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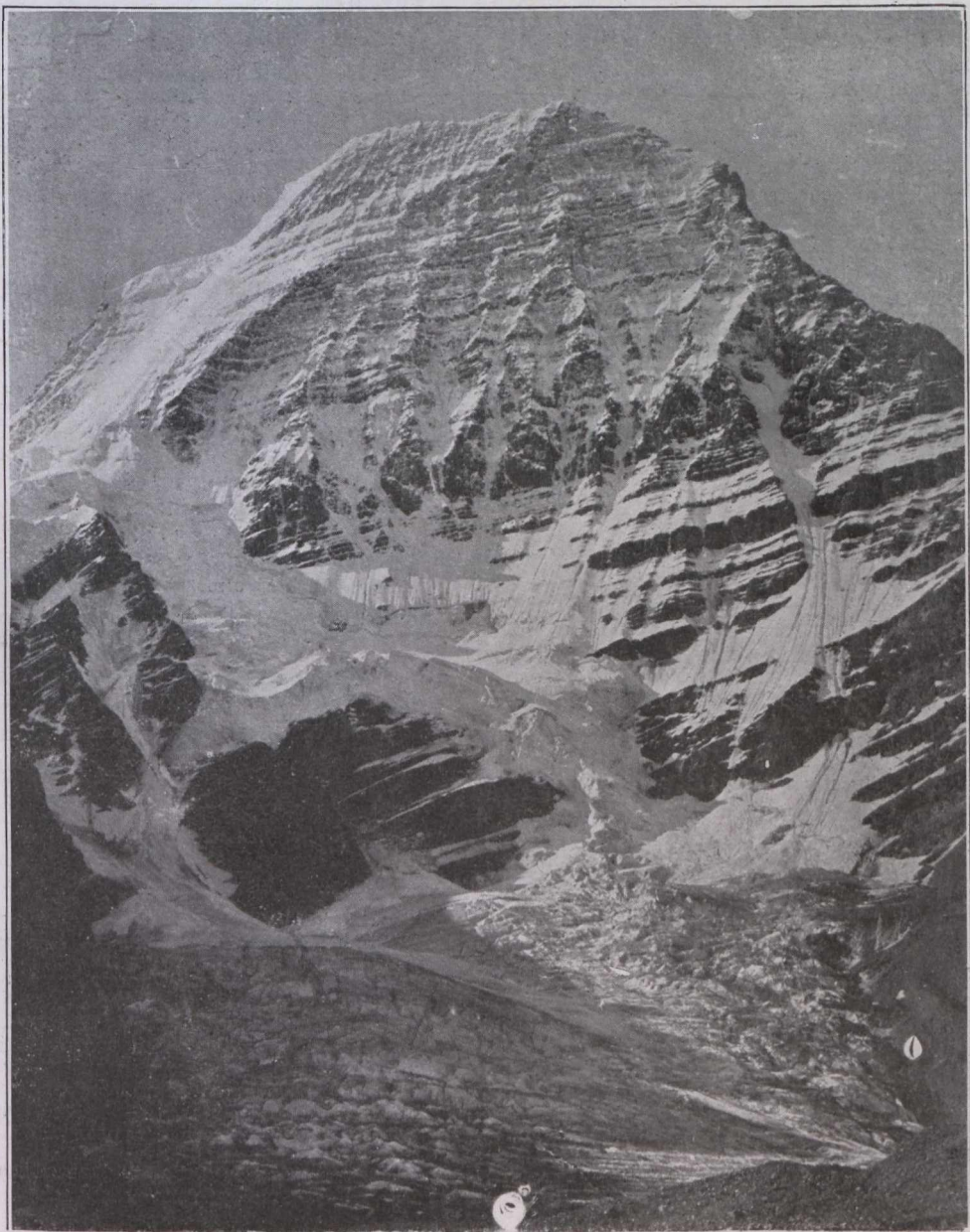
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VOL. XXXVII

TORONTO

No. 21



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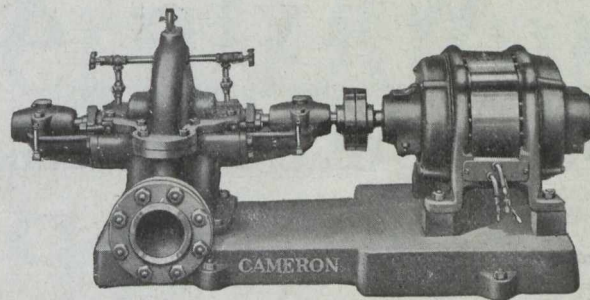
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- The Nickel Industry: with special reference to the Sudbury region, Ont. Report on, by Professor A. P. Coleman, Ph.D.
- The Copper Smelting Industry of Canada. Report on, by A. W. G. Wilson, Ph.D.
- Building and Ornamental Stones of Canada (Quebec). Vol. III. Report on, by W. A. Parks, Ph.D.
- The Bituminous Sands of Northern Alberta. Report on, by S. C. Ells, M.E.
- Peat, Lignite and Coal: their value as fuels for the production of gas and power in the by-product, recovery producer. Report on, by B. F. Haanel, B.Sc.
- Annual Report of the Mineral Production of Canada During the Calendar Year 1914 by John McLeish, B.A.
- The Petroleum and Natural Gas Resources of Canada: Vols. I. and II., by F. G. Clapp, M.A., and others.
- The Salt Industry of Canada. Report on, by L. H. Cole, B.Sc.
- Electro-plating with Cobalt. Report on, by H. T. Kalmus, Ph.D.
- Electro-thermic Smelting of Iron Ores in Sweden. Report on, by A. Stansfield, D.Sc.
- Non-metallic Minerals Used in Canadian Manufacturing Industries. Report on, by H. Frechette, M.Sc.
- The Mines Branch maintains the following laboratories in which investigations are made with a view to assisting in the development of the general mining industries of Canada:—
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- Structural Materials Laboratory.—Experimental work on sands, cements and limes is also undertaken.
- Applications for reports and particulars relative to having investigations made in the several laboratories should be addressed to **The Director, Mines Branch, Department of Mines, Ottawa.**

GEOLOGICAL SURVEY

Recent Publications

- Summary Report of the Geological Survey for the Calendar Year 1915.
- Memoir 34. The Devonian of Southwestern Ontario, by Clinton R. Stauffer.
- Memoir 57. Corundum, its Occurrence, Distribution, Exploitation and Uses, by A. E. Barlow.
- Memoir 64. Preliminary Report on the Clay and Shale Deposits of the Province of Quebec, by J. Keele.
- Memoir 65. Clay and Shale Deposits of the Western Provinces (Part 4), by H. Ries.
- Memoir 66. Clay and Shale Deposits of the Western Provinces (Part 5), by J. Keele.
- Memoir 69. Coal Fields of British Columbia, by D. B. Dowling.
- Memoir 73. The Pleistocene and Recent Deposits of the Island of Montreal, by J. Stansfield.
- Memoir 74. A List of Canadian Mineral Occurrences, by Robert A. A. Johnston.
- Memoir 76. Geology of the Cranbrook Map-area, British Columbia, by S. J. Schofield.
- Memoir 77. Geology and Ore Deposits of Rossland, British Columbia, by C. W. Drysdale.
- Memoir 78. Wabana Iron Ore of Newfoundland, by A. O. Hayes.
- Memoir 81. The Oil and Gas Fields of Ontario and Quebec, by W. Malcolm.
- Memoir 82. Rainy River District of Ontario. Surficial Geology and Soils, by W. A. Johnston.
- Memoir 84. An Exploration of the Tazin and Taltson Rivers, Northwest Territory, by Charles Camsell.
- Map 59A. Wheaton, Yukon Territory.
- Map 150A. Ponhook Lake Sheet, Nova Scotia.
- Map 160A. Manaimo Sheet, Vancouver Island.
- Applicants for publications not listed above should mention the precise area concerning which information is desired.
- Maps published within recent years may be had, printed on linen, at the nominal cost of ten cents each.
- The Geological Survey will, under certain limitations, give information and advice upon subjects relating to general and economic geology. Mineral and rock specimens, when accompanied by definite statements of localities, will be examined and their nature reported upon. Letters and samples that are of a Departmental nature, addressed to the Director, may be Mailed O.H.M.S. free of postage.
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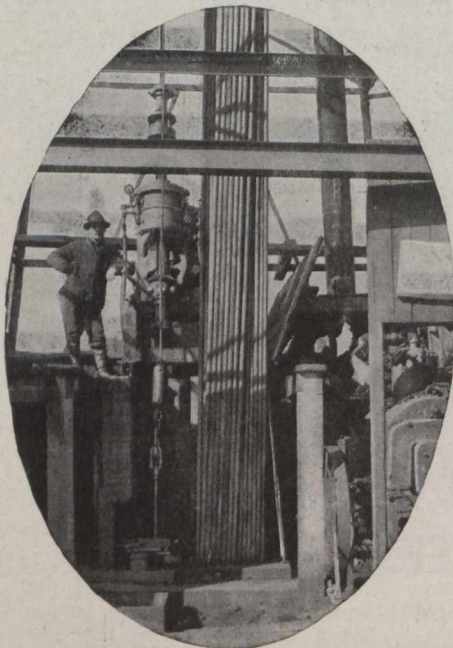
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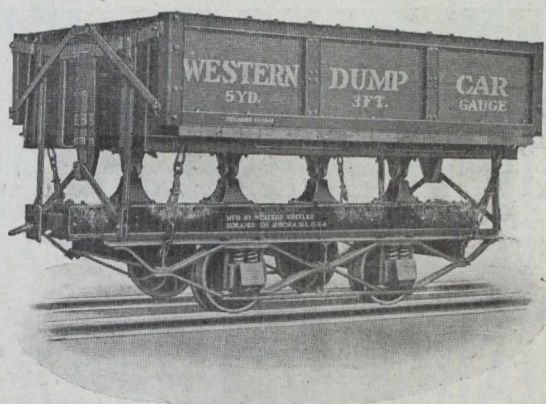
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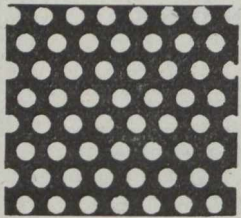
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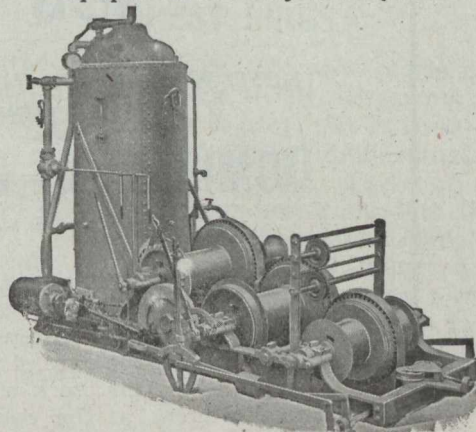
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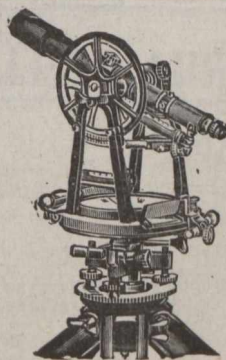


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VOL. XXXVII.

TORONTO, November 1, 1916.

No. 21

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REGINALD E. HORE

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CIRCULATION

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FOREST FIRES

In an article published in "Queen's Quarterly," Dr. W. L. Goodwin makes some timely statements regarding forest fires. He says in part: "It is quite evident that if the laws were carefully administered, forest fires would be comparatively rare. Those who spend a good deal of time in the woods know that they are not carefully administered—hardly administered at all. My experience, while not confined to Ontario, has been mostly obtained in that province. It covers a considerable period of time and a large part of the province. My impression is that the people pay very little attention to the fire regulations. Settlers burn brush heaps at any time in the summer and often to my knowledge start fires to clear off land under circumstances which make it almost certain that the fires will spread. There seems to be no sense of responsibility, little thought of consequences, and a total disregard of the law, a copy of which carefully printed on linen may be conspicuously nailed up on a tree nearby. Lately I spent ten weeks in a district large areas of which have been burnt over so often that a clean sweep has been made of all vegetation and humus where the soil is thin, and even where it is deep, its fertility has been largely destroyed. During that time fires were very frequent, and to my knowledge most of them were set for two purposes, (1) by settlers to clear land, and (2) by persons who wanted an easier chance to prospect for minerals. For about a week two forest rangers were camped within sight of these fires. I saw them frequently, but never observed them take any measures to stop the fires. After smouldering for several weeks of calm weather the fire was at last brightened up by a gale which carried it for many miles. In its course it must have destroyed a good deal of valuable pine, scattered groves left from former fires, and it is certain that it set back the natural re-foresting of those rocky hills and ridges a generation or so. This case is only an example of many which I could cite, and which are within the knowledge of the general public. The newspaper discussion of the recent terrible devastation in Northern Ontario is significant. When it came to an inquiry into causes, the correspondents and editors almost invariably assigned the disaster to 'bush fires' which had been brought to large dimensions by drought and gales. It did not seem to occur to any of us wise people of Ontario to put the little fires out.

"The trouble is not with the laws, although I have no doubt they can be improved, but with their administration. To go deeper, there are a great many people living in Canada—in pessimistic moods I am inclined to include the vast majority of us—who are impatient of any restraint of their activity,—we are practically lawless in these respects. Our forefathers were not restricted in the matter of making fires anywhere and everywhere. But they knew how—were living under conditions which made it imperative that they should know how. A few dreadful experiences, like that of the Miramichi fire in New Brunswick three-quarters of a century ago, taught the pioneers of those days;

but their descendants, and the newcomers, many of them city dwellers, or children of city dwellers, do not see any reason for the precautions. It is true that a process of education is being attempted by the various government departments and bureaus. Carefully worded placards are posted everywhere in and near forest lands, asking the people to be careful in the use of fire and pointing out the possible consequences in destruction of property and life, if these precautions are not observed. The Canadian Forestry Association has taken up this propaganda energetically; and, by the way, the secretary, Mr. Robson Black, in a recent pamphlet, makes it quite clear that the Ontario law is defective both in its provisions and in its administration. These educative efforts are good, and have aroused a very large body of public opinion which now demands action. It can be safely assumed that intelligent, well informed Canadians are of one opinion as to the necessity for action, although it is rather disturbing to find journals like the Toronto Daily News and the Canadian Mining Journal taking comfort from the reflection that the recent fires in Northern Ontario will make prospecting easier! That is exactly the attitude of the prospector who starts a fire for the purpose! I do not think there are many real prospectors who would do it, but I know there are a few."

We agree with a great deal of what Dr. Goodwin has to say; but must protest against his statement that the "Canadian Mining Journal" has any such unnatural opinion concerning forest fires. Surely none who know of the sufferings caused by the disastrous fires which have visited our north country could hold such views as Dr. Goodwin gives us credit for. We believe that he has no justification for making such a statement.

It is a fact that forest fires sometimes assist the prospector. The fact, however, does not warrant Dr. Goodwin in assuming that we take comfort from the destruction of life and property. We cannot imagine why he should wish to give his readers such an impression of us. His statement is certainly not based on reliable information.

Dr. Goodwin has had excellent opportunities for observing conditions in our northern forests and his outspoken statements are worthy of the attention of those responsible for the enforcement of the laws.

In some respects our experience does not coincide with that of Dr. Goodwin. We have generally found that the Ontario prospector has learned by experience to dread forest fires and that his life in the forest has led him to appreciate the extent of the losses through fire. It is doubtless true that prospectors are to blame for some fires, but most of these men have a good deal of respect for the fire regulations. We venture to state that railway companies, settlers and tourists are more often to blame for fires than are prospectors.

Dr. Goodwin claims that "forest fires are usually started by people who are ignorant, careless or criminal." In which of these classes does he place the railway companies?

Dr. Goodwin says, in conclusion: "We Canadians should cultivate carefully a patriotism which includes the idea that our country with all its resources is a trust to be handed on to succeeding generations, not only unimpaired, but increased in value." This idea as applied to forests Dr. Goodwin will find to be well supported by northern prospectors. There are few greater admirers of our forest wealth than those who live in the woods.

THE VALUE OF NICKEL MATTE

The Department of Customs in a report just issued states that during July, 1916, there was exported matte, ore and speiss containing 105,477 cwt. nickel valued at \$1,193,604.

It may be safely assumed that practically all this nickel was from the smelters of the Sudbury district. The month's production of nickel when refined would be worth over \$4,000,000.

The Department of Customs continues thus to publish figures which show that nickel in matte is worth only about one quarter of the value of refined nickel.

In previous issues we have raised the question as to whether certain figures published by our Government Departments are reliable. Official reports are worse than worthless if they are not accurate. They are not only a waste of the people's money, but they are dangerously misleading. We may, therefore, assume that the Department of Customs considers that nickel in matte is worth about 11.3 cents per pound. The question then arises as to whether or not the companies concerned also consider it a fair price.

If the companies consider that eleven cents a pound is a fair price, then the course for our Government is clear. We should at once make arrangements to take over all the matte on that basis and refine it ourselves. The Government would net a handsome profit in buying matte at eleven cents and selling the refined product at forty. In addition we would be satisfying the companies by giving them what they consider a fair price for their matte. The problem of control of nickel would also be simplified.

The above suggestion seems a reasonable one. We doubt, however, whether it could be satisfactorily followed out. We suspect that it would soon be found that the value placed on nickel matte by the Department of Customs is in need of adjustment.

THE DEUTSCHLAND'S CARGO

In an interview given to the Associated Press, Lord Robert Cecil, Minister of War Trade, said: "When I tell you that the Deutschland took on board in America certain vitally necessary metals, of which there is a serious shortage in Germany for munition purposes, and that there is reason to believe that these particular metals were a part of the small stock mined in allied territory, you will see how important it is that we should take precautions to prevent allied property getting into the hands of those we know will use it to help our enemy."

It is well known that nickel was one of the "certain vitally necessary metals" taken to Germany by her adventurous merchant submarine. For some reason the origin of this nickel has not been made public. According to statements which have appeared in eastern papers it was known that certain firms were holding a supply of nickel for shipment from the United States to Germany at the first opportunity. That such was the case

is not very surprising. Failure to accumulate such a stock would be more likely to cause wonder.

Canadians were naturally much interested in that nickel shipment. We immediately wanted to know whether it was Canadian nickel. We were pleased to find that our Government officials were able to unhesitatingly state that it was not of Canadian origin.

In view of this fact considerable interest attaches to the following statistics, compiled by the United States Bureau of Commerce, showing the imports of nickel matte and ore during the fiscal year ended June 30th, 1916:

From	Gross Tons.	Nickel Contents, Lbs.
France.	297	514,828
Canada.	52,742	64,622,286
Peru.	1	118
Australia.	1,329	1,268,084
French Oceania	2,618	2,391,922

These comprise the entire nickel imports into the United States for the year named. It is not unlikely that the source of the Deutschland's nickel may be one of the countries named, though it is just as likely that the nickel shipped was refined in previous years.

Obviously Lord Robert Cecil was not referring to Canada when he said "the small stock mined." He was doubtless not referring to Australia when he used the term "allied territory." He certainly was not referring to Peru. The imports from France are doubtless not from ore mined in France. There remains only French Oceania, meaning New Caledonia.

If Lord Robert meant New Caledonia, might he not better have said so? If he did not, should he have given out a statement which can in the light of known facts be variously interpreted? By at least some Canadians the practice of casting a cloak of mystery about facts is not highly appreciated.

Why is such an endeavor made to conceal the truth? Why do statesmen speak in whispers about such matters as nickel exports? It is surely not because they do not know of the ill effects. They certainly are aware that such statements as those of Sir Robert lead to unjust suspicion being cast on producers of metals. Why should the producer be made to appear in such an unfavorable light? Surely it has been abundantly shown that the producer of metals is one of the most useful persons at the present time.

The statement given out by Sir Robert led those who were more or less familiar with the facts to suspect that he was referring to some country other than Canada. Many Canadians, however, accepted his words as proof that Canadian nickel was carried to Germany on the Deutschland. Newspapers spread this idea broadcast and commented on what they considered new proof of the much talked of German control of our nickel industry.

HAILEYBURY SCHOOL OF MINES.

The new mining and milling laboratory of the Haileybury School of Mines, Ont., is nearing completion, and the school is now receiving machinery and

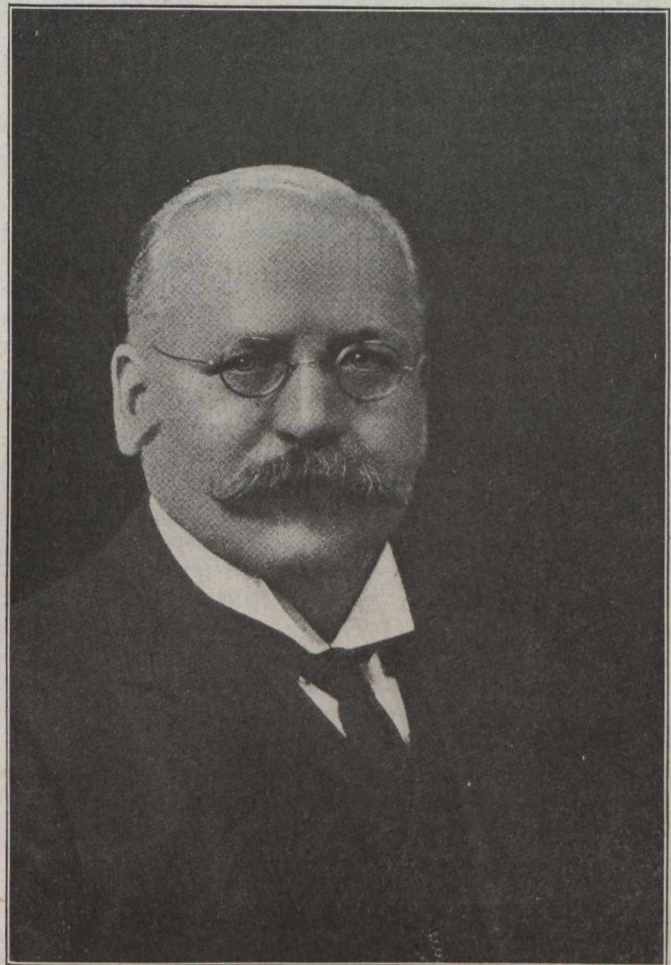
equipment. The laboratory will comprise a complete small size concentrator, cyanide mill, flotation plant, assay office, blacksmith shop, machine shop and carpenter shop, and will contain most of the machines usually met with in these lines. The school has the co-operation of the mines of the Cobalt district, and of manufacturers of mining machinery, and is always pleased to make arrangements with manufacturers who wish to have their machinery represented in the school.

BRITISH-AMERICA NICKEL.

The coming to Toronto of Mr. E. P. Mathewson to take up his new work as general manager of the British-America Nickel Corporation, is an important step forward to the time when this company will begin active operations in the Sudbury district. Mr. W. A. Carlyle, the prominent metallurgist who represents the British Government, has been in Canada for some time. These two gentlemen should be able to give President Dunn the best of technical advice.

BEDFORD McNEILL.

Canadian mining men who knew Mr. Bedford McNeill remember him as an unusually likeable man. Together with his charming wife, Mr. McNeill visited Canadian mining districts in 1913 on the occasion of the International Geological Congress. They made many friends here who deeply regret his loss.



The late Bedford McNeill

Mr. McNeill was in 1913 president of the Institution of Mining and Metallurgy. He had a wide experience in mining in Europe and America. His name is exceptionally well known all over the world on account of his cable codes.

METHODS AND COSTS OF PLACER MINING IN YUKON*

Prospecting.—The first work the prospector does on a new creek is to pan wherever the bedrock is exposed by the action of water. (Bonanza creek was accidentally discovered by Carmack, who panned in this way, and staked without further prospecting.) If, after panning, favorable prospects are found, a small space of ground is cleared and a shaft, usually 3 feet by 5 feet, is sunk to bedrock.

It is not necessary to thaw the frozen muck, which can be broken with a pick, but when the gravel is reached it is necessary to make a fire on the bottom of the shaft and thaw downwards until bedrock is reached. Another method of thawing the gravel is by boulders which have been heated in a fire. The warm boulders are dropped on the bottom of the shaft and covered with moss or bush. Either process thaws from one to two feet of gravel in about five or six hours. Dirt can be thrown out of the shaft to a depth of about ten feet, and then it is necessary to use a windlass to hoist. The gravel removed from the shaft is also panned at frequent intervals. The general rule is that if there is pay at all in the gravels, it is richest on or in bedrock. Paradise Hill, on Hunker creek, however, has furnished an exception to this rule. The main gold zone here in many places is found not in bedrock, but at elevations of from three to twelve feet or more above it.

To drift or tunnel, a fire is built against the side of the shaft, and the necessary amount of gravel is excavated. To prospect on creeks where a small boiler can be used, the procedure is somewhat different. A small Porcupine boiler of 3 h.p., which furnishes steam to three points is generally utilized. A half-inch pipe can be driven through 10 feet of muck in about five hours. To sink a shaft of 20 feet in this way requires about one cord of wood for thawing, and two men will remove the dirt from the shaft in two days.

Thawing.—The gold-bearing gravels in the Klondike are perpetually frozen and have to be thawed by one of the various methods employed in the district. Even if mechanical appliances were devised to excavate these gravels in a frozen condition, a process of thawing would be necessary before the gold could be recovered. The efficiency of any one method of thawing varies with the quantity of humidity in and the compactness of the gravels. Nearly all the gold-bearing streams of Post Tertiary age are frozen to bedrock and artificial thawing is absolutely necessary, while those of most recent age are only partially frozen and do not require artificial thawing.

Natural Thawing.—The method of exposing the gravels to the sun to thaw has not been universally adopted, partly because the overburden cannot be removed on account of the lack of water and grade and partly on account of the short seasons. It has not yet been demonstrated whether it is possible, either from a physical or economic point of view, to thaw a creek gravel deposit of 15 feet in depth. The surface of all creek bed deposits is covered with moss overlying a layer of frozen soil—known as "muck"—from a few feet to 14 feet in thickness. Before the rays of the sun can effectually penetrate the muck, the moss has to be removed by artificial means. If the grade is available the muck is removed by ground-slucing. Where the body of gravel is exposed the sun will thaw from four to five feet in one season, but where this depth is exceeded, it is necessary to thaw by artificial means where dredges are operating. In open-cut work, where the material is

excavated with the pick and shovel, the sun's rays are sufficient to thaw for a number of shovelers according to the area of gravels exposed. In all hydraulic operations the heat of the sun is the only medium of thawing. The monitor is placed in such a position that it can be directed alternately on certain areas, the face of the gravels usually being worked in three sections, i.e., while the water is directed on one section the other two sections are thawing. In this way the sun will supply sufficient material to keep the monitor operating.

Thawing with Rocks.—The method of thawing with rocks is not now practised. During the period of early mining in the Fortymile district, rocks were heated in a fire on the surface of the ground, and then dropped on the bottom of the shaft, where they were covered with tin or sheet iron to concentrate the heat. Rocks were also used to thaw the ground for drifting. Thawing with rocks concentrates the heat, and obviates the sloughing of the side of a shaft. In many localities the muck contains streaks of sand through which the heat is more rapidly conducted, and as a result a portion of the roof may fall down or "cave-in," as it is usually termed.

Thawing with Wood.—The several species of wood available for thawing purposes are, spruce, cotton-wood and jack-pine, the latter kind being scarce, the former species are chiefly used.

Thawing Bar Diggings.—The method employed in thawing bar diggings in the Fortymile district was as follows, namely:—

An area of about 50 feet square was stripped of ice, and a portion of this area, 20 feet in length by 6 feet in width was thawed by one fire, this being the quantity one man could excavate before the thawed ground was again affected by the frost. A row of kindling, two feet in width was placed along the whole length of the twenty feet, and covered with dry spruce. A second and third row of wood was placed on top and sheet iron or tin was used as a complete cover, so that the wood could smoulder and the heat be retained or concentrated within the area to be thawed. The quantity of wood necessary to thaw an area of ground 20 feet long by 6 feet wide and 1½ feet deep, was estimated at 1½ cords.

Wood Thawing in Drifts.—The method of thawing with wood in drifting operations is practically the same as that employed in bar diggings, but more care is exercised in placing the fires. This method is employed only in small drifting operations, when the material is hoisted with a windlass. To expedite the work in the drifts, it is customary to sink two shafts from 50 to 75 feet apart. While the drift from one shaft is being thawed, the dirt from the other shaft is hoisted from the other shaft. The mode of placing the wood along the face of the drift is as follows: Kindlings about one foot in width are placed along the face of the drift, and then a layer of wood. Dry spruce is placed on top of the kindlings for a width of a foot on each side. On top of the dry spruce is placed a layer of green spruce, which in turn is covered by sheet iron. The spruce and sheet iron keeps the fire smouldering and concentrate the heat. When bedrock is thawed the same method is applied, but the wood is placed lengthwise along the drift, the end of one stick resting on the end of the other. Fires of this kind burn for three or five hours.

* Extract from a report on the Yukon Territory published by direction of the Minister of the Interior, Ottawa, 1916.

Thawing with Hot Water.—This method is employed to the best advantage when the gravels are compact and contain very little sediment. Where the gravels are thawed by this method a much greater quantity of dirt can be handled by the shovellers than when the ground is thawed by either wood or steam. The method may be described as follows: A sump-hole is made at the bottom of the shaft, about five or six feet below the level of the drift, and a pulsometer or a duplex Worthington pump is installed on top of the sump-hole. The steam from the boilers is conducted through an iron pipe, down the shaft, to the pump or pulsometer, as the case may be. At the bottom of the shaft there is a small pressure pump, to which is attached a fire hose with nozzle. The water from the sump-hole is pumped on the face of the drift, and returns to the sump-hole by means of a small ditch dug along the side of the drift. The same water is used several times, and when it accumulates, as a result of the humidity of the gravels, it is pumped out of the shaft. The water is kept warm either by the fresh steam from the boilers or the exhaust from the pump or both. The duty of a No. 7 pulsometer is about 60 cubic yards in ten hours.

Thawing with Steam Points.—Steam thawing is employed in three distinct kinds of operations, drifting, open-cutting and dredging.

A "point" is made of extra hydraulic pipe, is 6 feet in length and has a bore of $1\frac{1}{2}$ inches to $\frac{3}{8}$ of an inch in diameter. They have solid standard heads, which stand the blow of a six or eight pound hammer.

The points are connected with batteries of four each, having a separate steam hose—usually $\frac{1}{2}$ -inch—and steam valve, and each battery is connected with the main steam line $\frac{3}{4}$ -inch steam hose and valve.

To do efficient work each point requires steam equal to $1\frac{1}{2}$ h.p., boiler capacity, i.e., a 30 h.p. boiler will furnish steam to 20 points. If a smaller boiler is used for this number of points, much trouble will be experienced in firing and supplying the boiler with water.

The quantity of ground that can be thawed with a steam point varies from 3 to 6 and often 7 cubic yards in 10 hours. The efficiency of the point varies according to the compactness of the gravels, the quantity of humidity in the gravels and the area to be thawed and as to whether it is in a drift or ahead of a dredge. In drifting operations the average duty of the point is 3.75 cubic yards in 10 hours.

When points are set in the face of a drift they are first driven about two feet, and allowed to remain at this length for an hour or so. They are then driven other two feet, and finally driven the full length. The points are set about three feet apart in average gravels, but only two and a half feet in compact gravels. Care has to be taken that only the pay material is thawed, otherwise waste material will have to be removed.

Thawing Ahead of Dredge.—All the dredges operating in frozen ground have steam plants for the purpose of thawing the gravels ahead of the dredge. The size of the plant depends on the number and capacity of the dredges in operation. The boilers used in operations of this kind are from 100 to 150 h.p. The steam is transmitted from the main station across the area to be thawed, by means of a main steam pipe from which there are many laterals conducting steam to batteries of 4, 6 and 8 points. All the main steam pipes are inclosed in a wooden box to avoid the condensation of the steam. The points are set from 4 to 6 feet apart and are from 12 to 15 feet in length, and are left in place for eight hours. The duty of a point under these conditions is from 5 to 7 cubic yards in ten hours.

Ground Sluicing.—This method consists of concentrating the steam on the gravels, which are thus removed by water without pressure. To successfully operate by this method it is necessary (1) to have a plentiful supply of water, (2) to operate in shallow gravels, and (3) to have a stream of sufficient grade to move the material. When the whole material from surface to bedrock is removed in this manner, the method is known as "ground-sluicing"; when only the over-burden is removed the method is known as "stripping." This work is easily done in the early spring by taking advantage of the spring floods and leading the water by several channels across the claim. The muck thaws easily and the streams soon cut down to the gravel, and then gradually widen their channels until they meet. In some cases the process is hastened by blasting out the walls of the muck channel with slow explosives. The upper portion, if barren, is removed and piled up where most convenient, and the underlying pay gravels are shoveled up or hoisted in buckets, and sluiced in the ordinary way.

Sluicing.—An abundant supply of water is essential to successful placer mining. After a winter dump has been thawed by steam points the dirt is moved to the sluice-boxes in various ways. One method is to scrape the dirt into a dump box at the head of the line of sluice-boxes. This is usually done by a steam scraper. Another method is to pump the water to sufficient elevation, so as to give a pressure to hydraulic the dirt from the dump into the sluice-boxes. When the water is convenient, however, probably the most economical mode of sluicing a dump is to place two sluice-boxes parallel to each other, on the space of ground where the dirt is to be dumped. These boxes are covered by short wooden planks or some other sufficient covering to keep clear the space through which the water runs in the process of sluicing. In the spring the sluice-boxes are gradually uncovered from one end, and the work of shoveling in, i.e., depositing the dirt in the sluice-boxes, can be accomplished by two or three men. This method obviates the necessity of employing a large number of shovelers. In order to confine the dirt within a limited area, cribbing is constructed around the dump so that the dirt is retained within easy access of the sluice-boxes. On many of the claims, however, the water for sluicing purposes, instead of being conveyed by flume from a point at a sufficient distance up the creek to give the required grade, is pumped up, and the sluice-boxes are placed high enough to carry the tailings where required, thus obviating the expense of handling or scraping tailings. During the summer the dirt or pay gravel is carried directly from the shaft and dumped into the sluice-boxes from the bucket attached to the self-dumper. By the open-cut method in shallow ground, however, the pay gravel is sometimes conveyed to the sluice-boxes by the ordinary wheelbarrow.

Self-Dumper.—The self-dumper or carrier was designed specially for the Yukon, and to meet the requirements of the miners for some light and simple machine that would hoist and convey the dirt from the bottom of the shaft or from an open-cut, to the dump or sluice-box. The carrier is operated on a single three-quarter inch cable stretched between two posts, and usually at an angle of about forty degrees, but if necessary at a much less grade. One post, about five feet high, is situated in rear of the shaft, and the other post, which is called the "gin-pole," is erected at whatever point the dirt is to be dumped. The carrier itself is worked by a single three-eighth inch or one-half inch

cable. The hoisting cable extends from the drum of the engine to the top of the gin-pole where it passes through a block and extends to the carrier, which, for example, is at the top of the shaft. The cable passes through a sheave in the carrier and extends down the shaft, passing through a block attached to the bale or handle of the bucket and then returning to the carrier, where it is fastened. When the signal to hoist is given the cable winds around the drum of the hoisting engine, quickly lifting the bucket from the bottom of the shaft to the carrier, where the handle of the block, which is attached to the bucket bale, lifts the hook in the centre of the carrier, thereby releasing the sliding latch and automatically locking the hook and holding the bucket securely in the centre of the carrier. This occupies only the fraction of a second, and the travel of the carrier is not impeded. The dumper is then pulled along the carrying cable to the point where the dirt is to be dumped. A chain is attached to the front side of the bucket, and at the end of the chain is a ring, which passes along a cable fastened at both ends and lying upon the ground directly under the carrying cable. When this ring comes in contact with a clamp, which is fastened to the cable, the bucket is prevented from going any farther and the strain on the chain overturns the bucket and the contents are emptied on the dump. After dumping, the hoisting cable is slackened and the dumper or carrier rapidly travels down the cable until it reaches the top of the shaft. An eccentric hook attached to the sliding latch in the carrier strikes a ball fastened on the carrying cable. This action releases the sliding latch, unlocks the hook, and disconnects the handle of the bucket from the carrier. The bucket then travels down the shaft to be re-filled.

Costs.

Cost of complete pumping, thawing and self-dumping outfit suitable for working ten shovels (or 16 shovels if power is not required to pump).

40 h.p. Scotch Marine Water Back Boiler, return flue	\$1,300.00
15 h.p. horizontal engine	375.00
6 h.p. Gould centrifugal pump (with foot valve attached)	300.00
10 h.p. hoisting engine	450.00
Self-dumping carrier and turnbuckle	100.00
200 feet $\frac{3}{4}$ -inch cable	38.00
500 feet $\frac{3}{8}$ -inch cable	50.00
20 $\frac{1}{2}$ -inch thawing points, 8 feet long*	200.00
4 wheelbarrow bucket	60.00
10 Pan-American wheelbarrows	100.00
100 feet $\frac{5}{8}$ -inch steam hose	65.00
1 dozen Silver Dollar shovels	18.00
200 feet $\frac{3}{4}$ -inch pipe	24.00
Miscellaneous tools and fittings	125.00
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	\$3,205.00

* To thaw by hot water instead of steam the points would be substituted by a pump at an approximately similar cost.

The self-dumping carrier can be used with a much smaller plant, and is in general use where only five or six shovellers are employed. In a smaller plant the cost of boiler, engine and hoist is much less than the figures quoted.

The following two tables, showing the cost of sinking shafts, were furnished by two different operators on the watershed of Indian river, namely:—

Sinking by Self-Dumper. (30 ft. deep, and 8 by 8 ft.)

1 boilerman* (one shift)	\$6.50
1 pointman* (one shift)	7.00
1 hoistman* (one shift)	7.00
2 shovellers* at \$6.50 (one shift)	13.00
$\frac{1}{2}$ cord wood (fuel) (one shift)	4.00
$3\frac{1}{2}$ cords (timbering) at \$8 (one shift)	26.66
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	\$64.16
7 ft. thawed and hoisted in 12 hours.	
Cost of 7 ft. (including timbering)	\$64.16
Cost per ft.	9.16

* These figures include an allowance of \$2.00 per day per man for board, i.e., 1 boilerman at \$4.50 plus \$2.00.

In this case the shaft was 55 feet deep and 8 by 8 feet, and the dirt was hoisted by hand windlass.

Labor	\$400.00
Timbering, 6 cords at \$8	48.00
Dressing timber	50.00
Steam for thawing, at \$1 an hour, 50 hours	50.00
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Cost of 55 ft.	*\$548.00
Cost per ft.	\$9.96

* The cost of sinking this shaft was furnished by one of the most successful operators on the watershed of Indian river, and is based on the prices of the present day, the shaft having been sunk in June, 1909.

Tunnelling by Self-Dumper. (6 ft. by 6 ft.)

7 to 12 p.m.—1 pumpman	*\$7.00
1 helper	* 6.00
1 fireman	* 6.50
1 to 6 a.m.—1 engineer	7.50
6 shovellers at \$6.50	39.00
Wood consumed, $\frac{3}{4}$ cords	6.00
Timbering 12 ft. of tunnel, $\frac{2}{3}$ cords	5.33
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	†\$77.33
6 feet of dirt excavated on each side of shaft in 12 hours.	
Cost of 12 ft.	\$77.33
Cost per ft.	6.44

* Thaws 5 hours.

† These figures include an allowance at the rate of \$2.00 per day per man for board.

The six shovellers take out the dirt and timber the portion of the tunnel that has been excavated. If the roof is muck, it is not necessary to timber. When the roof is gravel, the tunnel is timbered to obviate the sloughing of rocks and dirt, which would impede the progress of the work along the tunnel. It is claimed that the best method is to thaw five hours for the reason that the water becomes warm when thawing for ten hours, and as a result the roof is more liable to slough, the dirt piles up and blocks the operations of the nozzleman and the shovellers work at a disadvantage.

The following table, which was furnished by one of the most successful operators on the Indian river watershed, is taken from a 42 days' run, and shows the working cost per square foot of bedrock, i.e., the actual cost of thawing, hoisting and sluicing, the dirt being dumped from the bucket into the sluice-boxes:

Thawing Crew—	
2 pumpmen at \$6.00	\$12.00
2 helpers at \$5.00	10.00
1 fireman at \$5.00	5.00
3 cords wood at \$8.00 per cord	24.00

Hoisting Crew—

1 foreman at \$6.00	6.00
1 engineer at \$6.00	6.00
1 dumpman at \$5.00	5.00
1 bucketman at \$5.00	5.00
12 shovellers at \$5.00	60.00
Wheeling planks at \$75.00 per M.....	10.00
*21 days' board at \$1.75	36.75

†\$179.75

* In this case the board of 21 men is reckoned at \$1.75 each.
 † It will be noted that the wages paid by this operator is above the average, and it necessarily follows that only the best men are employed.

The quantity of material handled per day of 10 hours was 590 sq. ft. of bedrock, the dirt hoisted being approximately three feet deep.

Cost of handling 590 sq. ft. of bedrock.....	\$179.75
Cost per sq. ft. of bedrock.....	.30

The following table, which was furnished by a skilful operator, shows the working cost of a self-dumping plant, namely:—

Working Cost of Self-Dumper.

Thawing Crew—

*2 pumpmen at \$7.00 per day.....	\$14.00
*1 helper at \$6.00 per day	6.00
*1 fireman at \$6.50 per day.....	6.50

Hoisting Crew—

*1 foreman at \$8.00 per day.....	8.00
*1 engineer at \$7.50 per day	7.50
*1 dumpman at \$6.50 per day.....	6.50
*1 bucketman at \$6.50 per day	6.50
*16 shovellers at \$6.50 per day.....	104.00
3 cords of wood at \$8.00	24.00
Box candles	3.50
Coal, 25c; oil, 25c.....	.50
Picks (life one month), 16 at \$2.50; shovels (life one month), 16 at \$18.00 per doz. (per day) ..	2.13
Wheeling planks (life three months), at \$75.00 per M. per day	25

\$189.38

* These figures include an allowance of \$2.00 per day per man for board.

The capacity of the above plant, equipped with two No. 6 pulsometers, would be approximately 600 sq. ft. of bedrock, the dirt hoisted being between 3 and 4 feet deep.

600 sq. ft. of bedrock	\$189.38
Cost per sq. ft. of bedrock.....	†.31

† The above table includes the cost of thawing, hoisting and sluicing.

Hoisting by Windlass.—The following information, which was furnished by a miner on Lower Dominion, will give an idea of the cost of hoisting the dirt by hand windlass: (On many claims on the lower portion of Dominion the pay gravel is thawed by fires of kindling wood, and described under paragraph 7 of this part, and the dirt is hoisted by hand windlass.)

Plant.

- 1 5-h.p. boiler.
- 40 ft. ½-inch steam pipe.
- 2 steam points with hose.
- 1 lead hose, 10 ft. (to connect point battery with steam pipe).
- 1 windlass with 40 ft. ¾-inch rope or ¼-inch cable.
- 2 windlass buckets.
- Picks and shovels.

The ground is thawed for five hours in the afternoon and allowed to cool over night. The thawed

dirt is then hoisted in five hours next morning. Two men thaw and take out six feet of dirt in one shift, i.e., ten hours. Approximately one cord of wood is sufficient fuel to thaw a shaft 30 feet deep.

Working Costs.

(Sinking shaft 3 ft. by 5 ft.)

2 men at \$6.50	\$13.00
Wood, for thawing	2.00

\$15.00

Cost of sinking 6 ft.	\$15.00
Cost per ft.	2.50

Tunneling.—From the bottom of the shaft two men will drive a tunnel 6 feet by 4 feet by 3½ feet, in one shift, i.e., thaw the ground and hoist the dirt in ten hours. (It is seldom necessary to timber shafts or tunnels for windlass work.) The cost of tunneling by this method is estimated as follows:—

2 men at \$6.50	\$13.00
Wood for thawing	2.00

\$15.00

Cost of tunnelling 6 ft.....	\$15.00
Cost per ft.	*2.50

* The shaft in this case was 30 ft. in depth. The cost per ft. would necessarily increase according to the distance from the bottom of the shaft.

THE CREIGHTON NICKEL-COPPER DEPOSIT.

According to Mr. Cyril W. Knight, in a letter published in the "Engineering and Mining Journal," the Creighton orebody is an enormous breccia of crushed rocks. Mr. Knight says:

"The oldest rocks in the immediate vicinity of the Creighton are greenstones. Norite was intruded into these greenstones. Then came the granite intrusion, which formed the foot wall of the orebody. The granite forced its way mainly along the norite-greenstone contact. After the granite had solidified, there followed a period of tremendous crushing and brecciation along the norite-granite contact, and great 'crush breccias' and 'crush conglomerates' were formed. The fragments of this brecciated material vary in size from immense blocks 100 feet long to microscopic specks—rocks ground to powder. The shape of the fragments and blocks is infinite in variety, varying from sharply angular to round. Solutions circulated through the 'crush breccia' and 'crush conglomerate,' depositing sulphides that cemented the fragments together and partly or almost wholly replaced them. Some replacement of the granite foot wall also took place, but the norite hanging wall, particularly where it has been slightly sheared and brecciated, was more severely attacked, often forming what has been called 'spotted' norite. In short, the immense stopes of the Creighton mine have demonstrated that the orebody is merely an enormous 'breccia' or 'conglomerate' of crushed rocks, granite, greenstone and norite, cemented together by sulphides. The contact between this orebody and the lean, non-commercial hanging wall of 'spotted' norite is comparatively sharp—a few feet more or less. The 'spotted' norite, on the other hand, becomes gradually less and less impregnated and replaced with sulphides as the distance from the orebody increases. It may be added that every other commercial orebody in the nickel field is mainly of this character; that is, a mass of crushed rock fragments cemented together by sulphides."

THE PROFITS OF COAL MINING

By F. W. Gray.

Mr. Blake Walker, one of the best known colliery owners and mining engineers of Great Britain, was recently presented by his workpeople with a portrait of himself as an appreciation of 42 years as the head of the Wharneliffe Silkstone Collieries, in South Yorkshire. Mr. Walker is an example, all too few alas in these days of corporations, of an employer whose relations with his workmen have been very intimate, and in whose mind the well-being of his employees has always taken first place.

Some of the remarks made by Mr. Walker in his speech on this occasion are worthy of note.

Mr. Walker mentioned that Wharneliffe Silkstone Colliery—which may be taken as typical of many other collieries—had been working sixty years. In that time there had been disbursed in wages some \$27,500,000, and approximately 5,000 people had been kept in comfort by this disbursement over a long period of years. The above mentioned sum represented 89¼ per cent. of the total amount disbursed in wages, royalties and profits. The royalty payments had been 8½ per cent. of the total, and the return to the shareholders 2¼ per cent. The speaker said he wondered how many people realised that this was the financial return on a colliery that had mined coal for sixty years, and added that he thought if the figures were available from other collieries in South Yorkshire the results would not be greatly different.

Some years ago Lord Joicey, an eminent North Country coal-owner, said that the net return to the capitalist on coal-mining investments over a long term of years would not exceed five per cent. interest on the investment, without any return of principal.

Much the same statement could be made with reference to coal-mining investments in Canada. It is hardly expected that the capital invested in a colliery should ever be returned, and it would be hard to discover a Canadian coal company which to-day could return the capital invested in its properties. It would also be hard to find a coal company in Canada that had paid a continuous dividend of five per cent. on the original capital. We read occasionally of collieries that have paid ten and fifteen per cent. dividends. At the present time, because of the abnormal and inflated state of the coal market, there are collieries in Great Britain that are showing very large returns; but if the history of these same collieries comes to be reviewed from the sinking of the shafts until the last pillars are taken out, it is probable that the percentages of returns to shareholders, landlords and labor will not be very different to the figures quoted by Mr. Walker.

Mr. Walker pleaded for recognition of the essential identity of the interests of capital and labor, and the necessity in these times for both to adopt all the aids that science and machinery can afford. With this all thinking men will be in hearty accord.

Apart however from the desirability for co-operation between capital and labor, a condition which would be much easier of attainment had all employers the same high sense of duty that the speaker possesses, there are other features which explain to some extent the small returns on coal-mining investments.

A disproportionately large part of the ultimate price to the consumer is made up of transportation charges and middlemen's profits. There seems no good reason why large colliery combines should retail

coal through the medium of dealers, and quite recently Lord Rhondda, speaking of the acquisition of the Northern Navigation Collieries, expressed the intention of his company to eliminate the middlemen in the sale of coal. The average man would hardly believe how small is the price received for coal at the pit-mouth compared with the price he has to pay for the same coal delivered into his cellar. Anything more wasteful and unscientific than the manner in which coal is peddled out to the ultimate consumer could scarcely be conceived. The amount of re-handling, storing, trucking and bagging that some coal undergoes is ridiculous, and it results in an equally ridiculously high price to the consumer, and a low yield to the colliery owner.

Some day it may dawn upon us that it would be easier to transport the energy that lies in coal by converting it into electricity than by hauling a heavy material thousands of miles in ships, and cars and horse teams, and re-handling it until all semblance to the original mined product is lost.

If the colliery owner wishes to obtain the legitimate reward of his investment and his labor, he must prepare not only to mine coal, but to sell it to the ultimate consumer. He must apply scientific methods to the transportation of coal, and must be prepared to sell power in many cases instead of the raw material that he mines. Lord Rhondda, in the statement previously referred to, said he intended to establish a bureau of research, in which would be concentrated all the brains that could be secured, and in which would be collected also all possible information regarding new and improved mining methods in all parts of the world. Some little attention on the part of this bureau to sales and transportation would repay the trouble. A greater increment of profit per ton of coal is added by the dealer in many cases than is received by the colliery owner. The reason is not far to seek. The archaic methods of transportation seen in many cities, where half tons of coal are hauled over bad roads by decrepit steeds, are in sharp contrast to the great sums invested at the modern colliery to cheapen and quicken the cost of transportation underground. The cost of hauling coal on steam railroads is so tremendous as in many instances to be absolutely prohibitive. The reason again is not far to seek. Bad grades, poor rolling stock, inadequate sidings, single tracks, and a general inability to haul heavy loads for long distances at reasonable rates of speed, characterise too many railroads. It is evident then, that if the coal-owner wishes to reap his proper share of the ultimate cost of coal as it is landed in the cellar of the householder, or the bins of the factory, he must extend his interests, and must engage himself not only in the actual mining of coal, but in its transportation and sale. Colliery engineers consider themselves to be justified in expending large sums to save a cent or a half-cent per ton on the coal output, but how many cents are wasted once the coal has passed out of the colliery yard and started on its long and chequered journey to the factory boiler-house, or the humble domestic fireplace?

It is often said of a certain class of miners that they work for wages like horses and spend the wages like asses, and the analogy seems to hold good in respect of the material they mine.

MATHEMATICS AND ENGINEERING

The study of mathematics is generally conceded to be invaluable as a training in logical thinking. There is however, considerable difference of opinion as to how much time an engineering student should devote to courses in mathematics, and what branches he should take up in that time.

Some engineers do not consider advanced courses essential, and would prefer to have been more thoroughly drilled in the elementary branches. Others advocate giving engineering students all the mathematics they can absorb, which may be much or little. The efforts of teacher and student are often wasted when too much is attempted.

In a recent article in "Engineering Education," Mr. H. D. Gaylord says:

"We must consider the question of the purpose of the mathematical courses in the preparation for the engineering profession. The question arises whether these courses are intended as tools or as general mental training, or as both. Here we must contrast the opinions of three classes of critics.

"First, the engineers themselves for the most part consider these elementary subjects as tools. The following quotation is an illustration: 'To the engineer, mathematics should be taught as a useful tool, and not as an interesting pastime, or as mere mental gymnastics.' Second, the mathematicians consider the mental training an important part of all mathematics, and deplore the tendency to determine the value of a subject on the basis of its practical applications. Third, many psychologists believe that mental ability cannot be automatically transferred, and hence, that the study of mathematics can give ability only for more study of mathematics. The psychologist will thus agree with the engineer that mathematics should be studied only as a tool, since, in general, there will be no transferable mental ability acquired. If this transfer cannot be made, the study of any subject requiring reasoning ability will train the student as effectively as the higher branches of mathematics, unless these branches contain the elements of applicability which can be made appreciable to the student at the time he is studying them.

"It is fair to assume that the mathematics through a first year of calculus is given by the engineering schools because they believe that it is needed by the student for the purpose of understanding the various engineering courses he is studying. It may be admitted that this thorough understanding of the theoretical engineering courses is not necessary in the actual practice of the engineering profession. In fact, the educator is well aware that the actual problems arising in the engineer's experience may never involve the necessity of applying the details of calculus to the question in hand. He feels, however, that some knowledge of the methods involved in developing the theory upon which the problem depends, perhaps the method of deriving the hand-book formula which solves the problem, in some way gives the engineer who has this knowledge a distinct advantage over his less fortunate brother."

Relatively strong emphasis on the applications of mathematical theory to the problems arising in practice is what the engineers desire. Relatively strong emphasis on the theoretical side of mathematics seems to be what the mathematics departments are offering. Hence the contention by the engineers that for the purpose of preparing students to enter the engineering

profession, more emphasis should be given to the applications of mathematics and less to mathematical theory. Of course no general conclusion can be drawn from the fact that a given engineer thinks that too much emphasis was placed on mathematical theory in the course which he took. We cannot criticize mathematics departments in general because a few fail to appreciate the needs of engineering students.

"For this reason, much care was taken in sending out inquiries to include widely different parts of the country and to include many engineers who have received their training within the last ten years. The latter precaution enables us to avoid conclusions which might be true of mathematical courses twenty-five years ago, but which are no longer true because of changes in the methods of teaching. In view of this precaution it is interesting to note that from five different fields widely distributed both geographically and professionally, comes the testimony that unless the courses can be given with more emphasis on the applications, no mathematics beyond trigonometry is essential.

"There seems to be a decided opinion among both professors of engineering and professional engineers, that, beyond a certain amount of elementary mathematics, which would probably include arithmetic, algebra, plans and solid geometry, and trigonometry, the mathematics offered to engineering students should be taught with more emphasis on the applications of the subject to engineering problems. The pure mathematician, however, believes that there is a training quality to be obtained from the study of abstract mathematics which will be lost if the subject is taught through the study of its applications to any other science or profession. The mathematician believes that 'Mathematics is a basal science and not a tool. The spirit of mathematics is of more value to the engineer than the particular things which can be accomplished. The engineer need not be a mathematician, but he needs to think mathematically; and to my mind, he needs the power of mathematical thought more than skill in manipulating a few mathematical tools in mechanical fashion.'

"In this connection, it is evident that the time element must be taken into consideration. One professor of mathematics says, 'It is possible that better results could be obtained if the mathematical department had more time, say for a course in applications of mathematics to miscellaneous problems. But, as a rule, in our technical schools, the department of mathematics is allowed barely time to teach the necessary technique, with what illustrations and applications can be squeezed in. Hence, the mathematical department delivers to the engineering department an unfinished product; and it is the engineer's duty to teach the student to use the mathematics he has learned. Unfortunately, the professor of engineering is a poor mathematician and avoids this duty.'

"At this point, it seems to us, we have the suggestion of a possible remedy for the condition complained of by the engineers—a course given by a thoroughly trained mathematician who has sufficient knowledge and sympathy for the engineering profession to be able to illustrate all the mathematical theory by problems drawn from the engineering field. Such a course must be allowed a much greater time than that now allotted to the pure mathematics course which does not stop to take up applications; but if this kind of training is desirable for the engineering student, certainly, time should be found to give it.

"It is not the purpose of this investigation, however, to formulate the remedies for the undesirable conditions. It is sufficient for our purpose to set forth those conditions in definite form, and to formulate the opinions expressed in the data presented by those who are in touch with the undesirable conditions. These opinions may be set forth in four distinct conclusions:

"First, from the standpoint of the engineer, abstract mathematics divorced from its applications is not desirable in branches beyond trigonometry, i.e., mathematics beyond trigonometry is, for the engineering student, a tool and not a desirable end in itself.

"Second, these subjects being desirable as tools, the training in the elementary mathematics through trigonometry should be more thorough in order to enable the student easily to manipulate such parts of the higher branches as he may need in his profession.

"Third, study of theoretical mathematics beyond a year of calculus is not only undesirable, but is an actual hindrance to the practising engineer in adjusting himself to the relative values of the physical and mathematical sides of the problems which arise in practice. Hence, more emphasis on the applications of mathematics to physical problems should be given in mathematical courses for engineers.

"Fourth, such exceptional students as become interested in the theoretical side of the profession should be given ample opportunity, when that interest appears, to extend their mathematical training in whatever line may seem desirable for the particular branch of the profession in which they may desire to perfect themselves."

BOOK REVIEWS.

CONCENTRATING ORES BY FLOTATION — by Theodore J. Hoover—3rd Edition, 1916—Published by The Mining Magazine, London—Price 12s. 6d—For sale by Canadian Mining Journal.

The first edition of this book was published in 1912 and has been an important factor in the development of the art. The author and his associates, through this work, and a second edition published in 1914, contributed information invaluable to those who took up the problem of concentrating ores by flotation.

The new edition contains the matter published in the second edition and also a chapter covering briefly the progress made during the past two years.

The chapter headings are: Historical; sketch patents; litigation; theories; tests; Potter-Delprat process; De Bavay process; Elmore vacuum process; minerals separation process; other flotation processes; economics; bibliography; progress 1914-1916.

THE MINERAL INDUSTRY, Its Statistics, Technology and Trade during 1915—Edited by G. A. Rousch—Published by McGraw-Hill Book Co.—Price \$10—For sale by Book Department, Canadian Mining Journal.

This is volume xxiv. of the annual review of the world's mineral industry, founded by Richard P. Rothwell. The object of the work is to bring together as complete a record as possible of the year's progress in the mining and metallurgical industries in all the important producing countries and to give to the reader a general view of the entire field so far as information is available. A large number of specialists have contributed articles, and the editor has succeeded in compiling useful information on all the economically important minerals.

In addition to the main part of the book, in which the minerals are taken up in alphabetical order, there are special chapters on: Ore dressing and coal washing; concentration by flotation; data of the world's principal mines; and mineral statistics.

The book is a large one of 941 pages, but owing to the wide field covered, individual mining districts receive but little notice. The object of the work has, however, been achieved by careful selection of data from all parts of the world.

The statistical information is not as complete as in earlier volumes of the series. Naturally the production of some countries is not very well known.

An interesting feature of this edition is the prominence given to the minerals and metals for which the war has created a special demand.

MINING WORLD INDEX OF CURRENT LITERATURE—Volume IX.—First half year 1916—by Geo. S. Sisley—Published by Mining World Company, Chicago—Price \$2.00—For sale by Book Department, Canadian Mining Journal.

The Mining World Index is an international bibliography of mining and the mining sciences, compiled and revised semi-annually from the Index of the World's Current Literature appearing weekly in "Mining and Engineering World." The world's literature on mining appearing in periodicals published in America, Europe, Africa and Australia, papers read before technical societies, reports of Government surveys and mining bureaus, and new books are carefully classified and indexed by subjects and authors.

The Mining World Index is the only one covering the field. Anyone who desires a key to the literature on mining subjects will find the volume exceedingly useful.

UNITED STATES EXPORTS OF NICKEL.

The United States Department of Commerce in a report on foreign commerce gives the following figures, which are interesting to Canadians because nearly all the nickel exported by the United States, as well as that used in the United States, is of Canadian origin:

U.S. exports of nickel to	7 mos. ending	
	July, 1916.	July, 1916.
	lb.	lb.
France	470,085	1,960,880
Italy	180,951	1,223,533
Netherlands	302,917	312,660
Russia in Europe		3,018,800
United Kingdom	1,681,723	10,437,968
Other countries	760,286	2,085,810

NOT CANADIAN NICKEL.

Referring to Lord Robert Cecil's recent statement that nickel had reached Germany from United States by the Deutschland, Hon. Howard Ferguson says: "The statement of Lord Cecil that there is reason to believe these particular metals were a part of the small stock mined in allied territory, obviously has no reference to nickel mined in the Province of Ontario. Ontario mines and markets 85 per cent. of the nickel of the world. Therefore the words 'a small stock mined' can have no reference to this province. Had he meant Canada he would have said so. The United States Nickel Refining Co. gets ore from New Caledonia. What we do know as a result of our eternal vigilance is that the Deutschland didn't get any nickel from the International Nickel Co."

CONSOLIDATED M. S. & P. CO.

The prospectus of Consolidated Mining and Smelting Co. in connection with the new stock issue indicates that payments must be made in four installments, as follows: 25 per cent.—\$6.25 per share on application December 1st; the same amount on or before the four following dates: January 1st, 1917, February 1st, 1917, and March 1st, 1917. The amount may be paid in full, but only when it is paid in full will any dividend be paid on the new stock. If payments are not made on the days mentioned, or before, rights are liable to forfeiture. Rights expire December 1st at noon. The basis of distribution is one new share for every four held.

In a circular which Mr. W. T. Matthews, president of the Consolidated Mining and Smelting Co., is sending to shareholders, he states that after paying dividend the company will have fair surplus profits from the year's business. The object of the letter is to explain the need for increasing the company's capital, which is attributed to heavy construction costs, increased costs of labor and supplies, and a comprehensive plan of expansion.

Copper and Zinc.

The plants of the company are producing more metals than ever before. The new zinc plant is shipping regularly, and shipments will increase steadily. The two zinc contracts from Allied Governments, which were accompanied by partial advances only, will necessitate additional capital expenditures. The copper plant has been increased in capacity and two plants for the production of sulphuric acid solutions have been installed, which will reduce refining costs.

The company's mining operations have been extended and further extension is in view. Not only has the large copper property close to tidewater at the northern extremity of Vancouver island been purchased, but other properties are now being examined with a view to purchase. The acquisition of new properties and the development of same will absorb more money. In view of the fact that the company is refining five metals, on a large scale, even the capital about to be added will make the total outstanding a comparatively small figure.

UNITED STATES COPPER PRODUCTION.

Present indications are that for the year 1916 U. S. refinery production of copper, including all the product from both domestic and imported ore and concentrates, will average about 175,000,000 pounds per month. It has been as high as 190,000,000 and as low as 150,000,000. An output of 2,100,000,000 pounds for the twelve months would represent an increase of 28 per cent. over the refinery production of 1915. For the first time in the history of the industry the output promises to cross the 2,000,000,000-pound mark. We compare United States refinery outputs for a series of years as follows:

	Output, lbs.
1916 (estimated)	2,100,000,000
1915	1,647,000,000
1914	1,533,781,000

COPPER FROM THESSALON.

Mr. John A. McEacherne has made a shipment of copper ore from one of his properties in Gould township north of Thessalon, Ont. The ore averaged 16 2-3 per cent. copper.

MR. E. P. MATHEWSON.

Mr. E. P. Mathewson has returned to Canada after 30 years' experience as a metallurgist in the United States, including 14 years as manager of the reduction works of the Anaconda Copper Mining Co., to become general manager of the British American Nickel Corporation. He will reside in Toronto.

Mr. Mathewson was born in Montreal and attended McGill University. After graduating he spent one season assisting Mr. Eugene Coste, who was then engaged in making a topographical survey of the Trent valley. Then for a short period, Mr. Mathewson was employed in his father's store as bookkeeper, an experience which later proved of considerable value. He wanted, however, to follow up the profession of metallurgy. On the advice of Professor Harrington and T. Sterry Hunt he started for Colorado with a letter to the manager of a lead smelter at Pueblo. At the Pueblo smelter he began work in the assay office at a salary of \$50 per month. He worked 13 hours on the night shift for two weeks and then 11 hours on the day shift.

Gradually Mr. Mathewson advanced, and it was not long until he was in charge of the plant as metallurgist. His company was smelting lead, silver and gold ores, and refining lead and silver, and so he gained experience in several departments. The introduction of machinery for every possible purpose made the Pueblo plant a very efficient one.

In 1897 Mr. Ben Guggenheim placed Mathewson in charge of the Philadelphia smelter, and a few months later took him to Perth Amboy to run the copper and lead refineries. For a few months Mr. Mathewson was at Monterey, but he was back at Perth Amboy in 1899. In that year he went to Chile to run a smelter for a company which had a contract with the Guggenheims. Of Mr. Mathewson's experiences in Chile, a volume could be written. After two years he returned to New York.

Mr. Mathewson was next interested in the possibility of starting an electrolytic refinery in British Columbia. Before his plans matured, however, he was invited by Mr. Frank Klepetko to join the Anaconda staff, and until a few weeks ago he was still with the Anaconda company.

The period during which Mr. Mathewson was general manager will always be one of the brightest in Anaconda's history. His improvements in methods have kept Anaconda foremost among the companies treating copper ores. Increase in capacity, reduction in cost, and increase in percentage recovery have seldom been striven for so successfully as by Mr. Mathewson and his staff at Anaconda.

REX CLAIMS IN DEAL.

The Pas, Oct. 21.—A deal has been consummated between the owners of the Rex group and Walter Neal, representing a New York syndicate, headed by McKeever Brothers, whereby immediate development of the property will be undertaken. A contract has been let for the erection of camp buildings to accommodate twenty men, who will be engaged in sinking a shaft and drifting, so as to block out the ore sufficiently to determine the size of the stamp mill that Mr. Neal undertakes to erect inside of two years, or earlier if the conditions warrant.

Mr. F. G. Stevens, who negotiated the deal, left on Wednesday for Toronto, and Mr. Neal remains in town arranging for immediate work to begin.—The Pas Herald.

McINTYRE.

President A. M. Hay has issued the following statement concerning the operations of McIntyre-Porcupine Mines, Ltd., during the quarter ended September 30th:

There was milled 28,933 tons of McIntyre ore, containing \$9.08 per ton, and yielding \$250,744 at a cost of \$142,900, or \$4.93 per ton. The profit was \$107,844. There was also milled 6,877 tons custom ore at a profit of \$28,239, making a total profit of \$136,083 for the quarter.

No. 5 Shaft.—Vein 714. The face of the drift is now 320 ft. east of 7D crosscut on the 700-ft. level and shows about \$15 per ton over a width of 5 ft. North of this vein and paralleling it on the same level, No. 5 vein has been drifted upon for 280 ft., assaying for this length about \$10 per ton over an average width of 5 ft. The raise from the 1,000-ft. level, to connect with the 700-ft. level of this shaft, is now 200 ft. above the 1,000-ft. level.

No. 4 Shaft.—On the 800-ft. level a new vein 5 ft. wide, assaying \$6.85 per ton, has been drifted upon for 60 ft. east of the shaft and is still in ore. Drifting to the east on the 700-ft. level, has also proceeded about the same distance, but so far no new orebody has been met with. During the period these workings on the south side of the lake produced about 40 per cent. of the McIntyre-Porcupine ore milled, having a value of only about \$6.50 per ton, thereby reducing the general average to \$9.08 per ton.

McIntyre Extension Mine (Main Shaft).—Drifting is being continued to the east on the 1,000-ft. level, but no stopping operations are being carried on, as the present equipment is being used to its full capacity in carrying on development work planned for the economical handling of ore to be hoisted through this shaft in the future from the north side of the lake. The high operating cost shown over the period is due to the fact that all this extraordinary development is being charged against McIntyre Porcupine production, and will continue to show a relatively high figure until this work is completed. An adjustment of these charges will be made later on after production from the McIntyre Extension property has begun.

McIntyre Jupiter Mine.—About 70 tons of ore is being milled daily from this property.

Milling Operations.—The addition to the mill building and the installation of tank equipment for the D unit are now practically completed. When transportation facilities from the main shaft on the north side of the lake are available, the milling capacity will be raised to 500 tons per day without increasing the present crushing capacity of the mill. When the latter is increased the capacity of the mill will be 600 tons per day.

Main Shaft.—Drifting to the west on the Boundary vein on the 1000-ft. level has now been advanced for a total length of over 300 ft. on McIntyre-Porcupine ground. The stope for a similar distance on the sill floor, 18 ft. above the level, has carried a width of from 8 to 30 ft., with an average value of over \$15 per ton. The present face is about 18 ft. wide of similar grade. Foundations are being placed on the surface at the main shaft for a crusher house and storage bin from which all the ore from the north side of the lake will be conveyed to the mill by a new aerial tramway now under construction, with a capacity of 60 tons per hour. The existing aerial tramway, in operation from No. 5 shaft, although taxed to the limit, is unable to keep the

mill supplied to its capacity. The main shaft equipment, including hoist, crusher, ore bin, and aerial tramway, should be completed about the 1st of January, when the mill tonnage will be increased.

The amount expended during the quarter on new buildings, plant and equipment amounted to \$27,966.85.

INTERNATIONAL NICKEL CO.

Boston, Oct. 25.—International Nickel Co. made profits of \$6,344,246 in the six months ended Sept. 30, while surplus after dividends amounted to \$3,566,793. From the semi-annual statement just issued it becomes apparent that the third quarter of the year practically duplicated the June 30 quarter, in which profits were \$3,959,135.

In both periods earnings were of record proportions. Cash at the end of September was down to \$2,081,110, against \$4,137,633 on June 30, but on the later date certificates of deposits had grown to \$4,280,000 from \$2,030,000 at mid-year.

The consolidated profit and loss statement for the six months ended Sept. 30 follows:

Earnings.	\$7,775,145
Other income	137,628
Total income	7,912,773
Administration and general expense	563,896
Net income	7,348,876
Depreciation and mineral exhaustion.	1,004,630
Profits.	6,344,246
Dividends.	2,777,454
Balance.	3,566,793

Following is the balance sheet as of Sept. 30:

Assets:	1916.
Property.	\$44,193,831
Investments.	2,003,396
Inventories.	4,773,758
Accounts receivable	2,045,156
Loans on call	515,000
Certificates of deposit	4,280,000
Cash.	2,081,110
Total.	50,892,251
Liabilities:	
Preferred stock	8,912,600
Common stock	41,834,600
Accounts payable	1,951,255
Preferred dividend	133,680
Common dividend . . . . .	.....
Account and insurance funds	199,119
Previous surplus	3,294,195
Profit and loss surplus	3,566,703
Total.	50,892,251

BOSTON CREEK.

The R. A. P. Syndicate's property at Boston Creek, was closed down this month to permit of boiler repairs and installations, the latter including tables for sorting ore. The R. A. P. hopes to ship some high-grade shortly. The property will be opened up again in a week. In the meantime Harry Simms will take hold as manager.

The Boston Creek Gold Mines, Limited, which has the Kenzie property and a large group of other claims at Boston Creek, is starting work on its own account. The R. A. P. has been drifting from its workings on the Kenzie claim. The company is setting up a compressor and other equipment and will sink on the Kenzie claim.—Cobalt Nugget.

MINING POSSIBILITIES ALONG CANADIAN NORTHERN RAILWAY, WEST SHINING TREE TO NIPIGON.

By Cyril T. Young.

The formations enclosing the rich Porcupine belt unquestionably extend west across our line at Groundhog River and Foleyet divisional point, and so far as our exploration goes, continues west and quite probably is the same gold formation as outcrops at Hobon on the C.P.R. north of Michipicoten Harbor.

Large quartz bodies occur in formations identical with Porcupine, but there has been no development so far to discover where the rich areas occur. Schist formations outcrop along the line between Tionaga and Foleyet—a distance of approximately twenty-five miles. This is the extension westward of the Porcupine gold belt which has been definitely traced through. On this belt the Cripple Creek area between the C.N.R. and Porcupine is located. On this belt prospectors have secured assays of from \$6 to \$30 per ton on good veins, but little or no work has as yet been performed, and for the greater part it was winter staking. The gold belt through here lies immediately south of a magnetite iron range which is exposed by stripping and tested by diamond drilling on the Groundhog river one mile north of the railway bridge. Further east, in the vicinity of Deerfoot lake, this iron belt is associated with a nickel-bearing formation referred to later.

A mining engineer who looked at a prospect west of Aquesqui Lake states that conglomerates such as we find at the Dome in Munro township, at Kirkland lake and elsewhere, occur on this belt. This formation occurs in all the prominent producing districts in Temiskaming and is considerably different from the silver-bearing conglomerate at Cobalt.

Between the railway track and the northeast arm of Lake Matagama, a promising schist belt, carrying large bodies of quartz on which some staking and work was formerly accomplished is well worthy of exploration.

West of the Groundhog river, in the vicinity of Slate Rock lake, quartz veins occur. Some of these occur in the rock cuts, and all of them are open to prospecting at the present time as the property staked was not recorded.

This gold belt continues west across the big lake back of Foleyet and outcrops here and there across the Trout and Chapleau rivers, continuing west across the Algoma Central to Hobon on the C.P.R. line and Michipicoten Harbor.

The continuation of the West Shining Tree gold belt is also well worthy of exploration. The easiest method of reaching this belt, is from Gogama Station by canoe southward ten miles on Misnisiagua lake, where quartz showings are visible at the foot of the high trestle at the southerly end of the lake and in the rock cuts to the westward. On the westward extension of this belt at construction mileage 109 where the Macaming river crosses the steel and the canoe route is on ahead up the river through Macaming lake and Massmakanda lake (two short portages) and then southward to Schist lake. This section has not received the attention of mining men and prospectors, but stakers have been through it and my men say it is very promising.

West Shining Tree camp is already well known and several groups of properties in McMurchy township give every evidence of becoming mines, and are recently in the hands of more progressive mining men.

Quartz and schist occur at a number of places to the westward, and a schist belt crosses Kabinagagami lake

at the outlet of the river of the same name. This is reached from Oba, the junction of the Canadian Northern and Algoma Central. The canoe route has two short portages.

Quartz showings on the same belt again occur further westward up the branches of the Shekak river, and were reported to me as occurring again on the same belt still further westward. No exploration work has been done at any of the points or through the intervening miles of country, but these places were noted by our land and timber cruisers when travelling across the country.

Between Long lake (Longuelac) and Jellicoe, which is on the border of the Nipigon Forest Reserve, especially in the vicinity of Langmuir and Keemle, a schist formation occurs which is worthy of exploration. This is an extension of the same belt as Kowkash and Tashota occur in further north on the Transcontinental. This section is well worthy of exploration, especially north of our line between Octopus and Jellicoe.

A Mr. Barron, reporting for the Ontario Government for many years on Northern Ontario Exploration, a most capable and efficient mining engineer, gives an interesting report on the Ground Hog section:

"I met with lead and copper ores on the northwest side of the eastern arm of Lake Matagama, in the vicinity of Flying Post. The quantity of ore in the veins, where exposed, is not such as would justify, in my opinion, expensive mining operations, but sufficient taken in connection with the size and general character of the veins to warrant careful exploration, in the reasonable expectation that larger deposits of these useful and valuable metals may be discovered. It is said that one of the parties engaged on the survey for the Canadian Pacific Railway, discovered silver ore in the neighborhood of Flying Post. I think it likely, however, that the ore thus found was 'lead ore' rather than silver. Galena, the most common ore of lead, almost invariably contains more or less silver, sometimes in quantities barely sufficient to pay for extraction, and at others so rich as to entitle the ore to be classed as 'silver-lead.' The formation in which these veins occur belongs to the Huronian system."

That native silver was found by the C.P.R. surveyors is a fact that came within the writer's knowledge years ago. The men who found it have since been in the Yukon and never returned east. This old survey line of the C.P.R. can be picked up in places north of our line at points between Mount Horden (north of Agate on Kapuskasing lake) and Groundhog river, and the maps we have prepared set forth the exact location of this survey.

In an early Dominion report by Bell, he sets forth on a map—now out of print—the place where Borron found the silver-lead veins as being on the point between the two arms of Matagama lake well down towards the chain of lakes on the portage between Flying Post lake and the eastern arm of Lake Matagama. It is a country well worthy of exploration, and what Borron found has not since been located either by Indians or white man. This formation seems to extend westward where bloom and native silver flakes have been reported to have been found.

Further west, diabase outcrops on the portage on Missinabi river at the falls below Peterbell siding. Diabase outcrops again on the eastern shore of Lake Nipigon, north of a line due west of Jellicoe Station.

Magnetic iron ore occurs at several points along the line of railway, the first of importance north of Ruel,

being 14 miles to the west of Stackpool at mileage 105 at Sagatosh lake. Here Minneapolis and St. Paul capital has proved up millions of tons by diamond drilling within the past four years, the diamond drilling outfit having gone in from Bisco on the C.P.R. They are well satisfied with their results.

At Kukatush, mileage 133, close to Groundhog river, magnetite, low in phosphorus and sulphur, occurs running in an east and west direction. Diamond drills were working here recently. Magnetite occurs again on the line at Mackay lakes, mileage 91 from Hornepayne, and in larger quantities at Octopus, mileage 109 from Hornepayne on the shores of Little Long lake.

The pyrrhotite ores northeast of Tionaga have on certain analysis yielded $2\frac{1}{4}$ per cent. nickel, but I was not able to obtain satisfactory results on properties that we optioned in this vicinity and notified the owners that we could not consider them. Were it immediately adjacent to the line of railway this section would warrant investigation for the production of sulphuric acid. Nickel is also reported to me from the Minnipuka vicinity and further west. It is also reported as occurring between our line and the C.P.R. north of Schrieber. I have had no opportunity of investigating this statement, nor to obtain its exact location. Men are now out on the ground acquiring properties.

At Sagatosh lake, 16 miles west of Stackpool reached from Groundhog (Kukatush) American interests have diamond drilled a strong lead zinc vein to 500 feet depth. They are seriously considering taking out ore and hauling it 14 miles to our rail.

SAM DOBIE'S DEALS.

Sam J. Dobie is one of our best known mining men, says the Toronto World. He is always active in the new districts and as a rule comes away with substantial interests in promising properties. But it is rather as a vendor that he is best known to fame. Most of the properties that he has parted with at nominal prices have afterwards turned out veritable bonanzas. At one time he owned a large share of the famous "Croesus" in the Township of Munro, about 30 miles east of Porcupine. Even then there was little or no doubt of the great value of this property. Fabulously rich ore showed in several places, and to protect it from high graders the owners bolted down over the entire surface sheets of solid steel half an inch thick.

The Ontario Government paid \$10,000 for a chunk of ore, the dimensions of which were not greater than an ordinary pumpkin. And this was no fancy price. It was barely commensurate with the intrinsic value of the sample. It was easy for the officials to determine this by ascertaining the weight of the entire specimen and the fineness of the gold therein. If free from any alloy, the metal would be 19.3 times heavier than water, while the gangue or quartz is only 2.65. The bulk of the valuable piece could be ascertained by measuring its displacement of water, and on these data a calculation of actual value could be made.

The ore acquired by the Government was shown in a safe at the National Exhibition in Toronto. Lumps of pure gold studded the quartz like raisins in a Christmas pudding; not merely here and there, but evenly distributed through the mass and, as nearly as one could judge, taking up more than one-third of the whole.

Sam Dobie sold his interest in the Croesus at the rate of \$75,000 for the whole.

But a single generous act of that kind would scarcely be sufficient to establish his reputation as the best

man to buy from in the whole of northern Ontario. He also had a large interest in the Davidson, which has very recently come into great prominence in consequence of simultaneous finds on two different veins.

Apparently it is lucky to buy from Sam J. Dobie. Will the Coniagas mines of Cobalt be the next fortunate buyers from him? He and his associate owner have optioned the Anchorite in the northern part of Deloro to the Coniagas, so in the ordinary course, we may expect a big strike on this valuable property.

FLOTATION ROYALTIES.

Air flotation and not oil flotation governs the principles of ore concentration under the process of the Minerals Separation Co., according to its representatives in the United States.

It is estimated that licensees of the Minerals Separation Co. patents handle approximately 30,000,000 tons of ore annually at the present time. Further estimates double this volume to 60,000,000 tons as the amount of ore treated by flotation upon which royalties may at some time be collectible. This includes not only the copper producers operating in the United States, Canada, Mexico and South America, but Russia, Australia and other countries throughout the world.

Royalties range from 12 cents per ton of ore treated to a much lower figure when a large tonnage is handled.

The agreement which Anaconda Copper Mining Co. has with the Minerals Separation Co. covers probably the greatest tonnage of ore of any contract which the latter company has on its books. So far as can be learned the effect of the Bradford decision on the Callow process, if the decision is upheld by the Supreme Court, will probably not restrict the use of Callow machines, but will require users of the Callow machines to pay royalties to the Minerals Separation Co.

To licensees under its patents the Minerals Separation Co. sells its machines at cost, the profit to the licensing company coming entirely from royalties on ore treated.

Much stress has been laid upon the "oil flotation" phase of the process, but it is stated by the Separation Co. that it is in reality an "air flotation." Oil was used in the prior art, but the present discovery, according to its owners, makes it possible to "flotate" the fine particles in air bubbles resulting in much larger extraction and greater profits.

Preparations for carrying its case to the Supreme Court next month have been started by the Minerals Separation Co. Upon the outcome of this appeal, taken from a decision of the Circuit Court in San Francisco in the Hyde-Butte & Superior litigation, will depend the very existence of the company in the United States.

The Minerals Separation Co. has been busy securing new contracts with mining companies desiring to use flotation. Its best contract is understood to be that covering the Anaconda, Inspiration, Greene-Cananea, Arizona Copper Co., Calumet & Arizona Mining Co. and Consolidated Coppermines Co. upon which a minimum rate of four cents a ton prevails and is now being paid as the daily amount treated exceeds 30,000 tons.

It is doubtful if any other company or group of companies will secure such a low figure. The Braden mill has flotation equipment which has increased its saving materially. The Chile Coper Co. is also understood to have made arrangement to operate under the Minerals Separation process.—Boston News Bureau.

MOLYBDENITE.

Nelson, B.C., Oct. 11.—Prof. J. C. Gwillim, of the Canadian Munition Resources Commission, is in Kootenay and Boundary inquiring into the possibilities for an increased production of molybdenite, which is in demand for munitions work. So far the Molly mine on Lost Creek is the only one he has seen which promises a production, but he believes that there may be other showings in the district which would pay for operation at existing prices for the metal.

He gave the Daily News the following memorandum concerning molybdenite, prices and methods of disposing of it:

"There is a good market now for the mineral molybdenite, which is needed for making ferro-molybdenum used in munitions and other work.

"The general price is on a basis of \$1 per pound for 80 per cent. of the molybdenite content: 80 per cent. being the assumed recovery made in cleaning this mineral up to the grade required by the munitions board. This grade is 85 per cent. molybdenite.

"Thus a 5 per cent. ore would be worth \$80 and a 10 per cent. ore \$160 per ton, less the following charges: (1) Mining and sorting to 5 or 10 per cent.; (2) transportation from mine to railway; (3) freight to Ottawa or Renfrew, \$16 a ton on carload lots; \$36 a ton on smaller lots; (4) milling or concentrating cost, from \$5 to \$10 per ton.

"A little figuring for each case will determine what grade of crude ore will stand its charges — usually nothing under 5 per cent. molybdenite (not molybdenum) will leave much profit.

"There are two places in Canada where such lower grade ores can be cleaned up and paid for: The ore testing laboratories of the Mines Department, Ottawa, care G. C. Mackenzie; and the International Molybdenum Co., of Renfrew and Orillia, Ont. F. J. Mackenzie is its representative and is now in British Columbia.

"The Canadian Munition Resources Commission is interested in getting supplies of this mineral forward as quickly as possible to meet war demands and anyone who can should try to furnish such ores while the price is high and the necessity exists."

STANDARD SILVER-LEAD.

The Standard Silver-Lead Mining Co.'s net profits for the month of August were \$41,280.56. Mr. Geo. H. Aylard, of Victoria, is general manager for this company, but its head office is in Spokane, Wash. The Spokesman-Review, of that city, a few days ago published the August figures, as under.

The operating profit at the property of the Standard Silver-Lead Mining Co., near Silverton, B.C., for September was \$53,399, as compared with \$56,609 in July, \$38,437 in May, and \$136,943 in March. The surplus of the company on August 31st was \$287,662, as compared with \$296,381 in July.

Production is maintained from silver-lead and zinc ores and concentrates. The shipments in August were 523 tons of silver-lead ore, as compared with 429 tons in July, 497 tons in June, 504 tons in May, 729 tons in April, and 1,295 tons in March.

The zinc sales were \$18,482, as compared with \$63,890 in July, \$24,808 in June, \$18,260 in May, \$26,847 in April, and \$5,432 in March.

The receipts from zinc in August were at the minimum because the contract with a buyer admits of the shipment of only 500 tons a month. The company

states that it had on hand 750 tons of zinc concentrates made in August, that do not figure in this statement. The concentrates have been netting \$30 a ton, and those on hand are expected to bring an equal return. Negotiations are proceeding for the sale of the surplus zinc which the company hopes to dispose of in its entirety.

Among details of the Standard Co.'s statement for August by Mr. Charles Hussey, the secretary, are the following:

Receipts.	
Preliminary settlement for 523 tons of silver-lead ore and concentrates	\$64,926.50
Zinc sales	18,482.26
Umpires.	178.91
Boarding house	5,275.55
	\$88,863.22
Less final settlement for June.....	2,290.41
	\$86,572.81
Disbursements.	
Production of ore, including mining, milling, shipping, power and general expenses.	\$33,172.89
Development.	4,321.75
Construction.	2,211.80
Aylard tunnel	1,747.85
Store supplies	3,599.35
Miscellaneous.	238.61
	\$45,292.25
Cash Statement.	
Balance on July 31st.....	\$296,381.65
Net profit for August	41,280.56
	\$337,662.21
Less dividend payable	50,000.00
	\$287,662.21

TEMISKAMING.

In a letter, dated October 10th, to shareholders of the Temiskaming Mining Co. is the following:

The main shaft has reached a depth of 1,325 ft. We have approximately 300 ft. farther to sink before the lower contact between the Diabase and Keewatin formations is encountered, when lateral development will be commenced.

On the upper levels of the property, work is progressing very favorably. In various parts of the old workings, we have recovered some mill rock and small patches of high-grade. Development of the new vein system on the different levels has produced a great deal of very rich ore as well as mill rock. On the 500-ft. level, where we have our largest body of ore, the vein is very strong, varying from eight to fourteen inches in width and carrying exceptionally rich values.

Surface work on the McDonald claim and Gans lot has been suspended. The syndicate who had our Red Jacket claim under lease, have relinquished the same.

On September 30th, 1916, we had: Bullion in storage, 566,962.74 oz.; ore at smelters, 108,905.43 oz.; ore bagged at mine, 31,419.0 oz.; total, 707,287.17 oz. Cash on hand, \$25,074.08.

On July 22nd, 1916, we paid a dividend of 3 per cent., distributing \$75,000 among the shareholders. At a meeting of the directors held on October 10th, 1916, a dividend of 3 per cent. was declared payable on November 22nd, 1916, to shareholders of record October 31st, 1916.

THE MINERALS SEPARATION CASE.

A Delaware court has decided the suit brought against the Miami Copper Co. on the ground of infringement. The following is an abstract of Judge Bradford's opinion:

The court holds that "under the processes shown in the three patents a signal advance has been made in the art of ore concentration in point of simplicity, economy and efficiency, and in their practice large commercial success has been realized." * * * He then cites other practices which, "however, were far from commercially successful, being wasteful of water, of power and of a considerable proportion of the metallic particles in the slimes which were carried up to the surface and were lost with the gangue.

"Without pausing at this point to consider other processes of ore concentration disclosed in the prior art hereinafter discussed an important and, indeed, vital difference between water or gravity concentration under such processes and concentration under the processes of the patents in the suit is that while in the former the metallic particles after being separated from the gangue in the ore pulp sand to the bottom, in the latter the metallic particles coated with an extremely thin film of oil became attached to air bubbles in the ore pulp and the bubbles with the attached metallic particles rise to the surface forming a mineral froth of such coherency and permanency as to afford full opportunity for its removal from the surface for further treatment of the metallic particles. The ore pulp in the process of each and every one of the three patents in suit consists of a mixture of water and crushed or pulverised ore, together with one or more other ingredients.

"In each the agitation of the pulp coupled with the introduction of air into it develops and distributes throughout the mixture small bubbles of air which attach themselves to the metallic particles to the exclusion of the gangue and rise with them and form metallic air froth on the surface readily removable therefrom, the gangue particles sinking to the bottom and being disposed of as refuse."

Judge Bradford in his opinion says that "the first patent in suit is what is known as an air flotation process in which the frothing agent consists of an oil or other immiscible substance or material of an oily nature and the bubbles and metallic particles become attached to each other through affinity between the bubbles and the metallic particles enhanced by the coating of the latter with an extremely thin film of oil. The old water processes of ore concentration were in some features gravely objectionable.

"Under those processes it was desirable to avoid very fine grinding of the ore as being calculated to cause the fine particles containing metal to escape with gangue particles and be lost. In these processes there were two things to be avoided: first, the crushing or grinding of ore to such a degree of fineness as to lead to the loss of metallic particles through their escape; and secondly, too coarse crushing or grinding whereby particles of ore containing both metal and gangue might, with the gangue preponderating, too readily be carried to the surface and lost with the other gangue particles.

"The defendant admits that the air bubbles collect the metallic particles and the oil or other modifying agent in the mixture gives permanency to the mineral froth; that the attraction of the air bubbles for the metallic sulphide particles leads to the separation of those particles from the gangue that in the absence of oil or other modifying agents in the pulp facilitating

the formation of air or other gas bubbles, no process of concentration employing such bubbles is possible. * * * But there is an accentuated difference of opinion between the parties on the point of preferential affinity of oil for metallic particles as compared with the gangue.

"One of the principal questions in the case is whether patentable invention was involved in the discovery that the minute proportion of .1% of oil to the ore was sufficient for commercially successful operations in ore concentration. On this question I had some doubt during presentation of the case. But this doubt has since been removed. * * * There was I think patentable invention in the discovery made in March, 1905. Prior to that time there had been no suggestion in the art that the proportion of .1% of oil to ore or any other fraction of 1% of oil to ore would or might result in successful concentration. The statutes provide for patenting new and useful inventions and discoveries, but a bare discovery unaccompanied by the exercise of any invention in utilizing or reducing it to practice would not justify or support a monopoly in the discovery. In the present case, however, the facts disclose not a bare discovery, but a discovery coupled with invention in usefully applying it. In such cases patents may properly be granted. The defendant lays stress upon the proposition that the reduction in the amount of oil in the process for the concentration of ore did not and could not involve patentable invention, but only an ascertainment of the proper degree in which oil should be used, which was readily discoverable by any one competent to conduct or superintend a process of ore concentration; and further, that motives of economy would naturally have suggested a reduction in the quantity of oil to the extent of its excess over what was necessary for the accomplishment of the purposes of the process.

"But if such a reduction was obvious why is it that it was never made prior to the discovery in question? No one to-day understands how the use of only .1% of oil operates to secure the mineral froth of the first patent in suit. This is testified to by experts and admitted on both sides. * * * I perceive no escape from the conclusion that the discovery was patentable. To decrease the amount of oil used in an old process, so long as the characteristic mode of operation and result of such process are preserved, even though in less degree, does not as a general rule involve invention.

"The defendant contends that a substantial increase in the amount of oil involved used will not affect the nature or efficiency of the process of the separation, but will only add to the cost of carrying it on with an unnecessary amount of oil. But this position is in conflict with the decided weight of the evidence and with the showing of the experiments conducted by Higgins immediately prior to the time of discovery. It is satisfactorily proven that the process of first patent in suit depends upon the selective affinity of the air bubbles in the mixture for oil coated metallic particles, that the affinity is strongest when the film of oil surrounding the metallic particles is so thin as to be imperceptible to the senses, and that with any substantial increase in the quantity of oil on the metallic particles the character of the process is changed and its efficiency diminished for some reason as yet unrevealed.

"A great advance in the art of ore concentration has resulted from the process of the first patent in suit in efficient recovery of slimes. With the use of that process ore may be so finely ground as to insure the thorough separation of the metallic particles and gangue and

great savings effected. The profit so saved in a single year from the output of the principal porphyry copper mines, including the defendant's has been estimated by one of the expert witnesses as more than \$17,000,000.

"The defendant contends that there is nothing new in the employment of only a fraction of 1% of oil relative to the weight of the ore in the process of the first patent in the suit. On the whole, I am satisfied that the first patent in suit must be sustained as to claims 1 and 12, but not as to claim 9. The two former are definite, specifying and limiting the amount of oil to be used; claim 1 mentioning 'a small proportion' * * * amounting to 'a fraction of 1% on the ore' and 12 'a fraction of 1% of oil on the ore.' Claim 9 mentions 'small quantity of oil.'

"On the question of infringement of the first patent I have no doubt. It was practically admitted by counsel for the defendant in opening the defence that it had infringed the three patents in suit by its operations at Miami within four months next before the filing of the bill. The defendant in its operations also used the minute proportion of oil mentioned in the first patent in suit. It does not use acid in its process, but this fact is immaterial so far as the question of infringement is concerned for the reason that it appears both from the claims and the description of that patent that the use of acid is optional. In the plaintiff's process the separation is effected through the rising of air bubbles to which are attached the metallic particles through the mixture to the top and the formation of a froth or scum on the surface, which can by simple means be removed with the contained metallic articles. In the defendant's process the separation is effected through the rising of air bubbles to which are attached the metallic particles through the mixture to the top and the floating away into a launder of either the original bubbles to which the metallic particles were first attached or succeeding and oncoming bubbles which have caught and buoyed up to the surface the metallic particles escaping from the bursting bubbles. The defendant contends that since its abandonment of its original infringing process at Miami it has not and does not infringe for the reason that it does not in its process produce the coherent and permanent froth of the process of the first patent. It appears from the evidence, it is true, that the bubble froth in the defendant's process is not as coherent and permanent as the froth of the process of the patent; but both are mineral froths and that of the defendant is sufficiently permanent to effect through air flotation and efficient separation of the metallic particles from the rest of the mixture. The defendant further insists that its process lacks violent agitation * * * but the description (of the patents) nowhere mentions 'violent agitation.'"

Regarding the third patent involved the court says: "I do not find any element of patentability in the process of this patent."

ST. ANTHONY GOLD.

The St. Anthony Mine, of Sturgeon Lake, has been taken over by the Dominion Reduction Co., who are the owners of the "Croesus." Considerable development has been made on the St. Anthony under the management of Julius Cohen, and the superintendency of Harry Lavery, late of the Dome.

NIPISSING.

A strike of considerable importance is understood to have been made in the Meyer shaft of the Nipissing. From what can be learned the strike is very rich.

TREATMENT OF COBALT SILVER ORES.

Within the past couple of weeks an increase has been noted in the bullion shipments from the Mining Corporation. This increase is due to the addition of a high grade plant to the Cobalt Reduction Co.'s mill.

Previous to this the slimes from the concentrator have been cyanided in the low grade cyanide plant. This system, of course, is being continued, but the "sand concentrates" instead of going to the smelters as in the past, will henceforth be treated in the new plant just recently put in operation.

In addition to the concentrates of the Cobalt Reduction mill, the high grade ore from the three mines of the Mining Corporation of Canada will also receive treatment here and in a short time practically all Mining Corporation shipments will be in the form of high grade bullion going direct to London.

The new addition to the Cobalt Reduction Co.'s plant differs radically from the two other high grade plants in the camp, in that amalgamation plays no part in the treatment, nor is the ore crushed in cyanide solution. The ore is first slimed in a tube mill, and after a preliminary treatment in two stages is de-watered and washed on an Oliver filter, then given cyanide treatment and again filtered and washed on a second Oliver filter.

The silver is precipitated from the solution by the use of sodium sulphide instead of aluminum dust, and the resulting silver sulphide precipitated, de-sulphurized, pumped to filter presses, and then refined in reverberatory furnaces, to a high grade bullion ready for shipment in bars to London.

The new plant has only recently been put in operation and in the course of a few weeks will be working to full capacity.—Cobalt Nugget.

COBALT SHIPMENTS.

Cobalt, Oct. 21.—Eleven carloads of ore left the camp this week for the smelters. Nipissing led with 370,457 pounds. Three cars of nickel-cobalt residue from the Nipissing went to the Henry Wiggins Co., Birmingham, while another car from the same company went to Welland, Ont.

Right of Way again appears on the list with a car of concentrates consigned to Thorold, to which place the car from Beaver also went. The Dominion Reduction shipped to Denver. The remainder went to Canadian smelters at Welland, Thorold and Deloro. The total ore shipments totalled approximately 304,942 ounces, worth approximately \$184,554.

Ore shipments were as follows:

Shipper.	Pounds.
Right of Way	84,052
Nipissing.....	370,457
O'Brien Mine	129,828
La Rose	87,143
Dominion Reduction	88,000
Beaver Consolidated	81,536

Bullion shipments were:

Shipper.	Ounces.	Value.
Nipissing.....	132,429.67	\$91,045.40
Mining Corporation...	55,071.88	37,448.88
Crown Reserve	12,441.00	8,559.88
Dominion Reduction..	20,000.00	13,500.00
O'Brien.....	85,000.00	34,000.00

Crown Reserve, O'Brien and Dominion Reduction figures are only approximate.—Cobalt Nugget.

WHAT YOU CAN DO FOR THE RETURNED SOLDIERS.

By A. R. Doble, President of The Khaki League, Montreal.

The Military Hospitals Commission and many official and private organizations are spending much time and energy in behalf of the returned soldiers, but every Canadian citizen should and can take an interest in the national heroes.

Many have neither time nor opportunity to join an organization for that purpose, but much is to be done by individual and independent effort, intelligently directed. Here are a few suggestions which may help you to do your part:

When you see in the papers that any of the boys are returning to your neighborhood, get together with a few of your neighbors and give them a hearty reception.

Don't treat them to alcoholic refreshments. Many of the men are not in normal state, owing to what they have been through. While, under ordinary circumstances, a drink might do them no harm, under present conditions it might be a very bad thing for them. You will not wish to do an injury to those who have endured so much for you.

Find out what jobs are vacant in your community. Make it a matter of pride for employers to give the first chance to a returned soldier.

Encourage the men to get back to work. Loafing is bad for them, as it is for any of us.

If you are an employer, give the returned soldiers a fair show. It may take a little time for them to get their bearings. Have patience with them, and encourage them,—they have suffered so much for you.

Be in a position to advise the returned soldier where to go in case of need. If you see one in any difficulty, try to help him out, or go with him where he can get proper attention. Help the men who have helped you.

Some of the places where information and assistance can be obtained follow:

The Military Hospitals Commission of the Dominion Government has its chief office at 22 Vittoria Street, Ottawa. Branch Offices,—Room 301 Drummond Building, 511 St. Catherine Street West, Montreal, Que.; and 1 Queen's Park, College Street, Toronto, Ont.

Here is a list of the Provincial organizations: Nova Scotia — Returned Soldiers' Employment Committee, Metropole Building, Halifax. New Brunswick—Returned Soldiers' Aid Committee, 49 Canterbury Street, St. John. Prince Edward Island—Returned Soldiers' Commission, Box 306, Charlottetown. Ontario—Soldiers' Aid Commission, Parliament Buildings, Toronto. Quebec—Soldiers' Employment Bureau, 64-65 Dandurand Building, 294 St. Catherine St. East, Montreal. Manitoba—Provincial Returned Soldiers' Commission, 185 Lombard Street, Winnipeg. Saskatchewan—Saskatchewan Division of the Military Hospitals' Commission, Leader Building Regina. Alberta—Central Provincial Committee of the Military Hospitals' Commission, Government Buildings, Edmonton. British Columbia—Returned Soldiers' Aid Commission, Parliament Buildings, Victoria.

Some of the Provincial organizations have local committees in many towns, and more of these local committees are being formed.

Then there is the Khaki League, which maintains at its Khaki Club, 660 Dorchester Street West, a Soldiers' Employment and Information Department in charge

of a returned soldier, in addition to which it operates another Club at 184 Peel Street, as well as the Khaki Convalescent Homes at 46 Belmont Park and 128 McTavish Street.

Khaki Clubs are also established in the cities of Quebec, St. John, N.B., and Halifax.

In conclusion, take a personal interest in the returned soldiers. They don't need treating, nor coddling, nor charity, but they need human sympathy and kindness, as well as justice.

Canada owes her soldiers a debt which money can never pay. Will you do your bit towards paying it as above suggested?

HANDLING ORE AT HOLLINGER MINE.

When Hollinger's central shaft is placed in operation early next March a flow sheet unique in one respect in Porcupine will be introduced. The underground bin idea, something similar to that in use on the Gattineau-Alaska, is the main change.

The ore will be carried in trams run by electric locomotives along the haulage level to the main shaft, and there tipped into 750-ton loading pockets. From there it will be drawn off, the big lumps sledged or crushed, and will be drawn up in five-ton skips. At the shaft top the ore will be tipped into three No. 7 gyratory crushers and pass through trommels. The oversize will be recrushed in four No. 5 gyratory crushers.

When crushed the ore will drop directly into 500-ton storage bins, cut out in the side of the hill adjacent to the central shaft.

The tunnel cuts through the side of the hill to the bottom of the bins and from storage the ore is drawn up an incline plane to the top of the mill, from where it will be distributed to the stamp feeds.

The advantage of this flow system lies in the fact that haulage expense is reduced to the minimum through the employment of gravity to the greatest possible extent, and again in the fact that the building of storage sheds outside and heating of them is obviated.—Cobalt Nugget.

NOVA SCOTIA STEEL.

Boston—The roving eye of the stock market has searched out about every American steel company of merit, but so far little attention has been paid to the Nova Scotia Steel Co., Ltd., listed on the Boston Exchange. Nevertheless, Nova Scotia has assets and current earnings which are matched by few of the domestic companies whose shares have been making new records for altitude.

Nova Scotia Steel owns in fee simple or by crown lease over 80 square miles of land and submarine iron ore areas situated at Wabana, Belle Isle, Conception Bay, Newfoundland, near which are located ore shipping docks with ample storage capacity. This iron area is estimated to contain upwards of 2,000,000 tons of ore, and is recognized as the largest single deposit known. The company also holds leases on over 90 square miles of coal areas, limestone and dolomite properties, located in Cape Breton, N.S., estimated to contain 2,500,000 tons of coal. Furthermore, timber lands owned in Nova Scotia and Newfoundland exceed 65,000 acres, and freehold lands 8,000 acres additional. This takes no account of the coke ovens, blast furnaces, mills, etc., having a capacity of 120,000 tons of finished steel products per annum.

Nova Scotia owns the entire \$800,000 common stock of the Eastern Car Co., Ltd., which has a capacity of 30 cars a day.

The present rate of earnings of Nova Scotia Steel, after charges and a generous allowance for depreciation, is at least \$60 per share on the \$7,500,000 common stock issued. This is declared to be a very conservative figure. Considering the fact that the iron ore business through insufficient capital in the past has never been developed to anything like the extent which is possible, the common stock is seen to possess interesting possibilities.

Nova Scotia Steel was one of the earliest Canadian beneficiaries of munitions contracts. It is understood that munitions work sufficient to absorb the increased output of all the company's furnaces, mills and forges is already booked for practically all of 1917. This embraces shell forgings—18 pounder shrapnel to 12-inch high explosive shells. Nova Scotia Steel laid down a plant powerful enough to forge 12-inch high explosive shells.

PERSONAL AND GENERAL

Mr. W. A. Carlyle, formerly general manager of the Rio Tinto copper mines, is in Toronto. Mr. Carlyle is a director of the British-America Nickel Corporation. He was at one time general manager of the Le Roi, Josie, Nickel Plate, Columbia Kootenay and other mines in British Columbia. Mr. Carlyle is a graduate of McGill University and was at one time professor of mining in that institution.

Mr. E. P. Matheson is in Toronto after a brief visit to the Sudbury district in company with Mr. W. A. Carlyle. These gentlemen are now general manager and director respectively of the British-America Nickel Corporation. They attended McGill University at the same time, and are now recognized leaders in the mining profession.

Captain Alexander, chief owner of the Engineer gold mine, in Atlin mining division of British Columbia, has returned to the property from a trip to the State of Washington. He was accompanied by some prospective buyers of the mine who went to Atlin to examine it.

Mr. W. M. Brewer has returned to Victoria after having spent the field-work season examining mining properties and investigating conditions in parts of Vancouver island, with the purpose of preparing a report for the British Columbia Department of Mines.

Dr. D. D. Cairnes, of the Geological Survey of Canada, was in Whitehorse at the end of September, after having been engaged in geological investigations in Yukon Territory during the summer and early autumn. He went thence to Atlin district on a short visit before returning to Ottawa.

Mr. J. H. Cunningham, manager for the Canadian Collieries (Dunsmuir), Limited, at that company's Extension colliery, left Ladysmith, Vancouver Island, B.C., on October 11th, to visit his old home in Nova Scotia.

Mr. W. A. Cameron, manager for the Rambler-Cariboo Mines, Ltd., operating a silver-lead-zinc mine in the Slocan district of British Columbia, has been to Spokane, Washington, to confer with his directors relative to their mining enterprise, which has this year returned dividends to its owners after years of expenditure on deep development and additional plant and equipment.

Mr. Frank Jaynes is now manager of Nos. 5 and 6 mines of the Comox colliery, on Vancouver Island, B.C., owned and operated by the Canadian Collieries (Dunsmuir), Limited, in succession to Mr. J. H. McMillan, now a district mine inspector with office at Prince Rupert.

Mr. C. H. McDougall, one of the Consolidated Mining and Smelting Co.'s mining engineers who volunteered for active service and after leaving British Columbia, obtained a commission, was recently transferred from England to France.

Mr. W. T. McDowell, formerly of Fort Worth, Texas, is now manager of the Yankee Girl gold-silver mine near Ymir, Nelson division of British Columbia, having lately succeeded Mr. W. A. Buchanan.

Mr. Geo. J. Milton, head of the company operating a coal mine at Tantalus, Yukon territory, left Whitehorse on October 3rd for Minneapolis, Minn., where he will spend the winter. Mining operations at Tantalus have been suspended and the mine will remain closed until Mr. Milton's return to the property next spring.

Mr. Robert Musgrave is back on Vancouver Island after having made investigations in several mining districts on the lower mainland of British Columbia for the Provincial Department of Mines.

Mr. J. R. Rutherford, for some time manager of the Motherlode gold mine in Sheep Creek camp, Nelson mining division of British Columbia, for its Ontario owners, has returned to Ontario, going from Nelson to Cobalt district.

Mr. O. B. Smith, superintendent of mines for the Granby Consolidated Mining, Smelting and Power Co., and Mr. E. J. Conway, one of the company's field engineers, have been examining mining properties on the Queen Charlotte islands, British Columbia.

Prof. J. M. Turnbull, of the University of British Columbia's mining engineering department, has been examining mining properties in Skeena and neighboring mining divisions for the British Columbia Department of Mines.

Mr. J. Whittaker, a mine operator in the Coal Creek country, Yukon Territory, was in Whitehorse late in September on his way back to the interior, after having spent some time in England.

Mr. H. I. Wilson, of Butte, Montana, who is a director of the Kootenay Gold Exploration Co., has been at Nelson, on a visit to the Granite-Poorman gold mines which were acquired by his company several months ago.

Mr. D'Arcy Weatherbe, who had been in Russia, was in British Columbia early in October.

Mr. E. P. Mathewson has resigned as manager of the reduction works of the Anaconda Copper Mining Co. at Anaconda to accept the position of general manager for the British-American Nickel Corporation, with headquarters at Toronto. Mr. Mathewson is a Canadian who has been very successful in the United States and ranks among the world's leading metallurgists.

Mr. H. W. Dow has been appointed sales manager of the Nordberg Mfg. Co., Milwaukee.

Mr. George Rogers, who is developing claims in the West Shining Tree gold district, was in Toronto recently and has returned to Wasapila, Ont.

Dr. Chas. W. Drysdale recently visited Kaslo, West Kootenay, B.C. He was accompanied by Mr. M. N. Bancroft, also of the Geological Survey of Canada, who had been doing geological work in Fort Steele division of East Kootenay.

SPECIAL CORRESPONDENCE

BRITISH COLUMBIA

The report of the United States consul at Fernie, Southeast Kootenay, for the quarter ended September 30th last, gives information relative to the exports to the United States from the Fernie district, which comprises the country lying north of, and contiguous to the International Boundary line, including Southern Kootenay and Boundary districts of British Columbia. The total exports of copper for the nine expired months of the year amounted to 4,741,861 lb., valued at \$1,320,468. In the quarter under review there was exported gold to the value of \$171,329, silver \$52,664, zinc \$160,074, lead \$1,042, and coal and coke \$305,455. It is stated, further, that the British Columbia Copper Co., with smelting works at Greenwood, in Boundary district, will discontinue the shipment of copper across the International Boundary line after November 1st, the Consolidated Mining and Smelting Co., of Trail, having contracted to handle the entire copper product of the former company, so that it will no longer be included in the exports to the United States. The Rambler-Cariboo Mines, Ltd., has contracted with a zinc smelting company in the United States to take the 800 to 1,000 tons of zinc concentrate accumulated at the company's mill in Slocan district.

East Kootenay.

Concerning the shortage of labor at Crowsnest collieries, to which reference was made in last month's correspondence, the following comment has since been published in provincial newspapers: "There is one feature in the problem which is affecting production to a considerable extent. The manager of the British Columbia Copper Co. has been in Crowsnest district for several days trying to secure a larger supply of coke for his company, but has had to go away without any definite promise as to an immediate increase, owing to scarcity of labor. Five hundred more miners could be used to advantage in the Crowsnest coal mines. Secretary Carter, of the United Mine Workers of America board, reports a similar want of miners in the Alberta fields. The Georgetown mines, which were closed a short time ago, released about 120 miners who were quickly employed by the Drumheller Co. Hundreds more could be given work in the same field, while Lethbridge and other fields are also looking for more men."

The Moyie correspondent of the Nelson Daily News recently wrote that at the St. Eugene mine, Moyie, the Consolidated Mining and Smelting Co. is working the lower levels. Mr. L. A. Horne is local representative of the company and has charge of the work. The upper workings of the mine are being operated under a lease by a group of miners. The lessees are reported to have opened encouraging showings of silver-lead ore. It may be added that shipments of ore are made occasionally to Trail, where 422 tons of St. Eugene ore was received during the first half of the current year and 278 tons to October 7th of the current half; together 700 tons. Other mining properties in the neighborhood of Moyie on which work is being done are the Empire, situated east of the Society Girl group, with five men employed, and the Guindon, on the west side of Moyie lake, where some concentrating ore is being opened in the lower levels. In other parts of East Kootenay metalliferous mining is also being done, but the Sullivan mine continues to be the only large pro-

ducer; its quarterly totals of ore production this year have been, for the quarter ended March 31st, 16,497 tons; June 30th, 19,941 tons; September 30th, 29,307 tons; total for nine months, 65,745 tons.

West Kootenay.

Ainsworth.—A highly colored account of a reported important strike of ore in the Gallagher mine was quite recently published in a Spokane, Washington, newspaper. While years ago a considerable quantity of high-grade ore was shipped from this property, its production has been very small in late years. The record of ore receipts at the Trail smeltery show that in 1916, to October 7th, 41 tons had been received from the Gallagher, and in 1915 only 15 tons, while none at all appeared in the receipts figures for 1914. It is not at all improbable that with sufficient money available for considerable development the Gallagher may be made an important producer, but those responsible for the published statements now being referred to appear to be suggesting advantages that it is doubtful if the property possesses. For instance, there is the statement that "the Gallagher is surrounded by the Highland No. 1, and Silver Hoard and is a mile from the Florence." Now it is a very long mile from any one of those four mines to the Gallagher. Probably the reason the Highland and No. 1 were mentioned in this connection was that they have been the only considerable producers in the camp in 1915 and 1916.

Another objectionable movement in Spokane is the lately announced organization of the Leo Mining Co., "capitalized for 1,000,000 shares at 5 cents, of which 200,000 shares are to be held in the treasury." If this means that the promoters hold four-fifths of the shares the opinion may be expressed that anyone foolish enough to buy treasury shares at five cents while the promoters have so large a proportion of the total number of shares which it might suit them to sell at one cent a share, or even one-tenth of a cent, deserves to lose his money. Again, reference is made in connection with this promotion that "north of the property of the Leo company is the Banker mine, being worked by the Consolidated Mining and Smelting Co. of Canada. On the Highlander, adjoining on the south \$200,000 worth of work has been done. Other highly developed properties lie on the south and west." It is true that in 1914 the Consolidated Co. shipped 703 tons of ore from the Banker and Maestro properties, but for two years following the outbreak of the European war no work has been done on either. Nor has anything been done on the Highlander for years. Here again the names of well known mines have been used seemingly to mislead. Many productive mines in West Kootenay are being worked by Spokane operators, some of them with considerable profit to those who have been enterprising enough to finance their development and equipment, and the province can well do with much more of that desirable and needed class of support to its mining industry, but there are, unfortunately, other kinds, of which the less there is the better for legitimate mining.

Slocan.—The total quantity of ore received at Trail from mines in Slocan division during nine months ended September 30th, 1916, was 12,240 tons for the corresponding period of 1915 it was 8,356 tons. The increase has been, therefore, nearly 50 per cent. Last year 16 mines, big and little, were on the shipping list; this year, there are 21. Seven properties on last year's list, with a total production, to September 30th, of 140 tons of ore, have not been producers this year; on the

other hand there are twelve on this year's list that were not producers last year, and these have produced 2,293 tons of ore. These figures take into account only those that have shipped to Trail, so do not include shippers of zinc ore, nor one mine that in 1915 also shipped silver-lead ore to the United States. The larger shippers to Trail this year have been the Standard 5,394 tons, Rambler-Cariboo 1,457 tons, and Galena Farm 1,234 tons; other shippers of more than 100 tons are the Slocan Star 890 tons, Ruth-Hope 618 tons, Lucky Thought 488 tons, Hewitt 334 tons, Wonderful 279 tons, Lucky Jim (zinc) 193 tons, Idaho-Alamo 181 tons, and Noonday 121 tons.

Late news from mines in Slocan division includes the following: The strike of ore in the Alpha property of the Standard Silver-Lead Co. is reported to be quite important; also that silver-lead ore has been cut in opening from one of the lower tunnels. Net profits on operations at the Galena Farm mine, near Silverton, are stated to have been about \$22,000 for September, bringing the total for five months, May-September, up to more than \$150,000. In one of the Noonday adits, at about 1,000 ft. from its portal, a shoot of ore 3 ft. wide has been cut, and arrangements have been made for hauling ore about two miles to the railway terminus in Sandon. The Surprise concentrating mill is expected to soon be in operation, its equipment being nearly completed. About 70 tons of ore a day has been concentrated at the Slocan Star; when the new plant being added and the greater water power being provided shall be available, which it is expected will be before the winter shall set in, the output will be increased to more than twice as much as that now being made. The finding of a shoot of zinc ore in workings from No. 5 level of the Lucky Jim mine is reported; it is thought this will prove to be the downward continuation of the big shoot of ore opened from No. 4 about 360 ft. above. Shipment of ore from the Queen Bess mine has been resumed, after the mine had been closed for several years. The Slocan Sovereign, above Cody, will shortly be sending ore down to the railway at Sandon, the work of getting the trail in order for hauling or rawhiding having been taken in hand. Generally, there is much activity in mining throughout the district.

In Slocan City mining division there have been four mines shipping ore to Trail this year, namely, the Black Prince, Enterprise, Ottawa and Meteor. Total of production to October 7th is 319 tons, chiefly of ore having a comparatively high silver content.

Nelson.—Ore shipments to Trail from mines in this division during the quarter ended September 30th totalled 1,499 tons, which was nearly as much as during the six months ended June 30th. For the quarter ended March 31st the total was 708 tons, and for that ended June 30th 795 tons. The increase in the third quarter was made chiefly by the Emerald lead mine, near Salmo, and the Eureka copper mine, at the head of Eagle creek, near the city of Nelson. Of the total of 3,002 tons for the nine expired months, 1,227 tons was from the Eureka and 943 tons from the Emerald. Gold concentrates from the Queen stamp mill on Sheep creek totalled 292 tons, and from the Granite-Poor-man mill near Nelson 160 tons. The Molly Gibson, above Kokanee creek, shipped 186 tons of silver-lead ore, and the Hudson Bay, near Salmo, 112 tons of lead and zinc ores. The remaining 82 tons consisted of gold ores from three small properties.

A Nelson syndicate has bonded the Spokane group, in the Bayonne region east of Sheep Creek camp, from which 30 tons of ore shipped to Trail in August is stated to have given net returns from the smeltery of about \$100 a ton, the valuable contents having been silver, lead and gold. A trail down to Kootenay lake is being made, to allow of rawhiding ore to the lake side during the coming winter. Development work on the property includes two adits.

Rossland and Trail.—Ore shipments to Trail from Rossland mines during nine months ended September 30th, totalled 249,910 tons, as compared with 255,024 tons for the corresponding period of 1915. The small decrease this year was the result of an insufficient supply of coke at Trail, which necessitated a curtailment of Rossland ores in the latter part of the last quarter and a consequent reduction in output at the Consolidated Company's mines at Rossland. Comparative figures of production, those in parentheses being for the 1915 period, are as follows: Centre Star, 138,986 tons (139,255 tons), Le Roi, 98,300 tons (102,455 tons); Le Roi No. 2 Co.'s Josie group, 12,553 tons (13,297 tons); miscellaneous, 71 tons (17 tons); total, 249,910 tons (255,024 tons).

It has been announced that shipment of electrolytically refined copper from the Consolidated Mining and Smelting Company of Canada's smelting and refining works at Trail will shortly be commenced. The production of refined copper has been in progress at the company's new electrolytic refinery for several weeks, but the furnace for melting the copper after it comes from the electrolytic tanks was not completed by the end of September, so shipment of copper has had to await its completion. Much structural steel, for enlargement of the electrolytic zinc refinery at Trail is being received, and erected; meanwhile the output of electrolytically refined zinc is about 20 tons a day.

General Notes.

A bar of gold weighing 17 lb. has been received at the Bank of British North America, Ashcroft, from the Lorne mine, in Lillooet district. This was the third lot of gold sent out from the mine in two months.

The Highland Valley Co. has received about \$1,100 as the net returns from 31 tons of ore shipped from its mine in Ashcroft mining division. Mr. Rowland King, who is to have charge of the company's newly erected concentrator, arrived in Ashcroft late in September.

Mr. F. W. Holler, superintendent of the Surf Inlet gold mines, on Princess Royal island, for the Tonopah-Belmont Development Co., when in Prince Rupert at the end of September, stated that the prospects for the mine are better-looking as development work is advanced. The dam for water supply purposes has been finished and erection of buildings for housing the company's workmen is in progress.

A report, published in a Prince Rupert newspaper, is that on one property on Manson creek, Omineca, \$2,200 worth of gold was taken out in 18 days after tunnelling 760 ft. to reach the old channel in which the gold was found.

The British Columbia Copper Co. is developing under option of purchase, the Cariboo mineral claim, situated about four miles northeast of Chesaw, in the northern part of the State of Washington and within 20 miles of the company's smelting works at Greenwood, B.C. It is stated that about 40 ft. of copper ore of good grade has been opened.

SILVER CUPS FOR COMPETITIONS IN FIRST AID

The British Columbia Department of Mines has provided four handsome silver cups for annual competition in first aid work by teams of miners, one each for four districts in that Province, namely: (1) Vancouver island and the Coast, (2) Nicola and Similkameen, (3) Boundary and West Kootenay, and (4) East Kootenay. For the present, competitions in three of these districts are likely to be restricted to coal miners, since few, if any, first-aid teams have yet been organized in them by metal miners. In the other district, that of Boundary and West Kootenay, there are not any coal miners, but there are teams of metal miners.

The rules under which the competitions for these cups are to be conducted have been formulated by the Chief Inspector of Mines for the Department, as follows:

1. Competitions for the cups shall be open to all mining employees in and about the coal and metalliferous mines of British Columbia. Should the cup for any district not be competed for two years in succession, the Department of Mines reserves the right to remove the cup from that district and place it for competition in some other district.

2. The cup shall be open for annual competition, at a place to be designated by the District Committee.

3. Competitions for the cup shall be in a team event consisting of not less than five persons, including a patient.

4. Every member of a team contesting, including the patient, shall be the holder of a First Aid Certificate of Competency from the St. John or other recognized Ambulance Association, and may be either a surface or an underground employee. No physician nor professional nurse shall be eligible to compete.

5. No official of the British Columbia Department of Mines shall be eligible to act as a judge in any competition for a cup.

6. The method of discounting in any competition shall be the standard adopted by the Department of Mines. Discount cards will be provided.

Competition at Nanaimo.—The first competition for the Vancouver island-Coast cup took place at Nanaimo, Vancouver island, on Labor Day, September 4th, under the auspices of the Vancouver Island Mine Safety Association, organized last spring. There was also a competition for the Coulson cup, presented to the St. John Ambulance Association several years ago by Mr. W. L. Coulson, then general manager for the Canadian Collieries (Dunsmuir), Ltd., on behalf of the company, for competition annually by teams of miners or other mine employées. There were eight teams competed. Three teams came from the Canadian Collieries Co.'s Extension colliery and one team from that company's Bevan mine, Comox; the Western Fuel Co.'s mines sent two teams, one from its No. 1 shaft mine at Nanaimo, and the other from Protection Island mine; the Pacific Coast Coal Mines, Ltd., was represented by a team from its South Wellington mine, and the Vancouver-Nanaimo Coal Co. by a team from its mine at East Wellington. The judges in the competitions, which were held on the Cricket Ground, Nanaimo, in the presence of about 500 spectators, were Dr. W. E. Wilks, of Nanaimo, Dr. W. F. Luton, of Ladysmith, and Dr. P. E. Emerson, of Extension. Mr. Dudley Michell, Instructor of First Aid and Mine Rescue work for the Department of Mines, attended on behalf of the department. The results of the competitions were as under:

For Department of Mines Cup.

Name of Team.	Percentage of Points.
East Wellington	97
Extension No. 2	95
Extension, surface men	94
Protection Island	93
Bevan	93
Extension No. 1	92
No. 1 Shaft	91
South Wellington	90

For Coulson Cup.

Name of Team.	Percentage of Points.
Extension, surface men	97
Bevan	95
East Wellington	95
Extension No. 1	94
Extension No. 2	94
Protection Island	93
South Wellington	92
No. 1 Shaft	90

Besides winning the Department of Mines cup, the East Wellington (Vancouver-Nanaimo Coal Co.) team won the five gold medals donated by the association; the Extension No. 2, who came second, won the five silver medals donated by Mr. T. R. Stockett, general manager for the Western Fuel Co.

In the evening there was a banquet and musical entertainment, during which the prizes were presented to those winning them, and addresses were delivered by Messrs. J. H. Cunningham, Michell, and Fulton, the last mentioned representing the St. John Ambulance Association.

Competition at Rossland.—Arrangements are being made to hold a competition for the Boundary-West Kootenay district cup at Rossland on Friday, October 27th, when it is expected three or four teams from Rossland gold-copper mines will compete. It is not yet known whether any other part of those districts will send a team or teams, but it is hoped that one or two of the big copper mines in Boundary district will be represented in the competition, which will be the first to be held, open to teams from any part of those extensive metalliferous mining areas.

OBITUARY.

A press despatch from Seattle, Washington, dated August 31, stated that "Skookum Jim Mason, the Indian, who, with George Marmack of Seattle, discovered the Klondike gold field 20 years ago, died recently at Carcross, Yukon territory. At one time he had \$100,000 in gold, nearly all of which he squandered. On a visit to Seattle he threw money from his hotel window to see crowds fight for it in the street below."

The tragic death of Mr. Joseph Despard Pemberton, of Victoria, B.C., a well-known engineer and surveyor, who during a number of years of professional work had done much surveying in mining districts of the Province, was thus reported by the Victoria Daily Times: "The late J. D. Pemberton left Victoria last Tuesday afternoon, August 29, accompanied by W. F. Ferrier, of Toronto; and by H. M. Lewis, of this city, making the trip to Shawnigan Lake by motor. The party intended visiting some mining interests in the San Juan River country, and about 11 o'clock the next morning, after spending the night at the Stratheona Lodge, started out with pack-horses and the necessary supplies and provisions to last them for a couple of days. About 7.30 in the evening, after spending the whole day on the trail, the party had fixed on camping at

a certain point. Within five minutes or so of reaching this place Mr. Pemberton complained of cramp in the knees and sat down to rest, asking his two companions to lead his horse and proceed without him. As he did not arrive as quickly as they expected Mr. Ferrier and Mr. Lewis went back, after unsaddling their horses, and found him by the wayside, he apparently having never risen from the position where they left him. The body was taken down to Victoria on Sept. 1." The late Mr. Pemberton was born in London, England, about 43 years ago. His father was Surveyor-General for British Columbia, and the family has long been one of the oldest and best known in the southern part of Vancouver Island, where members of it have large property interests. Mr. Pemberton, Sr., died many years ago, but it was only last month that his widow—long actively associated with philanthropic and charitable work in the capital city of British Columbia—passed to her rest.

BRITISH COLUMBIA COPPER CO.'S OPERATIONS.

Mr. Oscar Lachmund, of Greenwood, Boundary district of British Columbia, general manager for the British Columbia Copper Co., is reported to have given the following information concerning the operations of the company when in Spokane, Washington, at the end of August:

"The results obtained by previous diamond drilling in the company's mining properties on Copper Mountain, Similkameen district of British Columbia, have been fully verified by the disclosures made by our main tunnel in the first orebody it encountered. The tunnel, which is now more than 1,000 ft. long, cross-cut one end of the orebody; and a drift is now being run in the ore, while the tunnel itself is being driven ahead at the rate of 20 ft. daily, except when timbering is necessary on account of the softness of the ground. The tunnel is 9 by 10 ft. in the clear and is designed to open the company's ground to what will be known as the glory-hole level, it being the intention to mine out on the glory-hole system all ore above that level.

"We are now installing a pumping plant to elevate water from the Similkameen River to a distributing point 1,700 ft. above the river, through a pipe line 6,000 ft. in length. The pumping equipment will consist of Gould triplex pumps, and the pipe line will be composed of 4-in. high pressure hydraulic pipe in the lower section and steel pipe of 6 in. in diameter at the discharge. The water will be used to supply the mine, the camp and a 50-ton experimental mill. The mill will be devoted to the working out of a concentration process preliminary to the erection of a 2,000-ton plant on the Similkameen River. If we are not delayed by railway troubles in the delivery of our machinery and pipe, we shall have the pumping installation completed before winter shall set in.

"The coke supply for the company's smelting works at Greenwood has been causing us a lot of worry. It is still so inadequate that we are compelled to draw continuously upon the stock pile which we like to keep in reserve at all times. We have obtained some 1,700 tons of coke from the Coast, but deliveries from that source are no longer to be depended upon, and in any event the cost is burdensome.

"As the failure of the Crow's Nest district coal producers to supply us adequately with coke is due solely to a shortage of labor, we are urging the Government to relieve the situation either by releasing such of the interned aliens as are willing to work or by suspend-

ing temporarily the law which prevents us from importing laborers from the United States.

"Besides ore from the company's own mines in British Columbia and Washington, we are smelting the entire output of the Intermountain Copper Co. in Montana, the Empire Copper Co. in Idaho, and the Iron Mask mine near Kamloops, B.C.

ZINC SMELTING.

Boston, Oct. 23.—When present construction work for increasing zinc smelting capacity in England has been completed, that country will be able to produce spelter at the rate of 85,000 tons, or 170,000,000 pounds per annum. This will represent an increase of 100 per cent. over two years ago.

Despite the fact that Englishmen controlled the large zinc mines of Australia, there was never any attempt made to smelt this product in Great Britain. This was left for German metal firms to handle in their smelters in Germany and Belgium. The war has altered that position and long-time contracts between the Australian mines and the Germans have been annulled.

The major portion of the Australian zinc output has been going to the United States smelters since the middle of 1914 while there have also been increasingly large shipments to Japan.

TORONTO MARKETS.

Cobalt oxide, black, \$1.05 per lb.

Cobalt oxide, grey, \$1.15 per lb.

Cobalt metal, \$1.25 to \$1.50 per lb.

Cobalt anodes, \$1.50 to \$1.75 per lb.

Nickel metal, 45 to 50 cents per lb.

White arsenic, 5½ to 6 cents per lb.

Oct. 24—(Quotations from Canada Metal Co., Toronto)—

Spelter, 15 cents per lb.

Lead, 9 cents per lb.

Tin, 45 cents per lb.

Antimony, 18 cents per lb.

Copper, casting, 29 cents per lb.

Electrolytic, 31½ cents per lb.

Ingot brass, yellow, 17½ cents; red, 20½ cents per lb.

Oct. 24—(Quotations from Elias Rogers Co., Toronto)—

Coal, anthracite, \$8.50 per ton.

Coal, bituminous, \$6.00 per ton.

SILVER PRICES.

		New York, cents.	London, pence.
October	6th.....	68¼	32½
"	7th.....	68¼	32½
"	9th.....	67⅞	32⅞
"	10th.....	67½	32⅞
"	11th.....	67⅝	32⅞
"	13th.....	67⅞	32⅞
"	17th.....	67¾	32⅞
"	18th.....	67¾	32⅞
"	19th.....	67¾	32⅞

MOLYBDENITE PRICES.

Schedule of prices per unit (20 lbs.) of Molybdenite in ore delivered at concentrator, Renfrew.

Ores carrying between 2% and 3% MoS₂, \$13.00 per unit.

Ores carrying between 3% and 5% MoS₂, \$14.50 per unit.

Ores carrying between 5% and 10% MoS₂, \$16.00 per unit.

Ores carrying between 10% and 15% MoS₂, \$17.00 per unit.

Ores carrying between 15% and 20% MoS₂, \$18.00 per unit.

80% concentrates \$1.00 lb. of MoS₂.

Penalties imposed for copper and bismuth.

MARKETS

NEW YORK MARKETS:

Oct. 31, 1916—Connellsville Coke—
 Furnace, spot, \$5.25.
 Furnace, contract, \$3.75.
 Foundry, prompt, \$5.00 to \$5.25.
 Foundry, contract (nominal), \$3.50 to \$3.75.
 Straits tin, f.o.b., 41 cents.

Copper—
 Prime Lake, nominal, 28.25 to 28.50 cents.
 Electrolytic, nominal, 28.50 to 28.75 cents.
 Casting, nominal, 27.12½ to 27.37½ cents.

Lead, Trust price, 7 cents.
 Lead, outside, 7 to 7.12½ cents.
 Spelter, prompt western shipment, nominal, 9.67½ to 9.80 cents.

Antimony—
 Chinese and Japanese, 13.00 to 13.25 cents.
 American, nominal.

Aluminum—nominal—
 No. 1 Virgin, 98-99 per cent., 64 to 66 cents.
 Pure, 98-99 per cent. remelt, 59 to 61 cents.
 No. 12 alloy remelt, 47 to 49 cents.
 Powdered aluminum, \$1.00 to \$1.15.

Metallic magnesium, 99 per cent. plus, \$3.50.

Nickel—
 Shot and ingot, 45 cents.
 Electrolytic, 50 cents.

Cadmium, nominal, \$1.45 to \$1.50.

Quicksilver, \$80.

Platinum, \$90.

Cobalt (metallic), \$1.25.

Silver (official), 67¾ cents.

Metal Products—Following base prices represent the outside market except where otherwise specified and are entirely nominal except in the case of lead sheets and sheet zinc:

Sheet copper—
 Hot rolled (f.o.b. mills), 37.5 cents.
 Cold rolled (f.o.b. mill), 38.5 cents.

Copper in rods, 43 cents.
 Copper in rolls, 40 cents.
 Copper wire (f.o.b. mill), 33 cents.
 Copper wire (f.o.b. mill), November, 32.25 cents.

High brass—
 Sheets, 42 to 46 cents.
 Wire and light rods, 45 to 48 cents.
 Heavy rods, 41 to 45 cents.

Tubing—
 Brazed brass, 45 to 50 cents.
 Brazed brass (f.o.b. mill), 43.75 cents.
 Seamless copper, 47 to 49 cents.
 Seamless brass (f.o.b. mill), 46 to 48 cents.

Naval bronze—
 Rods (f.o.b. mill), 40 cents.
 Sheets (f.o.b. mill), 41.50 cents.

Muntz metal—
 Rods, 38.5 cents.
 Rods (f.o.b. mill), 36.5 cents.
 Sheets, 42 cents.
 Sheets (f.o.b. mill), 40 cents.

Full lead sheets (f.o.b. mill), 8.5 cents.
 Cut lead sheets (f.o.b. mill), 8.75 cents.
 Sheet zinc (f.o.b. mill), 15 cents.

STOCK QUOTATIONS.

(By courtesy of J. P. Bickell & Co., Toronto.)

As of close October 23rd, 1916.

New York Stocks.		Bid.	Asked.
Can. Copper	.....	2.12	2.38
Canada Cement	.....	69.00	69.25
Howe Sound	.....	5.50	5.75
International Nickel (new)	.....	51.75	51.87
Midvale Steel	.....	67.87	68.00
Marconi	.....	3.00	3.25
Steel of Canada	.....	64.50	64.75
Standard Shipbuilding	.....	10.00	14.00
Submarine Boat	.....	44.50	42.00
Porcupine Stocks.		Bid.	Asked.
Apex	.....	.08¾	.08⅝
Davidson	.....	.50	.50½
Dome Consolidated	.....	.09½	.11
Dome Extension	.....	.33	.33½
Dome Lake	.....	.60½	.61
Dome Mines	.....	...	26.10
Foley O'Brien	.....	.70	.81
Gold Reef	.....	.01	.01¼
Hollinger	.....	6.70	7.00
Homestakes	.....	.61	...
Jupiter	.....	.28	.29
McIntyre	.....	1.56	1.57
McIntyre Extension	.....	.44	.45
Moneta	.....	.15	.16
Porcupine Crown	.....	.71	.72
Porcupine Imperial	.....	.03⅞	.04
Porcupine Tisdale	.....	...	.01¼
Porcupine Vipond	.....	.35	.35½
Preston East Dome	.....	.04	.04½
Vacuum Gas and Oil	.....	.59	.60
New Ray	.....	.75	.80
Teck Hughes	.....	.39	.41
West Dome	.....	.34¼	.34½
Bonanza Mines	.....	.15	.15½
Cobalt Stocks.		Bid.	Asked.
Adanac	.....	.31½	.32½
Bailey	.....	.07½	.08
Beaver	.....	.40½	.41
Chambers Ferland	.....	.17	.18
Coniagas	.....	4.75	5.20
Crown Reserve	.....	.51	.51½
Foster	.....	...	.07
Gifford	.....	.04	.05
Great Northern	.....	.08	.08¼
Hargreaves	.....	.03	.03½
Hudson Bay	.....	70.00	75.00
Kerr Lake	.....	4.75	4.87½
La Rose	.....	.60	.62
McKinley	.....	.60	.62
Nipissing	.....	8.55	8.60
Ophir	.....	.09	.10¼
Peterson Lake	.....	.20¾	.21
Right of Way	.....	.05	.06
Seneca Superior09	.10
Shamrock Cons.14½	.15
Silver Leaf01½	.02
Temiskaming61½	.62½
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Wettlaufer10	.10½

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The very best advice that the publishers of the Canadian Mining Journal can give to intending purchasers of mining stock is to consult a responsible Mining Engineer BEFORE accepting the prospectus of the mining company that is offered them. We would also strongly advise those who possess properties that show signs of minerals not to hesitate to send samples and to consult a chemist or assayer. Those who have claims and who require the services of a lawyer, with a thorough knowledge of Mining Law, should be very careful with whom they place their business.

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