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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 NEW DIRECTOR.

The appointment of Professor Reginald W. Brock to the position of Acting Deputy Minister and Director of the Geological Survey of Canada has been announced.

Referring, in a recent editorial, to the manner of man needed for this dignified and responsible office and to the Survey's need of reorganization, we stated that the new Director should be young, energetic, fearless and entirely free from political strings.

It is with sincere pleasure, then, that we congratulate the new Acting Deputy Minister and Director upon his appointment, and the Minister of Mines upon his choice.

Mr. Brock is young. His academic career, although undeniably brilliant, may also be more adequately described as one of exceptionally solid attainment.

As a field geologist Mr. Brock has stood almost pre-eminent among the geologists of Canada in at least one most important respect. In his work, more especially in British Columbia, he has subordinated the academic to the economic.

This very consideration, along with a knowledge of Mr. Brock's academic and professional successes, was doubtless the deciding factor in the Government's choice.

The Department of Mines and Canadian Geological Survey do not require a savant as their head. Neither do they need a specialist. Either variety of man would prove a hindrance.

What the Department and the Survey need (and in Mr. Brock this need we believe is filled) is a virile young Canadian, who knows Canada's needs at first hand.

The work of the Geological Survey cannot be delegated to others. The Survey's traditions, its honorable record in the face of meagre appropriations and political strife, are dear to every Canadian. It is to be hoped that the new Director will be supported, not only by the officers of the Survey as a whole, but by all the mining men of Canada.

To a very large extent the growth and advancement of Canada's mineral industries depend upon the intelligent activities of the Geological Survey. The Survey will be of incalculable benefit to the country if, from the first, obstacles are cleared away from the Director's path and if he is strengthened by a clear knowledge of the fact that the mining fraternity is solidly for him.

SMELTER SMOKE.

On another page we reprint from our valued contemporary, the *Mining and Scientific Press*, an article on smelter smoke. In view of the proposed establishment of a smelter for treating the arsenic ores of the Cobalt

and other districts, and the probable erection of a large iron smelter within a very short distance of Toronto's business section, this article should be read with care.

Attention is particularly directed to the fact that many complaints received by the authorities in smelting districts of the United States are exaggerated or even baseless.

Like the accident artist who makes the street railway pay damages on pre-arranged accidents, the farmers of the Western States have persistently persecuted the smelters.

If Toronto is to encourage the growth of metallurgical establishments within her limits she must take care not to be misled by the hypersensitive nostrils of sensation mongers.

At Deloro hardly a trace of arsenic is lost. Although many thousands of tons of highly arsenical ores have been treated there, no damage whatever has been done to the surrounding country.

STUDENT AUTONOMY.

For long Queen's University has encouraged her students to take in their own hands the enforcement of discipline. The students of each faculty have their own particular tribunal. The Arts "Concursus" and the Science "Vigilance Committee" are swift to punish error, pride, and disrespect in fellow-students. From the decisions of these courts there is no appeal. Sentences are carried out with speed and precision. Consequently there is seldom any need of interference on the part of the professors.

Following the admirable example of Queen's, the University of Toronto is making the undergraduates responsible for the preservation of law and order through committees chosen by the students themselves. This is discreet. Self-government induces self-respect. Self-respect inhibits acts of vandalism.

SCHOOL READERS.

To Mr. J. B. Tyrrell's article on "School Readers" we have given a prominent position in this issue of THE CANADIAN MINING JOURNAL.

With crisp directness Mr. Tyrrell indicates the vital need of teaching our children something about an industry which is of paramount importance to Canadians.

No argument is needed to support the dictum that a knowledge of the history and value of Canadian mines and minerals would be of infinitely greater value to the rising generations, than much of the meretricious, sentimental "literature" that is now considered essential to a child's education.

Undoubtedly no sounder, truer foundation for citizenship could be laid than by imparting to school children a definite conception of the story of Canada's mining industry.

Mr. Tyrrell refers to the history of Silver Islet. For sheer romance and engrossing interest Silver Islet's story can hardly be paralleled. And yet, we suppose, not one child in a thousand knows that there ever was a mine on Silver Islet.

Take, as other illustrations, the discovery of Copper Cliff, the finding of Cobalt, the checkered history of the Lake of the Woods, the early rush for gold in Nova Scotia, the struggles of the iron industry in Ontario and Nova Scotia, the drama of gold, silver, lead and zinc in British Columbia, the discovery of gold in the Yukon—is not any one of these subjects pregnant with inspiration for the youth of our land?

We need not look into the dim past for heroes. There has been, and there is now, more quiet heroism in the pioneer and prospector, in the working miner and in the mine manager, than in all the bold, bad barons of the middle ages.

Mr. Tyrrell's paper is more than timely—it is of very deep significance. Indirectly mining men themselves have something to learn from it. Between the lines they may gather that now, as always, the claims and duties of citizenship are as binding upon the mining fraternity as upon any other class of men.

A GOOD REPORT.

The annual report of the directors of the Consolidated Mining & Smelting Company of Canada was noticed briefly in our last issue. The report is, however, worthy of more detailed attention. A cursory glance through the attractive pamphlet is edifying.

For the year ending June 30th, 1907, the Centre Star and Ware Eagle group produced 81,788 tons of ore, yielding 32,306 ounces gold, 27,808 ounces of silver, and 1,030,529 pounds of copper. The total value of these metals was \$893,239. The corresponding figures for the St. Eugene mine were: 127,645 tons of ore, 24,737 tons of concentrates, yielding 675,959 ounces of silver and 29,391,389 pounds of lead, valued at \$1,713,933. The Snowshoe produced 49,002 tons of ore, 2,989 ounces of gold, 16,171 ounces of silver, 1,372,056 pounds of copper, a total value in metals of \$397,141.

At the Trail smelter 222,573 tons of ore were smelted, yielding a total value in metals recovered of \$3,786,146.

Resolving these figures into averages, we find that the Centre Star and War Eagle are averaged \$10.92; the St. Eugene ore, \$13.43; the Snowshoe ore, \$8.10. The ore smelted at Trail averager \$17.01.

Since March, 1898, the Trail smelter has produced metals the gross value of which is estimated at \$25,800,231.

In the Centre Star and War Eagle group there are about sixteen miles of underground work and about ten miles in the St. Eugene. A large total of underground development and of diamond drilling was performed during the year.

Nearly half a million dollars were expended in new construction and improvements.

To guarantee an adequate supply of lead ore for the Trail smelter the Consolidated has entered into an agreement with the Canadian Metal Company, whereby it secures the Canadian Metal Company's entire output of lead and zinc concentrates for a period of years. The Consolidated Company has a strong hold upon the Canadian, Chinese and Japanese lead markets. Hence this step was necessary.

The report is signed by W. H. Aldridge, managing director. It concludes with a warm recognition of the valuable services of several of the company's officers. To Mr. R. H. Stewart, mine manager, is attributed the excellent condition of the company's mines.

Messrs. Jules Labarthe, T. W. Bingay, William Chambers, John F. Miller, A. J. McNab, all of whom are officials connected with the Trail smelter, are given especial credit. Mr. R. Purcell, Mr. W. P. White, Mr. Charles Biesel and Mr. John M. Turnbull, who are responsible for various individual mines, are placed in the same roll of honor.

Such open recognition of faithful services, coming from a superior officer, is evidence of harmony and cooperation among the various members of the staff.

THE VALUE OF CORRESPONDENCE INSTRUCTION TO THE MINING MAN.

This is the title of a paper read by Mr. H. H. Stoek, editor of *Mines and Minerals*, before the American Mining Congress at its annual meeting in Joplin, Missouri.

Mr. Stoek traces the history of the International Correspondence Schools. The story of the origin and phenomenal growth of this institution is one of absorbing interest. The actual beginning of mining instruction was made about 1885 by Mr. T. J. Foster, who started a series of technical articles in the *Mining Herald*, published in Shenandoah, Pa. These articles "were intended to assist the ambitious and studious men about the mines."

From this small beginning has resulted a system through which 34,496 persons have received mining instruction.

The success of this important movement is justly attributed to the actual need of just such simple, flexible and practical educational method and to liberal "inspirational" advertising.

By means of carefully compiled statistics, Mr. Stoek demonstrates that in general the correspondence student makes a more energetic and successful miner than the miner who relies upon his unaided intelligence. The fact is accentuated that no man can learn by correspondence unless he is willing to make sacrifices of his spare time, and that this very willingness argues the presence of more than average backbone.

Many mining engineers, graduates of technical colleges, pay for a correspondence course for the sole purpose of securing a set of the International text-books. Others again, after leaving college, take the correspondence course as a supplementary training.

Reading Mr. Stoek's clear and forceful paper impresses one with two things. Firstly, the International Correspondence Schools have done a vast amount of good. They have opened the way to promotion for hundreds of men to whom the doors of our colleges are closed. They have imparted the right kind of instruction in the best available way to the men who most needed it. For these men, workmen, foremen, and bosses, our Canadian educational systems have made little or no provision. Only in Nova Scotia is a serious attempt being made to meet the requirements of these classes. Hence, both in Canada and the United States the correspondence system has performed a function of extreme importance.

But, excellent as is the system of the International in conception and in administration, efficient and complete as are its courses, it is obvious that its very existence is due to a vital defect in our present educational conditions. The absence of any provision in our schools and colleges for means to do the work that is done by the correspondence schools is anomalous and anachronous. We are not over-stating the claims of what, for lack of a better name, we designate the laboring classes, when we say that in all large communities they are and must be paramount. These claims our educationists have so far neglected to consider, and the correspondence schools have filled the gap.

The correspondence schools, of which the International is by far the largest and most important, have been created to supplement present educational systems. In this sense they are an artificial growth. To Canada their existence means a loss in money; but, also, a more than compensating gain in the increased efficiency of student-workmen.

It has often been pointed out that this money should be kept in Canada. This, however, is not the point. The benefits conferred by the International Correspondence Schools alone are worth more than can be expressed in terms of money.

The real question is this—must we not, as Canadians, see to it that to every man is given at all times the opportunity of securing exactly the kind of education he needs? It is not necessary to disparage the correspondence schools. It will, rather, be necessary to emulate them.

A ROYAL COMMISSION NEEDED.

The Toronto Branch of the Canadian Mining Institute has formally requested the Ontario Government to appoint a Royal Commission "for the purpose of revising, simplifying and amending the 'Mines Act' and the 'Act to Supplement the Revenues of the Crown.'"

The memorial suggests that at least one-half of the members of the Commission be chosen from the ranks of Ontario branches of the Canadian Mining Institute.

This course has been recommended after mature deliberation. It is confidently expected that every mining man in Ontario will support the movement.

It has been found impossible to obtain, through local meetings, any set of recommendations that would meet the whole situation. Special interests crop up, grievances are aired, and only one or two phases of the problem are discussed. So complicated are the questions of mining legislation and special taxation that the closest attention of a picked group of specialists for a considerable period will be required before comprehensive and constructive revision can be possible.

We endorse most heartily the request of the Toronto Branch.

It is unnecessary to dilate upon the large and urgent problems awaiting the attention of the Royal Commission. But we may reiterate our belief that the need of such a Commission is indisputable.

NOVA SCOTIA'S IRON ORES.

The annual report of the Department of the Interior includes the report of the Superintendent of Mines, the preliminary reports of Dr. J. E. Woodman, Mr. F. Hille, and Mr. Fritz Cirkel, on the iron ore deposits of Nova Scotia, Western Ontario and the Ottawa Valley, respectively.

Dr. Woodman advocates the payment of a cash bonus direct to the operators of small iron ore deposits. The necessity of this, as a stimulant to development, is particularly noticeable in Nova Scotia. The present system of bounties enriches the stockholders of iron and steel companies and has very little effect upon the operators of mines.

Referring to the Torbrook-Nictaux basin, Dr. Woodman characterizes this district as the most promising iron field in Nova Scotia. The country is open, a substantial water power at Nictaux Falls awaits utilization, transportation is easy, and within a few miles an abundance of hardwood timber is available.

The "basin" is described as either a large syncline or a succession of smaller folds, the axes of which run approximately north 55 degrees east to north 60 degrees east. The ore is interstratified, having replaced limestone beds. The basin's limits are vague, and have not yet been clearly defined. But many square miles have been explored already. The Annapolis Iron Company, controlled by the same interests that operate the Londonderry furnace, owns these ore deposits and ships ore to Londonderry. High grade hematites and siliceous magnetites are found in large quantities. All of the ore is phosphatic and most of it carries from two to eight per cent. of lime.

After touching upon the Clementsvale, North Mountain, Brookfield and Cobequid districts, Dr. Woodman

takes up the Arisaig deposits of Antigonish County. As now known the Arisaig ores run east and west for a distance of five and one-half miles.

The Arisaig bedded hematites occur in nearly vertical veins and, so far as known, as continuous for a great length on the strike. Vertical sections of the highest and lowest exposures give a depth of 350 feet. No drilling has been done to prove the deposits to greater depth. In the western part of the field the ore is less silicious and freer from trap intrusions. All of the ore, Dr. Woodman states, averages under fifty per cent. metallic iron in car load lots. Water power of not inconsiderable magnitude is available.

Dr. Woodman demonstrates the need of careful investigation of the whole Arisaig field.

To the reports of Messrs. Hille and Cirkel we shall refer later.

COBALT RESPONDS.

As has been expected, Cobalt has responded to the call upon her energies. November's output exceeded by more than one hundred per cent. that of any previous month. Shipments amounted to twenty-five hundred tons. Comparing this with previous figures, it becomes apparent that Cobalt is but beginning her career as a producer. But even these figures are not to be taken as indicating Cobalt's entire output. Several of the richer mines are holding several car loads each of high grade ore and concentrates. Altogether there are at least thirty cars of this high grade material being held in stock on account of difficulties with the smelters. Thus, although Cobalt is doing well, there is sound reason to believe that unexpectedly greater shipments will be begun and continued throughout the coming year.

Several special agents of English, German and French smelters have visited Canada recently. We believe that the principals whom these gentlemen represent are prepared to take advantage of the present friction between American buyers and Canadian shippers of ore. But (and this is most significant) the trend of inquiry is markedly for ores containing high percentages of cobalt. It will not, therefore, be surprising if a wider market develop within the very near future. As pointed out before, this will mean renewed activity in Portage Bay and like districts.

WISDOM.

The Rossland Miners' Union, fully appreciating the difficulties under which mine operators are now struggling, very wisely consented to a reduction in wages. The only possible alternative was a shut-down.

The Rossland mines were closed down for a day to give the miners of both shifts an opportunity of meeting inw discussing the proposed reduction of wages. The referendum vote favored the resolution by a two-thirds majority.

It is gratifying to observe the calm, judicial attitude of the workmen in this conjuncture. This is a practical manifestation of the spirit of mutual helpfulness.

OFFICIAL PUBLICATIONS ONCE AGAIN.

THE CANADIAN MINING JOURNAL recently drew attention to the fact that the usefulness of the Provincial mining reports was considerably lessened by delay in issuing them. This serious drawback from the standpoint of those in search of recent information as to mining development has been noted by others. Mr. Harrison Watson, Canadian representative of the City Trade branch of the High Commissioner's office, London, reports as follows to the Department of Trade and Commerce:—

“We continue to receive a considerable number of inquiries about Canadian mineral resources, and applications for copies of the reports on mining operations, which are annually issued by several of the Provinces. In this connection several persons have called attention to the apparent delay which occurs in the publication of these reports, whereby much of the news is to a certain extent out of date by the time the particular report is in the hands of the public. There are naturally difficulties in compiling reports of this description where the material comes from so many sources, but on the other hand it is possible that some improvement might be made in the direction indicated.”

Now that a widespread interest in Canadian mineral resources has been awakened in Britain, it is specially important that up-to-date official information should be accessible. So far as the reports of the Ontario Department of Mines are concerned, the difficulty might be overcome by making them considerably less voluminous. In addition to the report proper, dealing with the output and conditions of working mines, a number of special papers and exploration reports are included in the document. The latter, largely of a scientific character and of less timely interest, had far better be omitted and published subsequently in separate form, rather than be the cause of delaying for months the appearance of the practical data regarding actual mining operations which ought to be furnished as promptly as possible in order to be of value.

Editorial Note.

A report from Harrison Watson, of the Canadian High Commissioner's office, London, states that the chemist of one of the largest British manufacturers of grate polish and black-lead, who is proceeding to Corea to examine some plumbago deposits, was furnished with information at the High Commissioner's office concerning Canadian plumbago and his attention drawn to specimens shown at the Imperial Institute. He proposes to visit Canada before returning to England, being of

opinion that some the Canadian plumbago would answer the purposes of his company.

A TIMELY WARNING.

F. W. GRAY.

The following is quoted from an Associated Press Despatch of the 4th of December, descriptive of the conditions prevailing after the recent disastrous explosion of firedamp in the Namoi Mine, of the United Coal Company, near Fayette City, Pennsylvania. “The physicians present have been in almost constant requisition on behalf of the rescuers, who, despite the fact that they work in relays, only a fraction of an hour, are constantly being prostrated by the fumes of gas.”

If the information given by the American Associated Press is correct, it discloses a lamentable lack of knowledge in the Pennsylvania coalfield, of the modern breathing apparatus designed for just such cases as the Naomi Mine disaster. We believe it is a fact, that the only breathing apparatus of the modern type in the United States, was that exhibited in a recent exhibition of a Life Saving Society in New York. The United States Government recently detailed an expert to inspect the various Recue Stations on the continent of Europe with a view to having something similar in the coal regions of the States, but so far as we are aware no such provision has as yet been made. It is distressing to hear of men losing their lives, and of brave rescuers toiling in unavailing effort amidst deadly gases, when we know that devices are to be acquired, which would enable these heroic workers to render real assistance to their fellows at practically no risk to themselves. In the old days the death roll of an explosion was more often, than not, augmented by the death of would-be rescuers overcome by the post explosion gases, but to-day with perfected devices such as are used in every colliery district in Europe, there is no need for such a task on the physical powers of rescuers. In this respect the United States is behind even Russia and Spain, in both of which countries, properly equipped Rescue Stations operated by trained gangs of workmen, are made compulsory by the laws of the country. One of the apparatus we have referred to has up to date, the total of 50 lives to its credit, the lives of men who would otherwise have been poisoned by afterdamp. It is strange that the United States should lag behind second-rate European countries in this matter, that the country which boasts of the largest coal output in the World, should care so little about the lives of its miners. Such apathy cannot be from lack of knowledge. It is that the coal operators of America are afraid of humanitarianism or of expending money on apparatus, which do not directly help to pay dividends? There is another side to this matter, however, for the greatest usefulness of the breathing apparatus, we think will be found in that it enables men to extinguish mine fires in their first stages, and for this reason is a sound investment as fire insurance. Many a mine fire that has cost the operators thousands of dollars, could have been extinguished had properly trained men equipped with modern breathing apparatus been ready to respond to the alarm, as they are in Germany, France, Belgium, Austria, Russia, Spain and Britain. The whole subject of rescue work after mine fires and explosions is one that is deserving of the earnest attention of every coal operator. The Courrières disaster compelled public attention to this matter in Europe. If ever such an appalling disaster should visit the States, they will be found very unready in the work of rescue, if we have interpreted the despatch correctly that we first quoted.

THE ACTING DEPUTY-MINISTER OF MINES OF CANADA.

The official announcement that Mr. Reginald W. Brock, Professor of Geology in the School of Mining, Queen's University, Kingston, had been appointed Acting Deputy Minister of Mines and Director of the Geological Survey of Canada has met with the warm approval of all mining men.

Especially in the Provinces of British Columbia and Ontario, where Mr. Brock has done his principal work and where, consequently, he is best known, will the news be most welcome. As a trained mining geologist Mr. Brock has been most successful. In fact he ranks among the most brilliant and substantial of North American practical, economic geologists. Mr. Brock, whose father was a Methodist minister, entered the University of Toronto in 1890. During the summer of 1891, and for several succeeding seasons, he acted as field assistant in Geological Survey parties. In 1893 he left Toronto University and entered upon a course of study in the newly organized School of Mining in Kingston. Graduating in 1895 with high honors in science, he proceeded to Germany. Here for the summer of that year he studied at the University of Heidelberg. His instructors in geology and mineralogy were the famous professors Rosenbusch and Goldschmidt. The following autumn he returned to Kingston to assume the duties of Acting Professor of Mineralogy, Professor Nicol being absent on leave in Europe.

During his course in Toronto Mr. Brock had the advantage of some newspaper training. This experience, valuable to any young man, was of great benefit to Mr. Brock. The effect is easily perceptible in the more than ordinary ease and clearness of his reports.

From 1896 to 1900, inclusive, Mr. Brock was engaged as a permanent officer of the Geological Survey staff. Throughout this period his principal work consisted in developing the mining geology of British Columbia. His brilliant reports upon various mining districts at once won him recognition, and he was soon acknowledged to be one of the leading economic geologists of the day.

It is seldom indeed that recognition comes so unreservedly and so rapidly. But the practical value of Mr. Brock's carefully conducted field work appealed immediately to the mining men of the Dominion.

After spending another year in Heidelberg, Mr. Brock became Professor of Geology in the School of Mining at Queen's in 1902. Since that time Mr. Brock has spent his summers in the field work of the Geological Survey. Most of his work consisted in a detailed examination of the Rossland mining district. At the request of the mining companies themselves he reported upon Le Roi, War Eagle, Centre Star and other Rossland mines. It is this important work that has done more than anything else to establish Mr. Brock's reputation.

The most efficient Geological Survey in the world is that of the United States. The recently appointed Director, Dr. George Otis Smith, is a man of about the same age as Mr. Brock. But it may be doubted if his training and experience have been as complete as those of the new Canadian Director.

Geology as a branch of academic speculation is one thing. Mining geology is a quite different thing. Of the former Canada has had enough. Of the latter all mining men fully appreciate the necessity.

Excellent as the new Acting Deputy Minister and Director is equipped for office, he will not be able to work to best advantage unless he has the outspoken, constant and hearty co-operation of all those interested in the honest, rapid development of Canada's mineral wealth.

SCHOOL READERS.

Probably within a short time the Government of Ontario will revise its readers in use in the public schools, or possibly it may prepare a new set of readers altogether. In either event nothing could be more appropriate than that a goodly number of articles should be included in them descriptive of the mines and mineral industries of Canada, with accounts of their discoveries, growth and progress up to their present condition.

An account of the discovery of nickel at Sudbury and the development of the nickel industry up to its present enormous proportions would make a most interesting and instructive story, while the history of Silver Islet should be known to every child in the Province. Relations of incidents in the lives of prospectors who have travelled in canoes, and on foot with packs on their backs, through the northern forest would be far more entertaining to children than the trivial and mendacious stories of travel and adventure which are now current among the people, and especially among the children.

The value of a large part of Canada must ultimately depend not on its agriculture, fisheries or forest resources, but on its production of mineral wealth; so that mining is and must always be in increasing measure an industry of the first importance to us.

In no way can the people of the country be educated to appreciate the importance of the mining industry better than by informing them of it from their very earliest years through the medium of the school readers. The children might then grow up ambitious to emulate the exploits of some of our most successful prospectors, who have travelled through the wilderness with the constant aim of finding valuable deposits of ore, instead of having their thoughts foolishly centred on bears and wolves with the loveable attributes of the theatrical villain and the appearance of the woolly denizens of the toy shops.

Accurate information about our own mines and mining possibilities and about the hazards of the search for ore, so imparted to the children through the school readers, would form a basis for a sound knowledge of Canadian mining conditions, and of the vast importance of the mining industry to the general progress and welfare of the Dominion, and at the same time would fortify them against the blandishments of the men who endeavor to get their money on the fraudulent pretext that they are investing it for them in mining enterprises.

I trust that not only Ontario, but all the other Provinces in the Dominion, will see to it that the children are taught something about the mines and mining possibilities of Canada, and to that end will incorporate in their school readers, interesting and accurate accounts of their mines and mineral deposits.

J. B. TYRRELL,

9 Toronto street, Toronto, Ont.

UNDERGROUND HAULAGE.

Paper read before British Society of Mining Students.

(Continued from last issue.)

Advantages of its use.—The advantages of endless rope, where it can be adopted, are as follows:—

Instead of being worked intermittently, all sections of the mine are sending coal to the shaft at the same time, therefore a constant supply is always being received at the shaft by the onsets.

No mishap in one district will affect the others, as the clutch gear of the former can be thrown out of action and its rope stopped until the needful work of repair is completed.

No large shaft sidings or inbye landings are required.

Where the road is undulating, the tubs on the dipping gradients help the engine to pull up others on the ascending gradients.

A smaller engine will do the work. It is driven at a constant slow speed, and being fitted with a governor, the speed is kept constant, and it can be made very efficient and economical in the working.

Where few or no coals are coming out of one district, its rope can be thrown out of action, thus easing the work of the engine.

There is no large wear and tear of rolling stock, as accidents from derailed tubs are not so serious, and rarely happen except on heavy gradients.

All sections of the pit are continually supplied with tubs as required.

The engine can be erected on the surface, the band ropes being taken down the shaft and there connected to the main haulage wheels, which are driven by friction clutch gearing.

The engine being in daylight can be better examined and cleaned.

Where haulage roads have to be close-timbered it sometimes is advisable to put in endless rope, because there is less liability for slow-travelling tubs to be derailed, thereby knocking out the props and wrecking the place, than would be the case with the high-speed running of main and tail.

Position of Rope.—There are three particular ways for attaching the tubs to the haulage rope, viz., (1) over the tubs, (2) under the tubs, and (3) at one side of the tubs. One of the first two methods is generally adopted. The last is chiefly used for a certain method, to be referred to later on.

Over Tub Method of Attachment.—This method is applicable where the road is level or has only slight undulations, and is either straight or is curved along some sections. The carrying capacity of the tubs should not exceed 10 hundredweight, and are best not filled much above the level of their sides. The overhead system can in most cases be satisfactorily used, but not in cases where the tubs run on a narrow wheel gauge, or where the wheels are coupled close together, as under either of these conditions there is a great risk of the tubs leaving the rails. The tubs are mostly run singly or in pairs, or in threes; two clips are generally used in the last case, one at each end of the set. The sets or single tubs are kept at regular distances apart, being comparatively close if there are few or no branch roads throughout the course of the main haulage road, and from 10 to 20 yards apart where these branch roads occur frequently, as that interval allows the lads who are stationed at the branch roads ample time to switch the tubs required into their particular districts before

the next set reaches them. Light clips are best adapted for this method. Two forms of these, one known as *The Elswick Haulage Clip*, and the other locally known as *Jockeys*, are especially suitable for over attachment of the tubs.

Under the Tub Method of Attachment.—On haulage roads having steep inclinations, or even slight ones, if tubs are loaded with more than 10 hundredweight of coal, more especially where tubs are filled above the sides or where curves or undulations are of frequent occurrence, the under-rope method of haulage is the best to adopt. The underneath rope is better gripped, thus forming a more secure attachment for the tubs. During their transport they are not likely to tilt or leave the rails in passing along the curves. There is less liability for coals to be knocked off the tubs and strewn about the roadway.

Several forms of clip are suitable for this system, such as *Smallman's*, which is much used, also *Middleton's*, *Fisher's*, and those attached to bogeys run with the sets of tubs.

Clips.—One of the chief things to ensure a successful working of the endless rope haulage is the use of well-chosen forms of clip, as upon these as much as upon anything else must we depend upon getting the tubs carried securely along with a minimum of friction. Any particular form of those on the market will not suit every method of haulage. One may sometimes be best adapted for under-rope attachment, and another for overhead attachment, whilst different makes from either of them may act well on level roads and light gradients, and be an absolute failure on haulage roads having greater inclinations. Some are adapted for hauling one or two tubs at a time, whilst a different and much stronger form is necessary for sets of six, eight, or more tubs. Fortunately we have a varied selection of clips to choose from, and a careful consideration of the conditions of the work we have in view for them must determine the selection of that most suitable for a specific purpose. Where tubs are run separately, in twos, or in threes, a larger number of clips for the whole length of a long engine plane are required of the adapted form. Owing to the necessity for the frequent fixing and detachment of the clips they must be made light and handy, so as to facilitate these operations, and, where practicable, be adapted for use in conjunction with an automatic contrivance for their release from the tubs at curves, landings, and shaft sidings. Stronger clips are necessary for heavy work, or where sets are composed of large numbers of tubs. In such cases the total number of clips required is less for a given output than in the cases of shorter sets or single tubs. Those for attachment to the overhead rope are generally automatically released, but rarely is any device available for automatic release with the under-rope methods of attachment. Whilst where the sets are composed of six, eight, or more tubs, a very strong clip having a vice-like grip, worked with a hand-wheel, is preferable; those of lighter form are tightened by means of a hand lever. Clips may be said to consist of four varieties, viz., forks, lever clips, screw clips and bogey clips. Each variety again is subject to alteration in its construction so as to make it suitable for special work.

Forks.—These in the North of England are known by the names of jockeys, and are used only for over-rope haulage (See Fig. 8). One of the simplest and most effective is that shown in the sketch. The stalk fits into a socket formed by two holes a few inches apart, vertically made in the iron hoops at the middle of the two ends of the tub. The projecting plate at its upper extremity has a narrow notch formed in it; in this notch the haulage rope rests, its weight pressing downward sufficiently to grip and carry forward the tub when the rope is in motion. In the case of a heavily loaded tub the pockey is slightly twisted in the socket so as to give the rope a firmer grip. These forks are not trustworthy on roads with steep gradients.

Automatic Release of Jockey.—This is effected by the raising of the rope to such a height as will ensure its leaving the jockey. Ordinarily the overhead rope is prevented from touching the floor of the engine plane by the spacing of the tubs, which are never so far apart as to allow of the rope resting in the jockeys swagging much between. Fig. 9 shows a device which causes the rope to leave the tubs at desired positions. C and D are two vertical supports placed 6 feet apart, the upper portions of which are securely bolted to the roof timbers A and B. The support C is divided at the lower extremity sufficiently to take the small pulley F, and its length is such as to just allow of the rope, in contact with the lowest part of its circumference, resting in the

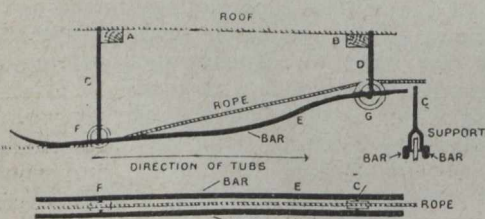


Fig. 9.

AUTOMATIC KNOCK-OFF FOR JOCKEY.
ENDLESS OVERHEAD ROPE

jockey. The support D is divided at its lower extremity sufficiently to take the small pulley G, and is much shorter than the support C, and the rope rests upon the highest part of its circumference. The supports C and D are connected at their lower extremities by a pair of bars E, H, which bars are spaced two inches apart and bent, as shown in the sketch. The tubs, travelling in the direction of the arrow, on reaching the pulley F continue their further course owing to a descending gradient given to the road, assisted by the impetus of their travel, and the rope, owing to its ascent over the pulley G, is constrained to leave the jockey in which it previously rested.

The Elswick Clip (Finney's Patent), shown in Fig. 10.—This is another clip most suitable for over-rope haulage, especially on heavy and undulating roads. It is stronger than the jockey and has a much tighter grip of the rope, a hand-lever on the top acting on a screw-plane to securely fix its jaws round the rope. The stem or stalk of the clip fits a socket formed of two loops or holes similar to that of the jockey; a lug or gib is cast on the stem projecting from one side. As it is inserted in the socket it is given a quarter of a turn round, and in this position the lug catches under the top hoop and cannot return therefrom until it is turned back again. A knock-off bar, fixed at any required point in the road, comes in contact with the lever at its upper extremity,

which is thereby depressed from its vertical position, causing the jaws to open and the rope to be released. These clips are also made with a hook on the top of the stem instead of the gib for fixing over the end of the tub, the lower part sliding into the yoke-hole. As thus

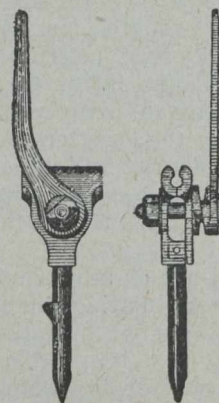


Fig. 10.

THE ELSWICK CLIP.

made the clip is very convenient in use upon level roads, but for all roads with gradients the form having the gib on it is best.

Smallman's Clip.—This clip is often used for under-rope haulage, especially on steep and variable roads. It consists of two plates, loosely connected by a centre bolt. Two jaws at its lower extremity are worked by a hand lever placed at one end to securely grip or release the rope as required, the centre bolt being adjustable to regulate the amount of slackening and closing at the jaws. Either a hook or a link, according to requirement,

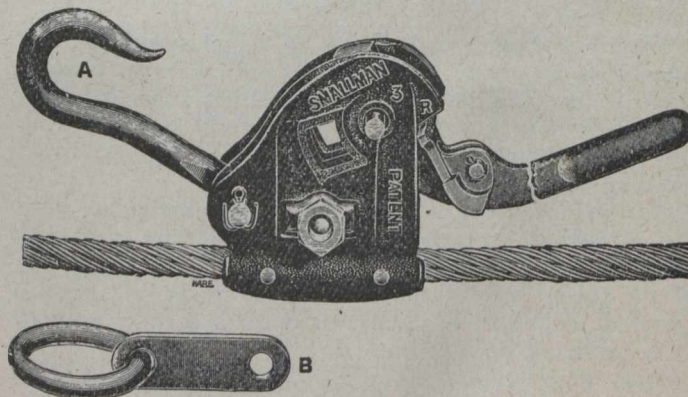


Fig. 11.

SMALLMAN'S CLIP.



Fig. 12.

AUTOMATIC DETACHMENT FOR SMALLMAN'S CLIP.
UNDER-ROPE.

is attached to the end of the clip, opposite the lever, for attachment to the tub. This clip can be automatically released from the rope where required. For this purpose a detacher is bolted to a sleeper between the rails. The upper surface of the detacher is curved and fixed at

such a height above the floor as causes the lever of the advancing clip to come into contact and slide over it. The lever is bent, and in continuing its course over the detacher, it is uplifted sufficiently to open the jaws, bringing about the release of the rope, the tub then under the influence of gravity, continues in motion, with the clip attached, to a point upon reaching which it is taken off the tub. Fig. 11 shows this clip, and Fig. 12 the detacher.

Bogey Clips.—These clips are admirably adapted for use on steep haulage roads, or on those where a large number of tubs are run together in sets. The clip

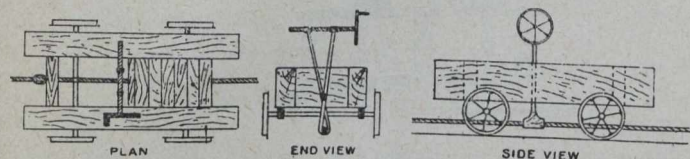


Fig. 13.
BOGEY CLIP.

proper consists of a pair of wrought-iron bars, working scissor-like on a pivot, the lower ends or jaws of which grip the rope when tightened by a right and left hand screw, worked by a small vertically-placed wheel. This clip is fitted to a heavy bogey wherein a lad sits during the runs. (See Fig. 13.)

The tubs run in sets of 20 and upwards, larger numbers than 20 at a time requiring a bogey at each end. On approaching branch roads, the rope is released by the run-rider until the switches are turned to direct the set aright, the journey then being resumed, and the sets run in or out, to or from, their respective districts, the rope being gripped again when the set has gravitated round or past the curve. These bogey clips are very strong and rarely get out of order.

Screw Clips.—These are fastened on to the ends of the tubs. They consist of two vertical bars of wrought-iron, fitted with collars near their extremities. A small horizontal projecting bar, bent downwards at the end, is welded on the top of collar. The bent portion can be placed in the yoke-hole of the tub; a bolt and shackle are attached to the lower collar, and form a means of connection, to the tub chains. The longer bar is formed with a foot shaped to receive the rope, which is gripped between the two bars when the shorter, by means of a hand screw at the top, is tightened upon it. The rope

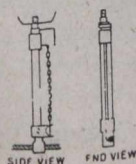


Fig. 14.
SCREW CLIP.

is thus securely seized in the grooved jaws. When this clip is used, sets of three or of six tubs are generally coupled together. Fig. 14 is an illustration of the screw clip.

Curves for Endless Rope.—Curves are rather difficult to lay out for this method of haulage, and require constant attendance, especially for an overhead rope. The sets of tubs run on the inside track of rails along the curve, the other sets of tubs moving in the contrary

direction on the outer track of rails are automatically released on reaching the curve, and continue their course to the end of the curve under the influence of gravity, the floor being suitably inclined to ensure this. Upon reaching the end of the curve the sets of tubs are again clipped to the rope. Fig. 15 shows this arrangement.

The curve proper for over-rope is made by building a brick wall along one side from the floor to a height, equal to that of the tubs throughout the extent of the curve. On the top of this wall rollers from 6 to 9 inches wide fixed in iron frames are placed 3 feet apart; they revolve horizontally and project beyond the brickwork to the centre of the rail track. The clips and the rope being above the tubs glide along these rollers all the way round the curve. The top flange of these rollers is of larger diameter than that of the bottom one, so as to prevent the rope from riding over and causing damage. Rollers with arms 6 inches long, one at each end of the curve, also prevent the rope from getting too high and out of its proper course. The other rope having no clips or forks attached to it is directed round the curve by means of large pulleys suspended from the roof.

For under-rope the best method for guiding the tubs round the curve is to construct it in a similar way to that for the main and tail rope with timber, but of

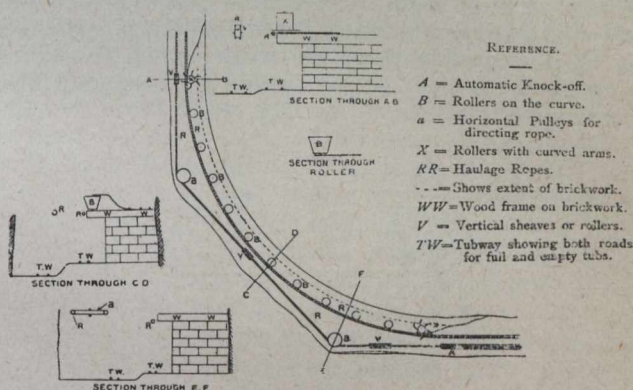


Fig. 15.
CURVE FOR OVER-ROPE.
ENDLESS ROPE HAULAGE

course having the two sets of rails, the outer rails being laid with a falling gradient as described above, with 9 inch sheaves laid horizontally for the rope.

In both cases the descent of the road should commence 8 or 10 yards back before coming to the beginning of the curve. Small vertical rollers instead of drums, but fixed similarly guide the rope and clips round. The tubs travelling on the outside rails are released from the rope, gravitate round the curve, and are again clipped at the other end. It is necessary to have a boy at each curve to attend to the tubs and rope.

Bearing-down Appliances or Rope Guards.—These are necessary in undulating roads, having alternating dip and rise gradients. In endless over-rope haulage means must be adapted to prevent the rope at points of change in the gradient of the road from springing upward to the roof, thereby disconnecting itself from the tubs either by pulling out the forks or clips or by leaving them, and from scrubbing against the roof or timbers, which might otherwise happen owing to the stress upon it; more especially when hauling up pronounced changes of gradient.

This is effected by suspending a large beam or a revolving drum from the roof at the points of change either of which prevents the rope from unduly rising.

The beam is about 6 feet in length, 12 inches in width, and 3 inches in thickness. One end of the beam is hinged to a girder close to the roof, the other end having a 3 inch diameter roller fixed on its under side is suspended by means of a chain from a balk of timber next the roof, and is weighted sufficiently to overcome the stress of the rope and cause the roller to press on it at one end and the hinge at the other allows the beam to adapt itself to slight oscillations of the rope. (See Fig. 16.)

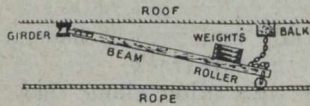


Fig. 16.

BEARING-DOWN BEAM.

At the bottom of drifts, a few yards inside of the point where the full tubs are clipped, a drum 2 feet in width, 18 inches in diameter, having six small parallel rollers within it arranged with a point in their circumference flush with that of the drum, revolves vertically just above the tops of the tubs. This keeps the rope down and also allows the tubs to be attached thereto. Sometimes two drums are used, there being a few yards distance between them. On engine planes which have small undulations the use of bearing down appliances may be dispensed with if the road can be levelled by taking up the bottom, or by ripping the roof and filling up hollows in the floor. (See Fig. 17.)

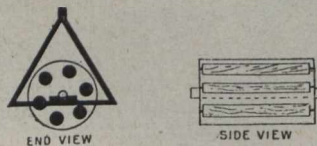


Fig. 17.

BEARING-DOWN DRUM.

Only jockey clips or forks are trustworthy in use with bearing beams; these clips slide along the underside of the beams and lift them without themselves being disconnected from the tubs.

Methods of Tightening Rope.—In the endless rope system, the single rope used is, as the name implies, endless, passing round pulleys at the extremities of the engine plane without being fixed thereto. Now all ropes are more or less elastic and will stretch more or less according to the stress put upon them by the engine or load; and when the rope stretches, unless means are

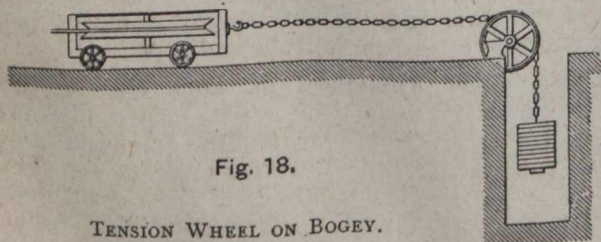


Fig. 18.

TENSION WHEEL ON BOGEY.

taken to prevent it, the driving wheel loses its grip upon the rope coiled round it, and revolves without giving motion to the rope. Consequently, tension bogeys, or wheels or weights, are used for taking up the slack from wear, and so keeping the rope tight. The best tightening appliances act automatically.

Tension Bogeys.—These are generally, but not necessarily, put at the inbye end of the haulage road, where they not only serve the useful purpose of maintaining tightness of rope but at the same time also act as return wheels. A tension bogey is made by fixing a pulley wheel in size from 4 to 6 or more feet in diameter, so as to revolve horizontally on a travelling carriage which may be gauged to run on the tub track. It may be placed either overhead for over-rope, or underneath the floor of the road for under-rope, in which latter case it is, of course, securely boarded over. This carriage usually runs on ordinary tub wheels, but in some cases

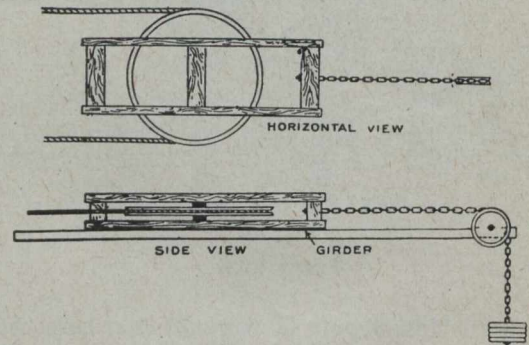


Fig. 19.

TENSION WHEEL ON GIRDERS.

slides on a pair of girders of sufficient length to allow the bogey to travel 5 or 6 yards, the haulage rope being coiled 1 1-2 or more times round the bogey pulley. Attached to the inner end of the travelling carriage is a rope or chain which, after being led over a small pulley, is heavily weighted. The weights are sufficient to keep the bogey tight at all times causing it to move forward so as to take up any slackness of rope. (See Fig. 18 and 19.)

Screw Wheel.—Sometimes tightness of rope is maintained by means of a tension-screw, one end of which, after passing through a thread in a frame A, is attached to the pulley-carriage B as shown in Fig 20. When the hand-screw C. is turned, the tension-screw is drawn through the frame, and the carriage B may thus be moved forward for a limited distance, determined by the length of the tension-screw. This is not a good tightening plan as it does not act automatically, and therefore must be constantly watched and regulated by

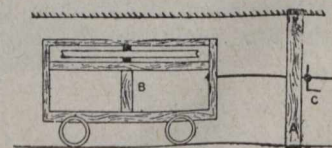


Fig. 20.

SCREW TENSION BOGEY.

an attendant at intervals of time demanded by variations of the rope. Moreover, it cannot be used for a greatly increased length of rope without the appliance being taken down and re-fixed in another position.

Pulleys.—Where the stress upon the rope is not very great, a simple method of maintaining its tightness is by means of a tension pulley arranged as shown in Fig. 21. The rope A is led over the two fixed pulleys B and C, which are each 15 inches in diameter, and under the sliding pulley D placed between the two fixed pulleys. The sliding pulley is free to slide upward and downward in a frame, and has weights E suspended from it

which, under normal conditions, keep this pulley below the level of the fixed pulleys. The exact difference of level is a means of measuring the amount of rope-stretching. It is obvious that when the rope has stretched

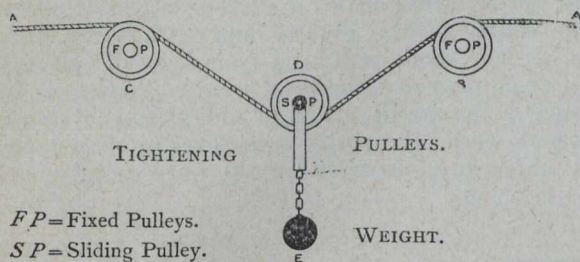


Fig. 21.

TENSION PULLEYS.

sufficiently for the weights to reach the floor this method of tightening becomes inoperative unless provision for their further descent is made by excavation.

ENDLESS ROPE HAULAGE FOR SINGLE ROAD.

In a mine having a bad roof, great difficulty is experienced in carrying wide roadways. It is impossible to introduce an endless rope system of haulage for a double line of rails. In this case a short double siding may be made at both ends of the haulage road, the two being connected by a single line of rails. The tubs can be run in sets of six or more, depending upon the quantity of coal to be despatched from the district and the distance and gradients of the road. The sets are run in a manner similar to that of the main and tail system, but with a continuous rope, and an inward and outward simultaneous travel is impossible. The ropes are carried on rollers underneath the tubs. The two ropes can be made to travel between the rails forming the track with separate rollers for each, the tubs being attached by means of clips, bogey clips being preferable. But in this method separate bogey clips must be used for incoming and for outgoing sets, one being adapted for use at each side of the road, the inward and outward moving portions of the running rope being about a foot apart and equi-distant from the centre of the roadway. A clip set on a bogey therefore to grip the rope travelling in a particular direction is not applicable for gripping the same rope moving in the opposite direction.

Sometimes in endless single road haulage the rope for the full sets of tubs is carried on rollers in the middle of the tub track and the tubs are attached to it by means of a lever or screw clip, the return side of the rope is carried by the side of the roadway on sheaves and the empty sets of tubs are attached to it by means of a side fork. But in this arrangement there is always danger of the empty tubs being thrown over and derailed.

POSITION OF HAULAGE ENGINE.

Endless Rope.—In endless rope the engine is sometimes erected on the surface and sometimes in the mine, the adoption of the site depending upon local circumstances. Where steam is the motive power and shafts are not above 100 fathoms deeps, then the best position for the engine is on the surface, with the rope securely boxed in where carried down the shaft. A good compound condensing engine on the surface, fitted with a governor, strong enough to do the work required of it, cannot be rivalled by any expensive electric motor, except where all the engines minus the winding one is

driven from a generating station. The weight of the ropes in the shaft 100 fathoms and under is not calculated to exert too heavy a strain on the engine, and where the driving pulleys for the main roads—all connected on one shafting and driven by the shaft rope—are fixed in a suitable position and out of danger, this arrangement cannot be improved upon.

Where it is a deep shaft, then the engine should be placed in the mine close to the shaft, and driven by electricity. The connecting cables between the surface dynamo and underground motor being securely armoured and fixed to the shaft sides.

By this method no heavy ropes are in the shaft, the engine is placed most suitably for its work, and no inconveniently-placed driving pulleys are in the onsetter's way.

Friction clutches of any good make are necessary for disconnecting the driving pulleys when required, whether they be placed at the shaft and worked by the shaft ropes, or are fixed on the main shaft of the underground engine.

Main and Tail Engines.—For main and tail it is always best to have the engine in the mine close to the shaft, and driven either by steam or electricity, the latter being preferred.

An objection to placing the engine on the surface is that the rope must of necessity be boxed-in in the shaft, consequently, with a high speed haulage, the confined ropes play havoc with the boxes, and in a very short time the continual hammering of the ropes either dislodge or break them, so that they will unless carefully watched for early signs of deterioration fall down the shaft, causing damage to or stoppage of the pit. Even if no injury were thus caused the rope works noisily in the boxes, and in the very place where quietness is most desired—at the shaft bottom. For signalling purposes, too, it is better to have the engine in the mine than on the surface, and placed close to its work.

For depths of 60 fathoms or less steam can be taken down the shaft to the engine without much trouble and without much loss of pressure, provided the pipes are well covered with some good non-conducting material, the only difficulty being that of dealing with the exhaust steam, which is usually conveyed by means of pipes into the upcast shaft. This difficulty is the greater if the upcast shaft is at a considerable distance from the engine. Electricity is the best motive power for an underground engine for main and tail haulage where the shafts are deep, there being no trouble in having the engine and motor in the mine, with heavily-armoured cables in the shaft.

ELECTRICITY FOR HAULAGE.

Electricity has been successfully applied for haulage, especially in the endless rope system. Both continuous and three-phase currents can be used. The former is the better and easier to deal with, especially if the engines are well designed and large enough for their work; there is certainly a liability of its commutator sparking and becoming dangerous, but underground haulage engines are rarely if ever placed in gaseous situations. If it should be so then three-phase motors are the better to adapt as they do not spark, but these are more complicated, and their factor of efficiency is not so high as with the continuous current. But whichever electric system is adapted a much larger margin of power must be provided for than if steam were used, owing to extra strains being put upon the motor when accidents happen to the sets of tubs.

CONCLUSION.

After thoroughly considering the two systems of haulage and all that may be said for and against them, the writer who has had a great deal of practical and varied experience with both systems and modifications of them, and frankly admitting a preference for main and tail owing to its simplicity and economy has come to the following conclusions as to the circumstances under which he would put in either one or the other.

Where only one or two main haulage roads are to be set away from the shaft in different directions to be driven for some distance, say a quarter of a mile or

more inbye before opening out into branch roads, and have still to be extended to considerable distances further in to win large areas of coal, he would in all circumstances put in main and tail.

But where a coal drawing shaft is situated somewhere in the centre of the royalty and with three, four, or more haulage roads radiating from it in different directions, then provided the roof would allow of a double line of way, he would put in an endless rope system, with over-rope where the roads were level or nearly so, and with under-rope where the roads were greatly inclined or undulating.

SMELTER SMOKE, WITH A DISCUSSION OF METHODS FOR LESSENING ITS INJURIOUS EFFECTS.

(Written for the "Mining and Scientific Press" by
L. S. AUSTIN.)

Anyone accustomed to smelting conditions as they formerly existed in the Western States, is astonished to learn that at the Freiberg smelting works in Germany, which treated but 70 tons of ore daily, complaint was made of the detrimental effect of smelter smoke, and the Government required sulphuric acid works to be erected at the expense of the smelter in order to get rid of the sulphur fumes. In the early experience of silver-lead smelting in the West, oxidized ores only were treated, and later when some roasted ore was added to the charge, the amount of sulphur was relatively small. The matte that was formed was heap-roasted and the smoke from the matte piles, practically containing sulphur dioxide only, caused little complaint. Sometimes the smoke would have a blighting effect when the wind was right for it, and the atmosphere was smoky to the leeward of the piles. Later, as the sulphide ores increased in quantity, they were roasted in hand or machine-rabbed reverberatories, and the fume was discharged from a stack, and thus became so diluted that it was not detrimental to vegetation. With the construction of large works treating thousands of tons of ore, the problem has greatly changed. The commonest ore of copper is chalcopyrite, which for proper self-roasting should contain (as much of it does) 25 to 35 per cent. sulphur. This is not the only drawback. At certain works not only is there sulphur dioxide, but arsenic, to contend with. While the latter cannot be called detrimental to vegetation, still it is poisonous if it falls in sufficient quantity upon vegetation which is to be used for forage. Again, the solid particles, or so-called flue-dust, falling upon the leaves of plants, may seriously injure them. The production of these substances is as follows:—

In both lead and copper blast furnaces the blast, coming up through the charge, makes a good deal of dust, and this in part settles in the flue that leads from the furnace to the stack. The velocity of the escaping gases is, however, too great to permit the settling of the finest particles. In the case of lead furnaces some lead is volatilized and upon cooling, a portion of it condenses upon the surfaces of the flue. The amount of SO_2 produced in lead smelting is not more than 0.2 to 0.5 per cent. The fumes from a copper blast furnace are different in constitution. They contain whatever arsenic has existed in the ore, and sulphur dioxide varying from 0.9 to 2.5 per

cent. (At the Washoe plant, Anaconda, it amounts to 1.5 per cent.)

The fumes from roasters are largely SO_2 (up to 2.5 per cent.) produced by the burning of the ore, together with some dust caused (in the case of the McDougall roasters) by the fall of the ore from hearth to hearth, to the agitation due to the rabbles, and to the draft through the furnace. This dust settles in the flue leading to the stack.

In the case of reverberatory furnaces the charge is dropped upon the hearth in a body, so that comparatively little flue-dust is made. Some SO_2 develops as the result of certain reactions, indicated by the frothing or bubbling of the charge as it is melted. At the Washoe plant the percentage formed was 2.08 during the first ten minutes after charging. It drops to 1 per cent. during the succeeding 80 minutes of melting. Ebaugh gives the SO_2 as being but 0.01 per cent., but this must be after the early reactions, and from furnaces where the charges are much more slowly treated.

The smoke, upon leaving the stack, is more or less dissipated according to the velocity of the wind. In still weather it rises rapidly and seems to be carried away at a great elevation. With a moderate breeze it rises slantingly, but fills the air to leeward, while in a high wind part of the smoke will come to the ground at the base of the stack. And thus by this threefold action of the aerial forces, the upward-driving gases in calm, the buoyant but drifting smoke clouds in a moderate breeze, or finally the tumultuous energy of the gale tearing them apart, so that in any case they are dissipated and diffused through a mass of cubic miles of air, all contribute to act intermittently only upon a given area of the soil, so that relief comes to the harrassed vegetation, that it may make fresh effort to resist the next oncoming attack. It can be estimated that at one mile away, allowing 1.5 per cent. as being present in the escaping gases, the dilution (and not counting diffusion) will be such as to give 20 parts of the gas in a billion air.

Prof. Ebaugh has published an article in the Journal of the American Chemical Society, July, 1907, entitled "Gases Against Solids, an Investigation of the Injurious Ingredients in Smelter Smoke," and thinks that "too much emphasis has been laid upon the injurious effect of SO_2 , and too little upon the harmful action of the solid

constituents (flue-dust)." He finds the blighting action is greatest in wet weather, least in dry. The losses of crops are not total but partial, and vary from year to year.

Analyses made for SO_2 in the air at distances varying from one to seven miles from the smelting works showed no gas in 60 per cent. of some 500 cases examined:—

60 per cent. contained no gas
 12 per cent. contained 1 part of SO_2 in a million
 20 per cent. contained 2 to 3 parts of SO_2 in a million
 6 per cent. contained 4 to 6 parts of SO_2 in a million
 leaving 2 per cent. of cases in which were found 7 to 10 parts of the gas in one million parts of air.

Upon passing air containing 1.5 per cent. of SO_2 over water to the point of saturation, the water at 90 degrees F. took up 0.33 volume of the gas per volume of water, and proportionately less as the air was weaker in gas. There is therefore but little chance of the gas when dissolved in water acting injuriously.

Hazelhoff and Lindau, German authorities, give the following conclusions regarding the action of SO_2 and SO_3 on plants:—

(1) No injury results to the soil nor to the roots of plants.

(2) The gases act by contact on the leaves of plants, and analysis shows that the sulphuric acid content is greater than in smoke-free plants.

(3) The sensitiveness of plants to such action varies with the species and with individuals which may show special immunity (white pines are susceptible, while post and white oaks and red maples are very resistant. Between these come black, red and black-jack oaks and yellow and scrub pines.—Haywood).

(4) Sulphur dioxide, even a few parts in a million, will with long continued action, produce an injurious effect on vegetation. Commonly such action is intermittent and so, less harmful.

(5) The gas acts by wilting the leaves, spots appearing and the leaves eventually turning brown or black and dying off. The SO_2 is probably converted to H_2SO_4 by the oxidizing effect of the leaves having thus a corrosive action upon them.

(6) The action of the gas is more injurious by day than by night.

(7) The action of the gas is cumulative, hence annual plants should be less injured.

In regard to the flue-dust itself, a sample of such dust, taken from the top of a stack, contained as follows:—Moisture, 4.1 per cent.; SO_2 soluble in water, 17.7; total SO_3 , 33.9; Fe soluble in water, 3.6; total Fe, 16.7; Cu soluble in water, 1.6; total Cu, 4.2; SiO_2 , 28.5; PbO , 8; AsO , 13; ZnO , 15 per cent. This analysis indicates the presence of soluble and insoluble sulphates. Such flue-dust is hygroscopic, taking up water in a saturated atmosphere as follows:—Original H_2O , 4.23 per cent.; after 12 hours, 10.21; after 24 hours, 12.05; after 48 hours, 13.09 per cent. The corrosive power was roughly proportionate to the hygroscopic power. Dust, mixed with water, and sprayed upon sugar beets and alfalfa, showed severe corrosion. If, however, the dust was mixed with soil to the extent of 10 per cent. or less of dust, the corrosive action was small; with 20 per cent. dust in the soil the action was severe.

Thus the finely divided dust or fume from either copper or lead smelting works is extremely corrosive in its effects upon vegetation. Prof. Ebaugh finally concludes: "By no means is sulphur dioxide to be consider-

ed harmless, especially in an enclosed place and a moist climate, but we are forced, by the weight of evidence, to the conclusion that heretofore undue influence has been laid upon the injurious effects of sulphur dioxide on growing plants, and that the solid emanations from the smelters, the so-called flue-dust, has been seriously under-estimated."

Haywood in an article entitled¹ "Injury to Vegetation and Animal Life by Smelter Fumes," says, in reference to the presence of arsenic at the Washoe plant, Anaconda: "Ores there treated contain in three instances As 0.51 per cent; As 1.17 per cent.; and As 2.54 per cent."

He found upon the leaves of plants which were to be used for forage:—

Bunch grass, 2 miles north of smelter, 78 parts As in a million.

Red top, 4 miles northeast of smelter, 21 parts As in a million.

Bunch grass, 3 miles east of smelter, 32 parts As in a million.

Bunch grass, 6 miles west of smelter, 42 parts As in a million.

Alfalfa, 10 miles northeast of smelter, 52 parts As in a million.

This corresponds, on a ration of 20 pounds daily, to from 3 to 11 grains of arsenic. However, it does not follow that this amount of flue-dust remains upon the grass, since because it is soluble to the extent of 90 per cent. and upward, rains may remove it, and particularly in harvesting, because of the frequent handling in curing, hauling, and stacking, the larger part of the dust would be shaken off the hay before it was fed to the cattle.² We may conclude, therefore, that in those localities where smelters do injury, farmers should adopt the soiling or stall-feeding system.

The smelting companies have been compelled by the troubles they have had with farmers, to cast about for methods of avoiding these difficulties, and have worked out the problem in different ways. As I have elsewhere stated, the farmers may be divided into three classes:—

First, those who do not feel they are damaged.

Second, those who honestly believe they are.

Finally, those who, while they do not believe it, make claims for the money there is in so doing. In Germany, for example, damages have been collected by cultivators, who have set out their grounds with expensive ornamental flowers unsuited to the climate, and which have no chance of prospering, in order to profit by damages for destruction by smoke.

The remedies that have been proposed may be thus enumerated:—

(1) Manufacturing the SO_2 into sulphuric acid to be sold as an article of commerce.

(2) Operating the smelting works in a barren country where the fumes will do minimum damage.

(3) Roasting the ore where the country is barren, thus removing most of the sulphur (to 10 per cent. or less) from the ore, then treating the roasted ore at a works convenient to labor and supplies.

(4) Roasting the ore at a works convenient to labor and supplies, discharging the resultant SO_2 by a high stack, then smelting the roasted ore, but filtering the fumes from this last operation by means of a bag-house.

(5) Filtering all fume resulting both from roasting and smelting.

(6) Introducing plants and animals best suited to withstanding the fume; adopting stall-feeding in place of grazing.

(1) This method may do well where there is a sufficient market for the sulphuric acid produced by the works. However, a large part of, say, 1,000 tons of ore daily would produce acid in excess of any probable demand. Besides this, only such SO_2 as was produced in roasting could be utilized, while the fume and flue-dust from the smelting would still do injury and would have to be filtered out.

(2) This was adopted at the Garfield plant of the American Smelter Securities Company, at Garfield, Utah, 18 miles from Salt Lake City. The land, especially in the path of the prevailing winds, was brought up by the company, which then proceeded to the erection of an expensive plant for the treatment of copper ore. The fume was removed by a stack the top of which is at a level some 600 feet above the works. The fume is thus diluted before it can touch land beyond the acquired portion. In a way, the experiment has proved to be an expensive one, since the company has been obliged to build a town for housing the employees; and at this distance from Salt Lake City, it is hard to get good labor, as well as hard to keep it. It is true that the company obtains a profit from its investment in the houses and in its town, but this is not the line of business into which it had intended to go.

(3) This method has been proposed where there are existing works that, because of the large amount of sulphur fume produced, have been serious offenders. If the ore can be roasted near the mine, for example, where the land is not used in agriculture, the damage becomes comparatively trifling, and the work of roasting requires but little labor. The operations of smelting and of converting the product can then be conducted where supplies and skilled labor are available.

(4) Prof. Ebaugh's experiments go to show that SO_2 gas alone may not cause radical injuries to plants and certainly not to animals, provided it is free from flue-dust. Indeed, according to Merrill's experiments³ in the smelter zone, with stock properly fed and cared for, the animals flourish quite as well as elsewhere. If then the SO_2 gas from the roasters is allowed to escape freely into the air, it means that the main bulk of gases is thus disposed of. An ore containing 30 per cent. sulphur can thus be reduced to 7 per cent. If we smelt and convert this roasted ore, we may easily filter the small volume now remaining to be handled as referred to in method No. 3.

(5) At the American Zinc Works, near Canyon City, Colorado, the company has for years filtered all the gases from their roasters and blast furnaces, the latter being purposely run to make all the zinc and lead fume possible. These gases are first cooled to the proper temperature, both by passing through sheet metal flues and by the admixture of fresh air, then having been filtered at the bag-house, there is no smoke visible. This is also true of the bag-house installed in connection with lead-smelting plants. Where works thus provided deliver visible smoke, it is that coming from the roaster stack. Even this can be filtered, but it is a more difficult problem, the bag-house needing to be fitted with the more expensive woollen bags, which stand the attack of the corrosive sulphates and sulphuric acid, and small as is the quantity of them produced, cotton bags would be readily corroded. Still, even in large works, all the fumes can be filtered. By so doing, not only the flue-dust but the arsenic can be got rid of. The flue-dust collected in the "pits" at the bottom of the house contain a large percentage of arsenic, and such flue-dust is to be sent away where it may be safely treated, or the whole product

buried, thrown into an abandoned shaft, or otherwise got rid of.

(6) It has already been shown that there is a great difference in the resistant power of plants to the fumes, and this power varies both with the species and with individuals. Especially where the land is owned or can be controlled by the offending smelting company, it should be good policy to plant those species of trees most resistant to the smoke. Forage plants should be selected in the same way and cattle should be stall-fed, rather than be permitted to pasture upon them. Root crops, as sugar beets, should be raised, since while the leaves of these plants may be damaged, it will not be to the extent of preventing a profitable growth of the plant. As far as the forage plants are concerned, the damage to the leaves varies, and is often so slight as to make little difference in the value of the plant for fodder.

In conclusion, we may consider the findings of the Master in Chancery, Oliver Crane, to whom was referred the matter of damages due to smelter smoke from the Washoe plant. He finds that the farmers had been somewhat damaged by the arsenic, but not by the SO_2 contained in the smoke. He says that an injunction and the closing of the smelters would damage the farmers and the community more than a continuance of the nuisance complained of; that the company had been doing what it could to avoid damages, and that the smelter is built on a site where it will do less damage than any other available place, and that the company has always been willing to pay some damages.

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^{2,3} "Feeding Experiments with Forage Grown in the Smelter Zone." *Western Chemist and Metallurgist*, April, 1907.

TECHNICAL EDUCATION AND THE FEDERAL GOVERNMENT.

At the annual dinner of the Engineering Society of Queen's University, Dr. W. L. Goodwin, in the course of a vigorous speech, suggested some ways in which Federal assistance could be extended to the cause of technical education. Dr. Goodwin took care to point out that, if control of the educative system is left with the Provincial authorities, there is nothing in the British North America Act to prevent such assistance being granted. Further, the speaker demonstrated that already the need and the principle have been recognized in the establishment of Federal agricultural, forestry, marine, biological and other similar stations. These may be fairly described as institutions for the advancement of science and scientific education.

The following excerpt from Dr. Goodwin's speech bears upon the above points and contains a series of very important and useful proposals:—

"It is natural that our particular interest should be in the advancement of scientific education. In this, Canada has made and is making great strides; but I doubt if she is keeping pace in this respect with industrial expansion, growth of population, and applications of science to industries. There is no general system of technical education of the secondary grade, there are very few attempts at trades schools, and even the higher scientific education is left to a few universities, most, if not all, of which are undermanned and insufficiently equipped. Some of the Provinces are doing their best to

meet the situation; but under our constitution Provincial revenues are not very elastic, while the Dominion revenues grow with the increase in the wealth and population of the country.

"It would seem then that this is an occasion for some Canadian Colbert—some far-seeing statesman—who will inaugurate a complete system of Dominion aid to scientific and technical education. There is nothing in the British North America Act to the contrary, provided control of the educative systems is left in the hands of the Provinces. Control is one thing—aid is another. That the principle has been already recognized is shown in the existence of the various Dominion agricultural, forestry, and other stations, which are really a means of scientific education, and are recognized as such, particularly in the case of the marine biographical stations. I venture to suggest some of the ways in which Dominion aid could be extended:—

"1. Grants to Provinces or municipalities for the establishment and maintenance of trades schools, or grants to existing schools to extend and improve them.

"2. An experimental forest in every Province, with station and staff, available for professors and students of all universities.

"3. Extension of marine biological stations, so as to include more of our coast waters and great lakes—permanent stations, with hatcheries and abundant opportunities for scientific investigation.

"4. Grants to universities and scientific schools to sustain research fellowships and professorships, and to maintain certain technical departments, such as standardization of instruments, standard testing of wheat, flour, etc., and the departments of practical science, as they are of general value to our country's industries."

THE ECONOMIC DISTRIBUTION OF ELECTRIC POWER FROM BLAST FURNACES.

BY B. H. THWAITE, Assoc. M. Inst. C.E. (London).

Although in numerous papers and articles contributed since 1894, and in his evidence given before the Royal Commission on Coal Supplies, the author has reiterated the statement that blast furnaces should be made as far as possible the source of power for manufacturing industries situated within a certain area of such furnaces, it has always been realized that where such blast furnaces were associated with steel works and rolling mills there was until last year an unfinished link that prevented the full chain of possible benefits from being completed, in the fact that the heavy rolling mills had not been electrically harnessed.

Fortunately this unfinished link has at last been forged, for which thanks are due to the enterprise of continental electrical firms. To those who strive with more or less strenuousness for the prevention of waste of fuel and of power, and the reduction of the incubus of dead charges on working costs, the successful solution of the problem of harnessing electric energy for driving heavy rolling mills is a fact of great economic significance.

The heat and power efficiency of existing rolling mills is deplorably low. The associated steam boiler plant necessary to satisfy the maximum requirements of a rolling mill operation and the effect of condensation in steam pipes means a heavy thermal loss.

Before the date of the actual proof that blast furnace waste gas could be directly converted into power with an expenditure of 70,000 to 80,000 British thermal units per indicated horse-power hour (equivalent to a reduction of as 10 is to 30 compared with a good steam power plant), the waste of energy involved in ordinary rolling mill plants was a matter of indifference, because the waste of heat about balanced the supply—indeed the power available from the blast furnace gases had often to be supplemented by coal; but now that it is realized how valuable, as a power agent, this gas has become, the waste of fuel is morally and financially inexcusable.

Unlike the blast furnace (which may work steadily on, year in and year out, without week-end or other stoppages), the rolling mill may or may not remain steadily employed: a paucity of orders may mean the

closing down of the mill for weeks, because, although pig iron may be stocked with little or no risk, it is not usual to stock mill products which may never be wanted. During this non-operating period the blast furnace gas used for firing the steam boilers is set free or blown into the air. This waste of fuel may be cut down considerably, if not entirely, by the application of the pooling system to be described, which involves the displacement of steam by gas power. Modern gas power electrification methods will set free a great volume of gas which, thermo-dynamically converted in a gas engine, will increase the power equivalent of such gas by 300 to 400 per cent.

The objection that is advanced against the gas-power electrification of the rolling mills relates to the heavy expenditure involved in such a technical reform. The objection is a real one, and unless removed or reduced, will tend to confine the advantages of application to firms of immense financial resources. Few British joint stock administrators would be permitted by their shareholders to risk the investment. But if it can be shown that for some iron-making concerns it will be possible to reduce the capital investment to the amount necessary to provide the equipment of the new rolls with electric motors, as distinct from the electric generators, and that such an investment will be financially well justified, the objection standing in the way of such electrification will be considered, even by the most cautious and conservative of managements, as of no deterrent consequence.

The author's proposal, first suggested in 1894 and 1898, repeated at different times since, and again to be described here, would, as an incident, secure a substantial reduction of the expenditure of a complete electric equipment of an iron and steel works, so as to cover all power demands.

The basis of this programme is to pool the waste furnace gases from all the furnaces of an iron-making district independently of the ownership of such furnaces. The energy (electrically transformed) of the different furnaces would be transmitted to a central distributing and transforming station, in which the current would be

transformed to the voltage to satisfy different customers. Of course there may be cases where the furnaces are so concentrated as to justify the delivery of the furnace gases to a pooling or central station for conversion into electrical energy, but usually it would be found to be more practical to transform the gas into electrical energy on the site of the ironworks, for transmission to a distributing central station. (See Fig. 1.)

The first call on this power would of course be the satisfaction of the internal demands of the iron and steel works, the balance of power remaining being available for external distribution over a wide area, the extent of which, owing to the familiarity with and knowledge of the resources and safety of high pressure transmission systems, is being yearly increased. When the author put forward the first long distance electrical transmission project of over 100 miles in 1892, the line pressure then suggested was considered dangerous in the extreme; today, power is being easily and profitably transmitted over varying distances at very much higher pressures

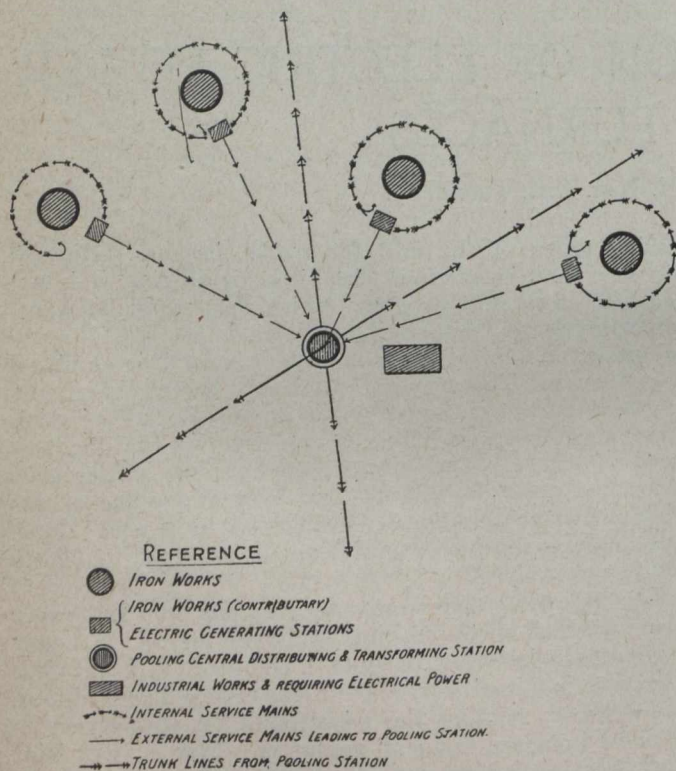


FIG. 1.—Diagram of Pooling System.

than those suggested in 1892. In 1892 the pressure specified was 20,000 volts; to-day, transmissions of 250 miles with 88,000 volts pressure are in daily service.

The pooling programme proposed would be provided by a separate and distinctive joint stock electric power organization, on the lines of the county electric power companies, which sprang from the author's 1892 proposition, with the exception that a proportion of the output is preferentially allocated to the satisfaction of the power demands of the iron and steel works from which the gases are drawn. The balance could be transmitted to any group of customers whose power demands justified the cost of distributing mains and associated transforming stations, but a more appropriate field of demand for an all-the-year supply would be the satisfaction of the electric energy requirements of the many profitable electro-chemical and electro-fusion processes described in the author's paper read before this Institute at Glasgow in 1901.¹

Included amongst these processes, in which the demand for power would correlate with its production at the blast furnace, or from January 1 to December 31, there are the production of high class steel from selected scrap, special alloys, such as ferro-silicon and ferro-titanium, ferro-chromium, besides the production of carbides (silicon and calcium). Some of these processes could take the current just as supplied, in large or small proportions, and at any moment, so that the levelling up of the load or the demand could be readily effected—obviously an important factor in the economic production and sale of electricity.

In the selection of the customers it would be advisable to secure the class of demand for operations such as mine pumping, electrolytic and like processes, on which the supply could be turned on or off whenever available, so that the distribution of the current could be arranged to fill up any gaps in the demand.

As an example of the kind of power demands that would be found in an average field of industrial operation surrounding iron works, exclusive of the municipal and rural demands for current for lighting and tramway power purposes, the following is given to represent a German district for which the pooling system was first outlined by the author:—

	Electric Horse-power.
For the coal mines in the district.....	1,300
Chemical (metallurgical) requirements	2,500
Electro-chemical requirements	1,500
Works and town electric lighting	500

In large districts, the power-driving requirements of the factories would provide a demand running into thousands of horse-power, although the direct driving of important machinery will secure a great saving of (and consequent reduced demand for) power compared with belt driving and its associated power losses. The satisfaction of electric transport power requirements is becoming an increasing factor both for water and rail transport services. By this pooling system the tall stacks of the furnaces would become centres from which would radiate the benefits of the cheap power; and the advantages would be reciprocal. Besides removing the many smokestack polluters of the atmosphere, the additional profit would increase the stability of the iron industry in this country.

The flexible demand for power which it would be the aim of the power organization to secure would be appropriate for the intermittent periods of mill idleness, whether temporary or prolonged; for instance, the sudden release of power for external services at the week-end periods of mill idleness (or during longer periods of compulsory idleness due to the falling off or cessation of orders) would be available for one or other of these flexible power demands.

(To be continued.)

Mr. E. Jacobs, editor of the "B. C. Mining Record," recently visited the Tyee Copper Company's smelter, at Ladysmith, B. C., where he reports, extensive improvements, including additional ore bunkers, increased wharfage facilities and the installation of new machinery, are being made. The proposed doubling of the smelting capacity of the works will probably be undertaken ere long. The recent additions and improvements, were meanwhile designed by Mr. W. J. Watson, manager of the smelter, and the plans drawn by Mr. George Williams, mechanical engineer, of Victoria.

MANCHESTER GEOLOGICAL AND MINING SOCIETY.

At the meeting of the Manchester Geological and Mining Society, held on Tuesday, November 12th, in the society's rooms, 5 John Dalton street, Manchester, the newly elected president, Mr. James Ashworth, C.E., delivered his presidential address.

He spoke in part as follows:—

“My address will be rather as a mining man than as a geologist. The various matters relating to the regulations and working of mines are too familiar to you to require anything in the nature of a review from me. We can still congratulate ourselves that this country continues to hold the first place in respect of regulations for the safe working of mines. This point was conceded at the recent Miners' Congress at Salzburg. I am, however, afraid that the proposal of the Belgian representative at this congress, ‘That coal production should be regulated by international laws,’ will not prove a very workable proposition, although it secured the moral support of most of the delegates. It is also worthy of note that King Edward has created a new medal for gallantry in mines and quarries. The warrant states that the King is ‘desirous of distinguishing by some mark of our Royal favor the many heroic acts performed by miners and quarrymen and others who endanger their own lives in saving or endeavoring to save the lives of others from perils in mines or quarries within our dominions and in territories under our protection or jurisdiction.’ The new medal will be of two classes, to be designated ‘The Edward Medal of the First Class,’ in silver, and ‘The Edward Medal of the Second Class,’ in bronze. This indicates his Majesty's great interest in the efforts made to reduce the danger and the death roll in collieries, and such encouragement has been applauded and approved by everyone connected with mining.

“Mining men in this country are in many cases looking anxiously for the report of the Commission now taking evidence on the safety of mines. The subjects of rescue apparatus and the best treatment of coal dust, continue to excite the keenest interest, and a preliminary report on the first subject has already been issued. It is to be feared that far too much is expected to result from the apparatus, the cheapest of which is very expensive. Up to now there does not appear to be more than one instance of the saving of the life of a miner by this class of apparatus, and this occurred in an Australian mine at Bonnieville. Doubtless, rescue apparatus will be found of great advantage in the case of gob fires and other similar occurrences underground, but it seems curious that a simple, inexpensive apparatus called the Denayrouse, which was introduced into the country many years ago, was not brought before the present Commission. On the general subject of rescue work in mines it seems to me that a great deal more might be done by the Home Office in apportioning a considerable sum of money per annum for scientific investigations, which would materially tend to increase the safety of the persons engaged in our great industry.

“With respect to the attitude of capital and labor, I think you will have noticed there is a strong desire growing up amongst all sections of the community that courts of arbitration should be formed to settle industrial disputes rather than having to resort to the barbarous practice of strikes. This point was very clearly brought out in Mr. Enoch Edward's speech at Southport, when he strongly suggested the settlement of disputes by means of reason and conciliation rather than striking first and adopting reason and conciliation after.

“The Miners' Eight Hour Day Bill will probably become law during the next session, and although the conclusions of the Parliamentary Committee make light of the assumed loss on production of 25,783,000 tons calculated on the output for 1906, it is not denied that considerable loss will inevitably follow the adoption of such a measure, and many other expedients are suggested for mitigating the effects of the proposed reduction in the time underground. The employers' remedy lies apparently in the extended use of labor-saving machinery—coal-cutting machines and conveyors—and in the improved mechanical equipment of the mines generally. The committee admit that certain temporary and permanent relaxations of the rigid rule might be found necessary in the interest of safe working, and that the conditions are variable to such an extent that the special regulations would be required for certain districts. From many of these conclusions it is clear that the operation of law will not remove all the intricacies of the existing systems, and a hard-and-fast limit of working time will be found detrimental to the industry, both from the point of view of the employer and that of the employed. And further, is there not some reason in all these considerations for the feeling (that many of us have), that these processes of restriction, this law-permeating atmosphere dominating our industrial and social life, is destroying in our race and nationality that individualism, that spirit of self-reliance and of self-restraint which, beyond doubt, have had much to do with the industrial as well as the national development of England? We move in days of big combines and trusts, where everything is done by concerted moves, and where, except in a few brilliant instances, personality is submerged and operations are performed mechanically. The danger I apprehend is loss of character by the reduction of the personal element in our undertakings, and if we look upon our national industries not merely as means whereby men may rapidly and selfishly accumulate wealth, but also as means of intercommunication of sympathies and goodfellowship between capital and labor, which after all should be one of the principal motives of our commercial aims and pursuits, the danger to which I refer becomes a live one and one which philanthropic capitalists might well direct attention. We cannot be unmindful of the service rendered by the workers in the days when legal ties and binding clauses were almost, if not, quite unknown, and when labor was performed from a sense of duty sufficiently strong to keep the worker at his post and assist in the wonderful development that has characterized modern English history.

“Let us for a moment reflect on the great and rapid change made in England by the coal-miner. Has he not completely revolutionized our land and turned a large part of an agricultural country into a huge workshop. Only one hundred and fifty years ago Lancashire was the poorest country in England, and the most sparsely populated. To-day if you take an area of 50 miles round this room you enclose a population more dense than any other part of the world. You may liken it to one big workshop built on a coal hole. The miner has mainly effected this change. This change has brought with it many problems, and one is tempted to ask whether some of us have not lingered too long on the slopes of the Pennine Chain? Is there any outlet for this congested population? I venture to think there is; but it is not in Old England, but in New England be-

yond the sea—a land that covers one-fifteenth of that of the the world, and yet has not a total population of London to-day. I refer to Canada. It seems to me that the miner would do well to turn his attention more assiduously to this vast dominion, for in my opinion it will prove to be one of the most solid and enduring jewels in the British Crown. It is a happy omen that the 1908 summer meeting of the Canadian Mining Institute is to be held to some extent under the Government auspices, and promises to be a most important one and worthy of the best representation from this country. It is for us, and especially the younger amongst us, whose field of observation is widening out, to mark, learn, and inwardly digest every phase of mining activity, every fresh means adopted to meet a particular contingency, and to apply the beneficial result of their observations to the work in hand. In order to acquire this experience, it is absolutely necessary that fresh fields should be sought and appropriated; the situation is one which should have a peculiar attraction for the young mining engineer or colliery manager, whose steps should be directed towards new fields, where his energy can find full development. Could he have better prospects than in Canada? After every visit I have paid to this vast dominion, I have returned more impressed with its possibilities, and if I can only arouse your interest, I feel sure that you will agree with me, that Canada is the country of the future, for our surplus population, and that the Lancashire man, especially the miner, will do well to give it his serious attention."

Grouping Nova Scotia, New Brunswick and Prince Edward Island together as Acadia, or the Land of Plenty, the president said:—

"Of all the numerous British colonies, this region presents the strongest family likeness to the Mother Country, not only in the singular variety of its resources, but also in its proximity to the markets of the world. Gold, which excels in purity that of Australia and California, is found here. It is here we have unequalled fisheries, safe harbors, extensive coal fields near the water's edge, and, above all, a position almost midway on the very highway between the Old and the Pacific side of the New World, and I am one of those who believe that Acadia will inherit a full share of that greatness which Britain in her old age must resign. Though it cannot be said to have yet attained the prosperity predicted for it, this region is to-day by no means an insignificant contributor to Canadian wealth, for of the total number of miners engaged in Canada, 42 per cent, find occupation in Nova Scotia. Coal is the staple mineral, and the Cape Breton, Cumberland and Pictou fields provide a fair proportion of the whole output. In Cape Breton coal is obtained in great quantity from the Sydney and Inverness fields. The Sydney field was the first exploited, operations dating from the year 1785. In 1863 the output of coal for Cape Breton was 214,812 tons; to-day it is over 4 million tons. The other fields in this district of Acadia are responsible for a little more than a million tons, or a quarter of the Cape Breton output. The coal measures of the Cumberland area outcrop on the seashore, and have been worked extensively at the Joggins mines, where a seam of about 6 feet of coal has yielded an annual output of about 80,000 tons. The Pictou field, opened up in 1827, by the General Mining Association, is about eleven miles long, three miles wide, at its broadest part, and covers an area of about 22 square miles. Its structure presents many interesting features, and a few problems, some of which are—the remarkable thickness of the seams (in

some cases 40feet); the extensive deposits of black and brown shale, the marked changes in these deposits noted at comparatively short distances; the nature of the dip—ever changing, but always considerable, and the numerous large and small faults intersecting the field at many points. The three coal producing districts of this field are the Albion, the Westville and the Vale. The coals vary in character, but are all the bituminous coking variety. Some tested at the Gas Light & Coke Company's Works, London, have yielded 10,450 cubic feet of 15-candle power per ton. Slack is valuable for blacksmith's purposes. The firey nature of the seams has necessitated the use of fans of large capacity and modern construction in place of underground furnaces. Mueseler, Marsaut and other lamps have been in use for many years. Quite recently the local papers announced that the Dominion Coal Company, whose annual output is about 3 1-2 million tons, has a representative in this country busily seeking to enlist an army of 2,000 miners for their collieries in Nova Scotia. Lancashire, Yorkshire and Staffordshire men are preferred, it is said, as being more accustomed to the long-wall system, which is the system of working in this part of the Dominion."

The president proceeded to discuss the other resources of this district, and speaking of Ontario, he said that:—

"Extensive iron ore deposits are worked at the Helen Mine, Michipicoten, along the line of Kingston and Pembroke and Central Ontario Railway, and smelted at Sault Ste. Marie Furnace & Steel Works, and Port Arthur Ironworks. Twenty miles north of the famous nickel district, iron ore is also found in the Moose Mountains (rocks of Keewatin age), and a railway only is required to make the Canadian iron ore certain of admittance into all markets. The proportion of iron in the ore is 60 per cent. No coal had been discovered in this province until quite recently, when lignitic coal was found near Lake Abitibi. It is reported that a mineral smelting plant is to be erected near to Toronto, which would provide employment for 15,000 men, treating 1,400 tons of ore daily."

Going further westward he said:—

"Though primarily the granary of the empire, Manitoba and the North-West Provinces are not bereft of mineral wealth, as they are underlaid by rich stores of lignite—which is a useful fuel for the cities and farming scattered population. Saskatchewan and Alberta, the two new provinces, each have an area of more than twice the size of the British Isles, but only a very small portion of the rich arable land is as yet under cultivation, nevertheless in 1906 the population had increased from a few hundreds in 1890 to nearly 500,000. In Alberta there are inexhaustible deposits of lignitic coal. The principal developments of anthracite and bituminous coal have been made in the neighborhoods of Banff, Frank and Coleman, and to a smaller extent between Calgary and Edmonton.

"Considerable deposits of iron ore have been discovered in Alberta, and this suggests an industrial as well as an agricultural future for this district."

Other districts in Canada were mentioned as fields of enterprise, and the president passed on to speak of British Columbia as offering great attractions to the miner, and in conclusion he urged the importance of Britishers not letting the control of any of these rich coal areas pass into the hands of Americans.

"I have now taken you," the president said, "across the continent, from coast to coast, and although we have quickly examined the localities of the most important minerals, a vast amount of exceedingly interesting in

formation on mining progress has necessarily been omitted. The principal object of my address is to endeavor to bring before your notice something of the immensity of the value of our Canadian possessions with a view to impressing upon you the importance of the direct investment of English capital into Canada, instead of through New York and other Stock Exchanges as at the present time, for the danger is that Americans will secure the command, through capital, of the mining and other undertakings. If this country is to have and keep the controlling power, then it is essential that she should hold the purse-strings. The latest news from the famous Crows' Nest district, report huge beds of coal above the railway, and the Pennsylvania miner sees in this district—if the British speculator cannot—great beds of coal more than equalling the enormous deposits of his own State. There was, and is, a great truth underlying the remark made by the Prince of Wales in reference to his Canadian visit, that 'England must wake up,' otherwise she will fail in her duty to the Dependencies."

THE COLLIERY GUARDIAN.

"HUSTLING" TO "RECEIVERSHIP."

ALEX. GRAY, Montreal.

Were he not the chief of the coterie of London mining financiers, the remarks of Sir Julius Wernher at the annual meeting of Fraser & Chalmers, Limited, held in London on November 14th, might go unnoticed. Because he is the senior member of Messrs. Wernher, Beit & Company, and therefore associated with very great industrial enterprises and higher technical institutions of learning, his reflections invite serious consideration and rebuttal. He represents the investing and speculative public, is one of the life governors of De Beers, has large interests apart from mining, and possesses the confidence of bankers on the continent. Naturally, therefore, his utterances carry weight, and on this account it is as well for all now concerned that he unbosomed himself in thus explaining away a comparatively insignificant falling off in the net profits for the year of Fraser & Chalmers:—

"Their investment in the Allis-Chalmers Company remained, unfortunately, unaltered. He said, unfortunately, because the shares had had a heavy drop, and again there was no dividend. If things looked black for the moment in America, let them remember that in spite of everything that was happening there the country itself was as sound as ever. Speaking generally, it suited us on this side to crawl into moderate prosperity *than to 'hustle' into receivership*. He hoped, therefore, that the shareholders would not be altogether dissatisfied with the modest 10 per cent. and a sound financial position which the board offered them that day as the result of the year's work."

Whatever the relation be between the British section of the business originally conducted under the aegis of Fraser & Chalmers—the Canadian-American department being included in the Allis-Chalmers-Bullock Corporation—the inference is plain that Sir Julius deprecates trans-Atlantic methods and capitalizations. He was epigrammatic, and at the expense of those "hustlers," some of whom recently took over the City of Mexico street railway system, in which Messrs. Wernher, Beit & Company were decisive elements. There being no dividends, a rather unfair analogy was drawn between "hustling" and "receiverships," whereas the magnitude of Canadian-American undertakings is the soundest argument

under the circumstances, why distributions should be deferred until the financial outlook is clearer. The "country is sound."

Without special knowledge of the position in corporate counting houses, it may well be assumed that huge capital commitments and inevitable credits do not make for dividends when currency is at a premium and overdrafts inaccessible on other than usurious terms. Undoubtedly the firm of Wernher, Beit & Company have never been heavy borrowers, their income from De Beers and kindred ventures yielding continuous returns; but Sir Julius should be chastened in spirit in view of the "hustle" manifested in the underwriting and distribution of mining shares and the prevailing market quotations for many of those shares. For this he is hardly at fault. He stands for the credit of the Witwatersrand Gold Fields and Kimberley Diamond Fields. When the Wernher-Beit "deep levels" were "hustled" into existence, six or ten years ago, without developments or dividends, "receiverships" were not thought of. When the Central Mining Trust was underwritten because it was sponsored by Wernher, Beit & Company, it was taken for granted by subscribers that the premiums they paid would be infinitesimal compared with the dividends they would receive. Instead of this there have been depreciations and writings off, and dignified disavowals therefor emanating from Sir Julius, whose entire career has been marked by honor and candor. When Rand "deeps" were promoted labor troubles and financial depression growing out of the South African, Russo-Japanese and American difficulties were not included in the list of possibilities, any more than the inability of the Westinghouse and Alils-Chalmers Companies to earn fancy dividends and suitably finance themselves in stressful times.

Sir Julius recognizes the impossibility of "hustling" governments into doing the sensible thing rather than precipitate thousands of holders of South African shares into the bankruptcy courts. His chief of staff in Messrs. Fraser & Chalmers, Limited, Mr. Walter McDermott, chose the more intelligent, and certainly more logical attitude, when he said at the same meeting—though before Sir Julius arrived:—

"Those who followed the great South African gold industry would have noticed that the producing companies were doing in the aggregate as well as, or even better than, ever before, but there was *little new enterprise for want of capital, and consequently orders for new installations were few and far between*. He was sure in his own mind that this would not last, and he quite shared the opinion lately expressed by a prominent South African that there were hundreds of millions of pounds worth of gold waiting extraction; that ore worth down to 5 dwts. and perhaps below would be found profitable to work, and to do so more machinery would be required, but it would all take time, and they must have patience."

No less distinguished as the ex-president of the London Institute of Mining, and a director of the Mines Selection, Limited, Mr. McDermott as a general manager of Fraser & Chalmers, Limited, touched the tender spot when he dwelt upon the scarcity of fresh undertakings owing to the "want of capital." In this instance the mining houses "want the capital," the machinery manufacturers find that "orders for new installations are few and far between"; but there is no presumption that the "hustling" of share issues has the slightest relationship to "receiverships." Nor will there be occasion to requisition innumerable "receivers" on this side of the water. "Every month less progress," as Mr. McDermott expressed it. Whatever inflation there has been was not confined to Canada and America. More reor-

ganizations and amalgamations have been consummated, or are contemplated elsewhere, than may be necessary over here if there is less haste for recovery from present complexities.

Sir Julius must not depart from his role of "guide, philosopher and friend" to the greatest gold-getting industry the world has seen—or will see. South Africa will be all right. Canada is all right. The United States will be all right—when enough Witwatersrand gold has been drafted thence.

PRODUCTION OF ANTIMONY IN 1906.

By far the greatest amount of antimony produced in the United States from domestic ores is that contained in antimonial lead. During 1906 a production of 10,546 tons of antimonial lead, containing 1362 tons of antimony, was reported by the refineries of the country. It is estimated that about one-fourth of this was produced from foreign ores, so that the production from domestic ores was about 1021 tons. This quantity was about half that produced during any year for the preceding five years and was less than the trade requirements, so that metallic antimony was melted with lead to supply the demand.

Most of this antimonial lead was used in making anti-friction metals, but it also finds use in storage batteries, for lining lead chambers in making sulphuric acid, and in making toys and coffin trimmings.

Antimony combines readily with many metals, from some of which it may be easily volatilized under the heat of the blow pipe. Antimony has the property of hardening lead when melted with it, and in the smelting of antimonial ores much hard lead is produced. Alloys of antimony and lead expand on solidifying and make excellent metal from which to cast type, since it will fill the corners of mould. Type metal contains varying quantities of antimony, generally less than 40 per cent., alloyed with tin, lead, and sometimes copper, zinc, bismuth and nickel. Britannia metal and pewter, formerly much used for table ware, are also alloys containing antimony.

Up to the present time the United States has been but a small producer of antimony, owing to the low price of the metal, to the distance of the known domestic deposits from market, and to the low cost of production from extensive deposits in other countries. Hence it has been only in times of high prices that the deposits in the United States could be worked at a profit; and although there is a constant increase in transportation facilities and the metallurgy of antimony is becoming better known, it does not seem likely that there will be much increase in domestic production in the near future.

The remarkable rise in the price of antimony which began in 1905 continued in 1906 and stimulated production greatly, but toward the end of the year the price fell. Sudden changes in price, however, have been common in the history of the antimony market.

DOMESTIC PRODUCTION OF ARSENIC.

Thousands of tons of arsenic are wasted annually in the fumes that pour from the stacks of the great smelters of the United States, yet notwithstanding this waste, or perhaps because of it, more than 8,000,000 pounds of arsenic and arsenic compounds, costing about \$375,000, were imported into this country in 1906. The domestic production for the same period was only a little more than one-sixth of the quantity imported and was valued at but \$63,460.

Arsenic ores are widely distributed, particularly in the granitic and highly metamorphosed rocks, and ores of tin, copper, and antimony are frequently accompanied by those of arsenic. Native arsenic, a tin-white brittle substance occupying a place midway between the metals and the non-metals, is found sparingly in veins at a number of places, but it is not important as an ore.

France, England, Germany, Portugal, Spain, Turkey, Canada, and the United States are the principal producing countries.

In the United States, and also in England, the great bulk of the arsenic produced is obtained from smelter fumes. English smelters are not allowed to pour arsenical fumes into the atmosphere, and compliance with the law gives added profit from the white arsenic saved. There are, however, but two smelters in this country that have plants for saving it—the huge Washoe smelter at Anaconda, Mont., and the smelter at Everett, Wash. A smaller plant, located at Mineral, Lewis County, Wash., makes white arsenic from realgar. The only other known arsenic production in this country in 1906 was a few hundred tons of arsenical pyrite mined at Pine Pond, town of Kent, Putnam County, N.Y., and this pyrite was shipped abroad. As ordinarily applied the term "arsenic" means "white arsenic" or "arsenious acid," or arsenic trioxide (As_2O_3). It is used as an insecticide in the preservation of hides and stuffed skins of animals and birds, in sheep and cattle dips, in arsenic soap, and as a wool preservative, where it also prevents fungoid growth. It is also used to prevent the growth of weeds and grass, in the making of some enamels and in the manufacture of glass, as a fixer or conveyer of aniline colors in calico printing, and as a constituent of the dyes themselves.

The greatest demand for arsenic is for making Paris green, used as a pigment and as an insecticide on plants. Its toxic effect limits the former use. In medicine arsenic is used as a tonic and it performs a similar office in various stock foods and medicines.

SULPHUR AND PYRITE INDUSTRY IN 1906.

The sulphur industry of the United States during the last few years has been characterized by steady growth in consumption, increase in production, and decrease in quantity and value of imports as a result of the development of domestic resources.

Statistics collected by Dr. David T. Day, of the United States Geological Survey, and published in an advance chapter from "Mineral Resources of the United States, Calendar Year 1906," show that the domestic production increased from 181,677 long tons, valued at \$3,706,560 in 1905, to 294,153 long tons, valued at \$5,096,678 in 1906. Exports amounted to 22,237 long tons, valued at \$460,435.

The great production of sulphur in Louisiana continued in 1906, and the success of the Frasch sulphur process, by which the mineral is melted by streams of superheated water pumped into the Louisiana wells, has been fully demonstrated. Local demands for sulphur for sheep dip and for use in destroying vegetable parasites have been very well met by developments in Utah, Wyoming and Colorado.

The dominating factor in the world's supply of sulphur has been the production of the material in Sicily, which in 1906 showed a large decrease, chiefly due to the loss of the American trade through the development

of the Louisiana deposits. The exports from Sicily to the United States have decreased steadily for the last four years—from 155,996 long tons in 1903 to 41,283 tons in 1906.

The pyrite production of the United States increased from 253,000 long tons in 1905 to 261,422 long tons in 1906, but the price declined from an average of \$3.71 per ton in 1905 to \$3.56 in 1906, causing the total value to decrease from \$938,492 in 1905 to \$931,305 in 1906.

Pyrite burning entered significantly into the sulphuric acid business in 1882, when the product was 12,000 tons. In 1885 the product had increased fourfold; five years later it had nearly doubled again, and increase has since been rapid. The growth has been due not only to the cheapness of this source of sulphur but to the use of the cinder in the blast furnace. The dominant position in the pyrite supply is occupied by Virginia, and California and New York follow.

More careful attention to waste products in copper, lead and precious metal smelting will lead in the near future to a production of sulphuric acid in such quantities as to affect commercial conditions very appreciably, and these sources of the acid must be taken into account.

EXCHANGES.

The "Mining Journal," London, November 16th, touches editorially upon the evolution of the State Trust and applies its conclusions to the tin industry of the Federated Malay States. As the "Journal" points out, that industry is in the hands of small Chinese operators who are incapable of surviving the loss entailed by suspension until the market improves. "Trust must be fought by Trust, and if there were anything in the Malayan idea that the United States Steel Trust were still operating against the tin market, they could argue with some force that as the Administration had previously intervened to protect the country against the Trusts' smelting designs, consistency required that it should do so again against their bear operations. Meanwhile, the idea of State interference will become more familiar, and in proportion as financial experience and strength becomes more centred in a few hands, the demand for Government control or reprisal will certainly grow, and may even form the basis of the international struggle of the future."

The "Mining and Scientific Press," November 23rd, presents a paper on "Smelter Smoke, with a Discussion of Methods for Lessening its Injurious Effects," by L. S. Austin. This article we have pleasure in reprinting on another page and in discussing in our editorial department. Another article by Mark R. Lamb on "Sliming Ore for Cyanidation" is timely. "It is not so certain from the present outlook that the sliming of all ore is generally advisable or even passible . . . However . . . it is possible, even easier, to treat and wash sand by agitation and vacuum-filtration than by leading. Sand cannot always be filtered successfully on vacuum-filters . . . Air-lift agitation has solved the problem of cheap and effective agitation of either sand or slime, but from the fact that fine grinding will increase extraction it does not follow that the entire mill product should be treated as slime. When it can be so treated such a plant is, of course, ideally small, self-contained, inexpensive, and easily operated.

PERSONAL AND GENERAL

Mr. M. L. Elliott, manager of the North Cobalt Silver Mining Company, left last week on a visit to England.

Mr. O. B. Perry, general manager in the Yukon for the Guggenheim Companies, has returned to New York for the winter.

Mr. S. Beanland, of the Boston-Richardson mines, Isaac's Harbor, N. S., has returned from visiting his home in England.

Mr. W. Knott, the discoverer of the Reddick mine at Larder Lake, died at Dorset, Ont., on the 21st ultimo, as the result of a gun accident.

Mr. O. S. James, consulting chemist for the J. E. Wilkinson Company and for the British American Smelters Limited, is conducting a series of experiments.

We learn, with regret, that Mr. Hiram W. Hixon, for many years past general manager of the Mond Nickel Company's mines and works, at Victoria Mines, Ont., is leaving Canada at the end of February next.

Mr. W. O. Gilman, operating a hydraulic mine in the Cariboo district, B. C., has returned to Boston, with the intention of arranging early in the spring for the equipment of the mine with suitable machinery.

Mr. D. W. Robb, president of the Robb Engineering Company, of Amherst, N. S., is at present in the West. After staying for a few days in Victoria he proceeded to San Francisco and other points in California.

Mr. Alex. McNeil, who has been actively associated with mining in Nova Scotia, as president of the Dominion Antimony Company and other enterprises, has left Halifax and will in future reside at Washington, D. C.

Mr. R. H. Sweetser, superintendent of the Algoma Steel Company's blast furnaces at Sault Ste. Marie, leaves shortly to assume the duties of superintendent of the Columbus Iron & Steel Company, Columbus, Ohio.

Mr. W. J. Prisk, until recently manager of the Dominion Antimony Company's mine at West Gore, N. S., is, according to the "Industrial Advocate" about to assume the direction of the Consolidated Gold Mines' property at Moose River.

Mr. E. A. Collins, of Hatten & Collins, consulting engineers of Webb City, Missouri, passed through Toronto on his way to Trenton, Ont., on the 7th December. Mr. Collins is a mining graduate of Queen's School of Mining.

It is reported from Vancouver that the Standard Oil interests have bonded a number of copper properties on Queen Charlotte Island, the claims having been recently examined and reported on by Mr. S. C. Chisholm, the company's chief engineer.

Mr. W. F. Jennings, of Sydney, C. B., has completed a tour of the mining districts of Nova Scotia, and is now engaged in preparing his report for the Mines Department at Ottawa on the mining and metallurgical industries of that province.

At the fifth semi-annual dinner of the Canadian Camp, held at Hotel Astor, New York, Dr. Robert Bell, chief geologist of the Ottawa Survey, was the guest of honor. Dr. Bell's entertainers were a group of men prominent in letters, finance and public affairs.

Mr. T. H. Wilson, chairman of the Tye Copper Company, has arranged to go out to British Columbia and supervise the business of the company temporarily, pending the appointment of a successor to the late managing director, Mr. Clermont Livingston.

Mr. C. A. Molson, a Science Graduate of McGill University, and a Logan Gold Medallist, was accidentally shot and instantaneously killed near Salt Lake City, Utah, on November 24th. At the time of his death Mr. Molson was acting as engineer for the London Exploration Company.

Mr. E. P. Colley, a well known British Columbia land surveyor, has just returned to Victoria for a season's work in the Ootsa Lake country, where he was in charge of surveys for the Provincial Government. Mr. Colley speaks in very enthusiastic terms of the rich resources of this area.

Referring to the recent close down of the Granby mines and smelter in the Boundary District, Mr. J. P. Graves, managing director of the company, expressed the hope that the suspension of operations would be very temporary, but added that it was impossible for the company to produce copper at the present market price.

The nineteenth annual dinner of the students of the Faculty of Applied Science, of Toronto University, was held on December 6th. The guest of honor was President Falconer. Among the speakers were President Falconer, Dean Galbraith, Professor A. T. De Lury, Mr. T. W. Gibson, Acting-Dean Ellis and Mr. C. H. Rust. Nearly four hundred attended the function.

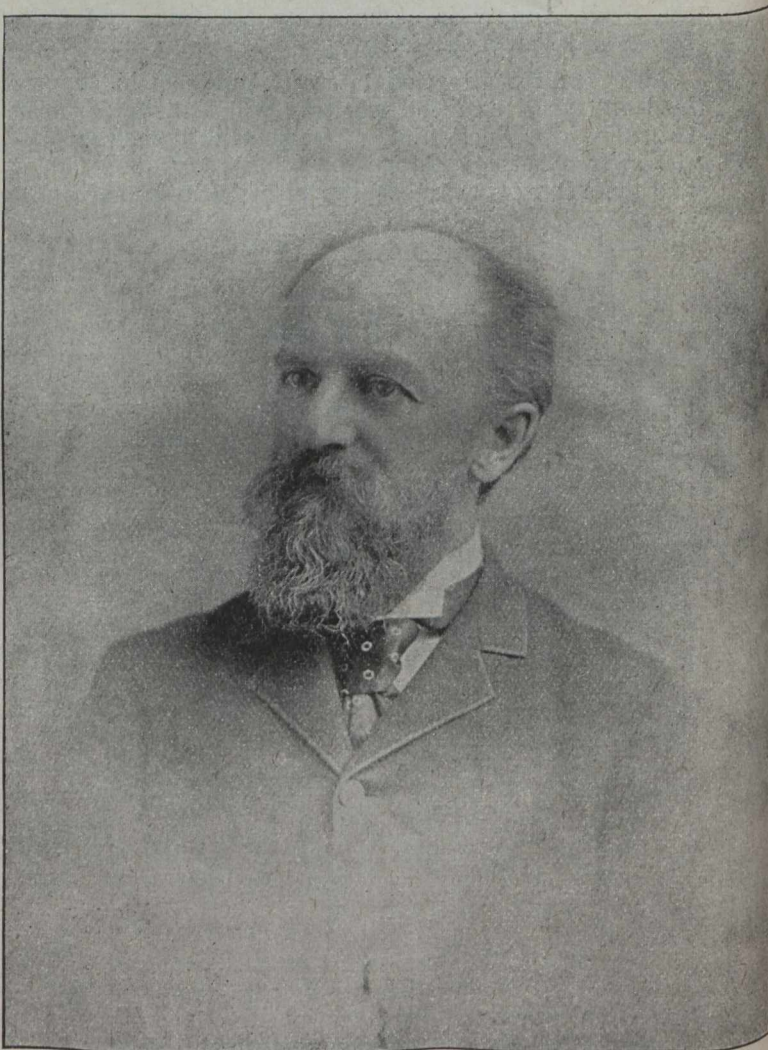
Mr. H. L. Clarke has been appointed mechanical superintendent of the Dominion Coal Company's No. 1, 5 and 10 mines; while Mr. A. Stewart has been appointed to a similar post at Nos. 3, 4 and 6 collieries, and Mr. R. J. Bell for District No. 2. The appointments of Mr. John Maxwell to the management of Nos. 2 and 9 collieries, and Mr. B. Connors to No. 4 are also announced.

Mr. Louis Katona, a Hungarian metallurgist, commissioned by the Austrian Government to report on the mining industries in the leading countries of the world, is at present in British Columbia. In an interview he expressed himself as very favorably impressed with the mineral resources of Canada, but added, that he considered only the surface had to the present been scratched. He was especially interested in the electro-metallurgical experiments at Sault Ste. Marie, and stated that the copper smelters in the Boundary district were the most up-to-date plants he had seen, and that Canadian metallurgical practice was far in advance of that of Austria or Hungary.

The annual dinner of the Engineering Society of Queen's University, was held on the evening of December 6th, in Grand Hall, one of the magnificent new buildings of the University. The dinner was a success in every respect. The various students committees are deserving of much praise for the way in which all arrangements were carried out. Among the guests of the evening were Deputy-Minister M. J. Butler, Mr. J. B. Tyrrell, Mr. Frank Loring, Professors MacLeod and Porter from McGill, and Mr. J. C. Murray, editor of the CANADIAN MINING JOURNAL. In addition to these gentlemen there were representatives from the University of Toronto, from McGill and from the Royal Military College. An innovation was introduced in respect to the hour of beginning. The guests were all invited for 6.30 p.m. The annual dinner has been made a dignified and important occasion. The students themselves indulge in no unseemly manifestations of animal spirits. The whole tone of the dinner is one of dignity and good fellowship.

OBITUARY.

The death occurred on the 29th ultimo, at Montreal, of Dr. Bernard J. Harrington, professor of mineralogy at McGill University. The late Dr. Harrington was born at St. Andrews, Que., in 1848. He entered McGill as an undergraduate in 1865 and four years later graduated with first class honors in Natural Science, winning also the Logan Gold Medal. He then went to Yale University to study chemistry, mineralogy and metallurgy, and there took his degree as Doctor of Philosophy. Dr. Harrington was appointed lecturer in chemistry and mining at McGill University in 1871, but resigning the post at the end of the year, for seven years acted as chemist and mineralogist to the Geological Survey of Canada. In 1883 he was appointed professor



of Mining and Chemistry at McGill University, a position he held to the time of his death. As a writer of scientific subjects, more particularly in the domain of Canadian mineralogy, Dr. Harrington was well known. During his long and useful career he also held offices in many technical organizations. For many years he was president of the Natural History Society of Montreal, and editor of "The Canadian Naturalist," now published under the title of "The Canadian Record of Science." In 1897, he acted as vice-president of the Chemistry Section of the British Association at Toronto. In addition to his academic degrees, Dr. Harrington was a Fellow of McGill University, of the Geological Society, and of the Royal Society of Canada, and of the American Chemical Society.

CORRESPONDENCE.

The Editor,

CANADIAN MINING JOURNAL, Toronto, Ont.

Sir,—Regarding my article, "A Method of Mine Surveying," in your issue of November 15th, please note the following corrections:—

Column IV line 10 should read "foresight read from vernier still using side telescope"

In Fig. II, $\Delta 110 - \Delta 111$ and $\Delta 111 - \Delta 112$ should be joined

Column IV paragraph 5 should read "The slope distance from centre of telescope at $\Delta 111$ to $\Delta 112$ and vertical angle being measured, the horizontal distance D , is calculated and the small angle $\delta = \delta' = \tan^{-1} \frac{d}{D}$,

whence the azimuth $\Delta 111 - \Delta 112$ becomes

$$\text{Azimuth } (\Delta 110 - \Delta 111) \mp \tan^{-1} \frac{d}{D} + \text{deflection} \pm \tan^{-1} \frac{d}{D_1}$$

where d = the perpendicular distance between telescopes, the upper or lower signs being used when telescope is respectively to right or left of observer.

Yours truly,

A. B.

Vancouver, B.C., Nov. 27th, 1907.

Springhill, N. S.,
Nov. 21, '07.

To Editor MINING JOURNAL,

Sir:—In a late JOURNAL there was a letter from Mr. Robert Archibald, manager of the Eastern Coal Company, at Maccan, criticizing some remarks of mine concerning the value of the coal claims outside of the C. R. & Company, holding in the county. It was not my object to at all discredit the value of the mines in operation in any part of the country. Outside of Springhill, Mr. Archibald probably knows more than the writer does about the value, or otherwise, of other mines operating in the country. I had not these in my mind when writing of the value of the C. R. & C. Company holdings. I have some knowledge of the well

equipped and well managed Chignecto Mines, also of the value of the Joggins areas, and the splendid work being done there by the present management. I know of the efficient management of the Fundy, Kimberly, Strathcona and Jubilee mines, as the managers of these several mines are all my friends and acquaintances. Leaving the question then where Mr. Archibald has placed it, and which I had no thought of doing, I also leave that gentleman his assumption of comparative values of all the mines, in quantity and quality. I must admit, however, that judging from the costly surface-plant of the mine of the Eastern Coal Company, of which I had a glimpse, there must be coal seams of unquestioned value on this property.

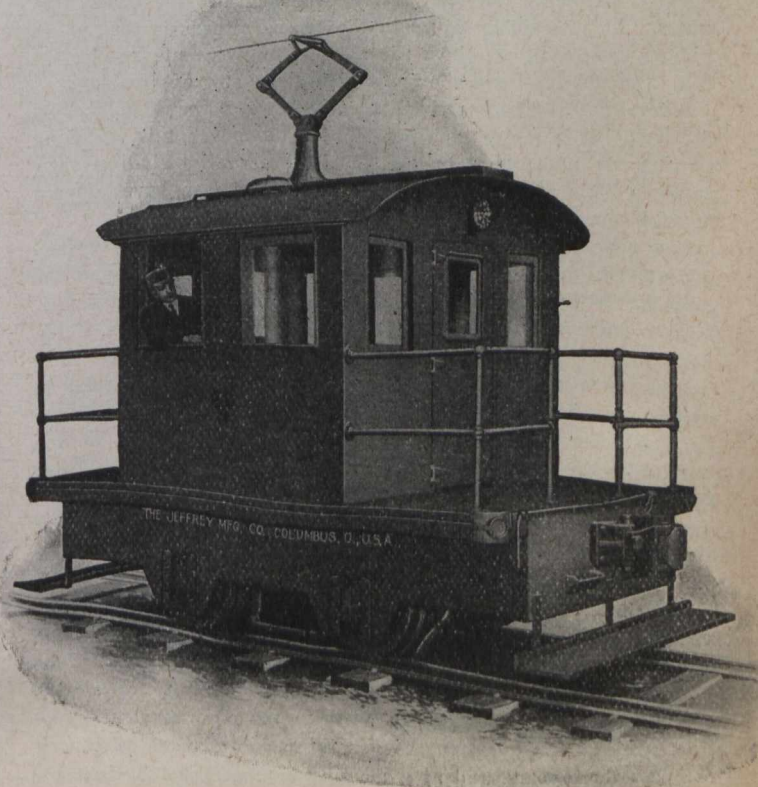
Yours,

W. D. MATTHEWS.

NEW MACHINERY.

The accompanying illustration shows a view of a 25-ton switching locomotive built by the Jeffery Manufacturing Company, Columbus, Ohio, for use in handling freight cars for the Cerveceria Brewery, of Monteroy, Mexico. This style locomotive takes the same electrical equipment as the mine type, the only changes being in the side and end frames and the addition of a platform and suitable cab to accommodate the conditions incident to surface work. The motors are of the water proof steel frame type having drum wound armatures, laminated pole pieces, oil lubrication with auxiliary grease boxes and liberal wearing surfaces.

These locomotives are built in sizes from 10 to 30 tons with two motors, and in larger sizes with three and four motors, arranged with rigid frame or with double trucks having flexible wheel base, depending entirely on the conditions.



SPECIAL CORRESPONDENCE

NOVA SCOTIA.

GLACE BAY.—The output of the Dominion Coal Company's mines for November is in excess of any previous November in the history of the Company, being 336,190 tons compared with 308,365 tons last November and 303,000 tons in November 1905. On the 28th. the collieries raised 15,457 tons which is the largest single day's output this year with the exception of any day in June. On the 27th, No. 2 shaft raised 4,659 tons for one shift's work, and maintained an average of over 4,500 tons a day for three consecutive days. We consider this is a noteworthy performance.

Thanks to the excellent outputs the Coal Company were able to rush shipments to Montreal before the close of navigation and succeeded in sending up almost 100,000 tons in November, which is another record for this month, beating the figures of 1902, which were 92,000 tons. The Coal Company shipped remarkably late this year, the last ship leaving Sydney on the 28th. This is at least a week later than any previous final sailing. Thanks to the open season and the outputs the company were able to catch up very markedly on their Montreal contracts and the shortage in shipments will be much less than was anticipated.

The Hub Colliery commenced to draw coal again on the 27th November, after being idle about eleven months. Reserve and Caledonia will in all probability go on single shift this week, but there will be no slackness of work this winter. The winter outputs in Cape Breton are steadily climbing up to the summer production, and the marked disproportion that once used to exist between them is gradually disappearing. What little difference now exists is due to local climatic conditions and not altogether to a varying market.

The Coal Company took a census of their houses recently and some of the information obtained is of interest. Despite the large influx of population the Cape Breton miner numbers 85 per cent. of the total. The total population dwelling in the company's houses is a little over 10,500. There are possibly 2,000 of the company's employees who live in houses not owned by the company. Altogether the population dependent on the mines is at least 15,000, independently of the population of Sydney, which is less directly, but none the less surely dependent on the Glace Bay mines. An interesting figure in the census returns is that of 88 widows, nearly all of whom are allowed to live rent free by the Coal Company, and are allowed a certain amount of free coal.

Several new residents arrived recently in the shape of Poles from Scotland. It is rather amusing to hear these men talk, speaking as they do with the broadest Lowland accent. Finding their names a little unpronounceable some of these men have adopted Scottish names, such as Adam Nelson.

The population around the collieries is growing very cosmopolitan. On the tramcars that run from Glace Bay around the collieries to Sydney, one meets very varied types of passenger. It is no unusual matter to see Frenchmen, Indians, Greeks, Poles, Russians, Jews, Belgians, Hungarians, Germans, etc., on the same car, and one would need to be a very accomplished linguist to understand the babel of language that ranges from Gaelic to Miemae from Lithuanian and Magyar to the dialogue of the Lancashire and Yorkshire collier and his comrade from the "wee kingdom." But, eventually they all bow to the supremacy of the English language, and the next generation will retain no remnant of their mother tongue, but will speak English as it is spoken in Canada, with no variation in dialect, from Vancouver to Scaterie.

The three years contract between the Dominion Coal Company and the Provincial Workmen's Association as representing the workmen of the Coal Company will expire with this year. The Coal Company approached the officers of the P.W.A., at the beginning of November, with a view to the renewal of the contract, which has worked to the general satisfaction of all during the past three years, and at a meeting on the 20th of November

the general manager of the Coal Company definitely offered the P.W.A. the option of a renewal of the old contract on exactly the same terms as before, the option to expire in one week. In putting their views before the men the Coal Company stated that while in the face of the present financial stringency and the prospects of industrial depression in the near future, there were many cogent reasons why it was not good policy on the company's part to enter into another long term contract at the present rate of wages, yet they felt these considerations were outweighed by the advantages of such a contract in giving general stability to their business, and in enabling them to make long term coal contracts and ship charters, added to the fact that it removed many possible factors of disagreement between the company and their men. For these reasons the company were willing to renew the contract as it stood. The general manager stated that in case the men were unwilling for any reason to renew the old contract, the company were willing to negotiate for a new one with the provision that it must not involve any increase in the cost of mining coal.

These proposals were reported to the Lodges, which we understand all decided definitely to refuse to renew the old contract. At a meeting held on the 27th November, the men asked for an increase of 15 per cent. to all day labor, an increase of about the same percentage to mechanics, that the loaders in all the Phalen seam mines receive a uniform rate of 15 cents per ton, which is an increase of from 25 per cent. to 30 per cent, and that all miners out of places receive \$2.44 per day, when on shift work until such times as places are available.

The men claim that their earnings have been reduced by the introduction of safety lamps and by the use of high explosives and detonators, which have been introduced in many sections in place of compressed powder and squibs, and by the system of company's shotfirers. They state that the mines are over-crowded with skilled labor, and that the native miner is being unfairly displaced by importations of European miners. The scarcity of loaders is also working to their detriment. They point out that the cost of living is much higher than it was, and that with the present price of the necessities of life the wage of the laborer is quite insufficient. The P.W.A. express themselves further, as being opposed to any contracts, preferring to work without, as under these arrangements they are precluded from taking advantage of any marked increase in the selling price of coal, and they would prefer to have their wages regulated by a sliding scale, having the present scale of wages as the minimum basis.

The company state that they cannot consider any general increase to mechanics, who they consider are well paid. The majority of the mechanics employed by the Coal Company did not come within the range of the old contract.

The company state that they cannot consider the rate of \$2.44 for miners out of places. Such a rule they consider would be impossible to carry out, and they could not guarantee to find work for any class of men.

The company recognize that \$1.38 is a small wage, but they point out that the majority of men getting this wage are drivers, or old men past active labor and practically pensioners. Many others earning this wage are unfit for more arduous or responsible work, being physically or otherwise unfit. There are very few men at this wage who are supporting families.

With regard to loaders the company have for a long time had difficulty in getting enough of this class to work their mines to the best advantage, and agree that the wages should be increased in order to make the work more attractive.

The management of the Coal Company have accepted the decision of the men not to renew the old contract as a final answer. The men take the ground that as they do not wish to sign any contract, they had no further proposition to make.

For some time passed labor conditions have been unbalanced at the collieries, and the company's officials contend that this is very largely due to the great disproportion that exists in the remuneration paid for the different classes of underground work. They maintain that some classes are overpaid and that others are very much underpaid, and further, that considerable difference exists between rates at different mines on the same seam under similar conditions, for which there is no adequate or real justification. In the early part of the negotiations for the contract of 1904, the general manager of the Coal Company expressed himself as being favorable to a readjustment of rates, which would remedy this unbalanced state of wages, but was not successful in getting his plan adopted by the men.

Under the circumstances above detailed the management of the Coal Company have decided that the time has now arrived when in the interest of all concerned, such an adjustment should be made, and they have announced their intention to the men to put adjusted rates into force by the first of next year.

The company propose to make an increase in the wage of the loader, making the rate such that he will be able to earn \$2.50 per day with a fair day's work. They further propose to equitably adjust the various mining rates in rooms worked by machines in such a way that the net result will be a slight increase in the total cost of mining machine room coal, and to increase the wages of the labor, excluding drivers and boys. To compensate for these increases it is intended to reduce the tonnage rate in pillars, which are claimed by the company to be so attractive that they cannot get men for the other necessary operations of mining. The management claim that the effect of a schedule such as they propose will be to benefit all concerned, that it will remove the unfair disproportion in rates which has resulted in an overlapping of their organization, that it will render it easier to get and retain the services of loaders, thus guaranteeing steady work to the more skilled and higher paid miners. The company also ask for the abolition or at least considerable modification of yardage consideration in pillars, and an understanding that whenever it is in the opinion of the management unsafe to draw pillars by the use of powder, the man will take these out with maul and wedge without powder at the same remuneration and without any cessation of work until such time as the dangerous conditions are overcome. The company also consider they should receive a fair return for the powder supplied by them to their workmen, which at present is charged at several cents below cost. In future powder will be charged at cost plus 10 per cent. to cover handling, distribution and wastage, the men being given the privilege of purchasing their powder elsewhere subject to its quality being approved by the officials.

At present all the company's employees get their house coal at a reduced rate. The company claim they lose heavily on this account every year, and that with the increase of the resident population the burden is steadily growing. They therefore propose to ask for a considerable increase in the price of workmen's coal.

The schedule of adjusted rates is to be presented for the consideration of the P.W.A. Lodges at their meetings on Saturday the 7th, and it is anticipated the men will give their answer early in the next week.

Up to the present the conference between the management and their men have been marked by fairness and courtesy, and the arguments of either side have been considered without any heat or ill-feeling. For a considerable time past the relations of the Coal Company's management with their workmen have been very pleasant, and it is hoped that they will continue to be so. The company are asking for a reply to their proposals by the 16th of December, and in any case, whether a contract is arranged or not, the new schedule of rates will become effective from the 1st of January 1908.

SPRINGHILL.—The workmen of Springhill have made application for a third Board of Conciliation. Ignoring the finding of

the Board in the first place, they came out on strike for what the Board denied them. While out on strike, and certainly not employees of the company, another hearing was accorded them by the chairman of the second Board. There were no representatives of the company present. Copious evidence was given by the workmen in proof of the justness of their claim. But, after all the evidence was in, even the astute Judge who acted as chairman, was at a loss what to do with it as the men were on strike and the settlement of the strike would be the settlement of all questions between company and men. The list of grievances summed up in this latter reference simply makes all concerned look most ridiculous in the eye of the public. In view of their treatment of the first Board, the men should in decency hesitate before calling another. The Government and the public generally must be greatly exercised over the sort of Board these people want. One man prominent amongst them complained that the first Board was too much like a tribunal of justice, there was no opportunity given a man to say all he wished. Those of the management who do not look upon the whole proceeding with contempt are amused over the situation as developed by the strike.

Weigh scales were placed in position during the strike, and the company have since been weighing all coal taken from the mine. No definite arrangement has yet been made as to the price per ton, but this will be easy of adjustment now.

It is announced that certain capitalists are negotiating for the purchase of the C. R. & C. Co's areas in C. B. Whether this be true or not, it is a well known fact that these areas are the most valuable, unworked on the Island to-day, covering as they do all the seams of the Morien Basin, situated to the south of the Dominion coalfields and midway between the splendid shipping ports of Sydney and Port Morien.

NEW BRUNSWICK.

New Brunswick is proving richer in minerals than many people ever dreamed of. Magnetic iron ore at Lepreaux, a mountain of iron at Gloucester, copper at Letete, with here and there a promise of richer finds, have served to direct public attention to the mineral possibilities of the province.

Premier Robinson, who was in St. John recently, expressed the opinion that the smelter to be erected by the Drummond Mines Limited, for working the Gloucester ore, would be located at Bathurst. According to expert reports made on this property, the mineral formation in that section is remarkable and is unique in the history of mining in Canada. The property is some fifteen miles from Bathurst on the Nepisiquit River and within a few miles of Grand Falls. It is an outcrop of what promises to be a large seam. The ore can be uncovered on the side of the mountain and without the sinking of any expensive shafts.

The property is located at some distance from the more frequented districts and for this reason the existence of the deposit was unknown to many except interested parties. In consequence of this, two or three private parties were enabled to secure control of all the property they desired. The fact that mining can be carried on as in quarries, and without the immediate necessity for the sinking of expensive shafts and the construction of hoisting plants, will greatly cheapen the work and practically the only undertaking of importance in connection with the development will be a railway line of fifteen miles in length from the working to Bathurst. It is estimated that the Nepisiquit River is capable of supplying 10,000 horse-power, which will be much more than can be required in the mines.

Mr. J. J. Drummond, of Londonderry, N. S., was in St. John on Friday, November 29th, and, after a brief stay in the city went to Gloucester County to look over the iron deposits. He expressed his intention of conferring with Premier Robinson and T. M. Burns, of Bathurst.

The most remarkable thing about the deposit, in Mr. Drummond's mind, was the fact that it had not been discovered for

such a length of time. He considered New Brunswick to be practically unexplored, as far as its mineral wealth was concerned.

The exploiting of the iron deposits will be carried on during the winter.

Next summer the Government will begin the construction of the branch railway from Bathurst.

At a meeting of the New Brunswick Iron Company held on Saturday, November 30th, a resolution was passed authorizing the sale of 2,000 shares of stock at \$25 each. This was the only thing done. Cash from the stock sold will be used for development purposes.

Information from Campbellton is to the effect that a rich gold discovery on the Jacquet River had been made recently.

It was stated that the Archibald brothers, who have been prospecting on the river all summer came upon a rich find on Saturday, November 25th. A confirmation of the report has not been obtained at St. John up to the present time.

It has also been learned that the mine owned by Dalhousie and Campbellton parties on the southwest branch of the Upsalquitch is turning out well. The ore is assaying about \$50 to the ton. Workmen have now tunnelled about fourteen feet. When forty or fifty in they expect to strike the ore shoot.

BRITISH COLUMBIA.

FERNIE.—The output of coal from the Crow's Nest Pass Coal Company's collieries is steadily increasing, and it is estimated that before the end of the year, a million tons will have been mined for the year.

There is at present another coke shortage, due this time to the fact that the smelters are not in a position to take coke, and the ovens at Michel and Fernie have been operating about half time for a month past. The Boards of Trade have not been conspicuous in a noisy effort to handle the situation, as they were three months ago. They are not now asking the Government to force the Smelters to take coke, so as to keep the laboring men employed, and the mines and ovens of the Coal Company working to produce coke, as they were in the summer asking the Government to give the smelters coke.

It will be remembered that in June last the smelters of British Columbia raised wages 50 cents a day inside and out, and in this way created a market for labor which left the Crow's Nest Pass Coal Company without men at their ovens, so that they could not produce coke. Copper was then 25 cents. Copper is now 13 cents, and the smelters and miners of British Columbia find it impossible to mine and smelt and pay that wage, so that they have decided to close down. The result is that having created a shortage of coke in the summer, by their action in raising wages, they have now created another coke shortage, so far as coke makers are concerned, by being obliged to go back to where they were in May last.

If anything were wanted to show the unfairness and unbusinesslike action of the smelters last July, after creating a situation in trying to take advantage of it to injure the Crow's Nest Pass Coal Company, and bring the Government to veto the exportation of coke to the United States, it is the present situation. If their policy had been effective, during their present shut-down the whole plant of the Crow's Nest Pass Coal Company would have lain idle, to serve their selfish ends, and until they got ready to again do business, by undoing the mistake they made last June in raising wages.

THE KOOTENAYS.—The local situation has improved a little since last writing. This is due to the acceptance by the Rossland mine workers of the wage scale that was in force prior to the raise in wages of July 1st, and to the fact, that it is highly probable that the Granby mines will begin work on the sixth of

December; at least it is the intention of the mine management to resume operation, provided the miners will go back to work at the same wage scale now prevalent in Rossland and other prominent mining camps. The miners of the St. Eugene mine at Moyie are more or less discontented at the moment of writing, owing to the fact that the Board that is arbitrating their differences in Nelson on the twenty-seventh of November, maintained that it was impossible and unreasonable to accede to the demands of the mine workers. It is anticipated that the Rossland mines will now be able to work along smoothly until general conditions are more favorable, and it is hoped that the Boundary people will get together and that work will be started there as expected on the sixth instant.

As stated above the thing that attracted most attention in Rossland camp during the last ten days, was the question as to whether an adjustment of the wage scale, which is a large item in this camp, could be arrived at. On Tuesday the twenty-sixth ultimo, Rossland Miners' Union took a referendum vote on the question, the mines closing down to afford all the men opportunity to cast their votes, and the result was that a very large majority favored retrograding to the scale of wages paid previous to July first. In view of this manifestation the rate mentioned went into effect on the first instant, and at the present time seems to be very satisfactory all around. It is stated that if the men had not voluntarily come forth and declared themselves as they did, some of the mines here might have been compelled to close down until the prices of metals strengthened. Under the high scale machine miners received \$4.00 per day of eight hours and shovelers got \$3.25. With the scale in force two or three months previous to July 1st, and which is again in effect, machine men are getting \$3.50 for eight hours and shovelers \$3.00; other help around the mines has been correspondingly reduced.

The men employed in the Consolidated Company's smelter, at Trail, B. C., voted on the 28th ultimo on the reduced wage scale, and as in the case of Rossland a majority were in favor of returning to the scale in vogue at the smelter prior to May 1st, at which time wages were advanced there. The question was examined from different view-points by both Unions and many factors entered into the result of the vote, which I cannot go into here, in this short article.

For the week ended November 30th, Le Roi mine shipped 2,240 tons of ore, Consolidated mines 3,635 tons. Le Roi Two shipped 525 tons of good grade ore. This is a fairly good output, and if maintained or increased in the future will bear good fruit. A good deal of important development work is being done on Le Roi, Centre Star, Giant-California and other mines here. So far the results of this development have been very satisfactory.

Mr. Kiddie has taken charge of the Northport smelter, vice A. I. Goodell who has taken charge of the Sullivan property at Marysville.

Ore received at the Trail smelter during the week ended November 30th, amounted to 5,373 tons. The following mines are shipping to Trail: Centre Star, St. Eugene, North Star, Silver King, Arlington, Whitewater Deep, Ferguson, Standard, Ymir and several others, shipments running from 458 tons, in the case of St. Eugene, 68 tons North Star, to 18 tons in the case of the Ymir, taking the mines in the order named.

Since last report the shareholders of the Consolidated Mining & Smelting Company, of Canada, have received their checks for the last dividend declared. The total amount of dividends paid so far by this combination amount to \$848,825.00.

Things have been very quite in the Boundary for the last fortnight. All of the big mines and smelters are closed down tight. There are only about a baker's dozen of men working around the Granby, B. C. Copper and other mines. They are mostly retained as watchmen. At the Consolidated Company's, War Eagle property in the Boundary, over 500 tons of coal have been stored away to be used until electrical power is available. The B. C.

Copper Company is installing a huge 42 x 43 Jenckes Crusher, and has an up-to-date Rand rope driven compressor on order.

Nothing has yet been given out as to the conclusions arrived at by Messrs. Melville and Johnson of the Dominion Copper Company, after their visit to the mines of the company in the Boundary district. A lot will depend upon the action of the Boundary miners. It is stated that the mine operators have gained some concessions in the way of reduced cost for supplies, and if the miners are anxious to see the mines start up at an early date and are willing to give their little aid, the low grads propositions of the Boundary will be able to work along even with copper at its present low price for a while.

For the week ended November 17th, ore shipments from the Granby, Snowshoe, Mother Lode and Emma mines, amounted to 28,403 tons. These were the only mines shipping that week.

The directors of the Granby Company have deferred action on the regular quarterly dividend. The B. C. Copper Company have done the same thing, and it is not known whether the dividend will be paid or not. The last B. C. Copper dividend was 25 cents per share, regular quarterly with 15 cents extra and was paid September 4th.

There are now fifteen blast furnaces cold in the Boundary district, the B. C. Copper Company having blown out their last furnace on November 26th.

The balance of the machinery for the Crescent mine has finally arrived after a long delay, and Supt. Feeney has started work on the property with a force of ten men. They have recently made a strike of silver bearing ore on the Crescent running about \$120.00 per ton.

R. Robert of the Jewel mine has gone to Ottawa on business. There are twelve men now working on the property. They have about 2,000 tons of ore on the dump and the ore body continues from two to four feet in thickness. As soon as the snow covered roads are in good condition for heavy hauling, some of this ore will be shipped to the smelter.

The lessee of the old Cariboo-McKinley mine have suspended operations for a while. It is said that the Providence mine will shortly resume work. The Strathmore, Fremont and E. P. U. mines are working steadily. The decline in the price of copper has not affected these high-grade silver properties the way it has the copper propositions.

There are a large number of men out of employment in the Boundary. In addition to the mining men who are idle, there are about seventy-five Hindus out of work, now that the farm products have been harvested. Unless these Hindus find work the Boundary people will have a small Hindu problem on their hands this winter. Numbers of the mine workers have gone into the hills doing assessment and development work and quite a number of them have gone into the woods cutting ties, getting out cord-wood, etc.

Only about 100 men are now engaged in building the Great Northern branch between Keremeos and Hedley. It is expected that the road will be to Hedley by May next and into Princeton about the end of 1908. The Vermillion Forks M. & D. Company will install machinery some time next year, which will enable them to augment their output greatly. The coal of this vicinity is well adapted to domestic purposes and there seems to be plenty of it. A strike has been recently made on Bear Creek and at Collins Gulch the seam recently discovered measures eight feet. The platinum properties being worked on Champion Creek in the Similkameen are showing up well, where work is being done.

The Guggenheims have suspended work indefinitely on their property in the Cariboo country. It is stated that they are negotiating for a group of valuable claims near the well known Britannia group.

The Britannia mine is now closed down tight, no one being about the place but a watchman. As soon as the ore about the Crofton smelter is cleaned up this plant will also shut down.

The Cornell group on Texada Island has been sold to the Texada Consolidated Mines for a half a million dollars. The Gold Peak group of claims on Moresby Island has been bonded to Tretheway Bros. for \$10,000.00. The Queen Charlotte Islands are very rich in coal, petroleum, gold, copper, silver and timber, and their resources will add materially to the future wealth of the already richly endowed provinces of British Columbia, as soon as they are opened up on a greater extent.

Nelson people have also bonded and are developing valuable Moresby Island copper properties.

The Western Fuel Company, of Nanaimo, has come to an agreement with their employees in the matter of wages, etc. The new agreement makes permanent the 10 per cent bonus recently granted. The Nanaimo mines are now enjoying the largest output they have known in their history.

The Tyee smelter has not been materially affected by the slump in copper and is still in operation. They are treating a high grade ore from a mine on Prince of Wales Island, which with the output of the Tyee and other custom ores is keeping them quite busy.

Another pulp mill proposition is being advanced on the Coast for a plant on Howe Sound. We trust that it will get on a little farther than the plans and specification stage and that the promoters, who are Vancouver people, will get the industry going in eight months, as they anticipate.

The Canadian Zinc Company, of Nelson, have their new electrical process zinc extractor nearing completion. A Nelson syndicate has just recently put up \$10,000.00 to complete the plant. The proposition has been about four years under construction and has cost from sixty to seventy thousand dollars. Zinc ores from the Slocan and other zinc districts will be treated along lines familiar to miners in Sweden. If this separator is entirely successful many of the Slocan mines now inoperative where the silver values are low and zinc percentage are high, can be worked at a good profit.

The 5,600 foot aerial tramway for the Hewitt mine was shipped from Nelson, where it was assembled and where part of it was manufactured, a day or so ago. The Hewitt people have just purchased 1,000 acres of land surrounding their property near Silverton. They have acquired this for the dual purpose of insuring themselves of a reliable source of timber for the future, and over which to run their tramway from the Hewitt number six level to the mill recently acquired from the Wakefield mines. They are negotiating for a compressed air plant and other machinery and it looks as though they meant business. In sympathy with a similar move in other parts of this district wages in the Slocan have come down a little. The Porto Rico mine has been leased to a Spokane man and a force of six men put to work. Poplar Creek, the gold camp, seems to be coming into favor a little again. Considerable work is being done and some good strikes reported. Forty-five men are being employed at the Rambler-Cariboo mine. Capt. Tretheway has resigned from the management of La Plata mine, on account of his health. He is leaving B. C. for the East. Mr. Tretheway will still remain a director of the company.

The Government has been asked for grants to aid in opening the upper Duncan country, which is rich in mineral and timber wealth. One of the companies operating in that section is termed the Consolidated Mining & Smelting Company, of British Columbia. This must not at all be confused with the Consolidated Mining & Smelting Company, of Canada, which is the Rossland concern.

The Sullivan Company at Marysville has just completed the installation of a third Huntington-Heberlein Roaster. It is the idea, however, of the Sullivan Company, to further explore the mines at Kimberly, at depth, before making any further addition to the smelter. As mentioned above in this report A. T. Goodell is now in charge at Marysville.

The St. Eugene arbitration board sat in Nelson on the 29th ulto. The men based their application for higher wages on the higher price of metals and higher cost of living. The company urged that there had been no material increase in the cost of living and that the high prices for metals no longer existed; further, that the St. Eugene miners were getting higher wages than those in Rossland, Butte and elsewhere. Next sitting of the Board will be held at Nelson December 19th, in the meantime there will be a conference held at Moyie.

The Aurora properties across the lake from the St. Eugene and in line with the submarine mine on the lake have been bonded

by Moyie people. About \$10,000,00 has been expended on development work up to date.

Labor is now plentiful along the Crow's Nest Pass, but there is a shortage of coal cars. The Crow's Nest Pass Company pay-roll for October was \$205,416. The provincial mineralogist has been investigating a huge crack in the mountain near Coal Creek. The miners feared a repetition of the Frank disaster. No danger is feared for the settlement of Coal Creek from this break in the hillside, however, as the conditions are not the same as existed at Frank.

Dec. 4th, 1907.

GENERAL MINING NEWS

NOVA SCOTIA.

PORT MORIEN.—The new North Atlantic Collieries, who have acquired the properties of the Gowrie and Blockhouse Collieries, Limited, are making especial provisions for sailing vessels and schooners, whereby they may be loaded with coal with a minimum of delay. Port Morien harbor, being safe, easy of access, and open for the major part of the year, offers inducements not to be obtained at more northerly sea-ports. The run of mine product averages less than 1.00 per cent sulphur and 2.50 ash.

SYDNEY.—The Dominion Coal Company is to ship through Portland, Maine, this winter 195,000 tons of coal, 130,00 tons will be transhipped through Canada and 65,000 tons will be used on the Grand Trunk.

It is reported that the Dominion Coal Company is to import 1,000 Polish and Slav miners between now and May 1st 1908. The men are to be chosen from those familiar with Scotch methods of mining.

SYDNEY MINES.—The Nova Scotia Steel & Coal Company's collieries had an output twelve hundred tons larger during November than during the preceding month.

The figures are as follows:—

Mine.	Tons.
No. 1.....	24,031
No. 2.....	26,387
No. 4.....	488
No. 5.....	7,374
Total.....	58,280

November output was exceptionally good since No. 4 was unable to ship coal on account of some unavoidable delays in construction work. Water is being rapidly taken out of the old No. 2 colliery.

Activity prevails in the other departments of the company's works.

QUEBEC.

MONTREAL.—Dr. B. W. Harrington, Professor of Chemistry, McGill University died on November 29th. Dr. Harrington had been one of the leading figures in his profession for many years.

ONTARIO.

OTTAWA.—The appointment of R. W. Brock, Professor of Geology at the Kingston School of Mining, to the position of Acting-Deputy Minister and Director of the Geological Survey was announced on November 29th.

COBALT.—George Leyson, formerly manager of the Silver Queen, has been placed in charge of the Cobalt Central.

The Cobalt Central Concentrators are now treating over 80 tons of ore per day.

The T. and H. B. mine, it is reported, is to be sold at a satisfactory figure to an English syndicate.

The Silver Bar has suspended mining operations pending the installation of a large new compressor plant.

At the end of November the Tretheway No. 2 shaft was down 85 feet. High grade ore is being shipped from Tretheway to Copper Cliff.

The Cobalt Concentrators, Limited, will conduct a custom sampling business at their Nipissing plant. They will sample only high-grade ore.

Winter roads are to be constructed from the T. & N. O. line to Montreal River district. Contracts have been let already for 37 miles.

The boilers for the new 18-drill compressor of the Nova Scotia mine have been installed.

At the McKinley-Darragh mine the stamp-mill is to be increased to 30 head of stamps.

Experimental shipments of Cobalt ores are being made to Great Britain and Germany. Old country smelters are becoming much interested in the camp.

The King Edward mine has discharged eighty of its men. Only forty are now employed.

The Right of Way will soon ship two cars of high-grade ore. A third quarterly dividend of seven per cent. will result from this shipment.

COPPER CLIFF.—Five cars of Cobalt ore arrived at the smelter on December 2nd. Nine more are on the road.

ALBERTA.

LUNDBRECK.—The Galbraith Coal Company of this place hoisted coal over the new plant for the first time, early in December. The plant cost \$25,000. 100 tons of coal will be hoisted daily.

SASKATCHEWAN

REGINA.—The Saskatchewan Government has acquired from the Federal Government coal areas in the district of Eagle Lake. Arrangements are being carried through by which the Provincial Government will be able to mine and sell coal to settlers, before next April. The Grand Trunk Pacific Railway will pass through the district.

BRITISH COLUMBIA.

VANCOUVER.—The discovery of important seams of bituminous coal is reported 100 miles northwest of Barkerville on the projected main line of the Grand Trunk Pacific. These are the first coal lands discovered in northern Cariboo. Their economic importance is indisputable. The nearest coal lands are three hundred miles west in the Telgna district.

The re-opening of the mines and smelters of the Granby Consolidated was announced by General Manager J. P. Graves, on December 2nd. The men have agreed to accept the scale of wages in force twelve months ago. Output will be increased and plants extended immediately.

The Britannia mines on Howe Sound are closed down indefinitely. It is understood that the shut-down was caused by the owners' loss of money on the New York stock markets.

GRAND FORKS.—A large amount of coke has accumulated at the Granby smelter.

BORMDARY.—Work has started on the Crescent mine. Drifting is being done at the 300-foot level.

ROSSLAND.—The Rossland Miners' Union by referendum vote on November 26th, decided to accept the wage scale that obtained before July 1st. Instead of \$4 and \$3.75, machine men and shovellers will now receive \$3.50 and \$2.75 respectively. The resolution was carried by two thirds majority.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

Great Britain's production of tin last year was 6,698 1-2 tons, of which the Cornwall mines contributed practically the whole, namely 6,690 tons. The high price of tin in 1906, resulted in the re-opening of old mines and thus the year's output shows an increase. Notwithstanding Great Britain as a tin producing country, ranks very low compared for example, with the Federated Malay States, which last year produced nearly 55,000 tons, and of Bolivia, which exported 19,425 tons of metallic tin. Australia with 5,400 tons and China with 4,538 tons are not very far short of British production.

The Miners' Federation of Great Britain have recently decided that an attempt shall be made in all the coalfields of the United Kingdom to merge the present minimum percentage of wage into the existing standard, which would mean a material advantage to them; and the South Wales colliers have already taken steps in this direction. The owners' representatives refused, however, to discuss the question, since they claim it is entirely outside the present agreement, and in any case could not be dealt with until that agreement expires, two years hence.

According to "The Phoenix" magazine published by the Royal School of Mines, all records in shaft sinking have been broken by the Brakjan Mines Company, managed by one of the associates of the School. In the No. 1 shaft of this mine, sinking averaged 143 feet during six months, and more recently 161 feet during three months. The shaft is of the seven compartment type, and is 8 feet wide by 39 feet long.

BELGIUM.

The official returns of this country's mineral production during 1906 have just been made public. The chief industry is coal mining, the production of coal having been 23,569,860 tons, while the industry employed 139,394 persons. Belgium's metal mining interests are small, but the returns show that 3,858 tons of blende, 908 tons of pyrites, 55,950 tons of iron and small quantities of manganese and lead were won. There are, however, very considerable metallurgical undertakings in the country, including thirteen zinc smelters, besides lead and steel works, employing in all over forty thousand persons.

RUSSIA.

Since the beginning of the year the price of platinum has dropped nearly one third, which according to an official report from Russia is attributable to the fact that a great quantity of old platinum has been thrown on the market.

The gold deposits in the North Ural are said to be extraordinarily rich, although they are not being worked to any great extent. This is explained by the "Ural" on the ground that the district

is very inaccessible, and that capital seemingly prefers to engage in quartz mining undertakings. Several years ago the Russian Mining Department commissioned an engineer to prospect these areas, his results and reports being eminently favorable.

UNITED STATES.

The statement of the United Steel Corporation for the quarter ending September 30th, shows a gain in net earnings as compared with the corresponding period of last year of over five million dollars, while the aggregate earnings reached the enormous sum of \$43,804,285.

The report of the State Mineralogist of California places the total value of the mineral productions of that State during the last year at \$46,776,085, as compared with \$43,069,227 in 1905. Of this the production of metallic substances, including precious minerals, represented a value of \$26,156,702; of non-metallic substances, \$2,589,984; of hydrocarbons and gases, \$10,170,273; and of structural materials, \$7,859,126. The principal minerals of the State are first, gold, the value of which produced in 1906 was \$18,732,452; second, petroleum; third, copper; fourth, clays and their products; fifth, cement; sixth, borax and seventh, silver. It is also to be noted that California produced last year a small quantity of asbestos, the value of which was \$3,500.

Imports of mica into the United States last month from Canada and India principally were 572,215 pounds valued at \$242,176.

At the recent meeting of the American Mining Congress at Joplin, Mo. a resolution was passed substituting that passed at last year's session, in favor of the establishment of a Federal Department of Mines. The new resolution advocates the creation of a Bureau of Mines and Engineering Investigation, under the Department of the Interior to: (1) Investigate and inquire into the nature and extent of the mine and quarry industries of the United States; (2) investigate in foreign countries concerning methods of mining, etc.; (3) investigation of, and enquiries into the engineering problems of the Government, and the testing of materials belonging to or for the use of Government; (4) to cooperate with the Geological Survey in determining the value of mineral products; (5) to publish and promptly distribute information so obtained.

The American Smelting & Refining Company has issued a circular announcing a change in methods of quoting prices on lead. The circular states the practice in the past has been to adhere to a fixed schedule for pig-lead, and to only change this schedule at rare intervals; but that henceforward prices will be fixed according to market conditions.

What is said to be the biggest and most remarkable coal mine in the world is known as Vesta No. 4, at California, Pa. During the first month of the mine's existence it produced 174,338 tons of coal, maintaining a daily output of from six to seven thousand

tons. In the mine are 600 rooms and 85 miles of stationary railway track, over which twenty-eight electric locomotives draw the coal to the surface. Steel 3-ton trams are used, one hundred going to a train. When the mine was opened two months ago, the tracks were equipped with 60-pound rails, but these proving too light, they have since been replaced with 90-pound rails. It is the intention to continue production at the rate of 175,000 tons monthly, and there is said to be sufficient coal in sight to keep the mine working for sixty years.

A coal-damp explosion at the Naomi mine, Fayette City, Pa., on December 1st, caused the death of thirty miners. The explosion was so terrific that the air-system was completely wrecked. The probable cause of the accident was the use of an open lamp in an old working. The Naomi mine is one of the largest bituminous mines in the district. It is owned by the United Coal Company, of Pittsburg, and gave work to 250 men.

VIRGINIA.—Monangah mines Nos. 6 and 8 of the fairmount Coal Company, subsidiary to the Consolidation Coal Company, of Baltimore, were the scenes of the horrible catastrophe of December 6th. Every effort has been put forth to rescue the 350 miners entombed by the terrible explosion of "black damp." Altogether 85 bodies have been brought to the surface. Heart-rendering scenes are witnessed daily at the pit-mouth.

COLOMBIA.

Many important discoveries of platinum are reported to have been made recently in the province of Lloro, but seemingly the Government intends to reserve the areas, as applications for mining rights have been refused. The Colombian Congress not long ago since passed a disposition constituting platinum a Government monopoly.

MEXICO.

The export metals from the Mexican Republic during the year 1906-07 was valued at \$160,246,002, of which the exports of silver were \$99,861,790; gold, \$23,873,713 and copper, \$28,018, 693.

AUSTRALIA.

Mine owners generally in Australia are complaining of the increased cost occasioned by the Federal tariff on the working of their mines, and recently a deputation waited on the Government to point out the unreasonable character of many of the new

duties. They were assured, however, that a high protection would continue to be maintained on machinery which, with this assistance, Australian manufacturers were capable of producing.

The State Government of New South Wales has appointed a Commission to enquire into the question of electricity in coal mines. The board will be required to decide, whether the use of electricity in gaseous mines is attended with danger. The contention of the miners is that compressed air alone should be employed in gaseous mines, and electricity in mines where no gas has been found.

An official report upon a discovery of asbestos in the Pilbarra district, Western Australia, states that the property is situated in a very rough country, 15 miles west of Cooglegong. The asbestos occurs in the serpentine belt running northeast and southwest, and mounded by 1 large jasper dykes. The serpentine varies in width from about 5 to 20 chains. Very little prospecting work has been done, however, and the value of the discovery is therefore quite problematical.

New iron and steel works were recently established at Lithgow, New South Wales, and production is now being made at the rate of 700 tons a day.

NEW ZEALAND.

The gold production of New Zealand last month was 26,167 ounces valued at £102,691, or considerably less than one half the yield for October, 1906.

SOUTH AFRICA.

The Government of the Transvaal has decided to operate a gold mine as a training school for miners, which remarks the correspondent of the "London Mining Journal," has met with very general approval. Considering the large number of white laborers, who are anxious to secure a training as mine workers, the step should result in advantages all round.

Costs at a number of the mines on the Rand have been considerably increased by the repatriation of Chinese miners. Thus at a recent meeting of the Glen Deep Company, the chairman, that in consequence of the necessity of replacing Chinese by native workers, the monthly profit of the Glen Deep, which during the past financial year averaged £10,000 fell to £7,423 in August and to £2,751 in September. The working costs in August had risen to 23s. 8d., and in September to 26s. 1d., as compared with an average of 21s. per ton for the year ending September, 1906.

STATISTICS AND RETURNS.

COBALT ORE STATEMENT.

For the week November 16th to 23rd:—

La Rose Mine, to Denver Col.—Nov. 18th, 66,000; Nov. 18th, 41,210; Nov. 19th, 41,335; Nov. 19th, 54,000; Nov. 19th, 66,000; Nov. 19th, 44,000; Nov. 20th, 66,000; Nov. 20th, 44,000; Nov. 20th, 66,000; Nov. 21st, 66,000; Nov. 21st, 66,000; Nov. 21st, 66,000; Nov. 22nd, 44,000; Nov. 22nd, 44,000; Nov. 23rd, 66,000; Nov. 23rd, 66,000; Nov. 23rd, 44,000; Nov. 23rd, 44,000; total, 994,545.

Temiskaming Mining Company, to American Smelting & Refining Company, Perth Amboy—Nov. 22nd, 63,000.

Totals—1,057,545.

Dominion Coal sales for November show an increase. November, 1907, 335,811 tons; November, 1906, 308,367 tons; November, 1905, 303,440 tons.

Following are the weekly shipments from Cobalt camp, and those from January 1 to-date.

	Week ending	Since Jan. 1.
	Nov. 30.	Ore in lbs.
Foster	95,500	611,806
Hudson Bay	134,000	179,170
Kerr Lake (Jacobs)	44,000	539,770
La Rose	1265,000	5,491,545
Nova Scotia	92,230	248,230
Silver Queen	120,000	957,157
Trethewey	53,750	1,648,438
Townsite	42,200	234,278
Temiskaming	63,000	355,011

The total shipments for the week were 1,912,680 pounds, or 956 tons. The total shipments since January 1, 1907, are now 25,905,811 pounds, or 12,997 tons.

RAND GOLD OUTPUT.

Gold production of the Rand during November is estimated at 545,000 fine ounces, against 553,553 fine ounces in October, and 583,373 fine ounces in November last year. The value of the November output, calculated on the basis of the above estimate, compares as follows with preceeding months and years:—

November, 1907	\$11,581,000
October, 1907	11,757,000
September, 1907	11,527,000
August, 1907	11,788,000
July, 1907	11,314,000
November, 1906	11,328,000
November, 1905	9,021,000
November, 1904	7,139,000
November, 1903	5,932,000
November, 1902	3,979,000

The output of the Dominion Coal Company's collieries in November was, roughly, 336,000 tons, as compared with 308,367 tons in November, 1906, and 342,469 in October, 1907. Comparative figures follow:—

	1907.	1906.	1905.
January	252,248	231,606	160,612
February	226,190	225,716	128,778
March	203,194	310,220	228,765
April	316,384	296,417	221,541
May	328,947	323,777	294,647
June	319,560	325,911	332,926
July	314,559	318,291	329,164
August	316,633	327,734	329,172
September	295,058	323,733	322,288
October	342,469	350,009	333,317
November	336,000	308,367	303,440
December		206,884	211,877
Totals		3,248,565	3,196,527

COBALT ORE SHIPMENTS.

Following are the weekly shipments from Cobalt camp, and those from January 1 to, date:—

	Week ending Dec. 7 Ore in lbs.	Since Jan. 1. Ore in lbs.
Buffalo	160,000	2,298,820
City of Cobalt		101,230
Coniagas	175,800	4,798,710
Cobalt Central		101,360
Colonial		74,250
Drummond		108,920
Foster		611,806
Green-Meehan		196,780
Hudson Bay		179,170
Imperial Cobalt		37,530
Kerr Lake		539,770
La Rose	171,600	5,663,145
McKinley Darragh	253,050	1,265,565
Nipissing		4,468,000
Nova Scotia		248,230
O'Brien	60,780	2,666,360
Red Rock		91,443
Right of Way		134,530
Silver Leaf	50,100	93,618
Trethewey		1,648,438
Townsite		234,278
Temiskaming	45,600	400,611
University		61,388

The total shipments for the week were 917 pounds, or 458 tons. The total shipments since January 1, 1907, are now 26,912,831 pounds, or 13,456 tons. In 1904 the camp produced 158 tons, valued at \$136,217; in 1905, 2144 tons, valued at \$1,473,196; in 1906, 5129 tons, valued at \$3,900,000.

The output of the Crow's Nest Pass collieries for the week ending November 29th was 21,820 tons, a daily average of 3,637 tons. For the same week last year the figures stood 13,736 and 2,289 tons.

The output of the Crow's Nest collieries for the week ending December 6 was 23,212 tons, a daily average of 3,869 tons.

British Columbia ore shipments for week ending November 30th stand as follows:—

Boundary shipments—Week, 19; year, 1,141,000.

Rossland shipments—Week, 7,038; year, 256,380.

Slocan-Kootenay shipments—Week, 3,705; year, 160,419.

The total shipments from the mines in the above districts for the past week were 10,762 tons, and for the year to date 1,557,799 tons.

Trail smelter receipts—Week, 5,373; year, 242,622.

Le Roie smelter receipts—Week, 2,862; year, 91,386.

Marysville smelter receipts—Week, 600; year, 28,800.

The total amount of receipts reported from the local and foreign mines for the past week were 8,835 tons, and for the year to date 1,427,887 tons.

Shipments from the collieries of the Cumberland Railway & Coal Company, Springhill, N.S., for November were 28,741 tons. No shipments were made during August, September and October, as men were on strike.

Company Notes.

NORTH STAR MINING COMPANY, LIMITED.

The directors have to report that during the summer diamond drilling has been carried on over a small extent of the company's property, until operations were stopped by weather conditions. Some of this work was encouraging, but no new large bodies of ore were discovered.

The mining operations during the last six months have been fairly satisfactory. Additional small bodies of ore have been found in the old workings, from which ore has been shipped at the rate of about 300 tons per month. The value of this ore has averaged about \$14.00 per ton, after deducting freight and treatment charges, but not mining expenses. The company's manager reports that there is at present in sight about 1,500 tons, which will enable the company to continue shipping at the same rate during the winter months.

The directors have declared a cash distribution at the rate of two cents (2 cents) per share, and notice is hereby given that the transfer books of the company will be closed at noon, on Tuesday, the 10th December, and dividend will be paid to shareholders of record on the above date on the 20th December.

The annual meeting of the stockholders of Cobalt Central Mining Company will be held on December 20th.

The Calumet & Arizona Copper Company has declared a quarterly dividend of \$1.50 per share. The dividends three months ago was \$5 a share.

Calumet & Hecla has declared a quarterly dividend of \$10 per share. This compares with \$15 per share declared in September, \$20 in May, \$20 in February and \$20 in November, 1906.

The first annual meeting of the Coniagas Mines, Limited, was held at the company's office, St. Catharines, on Saturday, November 30th, with a large representative number of the shareholders present.

Mr. R. W. Leonard, president, submitted the director's report for a period of eleven months, ending October 31, 1907, showing the result of mining operations for that period. A full report will be printed and ready for distribution to the shareholders in a few days.

The following is a correct abstract taken from it:—Gross returns, \$779,285.13, less total working expenses, including cost of organization, freight and treatment, etc., \$154,522.91; net returns, \$624,762.22; dividends paid, 1 to 3, inclusive, \$240,000; bonus paid, \$40,000; dividend payable November 1, 1907, \$80,000; total, \$360,000; balance, \$264,762.22.

In addition to the above there is ore stored in dump to be concentrated of an estimated value after allowing for concentrating and treatment charges of \$100,00.

Since the close of the year the president explained that a shaft to reach a lower level had been sunk to a depth of 60 feet under the 75 foot level, and that the ore at that depth was equal to any so far encountered. In reply to a vote of confidence in the management, the president stated that the one aim of the management had been to make his mine a business man's proposition, and this policy would be carried out as long as the present management continued.

The Wile Power Gas Company, of Cleveland and New York, have removed their general offices from Cutter Buildings, Rochester, N.Y., to their works, 1688-92 Columbus road, Cleveland, Ohio, where all communications should henceforth be addressed.

The company formerly known as the J. R. Alsing Company has changed its name to the J. R. Alsing Engineering Company. Its capital stock has been increased from \$20,000 to \$100,000. No change has been made in the personnel of the management. The main office is at 136 Liberty street, New York.

The Deister Concentration Company, for whom C. B. Fitch is Canadian agent, have shipped four No. 2 Deister tables to the Coniagas Mines, Cobalt, Ont.

The statement of the McKinley-Darragh Mine, issued on November 21st, shows total cash on hand to be \$53,536. To this amount must be added approximately \$120,000 due on ore shipped to the smelters. The following figures represent receipts and expenditures from the organization of the company until November 1st, 1907.

Receipts from sale of treasury stock	\$162,304.92
Receipts from sale of ore	127,081.18
	\$289,386.13

Disbursements—

Savage mine—

Debts	\$ 6,244.88
Plant	14,550.90
Development and operations	18,399.90

McKinley-Darragh—

Plant	36,667.25
Development and operating	90,135.86
General	24,404.73
Interest and discount	1,503.22
Office furniture	242.44
Dividend	44,150.96

The balance left on hand is \$53,536.47.

Since July 10th, when a car load of ore netting \$21,147.37 was sold, ten car loads, or 562,000 pounds, of ore have been shipped. Forty-nine thousand four hundred and eighty-three dollars and seventy-seven cents has been received in cash, and \$125 remains due the mine for ore sold. On November 1st there were on hand at the mine of No. 1 ore 51,770 pounds; silver nuggets from the lake shore, 4,495 pounds; concentrates, 24,896 pounds; No. 2 ore, 141,485 pounds. The value of the above ore is estimated at \$52,000. Since July 7th, then, 934,400 pounds of ore have been produced, worth, roughly, \$200,000.

The completion of the coffer dam across the south end of Cobalt Lake and the pumping out of the water rendered available not only nuggets but some second grade and milling ores. Altogether 4,500 pounds of nuggets; 100 tons of 300 ounce ore; and 1,500 tons of milling ore, 150 ounces to the ton, were won by the dam.

METAL, ORE AND MINERAL MARKET.

Aluminum, No. 1 grade ingots—37 to 40 cents per lb.
 Antimony—7 3-4 to 10 cents per lb.
 Arsenic, white—6 1-4 to 6 3-4 cents per lb.
 Barytes, crude—\$18 to \$20 per short ton.
 Bismuth, metal—\$1.75 per lb.
 Cadmium, metal—\$1.50 per lb.
 Carbons for drills—\$70 to \$90 per carat.
 Carborundum, powdered—8 cents per lb.
 Chromium, metal pure—80 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.
 Flourspar, 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 per ounce.
 Platinum, scrap—\$18 per ounce.
 Pyrite—10 to 11 3-4 cents per unit for 38 to 45 per cent. sulphur, lump ore or fines.
 Quicksilver—\$45 per 75 lb. flask.
 Sulphur—\$10 to \$21 per long ton.
 Tale—\$15 to \$40 per short ton, crude.
 Tungsten, pure metal—\$1.20 per lb.
 Tungsten ore, 60 per cent. pure—\$9.50 per unit.

MARKET NOTES.

Silver, Nov. 21st, 58 1-2; Nov. 22nd, 58 3-8; Nov. 23rd, 58 3-4; Nov. 25th, 58 3-8; Nov. 26th, 57 7-8; Nov. 27th, 57 3-8; Nov. 29th, 57 3-4; Nov. 30th, 57 5-8; Dec. 2nd, 57 3-4; Dec. 3rd, 57 3-4; Dec. 4th, 57 7-8.

Dec. 4th, Mexican dollars, 46 1-2 cents; sterling exchange, \$4.86.

Copper.—Both New York and London markets are weak, with a small volume of business reported. New York, lake 13 1-2; electrolytic, 13 1-4 on Dec. 4th; London, £60.

Spelter.—The market in spelter has gone to pieces. New York, 4.45 cents; London, £21.

Lead.—Market still weakening. Very little business. New York, 4.05 cents; London, £15 15s. for Spanish.

Tin.—Market weak. New York, 30 1-4 cents; London, £144 10s. for spot.

Pig Iron.—Pittsburg, Bessemer, \$18 to \$20. No. 2 foundry, \$18.50.