the whole in a satisfactory condition. In most of the districts that contribute to the annual mineral production of the province there is activity at the mines, and in some the outlook is more promising than earlier in the year. Work has been resumed on several properties that had been inoperative for a more or less lengthy period, and in other instances development work has been undertaken that will probably eventually result in adding to the number of producing mines.

"Taking the economic minerals separately, the following comment is made:

"Gold.—While it is yet early to make an estimate of the quantity of placer gold produced this year, the opinion may be expressed that an increase over last year's production may not reasonably be looked for, the gravel-washing season having been opened later than in some years with the resultant comparatively short period of operation at the more important placer mines. Then there was the carrying away of the North Columbia Company's dam at Surprise Lake, in Atlin camp, which prevented as large a recovery of gold as would have been made had the expected increased quantity of water been available for hydraulicking. In Cariboo Mr. John Hopp, who operates on a larger scale than any other placer miner in that district, had a satisfactory season, his gold returns having been good for the time worked. The close of the season was occupied by Mr.

Hopp in making dams and other provision to secure an enlarged supply of water for future operations. Mr. H. W. DuBois, of Philadelphia, U.S.A., let a contract late in the season for ditch and flume construction to provide a water supply for another Cariboo property. Mr. J. B. Hobson spent the season in the Quesnel Forks district, but no information concerning his operations has yet been made public. Other placer miners, both individuals and companies, worked in Cariboo and Atlin camps and on a smaller scale in North-east Cassiar and East Kootenay. Not much information was published relative to the Ingenika field, from which a good yield of gold had been expected. Dredging for gold, of which very little has been done in the province during quite recent years, is to be tried again, the holders of dredging leases on Fraser River above Lytton having made arrangements after having prospected their gold-bearing gravels, to install dredging plant believed to be adapted to local conditions and capable of being operated profitably. Before turning from placer gold, mention should be made of the fine collection of nuggets from Yukon and British Columbia placer fields purchased lately by the Dominion Government and placed on exhibition at the Alaska-Yukon-Pacific Exposition, Seattle.

"The outlook for an increasing production of lode gold is considered favourable, both at mines where gold is the chief valuable constituent of the quartz or other ore, and where it is associated with copper. The recently reported sale of the Nickel Plate group and 40-stamp mill in Hedley camp, Similkameen, is regarded as indicative of more activity there, while at several smaller mines in the same camp steady progress towards regular production has been made. The provision of railway transportation facilities for this district will probably give an impetus to mining and consequently mineral production to an appreciably large extent. In Nelson mining division, which embraces the gold camps in the near vicinity of the town of Nelson, and those at Ymir, Salmo, Sheep Creek and Erie, there has been substantial advancement in lode-gold mining during the current year, and it is expected that there will be a steady increase in the output of gold from this district. Important developments have recently taken place at the Queen mine, Salmo, and as well at several of the Sheep Creek properties. Prospecting in Summit camp, situated between the Salmo district and Kootenay Lake, to the eastward, has given encouraging results. Another discovery of gold quartz in Cariboo district has lately been reported, but its importance has yet to be determined.

"Silver.—There does not appear to have been much change in conditions relative to the production of silver in the province. Slocan and Ainsworth mines have continued to contribute to the total of production, and the St. Eugene at Moyie Lake has steadily maintained its output of this metal from its considerable production of lead-silver. In smaller quantity silver has come from mines in Nelson division; also from the Lardeau, chiefly from the Silver Cup group in Ferguson camp. Portland Canal district and some claims in the Skeena country, on which silver-bearing ore has been found, may be expected to add to the silver production later, but as yet they are non-producers. The copper mines of the Boundary and Rossland camps, and in much smaller degree those of the Coast district, yield a considerable proportion of the annual output of silver, which occurs in many of the mines in association with copper and gold. At the Marble Bay mine, on Texada island,

the quantity of silver found in the copper ore has become greater as depth has been reached, the ore at between 800 and 1,000 feet depth averaging higher in silver than nearer the surface.

"Lead—East and West Kootenay mines still produce practically all the lead included in the total mineral production of British Columbia. The St. Eugene, in the former district, and the Blue Bell and White-water, in the Ainsworth division of West Kootenay, are the larger producers. Work has lately been resumed on the Sullivan group, in East Kootenay, so that this property may be expected to put out shortly a fairly large quantity of lead. Other mines contributing more or less to the total lead production are the Rambler-Cariboo, Richmond-Eureka and several others in Slocan district; the Silver Cup at Ferguson, and the Emerald at Salmo, while lead is also obtained from concentrates from mines in Nelson and other divisions.

"Copper.—The Boundary is the chief source of copper in British Columbia, and indeed in Canada. The mines in that district of the Granby, British Columbia Copper, and Consolidated Mining and Smelting companies, respectively, are regular producers on a comparatively large scale, the Granby being far in the lead with the British Columbia Copper Company next. The mines of the last-mentioned company were idle during several months of the year, while the Granby operated with little or no interruption. The Consolidated Company closed its Snowshoe mine for a time but lately the output of ore from that mine has been larger than during most earlier periods of its history. Several smaller mines in the Boundary have been worked, notably the Bruce at Midway, which shipped 210 tons of ore to the British Columbia Copper Company's smelter at Greenwood, but on the whole the production of these has been small. The total production of ore from all Boundary mines has been about 1,000,000 tons for the nine expired months of 1909, of which approximately 700,000 tons was from Granby, 200,000 tons from the British Columbia Copper, and 100,000 tons from the Snowshoe.

"Rossland camp, with a total production during the same period of 170,000 to 180,000 tons of ore, has been the only other large producer of copper this year. Of the quantity mentioned, nearly 130,000 tons came from the Centre Star group of mines, owned by the Consolidated Mining and Smelting Company of Canada, Ltd., while the Le Roi No. 2 mined well on for 40,000 tons, and the Le Roi between 7,000 and 8,000 tons. The last-named mine is now at work again, doing development and diamond-drilling only, after a suspension of about six months.

"There appears to be a prospect of Kamloops properties next year adding to the copper production of the province, but during the current year their output has not been considerable.

"In the Coast district copper mining has been quiet on the whole, though the outlook for a marked improvement is considered encouraging. The chief exception to the general non-productiveness was Texada Island, where the Marble Bay mine in particular made an excellent showing, having developed a valuable deposit of bornite ore down to nearly 1,000 feet depth. The Tye Copper Company was operating the Indian Chief group, at Sidney Inlet, west coast of Vancouver Island, for a time and shipped a quantity of ore of good grade to its smelter at Ladysmith. Outside of this, though, copper mining on Vancouver Island has been of little importance for some time past. The smeltery at

Crofton has been idle for many months, production at the Britannia mine, on Howe Sound, from which it obtained its chief supply of ore in recent years, having been very much reduced, and the smaller quantity of ore and concentrate having been sent to Ladysmith for reduction. The Swayne group, in Lynn Creek camp, near Vancouver, has been steadily developed, latterly by the Tye Copper Company. While the supply of local ores has been small this year, that from south-east Alaska has been considerable, and from that source has come most of the 45,000 tons smelted by the Tye Copper Company at Ladysmith during the twelve months to August 31st last. Prospects appear good for a substantial production of copper ore from properties on Moresby Island of the Queen Charlotte group. It is stated that the Ikeda mine, operated successfully by the Awaya-Ikeda Company, of Vancouver, is under option to Scottish capitalists. Incidentally it may be mentioned that Vancouver men are giving attention to copper properties on Texada Island, with a fair chance of success.

"The completion of a railway into the Similkameen country may bring about a decided improvement as regards copper mining in that district, lack of economic transportation having heretofore prevented the development of the industry there.

"Zinc.—Despite the higher tariff charges on zinc going to the United States, there has been a larger quantity of zinc ores and concentrates shipped from Slocan and Ainsworth mines to the States during the current year than in the corresponding period of 1908. Most of this has been from the Lucky Jim mine, in eastern Slocan. Other producers of zinc have been the Blue Bell and Whitewater group, in Ainsworth division, the Ruth at Sandon, Slocan and several other mines.

"Iron.—There has been no recent production of iron in British Columbia. From time to time somewhat glowing accounts of the occurrence of iron ore in large quantities on Vancouver Island in particular, have been published, but these have generally been indefinite and not supported in important detail by well-known and competent iron mining men. The preliminary report of Einar Lindeman, a Swedish iron ore expert employed by the Dominion Government to ascertain local conditions relative to the occurrence of iron ores, their manufacture and sale of the product, is the only published official information of comparatively late date available for reference. As a matter of fact there has as yet been comparatively little development of the iron ore deposits, so the permanence or otherwise of the supply remains, under these circumstances, undetermined. Meanwhile, though, there is good reason to think that genuine efforts are being made to establish on the coast of British Columbia a plant for the manufacture on a commercial basis of iron from local ores. Whether this desirable object can be accomplished remains to be seen but if it be brought about it will not be as a result of existing extensive development of the ore deposits, since on Vancouver Island they are still largely undeveloped. Better conditions obtain, though, at the Iron mine, Texada Island, where there has been considerable development and a fair amount of ore production.

"Coal.—Coal mining operations in British Columbia were enlarged during 1908 and 1909 and are still being extended, both on the mainland and on the coast. In the Crow's Nest Pass region both the Crow's Nest Pass Coal Company and the Hosmer Mines, Ltd., are main-

taining a large output and the Corbin colliery, in the same district, is steadily increasing its production. The extensive coal seams of the upper Elk River are awaiting the construction of a railway to admit of their shipping coal, of which there is a large tonnage available, and that of excellent quality. In Nicola Valley the mines of the Nicola Valley Coal and Coke Company, of Vancouver, are again producing, labour difficulties having been arranged. Other companies operating in the same district are preparing for regular production. The promised early completion of a railway to Princeton, Similkameen, has encouraged the Vermillion Forks Mining and Development Company to arrange for additional equipment for its coal mine in that neighborhood, so as to be able to soon ship coal continuously. On Vancouver Island both the old established companies, the Wellington Colliery Company and the Western Fuel Company, have produced much coal this year, while the South Wellington Coal Mining Company has built a railway to tidewater and constructed coal bunkers and other shipping facilities, which have allowed of its entering the market for the sale of its coal. Two or three important coal land deals for Vancouver Island properties, have lately been made, and it is expected that the opening of other coal mines will eventually be the outcome of these."

After E. Jacobs, of Victoria, secretary of the branch, had read a review of the progress of the mining industry of the province during the expired months of the current year, an adjournment was made to allow members to join members of the Nelson Board of Trade in welcoming Sir Thomas Shaughnessy, president of the Canadian Pacific Railway Company, who had just arrived in the city, and afterwards to inspect the comprehensive district mineral exhibit at the Nelson Exhibition closing that day.

Paper on Ore Sampling.

On reassembling after lunch Thomas Kiddie read a paper on "Causes of Variations in Ore Sampling." After stating that, so far as he knew, there is not any regular or standard method of determining the accuracy or otherwise of various approved mechanical ore samplers in use, and expressing the opinion that in the interests of both sellers and buyers of ores there should be sizing as well as chemical tests to determine whether there are important variations in the results obtained by standard samplers and sampling methods, Mr. Kiddie submitted a number of tables showing the results of numerous experiments he had made in the separation of metallic sulphides from silicates (or quartz) by the gradual crushing of sulphide ores, having a hard gangue, from $3\frac{1}{2}$ to $\frac{3}{8}$ in. approximately. These indicated that the proportions of certain constituents in the ores always increased while others decreased as the size of the portion dealt with in these sizing tests increased. Generally, the percentage of silica and alumina increased with the size of the ore, while the gold, silver, copper, iron, and sulphur decreased as the lumps of ore were larger. Applying this principle, a standard sampler was tested, with the result that it was found there was an appreciably large difference in the sizes of the ore discharged on opposite sides of the sampler, the variation indicating a possible source of serious error which may occur in determining the actual values of ore sampled by a riffle sampler. Another table showed the difference in results from sampling by riffle and cone methods, respectively. It was claimed that from the chemical analyses and the results of sizing tests exhibited by the tables submitted, there were great dif-

ferences in the metallic contents of the various sized particles of ore, and a consequent considerable variation in results obtained by present methods of sampling. Mr. Kiddie suggested that to prove the accuracy of sampling machines or methods of sampling it would be necessary to make up a sympathetic or artificial ore, the composition of which as regards sizes and contents of its component particles to be definitely ascertained, and then compared with those originally obtained from the sample. It was recommended that these determinations be made by a commission, or by the faculty of a school of mines or like institution. Mr. Kiddie called attention to the fact that his investigations had been in connection with one class of ore only. He mentioned that Dr. J. Bonsall Porter, of McGill University, Montreal, had read his paper, offered suggestions, and kindly undertaken certain work in further pursuit of this investigation; also that the results obtained will probably be given in a future paper to be prepared by Dr. Porter and himself jointly.

The subject of the paper was discussed by Messrs. W. F. Robertson (who incidentally suggested that the tables be produced in graphic form), E. W. Widdowson, M. J. Connolly, and others. A hearty vote of thanks was accorded to Mr. Kiddie for his interesting and valuable paper.

Other Business.

A paper on "The Galt Coal Field," prepared for the Spokane meeting by W. D. L. Hardie, of Lethbridge, Alberta, manager of the Alberta Railway and Irrigation Company's Galt collieries, was read by the secretary, and a vote of thanks to the writer was passed.

The death of Andrew Colville, a western member of the institute, formerly superintendent of the Crow's Nest Pass Coal Company's Coal Creek colliery, was reported by the secretary.

There was some discussion concerning an advertisement appearing in an Albertan newspaper relating to an alleged fraudulent mining company, and the secretary was instructed to refer the matter to the council of the institute for such action, if any, as that body shall think advisable.

It was decided to hold the next general meeting of the branch, due about the middle of January, 1910, in Vancouver B.C.

INSPECTION OF MINES.*

By J. A. Holmes, U. S. Geological Survey.

Mine inspection is and should remain a function of the State. It has for its purpose the proper execution of state mining laws; and the object of these laws is primarily the safety of the miners, incidentally the protection of mine property.

The agent of the state in the carrying out of these laws is the Inspector of Mines, and his assistants. These should be sufficient in number for frequent and thorough inspection; the basis for selection and continuance in office should be fitness for office and efficient service. They should be independent of political or other extraneous influences. They should receive compensation for services commensurate with the responsibility resting upon them, and the experience and technical training required. They should have reasonable laws to execute. They should have the willing co-operation

of both operators and miners in carrying out the provisions of the law. Under such conditions men of the best type will accept and hold these positions; and their actions will receive the support of public opinion and of the courts.

This inspection by officers of the state, whenever practicable, should be supplemented by the work of special inspectors employed by the mining companies. Many such companies have already adopted such a practice and report favourable results. In other coal mining countries this practice has become much more general. But in recommending to American coal operators the adoption of practices found successful in other countries, it should be remembered that the selling price of coal at the mines in the United States is generally less than half that in other countries; and this fact may render impossible here many improvements in behalf of safety and efficiency that the American operator would otherwise be glad to inaugurate.

The function of the Federal Government in connection with mine operations is one of inquiry and research, having in view two fundamental purposes:—

1. Greater safety for the lives of miners; and
2. The conservation of mineral resources.

In connection with ordinary mine inspection the special service rendered by these investigations will be:—

(a) The development of data such as will serve as a basis for the enactment of reasonable laws, rules and regulations;

(b) The establishment of facts which may serve as a basis for the settlement of disputes between inspectors and operators and operators and miners, either by courts or boards of arbitration.

The propriety of having such inquiries and researches conducted by the Federal Government in relation to mining will scarcely now be questioned in view of the fact that such policy has long since been accepted in relation to agriculture, forestry, fisheries, and other industries. But it may be added that the practice avoids extensive duplication of labour and expense by the states; the Federal investigations naturally cover a wider field of experience, including also experience in other countries, and the results are likely to be more generally accepted as impartial, being further removed from local influences.

Under such an arrangement there will be no basis of conflict between the State and Federal interests—no encroachment of one on the duties or rights of the other. The support of the Federal work will depend upon its securing and maintaining the good-will and co-operation of the state's inspectors; and the success of both the State and Federal work will depend upon their securing the proper friendly co-operation of the miners and operators.

Nor is anyone now likely to question the proposition that the conservation of resources is a national as well as a state problem. In the mining, treatment and use of mineral products no state boundaries are involved. An ore mined in one state may be milled in another, smelted in a third, refined in a fourth, and used in many different states. The coal mined in Pennsylvania or West Virginia may serve as a basis of heat, light, power for various manufactories in a dozen or more different states, and may be essential to the interstate transportation of mails, passengers and freight, while the manufactured products to be transported may in turn serve as an essential basis of other industries in the remotest parts of the country. The iron ore of Minnesota may in Illinois be mixed with coke from Pennsylvania and

*An address delivered before the American Mining Congress Goldfield, Nevada, October, 1909.

limestone from Indiana, to be fabricated into steel to serve as frames for buildings in San Francisco, or New Orleans, or Boston, or as railway bridges across the Columbia, the Mississippi, the Hudson or the Nile.

The products of the mine constitute no less than 65 per cent. of the total freight traffic of the country; they are indispensable to our interstate and international commerce, and are essential to both our present and future welfare and greatness as a nation.

It is believed that the development of a system of co-operation between the State and Federal authorities such as is thus outlined will contribute to the improvement of the service by both the State and Federal Governments; will safeguard the rights of the states; will encourage greater uniformity in mining laws and regulations in the different states; will aid in the conservation of life and resources, and will be generally helpful to mining industries of the country.

GERMAN AND AMERICAN MINING LOCOMOTIVES.

By Frank C. Perkins.

The development of the mine locomotive has been most satisfactory during the past two decades since the first electric mine haulage system was installed in the Lykens Valley colliery of the Pennsylvania Railroad. It may be stated that electric mine locomotives are now not only extensively employed for the haulage of coal on the branch headings and main entry, but are also utilized to advantage for gathering coal from the working faces of the rooms which was formerly done by mules or horses.

While the compressed air gathering locomotive has been employed in some instances, it is stated that the radius of action is restricted and the efficiency is very

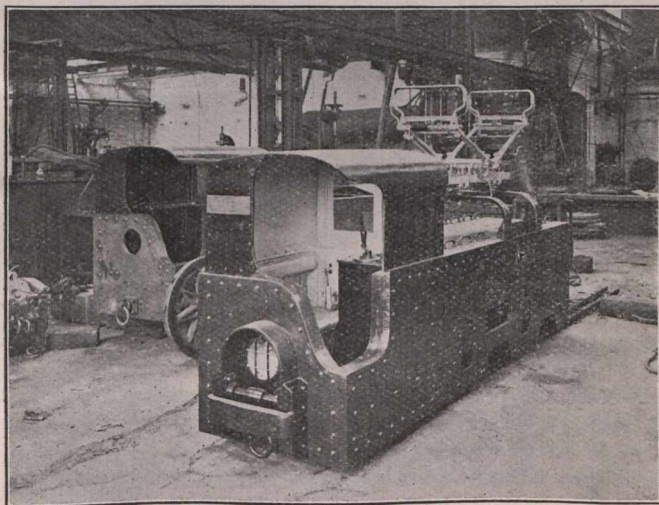


FIG. 1.

low. Where steam power is used for driving the air compressors, it is stated that the effective work done by the compressed air locomotive rarely exceeds 20 per cent. of the original power developed on account of the low plant efficiency. It is held that the efficiency of an electric mine haulage system is much higher, the losses in the engine, generator and locomotive as well as the line seldom exceeding 40 per cent.

The accompanying illustration (Fig. 1) shows the construction and method of operation of the German

mining locomotive as constructed at Berlin at the Siemens Schuckertwerke.

Attention is called to the double-bow-shape collecting device which is so largely used abroad and differs so materially from the American practice as indicated in the accompanying illustrations (Figs. 2 and 3) of the Baldwin-Westinghouse electric locomotives.

The illustration (Fig. 2) shows an American electric locomotive weighing 5 tons and measuring only 7 feet 2 inches in length, 3 feet 4 inches in height and 4 feet 1



FIG. 2.

inch in width. This locomotive is in use at the Bof Eftrellas mines, and was built for operation on a track of a gauge of about 1 foot 8 inches. The drivers are 20 inches in diameter, and the wheel base measures only 2 feet 3 inches. One only is employed on this mine locomotive, which is supplied with a direct current from an overhead trolley, the pressure being 220 volts. The mining locomotive noted in Fig. 3 is used on a gauge of 3 feet 9 inches by the Taylor Coal & Coke Company, and is of much heavier construction. It weighs 26,000 lbs. and measures 12½ feet in length, 4 feet 7½ inches in height and 4 feet 3¾ inches in width. This 13-ton mining locomotive has a wheel base 4 feet 8 inches long, and

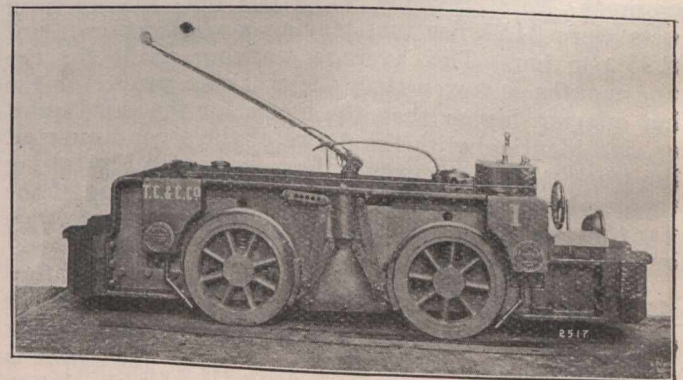


FIG. 3.

driver 30 inches in diameter. There are two railway motors of the direct current type employed, operating from trolley circuits of 220 volts pressure.

As is well known, electric mine haulage is so extensively used that, except for a few instances where special conditions are encountered, no solid arguments can be presented against its use.

The latest power-saving device applied to tube mills is the direct driving of three appliances by means of helically cut gearing. This is expected to save both in first cost and power.

OUR LONDON LETTER.

British Coal Mining Statistics.—The Rand and its Problems.—The Copper Situation. The Work of the International Lead Convention.

(Exclusive correspondence to the "Canadian Mining Journal.")

The latest figures with regard to the United Kingdom mining industry are contained in the series of returns showing the preliminary results of the investigation made under the Census of Production Act of 1906. The mines investigated were those which come under the Coal Mines Regulation Act, and include coal, ironstone, iron pyrites, oil shale, fireclay, clay and shale, limestone and sandstone mines. The selling value of their gross output for 12 months was \$616,225,000. The net output was \$531,820,000. The total number of persons employed was 840,280, and thus the net output per person employed was just under \$650 per annum.

The total quantity of coal raised in 1907 was 265,134,000 tons, and the selling value at the pit's mouth \$597,720,000. 24% of the coal raised was exported, and another 7% was shipped for the use of steamers engaged in the foreign trade. Of the steam coal raised 36.9% was exported, and 14.7% shipped for the use of steamers.

The importance of the South African gold industry makes the Rand and its problems always an interesting topic to the English mining engineer, plant manufacturer and investor. Just now it is perceived that the big milling policy inaugurated on the Rand has clearly reduced working costs substantially. With the exception of three mines, figures are to hand showing that the number of tons milled on the Rand for the first nine months of this year amounted to 15,195,798 tons, the yield of gold being very nearly 110,000,000 dollars.

Taking the per ton figures we get the following averages: Total revenue, \$7.20 per ton; the working costs were \$4.25 per ton, leaving a working profit of \$2.95 per ton. This average working profit for the nine months is lower than the working profit for the first quarter, higher than the figure for the third quarter, and identical with the figure of the second quarter. The working costs, however, have been steadily falling when reckoned per ton milled. At the beginning of the year they were 10 cents per ton higher than the average for the nine months.

Of course there are certain critics who contend that the correct method of determining costs is not to take a unit of ore but the quantity of gold recovered—say one ounce or \$5 worth. Either of these quantities is equally good for argument, adherents of the latter holding the opinion that mining policy should tend towards extracting the maximum amount of gold in the minimum of time. From their standpoint costs are not diminishing.

In the first quarter of the year on the Rand the revenue per ton was \$7.40. It cost then \$2.92 to produce \$5 worth of gold. In the third quarter of the year it cost 4 cents more to produce \$5 worth of gold.

Engineers here seem now to have wedded themselves to the idea that every possible ounce of gold should be extracted and consequently low grade ore should be milled, and in order to achieve this object big reduction plants are essential. It is only by the adoption of such means that low grade ore can be pro-

fitably treated. By following out this policy it must necessarily happen that, measured in terms of gold recovered, the ratio of costs will rise.

Talking over one interesting mining innovation on the Rand with mining engineers here, your representative learns that after some years' discussion the separation of the battery plates from the crushing portion of the mill (that is, the stamps and mortars) is being introduced at the Roodepoort United Main Reef's new mill. There will be no tables below the stamps, the crushed mill product being elevated direct from the stamps by a tailings wheel to the tube mills and plate house.

The first company to remove the plates from the battery is the Knight Central. The company's mill started crushing at the beginning of the year. It was erected in six months, and it was not possible to build the separate plate house concurrently. Little extra expense, however, is involved, and it is not thought that the delay in changing over will be more than of a few days. The building will be a large one, 74 feet long, 70 feet wide and 31 feet high up to the eaves. It is estimated that the new scheme of a separate plate house will give about 10 per cent. extra tonnage by saving the time now occupied in dressing and scraping the plates, during which the stamps have to remain idle.

Another advantage will lie in the increased facilities given for obtaining a correct sample of the ore being crushed. This is now obtained from the front of the screens, and the personal equation enters largely. With separate plates, all the crushed product will run down a central launder, in which an automatic sampler will be placed.

The general arrangement of the plate house at the Knight Central will be such that no ore will pass over any of the plates until it has been crushed sufficiently fine to go to the cyanide plant. The present cycle of operations, which is normal, is—(1) Mill plates; (2) Separator; (3) tube mills; (4) shaking tables; (5) return to separator. Under the new scheme the crushed ore will pass from the mortar-boxes to a classifier of the ordinary conical type. The fine crushed ore will pass over the plates. These are to be stationary, as experiments conducted at other mines tend to show that there is little advantage in using shaking tables; from these the ore will pass to the cyanide works. Coarse crushed ore from the separator will now go to the tube mill. There are three of these now installed, which represents one to each forty stamps.

Increased interest is being taken in the outlook for lead, the price of which has not yet responded in any marked degree to the very hopeful outlook for trade generally. Operators in the metal had rather high hopes of the International Convention some months back, but nothing has been done to warrant these hopes yet.

Producers in Germany and Belgium particularly have so far been a source of weakness owing to conflicting interests. The efforts of the Convention to

secure control of the price by reducing the output which it regulated to little more than 20% of the world's total, have been engaged further by labour disputes in Australia.

Readers of the "Canadian Mining Journal" may know that the Convention has not fixed minimum selling prices, but hopes to regulate the price by means of production on a sliding scale. The authorities of the Convention have entered into a provisional agreement which extends up to the end of 1910, after which it will be terminated by giving six months' notice. It embraces Great Britain, Germany, Belgium and France. The output of the combined producers is to be handled exclusively by Henry R. Merton & Company of London and the Metallurgische Gesellschaft of Frankfurt-on-Main.

Furthermore, during recent months the International Conference has been a somewhat persistent seller and early in August the prompt price of lead fell for a moment as low as 61.50 per ton. It has since recovered somewhat. Some consumption has led to accumulation of stocks which, while being less than at this time last year, are much higher than those of a year earlier. It is also believed that there are unknown stocks in Australia and Spain.

Last year's output was over a million tons the largest producer being the United States, which got out more than one-third of this. About half as much came from Spain, less from Germany, and about 90,000 tons from Australia. The United States consumed all but about 30,000 tons of its output and this country came second with a consumption of 228,000 tons. A little way behind came Germany. France consumed less than half as much as we did. The present price of lead cannot be regarded as extravagant. The highest price touched for prompt cash last year was \$74.25, the lowest \$60.25.

The copper situation here shows a stronger sentiment in response to buoyancy of the American share market. A few days ago one of the frequent scares materially depressed the price of standard copper and heavy liquidations took place. The market has, as we say, recovered from the worst, but there are as yet no signs of revival in the demand from the legitimate trade whose attitude has undoubtedly been seriously prejudiced by the bad statistical outlook.

EXCHANGES.

The Quarry, London, Eng., October, 1909.

This number contains an instalment of a treatise on the quarrying and preparation of stone for sale. The article in this issue is devoted to slate quarrying. The authors are Messrs. Allan Greenwell and J. V. Elsdon.

The Mining Journal, October 9th, 1909.—

A Department of Mines has been established at the British Home Office. According to *The Mining Journal* which has kept this subject before the public for some years, the new department is inadequate and faulty in organization. "What we look for," says our contemporary, "is a department organized more on the lines of colonial departments of mines, where, although the security of the mines is not neglected—as is evidenced by fatality rates comparing favourably with those in this country—commercial and economic considerations are

given their due place." Continuing, *The Mining Journal* alludes to the insufficient staff of inspectors, to the official neglect of mineral industries other than coal, and to the lack of commercial value in official reports.

The Colliery Guardian, October 8th, 1909.—

In a strong editorial the Guardian discusses the attitude of the leaders of the Miners' Federation of Great Britain. The Guardian touches upon the manner in which the officials of the union "despite their fervour of all reforms calculated to promote the safety of the mine, have . . . subordinated such reforms to the financial interest." The Guardian strenuously opposed "working-men" inspectors. The ideal qualification of the proposed "working men" inspectors is to judge from the assertions of one of their chief advocates, "not one that can be suitably tested by any examination; it is simply that the candidate shall not have had an education worthy of the position." On the other hand, "mine-owners and managers. . . desire that those who shall be in a position to dictate to them shall have the necessary technical qualifications irrespective of birth or social standing."

The Mining Magazine, October, 1909.

The second number of *The Mining Magazine*, is a worthy successor to the first. A great many subjects are treated. One of the most interesting articles is from the pen of Mr. T. A. Rickard, hydraulic mining is the subject. The operation of an hydraulic elevator is described. On Discovery claim, Ophir Creek, one elevator has been used to work ground since 1898. In addition to the monitor and the elevator a water-lift is employed to pump the seepage in the excavation where this work is proceeding. The installation and working of the elevator are outlined. The cost of operations in this case for 1907 was 45 cents per yard. The use of the monitor and the elevation insures the disintegration of any clay associated with the gold. Decomposed schist is cut and broken with the force of the jet. The hydraulic elevator is extravagant in its use of water. In a country where the precipitation of moisture is small, and where alluvial deposits are widely scattered, it is wasteful to employ water directly to raise water. With water worth \$1 per miner's inch per day, it is possible to use this form of natural energy to better advantage. In many cases it would be more economical to transform the energy of the water into electricity and transfer the power along a copper wire for use in machinery. This idea has already been applied in the Yukon.

The heavy stamp is an assured success, for from a trial run of the new twenty heavy stamps installed on the West Rand Consolidated the individual crushing capacity has been proved to be fifteen tons per day. They were estimated to be able to perform a duty of twelve tons, and it is satisfactory to note that the calculations of the engineers have been more than fulfilled. The importance of this development, not only to the West Rand Consolidated, but to other mines where heavy stamps are being erected, is obvious. It makes, of course, for a further reduction of working costs on the Rand. At the Roodepoort United 100 stamps of 1,910 lb. each are now being erected, and this weight may be even further increased in the case of yet another 100 stamps to be put up on the West Rand Consolidated.

PYRITE IN THE UNITED STATES.

The production of iron pyrites in the United States in 1908 amounted to 222,598 long tons, valued at \$857,113, an average price per ton of \$3.85. In 1907 the production was 247,387 tons, valued at \$794,949, or \$3.21 per ton. In both years Virginia was the principal producer. The worked deposits in Virginia occur as large lenticular masses conforming to the foliation of the inclosing rocks, mostly crystalline schists of various types. The pyrite is either massive or granular, varying in texture from fine to moderately coarse grained. It is usually associated with varying quantities of quartz and calcite. The general mining practice is to sink shafts in the direction of the dip and to run levels from both sides of the shaft in the direction of the strike. The walls are strong and little trenching is necessary. Imported pyrite still greatly exceeds the domestic supply.

CANADIAN PATENTS.

The following is a list of Patents issued by the Canadian Patent Office on Oct. 12, relating to Mining and Metallurgizing, and furnished by Fetherstonhaugh & Co., 5 Elgin Street, Ottawa, Russel S. Smart, Resident:

121101. A. S. Dwight, Joliet, Ill., R. L. Lloyd, New York City, processes for roasting and sintering ores.

121103. E. J. Meeker, E. Orange, N.J., F. L. Holmquist, New York City, executors of G. M. Westman,

121105. S. W. Berglund, Stockholm, Sweden, processes for the manufacture of fire-proof stone, of lime and quartz or such like.

121141. J. Hansford, Portland, Eng., mfg. of gas and coke or the like.

121144. H. K. Hess, Philadelphia, Pa., processes and app. for extracting copper from its ores or matte.

121178. C. Rollin, Newcastle-on-Tyne, Eng., mfg. of barium compounds.

121199. R. H. Vidal, Paris, France, processes for obtaining colouring matter from animal fibres.

121200. C. E. Wakefield, London, Eng., treatment of calcium carbide.

THE RIDDLE READ.

A waiting world hangs on the words of Cook and Peary. Moving silently, but swiftly, the Canadian Mining Journal, with a fine disregard of time, space, and expense, has secured for its own exclusive use, a scientifically exact account of a remarkable dash to the North Pole. The narrative contains a genteel sufficiency of technical terms, and, on the other hand, human interest is not lacking.

The ingenious expedients whereby the larder was replenished eclipse totally the crude pemmican and cruder gum-drops of Cook and Peary. The amphibious craft in which the journey was made marks an epoch in locomotion.

But most important are the geographical data observed and recorded. We are proud that it has fallen to our lot to announce the discovery that there is no latitude at the Pole—for untruthful persons.

We commend the whole narrative to the attention of all scientific bodies. It is with unbounded pleasure that we rise to remark that it requires a mining man to do the thing properly.

Our traveller's diaries and official records were sealed in a German silver tube, (a converted sugar-sprinkler), attached to a stone, and ejected from the submerged craft in the water that surrounds the foot of the Pole. There they lie.

A QUESTION OF LATITUDE.

By A. M. Hay, Toronto.

(All rights and wrongs reserved.)

All successful navigators, have been prevaricators

Since the days of good old Noah and the Ark;
Columbus told some tales, of sea serpents, whales and gales;

And Raleigh, with the public, had a lark.
While they sailed the summer seas, navigating at their ease,

With their topsails and their spinnakers unfurled,
They'd no trouble to keep warm, lots of time to spin the yarn

Which, later on, they reeled off to the world.

The circumnavigator, sticking close to the equator

Made slow progress, by degrees of longitude;
And, while sailing east or west, he always found it best
To borrow just a little latitude;

He created quite a rumpus, every time he boxed the compass,

But he ultimately got his work down fine;
When the compass he could box, he had solved the paradox

That a semi-circle's shorter than a line.

But Arctic navigation evolved a new equation

Full of difficulties no one understood,
And only those might try, who never told a lie.

And whose characters from childhood had been good
I longed to be a hero, at eighty below zero,

To leave the world behind me, and its vice;
Capture walruses and whales, face the howling Arctic gales;

Camp in Igloos, made of virgin snow and ice.

So I chartered for the trip, a combination ship,

One requiring special skill to navigate her;
She could sail or fly with ease, climb mountains and scale trees—

By lumber-Jacks she's called an alligator.

I fitted out my craft, rechristened her the Taft,

Then looked about to find a truthful crew;
Had the luck to find a Bos'n, born and bred upon the ocean,

And a treasure of a Sea Cook, making two.

Though the Bos'n couldn't lie; had but one leg and one eye,

He could damn and curse and swear like a bargee;
He could furl and reef and steer, and no better Engineer

Or Fireman, e'er was found on land or sea:

The balance of the crew, could boil and broil and stew,
And make skilly, out of icebergs at a pinch.

With such a boat and crew, the end I had in view
Seemed a simple undertaking--was a cinch.

When at last we struck the trail, weighed our anchor
and set sail

Not a soul was there to cheer as we departed,
Which perhaps was just as well, there'd be nothing left to tell

Had I told them all my plans before we started.

I've been brought up from my youth, to always tell the truth,

And to swear all affidavits on a book ;
So in sunshine and in fog, I entered up the log,
And had it witnessed by the Bos'n and the Cook.

Our ship had lots of power, good for sixty miles an hour
Though we started out at seven, in a fog.
She burned icicles for coal, and as we neared the pole
She ran up to a hundred, by the log.
The nearer we got there, the hotter got the air,
Caused by friction of the alligator's flight ;
But what could you expect, when you pause to recollect,
That the blazing sun stayed up with us all night.

On a Friday, just at noon, by the pale light of the moon
The Bos'n piped his dead eye, and reported
That the son of a Sea Cook had quietly took his hook
And that all supplies on board had been deported.
The news gave me a shock, worse than striking on a rock ;
The fond hope which until then I had cherished,
The ambition of my soul, to be first to reach the Pole
Was in peril of forever being perished.

When I got the information, I made an observation,
While the Bos'n made a number of his own—
On the last part of the trip, I would try an Arctic dip
And travel underneath the iceberg zone.
So we opened the sea-cock, sank, like going down the lock,
Went full speed ahead, and then I held my breath,
For if we slipped a cog, or struck a sunken log,
It was clearly, just a case of instant death.

I made a calculation, that a little variation
South of north, would cut the distance just in two
'Twould be easy to emerge, where lines of longitude
converge
If we steered north—astronomically true.
We knew we'd reached our goal when we bumped
against the pole
Took a half hitch—then we emptied out the tanks.
As we bobbed up from below, we could hear the breezes
blow,
And on our knees, we offered up our thanks.

On dewatering my eyes, lo ! What was my surprise
To find the Pole was spinning like a Peary ;
And there was Cook on top—no I never drink a drop ;
But I must admit the Bos'n's eye is bleary.
There are no prevaricators, amongst Arctic navigators ;
I couldn't tell a lie to save my soul ;
And I've solved the new equation of Arctic navigation :
There's no latitude, for liars, at the Pole.

PERSONAL AND GENERAL.

Mr. Charles Fergie is ill in Montreal.

Mr. J. E. McEvoy is making Toronto his headquarters for the winter.

Mr. C. L. Constant, Jr., of the C. L. Constant Company, is making an extended professional visit to the mining sections of Ontario and Eastern Canada.

Mr. Boyd Magee, general manager of the Keeley mine, South Lorrain, is in Toronto.

Mr. R. B. Lamb, of the C. L. Constant Company is leaving on a prolonged tour of the Western Mining sections.

Mr. W. H. Trewartha-James, general manager of the Tye Copper Company, leaves Vancouver shortly to visit London on business. He will return about the first of the New Year.

Captain W. H. Jeffery has resigned his position with the Silver Cliff Mining Company and has left for British Columbia. As manager of Chambers-Ferland, and in his last billet, Captain Jeffery did good work.

The British Broken Hill Proprietary Co., Ltd., has increased its contract for Elmore Vacuum Machines from five units to ten units, the whole plant should thus have a capacity of 400 to 500 tons of zinc tailings per day.

The Way's Pocket Smelter Co., of South Pasadena, Cal., announce that their exhibit has received the highest award in the Mining Building at the Alaska-Yukon-Pacific Exposition in Seattle. This gives Way's Process the highest award of any method of ore testing, as well as showing that it was the best and most attractive exhibit.

October 27, 1909, was an eventful day in the history of the Canadian Mining Institute, for on that day the billiard championship of the Institute was decided. Mr. Eugene Coste and Col. A. M. Hay were the contestants. Preliminaries were arranged by Dr. W. G. Miller. Col. Hay won a brilliant victory. The end is not yet.

A complimentary banquet was tendered to Mr. J. Stevenson Brown, until recently the treasurer of the Canadian Mining Institute, at Montreal, on the evening of Friday, October 22. Major R. G. Leckie occupied the chair, supported by Mr. Charles Fergie. Each mining province, with the exception of Alberta, of the Dominion was represented. Mr. Fergie spoke for Nova Scotia; Major Leckie and Col. A. M. Hay, for Ontario; Mr. H. Mortimer-Lamb for British Columbia; and Mr. John J. Penhale, for Quebec. There were present also Mr. E. E. Ling, of New York, representing the United States members of the Institute, President W. G. Miller, and Councillors R. T. Hopper and H. A. Drury. During the evening a beautiful silver service was presented to Mr. Brown.

The new smokeless fuel of Sherard Cowper-Coles is made by mixing one part by weight of wet peat with two parts of bituminous coal, and heating in a retort five hours at about 850 degrees F. The temperature, aided by the steam from the peat, is just sufficient to drive off the hydro-carbons that produce smoke. The coal binds the peat into a coherent mass, and this fuel has high calorific value, igniting readily in an ordinary grate, and burning economically and without smoke. The tar and other products distilled over in the watery extract may be condensed into a superior pitch, while the gases may be burned to supply the heat required by the process.

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

Glace Bay.—The U.M.W.A. Strike, 19th October, 1909.—

The trend of events in connection with this strike is best shown by figures, and we therefore make no apology for repeating those given in the last letter, with the addition of the average daily outputs for the first half of October.

Month	Total Output.	Average Daily Output.
July	136,000	4,200
August	154,000	5,900
September	180,000	7,200
October, 1-15,	102,000	8,000

We estimated the number of men still out on strike at the end of the third month of the trouble at 1,700 men, and this estimate was confirmed by a parade of U.M.W.A. adherents which was held on the 15th October. This parade was composed of approximately 1,650 persons, and as the men marched in extended order two abreast the procession was of imposing length.

There were several noticeable things about this parade: One was the small stature of the men who marched. The large majority of the processionists possessed the typical physique of the European miner, the characteristics of which are a certain "stockiness" and a marked development of the shoulders and torso in comparison with the lower limbs, and a gait which resembles that of the sailor. This type of physique has been transmitted from generations of miners who have worked in the low seams of Europe, and is not typical of the native Cape Breton miner. The last-named has not more than two or three generations of coal miners behind him, and neither he nor his forbears have ever worked in seams which do not permit of the miner standing upright. There was a sprinkling of the unmistakable Highland strain in the procession, but it was lost in the general impression one obtained of the strikers. One noticed the broad faces of the Huns and Poles, the bristling moustaches of the Belgians, and the dark complexions of the Italians, but as a representative gathering of Nova Scotian miners the parade was a dismal exposure of the true nature of this lamentable strike. We noticed also a number of small boys, several bar-tenders, and men whose working days had long since passed. There is no doubt the procession represented the full strength of the men on the relief roll of the U.M.W.A. at the mines of the Dominion Coal Company. There is a printer just across the way from the office of the Coal Company who believes that Socialism will bring the millenium. This enthusiast, as the head of the procession passed his door, tacked up a red poster, reading: "Vote for Socialism, the only remedy," and took in the poster as the last man went by. It is to be feared the advice was lost on many of those who walked by, not because the advice was ungenial, but because they could not read the English.

The foregoing is not written in any spirit of disparagement other nationalities, but simply to point out that this strike is not centred in Cape Breton and has not arisen out of any local discontent. It is a purely artificial disturbance, brought about by the lavish expenditure of the funds of an American union, and by intimidation of the non-native population, aided by politicians fishing for votes and a small group of disappointed office-seekers who preferred to accept the dole of a foreign union rather than bend their energies to the building up of their own organization. If those who have read in Toronto and Montreal newspapers the statement that "four thousand of the best miners in Nova Scotia" were on strike at Glace Bay, could have viewed this procession, it is to be feared the impression they would carry away would have been unfair to the Nova Scotian miner as he is in reality.

The U.M.W.A. in its abounding wisdom has brought suit against the Dominion Coal Company because, among other enormities, it has "unduly limited the facilities for mining coal." When the Coal Company was incorporated in 1893 the output was 800,000 tons per annum. For the past three years the output has been a little over three and a half million tons annually. The Dominion Coal Company, in the sixteen years of its existence, has added an annual production of coal to the total Canadian output of 2,700,000 tons, or 25 per cent. of the whole production of this Dominion. Notwithstanding the accusations of the U.M.W.A., the Company is proceeding with its policy of limitation, and has three new collieries under construction. The work at Dominion Nos. 12, 14, 15 and 16 Collieries on the Lingan-Victoria areas has been somewhat hindered by the intimidatory tactics of the U.M.W.A., which has endeavoured to prevent the construction men from going to work, and the Company has had to put up with such pleasantries as incendiary fires in the woods around the new mines. Nevertheless, good progress is being made. No. 12 Colliery is complete and ready for producing good outputs. At No. 14 Colliery the permanent bankhead and buildings are well advanced. At No. 15 the work would have been much further ahead but for the violence of the strikers, and it has been found necessary practically to stop operations there and at No. 16 Colliery.

Good progress is being made with the electric transmission line from Dominion No. 2 Colliery to the Lingan collieries. The poles are all erected and braced, and a portion of the wire is strung. The excavations are progressing for the condensing plant at No. 2, and the makers are working on the exhaust-steam turbine, which is to generate the power for the Lingan collieries.

At No. 2 Colliery the addition to the bankhead to house the new screening plant is completed. This screening arrangement will be similar in character to those at the Reserve and No. 6 collieries, and will consist of shaking screens and picking belts.

The activities and doings of the Stock Exchange are far removed from the actual operations of industrial concerns, and the rumours of a merger of steel and coal do not convey much immediate meaning to those who are engaged in the actualities of producing coal and the strike situation. Many of the shareholders in Dominion Coal do not fully realize what a magnificent property that company controls. Its areas are for all practical purposes inexhaustible, and cover the only coalfield in the whole Atlantic seaboard of this continent. The property in course of time will appreciate to an extent hitherto undreamt of. There are few properties in the world with such potentialities as that controlled by the Dominion Coal Company, and it will have to be an exceedingly good deal that gives the shareholders of this company what their property is worth.

ONTARIO.

Kenora Mining Division.—This district comes to the front again with the report of a valuable copper strike within 20 miles of Kenora.

Dr. S. S. Scovil and Frank Moore, the latter an old prospector who was employed in the original opening of the Calumet and Hecla, of Michigan, are now working this claim, which is situated on Alley Island, near Oliver Point, on the Lake of the Woods, within twenty miles of Kenora.

The samples brought to town and shown round contain native copper throughout, and the vein matter seems to be very soft and shale-like in its cleavage. In fact so soft is this vein matter that one would almost be inclined to say it was decomposed

from weathering were it not for the fact that no harder rock is visible even at the tunnel end.

The vein is stripped for 700 feet, and shows a width in one place of 120 feet.

The report of a recent trip through the West Hawk Lake and Star Lake districts gives a good idea both of the main features of the country and its inaccessibility. It says in part:—

“Leaving Ingolf station we paddle to the western outlet of Long Pure Lake, a distance of one mile, then portage to West Hawk Lake across a good dry portage of three-quarters of a mile and paddling down the east side of this lake we come to a point of contact between the granite and the older formations, along which contact is a heavily-mineralized vein on which are located the Mineral Queen and Mineral King mining claims, the latter being owned by Anthony Blume.

“This contact is clearly defined for a distance of eight miles from the lake shore, running S.E. by E., and is again visible on the west side but it changes its direction and swings to the south in a semi-circle, passing within a mile of the Manitoba Shiner on Little High Lake.

“On the western shore of the lake we come to the Bayfield and Caledonia, which show perhaps the most interesting geological formation of any location on the lake.

“On the Bayfield is a bluff 30 feet high, running out into the lake, showing on its exposed face copper and iron pyrites and tourmaline, while the crevices show a curious greyish encrustation not unlike the famous cobalt bloom. Traversing the remainder of the lake to the western extremity, we make a short portage into Star Lake, where the formation changes, showing frequently heavy quartz veins, many of which have been staked and are yielding good gold values.”

Cobalt.—Considerable uneasiness was recently felt by many of the mines owing to a coal famine, which seriously threatened them with a shut down. This shortage is due to various causes. The accommodation for freight at the Cobalt railway yards is limited, and the increasing volume of business in the district has brought about a congestion of freight, and the difficulty in securing teams to haul away the freight and coal as soon as placed seems to add to the trouble. Moreover, many of the mines have allowed their coal reserves to become depleted in anticipation of the delivery of the air and electricity before this time. The first mine to benefit by the electric power is the Colonial, where the mill was started up a few days ago. From here the transmission line is being extended to the King Edward, where everything has been in readiness for some time. The present power is being furnished by a temporary generator until such time as the main plant is completed. The importance of the new power to this district cannot be too highly estimated, since the reduction in the cost of power is in itself a considerable item, which will enable many properties now closed down to resume operations. This power will also aid materially in the opening up of the new properties in the Gillies Limit, where such promising finds have been made. The average cost per horse power per year is estimated at about \$175, whereas the new power will be sold for \$50 per horse power per year. The Cobalt Hydraulic Power Co. is pushing its work as rapidly as possible, and expect to have the air ready for distribution by the middle of December. They already have about nine miles of the twenty inch, and five miles of the twelve inch mains connected up. The Mines Power Co. has a force of some thousand men at work, and is making excellent progress. Its two 5,000 ft. compressors will be shipped from England within the next two weeks.

In this connection it might be mentioned that a new and important undertaking of interest to the Cobalt district has recently been financed by Toronto capitalists. This is the erection of a sampler plant, the site for which has been secured from the La

Rose Mines, on the west side of the T. & N.O. tracks, from which a short spur will be constructed. The question of a sampler for Cobalt has long been discussed, and overtures were made to the Ontario government to subsidize this undertaking, but met with no success. The present enterprise is being undertaken by Messrs. Campbell & Deyell, a local firm of engineers entirely on their own responsibility. The capacity of the plant will be one thirty ton car of high grade ore a day. The ore will be ground in a ball mill, and four separate samples taken by automatic riffle samplers, each of these samples being automatically sampled down. A separate plant will also be erected for the sampling of low grade ores, and storage bins of sufficient capacity erected to contain the ore, should it be found necessary to make additions to the ore in order to make same acceptable to the smelter to which it is consigned. This sampler will be of great benefit to many mines, several of which have stated their intention to have their ore sampled. At the present time, with but few exceptions, the only manner in which the silver contents of a shipment are ascertained is by a grab sample, which naturally is anything but accurate. With the facilities for proper sampling, mines desiring to ship low grade ore will be enabled to first determine whether same is of sufficient value to make the shipment a paying one. It is well-known that shipments have left this camp that have not paid for the freight and treatment charges.

Both the mines now using the cyanide process find that the consumption of cyanide amounts to much less than was estimated. Both the O'Brien and the Buffalo are satisfied at the success obtained with this process, which is practically new in this camp. The cyanide consumption at the O'Brien amounts to about 46c. to the ton, while the tailings assay run about 40c. to the ton. This company has decided to eliminate straight concentrating, and cyanide straight from the stamps. Taking into consideration the very complex nature of the cobalt ores it is doubtful if this process can be applied successfully, but the probability is that before long many of the concentrators will be equipped with cyanide plants to treat the slimes.

The district of South Lorrain still continues to attract considerable attention. An important discovery has been made on the property known as R. L. 470, lying about one-third of a mile north of the Kelley, and consists of the same formation as the latter, keewatin and diabase. The vein is in the keewatin formation and has been trenced for about three hundred feet, and in places shows good values in native silver. The Wetlaufer, one of the best known properties in South Lorrain, has 3 in. to 4 in. of high grade ore in the bottom of its shaft at a depth of 110 feet, with the wall rock well mineralized for some distance each side of the vein. It has already shipped one car of high grade ore, and the Keeley has also shipped two cars of medium. Work has been steadily progressing on both these properties all summer, and has proved up a large area. Mining activity in this section will be greatly facilitated in the future as soon as the electric power from the Mines Power Co. is available. The main transmission line of this company, whose plant is at Matabichouan River, which empties into Lake Temiskaming just south of the Montreal River, passes right through this district. Although this district is not as yet served by any direct railway communication, it is an easy matter to team the ore to the shores of Lake Temiskaming and there load on scows and tranship to the C.P.R. at Temiskaming station, at the foot of the lake. The low rates by water offset to some extent the additional expense incurred by re-handling the ore from the boats to the railway.

A large number of claims have been taken up this summer around Fabre, on Lake Temiskaming, in the province of Quebec, just below South Lorrain. This district has been opened up to the prospector owing to the recent changes in the mining laws of Quebec. The size of the claims is 100 acres, and measures one mile long and one sixteenth of a mile wide. One dollar a

acre has to be paid when the claim is staked, and four months are allowed in which to do the work.

The slump in the La Rose and Nipissing stocks, more particularly the La Rose, caused considerable comment in the Cobalt district, since there was no apparent reason for such a sudden drop. One explanation is that Guggenheims are responsible, and that they beat the stock down in an endeavour to get at the lower figure. The most likely explanation is that it is due to market manipulation by some New York interests for the purpose of driving out weekly-held margin accounts. Hitherto La Rose and Nipissing have been very free from market attacks, except in a slight degree.

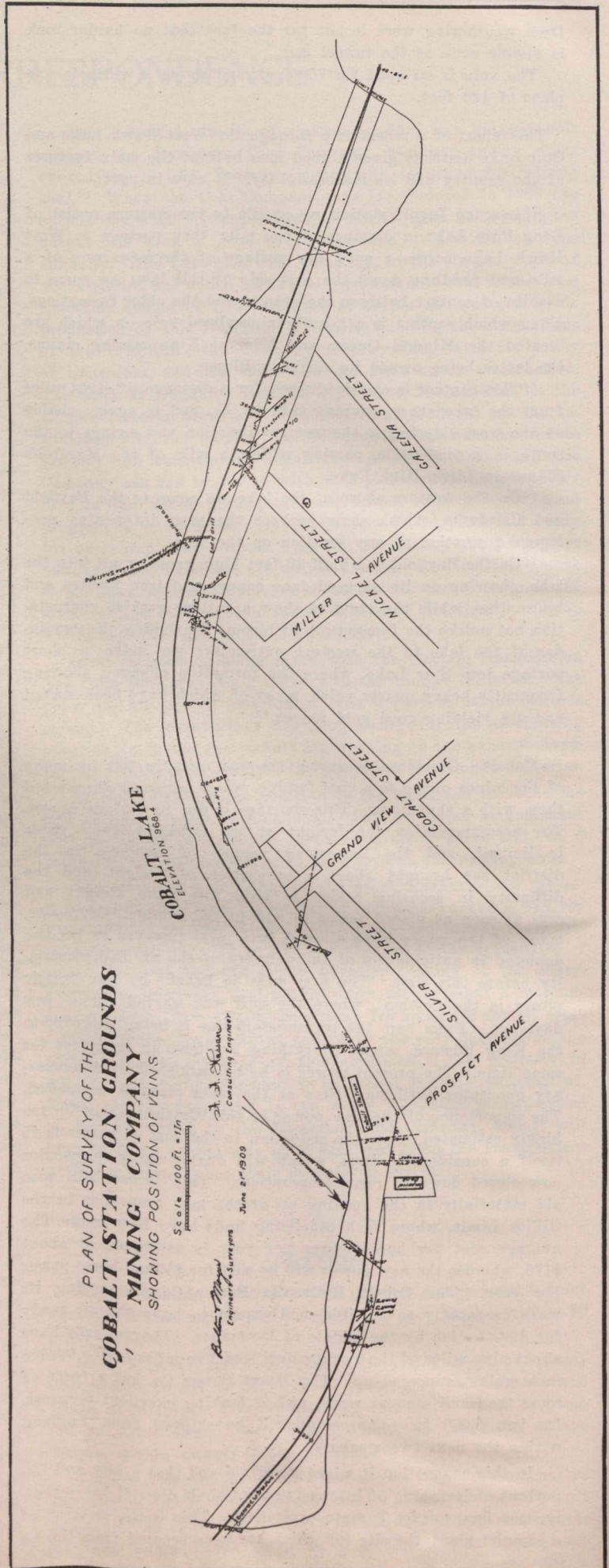
The Crown Reserve Mining Company has leased the Silver Leaf for a period of five years, on a royalty basis of twenty-five per cent. of the gross output of the mine. According to the terms of this lease Crown Reserve must spend twenty thousand dollars in development work on the property during the first year and ten thousand dollars a year for the four succeeding years. A short time ago a shoot of high grade ore was encountered in one of the old workings of the Silver Leaf. A statement has been made by the Crown Reserve that the rumours regarding the draining of Kerr Lake are entirely without foundation, and that this proposition has not been considered. This however, is incorrect, as some time ago the matter was gone into, and a tunnel was proposed, which would drain into Cross Lake.

Members of Parliament from England, Mr. J. A. Baker and Mr. T. Davis, accompanied by Mr. Dignum, visited the camp, and looked over one or two of the properties, prior to making a trip to Gowganda, where they will look over the Reeves-Dobie property, in which they are interested. It is generally understood that the Reeves-Dobie and Blackburn properties each has sufficient ore sacked to make a shipment as soon as satisfactory arrangements can be made for its transportation. The Reeves-Dobie has already made a contract with the Gowganda Transportation Co. to take out their ore at the rate of \$15.00 per ton. It is probable, however, that shipments will not be made until the winter roads are in good shape. Freight rates this season to and from Gowganda should be considerably lower than last year, considering the new and improved roads, and there is every likelihood of increased activity in that section. The Bartlett Mines, of which so much was heard last winter, have sunk to a depth of 100 feet on their main vein, and from that point a crosscut was driven to catch the vein which dipped from the shaft, but failed to find it, and it is believed that the vein pinched out before attaining that depth. Good ore has been opened up on a smaller vein in the No. 2 shaft at the 75-ft. level.

In the Gillies Limit a half interest in the claim known as A.11, which adjoins the Waldman and Young-O'Brien and Silver Bar properties, was purchased by Montreal capitalists. The value of this lot lies in its proximity to the Waldman and Young-O'Brien, on which such good discoveries have recently been made. A gang of men will be put to work at an early date to thoroughly prospect the property by trenching and stripping. The claim has an area of nine acres.

The Union Pacific Mining Co., operating on Peterson Lake, has secured control of the Michigan property adjoining the Farah and Silver Leaf. The price paid is \$240,000, \$140,000 of which is to be paid at once, and the balance within a period of five years. But little work has been done on the Michigan. A shaft has been sunk to a depth of 120 feet, and from this some drifting has also been done.

New gold discoveries are reported from the townships of Whitney and Tisdale, to the north of Gowganda, near Porcupine Lake. Some five hundred prospectors are reported to be on the ground, and many more are going in. All the available ground in Whitney and Tisdale has already been staked up, and pro-



spectors are moving south to the Temagami Forest Reserve. It is announced that the Government will send in an engineer to report on the district. The quartz veins are said to be very rich in places, and generally strike north-east and south-west. The veins are narrow and very similar to those in the Painkiller Lake district, where considerable work has already been done, and the results obtained so far have been very satisfactory. It is said that one claim in the new district has already changed hands for the sum of ten thousand dollars.

The Haileybury Silver Mining Co. has declared a 50 per cent. dividend from the funds obtained from the sale of one of their properties in South Lorrain.

The T. & H. B. has declared another 300 per cent. dividend.

The name of the Young-O'Brien Company has been changed to Wyandoh. It is reported that a fourteen-inch lead of calcite was opened up on A.15, one of the properties of this company, in the Gillies Limit.

In the Le Roi Lake district the Harman-McDougall & Ross syndicate is said to have encountered a new vein, showing high values in silver in places. The vein has been stripped for about 200 feet.

Although the syndicate which purchased the Provincial Mine has only been operating the plant about a week, good results have already been obtained. A good vein has been discovered on the 125-ft. level, and another surface vein has been located near the north end of the property. This syndicate will probably try to get its money back on a stock proposition. The price paid was over \$100,000.

The new vein on the Waldman shows high grade ore at the 65-ft. level. This vein is distinct from the original vein, which dipped from the shaft.

Good ore has been encountered at the 75-ft. level of the Otisse Mine. The wall rock on both sides of the vein is well mineralized.

Cobalt Central.—At the 260-ft. level of this property a new shoot of high grade ore was encountered in a large calcite vein. The capacity of the mill will be increased from 80 to 125 tons per day.

Another high grade vein about 6" wide was struck on the 190-ft. level of the Cobalt Lake Mine. This is about the best discovery yet made on this property.

BRITISH COLUMBIA.

Rossland.—The Velvet-Portland Mine, owned by the New Velvet-Portland Mining Co., Limited, of London, Eng., has been leased to Mr. Edw. Ehrenberg, of Spokane, Wash., who expects to have a force of about twenty-five men at work within a very short while. This property lies eight miles west of Rossland; is developed to a depth of 400 feet and contains some fairly large bodies of gold-copper ore that will carry from \$20 to \$40 per ton in those metals, with a little silver. It looks as though the opening up of this property foreshadows the resumption of smelting at the Northport smelter, as this is the natural and economical smelting point for Velvet-Portland ore and concentrates. This again would seem to indicate that the Le Roi Mine may be shipping to the Northport smelter at no very late date. There is little doubt but this is the plan of the Le Roi Co.; that is, to ship ore as soon as it seems advisable and resume smelting operations at Northport. There are several Washington mines that would contribute ore to the Northport smelter, in case work was again started up at that point, which would help to make the plant pay, and cut down the cost of smelting as a whole to an economical figure.

Diamond drilling in the Le Roi mine is being prosecuted as rapidly as three machines can drive the holes. Some good ore

that has been uncovered is being stoped and stored, ready for shipment to the smelter.

The work of sinking the Josie shaft on the Le Roi 2, Ltd. is going on steadily, and shipments have come up to the regular figure again, being 490 tons for the week ending Oct. 2nd.

It is stated that at the meeting of the Consolidated Mining & Smelting Co. of Canada, Limited, to be held in Toronto, Oct. 12th, the proposition to increase the capital of the company from \$5,500,000 to \$7,500,000 will be seriously considered. Of course this concern has adopted an extensive policy that not only requires a lot of money but warrants a good capitalization. Since the organization of this company, when over five million dollars was written off the old capital of \$10,266,667, making the new capital \$4,698,800, three years of splendid progress have been accomplished. The plant at the Centre Star group, in Rossland, has been made up-to-date and substantial; a hundred improvements have been made at the Trail smelter and refinery; the Snowshoe mine has been placed upon a producing basis, properties have been acquired adjoining the Snowshoe, in the Slocan, Wellington, and half-a-dozen more good claims have been secured adjoining the Centre Star group. Of course, three years' ore has been extracted from the Centre Star-War Eagle, St. Eugene and other mines of the company, but the extraction has been along sane lines and development work to-day is well advanced and there are large quantities of ore ready for stoping or "in sight." So it appears that there is nothing unreasonable in the consideration of an increase of capital at this time, as it is practically assured that good use will be made of such capital. The Phoenix Amalgamated group is about to be put on a producing basis and other important work outlined. It takes a large amount of capital to mine the semi-low grade ores of Rossland or the low-grade ore of the Boundary, if a company is after legitimate results.

During July and August the gross output of the Consolidated smelter and silver-lead refinery at Trail was \$985,000, as compared with \$635,000 for the same period in 1908. Progress is manifest in these figures to the extent of 55 per cent. for one year. An addition is being made to the lead refinery which will increase its capacity from 70 to 120 tons per day. There are now 240 working tanks in the plant and 180 more are being put in, which, with the settling tanks, etc., will make a total of 596 tanks in the building, which is to be lengthened to 600 feet.

The Boundary.—It now appears that we are approaching the climax of the Dominion Copper drama. It is announced that the British Columbia Copper Co., in view of its arrangement with the New Dominion Copper Co. to treat the ore from its mines, is to enlarge its Greenwood smelter, and will build an additional furnace 56 in., by 30 ft., thus augmenting the capacity of the Greenwood plant from 2000 to 3000 tons per diem. The Rawhide mine of the New Dominion Copper Co. will be the first one opened up, and it is thought that October will see the first work begun. This property has probably more ore ready for stoping in its depths than any of the other mines of the Copper Co. It is estimated that the probable reserve in the Rawhide and Idaho mines of the company is between two and three million tons, that should carry \$1 in gold, 18c. in silver and 22 lb. copper per ton. This ought to give a net recovery of 17 lb. copper and \$1.15 in gold and silver per ton, from which it may be calculated that in order for the company to make a profit of 40c. or 50c. per ton at existing prices it will be necessary to keep the mining charges down to about \$1.12 and smelting around \$1.25; converting, refining and marketing 46c. per ton; which, after the deduction of gold and silver will give approximately 10½c. copper.

The output at the Granby mines is being maintained at about 20,000 tons per week. This tonnage, however, will no doubt be increased to 23,000 to 25,000 tons per week when number eight

of the enlarged furnaces is blown in, about Oct. 10th; the full battery of eight furnaces will then be available and at times when none of them are shut down for repairs will be able to treat 28,000 tons per week and over. Working under these conditions would mean a production of 616,000 lbs. blister copper per week, as Granby ore nets approximately 22 lbs. copper per ton and carries \$1 and a little over in gold and silver. Improvements are continually being made about the Granby mines and smelter that with a smaller enterprise would receive considerable comment but which with this concern are passed over, only the big things being noted. At the present writing, new machine shops are being built at Phoenix, new brick thaw-house, an additional installation of electric underground locomotives, etc. About \$250,000 has lately been expended upon mine and smelter improvements, and it is now said that the Granby Co. will be able to produce its blister copper and market it at 8½c. to 9c. per lb. and this on a monthly average. The use of gravity has been worked down so fine that they now use even the cave-in principle. During dry weather and winter a lot of the work is done underground, work in the glory holes not being as favourable as during the summer months, and some of this underground work is done with a view to undermining large bodies of ore. This is comparatively safe as long as it is dry, but being of a lime formation, partly, the action of surface water causes the ground to soften and cave, when it is ready for the steam shovels. A big saving in labour and explosives is thereby effected.

The Oro Denoro mine of the British Columbia Copper Co. is again shipping ore to Greenwood at the rate of 300 tons per week. Twenty-five men are now working at the mine and the shipments will be increased from week to week until a good average is obtained. Large bodies of ore have been placed in Oro Denoro ground by the recent diamond drill operations. The B. C. Copper Co. is also planning to open up the Emma mine in the near future. Shipments from the Mother Lode mine increased 1,000 tons during the past week, and 8,800 tons was sent to the Greenwood smelter. The B. C. Copper Co. will not now begin diamond drill exploration of the several groups of claims recently bonded in Kamloops; this in view of the arrangement to treat New Dominion ore, etc.

An English syndicate has paid \$200,000 for 3,520 acres of coal land on Granite Creek, lately owned by the Tulameen Coal & Coke Co., a concern backed by Vancouver business men. The property is 11 miles from Princeton and will be near the Vancouver, Victoria & Eastern Ry. line, when it is finished.

Nelson.—There are two important issues in this district that affect the mining industry and thereby affect the Provincial and Dominion revenue and the revenue of the Canadian, British and foreign capitalists who have their money invested in British Columbia mines. These two issues are lead and zinc. A few years ago the Dominion government recognized that it was most advisable that the lead mining industry of this district should be nourished and the existing bounty on lead was the logical outcome. This measure was a great stimulus to the lead industry, but nature has taken a hand in the matter as work has gone on, and as many former lead mines have with work at depth, become zinc mines, we are now facing a zinc problem. The French capitalists who are working the Blue Bell deposits are doing their mite toward the solution of this problem; the Sullivan group has been acquired by a subsidiary company of the Federal M. & S. Co., of the United States, and as they will have plenty of capital, important work, will no doubt, be done at Marysville; a lot of Nelson capitalists, aided by the Provincial government, to the extent of \$20,000, have expended \$125,000, and five years of work on the electrical zinc smelting furnace. Just as they achieved their object, successful and economical smelting of zinc-lead ore, the money was exhausted, and now for lack of funds this Nelson plant is idle, whereas it should be working daily, and its capacity increased from its present capacity of 10 tons per day to 30, 60, 100, and even 200 tons per day. Overtures are being made to the Dominion government with a view to obtaining a reasonable amount of aid for this industry. There is no doubt that in the years to come the government would be richly repaid for any aid that it may give the zinc industry at this time.

The recently burnt headworks at the Silver King mine have been replaced and shipments will be resumed shortly. It is planned to run a high voltage electric power line from Bannington into the Sheep Creek district. This will give the mines there power at about \$32 per h.p. per annum.

The last payment of the \$15,000 purchase price on the Van-Roi property will shortly be made. Most of the money has been taken from the mine itself. The gross revenue from operating the mine in August was \$17,582.

Ten thousand acres of Peace River coal lands have been taken up by Canadian capitalists. The deposits are said to be rich, of a good domestic coal, that will also coke to 86%. There are some vast fields of good coal in the Canadian Northwest, from Souris to the Coast and from the boundary line northward, which are bound to be an important factor in the industrial progress of this country, not only in years, but in epochs to come.

GENERAL MINING NEWS.

NOVA SCOTIA.

Halifax.—In evidence brought out in the "conspiracy" case brought by the U. M. W. A. against coal operators of the province, it has been proved that there has been no increase in the price of Dominion Coal Company's fuel since 1902. Screened coal sold then, as now, for \$3 per ton; run-of-mine for \$2.75.

Halifax.—Unwonted activity in the transfer of gold-mining claims is noticeable. Some Cobalt names, notably that of Mayor H. H. Long, appear in late transactions. Toronto capital, also, has been attracted lately.

ONTARIO.

Cobalt.—The concrete foundations of the Nova Scotia concentrating mill are being employed.

Elk Lake.—Thirty men are employed on the claims of the Tee-Arr Mining Co. The shaft has been sunk 65 feet, and native silver is showing up well in the north drift at that level.

No. 1 vein on the north-west claim of the Silver Alliance shows three inches of calcite, with occasional leaf silver. Air is to be supplied from the plant of the Elk Lake Discovery Co.

South Lorrain.—The Wettlauffer property is doing well. The

first car of ore yielded a gross amount of 55,000 ounces of silver. The next car is expected to average nearly 4,000 ounces to the ton. At a depth of 103 feet a new vein was struck. At 125 feet another vein is 10 inches wide, and assays more than 4,000 ounces to the ton. Between the two veins is five inches of country rock. The fracture and cleavage faces of the rock are coated with pyrrargyrite.

BRITISH COLUMBIA.

Fernie.—For the week ending October 16th the output of the Crow's Nest collieries was 19,951, a daily average of 3,630 tons (five and one-half days). Of this total, 6,294 went to the coke ovens, the balance being sold to the railways. The daily average was only 136 tons less than the highest ever attained.

Kaslo.—The ore shipments over the K. & S. for the month of September totalled 1,855 tons, of which 1,270 were zinc and 585 silver-lead. The principal shippers were the Lucky Jim with 790 tons of zinc ore and the Whitewater with 300 tons of silver-lead and 280 of zinc. The Lucky Jim output was consigned to the United States Zinc Co. at Depue, Ill., and the Whitewater zinc product to the National Zinc Co., Blende, Col., and National Zinc Co., Bartlesville, Okla. The entire silver-lead output went to Trail. The Rambler shows an increased output over that of several months past, with a total of 180 ton of silver-lead, and the Cork is to the fore with 100. A gratifying showing is made with this season's tonnage when comparison is made with that of 1908. A year ago the combined output of all grades of ore amounted to 9,786 tons, this year so far the tonnage is 15,552, a big increase. This is more marked when it is noted that in last year's output is included the monthly shipments from Sandon, which point has been cut off from trans-

portation since last spring. Again, Bluebell's output for two months is not included in the Kaslo-Slocan section, and no mention at all has been made as regards shipments to the Highland-Buckeye at Ainsworth. The C. P. R. is expected to be running into Sandon in about a week, and for some time after connection has been made ore shipments from the Silver City will be heavy. Before 1909 passes into history we believe the combined tonnage of the Kaslo-Slocan district will establish a record untouched since the palmy days. The following are the mines and tonnage for September:—

Silver-Lead.		Tons.
Rambler		180
Cork		100
Whitewater		120
Whitewater Deep		180
Index		5
Total		585
Zinc.		
Lucky Jim		790
Whitewater Deep		330
Whitewater		150
Total		1,270
Total tonnage for month,		1,855.

Total output of silver-lead and zinc ores of the district for the year to date, 15,552 tons. Added to this total are the shipments for September and August from the Bluebell. These are respectively 360 and 395 tons, bringing the grand total up to 16,207 tons.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

A general stoppage of work in all the iron ore mines of West Cumberland is threatened. The men demand increase of wages and complete recognition of their union. Their wages are now 17s less per fortnight than they were in 1907. It is claimed that trade is better and that wages should rise.

AUSTRALIA.

The strike of the employees of the Broken Hill Proprietary Company, which was called on January 1st, 1909, cost the men £265,000 in wages, the company £33,600, and the transportation companies £160,000. Added to these losses are the losses of the New South Wales coal miners, part of whose regular market was cut off.

EGYPT.

An important discovery of petroleum has been made at Jebel Tanka, on the Gulf of Suez. The oil springs are on the shore immediately in front of a high perpendicular cliff. The springs are covered by the sea at high tide. The fact that the oil is being forced up through tight joints in the rock is taken to indicate that great oil pressure exists below. An available supply of petroleum here will prove of immense importance to the British Navy.

SOUTH AFRICA.

During July 1909, there were 9,620 stamps at work on the Rand. The corresponding number for July, 1908, was 8,975. Dividend declared during the first six months of 1909 amounted to £4,798,696.

SOUTH AFRICA.

The West Rand Consolidated's twenty new heavy stamps have had a trial run and accomplished the satisfactory result of 15 tons per stamp per day with 100 mesh screening. The stamps are of 1,850 lbs. weight, and have a base of greater diameter and a larger mortar box than usual on the Rand.

The profits of the Summer and Jack during the past year were £716,000. All ore carrying more than 3 dwts. is regarded as payable, owing to the low operating and milling costs. The ore reserves are estimated at 2,500,000 tons, averaging more than 61½ dwts.

RUSSIA.

St. Petersburg.—The director of the Baku-Black Sea Company telegraphs to the St. Petersburg Press confirming the news of the spouting of a great gusher on their property at Maikop, near the Black Sea coast. On 12th September it began, and took fire three days later. After tremendous efforts the fire was extinguished on the fourteenth day after spouting. It is estim-

ated by the district engineer Markovsky that it has already thrown out 2,000,000 poods (32,250 tons) of naphtha. Though plugged, it burst through again on the sixteenth day, and is delivering about 40,000 poods a day. This is an event of great importance as showing plentiful reserves of oil within easy shipping reach of foreign ports. The district has long been the scene of careful boring.

The following figures, showing the output of copper in Russia and the outlook for an increased production in the future, are furnished by the American Consul at Moscow in a recent report. The output amounted to 10,306 tons, 14,554 tons and 16,591 tons in 1906, 1907 and 1908 respectively, showing a steady increase. Deposits of copper in the Caucasus are said to present vast opportunities, and enormous beds of coprolites exist in Central Russia and in the Dniester basin, the quantities in the latter alone being estimated as high as 27,000,000 tons.

The production in the several districts in 1908 were as follows, in tons: Ural, 8,429; Caucasus, 4,780; Siberia and Kirghis, 2,516; all other districts, 966. The consumption of copper in

Russia in 1908 was as follows: Produced in the Empire, 16,478 tons; imported, 4,855 tons; total, 21,333 tons, less 113 tons exported. The prices in Moscow during 1908 ranged from 27s to 34s per pood of 36 lbs.

MEXICO.

The total percentage of recovery of the metal contents of the ore at the plant of the El Oro Mining and Railway Company is 89.41 per cent. The total working expenses are \$5.42 per ton. Apart from development, etc., the actual mining and milling costs average \$4.22 per ton.

Four months ago the Federal regulation providing for drawback of duties on mining and metallurgical machinery expired. Refunds can now be secured only by personal application to the Department of Fomento. Such applications must be accompanied by complete data descriptive of the plant at which the importer intends to use the machinery. This tends to prevent any but the largest concerns from availing themselves of the drawback.

COMPANY NOTES.

LA ROSE CONSOLIDATED MINES COMPANY LIMITED.

Apart from certain features, to be noted in a forthcoming issue, the second annual report of La Rose Consolidated Mines Company, Ltd., is a satisfactory document.

In his summary, Mr. R. B. Watson states that approximately 3,000,000 ounces of silver have been produced at a total cost of 16 cents per ounce. At a selling price of 51 cents, the net profit per ounce is 35 cents. The net profit, including receipts from sales of cobalt and arsenic, amounted to \$1,090,040 for the fiscal year ended May 31, 1909. For comparison it may here be mentioned that the net profits distributed among owners of La Rose mine from July, 1904, to May 31, 1908 (vide Report, June 20, 1908), totalled \$1,006,040.82.

The earnings for the fiscal year came entirely from La Rose mine, which also financed the equipment and development of the outside properties. The Lawson was acquired in April, 1909, and thus little work could be accomplished before the end of the fiscal year.

Mr. Watson mentions that, as might be expected, considerable sinking and development is necessary before the Lawson can produce steadily. No stopping has been done on the Princess. Apparently the only encouraging symptom here is the cutting on the 135-foot level of the vein originally found on the 50-foot level.

Production.—The production of the La Rose properties for the year is shown in this table:—

	Tons.	Ozs. silver.	Net value.
La Rose	6,141.8475	279,953.97	\$1,346,161.63
Princess	7.6345	19,331.71	9,167.25
University	24.3790	6,077.56	5,710.87
	6,173.8610	3,005,383.24	\$1,363,039.75

Shipments for the year ending May 31, 1909:—

Dry tons shipped	6,063.6705
Gross ounces silver contained	2,915,706.58
Gross silver value	\$1,492,046.70
Average price received per oz. cents	51.173
Received from sales of Cobalt	\$ 24,059.52
Received from sales of Arsenic	322.15
Gross silver values plus Cobalt and Arsenic paid for	\$1,516,428.37
Smelter deduction, freight and treatment \$	196,280.45
Net value received from ore sales	\$1,320,147.92

TYEE COPPER COMPANY.

The tenth ordinary general meeting of the Tyee Copper Co., Ltd., was held on September 30, at Cannon Street Hotel, London, E.C. Mr. T. H. Wilson acted as chairman.

The chairman announced that the Board of Directors had considered it inexpedient to issue a detailed balance sheet. Following the practice of all other smelting companies a condensed balance sheet had been prepared. No dividend was to be declared for the past year, as a loss of £22,646, 4s, 1d, has been incurred. This amount was made up principally by the items of £5,066, 9s, for depreciation on properties; £3,097, 18s, 1d on plant and buildings; £6,666, 15s, 5d loss on outside mining operations; and £3,034, 9s, 7d in inspecting various properties. Depreciation was allowed for at the regular rate of 10 per cent.

The smelting of customs ore, it was stated, is increasing steadily, the year ending with the last of August, 1909, was the best since 1905. The copper produced amounted to 3,245,424 lb. The second furnace is now completed and working satisfactorily. The two furnaces combined are capable of treating over 12,000 tons of ore per month, working only 25 days. This equipment is placed on the balance sheet at the low valuation of £28,712, 14s, 2d. During the past year one furnace only was in use for seven months.

The report and accounts were accepted after a warm debate. Several shareholders insisted that a detailed balance sheet should be given. It was explained by the chairman that since the company is now a customs smelting concern it would be decidedly bad business to divulge particulars of operations. The vote stood 19 for and 12 against.

The Kerr Lake dividends are payable December 15. The new rate of quarterly dividends is equal to 35 per cent. per annum. At a meeting of directors held on Oct. 15, Julius A. Lewisohn was elected a director of the company.

Tyee Copper results for the month of September, 1909, are as follows:—Smelter ran 16 days, treating 4,000 tons of ore, producing a total of 416 tons of matte.

LAKE SUPERIOR CORPORATION.

The report of the Lake Superior Corporation for the year ended June, 1909, states that the income derived from the subsidiary companies was £501,424, while interest and miscellaneous receipts amounted to \$65,087, totalling \$566,511. Interest and

general expenses, including interest on First Mortgage and Collateral Trust bonds, absorbed \$543,516, leaving a surplus of \$22,995. The result of the year's operations of all the subsidiary companies of the corporation, compiled without provision having been made for bad and doubtful debts, depreciation and renewals, shows a surplus for the year of \$1,093,372. Of this amount, \$501,424 has been paid to the Lake Superior Corporation in interest and dividends. The remainder of the surplus has been set aside by the subsidiary companies, as in previous years, to-

wards providing for such depreciation, etc. In view of this, the directors have not felt able to pay interest on the income bonds for the year. They are confident, however, that their decision will be approved by the income bondholders. When the reorganization of the corporation was consummated in 1904, an amount was provided for working capital, which proved quite insufficient for the needs of the various companies. The result was that the companies were forced to borrow heavily from the banks.

STATISTICS AND RETURNS.

COBALT ORE SHIPMENTS.

Following are the shipments from the Cobalt Camp for the week ending Oct. 16, and those from Jan. 1, 1909, to date:

	Oct. 16.	Since Jan. 1.
	Ore in lbs.	Ore in lbs.
Cobalt Central	44,442	685,196
Crown Reserve	115,420	4,923,894
La Rose	381,434	10,397,882
McKinley Dar.	89,706	1,643,424
Nipissing	129,402	10,317,618
O'Brien	64,042	2,215,649
Silver Queen	86,449	684,844
Silver Cliff	58,000	241,820
Trethewey	65,000	1,678,698

Ore shipments to Oct. 16, from Jan. 1, are 46,315,563 pounds, or 23,157 tons.
Total shipments for week ending Oct. 16 are 947,446 pounds, of 473 tons.

COBALT ORE SHIPMENTS.

Following are the shipments from the Cobalt Camp for the week ending Oct. 23, and those from Jan. 1, 1909, to date:

	Oct. 23.	Since Jan. 1.
	Ore in lbs.	Ore in lbs.
Buffalo	56,200	945,978
Carnegie		63,410
Chambers-Ferland ..		961,010
City of Cobalt		1,100,122
Central Cobalt		685,190
Cobalt Lake		141,340
Coniagas	60,900	1,356,515
Crown Reserve	124,790	5,048,684
Drummond		992,100
Kerr Lake	120,215	1,886,341
King Edward		183,740
La Rose	513,701	10,911,583
McKinley-Dar.		1,643,424
Nipissing	191,800	10,509,418
Nova Scotia		480,810
Nancy Helen		124,700
Peterson Lake		324,040
O'Brien	128,100	2,343,749
Right of Way	124,191	2,533,226
Silver Queen		684,844
Silver Cliff		241,820
Stewart, H. J.		62,392
Temiskaming		1,626,060
Trethewey		1,678,698
T. & H. B.		1,106,260

Ore shipments to Oct. 23, from Jan. 1, are 47,635,450 pounds, or 23,817 tons.

Total shipments for week ending Oct. 23 are 1,319,897 pounds, or 659 tons.

La Rose Reserves.—La Rose reserves as at June 1, 1909, were as follows:—

	Partly Developed:—			Estimated Profit
	Tons.	Ounces. Silver.	Silver at 51c. per oz.	
Main vein	3,189.4	2,668,088	\$1,424,513	\$2,987,329.96
No. 3 vein	278.6	790,605	408,781	283,326.11
McDonald vein	926.7	748,621	400,331	277,469.42
No. 10 vein	188.6	100,391	54,971	38,100.40
	4583.3	4,307,705	\$2,288,596	\$1,586,225.89
Country rock:				
McDonald	5747.	454,013	231,546	142,812.95
	10,330.3	4,761,718	\$2,520,142	\$1,729,038.84
Indicated ore:				
No. 3 vein	68.9	206,700	106,795	74,019.61
	10399.2	4,968,418	\$2,626,937	\$1,803,058.45

Following are the September returns of Le Roi No. 2:—
“Josie mine report for last month—Shipped 2,490 tons. The receipts from smelter are \$73,262 (£15,105), being payment for 2,859 tons shipped, and \$3,012 (£621), being payment for 80 tons concentrates shipped. In all, \$76,274 (£15,726).

B.C. ORE SHIPMENTS.

Nelson, October 9.—The following are the ore shipments and smelter receipts from Southeastern British Columbia for the past week and the year to date:

Boundary—	Week.	Year.
Granby	18,013	756,906
Snowshoe	4,166	112,728
Mother Lode	9,366	210,546
Oro Denoro	1,100	3,038
Other mines		664
Total	32,745	1,083,927
Rossland—	Week.	Year.
Centre Star	3,295	135,529
Le Roi Two	476	24,167
Do. milled	260	10,240
Other mines		9,561
Total	4,031	179,497

Slocan-Kootenay—	Week.	Year.
Queen, milled	420	16,596
G. Poorman, milled	250	9,850
W. Deep, milled	700	27,800
K. Bell, milled	70	2,770
S. Relief, milled	145	5,730
Nugget, milled	110	4,350
Blue Bell, milled	900	35,600
St. Eugene	278	16,445
Aurora	12	12
North Star	249	1,945
Second Relief	31	32
Blue Bell	142	3,891
Granite-Poorman	30	355
Van Roi	82	698
Highland Buckeye	70	134
Whitewater Deep	65	2,843
Rambler-Cariboo	21	824
Emerald	32	961
Other mines		*15,628

Grand total	40,583	1,410,182
Total	3,807	146,758

SMELTER RECEIPTS.

Granby	18,013	757,356
Consolidated Co.	9,149	314,319
B. C. Copper	10,566	213,629
Le Roi		12,761
Total	37,728	1,298,065

Nelson, October 16th:—The refinery of the Consolidated Co. at Trail, which has been enlarged, will shortly be ready to treat 150 tons a day. The ore shipments and smelter receipts for the past week are the highest so far this year. Appended are details of both:

Boundary—	Week.	Year.
Granby	22,371	779,277
Snowshoe	3,529	116,257
Mother Lode	11,132	221,678
Oro Denoro	3,300	3,383
Other mines		664
Total	37,332	1,171,259

Rossland—	Week.	Year.
Centre Star	3,233	138,762
Le Roi 2	570	24,737
Do. milled	260	10,500
Other mines		9,561
Total	4,063	183,560

Slocan-Kootenay—	Week.	Year.
Queen, milled	420	17,010
G. Poorman, milled	250	10,100
W. Deep, milled	700	28,500
K. Bell, milled	70	2,680
S. Relief, milled	145	5,875
Nugget, milled	110	4,830
Blue Bell, milled	900	3,986
St. Eugene	508	16,963
Blue Bell	95	3,986
Yankee Girl	81	2,096
Panama	69	69
Whitewater Deep	37	2,880

Silver Cup	34	1,124
Eastmunt	39	92
Emerald	28	982
Standard	22	407
Ottawa	28	427
Molly Hughes	21	251
Empress	2	2
Other mines		15,746
Total	3,639	150,317
Grand total	44,954	1,455,136

SMELTER RECEIPTS.

Granby	22,371	779,727
Consolidated	8,296	322,615
B. C. Copper	11,432	225,061
Le Roi		12,761
Total	42,099	1,340,164

TORONTO MARKETS.

Metals.

Oct. 26.—(Quotations from Canada Metal Co., Toronto.)
 Spelter, 6½ cents per lb. (strong).
 Lead, 3.75 cents per lb.
 Antimony, 8½ to 9½ cents per lb.
 Tin, 32 cents per lb.
 Copper, casting, 13.65 cents per lb.
 Electrolytic, 13.75 cents per lb.
 Ingot brass, 9 to 12 cents per lb. (metal market very steady).
 Oct. 26.—Pig Iron (quotations from Drummond McCall Co.)
 Summerlee, No. 1, \$24.00 (f.o.b. Toronto).
 Summerlee, No. 2, \$23.50 (f.o.b. Toronto).
 Midland, No. 1, \$22.50 (f.o.b. Toronto).
 Coal, anthracite, \$5.50 to \$6.75.
 Bituminous, \$3.50 to \$4.50 for 1¼ lump.

Coke.

Oct. 22.—Connellsville coke (f.o.b. ovens).
 Furnace coke, prompt, \$2.75 to \$2.85 per ton.
 Foundry coke, prompt, \$2.60 to \$2.85 per ton.
 Oct. 22.—Tin (Straits), 30.45 cents.
 Copper, prime Lake, 12.90 to 13.00 cents.
 Electrolytic copper, 12.70 to 12.75 cents.
 Copper wire, 14.50 cents.
 Lead, 4.40 cents.
 Spelter, 6.40 cents.
 Sheet zinc, 8.50 cents.
 Antimony, Cookson's, 8.37½ cents.
 Aluminum, 23 to 24.00 cents.
 Nickel, 40.00 to 49.00 cents.
 Platinum, \$28.50 to \$32.25 per oz.
 Bismuth, \$1.75 per lb.
 Quicksilver, \$46.00 per 75-lb. flask.

SILVER PRICES.

	New York.	London.
	Cents.	Pence.
October 9	51¼	23 11-16
" 11	51¼	23 11-16
" 12	51¼	23 11-16
" 13	51	23 9-16
" 14	51	23 9-16
" 15	50¾	23 7-16
" 16	50¾	23 7-16
" 18	50⅞	23 1-2
" 19	51	23 9-16
" 20	51	23 1-2
" 21	51	23 1-2
" 22	50¾	23 3-8