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Editor:

J. C. MURRAY, B.A., B.Sc.

Business Manager:

J. J. HARPELL, B.A.

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SPECIAL CONTRIBUTORS

GEOLOGY: Dr. Frank D. Adams, McGill University; Dr. A. E. Barlow, late of Geological Survey of Canada; Professor Willett G. Miller, Provincial Geologist of Ontario; Dr. J. E. Woodman, Dalhousie University, Halifax, N.S.

CHEMISTRY: Dr. W. L. Goodwin, Director School of Mining, Kingston, Ontario; Milton Hersey, M.Sc., Official Analyst Province of Quebec.

MINERALOGY: Professor W. Nicol School of Mining, Kingston, Ontario.

MINING: S. S. Fowler, M. E., Nelson, B. C.; Frederick Keffer, M.E., **Anaconda**, B.C.; A. B. Willmott, M.E., Sault Ste. Marie, Ont.; J. C. Gwillim, M.E., School of Mining, Kingston, Ont.; J. Obalski, Inspector of Mines, Quebec; J. Bonsall Porter, M.E., McGill University; John E. Hardman, M.E., Montreal; Fritz Cirkel, M.E., Montreal; H. Mortimer-Lamb, Sec'y C.M.I., Montreal; George W. Stuart, M.E., Truro, N.S.

METALLURGY: Hiram W. Hixon, M.E., Mond Nickel Company, Victoria Mines, Ontario; Stafford F. Kirkpatrick, School of Mining, Kingston, Ontario; A. P. Scott, Dominion Iron & Steel Co., Cape Breton.

COAL: Hon. Robert Drummond, Stellarton, N.S.

NATURAL OIL AND GAS: Eugene Coste, M.E., Toronto, Ont.

CEMENT: Manley Baker, M.A., School of Mining, Kingston, Ont.

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THE BEGINNING OF THE END.

A HISTORY AND A MORAL.

When the CANADIAN MINING JOURNAL began its open attack upon fraudulent promotions, a speedy victory was not expected. But, owing to the prompt and most creditable action of the Ontario Government, the situation has been cleared and a precedent of extraordinary significance has been established.

It was recognized from the first by those chiefly concerned in conducting the anti-wild-cat campaign, that the offending companies were organized for the especial purpose of evading the letter of the law.

Also it was recognized that human ingenuity could not construct a law that dishonest persons could not evade. It was then concluded that since the Ontario Companies Act is as clearly expressed and carefully constructed as can well be expected, and since this Act was being both evaded and disregarded, therefore it was necessary to see that not the letter alone, but the spirit of this Act be respected and observed.

The firm of Law & Company was chosen as the first point of attack for two reasons—it had erected already one monument of falsehood, "Silver Bird"; and its advertisements were fast becoming a public nuisance.

For several reasons it was thought wise to begin proceedings by laying information against Law & Company for breach of the provisions of the Companies Act. A criminal action for fraud could even then have been instituted. This, however, would have entailed delay and trouble and would not have served our purpose so directly.

The Provincial Secretary's Department at once acted upon the information laid and commenced proceedings against Frank Law. Law's associates, Russell and Abendroth were served with subpoenas. Russell promptly left for England.

After frequent hearings in the Police Court, during which most damaging evidence, bearing on Law & Company's methods, was heard, the Government decided to institute criminal proceedings. Accordingly on Monday afternoon, November 18, Frank Law was placed under arrest. The arrest was made in the Police Court just as an adjourned session of the trial under the Companies Act was beginning.

All relevant papers, and documents were immediately removed from Law's office. Law himself was given freedom on ten thousand dollars bail, exclusive of his personal securities. Meanwhile Russell, who is included in the indictment, is supposed to be on his way back from England.

Up to the date of writing Magistrate Kingsford has not given a decision on the Companies Act case.

A few days after the Companies Act case was begun, Law & Company started proceedings against the CANADIAN MINING JOURNAL for libel and prayed for an injunction against us. The injunction was refused by Chief Justice Meredith. Whether the suit against the JOURNAL is or is not proceeded with is immaterial. The present result amply justifies our position.

The principals of Law & Company now stand charged with fraud in connection with the flotation of Silver Bird, Blue Bell, Lucky Boys and Highland Mary. The Crown Attorney possesses all essential documents.

For the benefit of the public we give the following facts: Frank Law, the head of the firm of Law & Company, was, about four years ago, a barber in Montreal. Graduating from life insurance he started his present business in Toronto not more than a year ago.

With these qualifications for guiding the public in mining instruments he, or his firm, has abstracted a goodly number of dollars from innocent victims.

The above is a mere skeleton of the history of our efforts to bring Law & Company to justice. In themselves Law & Company need not be mentioned again. We shall be glad to drop the unclean subject.

But the episode has brought into light some important truths.

Foremost of these is this—the Ontario Companies Act is a comprehensive and sufficient piece of legislation. Second and, of as great importance, is the consideration that the Ontario Government can and will administer that Act as it should be administered. Of even greater future significance is the fact that the Government, in taking criminal action against Frank Law, shows that it is determined to stamp out improper mining flotations.

Ontario is no longer a breeding place for wild-cats. The Provincial Government has created a precedent that will swiftly and surely kill the entire breed. It is true that the Government did no more than its duty; but it is not every Government that will cheerfully accept its moral responsibilities.

Ever since the first days of Cobalt's boom the mining fakir has waxed fat. The Canadian public has swallowed tales of treasure-trove, compared with which the Arabian Nights are anemic and Captain Kidd's history but a pale anagraph. The bait has been taken. Latterly the barb has made itself felt. We hope, we believe, that the lesson has been taken to heart, for a time at least.

And now for the inevitable moral. If Canadians, with money to invest in mines or prospects, wish to go about it in a sane, profitable way, there is but one course. In Canada there are now a large number of especially trained, honest and capable mining engineers. McGill, Queens and Toronto are graduating some dozens every year. These men have made it their business, their life-work, to learn about Canadian minerals, how

they are found, how they are won and how they are made into commercial products.

The services of these men are procurable. As mining engineers they practice a profession at once honorable and arduous; a profession demanding broad mental development and more than average physical stamina. They have spent years of preparation. They must, from the nature of their work, undergo hardships that no other professional men are called upon to endure.

The title of mining engineer, properly won and properly worn, implies high technical skill added to scrupulous honesty.

These then are the men, products of our own universities, or of universities of equal standing, by whom the Canadian public should hereafter be guided in mining affairs.

One word on a delicate subject is necessary before concluding. There is a vague, though general, impression current that when a mining engineer asks a substantial fee for making an examination of a mining property, he is setting an exorbitant price upon his services. A little thought will correct this error.

The independent mining engineer is the product of an expensive education and of a more expensive practical training. Work with him is not usually continuous. There are long idle periods to be reckoned upon. This is one controlling factor.

Another is that the examination of a mine, or even a prospect, is almost always an expensive thing in itself. More especially is this the case in Canada. The taking of samples, the making of plans; the collecting and co-ordinating of data geological, mineralogical and metallurgical; the investigation of conditions of labor, market, transportation, fuel supply, water supply, are responsible and laborious work. A favorable report from a good engineer transforms commercially worthless ground into a negotiable asset. This must be kept in mind by the owners of mineral lands. The advice of a mining engineer at the right time may save much useless expenditure; also, the imprimatur of his approval may multiply the value of a claim many times.

As a corollary to its wild cat campaign THE CANADIAN MINING JOURNAL intends to begin at once a series of sketches of the leading mining engineers practising in Canada. Whenever possible portraits will accompany these articles. Neither sequence of seniority nor alphabetical order can be followed. But we hope to cover the whole field.

We have chosen this course deliberately as a constructive antidote to the mining fever and as the best preventive of a recurrence of a wild cat plague.

That Cobalt has lived through over-capitalization and manipulation is evidence of the camp's solid worth. The total output of 1907 will be gratifyingly larger than that of previous years. The present depression is forcing upon managers and directors the necessity of curtailing expenses. The attitude of the American smelters compels shippers to look around for other markets and to

begin the erection of Canadian smelters. These conditions will help to bring about important changes in Cobalt itself. That the camp is a rich one is unquestionable. But not until recently has it been so obviously necessary to adopt economical methods. Thus the depression of stocks and the scarcity of money will undoubtedly prove blessings. Cobalt put upon her mettle will do better than Cobalt hysterical.

It is not improbable that our attacks upon dishonest financial methods may, indirectly, do harm to Cobalt in general. We therefore wish to indicate plainly that of Cobalt's present worth and future success we entertain only the most favorable opinion.

A NIGHTMARE.

The *Mining and Scientific Press* of San Francisco in its issue of November 16th, prints a letter entitled "The Wild Cats of Ontario." It is dated from New York and is signed "D.A."

The letter suggests that THE CANADIAN MINING JOURNAL should expose what "D. A." is pleased to call "the Ontario conspiracy." "This," the writer explains, "is a gigantic conspiracy among the people of Northern Ontario to spread, and pretend to believe, the false reports emanating from irresponsible prospectors and fortune hunters."

The writer continues in this strain. Like Tomlinson, he repeats several things that he has been told, all of them extremely damaging to Cobalt and Ontario.

The specific statements concerning the Silver Queen, O'Brien, McKinley-Darragh and La Rose are untrue. They are based upon the cheap stories that cheaper male gossips circulate in every mining camp. Mostly these stories are created and repeated to give a fictitious importance to the teller. Neither "D. A." nor any other foolish person of his kind is in a position to know the facts about the mines mentioned.

If the "gigantic Ontario conspiracy" needs refutation at all it can be met by the one fact that THE CANADIAN MINING JOURNAL has received hundreds of letters from the engineers, miners, prospectors and mine owners of Northern Ontario, offering all assistance in the work of extirpating frauds and fakirs.

We doubt, however, if any person who has visited Northern Ontario could be induced to take "D. A." seriously.

It is the fear that this totally unwarranted letter may damage Cobalt in the minds of American readers that leads us to notice it.

There is no need of descending to the methods of wild cats in dealing with them. But "D. A." is quite as untruthful as the worst of these felines.

Repeating what we have said on another page, a sufficient answer to all such calumny has been made by the Ontario Government. The Government has set its face

definitely and resolutely against mining frauds. In this it has also set an example that "D. A.'s" own country could not do better than follow.

THE CONSOLIDATED MINING AND SMELTING COMPANY.

The payment of a November dividend by the Consolidated is a pleasant offset to other and discouraging reports from British Columbia. The company has an issued share capital of \$5,355,200, divided into 53,552 shares of \$100 each. This last quarterly dividend amounted to \$133,880. This is the seventh dividend disbursement at the rate of ten per cent. per annum.

The Consolidated is an example of the benefits of selective amalgamation. Under its control are the War Eagle and Centre Star groups of mines in the Rossland district; the Eureka group at Sandon; the St. Eugene at Moyie; and the Snowshoe group at Phoenix. The Trail smelter is also the company's property.

There are undeniable advantages in consolidation. The fortunes of a company, whose interests are not confined to one district are less susceptible to ordinary vicissitudes. The failure of one mine does not necessarily imperil their whole enterprise.

On the other hand, there is a needless duplication of work in mining districts where many mines are operated by single individuals or companies. In Germany this has been recognized. By a loose, but efficient, association of interests the owners of coal and iron mines, the blast furnace companies and the steel corporations work together. Orders for iron and steel are distributed and allocated by the central offices of syndicates. All matters pertaining to transportation are dealt with by specially trained experts. In fact the individual producers of ore, coke, pig iron or steel are relieved of much of the incidental troubles that so militate against similar operators in Canada. The German producer is assured of his raw material at a fixed rate and of a sale for his product.

To a certain extent like benefits accrue to the members of any well organized consolidation.

This is not a panegyric on trusts. It is merely an amplification of the old saw, that in union there is strength.

NOVA SCOTIA AND THE JAMESTOWN EXPOSITION.

Nova Scotia's exhibit of gold ores has won highest distinction at Jamestown. This is gratifying. Upper Canadians are ignorant to an amazing degree of the mineral wealth of Nova Scotia. In Boston and New York her resources are better known. But throughout both Canada and the United States Nova Scotia needs advertising.

We are informed that the creditable exhibition made at Jamestown was organized largely by a Virginian lady, who is interested in a Nova Scotian mine. Part

of the exhibit is the personal property of Mr. A. A. Hayward, past president of the Nova Scotia Mining Society, and late manager of the famous Golden Lode mine.

It is but a matter of time when Nova Scotia's gold fields will come to their own. They have passed through two stages—one of early crude methods and one of mismanagement. With improved methods and a better understanding of the geological phenomena, Nova Scotia will presently lead all Canada as a gold producer.

A GOOD MOVE.

The Ontario Bureau of Mines has engaged Mr. G. C. MacKenzie to look into the adaptability of various methods of magnetic concentration to the iron ore deposits of the Province. Mr. MacKenzie's instructions are, as they should be, general. Electric smelting, magnetic cobbing, magnetic concentration and kindred processes will be investigated. Then will follow a thorough examination of the extent, nature and availability of many iron ore deposits hitherto considered unworkable.

The Bureau of Mines is acting with wise prevision in this. The advance of science is rendering valuable ore bodies that ten years ago were worth nothing. Undoubtedly also electric smelting is the process of the near future, especially in a country where water power is cheap and abundant.

The choice of Mr. MacKenzie is a good one. Mr. MacKenzie is a graduate of Kingston School of Mining. Though a young man, he has had wide experience in mining. He is a proficient iron metallurgist. Thus he is well fitted to conduct this very important investigation.

The results of an enquiry so complicated and of such immediate significance will be looked for with eagerness, not only in Ontario but throughout the whole of Canada.

The investigation, we take it, will not be confined to the commercial aspects of the question, but will in addition deal with the present condition and future promise of electro-metallurgic processes of reduction and, more especially, with the comparative merits of magnetic concentration methods. On these subjects there is a large and constantly increasing series of monographs. This literature constitutes a valuable starting point for the investigator. Indeed a careful summary of literature already published would form an excellent introduction to the final report.

THANKS.

The *Mining Reporter*, November 14th, makes appreciative mention of THE CANADIAN MINING JOURNAL'S attitude towards questionable mining schemes. We are grateful for this. Coming from such a source, appreciation is significant. The *Mining Reporter* is one of a number of American periodicals whose whole influence

is for good. The United States is by no means free from fraudulent mining promotions. But the educative and moral power of clean technical journals has done very much to restrict wild cats. Indirectly, by the dissemination of knowledge; directly, by exposing fraud, the technical press has performed a high mission.

A THREE CORNERED ROW.

Three of our contemporaries on the other side of the line have been indulging in a little squabble as to the errancy of copper statistics. Witnessing the fray from afar, we would award the victory to the *Mining and Scientific Press*. Our Chicago contemporary, the *Mining World*, lays claim to inerrancy and infallibility. These claims the *Press* punctures with all the surgeon's pleasure in a perfect incision.

Only two disputants were involved at first—the *Engineering and Mining Journal* of New York and the *Mining and Scientific Press* of San Francisco. The *World* "butted in" (that phrase is used advisedly) with results disastrous to itself. The *Press* has a long, sharp sting. It used that sting on the *World*. Our metaphors may be mixed; but we await eventualities with fervent interest.

NOMINATIONS.

At a well attended meeting of the Toronto Branch Dr. W. G. Miller was nominated for the presidency of the Canadian Mining Institute. A similar nomination, signed by a large number of members, was also sent to headquarters in Montreal from Cobalt. The Toronto Branch has also nominated Dr. A. E. Barlow for the position of vice-president, and Mr. J. B. Tyrrell for councillor. It would be hard to select three more fitting men.

Editorial Note.

A government laboratory is an asset of tremendous value. The Quebec Government, although it possesses no laboratory of its own, has had an arrangement with Mr. Milton Hersey, of Montreal, whereby prospectors and others can have all varieties of mineral samples assayed and analyzed at very moderate rates. Qualitative examinations are made for the nominal fee of twenty-five cents. Incidentally it may be remarked that the qualitative examination is far more useful than is usually recognized. An assay or a quantitative estimation is often misleading for the reason that the original samples are not representative. A laboratory, conducted by a chemist whose reputation is established beyond question, no doubt appeals to the public more than an enterprise controlled by the Government.

THE CARIBOO-McKINNEY MINE.

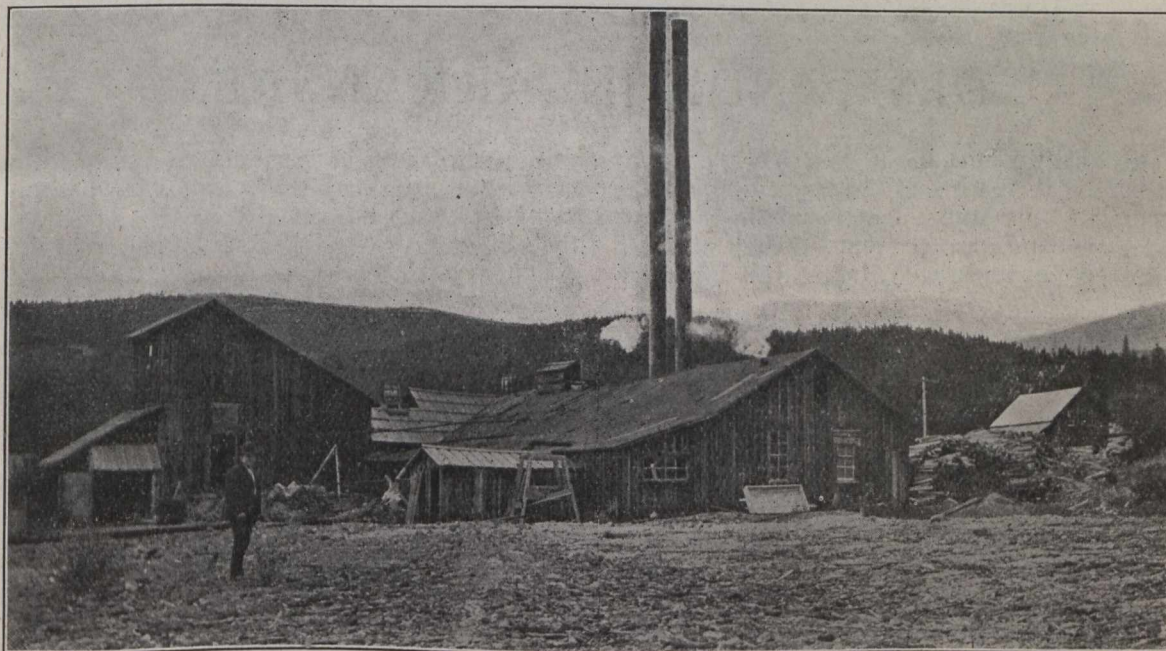
The old Cariboo-McKinney mine, at Camp McKinney, B.C., about twenty-seven miles west of the Granby mines at Phoenix, is once again being operated, after having been closed down for several years. A syndicate of Phoenix people, yecept the Cariboo-McKinney lessees, about a year ago leased and commenced work upon the property. Following is a list of the officers of the Cariboo-McKinney lessees syndicate: President, R. B. Boucher; secretary, Geo. L. McNicol; superintendent, P. D. Ahier; directors, L. Y. Birnie, C. M. Campbell, William Rowe, W. S. Macy and A. B. Hood. The head office of the concern is situated at Phoenix, B.C.

Owing to the impaired condition of the shaft, it having been found, in the lower levels, to be full of timbers and rock intermixed, it took over six months to get the water out of the mine to the four hundred foot level. Prospecting for ore was then undertaken and after some little work what appeared to be a good body of ore was located on the two hundred foot level. Ten stamps of

depth than they have now attained. It consists of sixty and eighty horse-power boilers, hoisting engine, five drills, compressor, pumps, etc. Only two air drills are being operated at the present time on the development work, and as has been stated before, the outlook is not very encouraging. However, the Phoenicians are born optimists anyway, and the lessees hope for brighter things later on.

The six claims which comprise the property of the Cariboo-McKinney are the Cariboo, Amelia, Okanagan, Saw Tooth, Maple Leaf and Emma. Supplies for use at the mine are shipped to Bridesville on the Great Northern Railway, and go from there to Camp McKinney, ten miles, by a good wagon road.

The authorized capital of the Cariboo-McKinney Company is \$1,250,000, par value of shares \$1 each. The company has paid \$546,837 in dividends to date, the last dividend having been paid the shareholders in February, 1904, which only amounted to four cents per share. The



CARIBOO-McKINNEY SHAFT HOUSE AND COMPRESSOR ROOM.

the battery of twenty now on the property were fixed up and two hundred tons of this ore was put through the mill, but when the clean-up was made and a gold brick turned out it was found that the values saved from the ore taken from the two hundred foot level were not sufficient to mine and mill it and pay a profit, so the lessees have closed down the mill and at the present time are prospecting for a better grade of ore. I am informed from a reliable source that up to the time of this writing there is no ore in sight that is worth taking out of the mine. Some of the ore which they have encountered runs from \$3 to \$12 per ton, and there are pay streaks in this running from \$12 to \$31 per ton. Of course prospecting a mine like the Cariboo is somewhat of a gamble, and at any moment the miners are apt to encounter exceedingly rich ore, a very small body of which would put a lot of money into the pockets of the lessees.

There are now only about twelve men working in and around the mine. The property is equipped with a mining plant of sufficient capacity to mine to a greater

shares, which sold considerably above par eight or ten years ago, and around 36 cents per share five years ago, can now be secured for about four cents per share.

Al. McKinney, now nearly broke and dying of cancer on a small farm in Washington State, with some other prospectors, leaving Colville, Wash., in the spring of 1887 and going up into the Creek district, passed through the placer workings that were then being operated there and going along the ridge dividing the North and South Forks of Rock Creek came to the bare spot where now lies the Cariboo. Here they found decomposed quartz with the free gold plainly visible in it. The Cariboo claim was staked on the discovery, but the discoverers made a mistake in supposing that the vein ran north and south and staked the claim in that direction, the claim being 1,500 feet by 600 feet, as required by the laws in force at that time. McKinney and another prospector each owned a moiety in the Cariboo, and one of their partners, "crying" because he was not in on the deal, was appeased by McKinney showing him what appeared

to them a parallel vein to the east of the Cariboo. But this other man was from Patagonia, and McKinney had to take a pan of the decomposed rock to the creek and pan out the gold before he would believe. The pan of dirt ran \$2.50, and so the Amelia was located at the same time, "doubting Thomas" and the other prospector getting in on the ground floor.

In 1887 McKinney sold his interest in the Cariboo to a Spokane syndicate, among whom were James Monaghan, Geo. B. McAuley and Clement King, for about \$7,000. However, the Spokane people were not in a much better position to operate the property than McKinney and his partners, so it still lay idle. Finally in 1894 Monaghan secured a second-hand milling plant on a long credit, and, arranging with his miners that they should depend on the proceeds of the mine for part of their wages, he started to work. The Cariboo paid handsomely from the moment the first stamp dropped, which was on April 24th, 1894.

Several years afterwards Monaghan sold most of his stock for sixty cents per share, and the money from the

sale of these shares, together with what he had received in profits from the mine, amounted to nearly \$400,000.

From 1894 to the time when it closed down a few years ago, the Cariboo mine produced something over two million dollars altogether.

McKinney and the money he got for his interest in the Cariboo were eventually parted, and once again he turned towards the rugged hills, his heart filled with the sempiternal hope of the prospector, searching for another of nature's treasure deposits, but he has never since made a find to compare with the Cariboo. Recently when in the Hope Mountains, on what McKinney knew to be his last prospecting trip, when he was making a final effort to leave his daughter a competence, he fell exhausted and would have died a lonely death in the hills he loved had he not been found and brought back to where he could receive the attention he required. Such is fate!

GEO. A. OHREN.

Oct. 25th, 1907.

DIAMONDS IN ARKANSAS.

The yellowest daily journals of New York City are devoting considerable space and corresponding display to the authenticated discovery of diamonds in the State of Arkansas—a not unexpected event—though attended by the usual degree of unveracity, taking this for example:—

"Arkansas Farmers
"Desert the Plow
"For the Diamond."

"Harvest Fields Being Run by Women While Men
Seach for Fortunes."

Cotton crops are spoiling, farmers are "diamond crazy." Labor is "impossible to get," male members of families "are out combing the banks of the Little Missouri in search of wealth." Such is the introduction followed in sequential order by assurances that

"There are real diamonds in Pike County and plenty of them."

"Two and a half miles south of Murfreesboro there is the crater of an extinct volcano in which occurs periodrite (a printer's error), the South African diamond-bearing rock, and up to date more than one hundred and forty stones, running in size from one to six and one-half carats have been found."

That such stones "are of the finest quality and lustre," also goes without saying, notwithstanding the writer said it. The further averment that "the crater is at least one mile in diameter" and that "ten shafts sunk within this radius have tapped the diamond-bearing rock" arouse the suspicion that "the Arkansas Traveler" is again active in amusing fictions.

It is quite possible that "a number of prospectors are working the shoals along the river bed and are getting good returns." No one will have to dispute the statement that "a few good diamonds have been found along the river bank, having undoubtedly been washed from the volcano." That is, this mile wide mine, during the period of activity as a volcano, when the point of least resistance expanded and muds and associated minerals

were rushed into the vacuum, was subjected to a species of sluicing, causing "the volcano" to disseminate gems along the "shoals" and "banks." The lay writer on the subject probably mistakes the period of deposition—a minor detail, perhaps. He might be excused had he not continued thus:—

"According to the geologists sent here by the Government to investigate the diamond field, at some remote period the Gulf of Mexico extended as far north as the volcano in which the diamonds are found. During an eruption, they say, under the water, the sudden cooling of the earth, together with the great pressure, formed the diamonds. The stones are found in quantity about twenty feet below the surface and under a bed of gravel. No drill has yet been sunk deep enough to find out the depth of the peridotite."

Needless to say, the origin of these diamonds, as recounted, will astonish "the geologists" referred to, Professors Crookes and Myers, Mr. Kunz, international crystallographers, and the directorates of Kimberley and Transvaal mines. A globular crater "a mile in diameter"—seven or eight times larger than any "pipe" of payable value—and that before the characteristic containing walls of "the volcano" are defined—"licks creation." Nothing of the sort was heretofore classified among the "great expectations" of mining men. The Arkansas writer may have divined this claim area, or it may only be a measured aberration on his part. While he was at it, however, he might as well have anticipated the future ascent, and the records of the diamond drill core, which drill is to be "sunk deep enough to find out the depth of the peridotite." Having presumed as to the diameter of the circuitous crater he could have projected his hypotheses to vertical details, thereby leaving it to "rotaries" and "pulsators" to present the diamonds as their portion of the daily routine of such mining.

Because Ontario has an assortment of "experts" who bring discredit upon honorable and distinguished technical men earnestly engaged in conscientiously determining the economic worth of its mineral resources, the

advent of this Arkansas writer points a moral. He glibly refers to "diamond-bearing rock," describes the volcano forming and emitting gems like clay pigeons from a trap, obviously escaping from subterranean cold and crushing forces; yet he intimates that the depth of the peridotite is a matter of solicitude.

Ontario has evolved "gems" in the form of prospectuses. This Arkansas "expert," and whoever inspired him, will be readily conceded precedence in this regard, because a new theory and practice relating to diamonds and diamond mining are comprehensively expounded. Unfortunately, such "experts" cause "farmers" to "desert the plow"—or sell it—drive women to despair, or the furrow—and indirectly discredit scientists devoted to the determination of mining problems. For years it has been an open secret that diamond-bearing craters or "pipes" might at any moment be found on this long line of fissuring. The trouble there has been, as elsewhere, unscrupulous and improvident speculators conceived it to be a first principle, that millions worth of scrip must be issued and parcelled out among the adventurous public before a washing test was made of the diamondiferous ground. In one glaring instance a company, capitalized at \$5,000,000, with every mineral present that the Kimberley mines disclose—except diamonds—had not washed a solitary load to ascertain whether the one indispensable existed in "the pipe." Scrip at 10 cents on the dollar was put in circulation.

This Arkansas development is in danger of being involved in similar scandals, and rather than submit to such "experts," it devolves upon those responsible for cotton crops rotting in the fields, women going into the fields, men tempting the unkind Fates, to begin washing operations and publish the recovery per hundred loads. Conceding that diamonds exist in the peridotite, that their quality and lustre are superb, the question recurs: "How many diamonds per hundred loads will be recovered from a trial washing of 20,000 loads?"

There are "blind pipes," low grade and unpayable "pipes," and "pipes" possessing diamonds in payable quantities; but a "pipe" a mile wide, with "plenty" of the precious stones, gives the palm to Arkansas—or its "expert."

ALEX. GRAY.

A WESTERN AUSTRALIAN PLANT.

In the report of the Western Australia Department of Mines for the year 1906, the treatment plant of the "Associated Northern Blocks, Limited," of Kalgoorlie, is described. This treatment plant is of the "Dry Crushing Type" and is designed to handle the sulphotelluride ore obtained from the "Iron Duke" shoot.

The treatment may be subdivided thus:—

1. Breaking and storage.
2. Milling.
3. Roasting.
4. Grinding and classification.
5. Agitation and cyaniding.
6. Filter pressing.
7. Disposal of residues.
8. Precipitation and clean up.
9. Re-treatment.

Breaking and Storage.—The ore is tipped upon a grizzly, the fines pass through and the oversize goes into a No. 5 Gates' breaker, capacity 500 tons per diem. The products of breaker and grizzly meet at the foot of the breaker and fall on a Robins conveying belt, which dis-

tributes the ore evenly over a storage bin of 350 tons capacity.

Milling.—The ore is now fed from the bottom of the coarse ore bin into a row of three ball mills, size No. 5, by means of automatic bump feeders. These mills reduce from 38 to 44 tons of ore per diem and grind it until 50 per cent. will pass through a 150 mesh screen. The crushed ore falls from the mills through a chute into a spiral conveyor, which passes it to the fine ore elevator. It is then stored in a bin holding about 60 tons.

Roasting.—The fine ore is fed from the bin to a double push conveyor by means of another screw, and this in turn pushes it along the line of six Merton roasting furnaces, which have a capacity of 20 tons per diem of ore running 4.5 per cent. of sulphur. The ore after roasting is conveyed by another push conveyor to a Krupp elevator of the chain and bucket pattern, and this elevates it to the height required for all future handling.

Grinding and Classification.—The hot ore falls from the mouth of the elevator into a vortex mixer, where it meets a stream of weak cyanide solution, and is here converted into a pulp consisting of one ton of ore to five tons of solution, and this gravitates to a row of eight Forwood-Dunn grinding pans. Here the grinding is carried on until, approximately, 93 per cent. of the total product will pass a 150 mesh screen. Mercury is added to the pans and a fourth of the gold contents of the ore is collected in the form of a crude amalgam. This passes on to the clean-up room for further treatment in the amalgamating barrel. From here the clean amalgam is pressed into balls and retorted. The bullion averages £4 per ounce.

The overflow from pans runs to the "settlers," where four parts of the solution is separated and again returned to mixer for treatment of a further quantity of ore. The thick pulp is drawn through taps at the bottom and passes on to the agitation plant.

Agitation and Cyaniding.—Here are six vats, each 22 feet diameter and 6 feet deep. One is used solely for re-treatment purposes and the other five for ordinary slime. The pulp is kept agitated here for 16 to 18 hours with cyanide solution of strength 0.06 to 0.08 per cent. cyanide.

Filter Pressing.—The pulp is charged into three 5 ton presses by a three-throw plunger pump, and the washing is done by another pump of the same type. The gold solution after being separated from the ore runs into a large storage tank.

Precipitation and Clean-up.—The gold solution is elevated by centrifugal pumps to another tank at a height of 30 feet, for the purpose of having a steady pressure on the clarifying press. This press removes all fine mud from the solution and it then goes to the extractor boxes. After gravitating through the boxes it is deprived of 47 per cent. of the gold contents and is again ready for use in the plant as weak solution.

For clean-up purposes there are the following:—

- One lead lined acidizing tank.
- One gold slimes filter press.
- Two muffle roasting furnaces.
- One tilting retort furnace.
- One refining mud furnace.

These only come into use once a month.

Disposal of Residues.—This is now done by men trucking from chutes directly under the presses. Owing to the growth of the dump it has been found necessary to instal a belt conveyor, which will elevate to 60 feet. It is set at an angle of 60 degrees.

UNDERGROUND HAULAGE.

(A paper read before the British Society of Mining Students.)

BY JOHN BELL.

At collieries having large royalties and seams, worked to a rather inconvenient distance from the shaft for horse haulage, one of the important problems the colliery manager has to face is the introduction of the most suitable system of mechanical haulage to convey a quantity of, say, 1,000 tons of coal to the shaft in eight hours.

This output will not be attained until the seam has been fairly won and developed. A period of 18 months or so is necessary to reach this stage of development, but the adoption of a particular system of mechanical haulage has to be carefully considered and preparations made for it from the very commencement of the winning of the seams and opening out of the intended main roadways.

One thousand tons a day is a fairly good output of coals from one shaft bottom, or from one seam in an eight hour shift, and the following consideration of the subject of haulage is based upon such output.

Very rarely the coal-drawing shaft is situated near the centre of the royalty, and as the area to be worked comprises in many instances 1,000 acres or more, the whole being contained in an irregular shaped plot, the haulage roads sometimes have a distance of from 1 1-2 to 2 or more miles to go before reaching the limit of the undertaking.

To those familiar with extensive underground workings it is well known that the main roads are sometimes driven with many turnings, either to prevent trespassing on other colliery leases, or to avoid the payment of wayleave rents, or to pass well aside of old workings, or the undermining valuable property, injury caused to which may be very costly, etc. Therefore, the distance and direction of the intended main roads, approximate number of branch roads, and necessary curves have to be designed and their intended courses marked upon the working plan after mature consideration of all the influencing circumstances.

Again, it often happens that it is decided upon to win other seams by drifts from the principal one. Also it is a very fortunate colliery that has few or no faults of great or little magnitude to contend with, and consequently these must also be taken into account when deciding upon the system of hauling to adopt.

One important item to consider in which experience is gained as the early workings proceed, is the nature of the roof and sides of the main roads, because upon this more than upon anything else is the final decision made; as a certain method of haulage, much favored by some mining engineers, can only be worked under a very good roof.

Mechanical haulage in Great Britain resolves itself into two systems, *Main and Tail Rope*, and *Endless Rope*.

Endless chain haulage is almost identical with endless rope, but rarely used underground, though perhaps oftener on the surface for short distances. Electric and compressed air motors can only be successfully used in high seams, and therefore are not adapted for British mines, which have haulage roads often not more than 5 feet high. These motors are generally used in American and Canadian mines, but a description of them does not come within the scope of this paper, as there is less likelihood than ever of their being installed in this country.

It has for a long time been a debatable question with mining engineers as to which is the best system of haulage—main and tail or endless rope. Some mining districts in past years have almost exclusively adopted one of these methods, as the North of England with main and tail; other districts, such as the Midland Counties and Lancashire, using endless rope.

Each method can only be a success under certain local circumstances. But naturally we all prefer that system we know best, and from long use are thoroughly familiar with, giving it preference for the intended work we have in view, and which may be afterwards successfully accomplished; although installed by others accustomed to it, a different system of haulage may be even more economical and successful because best suited for the seam. The best results in the after working cannot be obtained by a system carried into effect by those totally inexperienced in its design and installation.

The two systems of haulage we are considering are entirely different from each other. The Main and Tail does not admit of much variation from its general principles, except that sometimes for comparatively short distances or sections along the engine plane from the shaft in which dip gradients inward prevail the tail rope can be dispensed with. But the other method—the endless rope—can be arranged in many different ways, and consequently there is greater scope for ingenuity and invention for those who have to lay it out.

MAIN AND TAIL ROPE SYSTEM.

We will first deal with the above system. The Main and Tail rope can be adopted in *all* mines, but the conditions most favorable for the successful working of it are: (1) Straight long engine planes with the branch roads leading off it at some distance from the shaft, thus allowing the sets to attain a high speed. (2) Engine planes having curves of large radius; the engine plane can be formed with any number of curves bearing to the right hand or to the left along its course without extra risk of derailment of tubs, whereas curves are not easily negotiated in the endless rope system. (3) Narrow roadways requiring only sufficient width for a travelling road at one side of a single line of rails. These narrow roadways can be quickly pushed forward with the aid of heading machines if speed of driving is required, and a travelling passage in addition to the necessary refuge holes tends to the safety of the workmen on their way to and from the workings.

Another question rarely considered when comparing the two systems is the time lost by men and boys travelling underground to and from their work where they have long distances to go, sometimes two miles or more before reaching the end haulage station or coal face. Sometimes this travelling—especially if the roads are low—takes up at least an hour each way, and by the time the men reach the face they are much exhausted, consequently valuable time and money producing energy is wasted to the detriment of all concerned. In the system we are considering this can to a great extent be avoided, for the men and boys can be quickly taken in by fresh to their work by riding in the set and out again when the shift ends, thus giving them the maximum time

for a day's work at the face. Under the endless rope system of slow travelling tubs this cannot be done.

Disadvantages of Main and Tail Rope.—It naturally follows that where sets of tubs, each made up of from 30 to 60 or more in number, travelling at a high speed for long distances to and from the shaft at frequent intervals, accidents will now and again happen, either from derailed tubs, breakage of couplings, ropes, or wheels, loose rollers, falls of stone, switches turned the wrong way, and from other causes, resulting in a stoppage of work for a period of half an hour or longer. Extra length of shaftings and also of sidings at the inner end of haulage stations must be made to hold a surplus number of tubs in case of accidents, to ensure regularity of work without delays.

Also the intermittent nature of the running in bringing the loaded tubs to the shaft is a disadvantage. More steam for the time being is required, and a large engine, whilst the wear and tear of material is rather high.

Branch Roads.—The working of branch roads for this system is much simpler than it is for the other method. No connecting driving wheel is required at the junction, only a return wheel at the branch engine plane terminus for working the rope. The connection of the ropes to those working the main engine plane being simply and quickly done by the offtake boy stationed at the junction. In order to facilitate the haulage where it is necessary to win large tracts to the right and left of the main engine plane, it is best to turn the branch roads from the main haulage road nearly opposite each other, but in practice this may not always be possible.

Every one of these roads is either driven from the main way by means of a carefully made curve, or the connecting curve is made later before the working of the branch begins. The haulage rope for it is laid from the junction, inward, over a return wheel at the far end and back again. Each end of this rope is provided with a split link. These links are exactly opposite two similar links on the main and tail ropes when the journey of full tubs is at the shaft, so that all that is required is to disconnect the main and tail ropes at these links, and join on the branch ones, using a small hand winch to draw the main and tail joints to a position opposite each other if they are not quite up to their mark, change the switches and rap the set in to the landing.

These junctions are generally called offtakes. A boy is stationed at each offtake, whose duty it is to divert the sets into the branch road, for which purpose he telephones to the shaft, and changes the switches and ropes.

Shaft Sidings.—Main roads and shaft sidings should be turned away if possible at right angles 10 or 12 yards distant from the shaft.

Owing to the large number of tubs travelling by this system it is necessary to make long shaft sidings and also inbye landings to store them. Suppose sets of 60 tubs are run, then the sidings must be long enough to contain $60 + 20$ spare tubs which sometimes remain undrawn in front, and also an additional length of 30 yards at the inbye end to allow of clearance or for a rising gradient. Tubs which contain 10 cwt. are 5 feet 2 inches long, including coupling chain. $\therefore 5 \text{ feet } 2 \text{ inches} \times (60 + 20) = 413 \text{ } 1\text{-}3 \text{ feet}$, say 138 yards + 30 = 168 yards, thus making the length of shaft sidings 168 yards.

If coal is drawn to both sides of the shaft then the same arrangements must be made also at the other side.

The sidings are divided lengthways into two parts, each sloping in opposite directions. The higher portion

known as the "kip" is for the full tubs, and is made to fall towards the shaft at a gradient of 1 in 72, so that a loaded tub may run by gravity to the shaft. The road for empty tubs is formed with a falling gradient from the shaft for about four-fifths of the length of the siding, rapidly rising at the far end. This depression is called the "dish," and is about 4 yards wide.

Inbye Landings.—These landings do not take much making and need only be wide enough for a double road, with a travelling way for men and ponies between them and sufficient clearance from the timbers at the side; 3 1-2 yards is generally wide enough. They must also be long enough to contain a full set of 60 tubs, and additional length to accommodate other 20. Consequently the total length will be about 138 yards.

Spring switches instead of the old lever switches are laid at the entrances to landings, and at the inbye end of shaft sidings.

Intermediate Collecting Stations alongside Main Roads—Sometimes it is necessary to open out a small district on one or on both sides of a main haulage road. In either case one landing laid alongside the engine plane will suffice. Such landing can be formed without much trouble if the roof is good by taking coal from both sides of the main way, thereby increasing the width sufficiently to allow an extra road to be laid along each side of the haulage road for a length of 138 yards. There must be sufficient space between these roads to allow tubs to travel freely at a high speed along the main haulage road. A width of 4 1-2 yards would be required for this purpose under the given conditions. Movable clams¹ crossing the main road allow the tubs to be taken from one side to the other as required, ordinary switches being used at the top end to direct the tubs in or out. (See Fig. 1.)

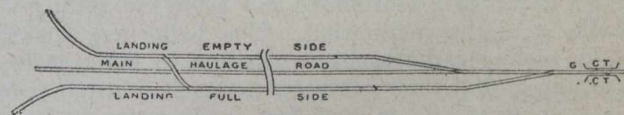


Fig. 1.

Arrangement for Landing on a Through Main Haulage Check Table.

G—Greaser. C T—Check Table.

floor level of the curve a series of revolving horizontal

Laying out and working Curves.—Curves on haulage roads are a necessary feature in mines, and require careful laying out. The curved debouchure of a branch road is generally made a little wider than its continuance. A long row of strong props is securely fixed between roof and floor, from 3 to 4 feet apart, all round the curve on the inside of the inner rail; then strong horizontal deals are nailed to them, one deal length extending from prop to prop at a height from the floor slightly less than that of the tub. On these deals a thin iron or steel rubbing plate 6 inches broad is nailed, and placed in such a position that the tubs passing to and from rub against the metal all the way round the curve. At

¹Clams are long bridge rails, more or less curved, as required, moving on pivots at one end and connected to the rails on a branch road. These clams then go over the top of the principal haulage road rails, and their free ends are widened out and sharpened. These ends can be moved into position over the top of the main road row of rails at any point required, thus allowing tubs to be diverted without any check into the first branch heading.

drums, 4 feet in diameter and 9 inches in height, are placed for guiding the rope, so that the latter rubs against and causes the drums to revolve, thus reducing friction as it moves in either direction. Along the whole length of the curve between the props and coal side vertical sheaves are fixed at intervals of 8 yards, for guiding and reducing the friction of the tail rope. (See Fig. 2.)

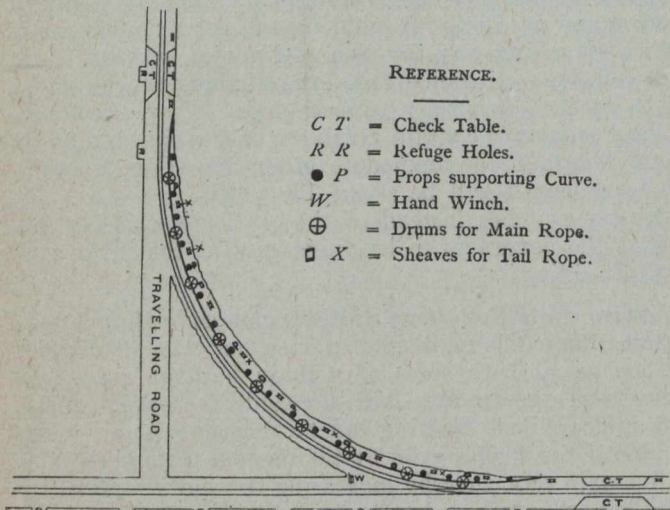


Fig. 2.

Curve for Main and Tail Rope System.

Return Wheels.—Unlike the erection of return wheels in endless rope haulage, that of the Main and Tail system can be quickly and effectively made secure. In order to do this it is necessary to fix two strong balks at a sufficient distance apart for the insertion of the wheel between the balks being well let into the roof and floor to a depth of 2 feet above and below, so as to give the balks a slight inclination. The balks are spaced apart by having a distance-piece bolted to them at top and bottom, and at their centres are attached bearings to take a large grooved pulley 5 feet in diameter between them. This wheel must be securely fenced in. Sometimes this pulley wheel is fixed in an horizontal position below the floor of the road, but the writer is of opinion that in order to resist the tremendous pull exerted upon this pulley when the sets are running, heavily loaded at a high speed up a steep gradient, the vertical position is much stronger than the horizontal. It can also be better examined and oiled than when laid under the floor of the roadway and boarded over. Again, the vertical position offers better facilities for connecting another rope pulley on to it, if the occasion to use a rope-driven pump for forcing water out by, should arise at any time. If the use of such pump were adopted it could be worked when the haulage rope was running.

Haulage from Workings Proceeding in the Direction of Dip.—Sometimes small districts or flats to the dip have to be worked, and the coal therefrom brought to the end of the main haulage road. In such a case an economical method of conveying the dip coal may be obtained by forming a two-way siding capable of holding from 15 to 30 tubs depending upon the gradient, distance, and size of district at a suitable place in the workings, and connecting this siding with that at the end of the main haulage road by an engine plane for direct haulage, which could be worked by means of an additional rope from the landing inside siding. The sets of tubs can be made ready, the one at the end of the main haulage road for transference to the shaft, the

other at the inside siding for transference to the main haulage road. The two ends of the rope then lying on the floor of the direct haulage road are attached, one to the hind end of the set of tubs going to the shaft, the other to the front end of the set at the inside siding. This rope then connects the two loads, it having a slip bolt and pin, or a dog as it is called, at the outby end for easily disconnecting it from the main set.

The engine in hauling out the main set at the same time also pulls out the smaller one to the top end of the landing, where the inside rope-end is attached. It is, however, necessary to slow down or stop the shaft set while the disconnection is being made, owing to the great length of the main haulage road compared with that of the direct. A single horse may be employed to pull in the required number of tubs securely dragged or scotched to the siding, the rope being attached and trailed in behind the set, so that in this way much horse labor is saved. Or, if the gradient is suitable for the tubs to be run in by gravitation, the use of a horse will not be required at all. In that case the gradient must be uniform, and such as to ensure the tubs spragged or un-spragged descending the road gently.

Check Tables.—In both systems of haulage it is necessary to have check tables laid at distances of about 200 yards apart on the main road, and always at the entrances to landings or sidings, and at both ends of curves. These are made of wood 6 feet in length measured over the rail, and 4 inches in height, and are firmly fixed to the floor and sides, so that when any derailed tubs either full or empty reach the check tables they are directed on to the rails again.

Automatic Tub Greasers.—These are fixed at the entrances to the landings, and also at both ends of the shaft sidings, for full and empty tubs. These to a considerable extent reduce the friction of the tub axles, and are of great benefit to the putters and horses.

Friction Rollers.—Rollers of iron and wood are fixed at suitable distances apart to keep the ropes off the roads and reduce friction. They are generally placed from 8 to 10 yards apart on the main way. Iron or steel rollers are best on heavy gradients as they last much longer, wooden ones being better on level roads. They are generally arranged thus:—Every three succeeding rollers throughout the engine plane consist of one iron one followed by two wooden ones. They should be fixed in suitable boxes, which are firmly placed in the holes sunk in the floor, instead of as is frequently done, nailed to stretcher-pieces reaching from sleeper to sleeper, and consequently easily torn up by derailed tubs, afterwards often to cause the derailment of others. Rollers are 5 inches in diameter and 9 inches in length.

Grooved sheaves from 12 to 15 inches in diameter and 3 inches in width are used for the tail rope, and are placed from 10 to 12 yards apart.

Refuge Holes.—For this system of haulage, where there is very little spare room between the tubs and the coal side, the Coal Mines Regulation Act requires refuge holes to be at no greater distance apart throughout the length of the engine plane than 10 yards. These refuge holes should all be on the same side of the road, and opposite the side the rail rope travels along. They must be kept perfectly clear from deposits of rubbish, timber, and in-filling of every description, and should be frequently whitewashed, so that they can be readily seen in cases of emergency.

Automatic Detaching Hook and Safety Bar Attached to the "Sets."—To the fore end of the leading tub of

every full set an automatic detaching hook is fixed. This is made of wrought iron. The low portion has a link which fits in to the coupling hook of the tub; another half link on a swivel can be turned up and made fast by a collar. To this the main rope is attached. On the top is a crook which fits on the tub end. A bell crank lever at this point has a chain connected to the collar. As the first tub of an outgoing set approaches to within 40 yards of the shaft the lever strikes a horizontal bar and is forced over; this action lifts the collar and detaches the rope, which falls over the "kip" side, allowing the tubs to run by gravity to the shaft. (See Fig. 3.)

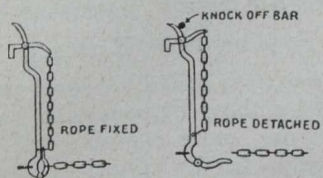


Fig. 3.

AUTOMATIC DETACHER FOR MAIN ROPE.

Where full tubs have to be hauled up heavy gradients a strong trigger is attached to the hind end of the last tub. This is a bar of iron 1 1-2 inch in diameter and 3 feet in length, suitably bent. One end is fixed to the tub at a point two-thirds the height of the tub from the floor, the other having two fangs rests on the tail rope. If the couplings or the main rope breaks the fangs slip off the rope as the tubs run back and the pressure forces the fangs into the floor or into a sleeper and throws the last tub off the rails; this stops the other tubs from running wild down the declivity and prevents much damage from being done.

Run-Rider.—A boy 17 or 18 years of age is frequently employed as rider on a set. His duty is to see that the set is immediately stopped in case of accident from derailed tubs, broken rope, etc. He also attaches the rope to the leading end of every set and sees that all are ready for its journey in or outbye. The duties of this attendant are often dangerous and his services should be dispensed with wherever possible, especially on heavy gradients.

Signalling.—In all methods of haulage, electric signals and telephones are placed for use between the shaft and the engine-house at one end to all inbye landings.

Automatic Chocks and Catches.—Over portions of an undulating engine plane, the rising gradients for full or empty tubs are provided with some means for preventing the tubs from running back. Spring chocks and automatic catches are used for this purpose. The former are best for light gradients, the latter for great inclinations. Spring chocks are made for a piece of wood, 8 feet in length, 9 inches in width, and 3 inches in thickness. Upon this plank the spring proper is fixed. It is made of elm, 4 inches deep, tapering from 3 inches wide at that extremity which is fastened to the bottom piece by two bolts to 1 inch wide at a point near the other end where it widens out again. This free end is in contact with the side of a wooden chock, plated with iron and pivoted at one end to the plank below by means of a bolt. A short chain prevents this chock from coming out too far, and thus ensures continual contact between the spring and the chock, but the action of the spring when not forced back always presses against the

chock sufficiently to cause its unpivoted end to project slightly beyond and over one rail of the tub road. The tubs in passing the chock force it back, but as each wheel clears the chock, it springs out again and crosses one rail, so as to form an effectual stop to the return of tubs. These spring chocks are always fixed between the rail and coalside. (See Fig. 4.)

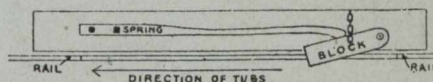


Fig. 4.

AUTOMATIC CHOCK.

Automatic catches, shown in Fig. 5, are fixed midway between the rails. They are simply made, and each consist of an iron bar fixed slantingly to work on a pivot attached to a thick sleeper. The heaviest and longest part of the bar works in a cavity in the floor; the upper portion projects above the tub axles. As each axle passes over it, the bar is depressed, but as soon as the tub has passed beyond it, the catch rises again owing to the superior weight of the portion below the pivot, and thus

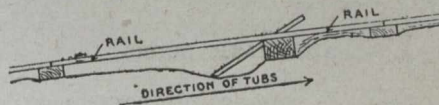


Fig. 5.

AUTOMATIC CATCH.

prevents the tubs from returning. Ordinary stopblocks, plated with iron, the longer piece crossing one or both rails, are also used for preventing tubs from running back.

Automatic Doors on Haulage Roads.—It is sometimes imperative to have doors on main haulage roads for ventilation purposes. Needless to say, only the strongest necessity excuses their use on such roads, and where heavy canvas doors are not satisfactory, then wooden ones should be erected. There must always be two doors fixed distant from each other rather more than the length of a full set of tubs, so that the space between allows of the whole set passing through one door before the leading tub reaches the other.

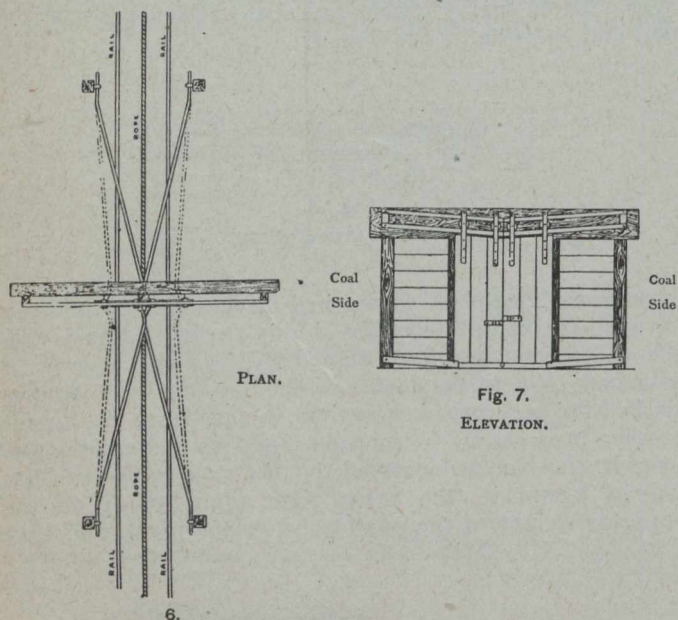
Formerly trapper boys were employed to open and shut these doors when required, as the sets were approaching and were not to be stopped; but the work was always a source of danger to the lads, and accidents often happened either through carelessness or ignorance.

Consequently, self-closing doors were invented which could be opened automatically from either side by the approaching sets of tubs. The following description will be understood by reference to Figs. 6 and 7, which are a plan and elevation respectively of them.

These doors are made in halves on overhead travelling pulleys moving on rails in the upper frame; the leading tub of an in-going or out-going set forces them asunder before quite reaching them. On each side of each half of the door an iron bar 12 feet long is fixed horizontally at a height above the floor equal to half the height of the tub and secured at one extremity to the door by a hinge so arranged that the bars act from either side of the doors as required by the approaching set. The ends of the bars farthest from the doors work in eyebolts

fixed on vertical posts, having plenty of room to slide through them.

The rails on which the pulleys run are inclined towards the centre of the road, so that the doors are forced upwards and at the same time sideways by the



6. AUTOMATIC DOORS

passing set, which on coming into contact with the bars pushes their inner ends apart carrying the doors with them, which close by gravity after the last tub is through. The main rope travels through a small opening left at the bottom of the two halves. The tail rope runs through a small hole in the casing between the doors and the side of the way.

Method of Finding Size of Engine Required for Main and Tail Rope Haulage.—Suppose 500 tons a day have to be hauled up an incline rising 1 in 6, 1,200 yards long, in five hours, steam pressure 60 pounds at the engine, coefficient of friction 1-20th.

500 tons in 5 hours = 100 tons an hour. Assume speed of sets 10 miles an hour equals 880 feet per minute. Time for set to run 1,200 yards. $1,200 \times 3 \div 880 = 4.09$, say 4 minutes.

Empties take the same length of time. \therefore a set is run in 8 minutes. 8 minutes a set = $60 \div 8 = 7.5$ sets per hour. $\therefore 100 \div 7.5 = 13.33$ tons a set.

Assume 10 hundredweight tubs, each have a tare of 4 1-2 hundredweight. 27 tubs are required to carry 13 1-2 tons. Total weight of coal and tubs = $27 \times 4.5 \div 20 = 6.07$. $\therefore 13.33 \times 6.07 = 19.40$ tons.

On a gradient of 1 in 6 these full tubs exert a pull of $19.4 \div 6 = 3.23$ tons, neglecting friction. To find size of rope, a factor of safety being 6. \therefore rope must have a breaking strain of $3.23 \times 6 = 19.4$, say 20 tons. A suitable rope for this will be 5-8 inch diameter, and weigh 2 1-4 pounds per yard. Total against engine, including gradient and friction, will be—

Full tubs, $19.4 \text{ tons} \div 6 = 7,242.66$ pounds.

Rope, $1,200 \times 2.5 \div 6 = 450$ pounds.

Full tubs, $19.4 \text{ tons} \div 30 = 1,448.5$ pounds.

Rope, $1,200 \times 2.5 \div 30 = 90$ pounds.

Total number of pounds 9, 231.16.

To this total we add 50 per cent. for general resistances. $\therefore 9,231.16 \times 50 \text{ per cent.} = 13,846.74$ pounds. Rope travels 880 feet per minute. $\therefore 13,846.74 \times 880 = 12,185,131.2$ foot pounds of work the engines must do.

Piston speed to be 250 feet per minute. $\therefore 12,185,131.2 \div 250 = 48,740.5$ pounds of work done at one revolution.

Steam pressure, 60 pounds. $\therefore 48,740.5 \div 60 = 812.34$ square inches is the area of both cylinders. \therefore area of each is 406.17 square inches.

Diameter of each cylinder = 22.8 inches, and stroke 45 inches.

Number of revolutions, $250 \times 12 \div 90 = 33.33$ per minute.

Size of drum, $880 \div 33.33 \div 22 \div 7 = 8.4$ feet diameter.

\therefore dimensions of engine.

Double cylinders, 22.8 inches diameter, 45 inch stroke, 33.33 revolutions per minute. Drums, 8.4 feet diameter.

ENDLESS ROPE HAULAGE.

Endless rope has been called the ideal system of underground haulage by those persons who have become experienced in its use, more especially if the conditions have been favorable for its adoption.

It certainly has in some instances advantages over the main and tail system, but, unlike the later, it cannot be adopted in every seam.

Disadvantages of its use.—It requires a continuous double line of way, one side solely for full tubs coming outbye, the other for empties going in to the workings, together with extra width for a travelling way. It cannot, therefore, be used in seams having weak roofs, necessitating a narrow engine plane. Again, despite what may be said to the contrary, under certain methods of fixing the tubs to the haulage rope, curves are not so easily worked as in the main and tail system. More tubs are required, and more boys must be employed. The rope must be kept tight and adjusted by means of tension screws or bogeys, these being generally, but not necessarily, placed at the inbye end of the terminus. The working of branch roads sometimes is a source of trouble unless the connecting pulleys and switches are carefully laid out. Owing to its slow speed workmen cannot be quickly conveyed in or outbye to or from their work by means of the tubs; so that their working time—a source of profit to both themselves and the owners—is reduced. This is an important factor where working places in large collieries are 1 1-2 to 2 1-2 miles from the shaft. The clips frequently are a source of trouble, especially on heavy gradients, for they are liable under the heavy stress prevailing to become detached, causing the tubs to run a-main, or leave the rails. A constant clipping of the rope injures it by compression, making its life shorter than otherwise it would be, whilst broken strands are of frequent occurrence, causing stoppage of work and frequent repairs.

(To be continued.)

D. A. Thompson, M.P., has arrived at Ottawa from Dawson to attend the Parliamentary session. Referring to conditions in the Yukon, Dr. Thompson expresses a very optimistic view of the future of the country and anticipates a large annual production of gold, at least equal to the best past records in this respect, at no very distant time. One corporation alone last year employed 1,500 men in connection with equipment operations, while next year a still larger force will be engaged. Dr. Thompson, moreover, does not agree with the generally expressed opinion that the day of the individual miner in the Yukon is over; for, he maintains, there are still rich fields, which may be developed by individual effort.

IRON ORES, PIG IRON AND STEEL.

BY EDWIN C. ECKEL.

(Abstract from advance chapter from "Mineral Resources of the United States," for 1906.)

INTRODUCTION.

The year 1906 witnessed a steady growth in production in all branches of the iron industry, from ore to finished products, previous records being broken in production of ore, pig iron and steel. Coincident with increase in production came increase in prices, which rose steadily from the beginning to the end of the year, with the exception of a slight depression in June. These movements in output and price must be regarded as continuations of the growth shown during 1905, and their relations to the past history of the iron industry, can be noted on comparison of the records of the industry for a number of years preceding.

The chief factors in keeping prices down to a reasonable level have been, curiously enough, the great iron and steel producing corporations. Their attitude in this matter is not, of course, dictated by altruistic motives, but it affords a refreshing contrast to the method of procedure which a few years ago would have been considered to be the immediate consequence of the consolidation of interests in any industry. Realizing that steady sales at reasonably high profits are in the end better than a runaway market with its consequent great fluctuations in both prices and sales, all efforts have been made to steady the iron market so far as is possible, and until within a very recent period this policy was markedly successful. Toward the very close of the year, however, prices in several lines rose more sharply than is generally considered advisable, and it is doubtful as to how far control would be possible in 1907 in case generally prosperous business conditions should maintain a high demand for iron and steel products. It is known, moreover, that heavy increases in production

will be possible during the latter half of 1907 and in 1908, and the probabilities are therefore in favor of lower rather than of higher prices in the near future.

PRODUCTION.

The iron-ore production of the United States in 1906 amounted to 47,749,728 long tons, valued at \$100,597,106. As compared with 1905, the most productive previous year, this was an increase of 12.28 per cent. in tonnage and of 33.83 per cent. in value.

VARIETIES OF IRON ORE PRODUCED.

The iron minerals which are used as ores of that metal fall, when considered from the chemical point of view, into two classes—oxides and carbonates. The latter are relatively very unimportant in the United States, furnishing less than one twenty-fifth of 1 per cent. of the total output. The important group of oxides, moreover, is separable on both commercial and scientific grounds into three sub-groups, the ores of which differ in composition, grade, and geologic associations.

The final grouping used in this report, therefore, is as follows, the varieties being named in order of their present productive importance:

1. *Red hematite*: Including all the anhydrous sesquioxides known locally as red hematite, specular ore, fossil ore, oolitic ore, etc.
2. *Brown hematite*: Including limonite, gothite, and other hydrous sesquioxides known locally as brown iron ores, bog ores, etc.
3. *Magnetite*: Including the magnetic oxides.
4. *Carbonate*: Including the iron carbonates of various types.

Production of iron ore in the United States in 1906, by States and varieties, in long tons

State.	Brown hematite.	Red hematite.	Magnetite.	Carbonate.	Total quantity.	Total value.
Alabama	821,301	3,173,797	.....	.....	3,995,098	\$5,123,539
Arkansas and Texas	c36,660	.....	.....	.....	36,660	36,660
Colorado	14,078	.....	.....	.....	14,078	22,525
Connecticut and Massachusetts	31,343	.....	.....	.....	31,343	94,129
Georgia	305,624	105,606	.....	.....	411,940	734,780
Kentucky, Maryland, and West Virginia	18,895	27,433	.....	612	46,940	58,175
Michigan . . . . .	.....	11,822,874	.....	.....	11,822,874	31,145,087
Minnesota . . . . .	.....	25,364,077	.....	.....	25,364,077	51,799,256
Missouri	41,805	39,105	.....	.....	80,910	158,109
Montana, Nevada, New Mexico Utah, and Wyoming . . . . .	.....	d620,635	171,555	.....	e792,190	946,551
New Jersey	20,611	.....	521,907	.....	542,518	1,570,578
New York	1,000	128,385	912,607	.....	1,041,992	2,635,639
North Carolina . . . . .	.....	.....	56,057	.....	56,057	75,638
Ohio . . . . .	.....	.....	.....	17,384	17,384	29,706
Pennsylvania	134,027	8,854	806,548	.....	949,429	1,246,267
Tennessee	590,763	279,971	.....	.....	870,734	1,307,433
Virginia	735,204	92,257	620	.....	828,081	1,579,817
Wisconsin	29,752	818,381	.....	.....	848,133	2,033,217
Total	2,781,063	42,481,375	2,469,294	17,996	47,749,728	100,597,106

c Texas alone. d Includes a small quantity of brown hematite. e Includes some ore used as smelter flux.

VALUE OF IRON ORE PER TON.

The following table presents data on the value per ton of the different varieties of iron ore in the various producing States. The values given are intended to represent value at the mouth of the mine, and are taken directly from the replies of the producers. It is probably unnecessary to caution the reader that any such table must be accepted as merely a fair approximation to the truth. The element of inaccuracy arises from conditions in the iron-ore business and can not be readily overcome. By far the bulk of the iron ore produced in the United States is mined directly by pig-iron producers for use in their own furnaces, and the valuation which they place on such ore is therefore entirely a matter of accounting. In some cases the reports made to the Survey evidently include merely actual mining costs; in others they contain an allowance for sinking funds; and in still other instances the values given are obviously merely convenient prices to use in charging costs against the blast furnaces.

It is noted, however, that the errors are almost entirely in one direction—that of undervaluing the ore rather than of overvaluing it. If all the American iron ore were to be bought by iron furnaces in open market from an entirely distinct set of iron miners, the average prices paid would probably be considerably in excess of those now reported.

Average value per long tone of iron ore in the United States in 1906, by States and varieties.

State.	Brown hema- tite.	Red. hema- tite.	Mag- netite.	Carbon- ate.
Alabama	\$1.62	\$1.19	....	....
Arkansas and Texas	a1.00	....	....	....
Colorado	1.60	....	....	....
Connecticut and Massa- chusetts	3.00	....	....	....
Georgia	1.86	1.57	....	....
Kentucky, Maryland, and West Virginia	1.52	1.01	....	\$3.00
Michigan . . . . .	....	2.63	....	....
Minnesota . . . . .	....	2.04	....	....
Montana, Nevada, New Mexico, Utah and Wy- oming . . . . .	....	1.14	\$1.39	....
New Jersey	2.46	....	2.91	....
New York	4.00	2.40	2.55	....
North Carolina . . . . .	....	....	1.35	....
Ohio . . . . .	....	....	....	1.71
Pennsylvania	2.33	2.42	1.14	....
Tennessee	1.62	1.26	....	....
Virginia	1.90	1.94	3.08	....
Wisconsin	2.17	2.41	....	....
Total average	1.78	2.13	2.05	1.75

a Texas alone.

STOCKS OF ORE AT MINES.

The stock of ore on hand at mines on December 31, 1906, amounted to 3,281,789 long tons, a decrease of 13.92 per cent. from the stock held on December 31, 1905—3,812,281 long tons, which in turn was a decrease of 18.31 per cent. from the quantity in stock on December 31, 1904. The stock in 1906 represented about 6.8 per cent. of the total output of the year.

Stock of iron on hand at the mines December 31, 1906, by States, in long tons.

State.	Quantity.
Alabama	24,034
Georgia	2,061
Maryland	225
Massachusetts	3,300
Michigan	1,991,074
Minnesota	996,902
Missouri	2,950
Montana and New Mexico	1,900
New Jersey	5,608
New York	87,663
Ohio	15,573
Pennsylvania	11,365
Tennessee	36,230
Texas	6,000
Virginia	460
Wisconsin	96,444
Total	3,281,789
Total stock, 1905	3,812,281
Per cent. of decrease, 1906	13.92

IRON ORE RESERVES OF THE UNITED STATES.

About two years ago, in response to a request from the Swedish Parliament, an eminent Swedish geologist prepared a report on the iron ore reserves of the world. The report itself attracted little notice in the United States, even among those directly interested in the iron industry. Early in 1906, however, a summary of the report was forwarded by the American consul at Paris, and the wide circulation given to consular reports in America resulted in drawing considerable attention to the matter in both the daily and the technical press.

The character of the report in the form in which it reached the American public is fairly indicated by the following extracts:

It will surprise a great many to learn that we are likely to run short in iron inside of a single century, if we keep up the present rate of consumption. As a matter of fact we are more likely to increase the consumption than we are to reduce it. The world has only 10,000,000,000 tons of iron ore available. Of these Germany has twice as many tons as the United States. Russia and France each have 400,000,000 tons more than this country. * * * Assuming therefore as true the claim of geological science that the extent of workable iron ore beds is known to within a margin of possible error not exceeding 5 per cent., the Swedish report, which is based upon the most authoritative information, has naturally attracted world-wide attention. * * * The present output of ore and the amount of ore actually consumed by each is as follows, in tons:

Country.	Workable de- posits.	Annual output.	Annual consumption.
United States	1,100,000,000	35,000,000	35,000,000
Great Britain	1,000,000,000	14,000,000	20,000,000
Germany	2,200,000,000	21,000,000	24,000,000
Spain	500,000,000	8,000,000	1,000,000
Russia and Fin- land	1,500,000,000	4,000,000	6,000,000
France	1,500,000,000	6,000,000	8,000,000
Sweden	1,000,000,000	4,000,000	1,000,000
Austria-Hungary	1,200,000,000	3,000,000	4,000,000
Other countries	1,200,000,000	5,000,000	1,000,000
Total	10,000,000,000	100,000,000	100,000,000

While it is probable that the foregoing statement does not take into adequate account the undeveloped ore deposits of Utah and Alabama, its teachings are nevertheless obvious and impressive. Of the world's workable iron ore deposits, as at present known, the United States possesses only about one-ninth, and at the present rate of consumption the entire supply will be exhausted within the present century.

It must be admitted that an official statement such as this might fairly cause alarm to those unacquainted with the facts of the case and that the daily press can not be blamed for taking the matter very seriously. As a matter of fact, however, the figures given can not be accepted as reliable, and it seems desirable to present a more careful statement of the case. The original Swedish report did not do justice to the American iron ore deposits, and in the consular translation this injustice was accentuated rather than lessened.

Before taking up the subject of American iron ore reserves in general it may be well to dispose of one statement in the quotation: "Assuming therefore as true the claim of geological science that the extent of workable iron ore beds is known to within a margin of possible error not exceeding 5 per cent. * * *." This assumption appears to be entirely gratuitous. No mining geologist of any experience would make such a claim, except for very small or unusually uniform ore bodies. Elsewhere, in discussing the Clinton or red ores of Alabama, the writer has said: "The amount of Clinton ore in any area can probably be determined by a geologist within 5 or 10 per cent., and estimates of red ore reserves can therefore be made by competent men with a degree of accuracy impossible in dealing with the magnetites, hematites, or brown ores of other districts." The Clinton ore it must be remembered is an exceptionally easy ore to estimate, because it occurs in bedded form and is fairly uniform over considerable distances, both vertically and horizontally. In dealing with irregularly shaped bodies, an estimate which came within 25 per cent of the actual quantity might well be considered remarkably accurate. When, however, the estimate covers not a single area or deposit, but the total iron ore contained in a State or nation, the case is very different, for the possibility of error in such an estimate is enormous. As will be shown below, the Swedish report on iron ore reserves probably contains an error of something over 1,000 per cent. in its estimate of American ore tonnage.

The Lake Superior district, at present the leading American producer, has been explored more thoroughly than any other ore field in the United States, but estimates as to total tonnage range within rather wide limits. At present the totals commonly quoted vary from 1,500,000,000 to 2,000,000,000 tons, of which the United States Steel Corporation is commonly supposed to control over three-fourths. This supply is being drawn on to meet a constantly increasing annual demand, and it is conceded that before 1915 the district will probably be called upon to ship over 50,000,000 tons of ore a year. It is obvious that at such a rate the Lake Superior ores can hardly be expected to last beyond the year 1950, and it is equally obvious that long before that date the value of good workable deposits of iron ore, both there and elsewhere in the United States, will have increased immensely. During the past year ore lands in the Lake district have been sold at a valuation of \$1 per ton of ore in the ground, though the average valuation is still, of course, considerably below that price.

In the Rocky Mountain and Pacific States a few large iron ore deposits are known to exist, and many others

are reported, but any attempt at any estimate of total tonnage would be, with only our present knowledge of the subject, merely the wildest sort of guessing.

A more promising field lies in the older Eastern States. It is probable that careful exploratory work will develop magnetic iron ores in New York, New Jersey and Pennsylvania in quantities far in excess of anything usually considered possible in those States. Here also close estimates are impossible.

With regard to the southern iron ores the case is very different. Here the work which the Geological Survey has carried on during the last three years and which was planned so as to obtain data on the quantity of ore available, gives a fairly secure basis for tonnage estimates. It is safe, therefore, to submit the following figures as representing minimum values for the workable iron ore reserves above the 1,000-foot level of certain Southern States, with the caution that further exploratory work in the South will probably greatly increase rather than decrease these estimates:

	Red ore.	Brown ore.
Alabama, long tons	1,000,000,000	75,000,000
Georgia, olng tons	200,000,000	125,000,000
Tennessee, longs tons	600,000,000	225,000,000
Virginia, long tons	50,000,000	300,000,000
Total, long tons	1,850,000,000	725,000,000

This gives a total estimated reserve, for the red and brown ores of the four States noted, of over 2,500,000,000 tons. If to this we add the ores occurring at deeper levels in the States named, and also the red and brown ores of Maryland, West Virginia and Kentucky, and the magnetic ores of the other Southern States, it is probably fair to assume that the total southern ore reserve will amount to very nearly 10,000,000,000 tons, or five times that credited to the Lake Superior district. Much of this ore is of course unworkable at the present day, but all of it should be counted on in any estimate of total ore reserves.

In considering these figures it will be well to bear in mind that the southern red ores will average from 33 to 43 per cent. metallic iron, but that they carry so much lime as to be almost or quite self-fluxing. The brown ores, as washed, will range from 40 to 50 per cent. metallic iron. It may be further added that the estimates as to red-ore tonnage are probably much more accurate than those relative to brown ores.

To sum up the matter—in place of the 1,100,000,000 tons credited by the Swedish geologist, it is probably safe to say that the United States has from ten to twenty times that reserve of iron ore.

The present rate at which our ore is being mined is as follows:

1903, tons	35,019,308
1904, tons	27,644,330
1905, tons	42,526,133
1906, tons	47,749,728

Assuming that the demand for iron ore during the present century may range from 50,000,000 to 100,000,000 tons per year, the Lake Superior district would last for from twenty-five to fifty years more, if it supplied the entire United States. But counting on the known reserves elsewhere in the United States, the ore will last for a much longer period, though, of course, it must necessarily show a gradual but steady increase in value and in cost of mining, along with an equally steady decrease in grade. No attempt is here made to consider

a very important factor in the problem—the extent to which Cuban, Haytian, and other high-grade foreign ores may be imported in the near future.

RECENT TECHNOLOGIC ADVANCES.

Of processes affecting the iron industry the three which have received most attention during the last few years are probably the Gayley dry blast, electric smelting and nodulizing. The first of these is in successful operation at a number of furnaces, and is now hardly subject to discussion as a new or untried process. With the other two the case is different, and some space may profitably be devoted to a brief discussion of their probable status in the iron industry.

Electric Smelting.—There is of course nothing particularly novel in the idea of producing iron or steel in the electric furnace, though some recent experimenters appear to ignore this fact and to consider the mere electrolytic production of metal to be the mark of success. The real point is to produce metal in the electric furnace cheaper than in the blast furnace, and concerning this possibility a great deal of discussion has taken place, often in a purely academic fashion, without much experimental basis. During the past two years, however, a number of experimental plants have been operated in various parts of America and Europe, and our knowledge of the problem is fast assuming a definite shape. Recent exhaustive discussions of the subject by Haanel, Harboard, Kershaw, and others seems to warrant the following conclusions:

(1) Under the conditions which obtain in most of the settled portions of the world, neither pig iron nor ordinary structural steels can be produced in the electric furnace at a cost to compete with the blast furnace.

(2) Under exceptional conditions, where ample water power can be very cheaply developed in the immediate vicinity of the ores and when fuel is very dear, pig iron and steel can be produced profitably in the electric furnace. Harboard estimates that with electrical energy costing \$10 per electrical horse-power year, and with coke at \$7 per ton, the two methods are about on an equality.

(3) Electric smelting may be practicable in the case of titaniferous ores or of other ores difficult to treat in the blast furnace, if the resulting product possesses any properties which would counterbalance the increased cost.

(4) Electric smelting methods can be profitably applied to the manufacture of crucible steel or of other high-grade special steels and ferro-alloys.

It will be seen, therefore, that there is little prospect that electric smelting will have much influence on the general development of the iron and steel industries until fuel supplies become much scantier than they are at present. Considerably more practical results to the industry can be expected from the process next to be considered, though it bears on an entirely different phase of the iron manufacturer's problems.

Nodulizing.—In all furnaces, and particularly in those running on soft or fine ores, a very appreciable quantity of iron ore is carried out by the blast. This ore dust, which may amount to 5 per cent. or more of the furnace charge (equivalent to from 25 to 50 tons per day per furnace), is usually trapped before entering the stoves, so that it can be removed and stored. Its fineness, however, precludes its direct use in the furnace, and hitherto the only method of utilizing it involved the preparation of briquettes. The "nodulizing" process does away with certain difficulties inherent in any regular briquet-

ting process and seems likely to come into general use as a means for economically handling flue dust. It is of service also in other fields, for it can handle the finer material produced during magnetic concentration, and it renders available certain sulphurous products (blue billy, sulphury ores, etc.) which have hitherto been treated with difficulty.

The principal novel point in connection with this process is that it employs rotary furnaces closely similar to the rotary kilns now so familiar in the Portland cement industry. These kilns are set slightly inclined; the fine ore is fed in at the upper end and travels toward the lower end as the kiln revolves slowly. Fuel is sprayed in at the lower end, so that a high temperature is produced there. So far the process is exactly similar to that employed in cement practice. The point of difference lies in the fact that a hydrocarbon or other binder is dropped or sprayed into the ore as it is fed into the upper end of the kiln. As the materials slowly pass downward the binder mats the ore into little masses or nodules. Farther down in the kiln the greater heat causes the tar to combine with the sulphur, if the latter be present, and the two are largely volatilized. Still closer to the discharge end practically all of the binder has disappeared, but the ore nodules, now free from sulphur, still cohere, owing to incipient fusion of their particles, for the heat here approximates to 2,000 degrees F.

It will be seen that this "nodulizing" accomplishes both the consolidation and the desulphurizing of the material, and that its chief advantage, as compared with the older briquetting and roasting processes, arises from the fact that the rotary kiln is an extremely effective labor-saving device.

STANDARDIZATION.

The Institution of Mining and Metallurgy

Salisbury House, London, E.C.,

November 4th, 1907.

STANDARDIZATION.

Dear Sir,—

The circular embodying a number of questions on the recommendations of the "Weights and Measures" and "Mesh" Standardization Committees, sent to members of the Institution and other on February 11th, 1907, has elicited answers from technical societies and chambers of mines, as also from 280 engineers and metallurgists; and these answers have very strongly confirmed the conclusions of the Standardization Committees.

As regards the general adoption of the metric system of weights and measures, opinions are so evenly divided that the Council do not feel justified in recommending uniformity of practice at the present time.

Whilst there is a very general feeling amongst engineers that the term "slimes" should be more clearly defined than at present, the suggestions received have been too divergent to justify the Council in making any recommendations on the subject at present.

I enclose copies of memoranda embodying the standards and definitions now adopted by the Council, and I am directed to express the hope that all members of the Institution, and other professional men, will adopt and use them in reports, scientific papers and other publications.

In some replies containing objections to the convenient constant of 85s. for the value of one ounce of fine

gold, the writers overlooked the fact that clause (6) in the accompanying memorandum refers only to assay results of ores, etc.; and it will be admitted that unavoidable variations in both check assays and check samples are such as to make the difference of 0.55 of a penny, per ounce of fine gold, a negligible quantity.

With a view to securing the greatest uniformity in the drawing of the wire and the manufacture of the standard screens, Messrs. N. Greening & Sons, Limited, of Warrington, England, have agreed to manufacture a certain quantity of each of the standard sizes to a width of 8 inches at one operation, and these will be supplied by them direct, by their agents abroad, or by dealers in laboratory supplies.

Note.—Sizes 5, 8, 10, 12, 16, 20, 30, 40 and 50 are now ready in 8 inch squares, and may be obtained in made-up "nests" by the end of November. The manufacture of the remaining sizes is being pressed forward with the least possible delay.

I am, dear sir, yours faithfully,

C. McDERMID, Secretary.

STANDARDIZATION.

Weights and Measures.

The following definitions have been adopted by the Institution:—

(1) The word "ton" shall represent a weight of 2,000 lb. avoirdupois (29,166.6 oz. troy).

[Note.—It is advisable to abandon the use of the terms hundredweights and quarters, and to express fractions of a ton in pounds or in decimals of a ton.]

(2) The term "miners' inch" shall represent a flow of 1.5 cub. ft. of water per minute; and the term "sluice head" shall represent a flow of 60 cub. ft. of water per minute.

[Note.—It is advisable to abandon the use of both terms, as being merely of local usage, in favor of definite expression of the flow of water per minute, or per second, in cub. ft. or in gallons.]

(3) The word "gallon" shall represent the Imperial gallon measure of 10 lb. of water.

(4) Temperatures shall be expressed in degrees centigrade.

(5) Returns of gold and silver shall be expressed in terms of fine gold and fine silver respectively, not as "bullion."

(6) Gold contents of ores, etc., determined by assay, shall be expressed in money values as well as in weights; and in this connection the value shall be taken (as a convenient constant) at 85 shillings, or \$20.67 U. S. currency, per troy ounce of fine gold.

By order of the Council,

C. McDERMID, Secretary.

Salisbury House, London, E.C., November 4th, 1907.

[Editor's Note.—The sluice head may more conveniently be taken as equal to 40 miners' inches, or one second-foot.]

STANDARDIZATION.

Mesh or Wire Cloth.

The following table of "I. M. M. Standard Laboratory Screens" is intended for use in making grading tests and for the correlation of screens used in commercial or other work.

When screens other than the I. M. M. Standards are employed, the diameters of apertures should be given in any published results, so that comparisons may be made.

When screens are described simply by the number of meshes per linear inch, it will be understood that the I. M. M. Standard is referred to.

The number of sizes standardized has been reduced to a minimum, as it is desirable to abandon excessive refinements in grading tests. It is believed that the I. M. M. Standards will meet all necessary requirements of the laboratory.

In reporting grading tests it is desirable to state whether wet or dry screening has been employed.

TABLE.—I. M. M. STANDARD LABORATORY SCREENS.

Mesh or apertures per linear inch	Diameter of Wire.		Aperture.		Screening area. Per cent.
	in.	mm.	in.	mm.	
5	0.1	2.540	0.1	2.540	25.00
8	0.063	1.600	0.062	1.574	24.60
10	0.05	1.270	0.01	0.254	25.00
12	0.0417	1.059	0.0083	0.211	24.80
16	0.0313	0.795	0.0071	0.180	24.70
20	0.025	0.635	0.0052	0.157	24.60
30	0.0167	0.424	0.0055	0.139	24.50
40	0.0125	0.317	0.005	0.127	25.00
50	0.01	0.254	0.0042	0.107	25.40
60	0.0083	0.211	0.0033	0.084	24.50
70	0.0071	0.180	0.0025	0.063	25.00
80	0.0063	0.160	0.05	1.270	25.00
90	0.0055	0.139	0.0416	1.056	24.92
100	0.005	0.127	0.0312	0.792	24.92
120	0.0041	0.104	0.025	0.635	25.00
150	0.0033	0.084	0.0166	0.421	24.80
200	0.0025	0.063	0.0125	0.317	25.00

Note.—Whilst absolute accuracy to the fourth place of decimals of an inch is impracticable in the manufacture of wire cloth, a sufficiently close approximation to the above standards is attainable.

The adoption of a screening area of 25 per cent. necessitating equality of size of wire and aperture, secures

perfect interlocking and consequent permanence of aperture.

Some of the finer mesh screens can only be woven in what is known as "twilled."

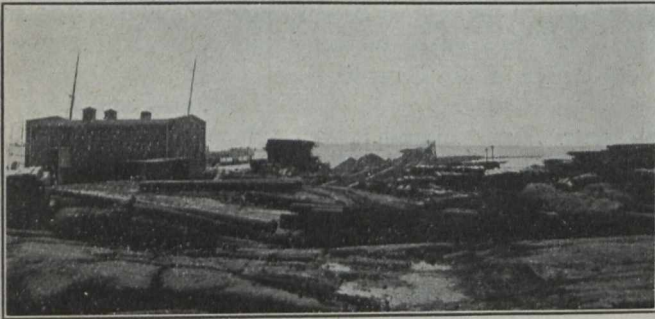
By order of the Council,

C. McDERMID, Secretary.

Salisbury House, London, E.C., November 4th, 1907.

WHERE MOOSE MOUNTAIN ORE WILL BE HANDLED

Key Harbor, Ontario. — A notable step in the development of Canada will be accomplished next spring when Key Harbor, on the north shore of Key Inlet, will be a busy port. Everything is in shape here to continue, after the freeze-up, the building of the ore docks, which are to be the foundation of



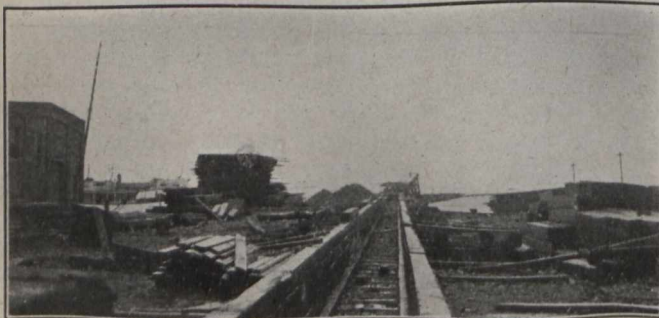
Power-house Tunnel for Ore Belt and Dock Piling, showing commencement of elevation through which steamer will be loaded.

the port, and from which the product of the Moose Mountain mines will be shipped to Cleveland and other American ports. The mines, thirty miles north of Sudbury, are already piling up ore for shipment as soon as the Canadian Northern Ontario Railway is able to carry it.

The strong position of the Moose Mountain ore, owing to its high percentage of iron, is improved by the location of the mines. They are about the same distance from navigable water as the iron ranges back of Duluth, but are over five hundred miles nearer coal and smelters than Duluth will ever be.

The Government steamer "Bayfield" has about completed the survey work for the harbor and its approaches. The entrance from Georgian Bay will be quite simple, only four ranges for the guidance of vessels being necessary, the last running straight into the dock. The buoys and lights are ready to be placed in position.

The six miles grading from the main line of the Canadian Northern Ontario Railway, three miles south of French River, is almost completed, and the building at this end of a mile-long trestle will be begun immediately.



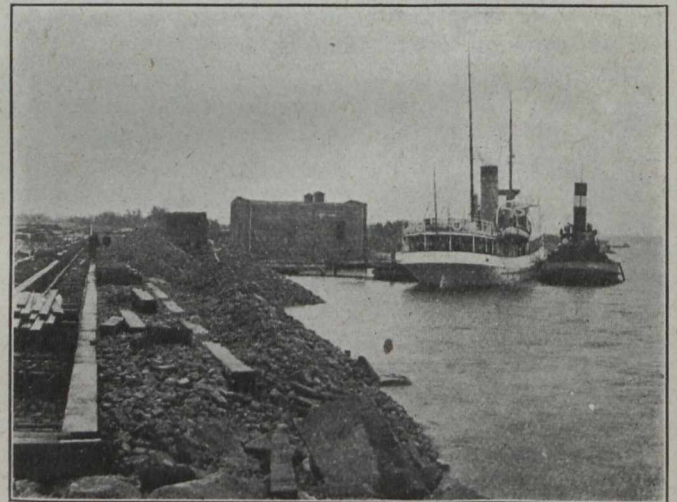
Tunnel through which 42-inch belt will convey ore to docks at rate of 800 tons per hour.

ately, on which train-loads of ore will be elevated so that their contents may be dumped into pockets and transferred to a rubber belt conveyor running through a tunnel cut out of the rock, and then elevated on another belt to a trestle sixty feet above water level, where it will be held ready to be shot into the steamers

lying alongside. The capacity of the dock plant will be 8,000 tons per day of ten hours. The power-house is almost finished. Coal docks must also be built, and the trans-shipment of mineral alone must make Key Harbor a port of considerable magnitude within a short time; and immediately the Canadian Northern connection with Ottawa is completed it will be the entrepot for all Canadian Northern direct traffic between tide water and the West.

At the dockside there is 24 feet of water—more than sufficient to carry the largest boats on the lakes, for the draught of the Soo Canal and the St. Clair River is only 20 feet, 6 inches. Key Harbor will markedly affect business with Port Arthur. The biggest vessels will be able to bring wheat here from Port Arthur; carry ore to Cleveland, and load coal there for Port Arthur and the West. No such economical transportation is at present possible in Canadian services on the great lakes.

The whole of the construction is in charge of Mr. R. M. Pratt, who built the elevators and coal docks at Port Arthur, and has had great experience in railroad and terminal construction for a quarter of a century.



Eight-foot cribbing alongside Ore Tunnel. Government Survey Steamer, "Bayfield," and Ice Breaker alongside natural wharf of rock.

LIGHTING CONDUCTORS AND THE STORAGE OF EXPLOSIVES.

This is a subject into which the State Electrician of Western Australia appears to have gone thoroughly. In his official report that officer recommends enclosing the magazine building in what is practically a metallic cage. This can be done by erecting three poles, one at the back and two at the front. For larger magazines four poles, one at each corner, would be better. The poles should be about four feet higher than the building, and iron barbed wire should be stretched from pole to pole across the building. The barbed wire should be connected to stray iron wires from the top of the poles to earth plates sunk in the ground. The metal work of the building should be connected to stray wires also.

The system should be modified to suit various building and dry soils.

MONAZITE AND ZIRCON.

(Advance chapter from "Mineral Resources of the United States," 1896.)

BY DOUGLAS B. STERRETT.

(Continued from last issue.)

The product from the mill runs between 90 and 95 per cent. monazite. A higher grade product can be obtained by careful treatment, but is not necessary. The company works the stream gravels on its property with sluice boxes and treats the concentrates obtained on one of the Wilfley tables, bringing it up to nearly 90 per cent. monazite.

Ore deposit.—At the time of visit the ore rock was being mined from a shallow open quarry over 150 yards long in a northerly direction and from 8 to 25 yards wide. The cut varied from 5 to 20 feet in depth and was irregular in shape. The rock was generally removed through the full height of the working face and the ore material was cobbled out. This was not usually difficult, as the ore rock differed in appearance from the lean. The rock was somewhat jointed and, being partly weathered, was easily removed with the aid of dynamite. The ore was hauled in tram cars, drawn by horses or mules, from the quarry to the mill at the southeast corner of the cut.

Monazite was found in all of the rock taken from the cut, though the material used for ore occurred in bands varying from a few inches to 3 or more feet in thickness, interbedded with lower grade material. In places two or more streaks were worked for ore at the same time. All rock carrying above 0.4 or 0.5 per cent. monazite was treated as ore; beds carrying a lower percentage were discarded. Mill tests made on some of the lean streaks showed only 0.03 per cent. monazite.

Geology.—The country rock is Carolina gneiss, which has been considerably altered along certain strata by pegmatization. The beds have been thrown into a series of gentle folds. The latter, as exposed in the quarry, were from 20 to 50 or more feet axis to axis. The rock as a whole is a pegmatized graphite biotite gneiss, in which certain beds have been more highly re-crystallized or pegmatized than others. The beds carrying larger percentages of monazite are those with a typical augen structure. The latter is due to porphyritic feldspar crystals, and small bodies of pegmatite, ranging from the size of a grain of wheat to that of a walnut, scattered through the gneiss. Beds where pegmatization had been small, or where nearly the whole rock has been replaced by pegmatite, do not carry as much monazite as those in an intermediate position.

Under the microscope sections cut from specimens from one of the ore streaks show quartz, feldspar, biotite, graphite, muscovite, monazite, limonite in films and stains, and very little zircon. Though the feldspar has been partially kaolinized and was mostly lost during the grinding of the sections, it seems to be chiefly orthoclase and microcline; but a few small fragments of albite are left in one of the sections. The greater part of the quartz is plainly secondary. It occurs in bands or streaks of grains running with the schistosity of the rock. In some places the quartz has been deposited in the fractures or between grains of other mineral, while in other places it includes fragments of such minerals as biotite and graphite. Inclusions of gas cavities and some very fine acicular mineral, probably rutile, are not uncommon in the quartz. Biotite occurs in interwoven laths and crystals roughly parallel with the banding of the

rock. The pleochroism of the biotite is light yellow-brown to dark greenish-brown. The graphite occurs as plates and laths, in general lying parallel to the banding of the rock, and exhibiting various relations to the associated minerals. In some cases it is interbanded with, and even interleaved with, biotite, while in others the plates were turned across the schistosity. Monazite occurs in contact with the various minerals of the sections, though it is more often included in or surrounded by grains of quartz and biotite.

The rock has been so thoroughly re-crystallized that it is impossible to say just what the original minerals were. The quartz was evidently the last mineral to be added, and the biotite was probably the first to be formed during re-crystallization. Much of the graphite was apparently contemporaneous with the biotite; the remainder was plainly formed later. It would be difficult to give the order of formation of the muscovite, feldspar, and monazite. They are intermediate between the biotite and the quartz, or in some cases probably contemporaneous with the latter.

WESTERN STATES OF THE UNITED STATES.

The investigations carried on by the concentrating plant of the United States Geological Survey at Portland, Oreg., during 1905 and 1906⁴ have shown the wide occurrence of monazite in the Western States. Appreciable quantities of monazite were found in samples from gravel deposits of California, Colorado, Idaho, Indiana, Montana, Nevada, New Mexico, Oregon, South Dakota, Texas, Utah, Washington and Wyoming. In many cases it would seem that workable deposits exist, judging from the percentage of monazite recorded in the tests. In Idaho especially there have been a number of monazite-bearing deposits recorded in the following counties: Ada, Boise, Idaho, Lemhi, Lincoln, Nez Perce, Owyhee, Shoshone and Washington. In practically every case where monazite was found there was considerable zircon present. When it is remembered that many of the western deposits on which tests have been made carry gold and platinum it will be seen that they should be paying proportions if carefully handled.

IDAHO.

Several years ago Mr. Waldemar Lindgren, of the Geological Survey, called attention to the occurrence of a notable mass of monazite in the granite areas of the Boise Basin.

In 1906 investigations showed that the black sand residues left in the sluice boxes of the placer mines in the Boise Basin contained much monazite, frequently 50 to 200 pounds to a ton of concentrates. Similar investigations established the fact that the old tailing dumps left by previous placer miners were also rich in this material. When the original sand, including sand down Grimes Creek, was washed out for gold there were left in the residue the heavier minerals, especially monazite, in much greater proportionate quantity than in the original sand.

Publications of the Geological Survey calling attention to these considerable quantities of monazite in the Boise Basin led to the formation of the Centerville Mine and Milling Company, at Centerville, Idaho, for the

purpose of extracting monazite from the old placer workings. Machinery was installed, and two or three tons of monazite were collected by the time severe weather set in in November, 1906. Now, in the spring of 1907, additional machinery for the magnetic separation of the monazite from the concentration of the tailings on a Wilfley table has been ordered, and much monazite is being gathered by sluicing the old placer claims preliminary to cleaning up on tables.

FOREIGN SOURCES.

BRAZIL.

The principal source of supply of monazite for the world's consumption has been Brazil. In the United States, however, the market for the monazite has not only practically been supplied by the home production, but during the last several years a considerable amount of high-grade sand has been exported. In return, however, there is a large importation of manufactured thorium nitrate each year.

The Brazilian deposits lie along the coasts of the States of Bahia and Espirito Santo. The monazite occurs in the sand banks and dunes on the beaches, where it has undergone partial concentration by the action of the tides and waves. Gravel deposits of commercial value have also been reported along the Rivê Parahyba, where a plant has been erected to test their value. The exploitation of the Brazilian beach deposits was first undertaken by John Gordon, an American. In the early days of mining Gordon shipped monazite sand as ballast at a cost of less than \$15 per ton, to Hamburg, Germany, where he realized large profits on it, since the lowest price at that time for sand carrying 5 per cent. of thoria was \$95 to \$120 per ton. Later he was forced to enter an agreement with the German combination of thorium manufacturers without being able to establish the intended monopoly of the export of Brazilian monazite. In 1903 the Barzilian legislative assembly decided that the deposits of monazite sand along the coast belonged to the Federal Government and forbade their exploitation. Later bids were let for the privilege of working these sands, and the rights were finally secured by A. C. De Freytas Company, of Hamburg. This company guaranteed a royalty of 50 per cent. of the sales made and an annual production of 1,700 tons. The De Freytas Company soon went into partnership with Gordon, and together they made an agreement to sell their whole product to the German thorium syndicate. From the latter they were to receive, in addition to the selling price, a share of the profits from the sale of thorium nitrate. In this way the thorium syndicate has held a partial monopoly over the production of monazite from Brazil.

When it was found that other manufacturers of thorium products were able to obtain supplies elsewhere and that the whole output of Brazil could not be controlled, the German thorium syndicate decided to kill out all competition. Accordingly, in January, 1906, the price of thorium nitrate was reduced to nearly half of that prevailing at the time. The quantity of nitrate sold to each consumer was limited to his demands and was so placed as to conflict with the attempted sales of companies not in the thorium syndicate. In this way the acquisitions by brokers of large quantities of low-priced thorium nitrate for speculative purposes was avoided. This cut in the price of nitrate has been injurious or fatal to several smaller manufacturers of thorium products who had supplies of high-priced material in stock, though it has not seriously affected larger well-establish-

ed firms mining their own monazite. The effect on the production of monazite in the United States has been very small, and it is doubtful whether the total output was in reality less than in 1905. The production all came from North Carolina and South Carolina, and represents the output of five companies, with a few independent producers. Three of the smaller companies, once active in the region, have either been forced out of business or handled no sand during 1906.

As reported by Consul-General G. E. Anderson,⁵ the exports of monazite in 1906 were 4,787 tons, valued at \$480,843, as compared with 4,881 short tons, valued at \$485,184 in 1905.

The federal authorities of Brazil continue to charge 50 per cent. on exports of monazite, and the quality of the sand obtained is not so good as formerly. Exporters state that they can not ship their monazite to the United States, since the tariff of 6 cents per pound for 5 per cent. thorium constituent is prohibitory.

AFRICA.

The monazite deposits of the Oban Hills and of Kukuruku Hill of Southern Nigeria,⁶ Africa, were still further investigated during 1905. So far the Oban Hills have yielded the richest samples.

RUSSIA.

In Russia the discovery of rich deposits⁷ of thorium-bearing mineral has lately been reported in an abandoned mine in the province of Perm.

MALAY STATES.

The occurrence of monazite with alluvial tin ore has been reported at Pahang in the Malay States.⁸ A sample of the tin concentrate contained about 13 per cent. monazite with a content of 8.38 per cent. thoria. This monazite does not much resemble the sand from the Carolinas and Brazil, since the grains are of an opaque whitish color. It should pay to separate this monazite magnetically before the tin ore is smelted, for the thoria content is unusually high.

SOUTH AUSTRALIA.

A recent report in the (London) Mining Journal⁹ tells of the finding of monazite in South Australia, on Kangaroo Island, about 30 miles from Kingscote. This discovery has not been authenticated as yet.

CEYLON.

During 1905 there was considerable prospecting for thorianite in Ceylon,¹⁰ resulting in the finding of numerous small deposits and an of 17,900 pounds, valued at \$24,110. Thorianite is a new mineral, discovered in 1904 in Ceylon. It carries from 70 to 80 per cent. of thoria, and has a specific gravity between 9 and 10. Thorianite has been discovered in almost microscopic crystals in the sands of various rivers and is found to be widespread occurrence in Ceylon. The matrix has not yet been discovered, though the pegmatites, cutting the acid leptynites of the region, have been suggested as the possible source. Besides thorianite and thorite, monazite has been discovered in the river gravels of Ceylon. In some places gold is found with these thorium-bearing minerals, and it seems the deposits could be profitably worked with mechanical separators for their several valuable minerals. According to Consul William Morey,¹¹ of Colombo, the exports of thorianite during the first three months of 1906 showed a falling off, for only 1,110 pounds, valued at \$2,525, were shipped. About 100 pounds of thorite, valued at \$97 were shipped in 1905.

ZIRCON.

The demand for zircon has not been large, and has generally been met in the United States by the intermittent working of the Jones and other mines near Zirconia, Henderson County, N. C. At these places the zircon is found in bodies of pegmatite out cropping along the top of a hill for a distance of over a mile. The zircon occurs in simple tetragonal crystals of small size, up to one-half inch square and 1 inch in length. There are a number of associated minerals, among which are many of those carrying rare earths, as xanthitane in abundance, with some titanite, titaniferous garnet, polycrase, allanite, auerlite, monazite, xenotime and cyrtolite. Other minerals are orthoclase in crystals, epidote, staur-olite, stilbite, magnetite, apatite, quartz and decomposed hydrated mica. The formations are badly weathered and are readily excavated through the shallow depths of most of the workings. The zircon is separated from the decomposed matrix without much difficulty by rough crushing and washing.

As already mentioned, zircon, in small, clear crystals can be obtained in quantity as a by-product from much of the monazite concentrates. A clean separation can be made with electrical machinery and by careful washing. With this object in view the concentrating plant of the United States Geological Survey at Chapel Hill, N. C., is at present engaged in making careful tests as to the best method of separating zircon, garnet, and other products of commercial value from monazite concentrates.

The output of zircon in 1906, amounted to about 1,100 pounds, valued at \$248, and it all came from Henderson County, N. C. There was a call for several tons of zircon during the last part of 1906, but a supply could not be obtained before the close of the year. This demand has increased, and zircon is being mined during the present year as fast as possible to fill orders.

PRODUCTION.

The production of crude monazite sand in the United States during 1906, amounted to about 2,000,000 pounds, which averaged about 30 per cent. monazite. Of this quantity North Carolina contributed about five-sixth and South Carolina furnished the remainder. The grade of this was so variable and the prices realized on different lots were so irregular that it has been found safer to estimate the quantity of monazite produced as concentrates. This is especially true since the greater part of the output is cleaned by local mills in the region before shipping to the manufacturers and the grade is brought up to at least 80 per cent. monazite. Estimating the quantity and value of all the sand produced in 1906 on an 80 per cent. basis, the production was: North Carolina, 697,275 pounds, valued at \$125,510; South Carolina, 148,900 pounds, valued at \$26,802—at total of 846,175 pounds, valued at \$152,312.

The following table gives the production and value of monazite from 1893 to 1902, inclusive; of monazite and zircon in 1903; of monazite, zircon, gadolinite and columbite in 1904; of monazite, zircon and columbite in 1905; and monazite and zircon in 1906:

Production, in pounds, of monazite in the United States, 1893—1906.

Year.	Quantity.	Value.
1893	130,000	\$ 7,600
1894	546,855	36,193
1895	1,573,000	137,150
1896	30,000	1,500

Year.	Quantity.	Value.
1897	44,000	1,980
1898	250,776	13,542
1899	350,000	20,000
1900	908,000	48,805
1901	748,736	59,262
1902	802,060	64,160
1903	¹ 865,000	65,200
1904	² 715,999	85,038
1905	³ 1,352,418	163,908
1906	⁴ 847,275	152,560

¹Including 3,000 pounds of zircon, valued at \$570.

²Including the small production of zircon, gadolinite, and columbite.

³Including a small quantity of zircon and columbite.

⁴Including 1,100 pounds of zircon, valued at \$248.

The greater quantity of monazite sand recorder for 1905, as compared with 1906, without a corresponding excess of value, is due to the fact that in 1905, the quantity represents in part concentrates and in part crude sand, while the production for 1906 is placed on the basis of concentrates.

IMPORTS AND EXPORTS OF MONAZITE.

According to the Bureau of Statistics, of the Department of Commerce and Labor, there were no imports of monazite or other thorium-bearing minerals into the United States during 1906. A considerable quantity of thorium nitrate, however, has been imported during the last five years. The quantity and value of these imports are given in the following table:

Year.	Quantity.	Value.
1902	42,815	\$131,350
1903	64,520	232,155
1904	58,655	232,155
1904	58,655	249,904
1905	52,378	269,504
1906	40,000	139,929

Considerable monazite was exported to Germany and England in 1906. This was high-grade sand in each case, and amounted to from one-fourth to one-third of the output of the United States.

PRICES.

The price of thorium nitrate has shown some remarkable variations during the last thirteen years, as appears in the following table:¹²

Prices (per kilogram of 2,2046 pounds) of thorium nitrate, 1894-1906.

Early in 1894	\$476.00
January, 1895	214.00
July, 1895	119.00
November, 1895	71.40
May, 1896	35.70
October, 1896	21.40
October, 1899	7.14
Later, and in 1905	12.61
January, 1906	6.43

The prices paid for crude monazite in the North Carolina and South Carolina mining regions varied from 1½ cents per pound for very low-grade concentrates

with small thoria content to 15 or more cents for the better grades. The average price was nearly 8 cents per pound.

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⁶(London) Min. Jour., December 29, 1906.

⁷New York Globe, April 27, 1907.

⁸Eng. Min. Jour., November 17, 1906, from Selangor Govt. Gazette, September 14, 1906.

⁹(London) Min. Jour., March 30, 1907.

¹⁰Administration Reports, 1905, Min. Survey of Ceylon, pp. E 6 and 7.

¹¹Daily Cons. Repts., No. 2598, June 25, 1906.

¹²Southern Industrial and Lumber Review, September, 1906.

COAL CUTTING BY MACHINERY.

(Science and Art of Mining.)

Last year coal was raised from 3,295 mines in Great Britain, as against 3,461 in 1902, and the number of machines at work was 1,136, as against 483, a clear gain during the period of 653 cutters. From this it will be apparent that machines are rapidly growing in favor, a considerable proportion of the increase being recorded in the East and West of Scotland, Yorkshire, the Midlands and Durham. The driving or motive power continues to be a debatable point. In Scotland electricity is chiefly in favor, 171 machines being so driven as against 134 by compressed air, and from the inspector's reports it is ascertainable that every year electricity is making headway most rapidly across the Border. On the other hand, in the Newcastle and Durham districts combined, which are nearest to Scotland, compressed air is the power for 140 machines, as against 79 driven by electricity. Again, there is an almost similar proportion—158 to 94—in Yorkshire, whilst in Lancashire (Manchester and Liverpool districts) the disparity is most pronounced, being 146 driven by compressed air to 14 only by electricity. In explanation Mr. H. Hall, His Majesty's inspector, says that machines driven by electricity are found to be less reliable than those actuated by compressed air. In the Midland district the position is curiously even, 70 machines by the one power and 70 machines by the other being the exact record. The total coal production of the United Kingdom last year was in excess of 251 million tons; in 1902 the output was about 227 1-2 million tons. The machine-mined coal in 1906 was 10,202,506 tons, and in 1902, it was only 4,161,202 tons. A simple calculation shows that though the experimental stage has been passed the production per coal cutter has but slightly increased from 8,615 to 8,981 tons. The increase in the number of machines and the total output therefrom is therefore more significant than the amount of coal obtained by each machine, the reason probably being that a great many machines were started too late in 1906 to affect the output appreciably. A broader view of the question of coal cutting machinery is now being taken, and the usual apology of which we heard so much ten years ago, that the miners objected to the use of the machine even

under favorable conditions, has not the same force today. It is satisfactory to note that whereas in 1902 only one ton in about fifty was machine-mined, last year the proportion was one in twenty-five.

EXCHANGES.

The Dusseldorf correspondent of the *Iron and Coal Trades Review*, November 15th, remarks that a large reduction in the German coal output per miner has recently been noticeable. The miners' unions are mentioned as a possible cause of this. The iron and steel market is developing unfavorable symptoms. The expected increase in the export trade of the United States is influencing the German market appreciably.

The Ottawa correspondent of the *London Mining Journal*, whose letter dated October 22nd appears in the issue of November 2nd, does not observe that nice distinction between fact and fancy that is at least desirable in mining correspondence. In a Larder Lake item he states that the "long winter in this region has begun." This is incorrect. The canoe route to Larder City was open until October 28th. On November 1st the weather was mild and there was no sign of snow. On the succeeding day rain fell. Another item gives favorable mention to the Crawford property, which is thirty miles or more from Larder district. The boldest man should hold his breath for a long time before speaking commendingly of the Crawford mine. Our venerable English contemporary should appoint a Canadian censor. Canada's climate has been sufficiently misrepresented. Also it would be well for our London namesake to see that it does not lend its columns to very doubtful promotions. The letter referred to gives prominence to more than one wild cat. "The oldest, most influential and most widely circulated journal" must walk more circumspectly. Verbum sap.

The *Engineering and Mining Journal*, November 16th, contains an instructive editorial on the lead market. The depressed condition of this market had induced the American Smelting & Refining Company to curtail production. But the largest independent producers have refused to follow suit. The stocks of refined metal have increased to the large total of 30,000 tons, despite the efforts of the trust. "It has been fully recognized that . . . the apparently successful regulation of the price of lead," our contemporary adds, "by the American Smelting & Refining Company was based on a generally rising market; and that the test of its control would develop on a falling market."

The *Iron and Coal Trades Review*, November 8th, reviews in an editorial the steel trade position and prospects. Referring to the United States, it points out that, since 1904, so great has been the demand for pig iron that blast furnaces have been run with only a minimum of repairs. Now that prices have dropped it is fully probable that many furnaces must be put out of commission. Moreover, after a long campaign the relining of many stacks is imperative. These and like reasons indicate that the output of pig iron predicted for the States for 1908—30,000,000 tons—is excessive. Hence the danger of dumping is minimized by these considerations. "The world's appetite for iron and steel is growing and not shrinking, and Great Britain is by no means yet played out as an iron-producing and steel-manufacturing country."

In the *Engineering Magazine*, November, A. Selwyn-Brown writes on the world's tin mining industries. The

limited and almost stationary annual output of tin ore and the gradually increasing value of the metal have brought about many economics and inventions in tinning processes. Nowadays very little tin is wasted. There is not now an important tin-producing mine in operation in any part of North America. Of Africa the same can be postulated. Cornwall and small districts in Spain and Saxony are responsible for Europe's output. Excluding Cornwall, the Malay Peninsula, Bolivia, and Australia are the most important tin mining countries. There is a lack of agreement in official estimates of the world's total output of tin. It is probably about 85,000 long tons per annum. Of this the Straits Settlements may be credited with at least 55,000 tons. Bolivia ranks second with 14,700 tons; Australia, 9,300, and England, 4,920. The Straits Trading Company, an English corporation, has a large tin smelter at Singapore, which reduces most of the tin mined in the Orient. Curiously, the shares are largely held by Chinese merchants. The exhaustion of the easily worked surface deposits and the scarcity of Chinese coolie labor tend to hold back the output. In Siam and in the Chinese provinces of Yunnan and Kwangsi large amounts of tin ore are mined. In Bolivia the most important deposits are situated at an altitude of 15,500 feet above sea level. The mines are worked at great disadvantage. Labor is scarce and unreliable. The ore occurs in porphyry veins traversing a series of clay schists. It contains between 3 and 10 per cent. metallic tin. In Tasmania is the greatest individual tin producer in the world—the Mount Bischoff mine at Waratah. It has paid \$10,395,000 in dividends during the past thirty-four years. The proved tin fields of Australia are ample to supply the world's wants, and their slow developmest is due solely to the scarcity of capital.

At risk of being charged with impertinence to a senior, we wish to indicate once more to the *London Mining Journal* that its Canadian correspondent has missed his vocation. His proper and only calling is wool-gathering. A luminous paragraph appears in the Canadian letter of November 9th issue. "Grand Trunk Pacific officials, who have been on a tour of inspection, as far west as the coast, confirm the report of the discoveries of coal in this region." We respectfully suggest that the *London Mining Journal* should authorize its Ottawa correspondent to confirm the discovery of salt in the Atlantic.

PERSONAL AND GENERAL

Mr. George H. Gillespie, acting consulting engineer of the Trethewey mine was in Toronto on the 23rd November.

Mr. Robertson has resigned the superintendency of the Hub Colliery and will be succeeded by Mr. W. Wilson.

Mr. O. Frohnknecht, ore buyer of Frankfort and New York, is visiting Nelson and other Western mining centres.

Mr. James D. Hurd, the new manager of the Crow's Nest Pass Coal Company took up his duties on November 16th.

Mr. E. M. Sandilands, a resident of Sandon, B. C., for many years, has been appointed Government Agent for the Moresby Island mining district.

It is reported that Mr. J. R. Blackett has been offered and has accepted the post of comptroller for the North Atlantic Collieries Company, of Port Morien.

Messrs. H. H. Melville, vice-president, and H. M. Johnson, consulting engineer of the Dominion Copper Company, recently visited and inspected the company's mines and smelter in the Boundary district.

Mr. D. Davies, who for some years past has acted as comptroller of the Crow's Nest Pass Coal Company has resigned that position, and will be succeeded by Mr. A. Klauer, heretofore employed as chief clerk in the company's office at Fernie.

Mr. I. Patterson, president of the Nickel Copper Company of Ontario and of the Nickel Steel Company, of Canada, recently visited Sudbury on business in connection with the sale of properties in this district to the Booth and McFadden syndicate.

Mr. Geo. S. Waterlow, of London, England, a director of the Rossland-Slocan, (B. C.) Syndicate, owning the Snowshoe mine in the Boundary district and other properties in British Columbia, is in Montreal, where he will remain for a week or so before visiting the West.

The Dominion Coal Company has recently created new offices on its engineering staff. Thus Mr. R. J. Bell, formerly of Port Hood, has been appointed assistant district mechanical superintendent at No. 2 and No. 4; Mr. Maxwell of No. 9 and Mr. Connors of the international.

At the annual meeting of the Pathfinder Mining Company, held recently at Grand Forks, B.C., the following gentlemen were elected to offices: President, Mr. W. K. C. Manley; Vice-President, Mr. G. H. Rutherford; Secretary, Mr. R. F. Petrie; Directors, Dr. Kingston and Messrs. T. Newby and A. W. Fraser.

Mr. R. G. Drinnau, for four years general superintendent of the Crow's Nest Pass Coal Company's mines, has resigned that position to become general superintendent of the mines of the Pacific Coal Company at Hosmer. Before leaving he was presented with a silver service, a fur coat and a purse of gold.

The retirement of the Hon. George A. Cox from the presidency of the Crow's Nest Coal Company is announced. Senator Cox has served the company in the capacity of President for a period of ine years. He is succeeded by Mr. G. G. S. Lindsay, K.C., who from his connection with the company as general manager is exceptionally well qualified to assume the presidential duties. It is understood that Mr. James D. Hurd, of Duluth, a mining engineer of long experience, has accepted the appointment of general manager, while Mr. R. M. Young has been appointed secretary to the company.

Mr. John Hopp, who is largely identified with mining in the Cariboo district, is reported as having stated that hydraulic operations in this district during the past season were exceptionally satisfactory, the yield having considerably exceeded that of 1906. Mr. Hopp also expressed the opinion, that ere long lode mining would become an important industry in Cariboo, the indications of the occurrence of gold in quartz and also of rich copper ores being most favorable.

A further effort by the United States Government to discountenance wild-cat mining schemes is evidenced in the prosecutions initiated by the Post Office Department against the promoters of a New Mexico concern on the charge of using the mails to defraud. The prosecution resulted in the conviction of the accuser, who received severe sentences, and it is likely that other flagrant instances will be brought to the attention of the authorities to be dealt with in the same manner.

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

GLACE BAY.—With this week the St. Lawrence shipments will be rapidly approaching a close for this season, and it is to be feared that the shortage in shipments will be considerable. This shortage is due to one cause only, and that is a lessened rate of production per man. There has not been this Summer any real shortage of labor so far as the number of names on the colliery rolls, or the organization of the working forces of the mines is concerned, for this has been in excess of any former years. But for some reason or other the producing capacity of the miner has gone down, and to-day it takes more men to do a given amount of work, than it did say five years ago. This phenonema is not confined to Cape Breton, for it has been noted the world over. In a recent editorial in the "Iron Age," this matter was referred to, the writer saying that while employers of labor did not blazon this fact, yet in all their councils it came up for consideration, and was causing them more perplexity than any other distrubing factor in business circles at the present time. We do not care to attempt to explain this fact, but a fact it is, and one that must be recognized.

The Hub Mine is now clear of water, and it is expected that hoisting will recommence very shortly. The mine has been idle since the 14th of last December. This is the second time the mine has been pumped out.

The Fire Brigades from the various collieries competed on the night of the 16th for the Fergie Cup, a trophy that was donated by the Coal Company's superintendent of mines, and which has given rise to much emulation and rivalry among the different colliery teams. The trophy was won by the Hub team, after a keenly contested fight, that was watched by a most enthusiastic crowd of spectators and partisans. This kind of rivalry and sport is healthy and commendable and much praise is due to the Manager's Association, which had charge of the arrangements.

The local papers announced that Mr. Alexander Dick had resigned his position as general sales agent of the Dominion Coal Company. So far no confirmation of this statement has been forthcoming, and it has been received with very general scepticism.

The Coal Company's Rescue Station at No. 2 colliery is complete with the exception of the interior fittings. The instructor, Mr. James MacMahon has arrived from England, where he has for many years been connected with breathing apparatus work and drill. Before coming to Glace Bay Mr. MacMahon spent several weeks in Germany, where he visited the Draeger factory at Lubeck, and all the important Rescue Stations in Germany. After Mr. MacMahon has acquainted himself with the general layout of the Coal Company's mines, and has got the equipment into order, he will proceed to organize and train the corps in the use of the apparatus. There is every reason to suppose that this work will be taken up as enthusiastically as the fire brigade exercises, that at present are becoming so popular round the mines. It is also anticipated that a certain amount of ambulance and first aid work will grow up in connection with the Rescue Station, and some day it is hoped the Coal Company will have fire brigades, ambulance corps and rescue squads properly organized and affiliated and ready for the emergencies that may any time arise in the work of coal mining.

Work on the new developments at Victoria and on the railway is going along steadily, and if the present fine weather continues considerable progress will have been made by Christmas.

Coal finds are still being reported from Antigonish, and we understand Mr. A. C. Ross, M.P., has taken up large areas in the vicinity of the reported finds. Mr. Ross has some little

reputation for shrewdness in this kind of thing, and there may be something in the reports. If Mr. Ross does not own valuable mineral areas it will not be for want of trying.

The Mining Schools inaugurated this session by the Nova Scotian Government are making good progress. At Glace Bay the work is in charge of Mr. John Macdonald, late chief surveyor of the Dominion Coal Company. Classes are being held in elementary subjects in English, in mechanical and plan drawing, in engineering and mining, and are being well attended. Similar schools are being held in Sydney and Sydney Mines, and the beginning so far augurs well for their continued success. As to the necessity of these schools, there can of course be no doubt.

NEW BRUNSWICK.

The Dominion Iron & Steel Company have succeeded in securing a lease of the iron ore deposits at Lepreaux, New Brunswick, and operations will be started at the earliest possible moment. Axel Auderberg, the Steel Company's expert engineer, was in St. John on Tuesday, November 19th, and left directly for Lepreaux.

This information was furnished by Mr. Peter Clinch, of St. John, N.B., who is associated with the New Brunswick Iron Company, from whom the lease already referred to was obtained. The Steel Company will pay Mr. Clinch's company twenty-five cents per ton for all ore mined by them from the Lepreaux holdings. The Government is to receive a royalty of five cents per ton.

Just how many men will be employed at the mines or when operations will be started is not as yet definitely known, and at the present time Mr. Clinch is only aware of the fact that the preliminary drilling is to be done by contract.

The deal was put through recently by C. V. Wetmore and, for the Province of New Brunswick, is a very important transaction. Future developments are awaited with interest and further particulars will be furnished in the next issue of THE CANADIAN MINING JOURNAL.

In respect of mineral wealth, New Brunswick is inferior to Nova Scotia, but it possesses some valuable ores and there is an abundance of excellent stone. Coal is found at many points in the southern portion of the Province and is being worked at Grand Lake and in two or three places in Kent County. The seams are thin, but close to the surface and easily reached. Albertite is found in Albert County. Bituminous shale is found along with petroleum. Petroleum wells are being operated in Westmoreland County. Iron is found in many parts of the Province and has been worked extensively in Carleton County. Copper ore exists in large quantities and has been worked in Westmoreland County. Deposits of nickel, antimony, galena, manganese and graphite are also to be found in New Brunswick.

The Province is abundantly supplied with limestone, the most valuable deposit being in St. John County. Gypsum is found in large quantities and is extensively quarried in Albert County. Large quantities of granite are also found in various parts of New Brunswick—at Hampstead, in the Nerepis valley, and near St. George, in Charlotte County. In certain localities marble is to be found. Freestone suitable for building purposes and for the manufacture of grindstones and millstones is also found in many parts of the Province. There is an abundance of slate and in most of the counties clay is to be found for the manufacture of bricks. Mineral springs are numerous, the principal ones being in King's County, where salt springs are also to be found. The latter are now being profitably operated.

The value of the mineral products of the Province of New Brunswick in the year 1900 is stated in the last census returns at \$650,679, as will be seen from the following statistics:—

MINING IN NEW BRUNSWICK.—CENSUS OF 1901.

Classes of Products.	Value of Products.
Metallic ores and products	\$100,000
Abrasive products	38,400
Fuel and light material	17,479
Structural materials of stone and clay	262,408
Miscellaneous products	232,392
	\$650,679

The Drummond Mining Company of Montreal have secured a lease of rich iron mining areas in Gloucester County, New Brunswick, and will immediately take steps to develop the property. The deal was put through in Montreal early this month by Messrs. T. M. Burns, M.P.P., and William Hussey, of Bathurst, who hold the property under lease from the Government, and it is understood that they are to receive a sum in the vicinity of \$80,000 for their interest.

Mr. Burns confirms the statement that the deal was put through at the Canadian metropolis. Their development by a strong company will mean much to the people of the county. Mr. Burns expressed the belief that as far as New Brunswick is concerned this is the most important mining deal ever consummated.

The property referred to is located near the Nepisiguit River, about eleven miles from Bathurst. The ore is very rich and heavy outcrops are visible. A recent test, made by an expert engineer, showed a depth of 320 feet of solid iron ore. It will, no doubt, take a great many years to exhaust the supply.

In order to properly develop the mines it will be necessary to construct a branch line of railway to connect with the I. C. R. at Bathurst. Mr. Burns has decided to have a delegation wait upon the Minister of Railways in the near future and apply for a subsidy. An application will also be made to the Provincial Government for assistance.

Fred. R. Taylor, of the law firm of Weldon and McLean, St. John, N.B., appeared before the Provincial Government at Fredericton on Tuesday evening, November 5th, for Col. Calhoun, of New York, of the Albertite, Oilite & Cannel Coal Company, asking the Government to settle the terms of a lease of shale deposits in Albert County.

The company offers to spend \$100,000 in development in three years, and to pay \$300 annual rental if they can secure a one hundred years' lease of the territory, which covers about 200 square miles. They propose to work things on a royalty basis of 10 cents per ton for shale and \$1 per ton for Albertite. The principle of the lease was decided when Hon. A. T. Dunn was in the office of Surveyor-General, and the Government is to take the matter into consideration at an early date.

QUEBEC.

QUEBEC.—Many years ago alluvial gold was found in the valley of the Chaudiere River (Beauce County). About two million dollars worth of gold was taken out from the Gilbert River diggings. A great deal of prospecting has been done to discover gold quartz in place, but without success. Last summer, however, in the Township of Marston, near Lake Megantic, a farmer while ploughing struck a vein of quartz showing signs of gold. A mining license was taken out and this fall a small syndicate called "The Marboro Gold Mining Syndicate" was organized amongst local people. The occurrence may be described as a band of quartzite and quartz conglomerate interbedded between the stratification of the slate and intersected by numerous vein-

lets of quartz. Many of these veinlets contain visible gold. The dirt from drilling shows numerous coarse colors along with some fine colors. The reef itself has a width of seventeen feet. The prospect is a significant one. If the whole body is good for milling it will be the first commercially important gold-bearing quartz discovered in place in the Chaudiere River district. Prospecting will be renewed vigorously next summer.

The asbestos mines are in full operation, the market demand for their product continuing good. The district of Broughton is developed on a large scale for the treatment of fibrous serpentine. Three large mills are working. The last one to be started is owned by the Eastern Township Asbestos Company. Two more mills will be built there this winter by the Frontenac Asbestos Company and the Boston Asbestos Company.

The Chrome ore mines of Colrairie are also in operation, and deep mining is being undertaken by the Black Lake Chrome & Asbestos Company.

The Ottawa mica district is working steadily. A fair price is still obtainable for small mica.

The Hull cement works is to increase largely its production.

Natural gas is being used for power purposes in the district of Three Rivers, as mentioned at length in the annual report of the Provincial Bureau of Mines.

ONTARIO.

COBALT.—The Copper Cliff smelter's change of arrangements in receiving ore is a topic of importance to producers of ores. The system heretofore has been to pay cash for ores in fifteen and forty-five days. In future twenty-five per cent. will be paid in forty-five days and the remaining seventy-five per cent. in ninety days. In place of a cheque payment will be made in silver bullion. Apart from friction and temporary inconvenience, this action, though drastic, will have the effect of steadying things and encouraging a larger production.

La Rose mine in the week ending November 23rd shipped twenty-two cars of ore. More than this could be shipped were the supply of cars sufficient.

On the Cobalt Central the concentrator is running steadily. A night shift is now working as well as a day shift.

The Cobalt Central has announced an offer of a \$1,000 reward to any persons discovering a vein on its properties. It stipulates, however, that the vein must have been a silver content of at least 500 ounces to the ton.

The Silver Queen has reduced the number of its employees to eighteen. Drilling will be done on day shift only. Wages are being cut considerably.

ALBERTA.

FRANK.—The Canadian-American Coal & Coke Company, of Frank, Alta., and Wm. McVey, fire boss in the employment of the said company, were each fined for a contravention of the Coal Mines Act. It appears that the company had employed McVey as a fire boss, while McVey was not the holder of a fire boss certificate, as required by the mining laws of the Province.

BANKHEAD.—The briquetting plant installed a few months ago by the Bankhead Mines, Limited, which produces 300 tons of briquettes in 24 hours, is being duplicated, as the plant has proved such a success.

This company is also installing a new ventilating fan and boilers of the most approved type at their air shafts, which are driven out to the surface on the side of the mountain, where the coal outcrops.

COLEMAN.—Messrs. A. C. Flummerfelt and H. N. Galer, president and vice-president of the International Coal & Coke Com-

pany, of Coleman; of the Alberta Coal Company of Lundbreck, and the Royal Collieries of Lethbridge, have taken over the mines of the Breckenridge and Lundbreck Coal Company in connection with their other undertaking near Lundbreck, viz., the Alberta Coal Company. The Breckenridge and Lund mine has never been fully developed, but the new owners intend pushing forward development work with all speed. The coal to be produced is a domestic coal, which will be shipped east and sold in the prairie towns along the railway.

HILLCREST.—The Hillcrest Coal & Coke Company, Limited, which was fined \$200 recently for locking out some of their miners in contravention of the Lemieux Act, has appealed the case, claiming that the text of the notices posted at the mines prior to closing down did not constitute a lockout. It is anticipated that the labor troubles at Hillcrest, which have been of long duration, are about to be settled, and while the final settlement is being adjusted the men are once more back to work and the mine running to its full capacity.

LETHBRIDGE.—Again the Lemieux Act, which by this time is known to every man, woman and child in our Western coal mining camps, has been brought to bear on a difference arising at Lethbridge between the Alberta Railway & Irrigation Company and their employees. The dispute in this case hinges on the very important point whether a pony driver's work in the mine commences at the time he starts to harness his horse or at the time he reaches his switch and commences to haul coal.

The company was represented on the Arbitration Board by Messrs. George Hatch and Hugh McBeth, the miners by Messrs. Fred. Hopkins and Thomas Biggs.

In the case of the Alberta Railway & Irrigation Company's mines, the face of the coal has advanced a long distance away from the bottom of the winding shafts, and in many instances the stables are situated a mile away from the working places, so that a considerable time elapses between the time the driver harnesses his horse and the time he reaches his appointed station to commence hauling coal. The men claim they ought to be paid from the time they leave the stables, while on the other hand the company claim the men's pay begins when they reach their working places.

President Hamilton of the miners' local union testified that where he worked in Indian Territory in a non-union mine, the pay started when the harnessing of the horses began.

DIAMOND CITY.—The Diamond Coal Company are opening a new mine on an extensive scale at Diamond City, which is in the Lethbridge district. At present this coal camp has no railway connection, but when the high level bridge on the C. P. R. is built they will have direct communication with the Crow's Nest branch.

The mines will be laid out to produce 1,000 tons per day of domestic coal. At present the machinery for the new plant is being hauled in from Leavings, a distance of 30 miles. Leavings is a station on the McLeod to Calgary branch of the C. P. R.

BRITISH COLUMBIA.

HOSMER.—A sad accident caused by an explosion of dynamite occurred at the Hosmer mines, whereby three miners, Harry Montelbetti, Joseph Lichazt and J. Matawish, lost their lives.

FERNIE.—At a meeting of the directors of the Crow's Nest Pass Coal Company Senator Cox resigned the presidency, his place being taken by G. G. S. Lindsay, K.C., who has been general manager for some time. Jas. D. Hurd, of Duluth, succeeds Lindsay in the general managership. G. G. S. Lindsay was at the same meeting advanced to the office vacated by the retirement of Geo. A. Cox, with the understanding that as chief executive officer he devotes all his time and attention to the duties of the position, and as this in turn involves the appointment of a new general manager, that office has been filled by the selection of James

D. Hurd, a mining engineer of long experience. Mr. R. W. Young becomes secretary.

THE KOOTENAYS.—The dark shadow which has been hanging over this district for some time past settled on the Boundary country this week when the mines of the Granby, British Columbia Copper and Consolidated (Snowshoe) Companies ceased operation simultaneously, and the fires were gradually drawn from the Granby and other smelter furnaces.

Rumor has it that the Rossland mines and possibly other properties and industries related thereto will follow suit, but there has been no action taken at the time of this writing, and it is hoped that no such a situation will occur. It is argued, and with some logic, that while the Boundary mines are mostly low grade copper propositions, the Rossland properties, though still lower in copper, have a preponderance of gold, average ore running approximately one-half an ounce of gold (\$10), which is naturally not affected by present conditions; one ounce of silver (58 cents) and one per cent. or a little under of copper (\$2.60). So it is anticipated that if supplies, etc., come down in price the mines on Red Mountain will be able to continue work and realize a good profit on their production.

Numerous elements have brought about the train of events that has culminated in this action by the Boundary mines. The cardinal point, of course, has been the big drop in the price of the metal they are mining, copper; then there has been an increase of from twenty to about forty per cent. in the cost of supplies of every kind for use in mining and smelting; increased cost of labor, etc. This condition of affairs could be tolerated to a greater or less extent with copper above twenty cents per pound, but when copper slumped and the other costs remained the same it placed the mining companies between Scylla and Charybdis. They chose what they considered the lesser evil and closed down, awaiting a more equitable adjustment of conditions.

It is felt that this phase of the present situation will not be of long duration, and that the mines will start up again in a month or so. At least we all hope that this will be the case. It is rumored that when work is begun again the wages offered will be on the old scale; that is, \$3.50 for miners for eight hours' work, instead of \$4 as they have lately been getting, and so on down the line. It will probably mean a reduction of about twenty per cent. in wages from what they have been getting here lately. Most of the miners do not object to this step backward, as it were, and it is not anticipated that there will be any friction caused by a move of this kind.

Many of the miners have taken advantage of the close-down to take long looked for holiday trips to the Old Country and to their homes in Eastern Canada and the United States. Owing to there being a superfluity of labor at coast points and other parts of the Province most of the miners are contenting themselves with staying in the Boundary district.

The Rossland mines have been shipping about the same quantity of ore as last reported. Development work is going on as usual, and the ore is showing up well. There are large quantities of ore in the Consolidated and Le Roi mines that have recently been blocked out, and the future looks bright for these mines if outside influences do not hold them in check.

Mr. Kiddie, the new manager of the Northport smelter, was in Rossland early this week, but had nothing to say in regard to smelter matters.

The cessation of ore shipments from the Snowshoe mine in the Boundary to the Trail smelter will probably cause the closing down of a couple of copper furnaces there.

Le Roi Company have ceased diamond drill work in the Spitzee, which property they have under bond in this camp. The company has not given out a report as to the success they had in their work on that property, but it can be taken for granted that it was not of a very brilliant nature, as the mine was examined

the other day by Mr. Alexandar Sharp, who is managing the First Thought mine near Orient, Wash., in the interest of the shareholders. Naturally Mr. Sharp was mum on the subject. Mr. Sharp is managing the First Thought mine for "Pat" Burns, the Calgary cattle man, who owns a controlling interest, and is making quite a success of the proposition.

Prior to closing down all of the Boundary properties were making record shipments, with the exception, of course, of the Dominion Copper Company, which had already closed down, and things were looking particularly well. For the week ended November 9th the Granby smelter made a new record, treating an average of over 3,200 tons of ore per 24 hours. Total shipments for that week from Boundary were as follows: From Granby mines, 22,080 tons; from Emma, 930 tons; Mother Lode, 3,397 tons; Snowshoe, 5,480 tons. The Snowshoe has been making very heavy shipments, reflecting credit on the assiduity of Superintendent Biesel.

Dominion Copper Company officials are expected in the Boundary at an early date. Warner Miller, president, New York; H. H. Melville, vice-president, Boston; M. M. Johnson, consulting engineer, Salt Lake, and probably some of the other officers will look over the situation on the ground. (Later—Melville and Johnson arrived at Boundary on November 13th and are looking over ground.) T. L. Dickason, of Chicago, president of the Crescent mine, is also expected at that property in the immediate future. This property is now equipped with a good electrically operated hoisting and compressor plant, and work will very likely be pushed forward earnestly from now on. The annual meeting of the Pathfinder Mining Company was held at Grand Forks early in the month. Officers were elected, and it was decided not to do any further development work on the property for the time being. A Grand Forks mineralogist discovered graphite within the city limits the other day, and a number of the citizens affected by the craze are having samples of the soil in their flower gardens tested.

The Spokane & British Columbia Railway, better known locally as "The Hot Air Line," which now runs trains from Grand Forks to Republic, Wash., is shortly to be built from the latter place to Spokane, Wash. This move should prove of much benefit to the Spokane & British Columbia, and will no doubt result in a much better position for this road in the railway world.

There is no doubt but that the Tulameen district as well as the Similkameen will be coming to the front in mining affairs in a very short time. Large ore deposits carrying tantalum, thorium and thallium have been located in the Champion Creek district.

A Denver outfit has put up \$10,000 to prospect a platinum ore deposit near Slate Creek. Numbers of prospects are being worked in both of these districts and good strikes are reported daily.

Robt. Stevenson, of Princeton, is reported as going to develop a copper property on the Similkameen River this winter. If he makes as great a success of his mining as his namesake did with literature, that copper mine will surely turn out well.

Railway work was never more active in this district. Engineers are in the field making a survey of the proposed extension of the Nicola branch to Princeton. Good progress is being made on the V. V. & E. between Keremeos and Hedley. There is only a small force working on this, but it is expected that Hedley will be reached early in the spring. It is probable that a larger force will be put to work now that labor is a little more plentiful and the work hurried on. Nine feet of good bituminous coal have been located on the property of the Nicola Coal Company. There is not much doubt that when the Nicola coal fields have been developed to a greater extent valuable mines will be found there. Prospectors are cutting seams of coal right along in that country and things are looking better.

Travelling a little farther from home, another discovery of gold is reported from the vicinity of Cape Scott, Vancouver Island. Numerous claims have been staked, as usual. We hope that the find is of a substantial nature, and that its existence will not be of the same evanescent nature as other discoveries we have known. A number of the business men of this district are interested in the Telkwa and other northern mining fields. Travellers from the Telkwa country claim that the mines there are likely to equal if not surpass the Boundary propositions. If they do, then so much the better for British Columbia. Another proposition in the Tatlayoco Lake district attracting local attention is an antimony mine, carrying 67 per cent. antimony and some gold and silver, total values running approximately \$209 per ton. There is also a quartz lead on the property running about \$54 per ton in gold. A copper-bearing dyke on the claims varies from 75 to 200 feet in width, values averaging about \$11 per ton. The property is in a development stage as yet. Of course "the north" is a big country, and we only hear of the richest of the mining properties, still some of the tales of wide and long ledges of rich copper and other ores that have been found and are being worked make a fellow feel like getting into his "diggin' clo'es" and "hiking" for the frontier.

The Alaska Treadwell Company treated 702,953 tons of \$2.42 gold ore during the year ended June 1st, realizing \$2.15 per ton. They paid 14 per cent. in dividends, or \$700,000. They certainly have the art of ore extraction down pat at Treadwell, and can make very low grade ore pay, but it is naturally a much more amenable product than most of the mill men in this country have to struggle with.

The Arbitration Board in the Consolidated (St. Eugene) matter did not meet as expected owing to the bereavement of one of its members. Hence we cannot report the outcome of this question at this writing.

Robert R. Hedley, special commissioner, Department of Mines, Ottawa, is now in this country gathering data in reference to the Western mining industry. This is the proper way to secure reliable information. Much more can be done by a man on the ground in an hour than can be done through the mails in a month.

Slocan mines are steadily getting in supplies for the winter, and development work will be done on a number of properties all winter. The Westmount is about ready to ship a car of ore. The Reco mine is reported to have lots of ore in sight.

The Silver Dollar mine of Lardeau will ship a large quantity of concentrates now on hand as soon as the snow is in condition for "rawhiding." A Philadelphia company is doing some gold dredging at Gold Hill in the Lardeau near Poplar Creek, where the gold excitement was a few years ago. The outcome of the venture will be awaited with some interest by miners in this country.

Wm. Waldie, of the Queen mine, Salmo, in the Ymir district, has recently ordered an addition to his stamp mill. Mr. Waldie will yet make a good mine of the Queen. We must admire his pertinacity, which will no doubt achieve success in the end.

Work is proceeding as usual at the St. Eugene Mine, Moyie. A large force of men is being employed and the mine is looking well.

Chas. A. Mackay, manager of the mine that is working in the middle of Moyie Lake, has his caisson shaft down about 80 feet and will begin pumping the water out of it at an early moment. The bottom of this shaft is now resting on 10 feet of clay. In a prospecting drill hole sunk on this property some time ago they got traces of galena ore from the bottom of the lake. If Manager Mackay gets the St. Eugene lead in the lake bottom the value of claims on the other side of the lake will be greatly enhanced.

The C. P. R. is reported as going to build that long looked for piece of railway from Golden to Fort Steel. Let us hope it is

so. This road would open up a very rich mining and agricultural country and would be a paying proposition all around. The C. P. R. Company has made extensive improvements at Cranbrook, which will aid them materially in handling the Crow-Spokane business.

One of the many mines that would be benefitted by the Golden-Fort Steel branch of the C. P. R. is the Giant mine near Golden, where they have recently installed an Elmore vacuum oil plant, with a capacity of forty tons a day. Other mines aided would be the Ptarmigan, Red Line, Paradise and others.

At a meeting of the shareholders of the Alberta Railway & Irrigation Company, held at London, November 7th, among other things the chairman reported that the common shares of the company would no doubt be placed on a dividend paying basis in 1907, which will be noted by the holders of such shares with much gratification.

As has been hinted for some time, a shuffle has occurred in the affairs of the Crow's Nest Pass Coal Company. Hon. Geo. A. Cox has retired from the presidency, and Mr. G. S. Lindsay, K.C., has stepped into his place. James D. Hurd, of Duluth, will be general manager, and R. M. Young will be the new secretary.

A banquet was tendered Mr. R. G. Drinnan at Fernie on the 14th November, prior to his departure for Hosmer, where he will shortly take charge. Mr. Drinnan is a very popular man on the Crow, which was duly manifested during the course of the dinner.

The coal mines have been busy, but it is expected that several of them will materially curtail their output or cease operation as far as coke and coal production for the Boundary is concerned.

GENERAL MINING NEWS

NOVA SCOTIA.

SPRINGHILL.—The miners of the Cumberland Coal & Railway Company have applied to the Department of Labor for a new conciliation board to investigate certain matters of difference between the men and the company.

The Springhill mines are now outputting about 1,400 tons of coal per day. Manager Cowans has hopes of catching up with back orders before the winter is over.

The mechanics employed by the Cumberland Coal & Railway Company quit work on October 2nd. This left the pumps and necessary power machinery of the mines unmanned. The officials of the company, however, came to the rescue and filled the vacancies. Men are to be sent by the Provincial Government to relieve the situation. Deputy Minister McKenzie King is now in Springhill.

HALIFAX.—Two hundred students are now in attendance at the Halifax Technical School. The movement for technical education is being enthusiastically supported by the people.

PORT MOREN.—Thirteen square miles of coal areas adjoining the areas of the Cape Breton Coal, Iron & Railway Company (Broughton areas) are the subject of negotiations between the Dominion Steel and the Cumberland Railway & Coal Company. Three seams of good coal have been found on the areas.

SYDNEY.—It is expected that the Dominion Coal Company will despatch the last coal-laden steamer up the St. Lawrence on or about November 23rd. Navigation usually closes about that time.

The Dominion Iron & Steel Company on November 18th made a new record by producing in 24 hours 1,086 tons of steel rails. A cargo of 4,050 tons of rails left Sydney yesterday by the Elder-Dempster liner Memnon for Quebec, to be used by the Transcontinental.

ONTARIO.

COBALT.—The McKinley-Darragh Mining Company has definitely reduced the wages of its employees. It is understood that there will be a general movement towards reduction of wages all over Cobalt. This is an inevitable effect of the present tightness of the money market.

Cobalt mining companies with head offices in the United States are being urged to establish transfer and registry offices in Toronto.

A movement is on foot in Cobalt to form a shareholders' protective association. By its aid rigid examination will be made of the administration of funds.

The Coniagas concentrator is handling between 60 and 70 tons of ore per day. The richest ore is first hand picked out. An extra Wilfley and a Wilfley slimer have been installed. The mine is employing a full force of 130 men.

The Buffalo mine has 120 men working regularly.

The proposals of the Copper Cliff smelter have been thrown into definite shape thus: The right of sending back bullion instead of cheques is reserved; for ore carrying 4,000 ounces or over they agree to give the mine 94 per cent. of the value; 1,200 ounces, 93 per cent; 800 ounces, 92 per cent; 500 ounces, 90 per cent.; 300 ounces, 85 per cent.; and 150 ounces, 80 per cent. Ore containing 12 per cent. or over of cobalt will be paid for at \$30 per ton; 8 per cent. cobalt, \$20; and 6 per cent., \$10. Within 45 days of the last day of sampling, the company promises to pay 50 per cent. of the amount due the mine, the balance being payable in ninety days.

PORT ARTHUR.—The first car load of silver ore shipped from the Beaver mine since reopening left Port Arthur recently. It was shipped to Omaha. A new mill will probably be erected.

The rumor that West End Silver Mountain mine was shut down has been officially denied.

BRITISH COLUMBIA.

ROSSLAND, B.C., Nov. 23.—Rossland Miners' Union held on November 25th a referendum vote for the purpose of determining whether or not the present scale of wages will be decreased to the scale which prevailed prior to July 1 of this year. The scale at that time provided for \$3.50 a day for miners, instead of \$4 as at present. Other workers around mines will have wages reduced in like proportion if the vote is in the affirmative.

The lower price of metals has cut down the profits of mines to such an extent that it is claimed they cannot be operated under the present scale and may close down if the scale of wages is not reduced.

The Granby Consolidated Mining, Smelting & Power Company wired from Grand Forks: Shut down is due to the low price of copper, the high operating costs and the united action amongst the large copper producers of America to curtail production and reduce the surplus of copper.

KASLO.—The market for zinc ores is improving. Recently the Whitewater mill sold 2,500 tons to a large Kansas reduction company. A contract was made for the entire output of the property for one year.

FERNIE.—Three men were killed by the explosion of a missed hole in an open cut at the Hosmer mines of the Pacific Coal Company. This is the first fatal accident to any of the company's employees in the district.

NICOLA VALLEY.—The Diamond Valley Iron & Coal Company is sinking a shaft to its principal seam. Three shifts are at work.

NANAIMO.—The Western Fuel Company broke all local records on Wednesday, November 6th, by hoisting 2,803 tons of coal from its No. 1 and Northfield mines. Of this amount the Northfield mine put out 1,238 tons.

CRANBROOK.—Three additional furnaces are to be installed at the smelter of the Sullivan mine, located at Marysville, B.C., as soon as financial arrangements are completed.

FAIRVIEW.—Work on the Canada Zinc Company's building and plant at Fairview is being rushed. It is hoped that everything will be in readiness to start in March. The electric reduction

process, successfully operated in Sweden, has been materially modified and improved. If the plant proves a success the zinc-lead ores of Kootenay will at once go up in value.

VANCOUVER.—A syndicate of Vancouver and Victoria people is about to undertake the development of a group of seven copper-gold claims on Moresly Island. A plant, including a steam hoist, a twenty horse-power boiler and a Cameron steam sinking pump, will be shipped in the immediate future.

Reports have reached this city that the Cornell copper mine on Texada Island has been sold to G. L. Tanzer, a Seattle mining man. The Texada Consolidated Mines have acquired the Cornell from Mr. Tanzer, along with eight claims of the Raven Creek group. Two thousand feet of tunnelling have been done on the Cornell.

YUKON.

DAWSON.—Four hundred tons of dredge construction material must yet be received before the dredges of the Consolidated can be completed. There is now enough material on hand to complete two. Several million feet of lumber will be distributed from the company's sawmill at Twelve Mile. The old dredges on 104 and 90, Bonanza, were closed down on October 13th.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

Commenting on the fact that one of the largest British railway companies has recently placed an extensive order for open-hearth steel rails, the *London Times* remarks that this will not occasion surprise to those who have followed this method of the manufacture of steel. That greater reliance can be placed on the product of the open-hearth furnace is now fully attested by the almost complete exclusion of Bessemer steel for structural purposes, and the specification of open-hearth steel for use in bridges and other structures has become so familiar as to be generally understood when the specification is silent upon the method of manufacture required. While it is not anticipated that the Bessemer converter will be completely superseded by the open-hearth furnace, the number of new works in Great Britain equipped for the manufacture of steel by the open-hearth process greatly exceeds those planned for the Bessemer process, and the demand for the former material is enormous in view of the extensive employment of structural steel for skeleton framework of buildings and steel plate for ships, boilers and engineering work generally.

The death of Mr. Forster Brown, one of the best known engineers in South Wales, has occasioned sincere regret. As an expert his advice was much sought after, and his opinion highly valued. The deceased gentleman was associated with the opening up of some of the most important collieries in the South Wales district.

At a public meeting recently Mr. Samuel, Under Secretary for Home Affairs, spoke on the subject of the Mines Regulation Acts. As to the proposed Mines Department, he said the work had now to be dealt with by the officers of the Industrial Department, which he considered wrong. The country ought to have a real Mines Department, with a chief inspector of mines continually devising new improvements. He had no doubt that the Royal Commission on Accidents would recommend the creation of a Mines Department, and he hoped it would be the privilege of himself and Mr. Gladstone to carry out the scheme.

Mr. Arnold Lupton, M.P., has published a pamphlet of the Eight Hours Bill, in which he refers to the fact that in two large

collieries started by him with eight hour shifts underground, the colliers in each case requested that the hours should be increased to nine. In one case the change had the immediate effect of increasing the average earnings to the extent of a shilling a day, and based on this evidence he thinks that the average decrease in earnings following the adoption of an eight hours bank-to-bank day would not be less than two shillings a day.

According to statistics compiled by a well-known British firm, the world's production of pig iron during 1906 was 58,742,322 tons, an increase of nearly five million tons on the output of 1905. In 1906 the United States manufactured 25,307,191 tons; Germany, 12,422,177 tons; and Great Britain, 10,149,388 tons.

GERMANY.

Extensive improvements are contemplated in connection with the Krupp collieries, Hanover and Hannibal, no less a sum than seven million marks having been appropriated for the thorough equipment of the mines.

AUSTRIA.

Advices from Budapest affirm that the State has decided to acquire a number of collieries and has already purchased large areas of coal-bearing lands, which have not been properly exploited up to the present time owing to lack of capital and means of communication. In addition a colliery has been purchased in Croatia which is already producing 100,000 tons.

FRANCE.

Some interesting figures have been published on the cost of coal production in the Nord. Thus while in 1887 the annual output per man was 306 tons, the average annual wage was £44 6s. 4d., and the cost per ton 3s. 6d.; in 1906, the annual output per man was 261 tons, the average wage £58 13s. 8d., and the cost per ton 5s. 8 1-2d. In fact during this period there has been a gradual but persistent decrease in output per man accompanied by a steady increase in wages paid and in cost of production.

SWEDEN.

A Consular report states that about 4,500,000 metric tons of iron ore were produced in Sweden last year, from 308 mines. The gold production was, however, very inconsiderable, while lead was produced to the amount of 7,000,000 kg.; copper, 1,209,130 kg.; and zinc, 174,600 kg.

RUSSIA.

Intelligence has been received of the discovery of rich gold placers near Okhotsk, and several enterprises are already prepared to work them. The discovery, it is stated, of gold in the north-eastern possessions of the United States, in Alaska and on the Seward Peninsula, has been of great importance in the development of adjacent Siberian territory.

PORTUGAL.

Portugal produces, according to an official report just issued, antimony, arsenic, anthracite coal, copper, lead, iron, manganese, tungsten, tin and zinc. The industry, however, is not yet established on a very important footing, since the total mineral output for last year is valued at only \$1,803,380.

UNITED STATES.

For the nine months ending September 30, asbestos to the value of \$798,301 was imported into the United States, the product being that of the mines of Thetford and Black Lake districts, in the Province of Quebec.

Nearly all the copper mines in the United States, following the example of Butte, have announced a reduction in miners' wages. Among others the principal mines in Arizona, notably Bisbee, Globe, Clifton-Morenci and Jerome, have effected reductions, as have also a number of the large companies operating in the Lake Superior mining districts. Thus the Calumet & Hecla has announced a reduction of 12 1-2 per cent. in the wages of all classes of labor at the mines and mills, while in other cases a reduction of only 5 per cent. has been made. The Calumet & Hecla employs between six and seven thousand men. The miners, however, are not permitting the new scale to go into effect without protest, and a deputation has been appointed to request the company to make the reduction less severe.

Meanwhile iron mining in this region is very active, production during October constituting a record for the year, the output from the five ranges being approximately 6,400,000 tons.

The Couer D'Alene lead mines still continue to maintain a normal production, despite the unsatisfactory lead prices, while last month five companies paid dividends aggregating \$576,000.

As a result of lower treatment rates conceded by the mill and smelter trusts, a largely increased output was made by the Cripple Creek mines last month, or 69,950 tons, valued at \$978,086, as com-

pared with 62,950 tons, valued at \$944,200, for September. It is anticipated that the November output will realize \$1,250,000.

The mineral production of the United States is shown in "The Mineral Resources of the United States," advance sheets of which have been issued, to have reached the enormous total value of \$1,902,505,206, as compared with \$1,623,928,720, an increase of 17 1-2 per cent. The two most important mineral products were coal and iron, the value of the former having been \$513,079,809, and of the latter \$505,700,000.

MEXICO.

The Government has under consideration the enactment of new mining laws, which have created much discussion among mine operators. The questions raised include the ownership of residues from reduction plants and mills, the disposition of the waters from the mines and mills, the subdivision of mining properties, and the registration of mining titles.

SOUTH AFRICA.

An effort is being made in London to secure additional capital for the development of platinum mines in the Albany district, Grahamstown, Cape Colony. Samples of the rock are said to assay as high as 17 oz. 16 dwts. platinum to the ton.

The Johannesburg correspondent of the *Mining Journal* (London) states that the advent of the Victoria Falls Power Company inaugurates a new era in the production of electric power on the Witwatersrand, and in some instances a load factor of over 90 per cent. is being regularly maintained.

An interesting paper on the "Origin of the Gold in the Rand Banket" was recently read before the Institution of Mining and Metallurgy by Prof. J. W. Gregory, wherein he arrives at the conclusion that the theory in best agreement with the facts seems to be that which regards the banket as a marine placer in which gold and black sand were laid down in a series of shore deposits. The gold was in minute particles, and it was concentrated by the wash to and fro of the tide, sweeping away the light sand and silt, while the gold collected in the sheltered places between the larger pebbles. The black sand deposited with the gold has been converted into pyrites, and at the same time the gold was dissolved and deposited in situ.

AUSTRALASIA.

A new copper field of great promise is reported to be developing in Cangai, in the Grafton district of New South Wales. The deposits are said to be of enormous size, while the conditions are such that costs are very much lower than in any other copper district in Australia. The metal is at present being obtained at a cost of \$165 a ton, as compared with from \$100 to \$250 a ton in other New South Wales districts, of \$66 a ton in Queensland and \$350 in South Australia.

STATISTICS AND RETURNS.

The output of the collieries of the Crow's Nest Pass Coal Company for the week ended November 15 totalled 22,043 tons, a daily average of 3,674 tons.

The output of the collieries of the Crow's Nest Pass Coal Company for the week ending November 22nd was 18,508 tons, a daily average of 3,085 tons. For the corresponding week of last year the output was 7,791 tons, a daily average of 1,298 tons.

Despite the shut down of the Boundary Mines and smelters in the middle of last week, the ore receipts at the smelters show a

respectable total, to a large extent made up of ore in transit. It is generally considered that the shut down, for which as yet no cause has been assigned, is not likely to last.

Appended will be found the ore shipments in detail for the week ending November 16th and year to date in tons.

Boundary shipments—Week, 27,618; year, 1,139,708.

Rossland shipments—Week, 6,162; year, 242,935.

Slocan-Kootenay shipments—Week, 4,455; year, 143,125.

The total shipments from the mines in the above districts for the past week were 38,235 tons and for the year to date 1,525,768 tons.

BRITISH COLUMBIA SHIPMENTS.

Nelson, B.C., Nov. 23.—Following are the ore shipments and smelter receipts in Southeastern British Columbia districts for the week ending November 23 and year to date in tons:—

Shipments—	Week.	Year.
Boundary	1,273	1,140,981
Rossland	6,407	249,742
East of Columbia River	3,689	156,714
Totals	11,369	1,547,714
Smelter receipts—		
Trail	7,080	237,249
Northport	919	88,529
Marysville	600	28,200
Others . . . . .	.....	1,110,079
Totals	8,599	1,464,057

DOMINION COAL OCTOBER OUTPUT.

Output.—No. 1, 52,569; No. 2, 59,241; No. 3, 34,036; No. 4, 56,269; No. 5, 43,707; No. 6, 19,719; No. 7, 14,277; No. 8, 26,542; No. 9, 38,655; No. 10, 4,994. Total, 350,009. Total shipments, 306,108, approximate.

Dominion Coal Company's outputs for first half of November, 1907:—

No. 1, 24,900; No. 2, 34,180; No. 3, 16,120; No. 4, 27,300; No. 5, 27,510; No. 6, 11,440; No. 8, 10,340; No. 9, 18,360; No. 10, 4,050. Total, 174,200.

The mines during the week ending November 9th from the Rossland camp have shipped normally. There is a larger output than ever before from the Granby mine, which has a record week, but otherwise the Boundary mines have not improved recently. Great activity is being shown in the Slocan and in Kootenay mines generally in the silver lead and gold quartz districts. There are a far larger number of mines shipping than has been the case for some time past and new mines are being added to the shipping list every week.

Boundary shipments—Week, 32,233; year, 1,112,090.

Rossland shipments—Week, 5,775; year, 236,773.

Slocan-Kootenay shipments—Week, 4,191; year, 138,570.

The total shipments from the mines in the above districts for the past week were 42,109 tons and for the year to date 1,487,433 tons.

COBALT SHIPMENTS.

Cobalt ore statement for the week ending November 9th, to November 16th, 1907:—

La Rose Mine—To Denver, Col., Nov. 11th, 65,000; Nov. 11th, 45,000; Nov. 11th, 65,000; Nov. 13th, 53,000; Nov. 13th, 43,000; Nov. 14th, 44,000; Nov. 14th, 43,000; Nov. 15th, 66; Nov. 16th, to New York, 41,100; Nov. 16th, to Denver, 88,000; Nov. 16th, 66,000. Total, 619,100.

Nipissing Mine—To New York, Nov. 12th, 61,720; Nov. 14th, 60,570; Nov. 16th, 60,170. Total 182,460.

McKinley-Darragh Mine—To Penn. Smelting Co., Carnegie, 61,160; Nov. 15th, 60,110. Total, 121,270.

City of Cobalt Mine.—To American Smelting & Refining Company, Perth Ambody, N.J., Nov. 14th, 63,950; Nov. 14, 37,280. Total, 101,230.

Total—1,024,060.

Cobalt ore statement for the period November 2nd to 9th, 1907:

Nipissing Mine—To New York, Nov. 4th, 32,443; Nov. 4th, 41,127; Nov. 8th, 61,470. Total, 135,040.

La Rose Mine—To Denver, Col., Nov. 5th, 66,000; Nov. 5th, 66,000; Nov. 5th, 68,000; Nov. 7th, 40,000; Nov. 7th, 40,000; Nov. 8th, 65,000; Nov. 8th, 40,000; Nov. 9th, 40,000; Nov. 6th, 32,040. Total, 544,040.

O'Brien Mine—To Delore Mining Company, North Bay, Nov. 6th, 260,000.

Buffalo Mine.—To American Smelting & Refining Company, Denver, Col., 40,000.

Kerr Lake Mine—To Kerr Lake Mining Company, Perth Amboy, N.J., 62,040.

Total—952,120 lbs.

AVERAGE PRICES OF COPPER—NEW YORK.

Month.	Electrolytic.		Lake.	
	1906.	1907.	1906.	1907.
January	18.31	24.56	18.41	24.88
February	17.86	24.93	18.11	25.20
March	18.36	25.07	18.64	25.47
April	18.37	24.27	18.63	24.87
May	18.45	24.15	18.72	25.17
June	18.44	22.82	18.71	24.01
July	18.19	22.12	18.58	21.31
August	18.43	18.35	18.61	18.25
September	19.14	15.56	19.20	16.04
October	21.27	13.12	21.71	13.57
November	21.99	.....	22.34	.....
December	23.03	.....	23.38	.....
Year	19.35	.....	19.60	.....

Julius Matten, 25 Road Lane, London, E.C., supplies the following figures of the world's production of pig lead, in English tons: 1904, 985,069; 1905, 990,920; 1906, 975,610. In metric tons the figures stand—1904, 999,844; 1905, 1,000,784; 1906, 990,244. The year average prices of soft lead per pound in New York and per ton in London are:—New York—1904, 4.45 cents; 1905, 4.84; 1906, 5.78 1-2. London—1904, £11 19s. 8d.; 1905, £13 14s. 4d.; 1906, £17 7s. During the years the highest monthly average was obtained in December, 1906, being 6.08 cents and £19 12s. 6d.

Canada's production is given thus:—English tons—1904, 12,143; 1905, 17,125; 1906, 16,991.

In 1906 the United States, Spain, Germany, Australia and Mexico were the chief producers. Canada comes eleventh on the list.

The following are the figures of German consumption of foreign copper for the months January-September, 1907:—Imports of copper, 93,867 tons; exports of copper, 6,387 tons; consumption of copper, 87,480 tons; as against during the same period in 1906 of 91,340 tons.

Of this quantity 73,616 tons were imported from the United States.

Figures received from L. Vogelstein & Company.

Company Notes.

Butte Coalition Copper Company has reduced its quarterly dividend from 50 to 15 cents a share.

The annual meeting of the Nova Scotia Cobalt Silver Mining Company is called for Monday, December 2nd, in Montreal.

The annual meeting of the Coniagas Mine, Limited, was deferred until November 28th on account of the inability of Mr. Milton Hersey, of Montreal, to attend on the 26th.

At the annual meeting of the Pathfinder Mining Company, held a few days ago in Grand Forks, the following officers were elected: President, W. K. C. Manly; vice-president, G. H. Ruthford; secretary-treasurer, R. F. Petrie; board of directors, Dr. Kingston, Thos. Newby, and A. W. Fraser.

The Westinghouse Machine Company and the Westinghouse Electric Manufacturing Company have secured large Pacific coast contracts during the past week. The contracts total nearly \$2,000,000. Both companies are in a decidedly easier position.

The November dividend of the Consolidated Mining & Smelting Company is, like the other six previously paid, at the rate of ten per cent. per annum, or two and one-half per cent. quarterly, the same amount having been paid quarterly for the last twenty-one months. As the company has an issued share capital of \$5,355,200, divided into 53,552 shares of \$100 each, this last payment made the dividend disbursement amount to \$133,880. Including the six dividends heretofore paid, themselves amounting to \$714,945, the total amount thus far paid in dividends by this company amounts to \$848,825.

The Waverley Hydraulic Mining Company declared a dividend of \$5.50 per share at the annual meeting of the stockholders at Barkerville. This is 50 cents per share more than last year. The yardage moved was 27,200, of which 4,600 cubic yards was from the lost channel, and 12,600 cubic yards from the Grouse Creek channel. The average value was a shade under 36 cents per cubic yard. More than half the gold came from the Grouse Creek channel, which is therefore richer than the other. While the clean-up was in progress a slide of bed rock amounting to 3,000 cubic yards or more came down from the west rim of the east channel, covering a part of the uncleaned ground, so that not all the gold was recovered this year from the season's piping on that channel. One hundred and forty-four feet of the old sluice flume was rebuilt with new boxes at the end of the season.

METAL, ORE AND MINERAL MARKET.

Aluminium, No. 1 grade ingots—45 to 47 cents per lb.
 Antimony—8 3-4 to 11 cents per lb.
 Arsenic, white—7 cents per lb.
 Barytes, crude—\$18 to \$20 per short ton.
 Bismuth, metal—\$1.75 per lb.
 Cadmium, metal—\$1.60 per lb.
 Carbons for drills—\$70 to \$90 per carat.
 Carborundum, powdered—8 cents per lb.
 Chromium, metal pure—50 cents per lb.
 Cobalt, f.o.b. Cobalt, Ont., unrefined—30 to 40 cents per lb.
 Corundum—7 to 10 cents per lb.
 Feldspar, ground—\$10 per short ton.
 Feldspar, lump—\$8 to \$13 per long ton.
 Graphite, domestic—\$50 to \$150 per ton.
 Gypsum, lump—\$7 per short ton.

Infusorial earth, ground—\$15 to \$30 per ton.
 Manganese, pure metal—75 cents per lb.
 Mica, ground—\$40 to \$70 per short ton.
 Mica, scrap—\$10 to \$15 per short ton.
 Molybdenum, pure—\$1.70 per lb.
 Molybdenite ore, 90 per cent. pure—\$4.50 to \$5 per unit.
 Nickel, metal—45 cents per lb.
 Platinum, ordinary metal—\$26 to \$26.50 per ounce.
 Platinum, scrap—\$19 per ounce.
 Pyrite—10 to 11 3-4 cents per unit for 38 to 45 per cent. sulphur, lump ore or fines.
 Quicksilver—\$45 to \$46 per 75 lb. flask.
 Sulphur—\$10 to \$21 per long ton.
 Tale—\$15 to \$30 per short ton, crude.
 Tungsten, pure metal—\$1.30 per lb.
 Tungsten ore, 60 per cent. pure—\$9.50 per unit.

MARKET NOTES.

Silver.—Nov. 7th, 59 3-8; Nov. 8th, 58 1-2; Nov. 9th, 68 1-8; Nov. 11th, 58 1-8; Nov. 12th, 58 3-4; Nov. 13th, 58 1-2; Nov. 14th, 58 1-4; Nov. 15th, 58 1-4; Nov. 16th, 58 1-2; Nov. 18th, 58 7-8; Nov. 19th, 59 1-2; Nov. 20th, 59 1-4. Mexican dollars, 47 cents. Sterling exchange, \$4.860.

Copper.—New York, on November 20th, Lake, 13 1-4; electrolytic, 13; London, £58 3s. The market is still depressed. The financial depression is holding back buyers. Producers, on the other hand, do not wish to accept large orders at present prices.

Spelter.—Market quiet. There has been a heavy fall in prices. New York, 4.90 cents per lb.; London, £21.

Lead.—Market is continuing to weaken. New York, 4.30 cents; London, £16 17s. 6d. for Spanish.

Tin.—Market strong. New York, 31 cents; London, £135 15s. for spot.

Pig Iron.—At Pittsburg No. 2 foundry has fallen to \$18.50, Bessemer \$20.

Catalogues and Other Publications.

Merek's 1907 Index (third edition). An Encyclopedia for the Chemist, Pharmacist and Physician. Merek & Company, 15 University Place, New York. In this well bound, clearly printed volume are listed all of Muck's standard, rare and newest products. The Index is not a price list; but comparative values are indicated by a special code. Appended to the name of each substance is an abbreviated list of its physical and chemical properties.

The Westinghouse Machine Company's Catalogue P. is the first pamphlet we have seen devoted exclusively to storage batteries for portable service. The batteries are made for a wide range of service—for car lighting, for electric locomotive power, for auto trucks, and for any purpose in fact for which a storage battery is used. The prices of elements and of all accessories are plainly listed. Portable batteries vastly increase the utility of this form of energy. For certain varieties of mine work nothing could be more efficient than the modern, compact, efficient portable storage battery.