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Editor

REGINALD E. HORE

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OUR DISABLED SOLDIERS

Canadians are responding nobly to the call to arms. In the early days of the war few of us understood that Great Britain, with her little regular army, would undertake important operations on land. Then came the announcement that the first army had been transported to the Continent to support the gallant Belgians. Soon others followed, and the magnificent fight put up by the small British force in the retreat to the Marne and in the saving of Paris and Calais, showed that, even in these days of huge continental long-trained armies, Britain's force on land was not to be despised. Gradually the force has been increased and it is now reported that the British hold 100 miles of the line in Belgium and France, as well as undertaking the major part of the task at the Dardanelles.

Events show that Britain must and will take an ever-increasing part in the land battles as the war goes on. In these battles Canada will be well represented. So far we have undertaken to furnish 150,000 men for overseas service. We must be prepared to send more.

It is to be expected that a large percentage of Canadian soldiers will be killed or wounded. They are going to Europe to fight, and they will fight hard. Our first contingent did so at St. Julien in April and wherever those that survived, have had an opportunity since. Those who follow will uphold the reputation made by the first contingent in the face of the Huns' poison gas attacks.

We all delight in reading of the valor of our troops. We are glad to learn that Canadians can hold their own on the battlefield with the best trained soldiers of Europe. But our thanks should not be expressed merely in congratulatory messages. We must, among other duties, provide for those unfortunates, and there will be many of them, who return disabled for life. The way is open.

The Government has appointed a Commission, called the Military Hospitals Commission, of which a member of the Government is the president, to administer out of the public funds the maintenance of military hospitals and convalescent homes for our sick and wounded soldiers. Upon discharge from these hospitals and homes, the disabled will receive pensions at fixed rates.

These pensions, while being larger, per man, than those allowed to the British soldier, will, in numerous instances, be insufficient to meet the needs of the recipient, and to the end of further assisting them in the making of their livelihood, the Government is, in response to many suggestions, receiving a fund to be known as the "Disablement Fund." The plan of administering this fund by the above-mentioned Commission would depend upon its amount. If a sum is ob-

tained which will produce from investments a sufficiently large revenue, this income might alone be expended, but if not large enough to enable this to be done, both capital and income would be distributed upon well defined lines. Each case would be treated upon its merits, and assistance given in many ways. For instance, a totally disabled man could have his pension augmented by a sum to enable him to obtain additional physical comforts, while a partially disabled man, if unable to follow his former employment, would be assisted to take up some new occupation within the scope of his crippled ability.

Communications as to this fund should be directed to Mr. E. H. Scammell, secretary, Military Hospitals Commission, 22 Vittoria Street, Ottawa.

THE EMPLOYMENT OF ALIEN ENEMIES IN THE PRODUCTION OF COAL AND STEEL AND OTHER MUNITIONS OF WAR

For some time past there has been manifest in this country a desire to dismiss from employment all alien enemies. This cry is confined to a small section of the population, but it is a section that is noisy out of all proportion to its size and importance. The agitation is ostensibly based on patriotic motives, but it is to be feared that it has its origin in much baser things, and that the general objection to the "foreigner" is being used by designing agitators and irresponsible news sheets under the gloss of a spurious patriotism and an appeal to the lowest human passions. Reference was made to this danger in the Journal of June 1st in an article which had for its main arguments the fact that "alien workmen are assisting in the production of coal and steel, upon which to a very large extent depends the ability of Canada to manufacture munitions of war and to transport these munitions and men to the battle line," and the further statement that these alien enemies "so long as they pursue their peaceful avocations and indulge in no overt acts, should be allowed to earn their daily bread and otherwise be treated as potential citizens of this great Dominion."

Between the date of this article and the present time a section of the miners and steel workers—principally confined to the mainland coal fields of Nova Scotia—have taken the stand that they will not work with alien enemies, urging that these men should be immediately interned. The men who have taken this stand are without doubt sincere in their attitude, but their logic is hopelessly twisted. The purpose of internment camps is usually understood to be the removal of alien enemies to a place of safekeeping where it will not be possible for them to indulge in espionage and active hostility, or to escape to neutral countries from whence they may be able to return to Germany or Austria. In short, it is to prevent alien enemies from performing service for their own countries. But what is being urged with reference to alien enemies employed in Canada is the very

reverse. To-day these men are doing service for Britain and the Allies, digging coal, working steel, making shells, building railway cars, and helping materially the cause we all have at heart. At the same time these men are supporting their families, swelling the savings banks deposits of Canada, and in the great majority of cases are, in the words of the Government's proclamation, "peacefully pursuing their daily avocations." If these aliens should be forcibly interned, they at once, together with their families, become a source of expense to the country; peaceful men are turned into sullen enemies, confined in internment camps in enforced idleness; still greater drafts must be made on the defence forces of the country to guard these camps, and every department of civil administration will require to be on guard against office-seekers and would-be "grafters" and that type of citizen who regards the multiplication of internment camps as meaning fresh "jobs" and opportunities to make money out of the Government.

Very many of the so-called alien enemies are men who have been attracted to Canada by the widespread and elaborate advertising programme that has been pursued throughout Europe by the Immigration Departments of the various Canadian Provinces. In very many cases also the sympathy of aliens of belligerent nationality with their own country's policy is doubtful. The Bohemian Czech has no love for Austria, the Galician or Russian Pole, the Roumanian from Transylvania, the Austrian from the Trentino, may be assumed to view the progress of present events without any overwhelming love for Austria or Germany. These men left their birthplace, in most instances, to escape the very evils of militarism that Britain is now combating. They came to Canada as a refuge from oppression, a free land for freemen, and they are entitled at least to the benefit of the doubt, and the spirit of fair play that the Briton boasts he possesses.

The German propaganda in the United States has been directed to the stopping of the manufacture of munitions of war in that country for the Allies, and dire threats have been breathed through the press of that country against Germans who should dare to help in the manufacture of munitions. And here in Canada there are persons who propose that alien enemies should be prevented from working, not because they are dangerous men, but simply and solely because they are Germans and Austrians. In other words, our enemies should be imprisoned not because we are afraid of them, but because we hate them. Our actions are to be guided not by reasons of military advantage or necessity, but by the unreason of hatred. And this in a country which has laughed itself hoarse over Lissauer's Chant of Hate!

The miners who think they are serving the country by refusing to work with Austrians and Germans, not because they fear them, but because they don't like them, should read Lloyd-George's appeal to the miners of Great Britain, and his presentment of the all-para-

mount importance of coal to Britain and the Allies in the successful prosecution of this war.

Mr. Lloyd-George says: "In peace and war King Coal is the paramount lord of industry. It is our real international coinage. We pay not in gold, we pay in coal. We cannot do without coal. In war it is life for us and death for our enemies. It not merely fetches and carries for us, it makes the material and machinery which it transports. It bends, it moulds, it fills the weapons of war. Steam means coal. Rifles mean coal. Machine guns mean coal. Cannon means coal. Shells are filled with coal. The very explosive inside them is coal, and then coal carries them right into the battlefield to help our men. Coal is everything for us, and we want more of it to win victory. Coal is the most terrible of enemies, and it is the most potent of friends."

The miner who refuses to mine coal because Germans and Austrians are also helping in the work is grievously mistaken if he thinks that in taking this stand he is helping the Empire. He is most efficaciously helping the Kaiser.

The illogical position taken up by those who refuse to work until the alien enemies are dismissed is so absurdly obvious as to lead one to hope that if the case were properly presented to these men they would reverse their present attitude, and it would appear incumbent on the Canadian Government to make an official pronouncement on the question. Surely the ways of politics are not so devious in Canada that some responsible member of the Cabinet cannot see his way to put this matter fairly and squarely before the workers of the country.

It may be definitely and authoritatively stated that no employer of labor in Canada would wish for a single moment to displace Canadian labor by alien enemies, but where the production of munitions of war is being hampered by a shortage of labor, what possible objection can there be to utilizing the aliens now in the country?

The Germans are using the machine shops at Liege and Herstal in Belgium, the iron mines of French Lorraine, the iron works around Lodz in Russian Poland, and as far as possible are making use of the working population in the occupied districts. If the Kaiser has any sense of humor he should be hugely tickled when he hears of our workmen going on strike because German are being allowed to help the Kaiser's enemies.

The recruiting during July and August in the Nova Scotia mining districts has been heavy and it is estimated that twenty per cent. of the workmen at the mines have now joined the military forces.

Owing to the demand for copper the output of precious metals by copper mining companies is much larger than usual. During the year ending June 30, Granby Consolidated, Canada's largest producer of copper, produced over 400,000 oz. of silver, obtained in treating the copper ores.

WESTERN FEDERATION METHODS

In a recent issue of "Life," the well-known New York weekly, appears a protest against the conviction of John Lawson for murder committed during labor troubles in Colorado. "Life" protests on the ground that Lawson did not himself commit the murder.

Among the readers of "Life" is Mr. Homer Guck, editor of the "Mining Gazette," published at Houghton, in the Michigan copper country, the scene of the last big strike brought about by the leaders of the Western Federation of Miners. The impression made on Mr. Guck by the methods of the Western Federation leaders is exhibited in his open letter to "Life", dated August 10, 1915. Throughout the Michigan copper mining district are thousands who, since their experience with the Federation, share Mr. Guck's views concerning agitators. The letter says, in part:

"I remember four or five years ago reading articles in the socialistic magazines that were spread all over this section of ours preliminary to the entrance of the gangsters of the Moyer stripe, telling of the terrible conditions among the miners of Colorado and West Virginia. And I thanked goodness that there were no such conditions here, that we had lived in peace and prosperity and happiness for some fifty years or more with our mines and our miners and our citizens all doing pretty well and enjoying a happy family life. Then when the same gang that put out the tales about West Virginia and Colorado entered this district and began to spread the same awful lies about Michigan copper mines that they had used about the other states we awoke to the fact that if they were no more truthful about Colorado and West Virginia than they were about Michigan you couldn't believe much of them.

"E. O. J. says in your magazine that this man Lawson was convicted of a murder that he did not do. One night when our strike was at its very worst a gang of gunmen deliberately shot into a home occupied by an English family. They killed two innocent men as they slept in their beds. They wounded a little girl. These gangsters shot from a nearby woods. They were sneaking cowardly murderers of the worst type. There was no crime against the men they murdered. All they wanted to do was to work. They finally got one poor weak-kneed man to states prison for that murder. The real murderer was the man with the brain who filled the other fellows with rotten whiskey, took them to the spot and told them to shoot. The man who went to prison shot, alright, but was he as guilty as the man with the head who directed the work? Lawson directed the work in Colorado, and he got what he had coming to him. He was the brains. The others were the tools. And do you mean to assert that he goes to prison 'for a murder he did not commit' simply because he bossed the gang and perhaps did not fire the shot? And it is a satisfaction to know that in some parts of the United States at least they are able to send these murderers to prison for their crimes. In nine of ten cases they get away through intimidation of the juries, weakness of

the judges or shrewdness of their lawyers. And now when they do catch one of these rogues, who have done more to damage the cause of decent union labor than any other single factor, you print an article saying he did not commit the murder. The juries and the judges and the people of Colorado all agree that you are in error. And you, dear 'Life', go to the trouble to expostulate on this subject at some length.

"Before our experience with the Moyer-Tersich-Mahoney gang—you will notice that I change the names around occasionally and work them in differently just for variety's sake—we used to have a lot of respect for the Federal Government and its activities. As a child we remember trying to put peanut shells in a mail box and they told us that we might be sent to jail for tampering with any of Uncle Sam's business. We got over that through the strike experience, too. There were a couple of train attacks, one right in the city limits. A regular evening train, run by union men, including a car with United States mail and loaded with women and children, was shot full of bullet holes by a gang of the same hired gunmen of the Moyer-Mahoney-Yanko crowd, who stood back in the bushes as the train went around a dangerous curve. Nobody was even arrested for that crime if we remember correctly and the examination into the facts by United States officials was ridiculous. And what happened to that Government post office employee who actually was caught in the act of turning mail addressed to one of the mine officials into the hands of the Moyer leaders? Did he go to jail? Never heard a word about it.

"Is it any wonder that it makes one suspect that the gangs of parasitical agitators that live off the men they are able to induce to part with monthly dues, have more political power or more real influence in some quarters, than capital, in its most bloated condition, ever suspected it maintained.

"But I am wandering far and wide. Only that Jones story on the Colorado situation kind of made me sore all over. I know dozens of leaders who came here when our strike started and who are responsible for dozens of crimes, many of them murders, who got away with the money of our people, never ran any risk of jail and are now working in other fertile fields. When they get one of that tribe as they did in Colorado in the Lawson case let's give the Government credit for maintaining some respect for law, even when it does catch agitators of the Lawson type."

A Boston newspaper prints the following statement of a well-informed banker. It helps to show that the agricultural and mineral wealth of Canada are not unappreciated in New England. The banker says:

"I believe that a Canadian loan for \$500,000,000, endorsed by the British Government, can be placed on advantageous terms in this country. Let the price be made attractive to the bankers and brokers and investors, and we would quickly have a basis here of inter-

national credit and finance. The security would be right next door, and the Monroe Doctrine would have a substantial reality and a financial value. The agricultural and mineral wealth to the north of us should furnish security when backed by British resources to such an extent that half a billion would be only a beginning. Russia and the North American continent hold the real values to constitute a basis for credit in this great war. Here are the values that cannot be exhausted by the war."

Johannesburg reports numerous earth tremors recently. Considering the extent of the excavations it is not surprising that such movements occur, for so-called "air-blasts" have been of frequent occurrence in Michigan deep mines. The cause of the Johannesburg quakes is to be the subject of investigation by a committee recently appointed.

Glance Bay mines of the Dominion Coal Company, broke all previous records in July, producing 462,240 tons coal. The output would have been larger but for the shortage of ships. Considering also that the company has furnished 1,000 men for the armies of Britain and her allies the showing is a very remarkable one and augurs well for the balance of 1915.

ALLEGED SILVER DEPOSITS AT FOND du LAC

Mr Charles Camsell, of the Geological Survey staff, who was sent to Lake Athabaska in the spring to examine the alleged occurrence of deposits of high-grade silver ore, similar to those of Cobalt, at Fond du Lac, has reached Peace River Crossing.

Word has just reached the Department from Mr. Camsell who reports that no high-grade silver ores have been discovered on Lake Athabaska and that there is no warrant in the nature of the rock formation for the rush of prospectors to that region. The only ores found that seem to be possibly of economic importance are pyrrhotite deposits carrying a small amount of nickel. These ores are associated with norite rocks, similar to those with which the nickel is associated at Sudbury, but the percentage of nickel seems to be too small to allow of profitable working in a locality so remote from transportation facilities. Mr. Camsell's report confirms the opinion expressed regarding this region in the reports already published in the summary report of the Department for 1914, which was issued in July of this year. In that report Mr. Alcock, writing of the Fond du Lac locality, states that:

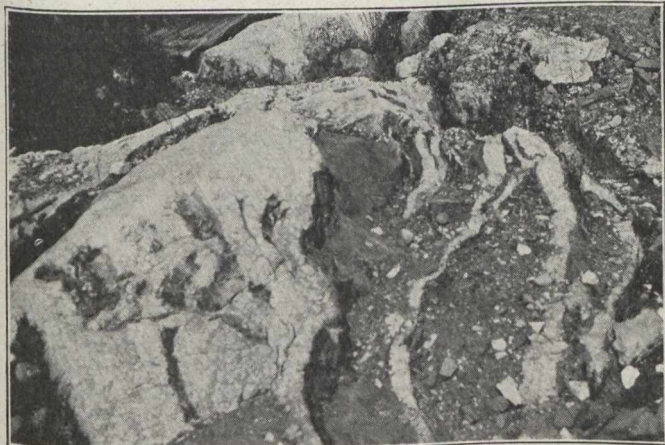
"A number of claims have been staked for nickel on iron-stained outcrops which have the nature of fahllands in the gneiss. In a number of these, pyrite and pyrrhotite were found, but in very limited amounts. In places in the norite at the east end of the lake, pyrite and pyrrhotite are found disseminated, and along certain fracture zones there has been concentration enough to produce a prominent iron-cap, but in no case was sufficient ore seen to warrant development work. Of a number of assays of pyrrhotite ore, only one showed nickel in workable amount."

GOLD

Gold is king. The nations of the world are unanimous in giving to the yellow metal a certain value, making it the standard for purposes of exchange. "It embodies and concentrates in the most convenient form," says M. De Launay, of the Ecole Superieure des Mines, Paris, "the product and the apparent end of human labor, the synthesis of effort, which is destined the next moment to be dispersed in the satisfaction of desires, in enjoyments and pleasures, every one of which will be expressible in terms of more or fewer of its particles. Once it has issued from the mine, from the works where it has been extracted and treated, gold runs all over the world playing with complacency, suppleness and

"The deserts of South Africa and West Australia are supplied with water; the foggy steppes of the Arctic Ocean temper their severity; the tropic forests and marshes lose their pestilence; man takes possession of the frozen plains, of the Alpine crest, of the coast desolated by malaria or yellow fever; he brings there, first the most indispensable necessities, then the conveniences and, finally, the luxuries of existence. Gold may afterwards disappear from the mines, the deposits may be exhausted in a few years, but the beneficent and creative influence remains.

"No other means, no despotic will, would have attained the same end so quickly or so surely. Thanks to gold civilization has brought its resources, its ingenuity,



Gold Quartz, Hollinger Mine, Porcupine, Ont.

the centuries almost untouched by wear. As generations pass, a giddy flight carries it from one hand to another; it goes, sowing joy and prosperity on its way, simply because it is there, because it intervenes like a god without losing any virtue of its own. Not only is gold destined to irradiate human life and to transfigure it by its spell; but it seems as if its discovery in the earth transforms Nature herself and throws down the impassable barriers by which she thinks to arrest the invasion of men and to keep her solitudes for ever untrodden. No sooner has gold been found in a savage, docility the part which is expected of it. It passes down barbarous and uncultivated country, hostile to life itself, than that country is transformed.

and its machines to the desert; there it has settled itself, constructed towns, cleared fields and traced roads, and there it remains. Long after the source of gold has been dried up and forgotten, the plain, which it once made fruitful, still prospers. Towns may suffer for a while, and populations grow thinner when the lodes disappear; but the useful work, which the discovery of gold was alone, or almost alone, capable of accomplishing with such promptitude, none the less subsists. Where modern man has planted the sole of his foot and hoisted his flag he remains. Owing to the necessity of feeding the miners, the mining centre becomes an agricultural centre; it remains agricultural after the miners have disappeared."

Gold is derived from two classes of deposits, alluvial or placer, and lode. We cannot here enter at length into the discussion of methods of working such deposits; but it will be well to point out that placers and lodes present very different problems. Placers are sand or gravel deposits containing loose particles of native gold which can generally be separated by agitation with water. Lodes are solid deposits in which the gold is tightly locked. In some cases placers are frozen or otherwise solidified so that some process of disintegration is necessary. In the case of lodes disintegration is always a process which requires great expenditure of power. In many lode deposits moreover simple disintegration does not free the gold, and chemical treatment becomes necessary. Placers therefore are frequently worked very profitably for some time by men of small means without great expenditure for plant, and later operated on a more pretentious scale by the use of more costly apparatus. On the other hand, the working of lode deposits usually requires larger expenditures for plant early in their development. Consequently we find that most lode mines are operated by stock companies, by capitalists or groups of capitalists.

Those who prospect for lode deposits are seldom in a position to mine what they discover, but are encouraged by the fact that operators are continually on the lookout for good prospects. The discoverers of placer deposits usually work their claims, for a time at least.

Placer deposits are usually at or near the surface, while most lode deposits extend to some depth. Naturally from this feature alone great differences in methods arise, for placers can be worked in the open while the greater part of most lodes is more easily extracted underground. Placer deposits have, in most countries, been the first to be discovered and worked, the discovery of lodes following later.

The history of gold mining dates back many centuries. Long before the birth of Christ there were several mining centres in the eastern Mediterranean countries. The mines of Asia Minor and Macedonia were celebrated in the times of Herodotus and Strabo. The enormous wealth of the king of Egypt is supposed to have been largely derived from gold mines east of the Nile. India produced gold ages before the founding of Rome. The Romans had little gold in their own country; but by their conquests took possession of vast amounts. Spain, Portugal and Gaul were large producers of gold during the early days of Rome's greatness.

The discovery of the Americas marks the beginning of a new era in the mining industry. The colonies of Spain and Portugal were made to yield great streams of golden wealth. Africa, Russia and Siberia also outstripped in productivity the old mining centres of Europe. M. De Launay estimates that between 1492 and 1848 the production of gold rose to 636 millions of pounds sterling, or 4,621 tons, of which 80 millions came from America, 100 millions from Africa, 44 millions from Russia and Siberia and 20 millions from Europe. McLaren, however, estimates that during the period 1545-1840 the Portuguese and Dutch obtained 75 millions in Japan alone. Japan has been usually overlooked by historians.

In 1848 wonderful discoveries were made in California. The successful operations of many fortunate ones in that country led both to the phenomenal development of California and to the opening up of mineral deposits throughout the Western States and in British Columbia and Yukon.

Almost simultaneous with the disclosure of the wonders of California came discoveries in Australia. Ballarat and Bendigo became centres of great industry. Then other parts of Australia and New Zealand also were found to be rich in gold.

In 1887 came the discovery of the world's greatest gold field—the Witwatersrand, commonly called the Rand, South Africa. In 1896 wonderfully rich alluvial deposits were discovered in the Yukon and Canada became an important producer. In the United States, Colorado became one of the largest producers after the discovery of rich deposits at Cripple Creek in 1891. In Western Australia rich finds were made in the now famous Kalgoorlie camp in 1892. Kalgoorlie and Cripple Creek are the richest telluride goldfields in the world.

The precious metal deposits at Tonopah, Nev., were discovered in 1900, when the mining industry generally in Nevada had sunk to a very low level. The discovery greatly stimulated prospecting and led to the revival of mining throughout the State. The district has produced silver and gold to the total value of more than \$60,000,000.

The discovery of gold at Goldfield in 1902 was a direct outcome of the development at Tonopah. The total production from Goldfield to the end of 1913 was over \$65,000,000 in gold and silver.

The Transvaal produced in 1914 8,394,322 oz. fine gold. The total production from the beginning of operations in 1884 to the end of the year 1914 amounted to 102,830,226 oz., valued at over \$2,000,000,000. The operating companies have distributed \$500,000,000 in dividends. The number of employees during the last five years has averaged over 200,000. Salaries and wages paid during 1914 amounted to over \$60,000,000.

In Canada there was little interest in gold mining previous to the great California discoveries. In 1857 rich placers were located on the Fraser, Thompson and Columbia rivers in British Columbia, and that Province has ever since produced large quantities of gold.

In British Columbia, Williams creek and Lightning creek, in the Cariboo district, have been especially productive. More recently discovered placer deposits in the Atlin division, Cassiar district, now surpass in output those of Cariboo. Now outrivalling any of the placers in British Columbia are the lode deposits at Rossland discovered in 1890, and in the Boundary district.

In Nova Scotia the first discovery was made in 1860. Since 1862 Nova Scotia has been a regular though never a very large producer of gold. In Quebec gold was obtained as early as 1823 in the Chaudiere district, and in 1863 rich gravels were found on the Gilbert river. Since that time the district has been the scene of more or less mining activity; though the total production is small. Gold was found in 1865 at Marmora in Eastern Ontario and in 1871 in the Lake of the Woods district, Western Ontario. By far the most important deposits known in Ontario are those in the Porcupine district, discovered in 1909. As early as 1869 gold was known to occur in the Yukon river; but it was in 1897 that the riches of the Klondike were discovered and Yukon became Canada's chief source of the yellow metal. While the amount of gold won by hand methods in the Klondike has fallen off greatly, production is still large owing to the operations being carried on by strong companies working on a large scale with methods and machines specially devised for the novel conditions. The Yukon should continue for years to yield much gold.

A considerable proportion of the gold produced in Canada comes from ores treated by smelting for base metals. Of the total production in 1914 (\$15,925,044),

\$5,695,508 was derived from placers, \$6,050,690 from milling ores, and \$4,228,846 from smelter products from ores, concentrates, etc., smelted.

Statistics, prepared by the Mines Branch, Ottawa, of the annual gold production of Canada and the several Provinces are shown in the following tables:

Annual Production of Gold in Canada, 1858-1914.

Year.	Value.	Year.	Value.
1858	\$705,000	1886	\$1,463,196
1859	1,615,072	1887	1,187,804
1860	2,228,543	1888	1,098,610
1861	2,666,118	1889	1,295,159
1862	2,798,774	1890	1,149,776
1863	4,186,011	1891	930,614
1864	4,126,199	1892	907,601
1865	3,987,562	1893	976,603
1866	3,153,597	1894	1,128,688
1867	3,013,431	1895	2,083,674
1868	2,773,527	1896	2,754,774
1869	2,123,405	1897	6,027,016
1870	1,724,348	1898	13,775,420
1871	2,174,412	1899	21,261,584
1872	1,866,321	1900	27,908,153
1873	1,536,871	1901	24,128,503
1874	2,022,862	1902	21,336,667
1875	2,693,533	1903	18,843,590
1876	2,020,233	1904	16,462,517
1877	1,949,444	1905	14,159,195
1878	1,538,394	1906	11,502,120
1879	1,582,358	1907	8,382,780
1880	1,304,824	1908	9,842,105
1881	1,313,153	1909	9,382,230
1882	1,246,268	1910	10,205,835
1883	1,113,246	1911	9,781,077
1884	1,058,439	1912	12,648,794
1885	1,148,829	1913	16,598,923
		1914	15,925,044

British Columbia—Annual Production of Gold.

Year.	Value.	Year.	Value.
1858	\$705,000	1887	\$693,709
1859	1,615,072	1888	616,731
1860	2,228,543	1889	588,923
1861	2,666,118	1890	494,436
1862	2,656,903	1891	429,811
1863	3,913,563	1892	399,525
1864	3,735,850	1893	379,535
1865	3,491,205	1894	530,530
1866	2,662,106	1895	1,266,954
1867	2,480,868	1896	1,788,206
1868	2,372,972	1897	2,724,657
1869	1,774,978	1898	2,939,852
1870	1,336,956	1899	4,202,473
1871	1,799,440	1900	4,732,105
1872	1,610,972	1901	5,318,703
1873	1,305,749	1902	5,961,409
1874	1,844,618	1903	5,873,036
1875	2,474,904	1904	5,704,908
1876	1,786,648	1905	5,902,402
1877	1,608,182	1906	5,579,039
1878	1,275,204	1907	4,883,020
1879	1,290,058	1908	5,929,880
1880	1,013,827	1909	5,174,579
1881	1,046,737	1910	5,403,318
1882	954,085	1911	4,930,145
1883	794,252	1912	5,205,485
1884	736,165	1913	6,149,027

1885	713,738	1914	5,177,343
1886	903,651		
Total, \$15,778,105.			

Nova Scotia—Annual Production of Gold.

Year.	Value.	Year.	Value.
1862	\$141,871	1888	\$436,939
1863	272,448	1889	510,673
1864	390,349	1890	474,990
1865	496,357	1891	451,503
1866	491,491	1892	389,965
1867	532,563	1893	381,095
1868	400,555	1894	389,338
1869	348,427	1895	453,119
1870	387,392	1896	493,568
1871	374,972	1897	562,165
1872	255,349	1898	538,590
1873	231,122	1899	617,604
1874	178,244	1900	598,553
1875	218,629	1901	546,963
1876	233,585	1902	627,357
1877	329,305	1903	527,806
1881	209,755	1907	282,686
1880	257,823	1906	252,676
1879	268,328	1905	283,353
1878	245,253	1904	214,209
1882	275,000	1908	244,799
1883	301,207	1909	210,711
1884	313,554	1910	163,891
1885	432,971	1911	160,854
1886	455,564	1912	90,638
1887	413,631	1913	44,935
		1914	63,000
Total value, \$18,467,071.			

Ontario—Annual Production of Gold.

Year.	Value.	Year.	Value.
1887	\$6,760	1901	\$244,837
1888	.....	1902	229,828
1889	.....	1903	188,036
1890	.....	1904	40,000
1891	2,000	1905	91,000
1892	7,118	1906	66,193
1893	14,637	1907	66,399
1894	39,624	1908	66,389
1895	62,320	1909	32,425
1896	115,000	1910	63,849
1897	189,294	1911	42,625
1898	265,889	1912	1,788,596
1899	421,591	1913	4,543,690
1900	297,495	1914	5,546,356
Total, \$14,431,951.			

Yukon—Annual Production of Gold.

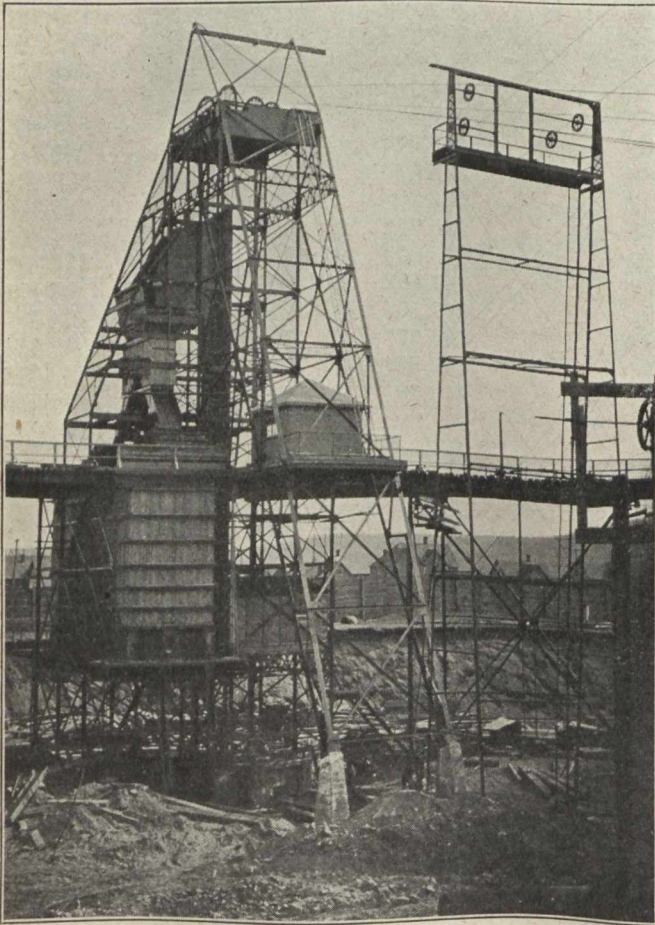
Year.	Value.	Year.	Value.
1885-1886	\$100,000	1900	\$22,275,000
1887	70,000	1901	18,000,000
1888	40,000	1902	14,500,000
1889	175,000	1903	12,250,000
1890	175,000	1904	10,500,000
1891	40,000	1905	7,876,000
1892	87,500	1906	5,600,000
1893	176,000	1907	3,150,000
1894	125,000	1908	3,600,000
1895	250,000	1909	3,960,000
1896	300,000	1910	4,570,362
1897	2,500,000	1911	4,634,574
1898	10,000,000	1912	5,549,296
1899	16,000,000	1913	5,846,780
		1914	5,125,396
Total, \$157,475,908.			

SINKING A SHAFT

By P. B. McDonald.

Of all the stubborn and ticklish jobs that confront a mine management, none is capable of more kinds of unexpectedness than shaft-sinking propositions. Mine superintendents recognize, as a rule, that sinking a shaft is no easy business, and consequently put on their best miners in three shifts to get the thing done. When it is done, they heave a great sigh.

Shaft-sinking can mean sinking from surface (with possibly sand and water problems), or deepening a shaft underground, or starting a winze in some new part of the mine, or raising a shaft from underground to meet another opening from above.



Head Frame at Maas Mine. Moved aside during concreting of shaft.

Shaft-sinking in nearly any form means look out for accidents, caves, water, getting-out-of-line, and general hell-to-pay. Somehow things happen fast at shaft-sinking.

A very great advance has been effected in shaft-sinking methods of late years. With the development of big, low grade ore deposits by "permanent" shafts and expensive equipment, the tendency has been toward fewer shafts and concentration of plant, both on surface and underground. The installation of electric haulage underground makes it possible to serve a considerable area with one main hoisting shaft.

The selection of the site for a main hoisting-shaft may well be the occasion for careful study, and sometimes develops into arguments among the mine officials. Beside the railroad spur or ore-loading considerations, there is the matter of whether it is better to

put the shaft down in the spot best adapted for serving tramping in the mine, or to pick the place where sinking is liable to be easiest. One iron mine at Iron River, Michigan, has its main hoisting shaft hundreds of feet back in the footwall, because to sink nearer the orebody would mean \$50,000 for a shaft through quicksand. Another company put its shaft down where it wanted it, and paid the \$50,000, figuring that years of tramping expense would be saved, and that, as the superintendent said, "the best way to do a thing is to do it."

The two most significant factors of late years in shaft-sinking at the 200 great mines of the Lake Superior iron and copper regions have been: concrete and the Jackhamer drill. To these might be appended the compressed air caisson for sandbags and drop-shaft work; but that is rather a special treatment not of interest except in quicksand.

The Jackhamer (a self-rotating, hammer-drill of the plugger or hold-in-your-hands type), has proved immensely popular at Lake Superior for shaft-sinking. It has four decisive advantages for this work over the customary, two-man reciprocating drill mounted on tripod or bar. They drill faster; twice the number can be used in a confined space; they can be hoisted out of the way expeditiously in a bucket when it is blasting time; they need no rigging up. Nearly all of the shaft-sinking on the Iron Ranges for the past two or three years—and there has been a good deal of it—has been accomplished by Jackhamers. In the Copper country, where vertical shafts (in which Jackhamers show up best), are as infrequent as inclined shafts at the iron mines, the Jackhamer does not excel so evidently, especially in shafts of low dip, as in the upper horizons of the Keweenaw series. (Incidentally, however, it may be remarked that Jackhamers in the copper mines have proven particularly efficacious for prospecting for copper on the sloping footwall in old or new stopes, as at Wolverine, Quincy, etc.)

Monthly records at sinking with Jackhamers on the Iron Ranges at shafts where system and celerity were unusually emphasized, have been the cause of considerable pride among the miners and bosses.

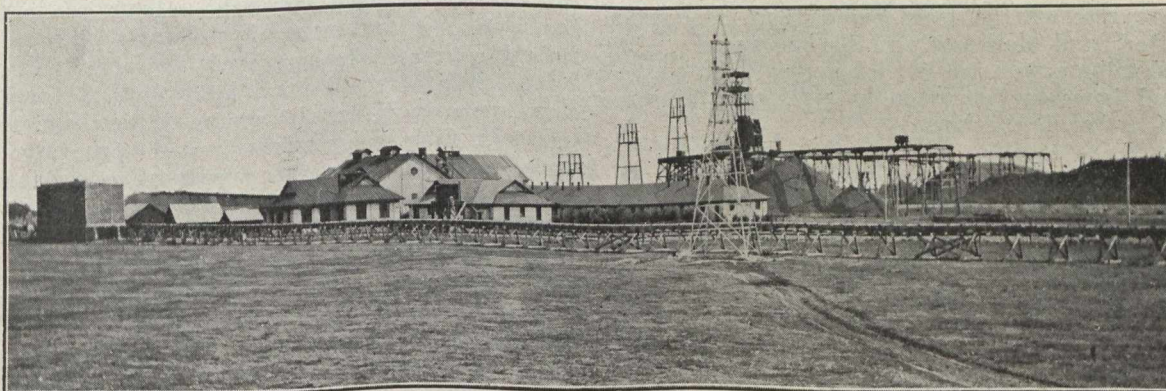
Concrete is not necessary for shaft-sinking in a hard, tough rock that is not very wet. In the broken up, sedimentary, more or less oxidized formations of the Iron Range, where water abounds in greater quantities than even the all-prevalent red stain of iron, concrete for a shaft-lining is at its best. It holds back whole lakes and swamps of water. The Maas mine of the Cleveland-Cliffs Iron Co. at Negaunee, Mich., replaced a few years ago at great expense its not-very-old timber shaft through sand of over a hundred feet by a solid monolithic tube of concrete, because Teal lake nearby was slowly draining into the Maas shaft with tendencies to twist and buckle the heavy timber structure that had taken nearly superhuman efforts to sink. For lining soft, wet rock shafts, concrete can be put on in slabs or squares made on surface. Some thousand foot shafts relined in this manner have given excellent satisfaction. Or it can be put in place directly. The use of steel alone for permanent shaft-timbering was considered by iron mining operators in Michigan, but concrete was preferred, since the formations are so wet.

The sinking of shafts through quicksand of a hundred or a hundred and fifty feet, as has been done not only at Minnesota and Michigan iron mines, but also at coal mines in the central states, is the most precarious phase of sinking. No one who has not experienced the terrific consequences of such an undertaking can imagine the difficulties, dangers and hopelessness of trying by ordinary methods to make progress in an ocean of quicksand, where the closely timbered shaft, in spite of sheet iron, straw and braces flops out of line, twists around, or drowns out in a trice. Navigating submarines or flying in aeroplanes is nothing compared to handling quicksand. The best solution of the worst problems in sand-shafts on the Iron Ranges was the dozen concrete drop-shafts, sunk by the Foundation Company on contract, using a compressor air caisson across the shaft, in which more or less desperate characters known as sandboys (white men and negroes who follow such work around) pick and shoveled in air up to 50 lb. pressure per square inch. The contract price for these shafts was not uncommonly high, \$500 per foot. Built several feet thick of reinforced concrete; with circular cross-section, but sometimes with rectangular interior; some of them

were made, due to the amount of water and quicksand encountered. Later, Captain Thomas Caddy was engaged at a comfortable salary to put into use his experience gained at the wet, old Penobscot mine nearby, and he got the shaft down. He tried sinking two shafts at once, so that pumping could be carried out to better advantage, and he forced the short drop-section of the main shaft down through occasional hard streaks of sand and gravel by jack-screws. This was a timber-lined shaft, but with a steel cutting edge on the drop-section. Incidentally, when the shaft got deeper, a shift boss was instantly killed by someone accidentally dropping a jack-screw from surface on his head.

The Rolling Mill No. 2 shaft in the Negaunee basin, Michigan, was raised 620 ft. from underground in five months, through jasper and schist to surface in one vertical raise with no levels or stops. Later the same stoper drills were used to enlarge the shaft from 8 x 8 to 12 x 14, drilling inclined holes from below to trim off the shoulder, the enlarging progressing downwards.

At a shaft of the Tod-Stambaugh Co., near Hibbing, sunk by the Foundation Company on contract, extraordinary difficulty was had in forcing the concrete



Maas Iron Mine, Negaunee, Mich.

with walls tapering in thickness toward the top, these monolithic tubes of 100 or 150 ft. depth were sealed water-tight to bedrock without pumping a gallon of water. Enormous quantities of concrete and a considerable weight of reinforcing steel were used, as permanency was desired, and, too, the greater weight forced the cutting-edge down to better advantage. The cost of cement and steel was a large item. The Rogers shaft at Iron River, described by me in an article in the M. & S. Press of December 30, 1911, is 29 ft. in outside diameter, with a rectangular interior of 16½ x 11 ft., so that the walls vary around the circle from 3 ft. to 7 ft. in thickness.

Some queer complications arose at two or three of these sand-shaft jobs sunk on contract, and strange things were done before the shafts were finally sealed to rock.

A not unpleasant surprise was occasioned by M. A. Hanna & Co. in sinking a shaft at Crystal Falls, Mich. Having arranged for pumping a lot of water, with ample pumps, boilers, coal, etc., at the temporary plant which served for sinking, scarcely any water was found as the work went ahead. It had been feared that, as there were no other mines in the immediate vicinity, and consequently the water-level had not been artificially lowered, the sand and water customary in the district would give trouble.

At the Susquehanna mine at Hibbing, Minn., when it was first attempted to sink a shaft, several failures

tube to solid bedrock through mixed hard-pan and sand. After weeks of scarcely any progress, a great ball of concrete was made and rolled on the drop-shaft, and with the air pressure of the caisson temporarily removed to get rid of its buoyant effect of several hundred tons, a few inches at a time was gained.

A somewhat similar difficulty occurred at the Rogers shaft at Iron River, where 125 ft. was accomplished through sand in 90 days, being an average of nearly 1.4 ft. per day, which was considered excellent. But to sink the next 15 ft. three months was required, an average of 2 inches per day as the result of the labors of 50 men, working expensive shaft shifts in the compressed air of the caisson.

At the North Lake mines of the Cleveland-Cliffs Iron Co., near Ishpeming, pigs of iron were used for weights in forcing the concrete drop-shafts through hard streaks.

In the sinking of the first timber-lined shaft at the Maas mine of the same company at Negaunee, so much quicksand was pumped that a big, bowl-shaped depression formed around the shaft, which stuck up like a smoke stack in the great hole.

One company operating on the Menominee Range tried sinking a timber-lined shaft through 200 ft. of sand, to reach a big orebody proved by diamond-drilling and was over two years accomplishing it, merely to bedrock.

Several unusual details developed during the sinking of concrete drop-shafts by the caisson method: The holding up of one side of the shaft by a boulder under the cutting-edge or shoe, causing the huge concrete tube to tilt out of plumb; tearing of the steel shoe to a distorted wreck by the hard layers it passed through; men with the "bends"; controversies between the mining company and the contractors; the difficulty of inspecting the work; when is "bedrock" too soft and broken up to be "bedrock," or is it hardpan?; leakage of the compressed air out through the soil.

Illustrative of the recognized capability of Lake Superior miners at shaft-sinking is the recent sending of fifty picked miners gathered at Crystal Falls, Michigan, to sink a 1,200-ft. shaft for the Orkla Mining Co. of Christiania, Norway. The contract was awarded by the Norwegian organization to the E. J. Longyear Co. of Minneapolis, partially in order to gain a knowledge of American sinking methods and American machinery, in spite of the fact that European practice in tunneling is reputed to be superior to American methods. The shaft is to be sunk in less than a year's time, and the miners will be paid a bonus for each month's work that is greater than 65 ft. Naturally the first several months' progress will be more rapid than later when depth, water, and darkness will slacken speed. The rock is said to be very hard, but, of course, hard ground if firm and homogeneous is to be preferred to some broken up, softer formations.

GRANBY CONSOLIDATED.

Granby Consolidated Mining, Smelting and Power Co. produced 26,705,928 lb. of copper in its fiscal year ended June 30. Of this amount 10,005,278 lb. came from the Grand Forks smelter and 16,700,650 lb. from the new Hidden Creek smelter at Anyox. From both properties precious metals recoveries totaled 415,806 oz. of silver and 32,126 oz. of gold.

The annual meeting of stockholders will be held in October and not until that time will the annual report be available. Notwithstanding the comparatively low cost at which the new Hidden Creek property has been producing copper, there were other factors, including the three months' shutdown last fall at Grand Forks, to keep total costs up to about 10½ cents a lb.

In June the Hidden Creek smelter made a record production of 2,053,027 lb. of copper against 2,021,717 lb. in the preceding month. The output at the old smelter at Grand Forks was 1,573,902 lb. comparing with 1,662,398 lb. in May.

Results of the past year's operations were as follows:

	Grand Forks.	Anyox.	Total.
Copper, lb.	10,005,278	16,700,650	26,705,928
Silver, oz.	179,205	236,601	415,806
Gold, oz.	24,998	7,128	32,126

Granby now has its smelting capacity in full swing as the fourth furnace at Hidden Creek has just been blown in. Production for the year beginning July 1 should exceed all that has gone before and costs at Hidden Creek should bring the average for the entire property down to a fair level if permitted steady operations. At the height of winter the Hidden Creek smelter will doubtless have to close for a few weeks, but this the management expects.

The Midas mine in Alaska has not started production and no definite plans have apparently been made in this direction.

PERSISTENCE OF ORE IN DEPTH*

By G. R. Mickle.

The paper on "Persistence of Ore in Depth" has evidently stimulated a great deal of discussion. It appeals to me as most useful and important, and without discussing the facts presented or the conclusions arrived at, I wish particularly to refer to the mode of reasoning followed. The method used is necessarily influenced by the different nature of the things under observation, but it is similar to that employed in determining the "Expectation of Life" by insurance companies. We are all familiar with the certainty and security of the life insurance business. Two factors contribute to this (1) the existence of many hundreds of thousands of observations on the length of life of the same kind of thing, i.e., healthy males who have been subjected to standard tests; this establishes the "expectation" for the individual, and (2) the fact that insurance companies take risks of comparatively small amounts on thousands of individuals, and not very large amounts on a single individual or small number of individuals.

To determine the "expectation" the thing that is relied upon is the work of the actuary of the insurance company. Physicians, physiologists and bio-chemists might estimate the length of life from their profound knowledge of the human body and the changes that take place in it, but the company that transacted business on their calculations would probably come to grief. At any rate, the results of many years of experience have proved that the actuary's work is reliable.

In the case of mining, the thing we wish to determine frequently is the "expectation" of any mine, using this term in the technical sense defined in works dealing with this subject. Thus, "the expectation from any event is obtained by multiplying the sum to be realized on the event happening by the chance that the event will happen."

It is necessary to ascertain the chance of success or "the chance that the event will happen," and in estimating this a knowledge of the history of similar things seems indispensable. But this is the very kind of knowledge which is not available to any adequate extent.

In any given mining district (for example, one containing gold-bearing quartz veins), in order to find out what proportion of the veins that have been tested are capable of being worked profitably would require probably months of constant investigation on the part of some one who had access to all the workings. This, if done, is very seldom published. It is obvious that any extensive information on such points as this—and it would not be of much value unless it were extensive—would require the co-operation of a great many. The examination would have to be made in some standard manner, that is, as far as determining certain specific things, just as the medical examiners for life insurance subject the applicant to standard tests.

It is clear we can never reduce the business of mining, involving as it does first the determination of the "expectation" of any given vein, and then the taking of the risk, to the same degree of certainty as life insurance, as we can never expect to have as many observations to fix the first, or sufficient capital to embark on thousands of enterprises. Moreover, the things themselves involved in the two cases vary between wider limits. The same degree of certainty is

*A contribution to the discussion of a paper presented before the Institution of Mining and Metallurgy, London.

not necessary, but we should be able greatly to improve the present state of affairs.

Mr. Rickard's paper appears to be a most important and valuable contribution in this direction and, I think, more likely to lead to a useful result than the voluminous discussions of the way ore has been formed and the deductions therefrom which are so dear to geologists. According to the theories of ore deposition generally accepted, the different elements or compounds which constitute ore are dissolved in some medium, transported in some way, and precipitated again, the solubility and precipitation are influenced by temperature, pressure and sometimes minute changes in composition, and other things; that is, the fact whether ore exists in any place depends on a combination of a number of events and, therefore, there must be a great number of ways in which the events might happen and, consequently, it seems unlikely we can correctly predict what has happened below the crust of the earth.

If we consider for a moment what takes place when we proceed in the opposite direction, viz.: vertically upwards, we see how theories have failed. It has formerly been assumed that with an ascent vertically upwards the barometric pressure and also the temperature would drop till finally at the limits of the atmosphere where the air pressure would vanish, the temperature would be zero (absolute) (—) that is—459°F. Within the last twenty years, however, meteorological observatories in many parts of the world have been sending out small balloons fitted with barometers and thermometers to great altitudes. This has proved that at an elevation of seven miles, more or less, dependent on the latitude, a layer of constant low temperature—50°F. to 130° is entered. This is called the stratosphere. As the balloon ascends through the stratosphere the temperature rises instead of dropping as it should, and this continues to an elevation of about 19 miles, beyond which there are no observations. Moreover, the stratosphere at the equator is some 30° colder than in middle latitudes, and over Canada, the stratosphere has a lower temperature in summer than in winter. We see then that in the case of the temperature of the air above us, although as far as known previously this depended on one thing only and nothing could interfere with it, the theory fails altogether. How much more likely is the theory to fail when the result admittedly depends upon a number of factors?

THE BRITISH COAL MINERS' PART IN THE WAR

As the outcome of a recommendation made in the report of the Departmental Committee on Coal Mining Organization, one of the most remarkable gatherings in the industrial history of the United Kingdom was held on Thursday, July 29th, at the London Opera House, Kingsway. The Home Secretary, Sir John Simon, presided. The meeting took the form of a conference of representatives of coal owners and miners from every coal field in the country, convened by the Government, at which there were about 2,500 present. The Government Departments and coal trade organizations represented included the Home Office, the Board of Trade, the Board of Education, the National Insurance Commission, the Ministry of Munitions, the Coal Mining Organization Committee, the Mining Association of Great Britain, the Miners' Federation of Great Britain, and the English, Scottish and Welsh Conciliation Boards. The proceedings were very enthusiastic

throughout. After speeches by Cabinet Ministers, a resolution declaring that "every effort should be made to secure the greatest possible output of coal," proposed by Mr. Robert Smillie, president of the Miners' Federation of Great Britain, and seconded by Mr. A. F. Pease, acting president of the Mining Association of Great Britain, was put to the meeting and carried un-animously.

Sir John Simon said the conference was called together by the Government and those connected with the great coal mining industry of the United Kingdom. Representatives of every coal field and, he believed, of nearly every miners' lodge in the whole country, were present. The Mining Association of Great Britain and the Miners' Federation were both represented, and that great assembly proved how united the coal mining industry was in the crisis they were prepared to face. The object of the meeting arose from a very remarkable and interesting report made by the Coal Mining Organization Committee, appointed by the Home Office and presided over by Sir Richard Redmayne. The committee, which contained an equal number of representatives of coal owners and miners, arrived at an absolutely unanimous report, and made a series of recommendations as to how the output of coal could best be maintained during the present emergency. It must be done by voluntary co-operation. That was the spirit in which the committee had reported; it was in that spirit that the Government had called the meeting together and counted upon them to promote the success of its object.

The mining industry had responded splendidly to the appeal for recruits. Whole regiments had been recruited from the colliery districts up and down the land. He had been assured by soldiers the most eminent that the miners carried to their work in the firing line the bravery and determination that actuated the industry throughout the country. In at least one military unit practically every private was a pitman, every officer and non-commissioned officer was connected with a colliery, and the commanding officer was one of H.M. inspectors of mines. The miners had given to Kitchener's Army a quarter of a million men.

The Government and the country looked to the coal owners to see to it that when these brave men came back to peaceful industry, places should be found for them again. He felt sure it was the fixed intention and the firm resolve of the coal owners of the United Kingdom that the men who had served them faithfully in times of peace and the country in time of war, should not suffer when they came back and asked to resume their ordinary occupations.

Warfare involved more than actual fighting. It involved supplies, transport and munitions, and those things depended absolutely upon a regular and abundant supply of coal. Furnaces must be kept stoked. The British navy—that sleepless and incomparable guardian of our liberties—must be kept steaming. And it rested first and above all on the coal mining industry to secure that the necessary supplies were forthcoming. They had lost the comradeship of 250,000 miners. Those who were left, and all who were concerned in it, must turn their thoughts and all their energies upon seeing how best and most effectively they could carry on the great coal mining industry. The committee he had mentioned, had ascertained that, as a result of the contribution made by the miners to the Army, there was a shortage of no less than three million tons of coal month by month; but with good will and an effort greater than any hitherto made,

it ought to be possible to recover some part of that shortage.

They would remember that Lord Kitchener had asked the industry to shorten the Easter holidays. What happened? Eight hundred thousand more tons of coal were raised. It might be truly said that the pits were only open a certain number of days, and the men might work only a certain number of hours, and that it was difficult to see, under such conditions, how a greater output could be secured. But they were met together to consider within what limits those conditions might be usefully modified for the period of the war, and he asked the owners to open their pits, and the miners to work on every day they possibly could. They would not suppose that the country did not understand that those who spent the working hours delving in the bowels of the earth in darkness and danger, expected to pause in their labors from time to time. But at such a time as the present there were no holidays for anybody, and he was sure the coal mining industry would see how they could help the Government in that regard.

The Eight Hours Act, though passed in times of peace, and in response to an overwhelming demand, contained a section which provided that in the event of war or imminent national danger or great emergency, the operation of the Act might be suspended by order-in-Council to such extent and for such period as might be named in the order. The Government, however, were not going to play tricks with that Act of Parliament without consulting them. He hoped that masters and men in every area likely to be affected would consult together to see what suggestions they felt able to make to the Government—whether a temporary modification of this or that regulation—to increase the output of coal to the maximum quantity possible. In the course of long years of effort the miners had established rules, customs and practices designed to protect their labor. Nothing that he or anyone said was intended to belittle the importance of those rules, or to indicate that they could be abandoned or watered down. But there were adjustments and modifications which might be made in them during the period of the war. In return he pledged the honor of the Cabinet, the Government, Parliament and the country that any relaxation in those rules and practices which, for national purposes, the miners made now, should be restored to them without alteration or modification, the moment the danger was past.

The Government relied upon the coal owners similarly to modify their established rules and practices, and to do everything they could in co-operation with the men to see that suggestions calculated to increase the output and to assist the nation during the crisis, should be favorably received, carefully weighed, and generously accepted in every possible case. In that way, they were confident that great additions could be made to the output of coal in the coming months. One class of regulations, however, would never be modified; those designed to secure safety in the mines. Nothing they were asking to be done ought in any way to modify or water down regulations made for the common good, not merely to protect the miners who might be injured, but the lives and limbs of all his fellows in the mine.

“Our country stands at this time in an emergency, and is faced by a danger which it is impossible to overstate. If there is one feature of the coal mining in-

dustry which strikes the imagination of every man who studies it, it is the instant response which everybody connected with that industry habitually gives if some great and overwhelming disaster overtakes the mine. When the news spreads of some terrible explosion, who is there, miner or mine manager, who holds back when the call goes out for a rescue party? Is the appeal ever made in vain in any mining district in the land? Gentlemen, nearly a year ago the greatest explosion that ever took place in the history of the world occurred in Europe. It was not the result of the secret workings of nature; it was not even due to the folly or the carelessness of some man. It was deliberately perpetrated. It was long planned. The German Emperor set fire a year ago to the mine, and we are calling for a rescue party. That explosion convulsed a continent. It has devastated thousands of square miles of fruitful territory. It has desolated tens of thousands of homes. And now we appeal to the mining industry of Great Britain to come and help in this work of rescue. For we are determined that this devastating fire shall be quenched, that peace and order shall be restored, that the dangers that threaten the freedom and the life of all who care for a free life, shall be removed, and that this terrible calamity, shaking as it does to their foundations the seats of the mighty and the humblest of homes, shall never, by dint of our efforts, and by the help of Heaven, be allowed to recur to curse the earth. That is the appeal we make for our mining rescue party, and we are very sure that the appeal will not be made in vain.”—*Colliery Guardian*.

CROWN RESERVE.

Montreal, Aug. 23.

Directors of the Crown Reserve Mining Company, Ltd., at a meeting held here to-day, decided, for the time being, to discontinue dividends. This course of action is stated by the directors to be due to the disappointing results in draining Kerr lake and also to the demoralized condition of the silver market. The following circular will be mailed to shareholders to-day:

“Your directors take this occasion to advise you that the drainage of Kerr lake and the removal of the mud and clay since the first of January, 1916, has not uncovered up to the present any large deposits of ore in the bed of the lake. Promising veins of ore of good value have been discovered on the Kerr Lake property, immediately adjoining the Crown Reserve line, and we trust that ultimately some discoveries will be made on the property.

“The operation of the mine during the last six months has been almost entirely in low grade ore, and the cost of milling and marketing the same has left only a very small margin of profit.

“The fall in the price of silver has also considerably reduced the profit from the sale of the ore produced, and your directors feel that unless the market for silver, which has never been at such a low point, has recovered, they will be acting in the best interests of the shareholders at large by retaining the ore and bullion, discontinuing the dividends, and conserving all the revenue of the company, which includes the dividends received from the Porcupine Crown Mines, Ltd., and acquire other properties when a suitable opportunity occurs.”

MINERS' UNIONS IN CANADA*

(Continued from last issue.)

Western Federation of Miners.

As with the coal miners, various forms of organization have existed for many years among the metalliferous miners on the North American continent. For some time these bodies were independent or purely local concerns, the operations being confined to some particular locality. As early as 1867 a miners' union was organized at Virginia City, Nevada, and has maintained a continuous existence, affiliating with the Western Federation of Miners some years after that organization was formed. In January, 1879, in Leadville, Col., the miners formed a union, which was publicly known as the Miners' Co-operative Union, but was in reality a Knights of Labor Assembly working in secret. This union, though having largely increased its membership in the early years of its existence, appears to have lost its identity, for it is recorded that in May, 1885, a miners' union, with 85 charter members, was organized in Leadville. In 1887, this union, with a membership of about 600, became identified with the Knights of Labor. There was no affiliation between the miners' unions which had been formed in the various mining camps, not even an exchange of working cards. This situation continued for a number of years until a convention was held in Butte, Montana, on May 14 and 15, 1893, at which were laid the foundations of the Western Federation of Miners. The beginning was small, fourteen unions, with a combined membership of approximately 2,500, forming the nucleus of the new organization. At the outset the policy of the Western Federation was to include in its membership coal miners as well as metalliferous miners, and this course was pursued until, in 1908, an arrangement was made between the United Mine Workers and the Western Federation of Miners whereby a division of jurisdiction was effected, the former confining its activities to the interests of the coal industry, and the Western Federation to metalliferous miners. In 1908 an interchange of transfer cards was also arranged between these two organizations.

The Constitution of the Federation.—The preamble to the constitution of the Western Federation of Miners, as contained in the issue of 1912, is as follows:

"1. We hold that there is a class struggle in society, and that this struggle is caused by economic conditions.

"2. We affirm the economic conditions of the producer to be that he is exploited of the wealth which he produces, being allowed to retain barely sufficient for his elementary necessities.

"3. We hold that the class struggle will continue until the producer is recognized as the sole master of his product.

"4. We assert that the working class, and it alone, can and must achieve its own emancipation.

"5. We hold, finally, that an industrial union and the concerted political action of all wage workers is the only method of attaining this end.

"6. Therefore, we, the wage slaves employed in and around the mines, mills, smelters, tunnels, open pits and open cuts, have associated in the Western Federation of Miners."

The following is a resume of the articles of the constitution as laid down for the governance of the organization:

The federation is composed of persons working in and around mines, mills, smelters, tunnels, open pits and open cuts. Among other objects it is the aim of the federation to increase the wages and improve the conditions of employment of the members by legislation, conciliation, joint agreements or strikes. Local unions are composed of twenty or more members. These units may form district or state unions, the same to be chartered by the federation. District unions are subordinate to the federation, but are a higher authority than the local unions in its jurisdiction. The conventions of the federation are held biennially on the third Monday in July, and each union is entitled to one delegate for 100 members or less, and one for each additional 100 members or majority fraction thereof, but no delegate is entitled to more than five votes. Ladies' auxiliaries of the Western Federation are entitled to one delegate with one vote. The pay of each delegate is not less than \$5 per day, which is paid by the local union represented. The transportation expenses of one delegate from each local in good standing are paid by the federation, as is also the transportation of one delegate from each ladies' auxiliary. Unions electing more than one delegate pay the whole expenses of delegates in excess of that number.

The officers of the federation consist of a president, vice-president, secretary-treasurer and four other executive board members. These officers are elected biennially by referendum vote. Provision is made for the recall of any official on petition of not less than 10 per cent. of the membership in good standing, representing not less than ten local branches. Among other duties of the president, he has the power to appoint, with the approval of the executive board, such organizers as conditions justify. Organizers so appointed are entitled to \$100 per month and transportation expenses. The president is required to visit each district once a year, and may convene the executive board when necessary; or he may, with the approval of the executive board, call an extra convention of the federation. With the concurrence of the executive board, the president may sell, transfer or encumber in any manner and to any extent any and all real and personal property, except the funds of the federation. Also, with the consent of the executive board, the president may revoke the charter of any local union or penalize it for violation of the constitution or by-laws, or for proven treachery to the principles of the federation. With the approval of the executive board, the president has the power to appoint one or more auditors, whose duty it is to audit the accounts of all unions, and to collect, for the use of the federation, such statistics as may be determined by the president. For his services, the president is entitled to \$5 per day and all necessary transportation and other expenses. The secretary-treasurer, whose duties include full charge of all the funds and property of the federation, receives \$150 per month. The executive board members constitute the board of arbitration and conciliation, and between conventions have full power to direct the workings of the federation. Each executive board member is also an organizer, and has power to investigate the conditions of local unions, and to report to the president. In case of trouble arising in the jurisdiction of a union, a member of the executive board

*Extracts from the Fourth Annual Report of the Department of Labor, Ottawa.

is authorized to take full charge in the direction of affairs or negotiations until the arrival of the president. The members of the executive board receive \$4 per day and legitimate expenses. The revenue of the federation is derived from charter fees (\$10) and a per capita tax of 25 cents per month and, in case of emergency, by such assessments as in the judgment of the executive board or convention may be necessary. The constitution provides for the publication of a weekly official journal, the pages of which are open to all members of the organization for the discussion of social, industrial, economic and political questions, etc., and must at all times advocate the principles of what is termed "industrial unionism."

Strikes and Adjustments.—Under the article pertaining to strikes and adjustments, local unions are enjoined from entering upon a strike unless ordered by two-thirds of the votes cast upon the question, such vote to be decided by referendum, of which three days' notice is to be posted, and vote to be taken by ballot, polls to be open for not less than eight hours. No referendum vote on a strike can be taken until after having received the approval of the executive board. In case of a union or unions being on strike, regularly ordered, and if in the opinion of the president and executive board it is necessary to call out any other union or unions in order to carry the strike to a successful termination, they have full power to do so. When a strike has been approved, the president is empowered to appoint, with the consent of the executive board, a representative to take charge of the funds furnished by the federation for the relief of members involved in a strike or lockout. The representative is required to make complete itemized returns of all receipts and expenditures to the executive board. Local unions or groups of local unions are empowered to enter into wage agreements for a specified time, provided such agreements have the approval of the executive board. Negotiations for such agreements must be made between the representatives of the local or locals affected and the employers, with at least one member of the executive board or representative of the general organization being present.

Reinstatement of Strike Breakers.—Methods for dealing with offences against the federation, its officers or members by members are outlined in article XI. One section is as follows:

"Any one acting as a strike breaker or scab during a strike in the jurisdiction of the Western Federation of Miners, who professes to have seen the error in his ways, may be placed on probation by the local union involved, or by any local union in whose jurisdiction he may be employed when such charges are preferred against him, provided the local involved grants permission; provided, that this shall in no way apply to any man who has been a deputy sheriff or gun-man in the employ of any corporation. Such men shall remain on probation until such time as the local union, in whose jurisdiction he is working out his probation, shall declare his offence expiated in full by good work for the cause."

When a member becomes a foreman or shift boss, or assumes a position that cannot be termed as part of a mining industry, he loses his active connection with the local union, but may continue as a beneficiary member or may be granted a withdrawal card.

The constitution provides for the initiative and referendum in all legislative questions of the federation, and the executive board has power to submit to a referendum vote any question of an urgent nature.

As with the constitution of the United Mine Workers, the federation provides for the issuance of transfer cards and also for the acceptance of similar cards from members of any chartered labor organization, subject to the rules governing the members of the federation.

From 1893 onward the federation grew in strength and influence, and not only concerned itself with mining difficulties, but championed the cause of working-men generally.

Officers of the Federation.

The following is the full list of officers of the Western Federation of Miners: President, Chas. H. Moyer, Rooms 503-11, Denham Building, Denver, Colo.; vice-president, C. E. Mahoney, Rooms 503-11, Denham Building, Denver, Colo.; secretary-treasurer, Ernest Mills, Rooms 503-11, Denham Building, Denver, Colo.; editor Miners' Magazine, John M. O'Neill, Rooms 503-11, Denham Building, Denver, Colo.; Executive Board, J. C. Lowney, 450 North Idaho street, Butte, Montana; Yanco Terzich, 503-11, Denham Building, Denver, Colo.; William Davidson, New Denver, B.C.; Guy Miller, Box 300, Joplin, Missouri.

The Coeur d'Alene and Other Strikes.—In 1894 the organization was involved in a strike in the mining district of Cripple Creek, Colo. This dispute developed into a most bitter struggle in which assaults and bloodshed occurred. In the spring of 1899 the miners at the Bunker Hill mine in Wardner, who had only recently organized, made a demand for the same rate of wages as that paid in the other mines in the district. The demand was refused, and a strike occurred on April 24, 1899. On April 29 the concentrator at Bunker Hill mine was blown up, by whom it was never established, but the strikers were accused, and riots ensued. Federal troops were sent to the strike zone and martial law was declared. Some 1,600 arrests were made, and the men were imprisoned in sheds (termed at the time "bull pens") without any conveniences. Of these about twenty were tried for a stated offence and eight were convicted.

The trouble in the Coeur d'Alene mining district of Idaho continued for some time, and was renewed with considerable violence in 1902. The whole strike situation was made the subject of an inquiry by a commission appointed by the United States Senate. Martial law having been twice declared in Coeur d'Alene district, a proclamation was issued by Governor Steunenburg, jointly with the general commanding the troops, forbidding the employment of men who did not hold a permit from the State authorities. The holder of such permit renounced all allegiance to the miners' union and promised not to seek membership in any other society. The actions and utterances of Frank Steunenburg, the Governor of Idaho at the time of the dispute, created bitter resentment on the part of the members of the federation, who applied to him the epithet of "Bull-pen Steunenburg." On the night of December 30, 1905, ex-Governor Steunenburg was assassinated. A few months later Chas. H. Moyer, president of the federation, and Wm. D. Haywood, secretary, and Geo. Pittibone, a former member, were charged with the crime. At the trials, which were delayed eighteen months after the arrests were made, the accused were acquitted. Vincent St. John, president of Burke Miners' Union, was also arrested in February, 1906, on the charge of being implicated in the Steunenburg murder, but there being no evidence against him he was acquitted.

The trial of the officers of the federation attracted widespread interest, particularly amongst the labor organizations, many of which held meetings protesting against the manner in which the accused had been arrested, and also against the delay in the holding of the trials. Assessments for the defence of the officers were levied on members of the federation, and contributions were received from other labor organizations.

The Federation and the I. W. W.—On June 27, 1905, with a number of delegates from other bodies, the chief officers of the Western Federation of Miners were instrumental in organizing the Industrial Workers of the World, a frankly revolutionary organization. Mr. W. D. Haywood, the secretary of the miners, acted as chairman of the organization meeting. The Western Federation of Miners, with 27,000 members, became enrolled as a part of the new organization, and Mr. Chas. Moyer, the president of the federation, was elected as a member of the executive board of the new organization. The action of the Federation of Miners in taking a prominent part in the formation of the Industrial Workers was condemned by the American Federation of Labor, and unions affiliated with that body were requested not to assist by any further contributions the eight-hour-day campaign of the Federation of Miners. The second convention of the I. W. W. was held in 1906. The legality of some of the acts of this convention was questioned by certain of the officers of the Western Federation of Miners, and the question of sustaining the action of the convention was submitted to a referendum vote of the federation members. The vote was overwhelmingly against approving the acts of the convention, and in addition a number of unions opposed the payment of any further per capita tax. The executive board, therefore, refused to pay any further tax to the I. W. W. until a better understanding was secured. At the 15th annual convention, held in June, 1907, the federation withdrew from what was termed the Trautman faction of the I. W. W. (Trautman was the secretary of the organization), and appointed a committee of seven, including W. D. Haywood and Chas. H. Moyer, to aid in launching a re-organized Industrial Workers of the World. This committee, however, was apparently unable to carry out the objects for which it was appointed.

Agreement with U. M. W. and Reaffiliation with A. F. of L.—At the seventeenth annual convention in July, 1909, a committee was appointed to arrange a conference of labor organizations in the mining industry with a view to bringing about a more compact organization. Subsequently a conference was held with representatives of the United Mine Workers, and as a result an agreement between the two organizations was reached, embracing the following clauses: (1) That at some time in the future there shall be a complete solidification of the W. F. of M. and the U. M. W.; (2) that the present arrangement of a mutual exchange of transfer cards be continued; (3) co-operation of organizers in organizing the coal miners and metal miners; (4) that the Western Federation of Miners affiliate with the American Federation of Labor; (5) that a mining department under the jurisdiction of the A. F. of L. be formed. The agreement was submitted to a referendum vote of the federation and endorsed by an overwhelming majority. On June 22, 1910, application for charter of affiliation was made to the American Federation of Labor, the application being granted on May 9, 1911. The Federation

of Miners was previously affiliated with the A. F. of L., a charter being secured in 1896. This affiliation was severed in 1898, and the Miners affiliated with the Western Labor Union, the affiliation continuing until the latter body dissolved in 1905.

Internal Troubles.—In addition to the conflicts which have been brought about by the demands for better working conditions for its members, the federation has been involved in a serious internal difficulty in Butte, Montana, where the largest local union of the federation, with approximately 7,000 members, has existed for the past thirty-six years. There appears to be a multitude of reasons assigned for the disintegration of the union, but one which stands out prominently is, that the Industrial Workers of the World, with which organization the federation was at one time identified, is responsible for the dissension. In May, 1913, the I. W. W. advertised in Salt Lake, Utah, that miners and muckers were wanted in Butte, although it was stated by the federation officials that such was not the case. From this time on the affairs of Butte local union become worse, charges and counter charges were made from time to time. On June 13, 1914, an attempt was made to wreck the Miners' Hall in Butte. The safe was taken out on a flat and dynamited, the records destroyed and the money taken. Some days later President Moyer went to Butte to investigate the cause of dissension and endeavor to bring about harmony. On June 23 Mr. Moyer attended a regular meeting of the union and made certain propositions to the local, and while he was speaking a crowd of dissentients attacked the hall with dynamite and demolished it. On June 21 an independent union of miners was formed in Butte, fathered, it was stated, by the I. W. W., more than 600 men who were brought to the locality joining the union organization. On August 8 a committee of the federation visited Butte to try and make arrangements for a new election of officers, the former having resigned in accordance with President Moyer's suggestion when he visited the union. With the coming of the committee the new union became active and made demands on the mining companies to discriminate against the members of the W. F. of M. and to force all men working in the mines to join the new independent union, under threat of deportation. The State militia was subsequently ordered to the district to prevent disorder. Later when the militia left the locality, the dualists proposed a demonstration, but the newly-appointed sheriff refused to allow any celebration.

When the federation was organized in 1893 the membership was about 2,500. During the next ten years the membership had reached 50,000. At the close of 1911 the figure was reported at 65,150; in 1912, 61,000; in 1913, 67,050; and in 1914 there were 270 local branches with a membership of 65,400. Of these twenty local branches, with a combined membership of 4,015, are in Canada.

Entry into Canada.—Previous to the coming of the Western Federation of Miners to Canada a number of local miners' unions were in existence in the Dominion, both coal and metalliferous. In most instances these unions soon became identified with the Western Federation, the first Canadian local to affiliate being the Rossland, B.C., Miners' Union. This occurred on July 16, 1895; other affiliations took place from time to time, until, on December 13, 1899, there were sufficient locals to form District Union No. 6. The federation was successful in organizing a number of other

branches, composed of coal miners in eastern British Columbia, and on November 25, 1902, District Union No. 7 was formed, with headquarters in Fernie. This district body only existed for one year, dissolving in November, 1903, when District Union No. 18 of the United Mine Workers of America was formed. All the locals that had formerly comprised District Union No. 7 of the federation went over in a body to the United Mine Workers. In 1906 the Western Federation entered the province of Ontario, the Cobalt miners forming local union No. 146 on March 24 of that year.

Federation Strikes in Canada.—The first strike in Canada under the auspices of the federation, according to records available, was occasioned by the refusal of the mine operators at Rossland, B.C., to grant an increase in wages. The strike occurred on July 11, 1901, and involved about 1,000 men. After the strike had been in existence for three months an effort was made, through application of the union, to settle the dispute under the Conciliation Act. The result was unsuccessful, and the strike continued. On January, 23, 1902, it was reported that the strike at one of the mines had been declared off, but no understanding had been reached with the other companies concerned. It was stated that the demand of the men had not been granted, but the terms of settlement were not made public.

On February 11, 1903, the Federation was concerned in a strike of coal miners in the Crow's Nest Pass coal region, which was under the jurisdiction of the District Union No. 7, and involved 1,500 men. The strike was the outcome of a refusal of the company to meet a committee of the newly formed district union. This strike was made the subject of investigation by the Dominion Government whose officer endeavored to effect a settlement, but without success. On March 1 the British Columbia Mining Association appointed a committee to act as a conciliation board with a view to bringing about a settlement. As a result, an agreement was reached which granted recognition of the union, an increase of wages in some classes of work in certain mines, and a definite arrangement governing conditions of employment. The contract was to be effective for three years from April 1, 1903. On March 28 the terms of settlement were finally accepted by both parties, and work resumed.

In March, 1903, the local union of coal miners of the federation at Ladysmith, B.C., was involved in a strike, 700 men being affected. A number of employees had been discharged, and the men believing that this action on the part of the company was owing to the fact that they had recently formed themselves into a branch of the federation, led to the strike. In July, the strikers, not having received the aid they had expected from the federation, returned to work under the old conditions.

On August 12, 1903, the members of Van Anda local, to the number of 215, went on strike for increase of wages and reduction of hours. This demand was subsequently withdrawn and a request for recognition of the union substituted. On September 2 the strike was declared off, the company having agreed to recognize the union and to discuss any grievances in the future with a committee of the union.

No strikes of importance occurred during the years 1904 and 1905, and only one took place in 1906, in which the federation was concerned. This dispute took place at Greenwood, B.C., on November, 21, owing to the refusal of the mining company to grant a demand

for a minimum wage of \$3, some 350 men being involved. On November 29 the demand was granted and the men returned to work on the following day.

The first strike of metalliferous miners in the Province of Ontario occurred on July 8, 1907, when the members of Cobalt Miners' Union No. 146, to the number of approximately 3,000, ceased working, owing to a disagreement as to wages and working conditions. Negotiations for a settlement were subsequently carried on, in which the Department of Labor took part. A compromise agreement was later reached with a number of the mining companies in which the miners secured some concessions. Some other companies held out, but by the end of September normal conditions had been restored in the mining district.

During the years 1908 and 1909 the federation had no strikes in Canada. On April 19, 1910, a strike was declared by local union No. 22, at Greenwood, B.C., owing to the refusal of the copper company at that place to employ none but members of the Western Federation of Miners. On May 11 the strike was declared off, the men having failed in their demand, and the 350 men affected resumed work. Prior to the strike the matters in dispute had been referred to a board of conciliation and investigation under the Industrial Disputes Investigation Act, but the award of the board was against the demands of the union.

During 1912 three strikes occurred in the Cobalt silver mining district. The first took place on April 28, on account of the discharge of two employees by a mining company for alleged intimidation of fellow workmen. On April 30, after two days' idleness, the strike was declared off, and the 189 men affected returned to work, with the exception of the two who had been dismissed. The second strike, which involved 225 men, took place on October 19, and was caused by the refusal of the company to reduce the working hours from ten to nine per day. On November 4 work was resumed on the conditions formerly existing. A strike of the gold miners in the Porcupine district against a reduction in wages, which took place on November 15, was of greater magnitude than the two first mentioned, involving approximately twenty-five mining properties and 1,200 men. At the end of January, 1913, it was reported that a large proportion of the men who were originally on strike had left the camp, and that many others had returned to work. The strike was practically ended on June 21, when an arrangement was made by which, although the strike was not officially declared off, the union permitted the men to return to work. On February 19, 1913, a strike of 500 metal miners connected with the federation occurred at Britannia Beach, B.C. The dispute arose over refusal of the company to recognize the union. A board under the Industrial Disputes Investigation Act had previously investigated the matter, and in the majority report of the board the views were expressed that the company should allow the union officials to visit the men on the employers' property to transact union business. The finding of the board was not accepted by the company, and the strike ensued. The strike was formally declared off on August 27.

There have been a number of other strikes in Canada in which members of the Federation were involved, but the foregoing include the more important of the disputes which have occurred in the Dominion.

(To be continued)

COAL PRODUCTS AND BY-PRODUCTS*

By E. Stansfield and F. E. Carter.

Methods of Producing Coke, Gas, Ammonia and Tar, from Bituminous Coal.

The employment of coal for commercial purposes may be roughly classified under three main divisions as follows: (1) the combustible matter in the coal is completely burned with an excess of air; (2) the combustible matter in the coal is completely gasified by partial combustion with a limited amount of air, or of air and steam; and (3) the volatile matter of the coal is vaporized by the application of external heat, in the absence of air.

In class 1, the coal is burned under steam boilers and in furnaces, etc. The coal is fed in and burned, heat is generated, and ashes are left. In this class, heat is the main product; the only by-products being the valueless ashes and furnace gases.

In class 2, the coal is gasified in the producer by blowing air and steam through it; but, by limiting the quantity of air supplied and having a deep layer of fuel, the coal is not completely oxidized, hence the gas produced is combustible. In this class the combustible gas is the main product, although ashes and heat are necessarily produced. The heat, which is generally kept as low as practicable by means of the steam, can be partially utilized, but is often a total loss. The gas is sometimes burned simply as a source of heat, while in other cases it is utilized as a source of power in internal combustion engines. As the gas leaves the producer it almost invariably contains more or less ammonia and coal tar, the quantities varying with the type of producer, with the amount of steam employed, and with the character of the coal gasified. By means of a suitable purifying plant, the ammonia and tar may be recovered from the gas before it is used. These residuals are, therefore, by-products from the utilization of coal in gas producers.

In class 3, the coal is carbonized in gas retorts for the production of coal gas, and in coke ovens for the production of coke. In both cases the coal is heated, gas and other volatile products pass off, and coke remains in the retort or oven; but in the coal gas plant the gas is the main product, the coke being only a by-product; whereas in the coke-oven plant the conditions are reversed, the gas being the by-product. In both cases, however, the gas, as it leaves the coal, contains ammonia and coal tar vapors, and these are recoverable by-products.

The by-products obtained from gas works and from coke-oven plants are of very great importance. Before discussing these in detail, a brief description of the plants themselves will be given.

The coking of coal for the manufacture of coke is carried out in what are known as coke ovens. There are two types of these in common use, known respectively as beehive and retort ovens.

As already stated, coal during coking loses gas and volatile matter. In some cases these are immediately burned in or adjacent to the ovens, and produce the heat required; in other cases the volatile matter is collected, its more valuable constituents saved, and only the residual gases burned. Coke ovens, therefore, whether beehive or retort, can be classified as non-recovery ovens and by-product recovery ovens.

Three types of ovens will be considered as illustrating three of the above classes. The fourth class—the by-product beehive oven—is not very important, and is not employed in Canada.

Non-recovery Beehive Oven.—This is the simplest type of oven in common use. It has a circular floor and domed roof, and is usually built of brick or stone lined with firebrick. The ovens are built back to back, in long rows, with the object of economizing heat and space. In operation, a suitable charge of coal is fed into the oven through a hole in the roof, the brickwork of the oven having been left hot enough by the preceding charge to start the coking of the coal and ultimately to ignite the volatile matter driven off. Air is cautiously admitted through loose brickwork in the door in front, and in such a way that the volatile matter escaping from the coal is burned in the oven over the charge, and the coal and the coke preserved, as far as possible, from oxidation. The heat generated by the combustion of the volatile matter is radiated down from the roof, and completes the coking commenced by the heat from the brickwork, and the whole oven is raised to a red heat. When the coking is completed—usually after about 72 hours—the coke is drawn out and quenched with water, and a fresh charge of coal is introduced into the oven. In most beehive-oven plants the coke is drawn out by manual labor, as the shape of the oven is not suitable for the utilization of mechanical extractors. Occasionally, the hot waste gases leaving the oven are carried under boilers, and used to generate steam, but otherwise coke is the one and only product of this type of oven.

Some beehive ovens have been so constructed as to allow of the recovery of by-products; but in these, the simplicity of the ordinary beehive oven is lost, without gaining the advantages obtained from the retort oven.

Non-recovery Retort Ovens.—In non-recovery retort ovens, the coal is coked in long, narrow retorts built of firebrick. The retorts may be arranged either horizontally or vertically, in batteries. They are made slightly wider at one end than the other, to allow of the ready discharge of the coke from the oven by means of a ram or by gravity. Coal is charged into a hot oven, as in the case of the beehive oven, but no air is admitted into the oven itself. The volatile products from the coal leave the oven through special ports, are then mixed with air, and burned in flues surrounding the oven. The heat of their combustion is conducted back into the oven through the walls, and the coking of the coal is thus completed. The hot gases from the flues are often used to generate steam, but otherwise coke is again the one and only product of this type of oven.

By-product Retort Ovens.—The construction and operation of these ovens is in many ways similar to that of the non-recovery retort ovens, indeed so much so that some retort ovens can be operated either with or without by-product recovery. The difference consists in the fact that, with the recovery ovens, the gases and other volatile products from the coal are led away through pipes to a hydraulic main, and thence to a recovery plant where they are passed through con-

*Extracts from a report entitled "Products and By-products of Coal," published by the Mines Branch, Ottawa.

densers, scrubbers, etc.; and in this way ammoniacal liquor and coal tar are obtained—as in a coal-gas plant. Enough of the purified gas is then piped back to the battery and burned in flues surrounding the retorts to keep the ovens at the temperature requisite for good coking. In this type of oven, regenerators are commonly used to preheat the air and gas before they are burned in the flues. The resulting economy is such that, unless the coal is low in volatile matter, only half the purified gas is required to heat the ovens, while the remainder—a valuable by-product—can be used for other purposes. In this connection it might be pointed out that the superior economies in the working of a by-product recovery coke-oven plant, as compared with a coal-gas plant, together with the superior quality of the coke produced, make the former a rival to the coal-gas plant, even as a means of supplying city gas; but the substitution is possible only where there is a large demand for coke of high quality.

Types of Coke Ovens Compared. — Until recent years there has been a decided prejudice against retort oven coke; the product of beehive ovens has been more in demand, especially for use in blast furnaces. This preference, however, is fortunately disappearing. As a matter of fact, retort ovens can make as good coke as beehive ovens, and can make more of it from ordinary coking coals. They have, moreover, a wider range of adaptability as they can produce a commercial coke from certain classes of coal which cannot be coked in a beehive oven. Hence the retort oven is gradually displacing the beehive oven, and in some countries the change is almost completed.

Beehive ovens, as a rule, are a nuisance in the neighborhood where they are located, they burn or waste all the gases and volatile matter generated from the coal, and they give no return except that of the coke produced. Moreover, they also burn about 10 per cent. of the coke itself. In other words, if, with a certain coal, a 75 per cent. yield of coke is obtained in a retort oven, probably only 65 per cent. would be obtained in a beehive oven. In the former case 134 tons of coal would be required to produce 100 tons of coke; whereas, in the latter case, 154 tons would be required. That is to say, for every 100 tons of coke produced in a beehive oven, 20 tons of coal, approximately, are needlessly wasted through the burning of the coke. From the ethical point of view, therefore, there can be no hesitation in condemning the beehive oven; while from the practical point of view it should be remembered that, in addition to the smaller yield, the greater waste of carbon in the beehive oven results in a higher percentage of ash in the coke produced. The beehive oven has the further disadvantage that the coking period is at least one and one-half times as long as in a retort oven, so that, if the charges are the same, it takes three beehive ovens to do the work of two retort ovens. The cost of working a beehive oven is also high, as the method of drawing the coke by manual labor is slow and expensive. The beehive oven is, however, very low in first-cost, and being simple in construction, is also easy to keep in repair. These facts, together with the widespread prejudice in its favor, and the great number of managers and men familiar with its use—but unfamiliar with retort-oven practice—explain the reluctance of so many coke manufacturers to adopt retort ovens.

It is probable that in nearly all cases the non-recovery retort oven is, in the long run, more profitable than

the beehive oven, and that it would certainly prove to be so in all large plants. The capital outlay is greater, but the working expenses are less; while the output of coke is at least 10 per cent. more for the same amount of coal used.

In Canada, at the present time, the profits to be gained by the recovery of by-products are more doubtful. On account of the high capital cost of a by-product plant, it is essential that there should be a reasonable certainty of working full time; hence it is usual to erect large central plants, where they are capable of drawing supplies from several collieries, and where a good market for the products is of easy access. Evidence given before a Royal Commission on Coal Supplies in England would appear to show that, there, the value of the by-products will not only pay for the working of such a coke plant, and provide a profit, but will also pay for the capital outlay within ten years. Various uses for coal tar are given later; but it seems certain that by-product recovery coke-oven plants which produce tar, and the coal-tar industry which uses coal tar as a raw product, must grow up together.

At the present time, there are only two by-product recovery coke-oven plants operating in Canada; yet in 1913 these two plants were responsible for two-thirds of the total coke production of the Dominion. As coke is imported, their production, however, only amounted to half the total consumption of coke in the Dominion. We may confidently expect that the tendency of the future will be towards the recovery of coal tar and ammonia at all coke and gas plants.

Properties and Uses of Coal Products and By-products

Coke is the name given to the solid residue left by the destructive distillation of coal, or of some other carbonaceous substances. It consists mainly of carbon, together with the original ash of the coal, but always contains small amounts of volatile matter which the temperature attained in the coking process has failed to drive out during the time the heat was maintained.

When coal is strongly heated in absence of air, it is decomposed, and loses water, gases and volatile compounds. Many coals so heated first fuse or soften, and then harden as decomposition progresses, ultimately leaving a strong coke. This coke, although quite hard, is light and cellular, owing to the bubbles produced by the escaping gases while the mass is soft. Neither anthracite nor lignite coalesces when heated, hence neither is capable of making commercial coke. The fragments left after the heating might strictly be described as coke, but they are approximately the same size and shape as the original pieces of coal, and bear little or no resemblance to the hard porous substance commercially known as coke. Some bituminous coals also fail to coke, or else make so weak or impure a material as to be worthless.

Coke bears the same relation to coal that charcoal does to wood. For many purposes, such as blast furnace smelting coke is so far superior to coal as a fuel, that it is necessary to go to the trouble and expense of coking the coal before use. The chief advantages of coke as a fuel are:

1. It is strong and hard, and does not crumble or soften when burning; thus it can support a heavy charge of ore, etc., in a furnace, without crushing or melting down and obstructing the blast.
2. It burns without producing tar or smoke.

3. It has a high calorific intensity; that is to say, a higher temperature can be obtained by burning coke than by burning coal, although a given weight of coal will naturally evolve a larger quantity of heat than will the coke produced from it.

Coke is the main product of cokeoven plants, and is a by-product of gas plants. A coke manufacturer selects coal that is capable of giving good coke, and treats it in such a way—with regard to the mass coked, temperature of oven, and duration of coking—as will produce a good quality of coke. The gas manufacturer naturally regards the quantity and quality of gas produced as his chief consideration, the quality of coke being only of secondary importance; his choices of coal, etc., are, therefore, all made from the viewpoint of gas production. Consequently gas or retort coke is practically always inferior to oven coke, as regards hardness, strength, lustre, etc.; but the former has advantages over oven coke for certain purposes, since it contains more volatile matter, and consequently burns more readily.

The most important uses of coke are in metallurgical operations, such as the smelting of iron in blast furnaces; the remelting of iron in the iron foundry; and the smelting of copper, lead, nickel, silver, etc. Oven coke is always used for these purposes, as a strong, hard coke is required. For blast furnaces, great compressive strength is essential; but for copper smelters, porosity is important. During 1913, 1,417,148 tons of coke was used in the blast furnaces of Canada; this amounted to about 65 per cent. of the total consumption of metallurgical coke in the Dominion.

Gas coke is chiefly used for steam raising, domestic heating, etc. It has the great advantage over soft coal that it can be burned in an ordinary grate without producing smoke and soot; this is a matter of great importance for the cleanliness of our cities even now, and will become more so as the cities increase in size. Where hard coal is burned, nothing is gained as regards smoke reduction by a change to coke; there is, however, a great deal to be said in favor of coking all bituminous coal that will form a commercial coke, thus obtaining the two clean fuels coke and gas, and recovering the valuable by-products tar and ammonia.

Gas coke can prove satisfactory for steam raising only where it is burned under suitable conditions. It has a comparatively high temperature of ignition—although not so high as that of oven coke—and requires a good draught. It gives a more localized heat than coal, on account of the absence of flame, and when burning freely gives a more intense heat; it is therefore liable to cause troubles such as the burning of the firebars and the formation of clinker. The latter trouble is accentuated by the fact that coke naturally contains a higher percentage of ash than the coal from which it is made. The difficulties attending its use are, however, not unsurmountable, as is shown by its successful use in many plants. A suitable furnace should be employed, and the method of stoking adapted to the fuel. Crushing the coke to a small uniform size is generally advantageous. Troubles due to ash and clinker would be reduced if the coal for use in gas plants were first washed, as is frequently done with coal for coke-oven plants. Washing the coal would also reduce the sulphur in the resulting coke.

Ammonia is obtained as a by-product in the distillation of coal in gas works, in coke-oven plants, and in producer gas plants. The quantity depends on the percentage of nitrogen present in the coal; but other factors, e.g., the temperature and shape of the retorts,

ovens or producers have also an influence on the fraction of the nitrogen which is evolved as ammonia. Generally nitrogen is present in coals to the extent of one or two per cent., but in gas works only about 14 per cent. of this is recovered as ammonia in the gas; this latter percentage may be sensibly increased by adding lime to the coal, or by passing steam through the retort during distillation. Increasing the steam used also increases the ammonia yield from gas producers. The Mond producers are run so that a very high yield of ammonia, amounting to about 60 per cent. of the nitrogen of the coal, is obtained by means of the large excess of steam which is passed through the fuel bed; the steam favors the increased percentage of ammonia by lowering the temperature of the producer below the point at which ammonia decomposes, and also by acting as a diluent to the gases evolved.

In gas and coke-oven plants some of the ammonia is washed out from the gas in the hydraulic main, purifiers, etc., but the bulk of it is recovered from washers and scrubbers installed for the purpose. As small a volume of wash liquor as possible is used in these washers, to prevent undue dilution of the ammonia in the resulting ammoniacal liquor.

Coal gas and coke-oven gas contain ammonia, carbon dioxide, sulphuretted hydrogen, cyanides, etc. As these gases combine chemically and dissolve in water, the ammoniacal liquor obtained is a complicated solution containing the following ammonium salts: acid and neutral carbonates, acid and neutral sulphides, thiocarbonate, cyanide, thiocyanate, ferrocyanide, sulphate, thiosulphate, sulphite, chloride and acetate. Because solutions of the carbonates, sulphides, cyanide and acetate readily give up their ammonia when boiled the ammonia in these salts is called "volatile." The other compounds require the addition of lime to liberate the ammonia, which in these salts is said to be "fixed." The ratio between the "volatile" and "fixed" ammonia in gas liquors varies widely, but that liquor with the largest proportion of "volatile," is naturally the most valuable. In producer-gas plants the gas is washed in towers by dilute sulphuric acid, and ammonium sulphate is directly produced.

The ammoniacal liquor obtained as above is distilled before and after the addition of lime, and the ammonia liberated is passed into sulphuric acid yielding ammonium sulphate, or into water yielding the ammonia solution generally known as ammonia, ammonium hydroxide, ammonia water, etc. This treatment of the gas liquor is not profitable in smaller plants, and from such places the liquor is generally shipped to central plants for distillation.

Uses of Ammonia—A strong solution containing about 10 per cent. ammonia, as obtained by simple distillation, is largely used for the manufacture of ammonia soda, and for cleaning purposes; while the more concentrated solution "liquor ammoniac," and anhydrous liquid ammonia, are used in refrigerating machinery. Ammonium nitrate, which is usually made from ammonium sulphate and sodium nitrate, is being increasingly used in explosives. Ammonium chloride, which is produced directly from the gas liquor, or from ammonium sulphate by boiling with common salt, or obtained from waste liquors of ammonia-soda works, is used for soldering, for galvanizing iron, for calico printing and for Leclanche cells and dry batteries. A process by which ammonia is converted into nitric acid has recently been patented by Ostwald, and will probably prove to be a very important applica-

tion of ammonia. Ammonium sulphate is the most important salt of ammonia; its possible useful application as a fertilizer is practically unlimited. As yet the need of fertilizers has not been felt so keenly in Canada as in older established countries, but its use here is bound to extend rapidly. During the last year there has been a tendency for the price of ammonium sulphate to drop, partly owing to the competition of other fertilizers now produced on a large scale by the fixation of atmospheric nitrogen by electrothermic processes, and partly owing to the progress which is being made with Haber's synthetic process for ammonia production. The war has caused a brisk demand for nitrates in the manufacture of explosives, and the removal of these nitrates from the fertilizer market, should bring about an increase in the price of ammonium sulphate.

Cyanides.—In the dry distillation of coal, up to 2 per cent. of the nitrogen of the coal is evolved in the form of cyanide, and is recovered both in the washers and scrubbers along with the ammonia, and in the purifiers where ferrocyanide is formed with the ferric oxide. The potassium cyanide, ferrocyanide and ferricyanide, which are worked up from cyanogen compounds of the gas, are very important by-products of the gas industry. In the twelve months ending March, 1914, Canada imported 1,615,490 lb. of potassium and sodium cyanides and 166,901 lb. of yellow and red prussiate of potash (potassium ferro and ferricyanide). The simple cyanides have a wide application in mining operations; the yellow prussiate is used for making potassium cyanide, for dyeing and for case hardening steel; and the red prussiate is much used in photography.

Coal-tar.—Probably the greater part of the world's production of tar is distilled in order to obtain the more valuable products described later; but there are many uses for entirely raw tar, or for tar in its dehydrated state (i.e. after it has been heated in closed vessels to remove the water, and, incidentally, to recover the benzol). Dehydrated tar finds wide application in the preparation of roofing felt, and for preserving timber, stone, iron, etc. Tar has, weight for weight, a slightly higher heating value than coke, and is now being used as a fuel. Formerly it was simply poured on to solid fuel, but under these conditions combustion was by no means complete; now the tar is usually injected in the form of a fine spray by means of steam or air and so comes in intimate contact with the air, this resulting in complete combustion. Tar is sometimes simply mixed with coke for heating retorts in a gas plant or used in conjunction with coke-oven gas for heating coke ovens. It is also converted into a gas by being passed through red-hot tubes.

There are so many valuable products which may be obtained from tar that its use as a fuel is, from the standpoint of conservation, to be condemned; but it must be admitted that in very many cases the tar has to be used in this way. Large gas and coke-oven plants can profitably have a tar-distilling plant in addition; but the distillation of tar in small works is not remunerative. In the latter case, the tar may be shipped to central distilling plants, but even this procedure is not commercially possible where the gas or coke-oven plant is isolated, and consequently the cost of transportation high. In such cases the use of tar for fuel is the only possible one.

Coal tar is distilled in wrought iron stills. These stills are usually upright cylinders of 10 to 20 tons capacity, sometimes heated by steam, but more often by a direct fire. As water in tar sometimes causes

bumping in the stills, it is removed as completely as possible before hand. With thinner tars the water settles out on the surface at ordinary temperatures sufficiently well to be run off, but thicker tars require to be moderately heated to cause a satisfactory separation. The still-head is connected with a condensing worm, from which the various products of distillation are conducted into different receivers. At the end of the distillation process, the fire is drawn out and the temperature allowed to fall to a point at which the pitch left behind in the still—though remaining liquid—will not ignite when it comes in contact with the air. This pitch is then run out into barrels, or other suitable receivers. Sometimes, in the last stages of the distillation, superheated steam or a vacuum is utilized, since either of these causes the high-boiling-point products to pass over at a lower temperature than would otherwise have to be employed. Recently, tar has been successfully treated in continuous distillation apparatus.

As is shown below, the various first products of coal tar give, on refinement, numerous compounds of supreme importance in technical chemistry. The amounts of these compounds obtained from tar vary considerably with the nature of the tar itself; and the following figures merely give an approximate idea of the quantities which may be expected from an average coal tar:

	Per cent.
Derivatives of Coal Tar—	
Benzene and homologues	2.5
Phenol and homologues	2.0
Pyridine and other bases	0.25
Naphthalene.	6.0
Heavy oil	22.0
Crude anthracene (30% pure)	1.5
Pitch.	60.0
Water and loss	6.0

Commercial Products of Coal Tar; Their Uses and Derivatives.

90% Benzol.—Uses—As a solvent for the manufacture of colors, for extracting fat from bones and seeds, and for making iron varnishes; also, as a detergent; as a fuel for internal combustion engines; and for carburetting gas.

Derivatives—By distillation, pure benzene, toluene, xylene, etc., are obtained. Benzene is widely used in the preparation of numerous technical organic products. From it nitro-benzene, aniline, etc., are readily obtained, and therefore it is the parent substance of the numerous aniline dyes; of many artificial perfumes; and of photographic developers, etc. Toluene and xylene are used in the preparation of certain dyes. The former gives on nitration trinitrotoluene, a substance used in the manufacture of explosives.

50% Benzol.—Use—As a substitute for the 90 per cent. benzol, in the manufacture of certain dyes.

Solvent Naphtha.—Uses.—As a solvent for rubber in the preparation of waterproof fabrics; as a detergent; and a solvent in the purification of anthracene.

Crystalline Carboic Acid.—Use—As an antiseptic. **Derivatives**—By nitration, carboic acid gives picric acid, which is used in the manufacture of many important explosives, and of some dyes. It is the source of many substances used in the color industry (e.g. salicylic acid), and of certain photographic developers (e.g. metol).

Liquid Carbolic Acid.—Uses—As a liquid antiseptic and as the active principle of disinfectant soaps, powders, etc.

Naphthalene.—Uses—For carburetting gas; for disinfecting purposes; for driving explosive motors; for preserving raw hides; and, sometimes also for fuel. Crude naphthalene is usually employed for the above purposes.

Derivatives—Pure naphthalene is the starting point in the manufacture of a large number of important artificial colors (phthalein colors, azo-colors, indigo, etc.).

Heavy Oil; also called Creosote oil.—Uses—As an illuminant where smoke is no objection; as an antiseptic; as a timber preservative; as a lubricant; as a binder, when mixed with pitch, in the manufacture of patent fuels; as a fuel, and as a solvent.

50% Anthracene.—Uses—Not important.

Derivatives—Anthracene is the raw material from which alizarin and other important coloring matters are manufactured.

Anthracene Oil.—Uses—For lubricating purposes; for timber preservation; for making soft from hard pitch; for removing naphthalene from coal gas.

Pitch.—Uses—For road making; for preparing artificial asphalt by admixture with heavy oil; for manufacturing varnishes by admixture with middle oil; for making patent fuels, after softening by admixture with heavy or anthracene oil; for insulating cables,

etc.; for roofing; and for making coke for electric carbons.

U. S. BUREAU OF MINES REPORT ON COAL TAR PRODUCTS.

The United States has recently been brought to a realization of its dependence upon German sources for coal-tar and "gas benzol" by-products, and this unenviable situation, which applies to Canada as well, is no more to their liking than it is to ours. With characteristic alacrity, however, which by the way, our department might advisedly emulate, their Bureau of Mines has published a synoptical and comprehensive pamphlet* pertaining to the ability of the United States to meet its own requirements in these commodities. Such published information will undoubtedly serve to stimulate the industries involved to greater effort; and as it is of great moment to us in Canada as well, and as we possess the same potentials for like industries, it is of timely interest to extract some of the salient features from this pamphlet.

Coal-tar in general comprises from 3 to 5 per cent. of bituminous coal (by weight), say 7 gallons per ton of coal. Ten per cent. of coal-tar can be made into drugs and dyes. Ninety per cent. of coal-tar can be made into pitch and various heavy oils.

A table showing the crude fractional distillation products of coal tar with their uses is given and is as follows:

Fractions of Average Coal Tar and Their Uses.

First crude separation by distillation.	Light oil	Middle oil (or dead oil).	Heavy oil (including anthracene oil).	Pitch.
Temperatures of distillation.	70°-160°C.	160°-230°C.	230°-360°C.	Above 360°C.
Percentage in tar..	3.	8.	24.	65.
Intermediate products, by distillation or other expression.	Benzene, toluene, xylene, etc., phenol.	Phenol, cresols, etc.; naphthalene, heavy hydrocarbons.	Cresols, naphthalene, anthracene; heavy hydrocarbons; quinoline bases.	Soft pitch, hard pitch.
Crude commercial products and their uses.	"Benzol" and solvent naphtha for solvents, paint thinners, motor fuel, gas enrichment.	Creosote oil. Lamp black. Disinfectants. . . .	Road oils, impregnation of timber. Roofing tars. Paving tars.	Pitch, briquetting, protective paints.
Intermediate chemical products.	Nitro benzene, aniline salts, aniline oil, carbolic acid.	Carbolic acid, picric acid, phthalic acid, naphthols, naphthylamines, salicylic acid	Anthraquinone, alizarin.	
Refined chemical products, dyes, etc., and their uses.	Nitrotoluenes, diphenylamine and other ingredients of explosives; aniline dyes; hydroquinone and other photographic developers; drugs and medicines.	Picric acid, picrates and other nitro-compounds for explosives; naphthol dyes and colors, artificial indigo, refined carbolic acid.	Alizarin dyes.	

*Coal Tar Products and the Possibility of Increasing their Manufacture in the United States, by Horace C. Porter, with a Chapter on Coal Tar Products used in Explosives, by C. G. Storm. Technical paper 89, Bureau of Mines, 1915.

Gas benzol, or light oil, is abstracted from coal gas. Gas benzol comprises nearly 1 per cent. (by weight) of high grade gas coals, say 1½ gallons per ton of coal. One hundred per cent. of gas benzol can be made into dyes and refined preparations.

About 25 per cent. of combined yield of tar and "benzol" may be turned into dyes, drugs and refined chemicals which were heretofore obtained from Germany.

Germany's leadership in production and utilization of these by-products is well instanced by the following comparative figures for 1913:

	Germany.	U. S.
Coal output, tons	295,000,000	475,000,000
Coal-tar, gals.	250,000,000	150,000,000
Benzol, gals.	50,000,000	7,500,000
Coal-tar imported, gals.	3,500,000	500,000
Value of exported dye-stuffs \$55,000,000		
Value of imported dye-stuffs		*\$10,000,000

*Practically entire consumption.

The raw materials "coal-tar" and "benzol" are obtained from by-product coke ovens and gas retorts.

"Benzol" in illuminating gas has so far been a requirement, and until illuminating gas gives way to fuel or heating gas, or until some other illuminant derived from the same sources be substituted, it is unlikely that municipal gas-making plants would strip the "benzol" for other purposes.

The chief coal-tar products with their uses may be summed up as follows:

Creosote oil.—Comprises 15 to 30 per cent. of the coal-tar. Water-gas tar on the other hand yields no true creosote, although this tar is sometimes substituted for creosote. Creosote is largely used for the impregnation and consequent preservation of wood, such as railroad ties, mine and structural timbers, piling, paving, blocks, etc.

Light oil, benzols and solvent naphthas.—The light oil contains benzene, toluene, xylene and small proportions of other compounds. This distillate is the basis of aniline dyes, certain nitrocompounds used in explosives, also medicines, drugs and photographic chemicals.

The light oil is used for solvents, cleansers, pitch-paint thinners, gas enrichment, etc.

Heavy tars and pitch products.—Comprise 50 to 80 per cent. of the tar. They are useful for road binders, road-treatment oil, roofing papers, roofing pitches and protective and waterproofing paints. The hard pitch product is utilized as a binder for briquetting coals, and for certain electrical uses.

Naphthalene and anthracene, useful for certain dye-stuffs, can be extracted from these fractions without detracting from the other uses enumerated.

Aniline dyes.—These are obtained chiefly from benzene, toluene and phenol through the preparation of nitrosubstitution products of these and various complex chemical transformations or combinations with other materials. In the process of manufacture sulphuric, nitric and acetic acids, caustic alkalies, alcohol, zinc dust, sodium nitrate, chlorine and bromine are requisitioned.

Naphthol Dyes.—Obtained through the intermediate products of naphthalene, such as naphthols, naphthylamines and phthalic acid.

The eosin dyes are derived from resorcin (a benzene product), and phthalic acid.

Artificial indigo is a product of naphthalene.

Five to ten per cent. of the tar content is naphthalene.

Alizarin dyes.—Made from anthracene by oxidizing the latter to anthraquinone, and then converting this into various hydroxy-anthraquinones and their derivatives, alizarins, purpurin, etc.

Between 1 and 2 per cent. of crude anthracene is contained in coal-tar.

The dyes enumerated above are the chief ones, although there are others of less importance.

Carbolic acid or phenol.—Is distilled from the light and middle oils. 0.3 to 1.0 per cent. of the crude tar is phenol. Carbolic acid is also produced synthetically from benzene through benzene-sulphonic acid.

Phenol, aside from its antiseptic uses, may be utilized in the manufacture of picric acid for explosives and certain dye-stuffs.

A substance resembling celluloid can be obtained by condensing phenol with formaldehyde.

Miscellaneous chemicals and drugs—such as benzoic and salicylic acids, certain photographic developers, hydroquinone, etc., acetanilid, acetphenetidid (phenacetin), saccharin, antipyrin, acetyl salicylic acid (aspirin), phenolphthalein, and many other drugs.

Explosives.—Mention has been made of the importance of coal-tar products in the manufacture of explosives.

The raw materials are benzene, toluene, naphthalene and phenol (carbolic acid). These are used in the various nitrosubstitution products which form the basis of explosive mixtures so much in demand for rock and other blasting purposes, as well as for purposes of war and sport.

The chief nitrosubstitution products are nitrobenzenes, nitoluenes, nitronaphthalenes, picric acid and pierates.

The pamphlet concludes with a short monograph by Mr. Horace C. Porter upon the "Commercial and Economic Phase of the Coal-tar Situation," which, on the whole, is favorable to the adoption of measures whereby the industry could be encouraged in the United States. One of the considerations which affects them is the validity of certain German patents upon chemical processes involved in the manufacture of some of the products. In Canada these could, and should, be overridden at this time by annulling any rights a German subject may have in so far as every such patent applies to Canada.

GOULD CONSOLIDATED.

According to "Financial Times," Gould shareholders at a meeting in Ottawa endorsed the following proposals: That the present company be re-organized, the capitalization being reduced to \$2,000,000 from \$3,000,000; that 250,000 shares of the par value of \$1.00 be given to parties for two claims in the Porcupine district, which the owners of the claims have accepted; that 751,000 shares be given to a syndicate in Detroit for \$75,000; that 750,000 shares be given the present shareholders of the Gould stock, which would be a ratio of one share new to four shares old, and that 249,000 shares of the new stock be left in the Treasury. The company also intends to try and re-lease the property in Cart Lake from the Peterson Lake Company, which lease was cancelled a few months ago. The giving of 751,000 shares to the Detroit syndicate has given them control of the company. If the company can re-lease the Cart Lake property, they intend to actively work it. The same directors as were appointed to manage the old Gould have been appointed to the new company.

PERSONAL AND GENERAL

Mr. James Cronin, of Spokane, Washington, who owns mineral claims in the Babine mountain section of Omineca mining division, British Columbia, was in Victoria recently, on his way home after having spent several months on his mining property.

Mr. J. H. Roaf, manager for the Pacific Coast Coal Mines, Ltd., with coal mines at South Wellington and other parts of Vancouver Island, is now with the military forces in British Columbia preparatory to leaving for active service in Europe.

Mr. George E. Farish, formerly manager of the Motherlode Sheep Creek Mining Company, with a gold mine and modern stamp mill at Sheep Creek, Nelson mining division of British Columbia, was lately examining mining property in New Mexico for New York clients.

Mr. James L. Bruce, of Butte, Montana, manager for the Butte & Superior Copper Company, has been spending a summer vacation with relatives at Victoria, British Columbia.

Mr. Thos. Kiddie has returned to Alhambra, California, after having spent the summer at the home of his eldest son, Mr. John Kiddie, in Morenci, Arizona.

Mr. K. C. Pepper has been appointed mill superintendent at the Schumacher gold mine, Porcupine.

Mr. Gwynne G. Gibbons, for some time with the Canadian Exploration Co., investigating mining properties in Ontario and British Columbia, has obtained a lieutenancy in the Royal Engineers, and is now with the 200th Field Company at Morecambe, England.

Mr. J. Cleveland Haas, of Spokane, Washington, is developing under option of purchase, some promising copper claims in the northern part of Vancouver island.

Mr. J. E. McAllister, of Toronto, has returned from a trip to the Pacific coast.

Mr. E. Jacobs, of Victoria, and Mr. Dudley Michell, instructor in first aid and mine rescue work for the British Columbia Department of Mines, attended a first aid and mine rescue meeting at Cle Elum, Washington, on July 31. Thirteen teams, each of six men, took part in the first aid contests, and seven teams of five men each in the mine rescue events, of which latter Mr. Michell was judge.

Mr. John Hopp, of Barkerville, B.C., who was in Victoria about the middle of August, stated that summer rains had been of great value to hydraulic miners in the Cariboo district, having prolonged the gravel-washing season which, owing to the unusually light fall of snow last winter, had been expected to have been shorter than usual.

Mr. Thomas French has returned to Nelson, B.C., from a visit to Ottawa whence he went with the object of seeking aid from the Dominion Government for the establishment on a commercial basis in West Kootenay of zinc-saving works to use the French process for the recovery of zinc.

Mr. R. G. McConnell, Dominion Deputy Minister of Mines, has returned to Ottawa from a visit to Western Canada.

Mr. O. E. LeRoy, of the Geological Survey of Canada, has been engaged lately in obtaining information relative to the iron resources of British Columbia.

Major Guy H. Kirkpatrick, mining engineer, of Vancouver, B.C., of the 72nd Seaforth Highlanders, has been granted the temporary rank of lieutenant-colonel.

Mr. R. H. Ley, who several years ago was conducting an assay office at Nelson, B.C., and later was with the Giant Powder Company, is in camp in British Co-

lumbia with forces training preparatory to proceeding to Europe.

Dr. Charles W. Drysdale, who on July 15 presented an interesting paper on the geology of the molybdenite ore deposit at Lost Creek, in Nelson mining division, British Columbia, before the meeting of the western branch of the Canadian Mining Institute, held at Rossland, has returned to the Bridge River section of Lillooet district, where he will spend the remainder of the field season making geological investigations in that part of British Columbia.

Prof. F. M. Handy, of the mining engineering department of the State College of Washington, Pullman, Washington, was recently in the Ymir district of British Columbia, whence he went to meet Prof. Francis A. Thomson, head of that department, and confer with him relative to some mining problems there on which the latter engineer had been engaged to advise.

Mr. Graham Cruickshank, of Rossland, who had been in charge of the Consolidated Mining and Smelting Company's experimental concentration plant there, has gone to Victoria to prepare for taking an officer's commission with His Majesty's military forces.

Mr. John D. Galloway, of Victoria, B.C., assistant Provincial mineralogist, is spending part of the field season in East Kootenay. Later he will probably give attention to parts of Nelson mining division.

Mr. W. L. Wotherspoon, consulting mechanical and electrical engineer of the Canadian Mining & Exploration Company, Ltd., has returned to New York after a three-month trip in the Western United States and Alaska.

Mr. J. A. Allan, of the University of Alberta, was in Toronto during August.

Mr. E. V. Neelands, manager of the Cobalt Comet, and formerly manager of the Hargraves mine, has been appointed manager of the Peters mine, New Guiana. Mr. Neelands will leave for South America about the middle of September.

Mr. W. F. Ferrier has returned west after a short stay in Toronto.

Mr. A. G. Burrows is in Toronto completing a map of the Porcupine gold district.

Dr. W. G. Miller has returned to Toronto from Northern Ontario.

Mr. C. W. Knight is at Sudbury.

Mr. J. E. W. Swent left San Francisco on August 14 for Mazatlan, Mexico.

Mr. R. R. Van Valkenburgh, of Juneau, Alaska, and Miss Paula Haire were married in Salt Lake City on August 18.

Mr. A. B. Clabon has been visiting Cobalt and Porcupine mines and is now in Toronto.

Mr. Frank Loring is at Goodfish Lake.

Mr. H. W. Hardinge is visiting mines at Cobalt and Porcupine.

Mr. Elias Rogers, president of the Crow's Nest Pass Co., and Miss Anna E. King, of Hampstead, England, were married last week in New York.

STANDARD SILVER-LEAD MINING CO.

Standard Silver-Lead Mining Company showed a net profit of about \$85,000 for July. Directors have declared a dividend of 2½ cents a share, payable September 10 to stock of record August 31. Distribution calls for \$50,000. The company has almost as much shipping ore on platforms as it had when it started on July 1 last.

SPECIAL CORRESPONDENCE

BRITISH COLUMBIA

New Plant at Trail.—A press despatch from Ottawa published in British Columbia about the middle of August included information to the effect that several conferences have been held between the Shell Committee and the Dominion Cabinet, the result of which is contained in the statement of General Bertram that agreements have been made and were closed for the refining at Trail, B.C., and other places, of both copper and zinc. It has been known for several weeks to a comparatively few well-informed men resident in British Columbia that there had been negotiations between the management of the Consolidated Mining and Smelting Company of Canada, Ltd., and the Dominion Government relative to the refining of copper at Trail, and that preparations in that direction were already being made. The work of putting in a copper converting plant at the Trail smeltery was arranged for some time ago, and when the plant was visited early in July it was seen that space for the converters was being cleared on the matte-tapping floor. The electrolytic refining of lead has long been an important part of the company's industry at Trail. It was to be expected that in due course the electrolytic refining of copper would also be undertaken there, and the time has now arrived for an extension of the company's operations in this direction.

Ymir Mining Camp.

While there has been little mineral production from properties in Ymir camp, Nelson mining division of West Kootenay, during the last two years, development work has been in progress at several mines, among them at least two that in earlier years made a considerable output of gold ore. These are the Wilcox and the Yankee Girl. Others that have been worked since production practically ceased are the Dundee, Jennie Belle, Canadian Pacific, Porto Rico, Iowna, Nevada, Commodore, and still others the names of which are not just now recalled. During the 1914 field season, Dr. Chas. W. Drysdale, of the Geological Survey of Canada, spent several weeks in the camp, he having been instructed, "in order to aid in the mining development of this camp to make a sketch topographical and geological map of the region, and to pay special attention to the working mines and deposits of prospective value." From a published brief outline account by Dr. Drysdale, the following notes have been taken: "The area assigned includes the mineralized zone lying south of Halls, east of the crest of Quartzite range, and north of Salmo. The west boundary of the map-sheet is about five miles west of the Nelson and Fort Sheppard railway, and includes the Fern and Porto Rico mines. The town of Ymir—the centre for the gold camp of the same name—is situated on the Nelson and Fort Sheppard railway 27 miles south of Nelson and seven miles north of Salmo. The Ymir camp is one of the oldest lode mining camps in British Columbia. In 1885, the Hall Bros., who two years later discovered the Silver King mine near Nelson, made locations near the headwaters of Wild Horse creek, which flows into the Salmon river near Ymir. In 1893 the construction of the Nelson and Fort Sheppard railway (which connects with the Spokane Falls and Northern railway and so completes railway communication between Nelson and Spokane, Washington), afforded easy access to the district. It was not until the summer and autumn of 1896, however, when the min-

ing boom was on at Rossland, that prospectors began to pay attention to outside districts. It was then that mining activity really commenced at Ymir, and among the many mineral claims that were staked in 1896 were the Ymir, Elise, Dundee, Wilcox, Porto Rico, and others. In 1897, Mr. R. G. McConnell, now Dominion Deputy Minister of Mines, examined and reported (see Summary Report of the Geological Survey, Canada, 1897, pp. 31-32 A) on the district in connection with the preparation of the West Kootenay map-sheet. For several years the camp had a comparatively steady growth, free from mining booms, and many of the properties then in operation have been working intermittently ever since, whereas others through complications in geological structure and for other reasons have been abandoned."

As Ymir camp is again having the attention of mining men, the present is probably an opportune time to recall that some years ago the chief production of lode gold was from the Ymir mine, relative to which the following information was given in the "Report of the Mining and Metallurgical Industries of Canada, 1907-8," issued by the Mines Branch of the Canada Department of Mines in 1908.

The Ymir Gold Mines, Ltd., incorporated in 1898 and reconstructed November 21, 1902, capital £200,000, owns, under Crown grant, four mineral claims aggregating 163 acres, situated on the north fork of Wild Horse creek, five miles from the town of Ymir. At this mine a quartz vein has been very extensively developed, and large bodies of ore stoped; notably that known as the Bonanza orebody, which was 480 ft. long, 500 ft. deep and between 10 and 40 ft. wide. The ore shows a comparatively heavy mineralization of chiefly pyrite, galena and zinc blende, and occasionally has developed bunches of shipping ore. During the years 1900 and 1901, the output of the mine approximated 5,000 tons a month. An 80 stamp mill was in operation, while active development work was in progress, including the driving of a tunnel to tap the vein at a depth of 1,000 ft.; and a cyanide plant was installed. The recoveries in bullion and concentrate at that time represented a value of about \$9 a ton, while the cost, including actual mine development, but exclusive of expenditure on account of the long tunnel operations, was from \$3.50 to \$4 a ton. Meanwhile, the development of the lower levels has afforded very disappointing results: for although a considerable quantity of ore was mined from Nos. 6 and 7 levels, such ore as was encountered in the lower workings occurred in isolated bunches, and no definite ore shoot has as yet been cut in the tenth level. The mill has treated to date about 350,000 tons of ore; some 20,000 tons of concentrate, and nearly 600 tons of crude ore have been shipped to smelting works. The mill building proper is a structure 160 ft. long by 83 ft. wide, provided with ore bins at the rear. The equipment includes stamps of 850 lb. each, crushing to 50 mesh at the rate of 2.5 tons daily. Concentration was accomplished by 24 Frue vanners. The mill was operated by water power, aided by steam, both being connected on the same line shaft. The cyanide plant is situated half a mile below the stamp mill, the difference in altitude being 300 ft. A riffled launder, 6 x 8 in., equipped with drop boxes, conveyed the pulp from the mill to the cyanide plant. Experiment having determined that the chief value was contained in sands, the plant was erected for percolation, and the classifiers were so arranged as to run

slime to waste, which represented about 20 per cent. of the ore. The plant comprises six steel riveted tanks 30 ft. in diameter, and provided with Butters distributors; it was operated by a Pelton wheel under 320 ft. head. A compressor, previously operated at the mill by steam, was removed to the cyanide plant building and was there driven by water power, the driving wheel having been increased and 24 buckets attached. It may be added that the Ymir Gold Mines, Ltd., paid dividends to a total of £60,000. Among its managers at different periods were Messrs. J. Roderick Robertson (deceased), S. S. Fowler, G. H. Barnhart, R. M. Atwater, Jr., and S. J. Speak. It is hoped that renewed efforts will yet be made to find the vein, which is believed to have faulted, at the 1,000 ft. level.

Little information has been made public of late concerning the Wilcox mine, another Ymir property that some years ago yielded profit to its operators, but it is known that developments at greater depth have proved the occurrence there of ore of higher value than in the levels above.

Coast District.

Granby.—Metalliferous lode mining in the Coast district is now giving employment to more men than at any other time for years, probably more than ever before. Copper mines have much bigger payrolls than either gold or silver-lead, especially those of the Granby Consolidated and Britannia companies. The Granby Co. is reported to be operating at full capacity, sending down from its Hidden Creek mine to its smeltery at Anyox by far the greater portion of the ore required to keep the furnaces of its reduction works in blast. Figures published in Boston show a production of copper at Anyox for five months to June 1 of approximately 7,455,000 lb. For May the output was placed at 2,021,000 lb. Estimating a production at a similar rate during June and July, a total of between 11,000,000 and 12,000,000 lb. of copper from that source seems to be about what has been made this year. It has been stated that a fourth blast furnace would be completed before the end of August, in which case a larger monthly output of copper may be made hereafter.

The Britannia Co. has been pushing on with its construction work, and the installation of new plant and machinery, for the further equipment of both mine and concentrating mill. The destruction of the upper terminal of its aerial tramway and the ore crushing plant at the mine, by the slide which several months ago wrecked part of the upper mine camp, caused a suspension of ore production, but with the completion of the renewal and new works now being vigorously pushed on, a considerably increased output will be made and thereafter regularly maintained.

The Tacoma Steel Co. has been engaged for more than a year in opening its Marble Bay gold-copper mine, situated near Van Anda, Texada island, at about 300 and 400 ft. deeper than what has been known as the 1,000 ft. level. The bottom level, known as the 1,400 ft. level, is actually only 1,260 ft. in vertical depth. Ore has been found by diamond-drilling, and the development work of the last year or more has had for its chief object the opening of the ore shoots thus proved to occur at greater depth than those in which mining had previously been done. An increase in output from this mine is, consequently, expected to be made.

Copper ore is also being mined in Omineca mining division; published reports have lately placed the output from a mine on Rocher Deboile mountain, a few miles from Hazelton, at about 100 tons a day, that by

ing the quantity stated to be sent to the Granby Co.'s smelting works at Anyox. Newspaper reports have appeared of mining operations in various other parts of the Coast district, but as some of these are plainly unlikely to be true, it will be best to await verification, or a statement of facts before giving further publicity to them.

COBALT AND GOWGANDA

While the price of silver has fallen below its record low level there is certainly a good deal of anxiety as to the future of this particular market. There appears to be no two men who can agree upon the prospects. Factors which apparently would lead to optimism, such as a good crop in India and the probability of standardization does not affect the price. The one barometer of the price of silver appears to be the good or ill success of the Allies. Ever since the war broke out the price of silver has closely followed the apparent progress made by the Allied powers, and there is no great reason for believing that until the war has shown a very definite promise in the direction of victory for the Allies and through this victory—peace—there will be any great advance in the price of the white metal. In spite of this uncertainty, however, the development of prospects is being proceeded with vigorously.

The Trethewey Mining Company has made final arrangements with the Lumsden Mining Company so that they can use their shaft to explore the Rochester. Some time ago a crosscut under contract from their 300 ft. shaft was run 150 ft. into Rochester ground. The Trethewey has now leased this shaft and will use it and the crosscut as a basis of operation.

Twentieth Century.—Near North Cobalt the Twentieth Century Mining Company has drilled and shot the first round of holes since work was resumed.

The Mining Corporation of Canada is opening up J. B. 2, the forty acres of ground which was formerly held by the Little Nipissing Mining Company. The Little Nipissing mortgaged their property to Sir Henry Pellatt and Sir Henry turned it over to the Mining Corporation of Canada.

The lessees of the Princess, Messrs. Smith and Walker, are now running a crosscut under contract with the Mining Corporation of Canada from their 135 ft. level. This crosscut has now been pushed 200 ft. The intention of the company is to discover what ore there is along the Cobalt Lake fault which runs almost the entire length of the property.

The Mining Corporation of Canada is the more encouraged to carry out this work since the remarkable discovery that has been made on the fault on the Cobalt Lake itself. At the 430 ft. level the vein along the fault was of remarkable width in massive niccolite and cobalt, but silver values were quite low. A raise was put up, and as it progressed bunches of high grade ore were found in the vein. A level was then run at 380 ft., with the result that one of the most remarkable ore shoots in the camp has been developed; it is 26 to 28 in. wide. It has been developed now for some distance, and the ore will probably average close to 2,000 oz. In a week's development this orebody yielded 36 tons, upon which it is reckoned a profit of \$35,000 can be made. Quite recently at another point along the fault the vein has shown cobalt bloom where before it was quite barren.

The Cobalt Lake has taken a good deal of ore from the vein along the fault, but never anything so spec-

tacular as this. While it is not the widest body of high grade ore found in the camp, it is yet one of the widest, and should stimulate interest in the development of the fault on other properties. So far other properties have obtained no profitable results from development along the Cobalt Lake fault.

The La Rose has done a great deal of dead work on the fault. They found the vein to be one or two feet wide, but the silver content of the calcite was altogether too low for mining at a profit. The Right-of-Way also did some development, but without any profitable results. At the other end of the lake McKinley-Darragh at one time had some very encouraging indications, but further development did not bear out this opinion. The development on the Temiskaming and Hudson Bay at their No. 2 camp is undertaken almost solely with a view to prospecting the ground in the vicinity of the fault. So far they have had no results. The discovery on the Lake will certainly stimulate further exploration by all of these companies.

At the northern end of their property the Mining Corporation has developed what is now one of the most important systems in the camp. When they took over the control of the City of Cobalt they found that a crosscut had been run from their shaft near the Buffalo line almost to the Coniagas line, a distance of about 1,700 ft. Proceeding with exploration work on this crosscut they soon ran into this rich vein. This vein has now been developed for 450 ft. to the east and west. It is about 5 in. wide and the wall rock is always rich enough to provide milling rock for the total width of the drift. In one place the area of enrichment was so extensive that the ore has been stoped out for a width of 25 ft. In addition to the main vein, another vein has been developed for some distance to the northwest; this is about 4 in. wide of high grade ore. To the east the drift is being run from the bottom of the winze at the 300 ft. level. The contact with the Kewatin formation comes in the winze at about this level, but the conglomerate is thicker as the drift goes east. The drift is now in good conglomerate under the Cobalt town hall. The strike of the vein is directly towards Cobalt Lake. From the 200 ft. level a crosscut to the south-west has developed a vein of an average width of 5 in. of very high grade ore. In one of the walls a vein 2 in. wide has lately been opened up. The whole system is of the greatest importance, as it has all the characteristics of the orebodies in the camp that have yielded the richest ore, the highest tonnage to the mill and the most permanence. All the ore is drawn back to the Townsite shaft and hand picked and the lower grade treated in the Cobalt Reduction mill.

Bartlett.—A last appeal is being made to Bartlett mine shareholders to save the prospect in Gowganda from being sold for debts. It is stated by Mr. F. R. Hamilton, who writes on behalf of 68 shareholders who are willing to contribute something to write off the indebtedness and work the property, that if 800 shareholders would put up \$50 each something might be done. It will be remembered that a week or two ago the Bartlett was put up for auction, but a bid of only \$6,000 was made for it and it was withdrawn. Mr. Peter McClaren, who has a report on the property in the circular, states that as far as he can estimate the old management only spent \$24,000 in underground mining, although half a million dollars was raised from the public in stock. He points out that there are quite a number of good veins that could be worked on the property, and outlines a scheme of operation if the mine is again to be worked. It is understood that

there is an indebtedness of about \$40,000 against the Bartlett, and this will have to be wiped out before the shareholders can expect to benefit from any operations undertaken.

E. V. Neelands.—Of unusual interest is the appointment of Mr. E. V. Neelands of Cobalt to the management of the Peters mine in British Guiana. Mr. Neelands has been in the Cobalt camp for seven years and he is one of the best known engineers in the district. He came to Cobalt from the West to take over the management of the Hargraves mine, and until that property closed down he remained there. Before the Drummond mine was sold he was instrumental in discovering the possibilities of the mining of the low grade ore, and he has been in charge of the property since it was taken over by the Caribou Cobalt Mining Company. Mr. Neelands will go to South America about the middle of next month. The mine he will be connected with is about 110 miles up the Essequibo river from the principal city of the colony, Georgetown. The trip is made by steamboat and gasoline. At present the property is shut down, but there are excellent prospects of a good orebody being developed. The lowest level is at 400 ft., and it is understood that the property has already produced about \$1,000,000. There is a mill of twenty stamps on the property, and as the ore is said to be very free milling, extraction is entirely by amalgamation. Mr. Neelands will be very much missed from the Cobalt camp.

The Mercer Silver mines has started work on the lease which until recently was held by the Gould. It has been determined to sink the old shaft on the southwest of the property from the 40 ft. level to a point where exploration work can most conveniently be undertaken. This old shaft will serve as a basis of exploration on the Gould that has never been explored before. All the work on the Gould before was undertaken on the other side of the lake.

PORCUPINE, KIRKLAND LAKE AND MUNROE TOWNSHIP

Jupiter.—At the annual meeting of the Jupiter mines there will be quite a number of offers for that property to be considered. This annual meeting will be held on September 8th in Montreal. These offers include purchase of control and also the milling of the ore by the company itself at some nearby mills. It is believed that no one offer has yet been definitely accepted by the directorate.

Huronian.—Reports from very reliable sources state that Messrs. Timmins have taken up their option on the Huronian mine in Gauthier township. The option has been extended from month to month, the last period expiring on August 15th. It is now understood that the Hollinger financiers have decided to purchase the control of the company and to work the property. It is also understood that they have taken an option on the two claims which were diamond drilled by the Trethewey, but thrown up. A considerable amount of diamond drilling has been done and it is learned that more holes are to be put down.

Boston Creek.—Cobalt engineers have taken up a very promising claim in Boston creek. The claims under option are known as the Giovazzo. While sampling on the orebody on the surface only gives low values in gold, the quartz is well mineralized, and the orebody where it is exposed is large. It is considered that the gamble is a good one. A small gang of men will be put on to do a little developing.

Barite.—It is interesting to note that the preparations for the shipping of barite from the Premiur-Langmuir prospect on Night Hawk lake are proceeding. Two large barges have been completed at Connaught station, and these will be towed up to within a few hundred feet of the orebody by a gasoline launch. A considerable quantity of the barite ore has been broken and is now ready for shipment. It will be shipped to United States from Connaught station. As far as can be ascertained this is the first barite ore that has been shipped from Eastern Canada.

On the Dobbins claims adjoining Dome Lake, some very promising veins have recently been uncovered. Some remarkable samples have been taken from a few shots in the vein and prospecting is now proceeding with a great deal of confidence.

It is confidently believed that the first run of ore will be made at the Schumacher mill on or about the 25th of this month. All the machinery is in place and nothing is lacking now but a few minor adjustments. Mr. K. C. Pepper, who was with Mr. Houston on the St. Antony mine in Sturgeon Lake, has accepted the post of mill superintendent.

A meeting of the Porcupine branch of the Canadian Mining Institute was held in Timmins on August 16th. About 35 members were present, and Mr. A. A. Cole, secretary of the Cobalt branch, attended and tendered an invitation from the Cobalt branch for the Porcupine members to visit Cobalt on September 16th and 17th. The offer was very gladly accepted. The principal event of the evening was a paper by Mr. A. R. Globe, assistant manager of the Hollinger, on his trip through the West and in Alaska. Mr. Globe made particular reference to the oil flotation process as it is now practised in the West, and also gave some very interesting figures on mill costs and mining, particularly in Alaska in the Juneau district. His notes were for the most part based upon practice at the Perseverance mine. An excellent discussion followed, Messrs. Robbins, Williams, Poirier, Summerhayes, Brown and others taking part. The new executive of the Porcupine branch has undoubtedly aroused much interest among the members in Porcupine, and there promises to be a number of very interesting meetings. The next meeting is to be held in South Porcupine, when it is expected that Mr. Church of the Dome will give a paper on stoping practices at the Dome mine.

NOVA SCOTIA

The outputs of the Glace Bay mines of the Dominion Coal Company in July were as follows:		Tons.
Dominion No. 1	.....	45,919
Dominion No. 2	.....	80,933
Dominion No. 3	.....	4,536
Dominion No. 4	.....	36,089
Dominion No. 5	.....	11,672
Dominion No. 6	.....	26,487
Dominion No. 7	.....	19,046
Dominion No. 8	.....	39,612
Dominion No. 10	.....	15,075
Dominion No. 11	.....	10,555
Dominion No. 12	.....	36,013
Dominion No. 14	.....	40,933
Dominion No. 15	.....	30,225
Dominion No. 16	.....	31,141
Dominion No. 21	.....	13,824
Dominion No. 22	.....	20,180
		462,240

The largest previous monthly production in the history of the company was 452,270 tons, in June, 1914, so that the tonnages of July are the largest yet recorded by 10,000 tons.

Dominion Nos. 2 and 9 collieries produced between them 120,545 tons, 80,933 tons being from the Phalen seam and 39,612 tons from the Harbor seam. No. 2 colliery, as is well known, has a double hoisting shaft, the output of two seams being worked to the one opening. The combined production of the two seams was 120,545 tons, which is a remarkable performance for one producer. The production of No. 15 colliery and of No. 22 colliery was also the largest yet placed to the credit of these mines.

Although the July production was a record one, it could have been at least 25,000 tons greater but for the restrictions which were imposed by the shortage of shipping tonnage, due to the requisitioning of the company's steamers for Admiralty purposes. The present capacity of the Glace Bay mines for output approaches 500,000 tons per month. The outputs of the Glace Bay collieries for the seven months ending July 31st totaled 2,537,683 tons, comparing with 2,634,577 tons in the corresponding period of 1914, showing a decrease of 96,894 tons. Although the output of the mines during August will again be restricted by a shortage of shipping tonnage, and is being also considerably restricted by a shortage of labor due to the heavy recruiting among the miners, it is probable that August tonnages will exceed those of last year by over 50,000 tons, and indications are that by the end of September the balance of the output will be in favor of 1915 as compared with 1914.

The July output at the Springhill mines was 36,068 tons, compared with 36,220 tons in August last, and for the period ending July 31st the outputs were 235,055 tons in 1915 as against 236,181 tons in 1914.

Statistics gathered by your correspondent to the end of June and published in the last issue of the Journal show that about 1,770 men from the mines had joined the military forces of Britain and the Allies, but during the months of July and August the rate of recruiting has been greatly quickened, as may be gauged from the fact that in Cape Breton alone over 600 men were enlisted in the 40th Infantry Regiment. No great exodus of Italians has yet taken place from the mines, but, under recent mobilization orders of the Italian Government it appears probable that the next two months will see large drafts made upon the Italian workmen at Nova Scotian coal mines. The Russian workmen may also be expected to be similarly affected, although the Russians do not form so large or important a class of mine labor as the Italians. The Italians are hard and steady workers, and their loss will be a serious one to the mining industry. It was calculated that at the end of June about thirteen per cent. of the workmen at the mines had joined the military forces of either Britain or the Allies, but this figure has now been greatly exceeded, and it will be safe to place it at more nearly twenty per cent.

The miners of Nova Scotia have not only a good record in the matter of recruiting, but they have contributed very heavily to the various funds that have been raised for patriotic purposes since war broke out. The contributions of the workmen of the Dominion Coal Company to the Canadian Patriotic Fund from the inception of the movement last November to the end of July totaled \$5,336. This amount is composed entirely of small sums deducted from the fortnightly

pay rolls and does not include larger individual contributions that have been made in various places by the officials of the Dominion Coal Company. The idea of the fortnightly payroll contributions is to obtain the modest sum of ten cents per month per man, and the large amount that has been raised is a useful illustration of the cumulative effect of small amounts when contributed by a large number and spread over a long period. The collections for the month of July made through the pay rolls were \$778, and there are good reasons to expect that the monthly amount may eventually rise to \$900 or \$1,000 per month.

The disbursements of the Canadian Patriotic Fund may naturally be expected to extend over many years to come. While the giving of large amounts by individuals is extremely laudable, this method of raising money appeals naturally chiefly to persons of comparative wealth, and very largely ignores the much greater class of individuals whose wealth is not so great. The method adopted by the workmen of the Dominion Coal Company is a striking object lesson of what can be done in a small way, and if it were generally followed throughout the Dominion it would ensure to the Canadian Patriotic Fund a steady monthly income. The amount of money that can be raised by the collection of small amounts from a large number of contributors spread over a long period is surprising.

In addition to the contributions toward the Canadian Patriotic Fund, the workmen of the Dominion Coal Company are also at the time of writing engaged in making collections for machine guns, and it is expected that the cost of five or six guns will be provided in this way. When it is remembered that a comparatively short time ago the workmen of the Coal Company gathered over \$4,000 for relief of the Newfoundland sealing disaster, and that in addition to the two funds mentioned above, they have given out of their earnings to the Belgian Relief Fund, the Red Cross Fund and other benefactions, and have in addition given recruits to the forces of the Empire in greater proportion than the remainder of the population of Nova Scotia, it will be seen that in true patriotism, of both person and purse, the miners are to the fore.

NEW YORK

Confidential advices from trustworthy sources in Germany tend to show that despite the perfect organization and military enthusiasm of the early stages of the war, a tremendous number of the Teutons are feeling rather "sick," and are showing it. Their intensely practical nature doesn't respond properly to the outlook.

American and British manufacturers of asbestos goods have made such successful efforts to capture the South American and other trade in these articles, which was formerly held largely by Germany, that the mining of asbestos in Quebec is on a more flourishing basis than for a long time. Good profits are being made. This condition is all the more remarkable because the asbestos market became extraordinarily depressed when the large German demand was cut off during the early months of the war.

The outlook for prosperity in the iron, steel and ore business becomes more pronounced constantly. The steel industry is operating at over 90 per cent. capacity; even the Alabaman field is reviving, where dullness was especially marked due to the South's financial difficulties regarding cotton.

J. P. Morgan, head of J. P. Morgan & Co., which American banking concern is acting for the British Government in placing war orders, etc., returned to his office on August 16th. He was shot several weeks ago by a German crank. Two thousand people gathered to see Mr. Morgan at closing time, and greeted him with hand-clapping. He had no guard or escort. Morgan & Co. has branches in London and Paris.

Holders of Cobalt stocks are interested in the fact now apparent that the low price of silver is largely due to its extraordinary output as a by-product of western copper mines. According to the Mining and Scientific Press, the annual output of silver by 14 of the largest copper and lead companies in North America is over 100,000,000 oz., while the 14 largest silver companies have a total output of only 21,500,000 oz. The Anaconda Copper Co. at Butte produces close to 11,000,000 oz. annually.

Unusual interest is manifest in Kennecott Copper Corporation, following a visit of its president and Henry Crumb, mining engineer, to the mines in Alaska. Curiosity prevails as to how long the 70 per cent. of its Bonanza mine will hold out. Monthly shipments of ore and concentrates from the company's three mines are now at the rate of about 9,000 tons per month.

Much British gold is arriving in New York from various sources, England, Canada, Australia.

United States Steel Corporation and the majority of the American steel manufacturers have not turned out a single piece of ordnance.

Yukon Gold Co. has acquired control of another dredging property in California, making the fourth Californian dredging property of the company, in spite of which its principal gold yield continues to come from Alaska.

Demands for sulphuric acid from the Allies is causing increased output in this by-product. Tennessee Copper Co. in particular is profiting.

MICHIGAN IRON RANGES

Resumption of activity at the Michigan iron mines is quite general. The Cleveland-Cliffs Iron Co., the biggest operator on the Marquette range, besides restoring the increased wage scale in effect a year ago, has increased forces at a number of its mines. In the Gwinn or Swanzy district, the Stephenson mine (so-called from Senator Stephenson, the lumber king of Wisconsin who owns the royalty) has been changed from four days a week schedule to a six day week. Steam shovels are stripping the Stephenson's large stock pile. The Gwinn or Smith mine, the Northwestern and the Princeton No. 2; other mines of the Cleveland-Cliffs Co. in the same district, have assumed new activity. At the Gwinn mine 180 men are employed four days a week, there being both night and day shifts. At the Northwestern underground development work is proceeding from the concrete shaft which with the standard steel headframe of the company has been idle since construction several years ago, the concrete shaft having been sunk and then sealed with concrete in the bottom, awaiting better times. At the Princeton No. 2, an older mine, sinking is in progress for a new level below the six already contained. At Negaunee, the Cleveland-Cliffs Co. has made notable additions to its working forces at the big Negaunee and Maas mines, which are connected underground,

and are known to contain over twenty million tons of good grade ore.

Over 2,000 miners are now employed by the seventeen active mines of the Iron River district. The large stock-piles accumulated during the dull season of 1914 and last winter are being loaded by steam shovel for shipment to Escanoba ore docks on Lake Michigan. Among the new mines to enter the list of shippers are the Bengal of Pickands, Mather & Co. of Cleveland, and the Homer of the Wickwire Steel Co. of Buffalo. The Homer mine was formerly the Donahue Exploration of the Munro Iron Mining Co., also of Buffalo, but was sold by this Rogers-Brown subsidiary to the Wickwire Co. several years ago.

Resumption of construction work on the new steel plant of the U. S. Steel Corporation at Duluth presages the making of steel at the head of the lakes. It is estimated that the plant will be completed early in the winter. Charcoal iron furnaces in the upper peninsula of Michigan, of which there are several, are resuming activity, and in particular are devoting attention to chemical experiments for most profitably utilizing the products of the distillation process of making the charcoal. Since German chemicals have been largely de-cut off from the U. S. A., this chemical by-product department of the charcoal-iron furnaces, which was just getting into the more complicated branches of chemical manufacture, has become increasingly attractive.

There is no truth in the newspaper story of the intended merger of several of the independent iron and steel companies into a second Steel Corporation under the leadership of Charles M. Schwab and H. C. Frick. The false report had it that the following companies would consolidate: Bethlehem Steel Corporation, Colorado Fuel & Iron Co., Jones & Laughlin, Crucible Steel Co., Lackawanna Steel Co., Cambria Steel Co., etc.

"Iron Ore," published by Geo. Newett of Ishpeming, good naturedly styles Charles M. Schwab "the American Krupp," on account of his recognized ability, distinguishing him from the run of American steel men, at manufacturing munitions of war. The Bethlehem Steel Corporation, which Schwab controls and actively manages, with headquarters at South Bethlehem in eastern Pennsylvania, conveniently near the port of Philadelphia, is now estimated to be producing enormous quantities of shells.

OBITUARY

Another of the "old-timers" of British Columbia died a few weeks ago in the City of Vancouver, named Frederic Soues, for more than 30 years in the Provincial Government service, and not long out of official harness, since it was only two or three years ago that he was superannuated. Details of his varied career have not been obtained, but it is known that before going to British Columbia more than 50 years ago he was in Australia and New Zealand.

The Daily Colonist, Victoria, B.C., recently published the following: "Mr. Frederick Soues, one of British Columbia's most respected and esteemed pioneers, passed away last week in Vancouver. A native of Scotland, he came to British Columbia in 1862, and for 30 years held the position of Provincial Government Agent at Clinton. In the early days the duties of that office were many and varied, extending over a very wide district, but no matter what the personal inconvenience, all would receive prompt and courteous attention. The late Mr. Soues was a life-long, faithful friend, a man whose word was as good as his bond,

and no one ever appealed to him for help in vain. His name stood for what is best in character, and those who had the privilege of his friendship feel that in his removal one of Nature's noblemen has gone to that bourne whence no traveller returns."

Mr. Soues was always enthusiastic concerning the mineral riches of Lillooet district, and for years he advocated gold dredging on the Fraser river which flows through it, but he did not live to see such operations undertaken on an extensive scale with modern gold dredging appliances. He was well known to the late Dr. Geo. M. Dawson, of the Geological Survey of Canada. Incidentally it may be mentioned that Mr. Robert A. A. Johnston, mineralogist and curator to the Geological Survey, made the following note on the mineral Souesite:

"Lillooet Mining Division, B.C.—The name Souesite was given by Hoffman (G.S.C., Sec. Chem. Min., 1906, pp. 9-11) to a nickel-iron alloy found associated with platinum, irodoamine, gold, magnetite, quartz and garnet in the river gravels about two miles below Lillooet on the Fraser river. A specimen of the mineral so named by Dr. Hoffman was first sent by Mr. Soues for determination."

As indicating the confidence the late Mr. Soues had in the mineral wealth of Lillooet district, the following excerpt from a report of his, printed in the Annual Report of the Minister of Mines of British Columbia, 1896, which was the first official report of the department published after the creation of the British Columbia Bureau of Mines, and the appointment of Mr. William G. A. Carlyle as Provincial Mineralogist. Mr. Soues, in the capacity of Gold Commissioner, wrote of Lillooet under the subhead of Bridge River, as follows:

"Bridge River—I have for years past, notably in 1886 and 1889, endeavored to draw attention to this (in my opinion) the richest, and at the same time most neglected, portion of the district, and may at this time and place be permitted to refer to it at length. . .

"From a personal residence of 34 years in the district, at Pemberton, Lillooet and Clinton, and during the whole of that time with exceptional opportunities of learning the amount of gold obtained and its sources, I may be supposed qualified to deal with the matter intelligently and correctly. With the decade ending 1869 official public reports, with regard to mines and mining in this district, are conspicuous only by their absence. The early miners coming to this province, 1859-60, worked their way up the Fraser river, testing all the tributaries for gold. Bridge river in those years was located and worked, and from that time on to the present, by white, Indian and Chinese miners, year by year, with varying success. The richest finds and largest nuggets of gold were obtained in the decade referred to. With the decade ending 1879, we have official mining statistics, commencing in 1874, in some of which annual reports place has been found for Lillooet district and the estimated returns. In others the district has been entirely ignored.

The foregoing is but typical of the consistent contention of the late Mr. Soues of the considerable promise for mining in Lillooet district. Only now is railway transportation being provided; doubtless many wagon road feeders will be established within a few years, and as these give better means of access to the scattered gold-bearing localities of Lillooet there will most likely be gradually realized the expectations of the late Gold Commissioner and others who have also predicted good returns from mining in this part of British Columbia.

HOW TEDDY McCORK WON BACK HIS CLAIM

By J. Harmon Patterson.

There had been one or two good discoveries of silver on Oswald Lake, and as was usual there had been a great foregathering of prospectors.

I arrived after the first rush, and by dint of much searching had found some apparently good ground, on which I staked two claims and at once set to work prospecting them. In a rush such as this it is necessary to stake with all possible speed. If you waited to make a real discovery someone might run lines around you while you worked, so I lost no time in getting in my stakes.

Adjoining my claims was one which had a fairly good showing. I soon met the owner, an Irishman named Teddy McCork.

You do not wait to be formally introduced in the wilderness, and Teddy and I became fast friends inside of an hour. As he had no partner and I had none he removed his little tent to the small stream on which I was encamped, and for two weeks we cooked and ate together.

A goodly man to look at was Teddy, tall and straight as an arrow, with a shock of brown hair and a clear blue eye. His smile was contagious. He was very active and strong, and I often thought he would be a dangerous man in a fight.

"I've been offered two thousand dollars for the claim," he informed me one night by the camp fire, but I want a thousand pounds."

"Why the thousand pounds?" I inquired. He went into the tent and came out with a photo in his hand. "That's why," he replied.

It was the picture of a girl of about twenty and very pretty she was.

"And isn't she the little fairy," he remarked. "No night could be as black as her hair, no sky as blue as her eyes, and the cherries were not more red than her lips. Sure she is the prettiest and sweetest little maid in all Ireland, and if I had that thousand pounds I'd go back to her at once."

"Nothing less than a thousand do?" I asked.

"Her father turned me away as being too poor," was the reply, "but the dear girl promised to wait a hundred years for me."

* * * * *

A prospector is allowed thirty days after staking in which to record his claim. If he fails to do this it is liable to be jumped, that is, restaked, by someone else. If a man deliberately abandons his claim this restaking is not considered anything amiss, but the regular claim jumper is held in great detestation by all prospectors.

Some men are unprincipled enough to take any advantage possible of the error of another, either in staking or recording, with the intent to do him out of his lawful discovery; but the mining laws of the Province, though they may be far from perfect, are justly administered and will not allow any rogue to profit at the expense of an honest but ill-informed man if it can be helped.

Teddy had not recorded his claim, as he was anxious to get in as much work as possible while the weather was fine. As the thirty days were drawing to a close he set out for the recording office alone. He intended first to visit another claim he had staked on his way.

Time passed and Teddy did not return. I was a little anxious, but decided that he would have his claim recorded in any case.

In company with another prospector named Roland, I set out for the recording office, having found sufficient indication of silver to warrant recording my claim. While in the office I thought I would look up the record of Teddy's claim. His name did not appear; but on the ground where his claim should be appeared the name of Daw. I further saw that it had been restaked and recorded.

The date of the staking was sworn on the Saturday before I left. I had been over the claim on Sunday and it had not been restaked, and as Daw had sworn falsely I saw a chance for Teddy. But where was he to be found. I waited all of the next day. Then as Roland was in a hurry and as three other men whom we knew were going in we set out for camp.

* * * * *

The route we had to follow was not an easy one, being a succession of small shallow lakes and bad portages. On one of these we met Teddy.

"Where have you been all this time?" I inquired as we all put down our loads.

"Got lost," was his mournful reply. "I was not very sure of the way, and somehow I got astray and put in six hungry days hunting my way; but I'm out now and will just hustle in and record and be back next day."

"No use," I informed him, "it's restaked and recorded."

Teddy jumped to his feet. "The dirty claim-jumper," he shouted, "who is he?"

"Don't know," I replied, "only his name is Daw."

"That sucker," said one of the men. "Why he jumped a claim on me down in Burke, and I had the assessment work nearly all done, too."

"I'll do my assessment work on his face," said Teddy, wrathfully. "See if I don't. Jump my claim, will he. I'll teach him."

"You didn't record within the thirty days, Teddy," I said, "so that legally Daw had a right to restake, but he swore that he did it last Saturday. Now I was on the claim on Sunday and no restaking had been done. I can swear to it. This will put Daw out. All you have to do is to go in quietly restake the claim, present your certificate, and file a caution against Daw, and I am sure that you will win."

"Me go to law to get my own claim," was his reply, "and then give it to the lawyers. Not I. I'll choke it out of him."

"Suppose he won't fight?" I suggested.

"I think he will," said one of the men, "he's some scrapper himself."

But Teddy didn't care how great a scrapper he was. In vain we warned him that he might lose the claim altogether. Vengeance he would have and his claim as well.

"If nothing but a fight will do you," I suggested, "I'll tell you what I'll do, I'll see this Daw if he is on the claim and try and get him to agree to fight you for it." I said it as a joke; but it was not taken as such. Teddy was most agreeable, and the men thought that Daw should be made to accept.

It was decided that all should go on to my claim, taking Big Mac to referee the fight, and I was to see Daw and arrange it with him amicably if possible.

Along with Big Mac came his partner, both anxious to see the scrap.

* * * * *

"Is your name Daw," I inquired of a pretty husky individual whom I found grubbing away on the claim.

"Name is Daw," he replied looking up. "What of it."

"I reckon you know that this claim belonged to a man named McCork," I began. "He left his recording rather late and on his way into the recording office he got lost. You know the rest."

"Yes," he replied calmly. "I know that this claim was originally staked by one McCork, but as he had not recorded it within thirty days after staking, as required by law, he forfeited all his right and title to it, and it makes no difference to me whether he was lost or hung."

"As it happens," I said, "McCork is an Irishman with a temper belonging to that race and unless you are ready to fight him for the claim I imagine you are in for a thorough licking."

"Wishes to fight me for the claim, does he? He's a fool, and I would be, too, if I agreed to such a crazy thing. I have the claim and am not exactly spoiling for a fight. Still if it's a fight McCork wants I might be able to oblige."

"Do you know," I said angrily, "that with your nerve I would own the whole camp. You chatter away so glibly about the law, that one would be apt to think that it was your best friend; but it has you on the hip this time. You've jumped claims before and got away with it; but you overstepped the mark this time. You swore you staked this claim a week ago to-day, when at the time you were not here at all. You made out your certificate, swore to it, recorded it and then came out here and restaked this claim. Now we will see just what the law will do to a man who will commit perjury to jump an honest man's claim."

"That's not true," he said, but I could see that he was badly scared.

"Very well," I replied, "you've had a real sporting offer made you. If you won't take it you will have a chance to prove your right to this claim in a court of law."

"Wait," he said, "what kind of a man is McCork?"

"As you said a moment ago he is a fool," I replied. "He has the notion that the only reasonable way to settle this matter is to fight it out, and the best man take the claim. He knows that he was at fault; but he also knows that you are absolutely crooked. He is not nearly as large as you are."

"And if I win the claim is mine," he asked, "and there will be nothing more about it?"

"That is his fool proposition," I replied. "The fight will end the dispute."

"And am I sure of fair play?" he asked anxiously.

"There will be fair play all around," I assured him.

"Then bring your man around to-morrow morning," he said finally.

Daw looked mightily surprised next morning at the appearance of seven men, when he had only expected two. He cast many an anxious glance towards Big Mac, but his face cleared when I named McCork.

"These men are all witnesses," I began, "that the winner of this fight is to be the absolute owner of the claim on which we stand, and that neither is to take any action against the other in any way in regard to it."

Everyone agreed that such would have to be the case, and both men expressed the willingness to fight under these conditions.

Big Mac assured them both that it was to be a straight, stand-up fight with their fists. And no one in the crowd was to make a remark till it was over.

The two men then faced each other. For a time they sparred as though to try and learn each other's skill, and it was evident to all that neither of them were novices at the game. Suddenly Teddy's fist shot out and he landed on his opponent's mouth. The blow was not hard, but it hurt. It angered Daw, who struck fiercely in return. Then the fight began in earnest.

It was soon apparent that Teddy was playing with his opponent. Daw was much stronger and his greater reach should have counted much in his favor. But Teddy's defence was perfect, and so quick was he in getting away that Daw rarely reached him. He would circle round and round awaiting his chance. Then he would plant a light blow and retreat. When Daw followed too close he always got punished. So the combat went for half an hour.

Daw at last realized that if he won he must make use of his superior strength. So he decided to force matters. He drew gradually back and as Teddy followed he made a rush. To his surprise his opponent did not retreat, but met him solidly. His mighty right punch was caught on Teddy's left arm, while Teddy's right landed on his chin. The blow dazed him and he dropped his arms.

"Had enough?" asked Big Mac, but he got no reply.

"Go to him Teddy," someone advised.

"Shut up," roared the referee. "The next man to open his head feels my fist."

Daw slowly recovered, but seemed in doubt what to do. Teddy stood ready, and just as the referee was about to call it off, Daw made a rush. Teddy dodged and slapped him smartly on the ear with his open hand as he passed. It was fear of Big Mac only which kept us from laughing.

They faced each other for a few seconds. Then Daw, if he could not fight, knew how to retire gracefully. He held out his hand.

"McCork," he said, "take the confounded claim. You could have knocked me out at the start and I know it."

"Sure," replied Teddy, who had not lost his smile since the fight began, as he took the proffered hand, all animosity forgotten, "I knew that I could whip you from the start; but you gave me a good half hour. Sure I promised my sweetheart I'd never fight again—only in a just cause, and I've kept my promise."

I invited everyone over to my camp for lunch, and had you seen the happy family demolishing my pork and beans, you would not have believed them fresh from a fight.

* * * * *

Next day Teddy restaked his claim and lost no time in recording it. He sold it later and though he did not realize the thousand pounds he decided that it was enough to change the mind of the parent of his sweet Kathleen.

MARKETS

STOCK QUOTATIONS.

(By courtesy of J. P. Bickell & Company, Standard Bank Building, Toronto.)

August 24, 1915.

New York Curb.

	Bid.	Ask.
Alaska Gold	32.00	32.50
British Copper	50	75
Braden Copper	7.37½	7.50
California Oil	301.00	304.00
Chino Copper	43.75	43.87½
Giroux Copper . . . . .	.50	1.00
Goldfield Cons	1.25	1.31¼
Green Cananea	36.00	39.00
Granby	86.50	..
Inspiration Copper	32.50	32.75
International Nickel	161.00	165.00
Miami Copper	25.00	25.50
Nevada Copper	14.00	14.12½
Ohio Oil	150.00	152.00
Ray Cons. Copper	21.00	21.12½
Standard Oil of N. Y.	188.00	191.00
Standard Oil of N. J.	423.00	430.00
Standard Oil (old)	140.00	..
Standard Oil (subs)	1000.00	..
Tonopah Mining	5.00	5.50
Tonopah Belmont	3.87½	4.00
Tonopah Merger	34.00	36.00
Yukon Gold	22.50	24.00

Porcupine Stocks.

	Bid.	Ask.
Apex . . . . .	.02¾	.03
Dome Extension . . . . .	.19	.19¼
Dome Lake . . . . .	.23	.24
Dome Mines	21.00	21.50
Foley O'Brien . . . . .	.27	..
Hollinger	24.00	..
Jupiter . . . . .	.11	.11½
McIntyre . . . . .	.49¾	.50
Moneta . . . . .	.07	.07½
Pearl Lake . . . . .	.00¾	.00½
Porcupine Gold . . . . .	..	.00½
Porcupine Imperial . . . . .	.06	.06¼
Porcupine Crown . . . . .	.70	.74
Preston East Dome . . . . .	.05¼	.05¾
P. Vipond . . . . .	.65	.66
P. Tisdale . . . . .	..	.02½
West Dome . . . . .	.08½	.08¾
Gold Reef . . . . .	.03	.03½

Cobalt Stocks.

	Bid.	Ask.
Bailey . . . . .	.04¼	.04¼
Beaver . . . . .	.26	.27½
Buffalo . . . . .	.35	.55
Chambers Ferland . . . . .	.12	.13
Coniagas	4.00	4.40
Crown Reserve . . . . .	.35	.38
Foster . . . . .	.01	.03
Gifford . . . . .	.01½	.01¾
Gould . . . . .	.01	.01¼
Great Northern . . . . .	.02	.03
Hargraves . . . . .	.01	.01½
Hudson Bay	20.00	..

Kerr Lake	3.60	4.00
LaRose . . . . .	.48	.50
McKinley . . . . .	.21	.26
Nipissing	5.50	5.75
Peterson Lake . . . . .	.19¼	.20
Right of Way . . . . .	..	.03¾
Silver Leaf . . . . .	.01½	.02
Teck Hughes . . . . .	.06¾	.08
Temiskaming . . . . .	.31¼	.32
Trethewey . . . . .	.10	..
Wettlaufer . . . . .	.04	..
Seneca Superior . . . . .	..	.79½
Homestake . . . . .	.17	.19
York Ontario . . . . .	.02	.02½

TORONTO MARKETS.

Aug. 26, 1915 (quotations from Canada Metal Co., Toronto)—

- Spelter, 18 cents per lb.
- Lead, 6 cents per lb.
- Tin, 40 cents per lb.
- Antimony, 40 cents per lb.
- Copper Casting, 19 cents per lb.
- Electrolytic, 19 cents per lb.
- Ingot brass, yellow, 13c.; red, 15 cents per lb.

Aug. 26, 1915 (quotations from Elias Rogers Co., Toronto)—

- Coal, anthracite, \$7.50 per ton.
- Coal, bituminous, \$5.25 per ton.

NEW YORK MARKETS.

Aug. 24, 1915—Connellsville coke (f.o.b.) ovens—

- Furnace coke, prompt, \$1.50 per ton.
- Foundry coke, prompt, \$2.20 to \$2.60 per ton.

Aug. 24, 1915—Tin, straits, 33.75 cents.

- Copper, Prime Lake, 16.12½ to 16.37½ cents.
- Electrolytic copper, 15.87½ to 16.12½ cents.
- Copper wire, 17.50 cents.
- Lead, 4.45 to 4.50 cents.
- Spelter, 12.75 to 12.95 cents.
- Sheet zinc (f.o.b. smelter), 16.00 cents.
- Aluminum, 34.00 to 36.00 cents.
- Nickel, 50.00 to 52.00 cents.
- Platinum, soft, \$42.00 per oz.
- Platinum, hard, 10%, \$44.00 per oz.
- Bismuth, \$2.75 to \$3.00 per lb.
- Quicksilver, \$91.00 per 75-lb. flask.

SILVER PRICES.

August—	New York.	London.
	cents.	pence.
7	47½	22 7/8
9	47¾	22 7/8
10	47¾	22¾
11	47¼	22 7/8
12	48¼	23 1/8
13	47¾	23
14	47¾	22 1/8
16	47	22 7/8
17	46¾	22 1/8
18	46¾	22¾
19	47¾	22 7/8
20	47¾	22 1/8
23	47¾	22 7/8
24	47	22 7/8