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CIRCULATION.

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SUMMARY REPORT OF THE GEOLOGICAL SURVEY BRANCH OF THE DEPARTMENT OF MINES FOR THE CALENDAR YEAR—1908.

The operations of the Geological Survey for the calendar year 1908 were more than ordinarily extensive. All the provinces and territories, with the exception of Manitoba, were given special attention. The Survey itself underwent some changes in organization. New efforts were made to meet the need for more topographical work and, in most respects, the Survey has had a successful year, despite the delay in receiving appropriations.

Amongst the changes noted in the director's report is the formation of two committees. One of these, the Geological Committee, was created for the purpose of supervising carefully all geological reports and the geologic coloring of maps before printing. Whatever delay this may entail will be amply offset by increased clearness and accuracy.

The second committee, an Editing Committee for Maps, was appointed to standardize maps, settle upon scales, and examine critically all maps before they are allowed to go to the engraver.

Quite apart from the elimination of errors, the work of these committees will tend to elevate the professional standards of each number of the Survey. The desire to get a report finished often leads the geologist to hurry his material into the printer's hands before it has been sufficiently pruned. When, however, he knows that a group of his associates is empowered to correct, modify, or to reject his reports and maps, he will be by no means eager to take unnecessary chances.

This is not the only good effect that should result from the establishment of these Committees. A Committee is impersonal. The officer of the Survey, whose work is pronounced imperfect or careless, will be apt to take his medicine more cheerfully than would be possible if on one person alone devolved the task of correction. Moreover, both committees will tend to give each member of the staff a better understanding of the difficulties, discouragements and merits of his colleagues.

The director lays emphasis upon the increasing demand for economic work. "There is . . . a wide demand for the careful study of districts containing economic minerals, and this assistance the mining public can reasonably ask of the Government."

The library of the Survey is to be made more complete. Two distributing lists are to be maintained for the Survey's publications—an exchange list, on which will be placed public libraries and institutions publishing scientific reports; and a notice list of private individuals. All reports and maps issued will be sent to

addresses on the former list; to the latter, notices of all publications as they are issued, and such publications as are requested therefrom.

Cabinets of representative Canadian rocks and minerals, prepared by members of the Survey staff, have proved most acceptable to educational institutions both here and in Great Britain. With the better facilities provided by the new building this branch of the Survey's activities will be greatly expanded.

The desirability of co-operation with the various Provinces is forcibly touched upon. It is pointed out that contoured topographical maps are indispensable, not only from a geological point of view, but also from many other standpoints. The benefits are equally shared by the Dominion as a whole and by the individual Province. Provincial assistance and co-operation would enable the Survey to cover much larger areas in its season's campaign.

After alluding to certain disabilities under which officers of the Survey labor, the director expresses his unqualified opinion that the salaries paid are far too small. In the United States Geological Survey the salaries range from \$6,000 down. The majority of responsible officers receive from \$4,500 to \$3,000. This standard has been recognized as inadequate and steps are being taken to raise it. In the Canadian Survey salaries are little more than half as large as those paid to United States officials. That the position of the Canadian Survey is unsatisfactory and undignified hardly need be stated. That it cannot hope, while the present rates of remuneration are maintained, to retain the proper type of technical employee is absolutely certain. This matter has been brought to the attention of the Dominion Government time and time again. It is hard to understand what possible reason the Government can have for prolonging a condition that will very soon bring loss and discredit upon the whole country.

It is not expedient to take up many other topics touched on by the director. We cannot refrain, however, from bringing to the attention of the Minister and the Director the fact that the Eastern Provinces are still waiting for an official visit. Last year both of these gentlemen visited the mining centres of Alberta and British Columbia. A similar tour through Ontario, Quebec and the Maritime Provinces would be beneficial to the Department and to the mining industry.

The tone and contents of the Summary Report show that Director Brock is performing the duties of his office with vigour, tact, and a degree of vision that is, perhaps, remarkable. Already the Survey has been largely removed from the sphere of political influence. Its field is being widened, its standard raised, and it is becoming what it should be, a connecting link between the mining industry and the public.

RECIPROCITY IN COAL.

To the manufacturer and to the ordinary user of fuel the cry for the removal of tariff restrictions on United States coal is seductive in the extreme. It is an easy matter to adduce fair and convincing arguments in favor of reciprocity. And one of the most cogent of these refers to the fact that the natural market for Nova Scotian coals is the Atlantic seaboard—not the St. Lawrence. Even more cogent is the statement that the collieries of British Columbia and Alberta cannot attain their proper growth until they find an open market in the Western States.

It is claimed by the advocates of reciprocity that not only would the price of coal drop immediately, but that also the prices obtaining hereafter would be uniformly lower. Further it is urged that Nova Scotia could readily switch her attention to the New England market without undue present loss and with the certainty of a much larger volume of trade. It is also confidently asserted that the growing Canadian West would receive a tremendous impetus.

In all this there is much truth. It is unfortunate, however, that a serious gap is apparent in the reasoning of many of reciprocity's warmest votaries. Whatever the natural markets for Canadian coal should be, the fact remains that Canada has developed her eastern and western coal fields almost entirely without the possibility of seeking other than Canadian consumers. This condition was created not by Canada, but by the United States. Our neighbor, realizing that sooner or later Canadian coal will be necessary to supplement its own supplies, has made tentative but very definite advances. Undoubtedly the United States desires the abolition of the tariff, both to secure in larger measure the Quebec and Ontario trade and also for the reason indicated above.

Incidentally there is remarkable unanimity in the expressed opinions of our eastern coal operators. They appear to be by no means desirous of exchanging their present markets for those of New England. It may be that they are the best judges of their own business.

Considering the question from a national point of view, we believe that Canada has much to gain by restricting the exportation of raw material. The coal mines of Alberta and British Columbia will be a greater or less source of wealth to those provinces and to the nation generally, in proportion as greater or less quantities of their product are used by Canadian enterprises. Naturally this holds true also of Nova Scotia.

As regards the specific arguments advanced by free-traders, it is not amiss to request an answer to certain questions. Two of these questions, probably the most effective, are these: Has Canada any guarantee that the reciprocity in coal would continue in force for more than a limited period? Is there any certainty that the removal of the tariff would mean a corresponding permanent reduction in the price of coal? It

is also pertinent to enquire as to whether the next generation of Canadians will be losers or gainers through any step taken now.

The whole problem must be worked out, not with an eye to the most rapid development and exhaustion of our coal deposits, but in a manner that will best conserve the future greatness of Canada and the Empire.

POINTS OF VIEW.

It is true of coal mines and iron mines that the annual net profit—when there happens to be a profit—is small indeed compared with the total cost of production. For this reason, other things being equal, it is not a matter of grave moment whether the stock of the Crow's Nest Pass Coal Company is controlled by Americans, Germans, Kurds, or Hindoos. The principal consideration is that these important collieries be developed economically and adequately. Unless radical changes are made in our tariff relations with the United States the market for Crow's Nest Pass fuels will be confined more or less to its present geographical limits. As a business venture, the profits accruing to its shareholders are not alarmingly large. Its operations, however, furnish a livelihood for more than 2,500 men, and its coke is essential to the smelting industries of Southeastern British Columbia.

Roughly, for every dollar of dividends that these collieries earn for the company's shareholders, ten or twelve dollars are spent in Canada. Thus a demand for machinery, supplies and merchandise of all kinds is created. Briefly, the benefits that Canada as a whole derives from such large mining concerns are immediately greater than the profits reaped by all the shareholders can ever be.

Our contemporary, "The Financial Post of Canada," has been scolding about United States control of Crow's Nest Pass. It has reflected with pointless wrath upon the recently appointed president. The "Post" is confounding patriotism with provincialism.

INSPECTION OF MINES.

Our Cobalt correspondent calls attention to the need of a resident Inspector of Mines in the Cobalt district. At present Ontario employs only one Inspector. As our correspondent points out, it is impossible for that official to enforce his recommendations. Although his powers are wide it is out of the question to think that his orders will be observed by mine operators who may see him only once or twice in six months. Indeed, it is impossible for one man to cover the Province of Ontario as closely and as frequently as conditions demand. No matter what penalties may be imposed upon those who disregard the requirements of the Mines Act, it is obvious that the proper enforcement of these regulations in a district like

Cobalt requires the constant presence of a Government official.

We believe that this is a matter that should engage the immediate attention of the Ontario Bureau of Mines. The unnecessary sacrifice of human lives must not be tolerated. Lives will continue to be sacrificed unless a thorough system of inspection is inaugurated.

Inspector Corkill has proved himself a competent and trustworthy man. But far too much is expected of him. It is time that he were given a corps of assistants.

EDITORIAL NOTES.

The Cobalt Branch of the Canadian Mining Institute has sprung into new life. A reading-room and library are to be opened for the benefit of members and visiting mining men. A complete collection of ore and rock specimens is to be displayed. The branch will be supported entirely by local subscriptions, entirely distinct from the general funds of the Institute.

Dr. Milton L. Hersey has donated \$10,000 to the Metallurgical Department of McGill University. The revenue from this sum is to be applied to the purchase of special apparatus for research work in processes. It will be remembered that Dr. Hersey recently gave a similar amount to the School of Mining, Kingston. These are examples that might well be followed by a few more Canadians.

Mexico has declared her ability to take care of herself in mining matters. There is now in process of organization a Mexican Institute of Mining and Metallurgy, a society closely resembling in constitution our own Canadian Mining Institute. Annual and monthly meetings are to be held in the Mexico City. The membership comprises three classes, namely, members, associate members and honorary members. The proceedings will be published in Spanish, but it is specially provided that any member can make a motion, present a paper, or enter into discussion in either English or Spanish. Such motions, discussions, and papers will be printed in the language in which they are submitted.

MONEL METAL.

It is claimed for the new alloy, monel metal, produced by the International Nickel Company, that it possesses 25 per cent. greater tensile strength and 50 per cent. greater elastic limit than the best rolled steel, with the superadded quality of incorrodibility. In chemical composition it is as follows:—

Nickel—68 to 72 per cent.
Iron—0.5 to 1.5 per cent.
Sulphur—0.014 per cent.
Carbon—0.073 to 0.15 per cent.
Copper to balance.

The new alloy is silver white, takes a brilliant polish and retains it indefinitely. It is finding many uses.

COAL MINING IN ALBERTA DURING THE YEAR 1908.

DEVELOPMENT OF OLD MINES AND OPENING OF NEW.

The Province of Alberta is fast becoming a considerable contributor to the coal output of the Dominion. In the year 1906 her production was 811,228 tons. Last year, 1908, the output amounted to 1,845,000 tons. That this is but slight increase—10,225 tons—over the returns for 1907, is due to adverse trade conditions. The number of new mines opened and the addition to the equipment of mines already operating indicate that Alberta is preparing for largely increased activities.

The classification of output shows that bituminous coal still preponderates. The figures for the past two years stand thus:—

	1907.	1908.	
Lignite	639,335	584,334	tons
Bituminous	939,295	1,011,571	"
Anthracite	256,115	249,095	"
Totals	1,834,745	1,845,000	"

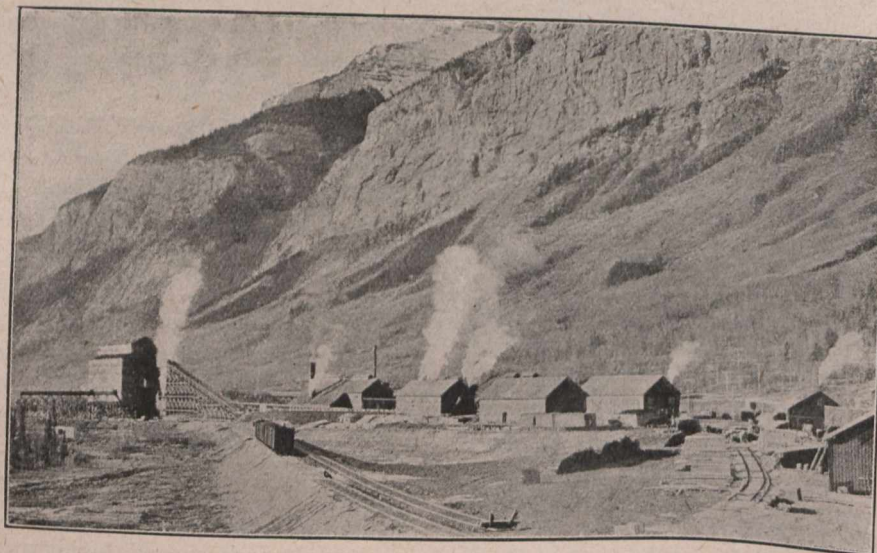
coking coals. Towards the east the high-grade lignite coals are found.

A few notes as to improvements and additions to plants may now be given.

International Coal and Coke Co., Ltd., Coleman.—Additions have been made to the screening plant. These comprise new picking tables, conveyors, and screens. One high pressure Canadian Rand air compressor was installed and two compressed air locomotives acquired; 40 beehive ovens were added.

Bankhead Mines, Ltd., Bankhead.—One additional 150 h.p. Robb boiler was installed. A new unit of briquetting plant, capacity 300 tons of briquettes in 24 hours, was erected.

Hillcrest Coal and Coke Co., Ltd., Hillcrest.—A new boiler and power house has been erected at the foot of the tippie. Safety lamps and electric lights are now in use in the mines.



SURFACE PLANT OF BANKHEAD MINES, LTD., BANKHEAD, ALTA.

The production of coke and briquettes is as follows:—

	1907.	1908.
Coal used in coke production..	112,887	128,397
Coke produced	73,782	75,657
Briquettes produced	49,585	36,261

During 1908 there were 112 coal mines in operation. Of these 19 were opened during the year. Two old mines were reopened, and six mines were abandoned.

Out of the 112 operating mines, only nine are producing bituminous coal. One, Bankhead Mines, Limited, is an anthracite mine; all the rest are producing lignite. All of the nineteen new mines opened are working lignite. From the figures of production given above, it is apparent that the majority of the lignite mines are small concerns.

Coal is being mined in the south practically from the eastern to the western boundary. In the west large bituminous mines produce both steamcoals and

H. W. McNeill Co., Ltd., Canmore.—A complete high pressure compressed air plant and compressed air locomotives have been installed. This has reduced the number of horses necessary for underground haulage.

Canadian American Coal and Coke Co., Ltd., Frank.—New screens and new electric light plant have been installed at this mine.

Galbraith Coal Co., Ltd., Lundbrek.—Wolff safety lamps and Monobel powder have been introduced here.

West Canadian Collieries, Ltd., Blairmore.—At the Bellevue mine a new tippie has been erected, equipped with cross-over dump and picking tables, capable of handling one thousand tons per day. An electric light plant for lighting tippie, mine buildings, and main gangway of mine, has been installed. Wolff safety lamps are now employed, and all blasting is done by qualified shotlighters.

Alberta Railway and Irrigation Co., Lethbridge.—This company have added to their No. 3 plant one 125 h.p. and one 175 h.p. Robb-Mumford boilers. At their No. 3 mine two new shafts have been put down, and

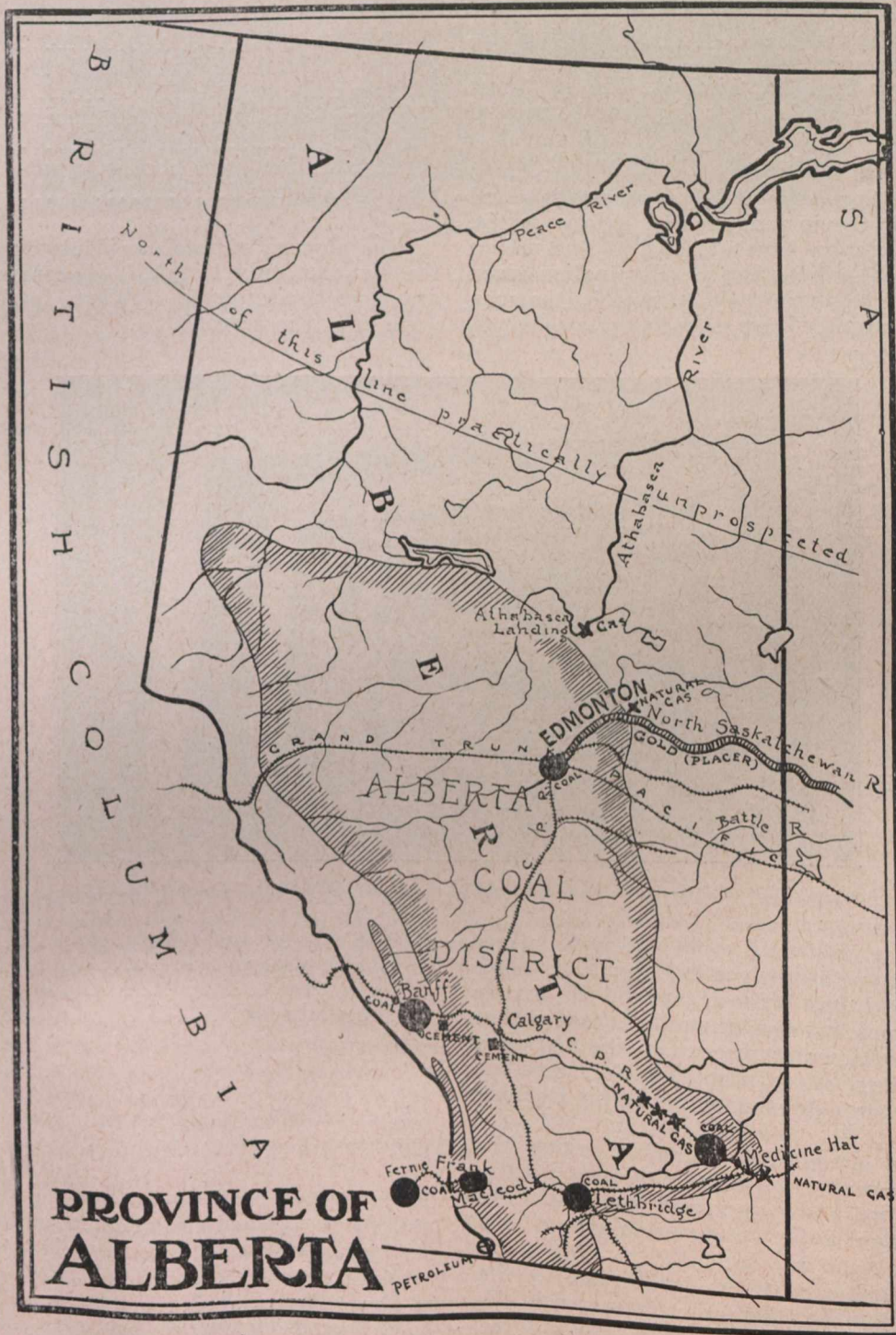
much new plant installed. A new steel tippie, capacity 1,800 tons per day, is in course of erection.

Diamond Coal Co., Ltd., Diamond City.—Brick buildings have been erected and, amongst other machinery, are a 275 h.p. haulage engine, three 150 h.p. Robb-Mumford boilers, a pumping station, and considerable electrical equipment. One Morgan-Gardner

compressed air punching machines. All main haulage roads and air courses have been enlarged.

Royal Collieries, Ltd., Lethbridge.—A branch railway now connects this colliery with Lethbridge, six miles to the south. A tippie, 400 tons per day, has been completed.

In the Edmonton district a considerable amount of



electric coal cutter and one Jeffrey electric coal cutter are in commission. The tippie is designed to handle an output of 1,000 tons per day.

Canada West Coal Co., Ltd., Taber.—At this mine the daily output has been increased to about 700 tons per day. Electric coal cutters have been replaced by

coal is produced for local domestic and manufacturing purposes. Most of the towns along the Canadian Northern Railway as far east as Saskatoon are supplied with fuel from these mines. Some of the larger enterprises are the following:—

The Alberta Coal Mining Co., Ltd., operates at Car-

diff. The mine is equipped with a double drum Flory hoist and a first-class screening plant. The output is now about 100 tons per day. An output of 500 tons per day is aimed at.

The Cardiff Coal Company, Ltd., is one of the largest producers in the district. This company is working a lignite seam about 15 feet in thickness, lying at a depth of from 18 to 40 feet from the surface.

The Twin City Coal Company, Limited, has one of the best equipped mines in the district. A complete compressed air plant and outfit of coal cutting machines has been acquired.

The Clover Bar Coal Co., Limited, through whose property the G. T. P. has built its line, is to be worked on a large scale.

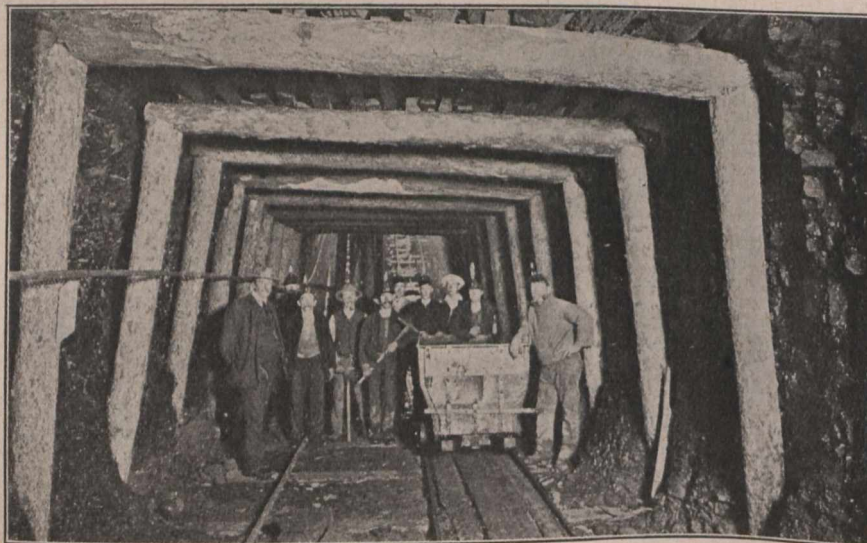
Accidents.

The Provincial Inspector of Mines reports less and less opposition to the introduction of safety lamps. "Some of the operators have objected to the use of safety lamps on the ground that the illumination given by the safety lamp is inferior to that given by the open light, thus causing miners to be more liable to accident,

Of a total of 62 accidents, 11 were fatal, 38 were serious, and 13 were slight. A comparison with 1907 is interesting:—

	1907.	1908.
Average number of persons employed inside the mines	2,700	2,681
Average number of persons employed outside the mines	900	1,099
Number of fatal accidents inside the mines	17	11
Number of fatal accidents outside the mines	2	Nil
Number of non-fatal accidents inside mines	75	43
Number of non-fatal accidents outside the mines	11	8

The absence of fatal accidents above ground, and the fact that only 11 fatalities occurred underground, are most praiseworthy. What fatal accidents did occur are thus classified:—



UNDERGROUND WORKINGS OF THE ALBERTA COAL MINING CO.'S MINE, CARDIFF, ALTA.

as with the inferior light they could not make such a thorough examination of their working places. This statement may hold true with regard to the earlier forms of safety lamps, but it is generally conceded that with the improved lamps at present on the market a sufficiently good illumination is obtained to enable the miner to make a thorough examination of his working place.

"Owing to the introduction of safety lamps the number of small burning accidents has been greatly reduced within the past two years, and in no case have we any record of there being an explosion caused by a safety lamp igniting gas in a mine."

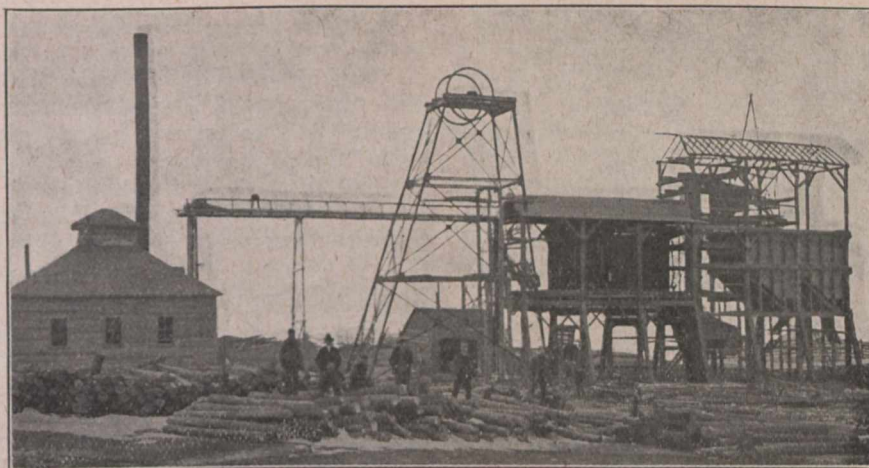
The past year saw a considerable decrease in the number of accidents. The most serious occurred in the No. 1 mine of the H. W. McNeill Co., Ltd., where three men lost their lives in an explosion of gas from the Carey seam. The accident was due to the utter disregard of orders on the part of a certificated shotlighter, who fired a shot charged with dynamite when he had instructions to see that only Negro Powder was used. Lax discipline is noted as one of the contributory causes.

Fall of roof and sides	4
Gas explosion	5
Mine cars	1
Miscellaneous	1
	—
	11

The serious accidents fall into the following groups:—

	Serious Accidents.	
	Above.	Below.
Fall of roof and sides	—	12
Gas explosion	—	6
Mine cars	—	10
Explosives	1	1
Falling down chutes	—	1
Miscellaneous	5	2
	—	—
	6	32

The rate of fatalities below ground is 4.1 per thousand men employed, as compared with 6.30 per thousand in 1907.



BRECKENRIDGE & LUND COAL CO.'S PLANT AT LUNDBRECK, ALTA.

Prospecting.

In the remote districts of the province a large amount of prospecting has been done during the year. Throughout the prairie country a number of bore holes were put down. But the largest undertakings are carried out in the mountainous regions towards the western boundary of the province, where the German Development Company, the Kananaskis Coal Company, Limited, and the Canadian Northern Railway Company, Limited, have been active. The first-named company has had a force of men in the field all summer, and many valuable seams of coal have been opened up

on their Kananaskis, Big Horn, and Brazeau coal lands. It is reported that the C. N. R. will shortly build a line into the Brazeau coal fields. This will provide a new source of bituminous coal for railways in the north.

The Inspector, in concluding, mentions last year's visit of the Canadian Mining Institute excursion as having given wide advertisement to the mineral resources of Alberta.

The wage scale obtaining during 1908 was practically identical with that in force during 1907. The latter schedule will be found in the Canadian Mining Journal for September 1st, 1908.

PETROLEUMS AND COALS.

Compared in Their Nature, Mode of Occurrence and Origin.

By Eugene Coste, E.M., Toronto.

(Printed as an advance paper of the Canadian Mining Institute.)

There is found in nature a great variety of compounds of carbon, not only in the sedimentary strata of all ages, but also in crystalline rocks, in igneous and volcanic rocks, in seams and veins through all these, and even in meteorites.

All these carbon-compounds have been assigned by many geologists as having the one and the same origin, namely, an organic origin from the decomposition of distillation of either animal or vegetable organic matter entombed in the strata, and they have all been grouped and classed into the one and the same series of compounds of carbon.

This organic origin cannot, of course, hold good for the natural carbon-compounds found in crystalline rocks, in igneous and volcanic rocks, in volcanic gaseous emanations, in metallic seams and veins where they are intimately associated with such minerals as quicksilver, for instance, and also when they are found in meteorites. It has, therefore, always seemed to me that this idea of only one natural series of compounds of carbon with an organic origin is so clearly at variance with so many well-known geological facts and physical laws that I cannot cease to wonder how it is possible for such a huge error to have taken the firm root it has in the science of geology. In two papers

which I read before this Institute, one nine years ago¹ and one six years ago,² and in another paper which I read in 1904 before the American Institute of Mining Engineers³ and before the Franklin Institute,⁴ I entered my strong protest against this fallacy. I pointed out in these papers the solfataric volcanic origin of the natural hydrocarbons or petroleums. Other geologists have also long ago given proofs of the inorganic origin of petroleums, especially Berthelot, Mendeleef, Eli De Beaumont, De Lapparent, and a number of other writers, mostly French and Russian.

But it evidently takes a long time to establish definitively even simple and palpable truths in science, as may be judged from some of the recent literature on the subject⁵ in which the derivation of the natural hydrocarbons from organic matter is either again admitted without discussion or again sought to be proved. It appears, therefore, necessary that some of

¹Journal Can. Min. Inst., Vol. III, 1900, pp. 68-89.

²Journal Can. Min. Inst., Vol. VI, 1903, pp. 73-128.

³Trans. Am. Inst. Min. Eng., Vol. XXXV, pp. 288-297.

⁴Journal Franklin Institute, Philadelphia, 1904.

⁵The Data of Geo. Chemistry, Bulletin No. 330, U.S. Geol. Surv., pp. 619-641. See also U.S. Geol. Surv., Bul. No. 250, 265, 282, 285, 300, 309, 317, 318, and others.

the facts in the case be once more presented, and I have adopted in this paper the comparative form, between coals and petroleums, in the hope that it will bring out more forcibly and more clearly how entirely and absolutely different some of the natural carbon-compounds are to others in their nature, their mode of occurrence and their origin, and in the further hope that it will demonstrate that there are really two series of natural compounds of carbon, namely the organic or the coal series, or coals, and the volcanic or petroleum series, or petroleums.

Nature.

Coal Series.—The coal series includes the natural carbon-compounds grading into one another from vegetation into peat, lignite, soft coal, semi-anthracite and anthracite. The exact chemical nature and proximate constitution of the members of this series are imperfectly known, and are not yet fully made out, but they are nevertheless established to be complex oxidized carbon compounds grading from definite carbo-hydrates into carbon-compounds richer and richer in carbon and poorer and poorer in oxygen as the natural carbonizing process of vegetation proceeded, the end product, anthracite, still retaining, however, some 2½ per cent. to 3 per cent. oxygen.

One hydrocarbon, namely, marsh gas or methane, is known to form during the natural decomposition of vegetation into coals; this is the only hydrocarbon thus formed. Many other gaseous or liquid hydrocarbons may be produced by the destructive distillation of carbonaceous matter or of coals, but these have nothing to do with the carbon-compounds formed in Nature by the normal geological processes as the destructive distillation of the sedimentary strata and of its carbonizing vegetation is not a normal geological process and never took place. This is conclusively proved by all the undistilled lignite and coal beds of the sedimentary strata all over the world and by the want of coke beds in these strata.

It may be well to point out here also that coal beds, being more or less porous strata, may and no doubt have been impregnated, in places, with gaseous and liquid petroleums, and hence these particular beds of coal, in these places, will be found really to contain natural hydrocarbons, but these are the result of a secondary enrichment by impregnation of the original coal deposit. These cases are, however, the exception, and do not in any way affect the problem, except as exceptions do, namely, to prove the rule.

Petroleum Series.—The petroleum series includes all the natural hydrocarbons, with the exception of marsh gas, above mentioned. These petroleums grade from natural gas into fluid crude oil or petroleum proper, into semi-fluid maltha and into viscous or solid bitumens or asphalt in their many varieties, of which such minerals as grahamite, gilsonite, elaterite, napalite, ozokerite, albertite, anthraxolite, are only a few. As the end products of this petroleum series there are good reasons, as we will see, to include both graphite and diamond, whose deposits prove that they also have had a similar inorganic origin.

A good definition of the nature of petroleum is the one of Mabery,¹ as follows: "Petroleum, from whatever source, is one and the same substance, capable of a simple definition—a mixture in variable proportions of a few series of hydrocarbons, the product of any particular field differing from that of any other field

only in the proportion of these series and the members of the series."

Mabery referred, I believe, in the above definition only to the crude oil or petroleum proper, but it applies equally well to natural gas, to maltha and to viscous or brittle solid asphalt; and it may be said, therefore, that all the members of the great petroleum series, as here understood and defined, are mixtures of different hydrocarbons in greater or less variety.

Mode of Occurrence.

Coals.—With regard to the mode of occurrence of the members of the coal series it is only necessary for the purpose of this paper to note that they are always found in regular beds of the sedimentary strata, spreading far and wide uniformly often over hundreds and even thousands of square miles. The marsh gas of the decomposing vegetation has partly escaped into the atmosphere in the early part of the process or possibly even later, if the folding, fissuring and faulting of the coal measures have been strong, as, for instance, in the anthracite fields of Pennsylvania. What marsh gas did not thus escape, however, has not mysteriously transformed itself into the mixture of the many varieties of hydrocarbons constituting petroleums, but it is still found as marsh gas right in the coal from which it originated and where it becomes to-day the dreaded fire damp of the coal miner, often mixed with considerable choke damp or carbonic acid and with considerable nitrogen. This gaseous mixture is a very different gas from the mixture of hydrocarbons constituting natural gas; it is never, like natural gas, associated with liquid petroleum and with large quantities of very strong salt and sulphur waters, and can only be confused with it by superficial observers.

There is only one more point which I think pertinent to make here with regard to the mode of occurrence of the coals, and that is that no coal beds are found below the Carboniferous period. A small amount of coal or carbonaceous matter is, however, found in some of the Devonian shales, but this never passes into pure coal beds and fewer of these carbonaceous shales are found in the Silurian and Cambrian. The science of geology has always interpreted and explained this fact, that so little coal is found below the Carboniferous, on the understanding that before Carboniferous time the conditions for the existence of considerable growth of vegetable matter were unfavorable, and it is a geological heresy to speak of or to believe in coal beds existing in formations lower than the Carboniferous; geology teaches us that they cannot and do not exist there. How is it then that there are so many large deposits of petroleums below the Carboniferous? It could not be, since there was so little vegetable or other organic matter entombed in these early strata, unless their origin is not in any way organic.

Petroleums.—If the mode of occurrence of coals is well understood, I may say by all, the mode of occurrence of petroleums certainly is not, and hence the great misunderstanding by so many about the origin of the latter. Instances are multiplying in which the natural hydrocarbons are found in emanations clearly volcanic and in igneous and volcanic rocks that is in places "where they have no business to be," according to those who believe in and support the organic origin of petroleums.

Still these petroleums are found often in such places, and no well-informed geologist can ignore this fact or

¹Journal Am. Ch. Soc., 1906, XXVIII., p. 417.

¹G. R. Mickle, Journ. Can. Min. Inst., Vol. VI., p. 123.

refuse to take account of it. Some geologists have passed such, to them, unwelcome cases over with the remark that the petroleum in the igneous or volcanic rocks were no doubt due to the distillation of the bituminous shales cut through by the intrusions; but how can a hot rock distill or drive away a vapour into itself? Some new principles in physics would have to be invented to permit of this explanation, which is simply a contradictory use of language and not a logical argument. It is also a fallacious reasoning, a reasoning in a circle, to attribute the origin of oil to bituminous shales or to shales containing oil, that is to say, to oil. In one of my previous papers¹ on this subject before this Institute I cited a good many instances of petroleum in volcanic emanations or in igneous or volcanic rocks, and I now refer you to this paper for full particulars of these, but I will recapitulate here what these instances prove beyond all doubt:

1st. The occurrence of graphite in igneous gneisses, granites, gabbros, pegmatite dykes, and in a quartz-porphry dyke.

2nd. The occurrences of hydrocarbons in the gaseous inclusions of the crystals of igneous rocks.

3rd. The occurrence of petroleum (liquid, semi-liquid and solid) in greenstone traps, in basalts, in trachytes, in dolorites and other volcanic rocks.

4th. The occurrence of diamond and gaseous hydrocarbons in volcanic necks and pipes.

5th. The occurrence of gaseous and liquid petroleum in the volcanic emanations of to-day.

6th. The occurrence of petroleum in freshly ejected scoriae from the volcano Vesuvius.

I will now in confirmation of the above cite a few other direct proofs of the occurrences of petroleum in crystalline rocks, in volcanic or igneous rocks or in close connection with these, and in metalliferous veins.

1st. Oil in crystalline gneiss. In Placerita Canyon, five miles east of Newhall, Los Angeles County, California, a very light oil, almost naphtha, of a gravity between 50° and 60° B., is produced from crystalline gneisses which overlay the San Gabriel granite.² It was discovered in shafting for gold. There are seven wells there, producing from depths of between 400 and 1,100 feet, one of them yielding between five and six barrels per day of oil, with 30 or 40 barrels of salt water, and another one spouted high when the oil was first struck. The crystalline schist or gneiss in which the oil occurs is micaceous and granitic, conspicuously banded and greatly contorted.

2nd. Oil and bitumen in the quicksilver deposits of California. The occurrence of petroleum in the Redington quicksilver mine, New Idria, Cal., and in the other quicksilver mines of that State, has been reported by Luther Wagoner,³ Prof. Egleston,⁴ Becker,⁵ Prof. Christy,⁶ and many others; it occurs abundantly as liquid oil, viscous tar, solid asphalt, and also in the gaseous state of natural gas intimately associated in the veins with the cinnabar and with metallic native mercury. Many other instances of petroleum found in quicksilver veins in Europe and in other metallic veins could be cited, in which the solfataric volcanic origin of not only the mercury or other metals, but also of the petroleum, is very apparent. The petroleum in such

deposits cannot possibly have an origin different from that of the metals themselves.

3rd. Graphite and natural gas in the metalliferous vein of Silver Islet, and graphite in the veins at Cobalt and Ducktown, Tenn. The natural gas and graphite found in abundance at the Silver Islet mine has often been cited.¹ Graphite was found there not only in the metalliferous vein intimately associated with rich native silver, but also in the norite or gabbro dyke accompanying the vein. At Cobalt, graphite is also found in many of the complex cobalt-nickel arsenides and silver veins.² Prof. J. F. Kemp, in his paper³ on "The Deposits of Copper Ores of Ducktown, Tenn.," says "graphite or some closely related carbon-mineral is met in occasional specimens of the ore of the Mary mine. It appears to specially favor the crushed masses, and was probably of late introduction. It not only forms fine leaflike aggregates, but in this section may be detected by the microscope as minute spheroids in the midst of other minerals, such as calcite and chalcopyrite. It must have been introduced as some gaseous or very mobile liquid hydrocarbon, which has penetrated into minute cavities and filled larger cracks, and has been subsequently changed to graphite."

4th. Solid petroleum in pegmatite dykes and certain veins associated with uranium, radium and vanadium. J. Obalski, in a very interesting paper read before the 1904 meeting of this Institute,⁴ mentioned the fact that he found in a pegmatite dyke worked for mica a radio-active carbonaceous material burning quite easily and leaving ashes containing oxide of uranium, and also that he found in the same dyke some "cleveite," an ore of uranium strongly radio-active and containing one-tenth of a milligram of radium. Similar so-called "coals," which are, however, solid hydrocarbons or petroleum, are found in veins in Peru,⁵ and are mined for the vanadium they contain; these veins form lenses of "asphaltite" or solid petroleum from 0.5 inches to 22 feet wide and as much as 500 feet long, in a well-defined belt 15 miles long in the Yauli district, Peru; they are parallel and in close proximity to an obsidian intrusive dyke. In the Quespi district, Peru, there is another deposit of solid petroleum, forming also a lens-shaped mass with a maximum width of 28 feet and length of 350 feet, occupying one of the faults of a quartz porphyry dyke. Similar occurrences of hydrocarbons containing vanadium and uranium have been cited by other writers.⁶

5th. Graphite, diamond and hydrocarbons in meteorites. It is well known that pure carbon in the form of graphite and diamond has often been found in meteorites,⁷ but it is not so well known that hydrocarbons have also been found in them, as cited by N. V. Sokoloff.⁷ C. Tschermak also reports 0.85 per cent. of hydrocarbon in the meteorite which fell at Goalpara, India.⁷

6th. Oil and natural gas in volcanic rocks in Europe, Africa and Mexico. O. Silvestry⁸ has found both liquid

¹Journ. Can. Min. Inst., Vol. VI., 1903, pp. 73-128.

²Bulletin U.S. Geol. Surv., No. 309, pp. 100-104.

³Eng. and Min. Journ., Vol. XXXIV, p. 334.

⁴Trans. Am. Inst. Min. Eng., iii, p. 273.

⁵U.S. Geol. Surv. Monograph, xiii, pp. 371-373.

⁶Trans. Am. Inst. Min. Eng., xiii, pp. 547-548.

¹Eng. and Min. Jour., Vol. XXXIV, pp. 320, 323, 453. See also Ore Deposits of the U.S. and Canada, by J. F. Kemp, p. 283, and Eng. and Min. Jour., Vol. XXIII, pp. 54, 55 and 70, 71.

²Prof. W. G. Miller, Bureau of Mines Report, Ontario, 1907, Pt. II.

³Trans. Am. Inst. Min. Eng., XXXI, 261.

⁴Jour. Can. Min. Inst., Vol. VII, pp. 245-256.

⁵Bulletin Am. Inst. Min. Eng., No. 27, March, 1909, pp. 291-316.

⁶See Bulletin U.S. Geol. Surv., No. 330, pp. 611-616.

⁷See Bulletin U.S. Geol. Surv., No. 330, p. 632.

⁸Gazz. Chim. Ital., Vol. 7, p. 1, 1887; Vol. 12, p. 9, 1882.

oil and a solid paraffin in basaltic lavas near the volcano Etna. Similar occurrences have often been cited from other parts of Europe, as, for instance, in Hungary,¹ where liquid petroleum, asphalt and bitumen are found in rhyolite tufts, rhyolitic quartz-trachyte and andesite. On the Elansdraai farm,² Hopetown district, Cape Colony, South Africa, two dolerite intrusive sheets were traversed in a well between the depths of 121 and 137 feet, and of 364 and 401 feet, and both were found to be rich in oil in their cracks and crevices. Many other dykes and sheets of intrusive rocks in Central British South Africa are also found richly impregnated with oil.

I have myself examined similar occurrences in dolerite dykes and in calcite veins running across upper Cretaceous strata in the State of Chihuahua, Mexico.

7th. Natural gas in serpentine,³ Asiatic Turkey. On the southwestern coast of Asia Minor, north of Cape Chelidonia, is the famous Chimaera, or "stone that burns," of the ancient Greeks. Here gases are continually disengaged from fissures, and are known to have been burning for at least 2,800 years, as the phenomenon was described by Hesiod before the time of Homer. According to the Russian geologist, Tschiateff, the gas is emitted from fissures in an altered igneous rock (serpentine), which is intrusive in limestone.

8th. The occurrence of oil around volcanic necks, Mexico. As described by Ezequiel Ordonez,⁴ in the State of Tamaulipas, Mexico, in the Gulf Coast lands, the oil deposits are found around vertical borings, chimneys or pipes drilled upward through undisturbed and almost horizontal shales by volcanic action during the Pliocene and perhaps Post-Pliocene times, and forming small isolated cones ranging from a few feet to four or five hundred feet in height. These cones of volcanic origin spread over the coastal peneplain, and consist either of solid basaltic lava or of basaltic tufa. At the base of these cones, or in their neighborhood, are to be found the greater number and more important seepages of oil. The Mexican Petroleum Company, at Ebano, near Tampico, have obtained their more productive wells at the base of the tufaceous cones, such as the Cerro de la Pez, where from but very few wells around this hill they have secured a daily output of 6,000 barrels. In the more highly productive wells of this company the heavy oil, abundantly charged with gas, carries a sandy material, consisting of small sharp pieces of shale, fine lapilli, and volcanic sand. The conditions above described as to the occurrence of oil prevail in an extensive zone of the Gulf-Coast lands, and extend further south in Mexico to the northern half of the State of Vera Cruz. Any number of cones, peaks and pyramids of volcanic origin are here also distributed over the coastal plain, piercing through very slightly folded or undulated strata of shales, interbedded with limestones and sandstones in thin layers, the whole probably of Upper Cretaceous age. The oil seepages are always found here also around the volcanic hills, but more frequently near the isolated volcanic peaks than in places where such peaks are closely grouped and surmounted on large bases which are composed of lava streams, preventing the oil from seeping out to the surface. Mr. Ezequiel Ordonez further says:⁵ "In the coastal plain lying between Tampico,

Tuxpan and Papantla will be found the greater number of volcanic hills, and the more important and densely distributed oil seepages of Mexico. I shall name a few of them. Near the Laguna de Tamiahua there exists a large pool of asphaltic oil, close to the twin volcanic hills known as Los Hermanos. Not far from the Sierra de Tantima is another big dry asphaltic lagoon. On the Hacienda de Tiacolula we found two oil seepages, one on either side of the basaltic hill called Temaxcales. The large volcanic mountain near the Hacienda de Tamatoco gives birth to several exudations of oil; on the eastern side, and not very far from its base, is found one of the larger seepages, named La Chapopotera de Juan Felipe, having an extent of one-half mile. The Chapopotera de Cerro Viejo, those of the Hacienda del Chapopote and others nearer Tuxpan are also extensive and important." It is along the Laguna de Tamiahua, mentioned by Mr. Ordonez as affording a large seepage of asphaltum oil close to the twin volcanic hills known as Los Hermanos, that S. Pearson & Son's wonderful and uncontrollable oil gusher¹ has since been drilled in a property known as the San Diego de la Mar, at a point on the lagoon known as Dos Bocas. The first well drilled on this property by the firm of Pearson & Son came in at 2,005 feet, with an estimated production of 5,000 barrels of oil daily. The second well came in on July 4th, 1908, at a depth of 1,824 feet, and the oil flow was so enormous that it lifted the 1,283 feet of 8-inch casing in the hole, and also the 43 feet of 11½ casing, and broke out in every direction on the outside of the casings, catching fire from the boiler and burning, it is said, for a time at the rate of 100,000 barrels of oil daily, and for 57 days before it could be put out by pumping sand and gravel into the crater formed around the well. Three weeks after the fire was put out the diameter of the crater was 400 feet, and soundings taken 30 feet from the sides showed a depth in places of 200 feet. Approximately two acres of earth dropped into the crater at one time from the sides. This crater later on became so big that the well was finally abandoned, and it is now a veritable geyser of oil, mud and water, throwing out, it was estimated on November 1st last, 14,000,000 barrels of an emulsion of oil, mud and water.

Other instances could be given here of petroleum deposits directly connected with vulcanism, but the one just cited is enough to prove that oil fields are not commonly remote from great indications of volcanic activity, as it has been contended,² and that on the contrary enormous quantities of oil are obtained in the porous sediments or tufaceous sands around volcanic necks. When the petroleum is found, however, in the igneous, volcanic or crystalline rocks themselves it is impossible to find more than small quantities, as the necessary porosity to store these products in large enough amounts to be economically valuable is, of course, wanting on account of the imperviousness of the crystalline texture of these rocks. These small quantities of hydrocarbons are nevertheless found in many regions all over the earth in whatever small cavities, cracks and seams are co-existent with the crystalline texture of the igneous, volcanic and crystalline rocks, and even in microscopic inclusions inside of their crystals.

On the contrary, in the sedimentary strata of all ages some of the sediments, principally sandstones, con-

¹Trans. of the Inst. of Min. Eng., Vol. XXXV, Pt. 6, p. 721.

²Trans. of the Inst. Min. Eng., Vol. XXXV, Pt. 4, pp. 545, 558.

³"Mineral Industry," New York, 1902.

⁴Mining and Scientific Press, Aug. 24th, 1907, pp. 247, 248.

⁵The Mining and Scientific Press, Aug. 24th, 1907, p. 248.

¹Eng. and Min. Journal, Jan. 2nd, 1909, pp. 7, 8, 9.

²The Data of Geochemistry, U.S. Geol. Surv., Bulletin No. 330, p. 633.

glomerates, limestones and sandy shales, are occasionally quite porous rocks, and therefore may and do form catch basins, tanks or reservoirs for gaseous or liquid petroleum forcing their way under strong pressure through the fractures, fissures, seams and joints of the strata. These reservoirs when thus filled constitute the important petroleum deposits, the commercial oil and natural gas fields. They are found indiscriminately in hundreds and hundreds of horizons in the strata of all ages, from the oldest Paleozoic to the alluvial gravels and sands of the Quaternary. The natural gas or igneous petroleum in these reservoirs is always found to have a heavy pressure, sometimes as high as 1,500 pounds to the square inch, and in this connection the most important factor to be noted is that this pressure in each particular field with the depth of the porous reservoir or sand containing the petroleum, indicating that its source is from below. It has been proven¹ beyond a doubt that this pressure is not a descending artesian or hydrostatic water pressure, the main proof being the uniformly decreasing pressure of the gas as it is being taken out; nor is it a pressure exerted by the weight of the superincumbent strata, since the gas is in the pores of firm coherent rocks not under crush. The origin of this pressure requires no explanation, and becomes self-evident when the true volcanic origin of the petroleum is understood.

Far from forming, like the coals, uniform beds spreading out uninterruptedly in every direction over wide regions, the petroleum reservoirs, on the contrary, are always found to form comparatively small, local, accidental and irregular pockets, pools or fields. In these pools or fields themselves extreme irregularity is often the characteristic of the reservoirs; patches and strips of barren and productive territory being intermixed in most intricate manners, leading often to productive wells being surrounded by dry holes, and vice versa. In many of these fields the oil and gas are obtained in a number of different sands or reservoirs, some of which are hundreds and thousands of feet lower than the upper one, and again in that respect in some of the fields there is great irregularity as to what depth the producing reservoir will be found; in neighboring wells the oil or gas may be tapped at entirely different depths. To any keen observer the above features at once indicate absolutely that the petroleum in all of their reservoirs are wanderers, not in their original home, and that all their deposits are deposits of secondary impregnation. This adventitious character of the petroleum in all their deposits is a self-evident proposition when the ever-present strong pressure of their natural gas is remembered. Fluids so elusive, ready to gush out with such force the moment the drill pierces their reservoirs, and evidently ever impelled upward through disturbed, faulted and fractured strata by the strong pressure of their gas, can never be in their original home, and the evidence that they are not is most abundant.

But there is another most important feature of the oil and gas fields, and that is they are generally very much elongated in one direction, and the different fields or pools of the same district are always arranged in lines along folded and fissured zones or belts parallel to the tectonic structure or to the orogenic uplifts of the region. The maps of the Appalachian oil and gas fields and of the Northwestern Ohio oil and gas fields published by the respective Geological Surveys of these

demonstrate that these fields form two parallel oil and gas belts to the Appalachian range of mountains, each belt being several hundred miles long. Many other illustrations of this may be found in the maps of the oil and gas districts of California, Galicia, Roumania, Russia and other oil regions. The oil and gas fields in these last-mentioned countries are always found ranged in belts at the foot and on each side, respectively, of the Coast range of the Carpathian Mountains and of the Caucasus Mountains. It is most marked in Galicia and Roumania, where the Carpathian Mountains form, as is well known, a semi-circle, and the oil and gas fields also States, illustrate this last feature most eloquently, and form the same semi-circle on both sides of the mountains and along their foothills or ranges. This reminds one of the metallogenetic provinces referred to and indicated by some geologists in regard to the incoming of particular metals into the strata at various periods of the earth's history in connection with certain volcanic manifestations and intrusions of that particular period, and along the great organic uplifts of that period. De Launay, Lindgren, Spurr and others have, in several of their writings, pointed out clearly some of these metallogenetic provinces. The alignment of the petroleum fields in every region in parallel belts to the orogenic uplifts or to the tectonic fissuring of that region shows conclusively that there are also in nature "petroliferous provinces" or petroleum-bearing belts no doubt due to causes similar to those which have given us the metallogenetic provinces, namely, tectonic disturbances accompanied by volcanic emanations. As De Launay remarks in his "Science of Geology,"¹ "the dislocations of the earth are more and more observed to have taken place, not alone in mountainous regions, but even in regions of plains"; he also remarks that² "all the regions of the earth, probably without exception, have been subjected to dynamic movements, to which are connected igneous manifestations of internal origin." These remarks will explain how petroleum fields even at long distances from mountainous ranges and in flat plains, such as the Northwestern Ohio, Ontario, Indiana, Illinois, Texas and Louisiana fields, etc., can nevertheless be connected with the tectonic structural dislocations of this continent and to the volcanic emanations which have accompanied these structural dislocations during the different geological ages. For further proofs of the connection of oil and gas fields with the disturbances of their region, even in the States which I mentioned last, where it is not at all apparent on the surface, I refer you to the following papers, one by G. D. Harris,³ on the "Geological Occurrence of Rock Salt (associated with petroleum in Louisiana and Eastern Texas);" another by H. Foster Bain,⁴ "State Geologist of Illinois, on the "Geology of Illinois Petroleum fields;" to the records of the late Edward Orton,⁵ on the "Northwestern Ohio Fields," and to one of my previous papers⁶ before this Institute.

In the California oil fields a most obvious connection is to be seen in most of the fields, between the occurrence of oil and the very strong and profound disturbances of the strata occasioned by the orogenic uplifts of the hills and mountains of the Coast range. Con-

¹La Science Geologique, L. De Launay, Paris, 1905, p. 229.

²La Science Geologique, L. De Launay, Paris, 1905, p. 351.

³Economic Geology, Vol. IV, No. 1, Jan. and Feb., 1909, pp. 21-34.

⁴Economic Geology, Vol. III, No. 6, August-September, 1908, pp. 487.

⁵Geology of Ohio, Vol. VI.

⁶Journ. Can. Min. Inst., Vol. VI, pp. 102-108.

¹Journ. Can. Min. Inst., Vol. VI, pp. 96, 99.

trary to many other oil fields, the oil is here often found in highly disturbed and intensely crushed strata, and in many cases along well defined and prominent structural faults. I refer you to Eldridge and Arnold's most interesting bulletin¹ on the Santa Clara Valley, Puente Hills and Los Angeles districts of Southern California for many good proofs and examples of this. Briefly, the evidence in this bulletin shows conclusively that the oil fields follow, in narrow but long belts, the much disturbed and faulted zones at the foot of the higher mountain ranges of the Coast Range, and that the oil is found to be stored in the porous reservoirs, rocks or in the seams and joints of any and all the strata affected by these disturbances in a vertical geological scale of some 25,000 feet, including at the bottom crystalline schists and gneisses resting on granite, then a great thickness of Tertiary resting unconformably on these crystalline schists, then an upper unconformable series, partly Tertiary and partly Quaternary, called the Fernando, and finally, overlapping all, unconformable beds of the Quaternary. To go into more details, the oil is found in the Santa Clara Valley in ascending order in the following formations:—

¹U.S. Geol. Surv., Bulletin No. 309.

In the crystalline schist and gneiss penetrated by the walls to a depth of 1,100 feet; above this there is a great unconformity, but the oil is still found in the following strata in ascending order:—

- Lower Eocene—Topatopa quartzites, sandstones and hard shalesabout 5,500 feet thick
- Upper Eocene—Sespe red sandstones and conglomeratesabout 3,500 feet thick
- Oligocene—Vaqueros shales, limestones and sandstonesabout 3,000 feet thick
- Miocene—Modalo sandstones and shales (probably equivalent to the Monterey formation)about 3,500 feet thick

Here there is another distinct unconformity, but above it we still find oil in the

- Miocene, Pliocene and Pleistocene—Fernando conglomerates, sandstones and arenaceous claysabout 9,000 feet thick

Here again is another distinct unconformity, but above it we again find the oil in

- Pleistocene gravel, sandstones, clays and conglomerates of variable thicknesses.

To be continued.

COINAGE IN THE BRITISH EMPIRE.

(Written for the Canadian Mining Journal by J. J. Harpell.)

In the matter of coinage as in that of credit the United Kingdom, more particularly London, may rightly be regarded as the money market of the world. According to the last official returns her imports and exports of gold and silver coin and bullion for the year 1907 were as follows:

	Imports.	Exports.
British gold and silver coin.	\$41,306,000	\$97,813,000
Foreign gold and silver coin	64,231,000	41,500,000
Gold and silver bullion.....	247,870,000	198,454,000
Total	\$353,407,000	\$337,767,000

In addition the imports of gold and silver in the ore amounted to \$15,287,000, and the exports of the same to \$100,000. The imports of gold leaf were \$597,000, of which \$5,000 was exported. From these figures it will be seen that, neglecting the amount which may have gone out of or come into the country in the shape of manufactured articles made entirely or partly of gold and silver, the United Kingdom imported some \$40,000,000 worth of these precious metals more than she exported in the year 1907.

Incidentally these figures furnish substantial proof that the mother country is not being drained of her gold and silver as some people would have us believe, who point to the very great excess of total imports of raw materials, food stuffs and manufactured goods over total exports, which excess in the same year, viz., 1907, amounted to \$640,000,000. Evidently the many ways in which this excess may be liquidated, such as by the interest on foreign investments, the earnings of the British merchant marine and the profits from international banking, insurance and other business, are more than sufficient.

Another feature of the figures given above which deserves special notice in passing is the large imports

and exports of coins of foreign countries. This is a fair indication of the cosmopolitan character of Britain's intercourse with the world both industrial and otherwise.

But the feature of the above figures that is more pertinent to the subject of this article is that much of the precious metals comes into the United Kingdom in the form of bullion and goes out in the form of British coin, in which form the greater part of that remaining in the country is also to be found. And it is with the British minting system that I desire to deal more particularly. The figures given above pertain only to the United Kingdom. But in dealing with the manufacture of coin a general reference will be made to minting in the colonies and dependencies as well as a more or less full account of the operations as they are carried on at the Royal Mint in London; because the mints of the Empire form one great system, those in the colonies being more or less branches of the Royal Mint in London.

The world's production of gold in 1907 was \$414,700,000. Of this the British Empire produced \$247,350,000. During the same year the gold turned into coin by all the mints of the world amounted to \$369,170,000, as follows:

British Empire	\$152,384,000
United States	80,452,000
France	75,652,000
Germany	16,227,000
All other countries	44,355,000

The world's production of silver in the same year was \$239,775,000, of which the British Empire produced \$38,141,000. In the same year the value of silver turned into coins was \$207,902,000, as follows:

British Empire	\$101,835,000
United States	13,110,000
France	16,017,000
Germany	20,922,000
All other countries	56,018,000

In addition to gold and silver coins, the British Mints turned out \$2,676,848 nickel coins, \$271,265,647 copper coins, \$8,202,599 aluminium coins, together with a number of official seals and medals.

The above figures include the re-coinage of worn and mutilated coins withdrawn from circulation, which, however, is small as compared with the coinage from bullion.

The parent Mint of the British Empire is the Royal Mint of Tower Hill, London. Previous to 1810 it was housed in the Tower of London, where it had been as far back as history records. Formerly mints were numerous in England, there being as many as fifty in the reign of Edward the Confessor. In the reign of Stephen, when the right was granted to barons and ecclesiastics to mint for private profit, they became even more numerous. But their number from that period on diminished, until the right of coining in the United Kingdom was confined to the one mint, namely, the Royal Mint of London. There is another mint, however, at Birmingham, known as the Birmingham Mint, Limited, where coins are occasionally made under the supervision of the Royal Mint.

Branches of the Royal Mint have been established in a number of colonies as follows: Three in Australia, namely, at Sydney, Melbourne and Perth; two in India, namely, at Calcutta and Bombay, and one in Canada, at Ottawa.

Nominally and technically, in as much as the technical skill for each of these branches is supplied by the parent mint in London, these are branches of the Royal Mint. But in many respects they are completely under the control of the Government of the colony in which they are situated. Any profit accruing from their operation goes to the Government of the colony, which also bears any loss. Moreover, the bullion required is purchased by the government of the colony under whose jurisdiction the mint is operated.

The nominal head or master of the Royal Mint is the Chancellor of the Exchequer. The administrative head is the Deputy Master and Comptroller, who has under him—

- (1) A chief clerk, who is responsible for the receipt of bullion and the delivery of the coin.
- (2) A superintendent, whose business it is to look after the manufacture of coin.
- (3) An assayer, whose duty it is to value the bullion and determine the fineness of the coin.

In each of these departments, of course, there are many assistants and workers.

In connection with most mints, including many of those in the British colonies, there are refineries for refining the metal. But some years ago the Royal Mint, finding it more convenient and less troublesome to accept nothing but refined metal, leased its refinery to the Rothchilds, who now do about two-thirds of the gold refining in England. The balance is done by three or four other refineries, all conducted as private enterprises.

The Royal Mint is required, by Act of Parliament, to coin, free of charge, any refined gold offered it, and to deliver to him who brings such gold, sovereigns and half sovereigns at the rate of £3 17s. 10½d. per stand-

ard ounce troy, without any deduction for waste or seniorage or charge for alloy or expense of manufacture. But the trouble and the time required for minting has shown those who have gold to coin that it is less troublesome and more profitable for them to take their bullion to the Bank of England, where they will receive sovereigns and half sovereigns at the rate of £3 17s. 9d. per ounce troy—the one and one-half pence being profit to the bank. The result is that almost all the gold coined at the mint is presented by the Bank of England. The bank, it may be explained, may suffer no loss of interest by the time required for coinage, because bank notes may have already been issued against it. However, this is generally not true, because for years the gold reserves of the Bank of England have exceeded its note issue. Thus from a point of loss or gain it makes no difference to the bank whether the gold is lying in its vaults in the form of bullion or going through the Royal Mint in the process of being made into coins. Refined gold bullion is generally in the form of bars, each weighing about 400 ounces. Standard gold is 916.6 fine.

Just here it may be of interest to refer to the manner in which the Bank of England receives and retains its gold. By the provisions of the British Banking Act, any one is entitled to demand notes from the Bank of England for standard gold, at the rate of £3 17s. 9d. per ounce. That is, the bank is forced to buy at a fixed price all the gold offered to it. Hence any gold offered in the open market, which is not bought at a premium by private interests or foreign banks, is turned over to the Bank of England. This provision has brought about two results. It has made London the gold market of the world, and it has made it impossible for the price of gold to fall below the price specified. On the other hand, any one possessing Bank of England notes may demand their equivalent from the bank, and foreign banks or financial houses desiring gold may procure Bank of England notes in exchange for securities, and then procure gold from the bank by presenting these notes for redemption. This privilege often leads to large and sudden demands upon the gold reserves of the bank, particularly in times of financial trouble in other countries, or when the balance of trade against the United Kingdom becomes so great that bills drawn upon her banks and business houses sell in foreign markets at discounts large enough to permit gold to be imported into these foreign countries at a profit. The only way the Bank of England can check such demands is by increasing her rate of discount. In other countries, such as France and Germany, the outflow of gold is generally checked by offering a premium for gold when it is likely to be exported. In other words, London is a free gold market, which fact has contributed not a little to making it the money market of the world.

Silver and bronze (the metal from which our "coppers" and pennies are made) are not received by the Royal Mint in the same way as gold. Silver bullion and the copper, tin, and zinc required to make bronze coins, are bought by the mint in open market. manufactured into coins, and kept in stock to be issued as required. From the manufacture of these coins there is a considerable profit to the Mint. With silver at its present price, there is over 100 per cent. profit in the manufacture of silver into coin. It is the duty of the Royal Mint to receive at their face value for recoinage all worn gold and silver coins that are withdrawn from circulation by the banks when they are found to be below the standard weight. In spite of the loss in this

recoining, however, the profit from the manufacture of silver and bronze coins is so great that for years there has been a substantial net surplus, after paying all expenses and making good any loss on worn coins.

In 1907 the profits of the Royal Mint accruing from the coinage of silver and bronze amounted to about \$5,000,000. The total outlay for salaries and other expenses was about \$400,000. The loss on recoinage of gold was \$40,000, while on the recoinage of silver it was \$280,000. Thus on the whole the Royal Mint showed a net profit to the United Kingdom of considerably over \$4,000,000. The methods employed in the manufacture of gold and silver coins at the Royal Mint are as follows:

The gold is melted in graphite crucibles about ten inches in height and eight and one-half inches in diameter at the widest part. The charge is from 1,200 to 1,300 ounces of metal. The crucible is put into a furnace first and allowed to get red hot before the gold is put in, the copper being added last and a lid put on the crucible to check the loss by volatilization. The charge is completely melted in about one-half an hour, and it is then thoroughly mixed by stirring with a graphite rod. The crucible is lifted out and the contents poured into moulds. The molten gold which is of a pale green color, solidifies at once in the iron moulds, and the bars are taken out immediately. They are then trimmed, assayed, and rolled. The amount of gold smelted in an ordinary day's work at the Royal Mint is from two to two and one-half tons. Silver is

melted in a similar way, except that larger crucibles are used. These rough bars are then passed backwards and forwards between steel rollers until they are reduced to the required thickness. They are then examined by a "Tryer," who cuts out one or two blank discs from each fillet and weighs them. If the weight of the blank is slightly below the standard weight, a somewhat larger cutter is used so that the blank may be of the correct weight. If the blank is too heavy, the fillet is passed through the roller again. When the fillets are reduced to the correct thickness they are sent to the cutting room, where as many discs as the fillets will produce are cut out, and the "scissel" or waste part of the fillets is sent back to the melting-house. The discs are then sent on to the marking-room, where their edges are rolled to produce a raised rim or to impress a design on the edge. The discs are then submitted to an "annealing" or softening process, so that they may be more easily stamped. After softening they are sent to the stamping-room, where each is struck between dies surrounded by a collar, which leave the required impression on the surfaces of the coin. From the stamping-room they go into the weighing-room. Here the coins of the required standard weight are selected and packed up ready for circulation, while all those that are found to be either under or over the standard weight are sent back to the melting-room. Of course, all these processes are done by automatic machines of the latest and most improved designs.

EXAMINATIONS UNDER THE COAL MINES ACT, PROVINCE OF ALBERTA.

Fire Boss Examination. December 9th and 10th, 1908
Paper No. 1. Time Allowed, Two Hours.

The value attached to each question is given in brackets. Candidates must obtain 60 per cent. of the allotted marks to pass.

Coal Mines Act.

1. State fully the various provisions of General Rule 8, relating to the use of explosives below ground. (25)
2. What are the regulations governing the employment of boys below ground? (15)
3. What are the requirements of the Act regarding the supply of timber to be kept at the mine? (15)
4. What are the requirements of the Act regarding signals and manholes on planes worked by machinery? (15)
5. What does the Act say regarding fences? (15)
6. State fully the provisions of the Act as to withdrawal of workmen in case of danger. (15)

COAL MINES ACT, PROVINCE OF ALBERTA.

Fire Boss Examination. December 9th and 10th, 1908
Paper No. 2. Time Allowed, Two Hours.

The value attached to each question is given in brackets. Candidates must obtain 60 per cent. of the allotted marks to pass.

Ventilation.

1. What gases are found in mines, and how would you tell one gas from another? Describe each gas carefully and fully. (20)

2. Describe and give the use of each of the following instruments in coal mining: Barometer, Anemometer, Thermometer and Hygrometer. (15)

3. What is meant by "Diffusion of Gases" and what effect has this on mine ventilation? (15)

4. Explain all the accidents or causes which may make a safety lamp dangerous in the mine. Who discovered the principle of the safety lamp and what did this discovery consist of. (15)

5. What are the different methods of producing ventilation in a mine? State the different ways of ventilating the face of development work which is in advance of the air current. (15)

6. Ventilate the given plan, showing direction of air currents and marking on all stoppings, doors, air crossings, etc. (20)

COAL MINES ACT, PROVINCE OF ALBERTA.

Fire Boss Examination. December 9th and 10th, 1908
Paper No. 3. Time Allowed, Two Hours.

The value attached to each question is given in brackets. Candidates must obtain 50 per cent. of the allotted marks to pass.

Practical Work.

1. Give a full account of all your experience in coal mining. (20)
2. Sketch and describe a mine or part of a mine with which you are acquainted. (20)
3. Describe with sketch how you would timber a main gangway in a 6-foot seam of coal, pitch of seam

35 degrees, gangway to be 9 feet wide and 6 feet in height from low side rail. (20)

4. An incline with a 30 degree pitch runs at right angles to a main entry. Sketch and describe how you would lay steel track at bottom of incline to connect with main entry track. Double track on main entry up to foot of incline, single track beyond, with single track up incline except for short distance at foot of incline. (20)

5. Describe in detail all the various methods of shot lighting as permitted in gaseous and non-gaseous mines. (20)

COAL MINES ACT, PROVINCE OF ALBERTA.

Fire Boss Examination. December 9th and 10th, 1908
Paper No. 4. Time Allowed, One Hour.

The value attached to each question is given in brackets. Candidates must obtain 50 per cent. of the allotted marks to pass.

Arithmetic.

1. Multiply four thousand nine hundred and eighty by thirty-four thousand seven hundred and eighty-two. (20)
2. Add the following numbers together: 642, 4812, 27, 34986, 347, 928, 63471, 62. (20)
3. Divide 68754 by 374. (20)
4. From 7896432 subtract 6797228. (20)
5. How many cubic feet of air would you require to produce in a mine where 200 men were employed, supposing each man required 200 cubic feet of air per minute and there was a leakage of 15,000 cubic feet between the intake and return airway before the air reached working faces? (20)

COAL MINES ACT, PROVINCE OF ALBERTA.

Pit Boss Examination. December 9th and 10th, 1908
Paper No. 1. Time Allowed, 1½ Hours

The value attached to each question is given in brackets. Candidates must obtain 60 per cent. of the allotted marks to pass.

Coal Mines Act.

1. State fully the provisions of General Rule 8, relating to the use of explosives below ground. (25)
2. State fully the provisions of the Act regarding the use of safety lamps. (20)
3. What are the requirements of the Act regarding manholes? (20)
4. What are the regulations governing the employment of boys about hoisting machinery? (15)
5. What does the Act say regarding the employment of females and boys in or about the workings of a mine? (20)

COAL MINES ACT, PROVINCE OF ALBERTA.

Pit Boss Examination. December 9th and 10th, 1908
Paper No. 2. Time Allowed, 2½ Hours.

The value attached to each question is given in brackets. Candidates must obtain 60 per cent. of the allotted marks to pass.

Ventilation.

1. Name the various occluded gases. Give their specific gravity and describe their various properties. (20)
2. Describe what you consider to be a good lamp for testing for gas. Why is it important that smaller

quantities should be detected than can be found with an ordinary safety lamp? (15)

3. An anemometer gives a reading of 24,000 cubic feet per minute in an airway 10 feet wide and 6 feet high while the water gauge reads 1.6 inches. What is the useful horsepower in the air? (15)

4. What pressure and power are expended in passing 20,000 cubic feet of air through an airway 8 feet by 10 feet and 6,000 feet long? (15)

5. Sketch and describe the water gauge. It is said that 1 inch of water gauge shows a ventilating pressure of 5.2 lbs. per square foot. How is this value determined? (15)

6. Ventilate the given plan, showing direction of air currents and marking on all stoppings, doors, air crossings, etc. (20)

COAL MINES ACT, PROVINCE OF ALBERTA.

Pit Boss Examination. December 9th and 10th, 1908
Paper No. 3. Time Allowed, Three Hours.

The value attached to each question is given in brackets. Candidates must obtain 50 per cent. of the allotted marks to pass.

Practical Work.

1. Sketch and describe the arrangements necessary at the top of a shaft to ensure safety while sinking. (15)
2. Sketch and describe how you would work a 7-foot seam of bituminous coal lying on a 28 degree pitch with a hard rock roof and floor. (20)
3. Sketch and describe how you would work a 7-foot seam of lignite coal, the seam lying flat and having a soft clay roof and floor. (20)
4. How do you draw timber in a mine and what appliances are necessary? (15)
5. State the conditions that would guide you in determining the size of pillars to be left in room and pillar working. (15)
6. What methods would you adopt for supplying timber to the working face when the rooms have been driven a considerable distance up from the levels, the pitch of the seam being 45 degrees. (15)

COAL MINES ACT, PROVINCE OF ALBERTA.

Pit Boss Examination. December 9th and 10th, 1908
Paper No. 4. Time Allowed, Three Hours.

The value attached to each question is given in brackets. Candidates must obtain 50 per cent. of the allotted marks to pass.

Machinery.

1. What useful horsepower is expended in raising 10 tons to a height of 165 feet in half a minute? (15)
2. What is the horsepower of an engine with a 30-inch stroke, 15-inch cylinder and an average steam pressure of 60 lbs. per square inch, running at 40 revolutions per minute? (20)
3. What are the various appliances required by the Coal Mines Act in connection with the machinery and other plant at a mine? (20)
4. Calculate the size of steel rope required for a breaking strain of 100 tons. (15)
5. Give sketches showing various forms of rope capping. Say which form you prefer and why. (15)
6. Sketch and describe a good form of brake for a haulage engine. (15)

COAL MINES ACT, PROVINCE OF ALBERTA.

Pit Boss Examination. December 9th and 10th, 1908
Paper No. 5. Time Allowed, Three Hours.

The value attached to each question is given in brackets. Candidates must obtain 50 per cent. of the allotted marks to pass.

Surveying.

1. What experience and what amount of study have you had in connection with mine surveying? (15)
2. Describe briefly the instruments, etc., required for making a mine plan. (15)
3. How many tons of coal are there in 1 7-8 acres of a flat seam 6 feet in thickness? Take the specific gravity of the coal to be 1.30. (20)
4. Describe by what method you find the difference in level between the ends of a main gangway and also between the top and bottom of a steep slope or incline. (15)
5. Plot the following survey:

Bearing.	Distance in feet.
N. 47 E.	88
N. 3 W.	165
S. 41 W.	114
N. 89 W.	39

 (20)

6. Draw to scale a vertical 12-foot pulley wheel for 1½-inch rope suitable for a pit-head frame. Show the wheel in side and end elevation and also show a cross section of the wheel. (15)

COAL MINES ACT, PROVINCE OF ALBERTA.

Mine Managers Examination. Dec. 9th and 10th, 1908
Paper No. 1. Time Allowed, 1½ Hours.

The value attached to each question is given in brackets. Candidates must obtain 70 per cent. of the allotted marks to pass.

Coal Mines Act.

1. State fully the various provisions of General Rule 8 relating to the use of explosives below ground. (25)
2. State fully the provisions of the Act regarding the use of safety lamps. (20)
3. Summarize the chief provisions of the Act to amend the Coal Mines Act for the purpose of limiting hours for work below ground, commonly called the "Eight Hours Law." When does this Act come into force? (20)
4. What are the requirements of the Act regarding machinery used in or about the mine? (10)
5. What returns and notices have to be sent to the Minister of Public Works and what returns and notices have to be sent to the Inspector of Mines under the Act? (25)

COAL MINES ACT, PROVINCE OF ALBERTA.

Mine Managers Examination. Dec. 9th and 10th, 1908
Paper No. 2. Time Allowed, 2½ Hours...

The value attached to each question is given in brackets. Candidates must obtain 70 per cent. of the allotted marks to pass.

Ventilation.

1. What is the weight of a cubic foot of air at a temperature of 30 degrees centigrade, when the barometer reads 29 inches? (15)
2. As a mine manager, taking in charge the direction of operations at a large gaseous mine, how would you examine it to satisfy yourself that it was being worked safely and according to law? (15)

3. State your views as to causes of explosions in mines and what precautions you would adopt to prevent them. (15)

4. Show by calculations which of the following airways will pass the most air, power and length being the same in each case:

- | | |
|---------------------|--------------------|
| 1—One airway | 10 feet by 10 feet |
| 2—One airway | 5 feet by 20 feet |
| 3—Two airways, each | 5 feet by 10 feet |
- (15)

5. Explain with diagrams the difference in construction of a force fan and an exhaust fan. With reference to force and exhaust fans, what style of fan is best suited in Alberta, bearing in mind climatic conditions? (15)

6. What are the advantages of splitting the air current? What determines the limit at which splitting should stop? (10)

7. Ventilate the given plan, showing direction of air currents and marking on all stoppings, doors, air crossings, etc. (15)

COAL MINES ACT, PROVINCE OF ALBERTA.

Mine Managers Examination. Dec. 9th and 10th, 1908
Paper No. 3. Time Allowed, Three Hours.

The value attached to each question is given in brackets. Candidates must obtain 60 per cent. of the allotted marks to pass.

Practical Work.

1. What are "bumps" as they occur in the mines of the Crow's Nest Pass? What are the causes and results of these occurrences and what remedy do you suggest for their prevention? (15)

2. What are the advantages of electric blasting? Describe the construction of the high tension and also the low tension detonator. How are detonators tested before use? (15)

3. Explain with sketches the different systems of drawing pillars which can be applied in the bituminous and lignite mines in Alberta. (15)

4. Classify the accidents liable to occur in lignite and bituminous mines and point out what remedies and precautions you propose to lessen these accidents. (15)

5. Describe with sketches the two main methods of mining coal. Give the conditions favorable to or requiring the application of each of these methods. (15)

6. To what use is electricity put in coal mines and what dangers arise from its use in mines? (10)

7. How would you proceed to replace a set of broken timbers in a main haulage road? Explain fully, going into details and taking into account the different conditions of roof, sides and floor. (15)

COAL MINES ACT, PROVINCE OF ALBERTA.

Mine Managers Examination. Dec. 9th and 10th, 1908
Paper No. 4. Time Allowed, Three Hours.

The value attached to each question is given in brackets. Candidates must obtain 60 per cent. of the allotted marks to pass.

Machinery.

1. Compare the advantages and disadvantages of power transmission into mines by means of compressed air, steam and electricity. (15)

2. How far would you place a pump above the water for it to work satisfactorily? State fully how you arrive at your answer. (10)

3. What is the pressure per square inch on the plunger of a pump raising water up a slope 300 yards long with a 33 1-3 per cent. grade? Neglecting fric-

tion, find the mean effective steam pressure required for this pump if the steam cylinder is 8 inches in diameter and the water cylinder 4 inches in diameter. (15)

4. What is there in water that produces incrustation in boilers? How do you proceed to clean a boiler? (15)

5. How far must a weight of 80 pounds be placed from the fulcrum of a safety valve having a diameter of 3 inches, the valve stem being 4 inches from fulcrum; the valve to blow off at 75 pounds pressure? (15)

6. What size of rope is necessary for a 400 foot shaft, hoisting with double decked cages, one car containing 25 cwt. on each deck? What are the various causes of wear on hoisting ropes? At which points does a hoisting rope wear most? What precautions would you take to ensure safety in the use of hoisting ropes? (15)

7. Find the H. P. of a duplex engine with 30-inch cylinders, 5-foot stroke, 40 revolutions per minute, with an average piston pressure of 40 pounds per square inch and an average back pressure of 5 pounds per square inch. (15)

COAL MINES ACT, PROVINCE OF ALBERTA.

Mine Managers Examination. Dec. 9th and 10th, 1908
Paper No. 5. Time Allowed, Three Hours.

The value attached to each question is given in brackets. Candidates must obtain 60 per cent. of the allotted marks to pass.

Surveying.

1. What is meant by declination and variation when speaking of the compass? (15)

2. How many tons of coal are there underlying a square field containing 8 acres, the seam being 6 feet 6 inches thick, lying at an angle of 31 degrees, the specific gravity of the coal being 1.51. (20)

3. Plot the following compass survey to a scale of 100 feet to 1 inch:

Station.	Bearing.	Distance in feet.
1-2	N. $32\frac{1}{2}$ E.	255
2-3	N. 79 E.	134
3-4	S. 61 E.	160
4-5	S. $28\frac{1}{4}$ E.	325 (20)

4. Two drill holes A. and B. 1000 yards apart, are put down to a coal seam. The depth of hole A. is 506 feet, the depth of hole B. is 766 feet. The surface at A. is 30 feet above the surface at B. Give the inclination of the seam, calculated in feet per hundred feet. (15)

5. On a mine plan there is shown a horizontal distance of 100 feet, and also a vertical distance of 100 feet. What is the distance measured on the pitch and what is the average pitch of the seam? (15)

6. How are the surface and underground surveys of a mine connected when the mine is operated by means of a shaft? (15)

FLUXES FOR SILVER TAILINGS.

In electro-plating with silver, and in other technical processes in the industrial arts, there are large quantities of silver tailings and precipitates, for the proper recovering and utilization of which smelting is necessary. These by-products are of such different characters that if they were all melted together, there would result no pure material, but the mass would ball together in the crucible and form a half-melted lava-like material, in which, as far as industrial purposes

are concerned, the silver would be in a worse condition than before. In order to smelt such a mass and get therefrom a pure silver bar, there must be used a flux, for the purpose of setting free the oxide that has been formed, and permitting the metal to form a single mass.

The flux described below by a writer in the "Deutsche Metall Industrie Zeitung" has been used for a long time in establishments that smelt silver tailings and sweepings, and has given the highest satisfaction. Originally it was used in the cyanide process for the extraction of gold from auriferous ores.

This process consists essentially in grinding the ore fine and then leaching the resulting material in wooden tubs by a weak solution of potassium cyanide. The latter substance dissolves out the gold and silver in the ore; the clear solution is drawn off, and the noble metals precipitated by the addition of zinc scrap. The deposit thus formed consists of gold, silver, copper and a greater or less quantity of zinc. When dried, it is smelted with a flux, and the mass sent to the refinery.

As this flux has given good satisfaction in the process just named, experiments were made to determine whether or not it could be employed to advantage for other kinds of silver-smelting, and for other sweepings, etc., containing silver or gold. Favorable results were obtained therewith. The flux consists of 3.06 kg. of calcined soda (soda ash), 0.9 kg. of borax glass, 0.4 kg. of sand, 126 grams of fluorspar. Borax glass is to be used, not borax itself, as the latter, when heated, swells too much, and this makes trouble in smelting the silver-bearing or gold-bearing materials. Borax glass can be obtained by melting crystallized borax and sand in a graphite crucible, until all is clear, and then pouring the liquid. Any kind of sand may be used, only it must not be coarse.

The silver-bearing material is mixed with the flux, and the mixture melted in a graphite crucible. This latter must not be quite full, as the mass swells a great deal in melting. The amount of flux necessary depends on the kind of material being melted. For most such material, the flux is employed in the proportion of one thereof to two parts of the former.

Where the tailings or sweepings are all chlorides, more flux—even equal parts by weight—is necessary. Fluorspar is added to make the resulting mass more liquid. In a slag of thick consistence, such as is produced by soda-ash alone, the metal does not separate, but attaches itself to the slag, so that much thereof remains on the latter. Where, however, fluorspar is used, the slag is rendered so liquid that all the metal, once melted, falls at once to the bottom of the crucible.

Where there is much iron in the material to be smelted it must be removed by the aid of magnets. As iron has a very unfavorable effect on the process of smelting, it must in no case be allowed to remain in the material. Incidentally, this latter must be perfectly dry before being mixed with the flux. R. G.

Coals carrying as high as 5 per cent. of sulphur can be burned without particular danger from clinkers. A little steam introduced under the grate will relieve much of the trouble. Of course clinker may be due to other causes than sulphur, as any constituents of the ash that are readily fusible may produce it.

Bituminous coals lose about 35.05 per cent. of their sulphur during coking.

MEETING OF THE COBALT BRANCH OF THE C. M. I.

The annual meeting of the Cobalt Branch of the Canadian Mining Institute was held on April 23rd. The President of the Institute, Dr. W. G. Miller, was present on special invitation.

The business of the evening was to appoint officers for the coming year. Retiring Chairman A. A. Cole was succeeded by Mr. R. W. Brigstocke. Mr. Cole was appointed secretary-treasurer, and an Executive Committee was elected comprising Messrs. Fraleck, Logan, Davis, Culbert and Bryce. The selection appears to be particularly fortunate. All of the members of the committee are active and prominent citizens of Cobalt. Mr. Fraleck is the well-known manager of the Cobalt Lake Mining Company; Mr. Logan, the local manager of the Canadian Bank of Commerce, is the leading banking man of the town; Mr. Davis is managing director of the Pontiac Mining Company and has for some years been an outstanding figure in Cobalt affairs; Mr. Culbert is manager of the O'Brien Mine; and Mr. Bryce is manager of the Cobalt Consolidated.

After the business of the evening had been transacted, Mr. Fraleck gave a talk on the outlook for mining in Ontario during 1909. Mr. Cole then read a paper which will appear in the Journal of the Canadian Mining Institute, entitled, "Sampling La Rose Mine."

On Monday, 26th April, a meeting of the Executive Committee was held. Messrs. Cole and Davis were appointed curators of the library and mineral collections. It was resolved that the committee would ask the leading mining companies for contributions towards fitting up the rooms.

It has been decided that the rooms of the Cobalt Branch will be fitted up with mineral show cases, maps, books, official reports, etc. The object is to make these rooms an accessible bureau of information for the general public, so that not only members, but also responsible outsiders, may avail themselves of the facilities there afforded.

The intention of the Branch is to have monthly meetings. The membership now numbers nearly 100, and there is every evidence of activity and interest.

The thanks of the Branch are due to Mayor H. H. Lang for his kindness in securing rooms.

PURCHASING COAL UNDER SPECIFICATIONS.

In the year 1907 the U. S. Geological Survey was instructed to begin the testing of coal for government use. A uniform standard of specifications has now been adopted by all departments of the U. S. Government.

The advantages of this system are thus summed up:—

1. Bidders are placed on a strictly competitive basis as regards quality, as well as price. This simplifies the selection of the most desirable bid, and minimizes controversy and criticism in making awards.

2. The field for both Government and dealers is broadened, as trade names are ignored and comparatively unknown coals offered by responsible bidders may be accepted without detriment to the Government.

3. The Government is insured against the delivery of poor and dirty coal, and is saved from disputes arising from condemnation based on the usual visual inspection.

4. Experience with the old form of government control shows that it is not always expedient to reject poor coal, because of the difficulty, delay, and cost of removal. Under the present system rejectable coal may be accepted at a greatly reduced price.

5. A definite basis for the cancellation of contract is provided.

6. The constant inspection and analysis of the coal delivered furnishes a check on the practical results obtained in burning the coal.

RHODESIAN GOLD MINES.

Records for the year 1907 show thirty operating gold mining companies in Rhodesia. A few details concerning one or two will show the character and scale of these enterprises.

The Giant Mines of Rhodesia, Limited, owns 90 claims in the Gadzema district of Mashonaland, 65 miles west of Salisbury and three-quarters of a mile from railway. The authorized capital is £250,000, in 250,000 shares of £1 each. All the shares are issued and fully paid. A 15-stamp mill, three tube mills and slimes plant have been in operation since December, 1905. During 1906-7, 53,897 tons of ore yielded £106,899 in gold, or 39s. 8 d. per ton. Dividends have been paid since 1905.

The Globe and Phoenix Gold Mining Co., Limited, owns 79 claims in the Sebakwe district, Matabeleland. The company has an authorized capital of £200,000, in 200,000 shares of £1 each, all of which are issued and fully paid. The equipment consists of a 40-stamp mill, a cyanide plant, and a slimes plant. During 1907 77,950 tons crushed yielded 39,791 oz. gold. At June 30th, 1907, ore reserves stood at 109,706 tons, averaging 11 dwts. per ton. Substantial dividends have been paid since 1900, with the exception of the year 1903.

The Gaika Gold Mining Company, Limited, holds 131 claims in the Sebakwe district. Its authorized capital is £300,000, in shares of £1; 205,007 shares are issued and fully paid; 168,000 vendors' shares were credited as fully paid. There are £50,000 six per cent. debentures. The equipment comprises a 5-stamp mill, a Huntingdon, and a Chilian mill. The gold output for 1907 was 10,890 ounces. At June 30th, 1907, ore reserves stood at 20,000 tons, carrying 13.5 dwts. per ton, and 32,670 tons of lower grade.

For the above figures we are indebted to Skinner's "Mining Manual."

COLORADO COAL.

There were 14,523 men employed in the coal mines of Colorado in 1908. The average number of days worked by each man was 212, as compared with 258 days in 1907. The average production per man was 663 tons in 1908. In 1907 the average was 759. The average production per day per man was 3.13 tons in 1908, as compared with 2.94 tons in 1907. A majority of the mines held to the ten-hour day. The total quantity of coal produced was 9,634,973 short tons, having a spot value of \$13,586,988, a decrease of 10.71 per cent. in quantity and of 9.90 per cent. in value as compared with the previous year. 211 mining machines were used, producing 1,668,602 tons. Altogether 449,320 tons of raw coal were washed, yielding 336,123 of cleaned coal. All of this was used for coking. 61 men were killed and 115 injured. By far the larger number of deaths and injuries resulted from falls of roof in rooms.

EXCHANGES.

The Colliery Guardian, April 23, 1909.—The Mining Department of the University of Birmingham is the subject of an article in this issue. In connection with the mining branch of this institution there is a well-equipped experimental mine. Here students are instructed in mining, ventilation, the use of explosives, rescue work, and mine surveying. The instruction offered in rescue work is particularly important. This, we believe, is the first instance of a university affording such facilities.

The Mining Journal, April 17, 1909.—The Royal Commission on Mines has recently issued an interim report detailing the results of an enquiry into the ventilation of collieries. "Statistics show," says the Mining Journal, "that the control exercised is more effective in the case of mines under the Coal Acts than under the Metalliferous Mines Acts, which makes us greatly regret that more attention has not been given in the proceedings of the Commission to the latter class of workings."

Mining and Scientific Press, April 24, 1909.—A correspondent discussing Dr. Kemp's definition of an ore suggests some modifications. As limiting the commercial phase of Dr. Kemp's definition, he cites the case of a pile of magnetite purchased at a bankrupt sale. "In a scientific sense an 'ore' is a metalliferous mineral belonging to the group of those that have commercially yielded the metals to the world's wealth. In its technical sense an 'ore' is a metalliferous mineral or an aggregate of metalliferous minerals, more or less mixed with gangue, and capable of being won as a commercial operation, adding in any way to the world's wealth." The last phrase is hardly clear enough, but it touches nearer the truth than anything we have seen.

The South African Mining Journal, March 27, 1909.—Public opinion on this side of the globe does not enforce upon mining companies the regular publication of monthly or even quarterly reports. The South African Mining Journal contrasts this state of affairs with that obtaining on the Rand, where every company files a return each month with the Transvaal Chamber of Mines. These are broadcast. The returns give full particulars of the month's work. Moreover, most mines cable summarized returns to London each month. Further information is given in quarterly reports, and in the event of any very important discovery being made, reserve shares being disposed of, or any large additions to plant being agreed on, interim reports are invariably issued both in Johannesburg and London. These various channels of information, along with the annual reports and speeches and discussions at the annual meeting, leave little to be desired.

The Iron and Coal Trades Review, April 23, 1909.—Under the heading, "What Percentage of Firedamp is Dangerous?" the Review discusses Dr. Cadman's report on this vital point. Dr. Cadman's conclusions are that less than 1 per cent. can be discovered by a careful observer on the flame of any safety lamp burning pure colza, by the aid of a magnifying glass; that 2 per cent.

of firedamp gives a complete cap a quarter of an inch high; and that when the return air from a stall, panel, or district contains 2 per cent. of gas, the mine is dangerous and the men ought to be withdrawn. It was shown that firemen and deputies have almost universally been in the habit of testing for firedamp without entirely obliterating the white light of their wick flames, and consequently percentages of 3 and 3½ have been the smallest discovered. Of 41 firemen examined it was found that 21 either had no nystagmus or were very slightly affected, seven were slightly affected, six were distinctly affected, and seven were severely affected.

The Engineering and Mining Journal, May 1st, 1909.—In an interesting article on Gow Ganda, Mr. H. E. West concludes that in the Miller Lake and Gow Ganda districts are many favorable prospects that promise to become mines. "At the same time it is certain that not one of these embryonic mines can become a steady producer of silver without the assistance of the railroad. It would, therefore, seem to be the duty of the Government to provide the means whereby these latent assets can be quickened into life, and increase the silver production of Ontario.

Mr. West indicates that, whilst it is within the realm of possibility that the whole Montreal River section may, within five years, equal the present production of Cobalt, this must be based upon the two assumptions that railroad construction is commenced forthwith and that the development of the mines at depth prove not less favorable than at the surface.

These assumptions, we suggest, should have been reversed in order.

PERSONAL AND GENERAL.

Mr. D. H. Browne, chief metallurgist to the Canadian Copper Company, was in Toronto on April 29th.

Mr. John B. Hobson has returned to Victoria, B.C., after having spent the winter in California. He will shortly leave for Cariboo.

Mr. Benj. B. Lawrence, consulting engineer for the Kerr Lake Mining Co., Cobalt, Ont., has returned to New York from a visit to the property.

Capt. W. H. Jeffery, superintendent of the Chambers-Ferland Mine, Cobalt, has retired from that position to devote his time to his Montreal River interests.

Mr. Horace G. Nichols, manager of the Ymir mine, British Columbia, is installing his new slimes-treating process in the new stamp mill being installed at the Jewel mine.

Dr. Milton L. Hersey, of Montreal, has returned from Germany, where he went in connection with the sampling of Crown Reserve ore purchased by the German Government.

Mr. A. B. Willmott, of Sault Ste. Marie, was recently in Toronto on his way home from North Carolina, where he had been investigating iron ore properties for some clients.

Prof. Macoun, of the Geological Survey of Canada, accompanied by Mr. C. H. Young, of Ottawa, has gone

to British Columbia to collect natural history specimens for the Victoria museum.

Mr. Chas. Watson, brother of the chief engineer of the Nipissing and La Rose Mining Companies, has been appointed engineer of the Chambers-Ferland Mining Co., in place of Capt. W. H. Jeffrey.

Dr. W. F. King, Canadian astronomer and boundary commissioner, has left Ottawa for Washington to arrange with Dr. O. H. Teddman, American boundary commissioner, for the resumption of boundary survey work.

Mr. Paul S. Couldrey, manager of the Le Roi No. 2 at Rossland, has resigned to accept a position in another field. Except for an interval spent in Western Australia, Mr. Couldrey has been in charge of the Le Roi since 1902.

Mr. R. T. Hopper, of Montreal, the president of the Standard Asbestos Co. and vice-president of the Dominion Asbestos Co., both of which are included in the merger, will join the board of the Amalgamated Asbestos Corporation.

Mr. C. H. Macmillan, formerly superintendent of the Dominion Iron & Steel Co., who has been recuperating in Maine for a year or so, has been appointed superintendent of the steel department of the company, and assumed his new duties on the first of the month.

CORRESPONDENCE.

Editor Canadian Mining Journal, Toronto, Ont.

Dear Sir,—On receipt of your issue of April 15th we notice a criticism by Gerald Dobbs on the method of testing air pipes as suggested in an article of ours in your issue of Feb. 15, 1909.

In answer to Mr. Dobbs we beg to call his attention to the latter part of the paragraph on this subject—"Corrections for temperature will be necessary for accurate results, but in practice are not needed."

If the expansion by leakage of the air in the pipe lines can be considered as Isothermal, that is that the temperature is constant, then Mr. Dobbs figure of 7.35 instead of 10 lbs. drop is correct. On the other hand, if the expansion is Adiabatic, that is that the temperature varies, the figure will be considerably more than

this. As it is probable on pipe lines on which there is considerable loss that the expansion would be neither Isothermal or Adiabatic, we have taken 10 lbs. as a convenient figure.

1st. Because it is an approximation between Isothermal and Adiabatic.

2nd. Because it is a convenient figure for the workmen to read.

The average pressure gauge used in this work is only graduated to 5 lbs. Of course this could be overcome by placing a special graduation on the face of the dial, or by the purchasing of more elaborate gauge. Even this would require a special pressure curve to be made for whichever gauge is employed.

As mentioned in our article, we hardly think all this is worth while, as the main point is to stop the leaks, and this can be done quite as efficiently in the rough and ready manner proposed, as can be accomplished by going into the matter in great detail.

Trusting this explanation will be satisfactory to Mr. Dobbs, we remain,

Yours sincerely,

R. E. CHAMBERS,
A. R. CHAMBERS.

INDUSTRIAL NOTES.

A Robb-Armstrong high speed engine will be installed at the new central lighting station to be erected at Listowel, Ont.

Southern Wisconsin Power Co., Madison, Wis., has recently installed a 30-ton travelling Northern crane and a 6-ton electric mono-rail hoist, both furnished by the Northern Engineering Works of Detroit.

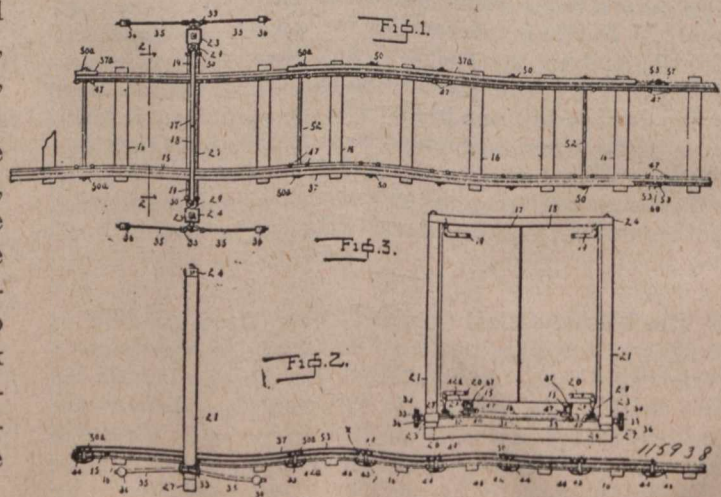
The Consolidated Mining and Smelting Company, at Trail, B.C., is producing a new electrolytic bearing metal, which is claimed to be equal to the highest grade friction alloys.

The San Francisco branch office and warerooms of the Sullivan Machinery Company are now located at 461 Market Street, in the Sheldon Building, instead of at 26 Fremont Street, as heretofore. Sullivan air compressors, diamond drills, rock drills, and other mining machinery are carried in stock at this office.

NEW MINING AND METALLURGICAL PATENTS.

No. 115,938. Mine Door.—Joseph L. Dinwiddie and Albert F. Braun, both of Carlinville, Illinois, U.S.A., 5th January, 1909; 6 years. Filed 12th September, 1908. Receipt No. 162,417.

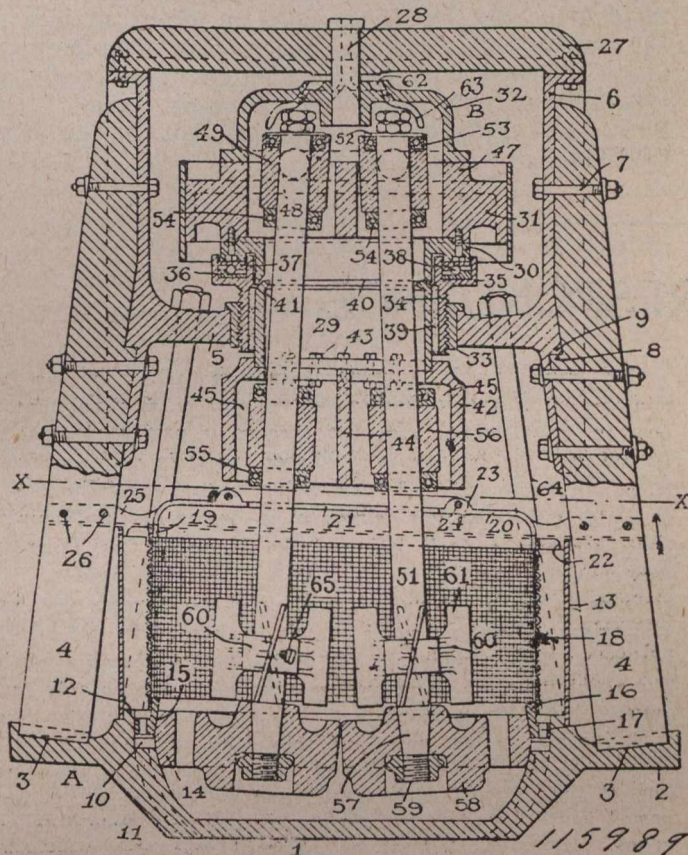
Claim.—In an apparatus for the purpose stated the combination with a hinged door and a railway track, of a door operating member arranged adjacent to one of the rails of said track and having its upper edge normally above said track rail, said member being provided with a series of granulated slots, a trip, a trip bar, said bar having a series of granulated slots, rock arms supporting said members and trip bar and engaging said slots, operative means for said door and connection between said member and said door operative means.



No. 115,989. Pulverizing Mill.—George E. Rudnick, Iola, Kansas, U.S.A., 5th January, 1909; 6 years. Filed 25th November, 1908. Receipt No. 164,437.

Claim.—In a pulverizing mill the combination with a base constituting a basin, a die ring within the basin, and a cylindrical screen surrounding and upstanding from the ring, of a revoluble bearing sleeve, means for supporting the same above the basin, a driving element

Fig. 1.



connected thereto, a skirt depending from the sleeve, boxes mounted to oscillate within and rotate with the driving element, shafts journaled within and depending from said boxes, said shafts being free to oscillate within the sleeve and skirt, boxes surrounding the shafts and bearing within the skirt, grinding rollers carried by the shafts and disposed to co-operate with the die ring.

No. 116,019. Steel Manufacture.—The Pearlite Steel Company, Limited, assignee of Andrew Charles Joseph Charlier, both of London, England, 12th January, 1909; 6 years. Filed 13th July, 1908. Receipt No. 160,652.

Claim.—1. A process for the treatment of low grade steel consisting in immersing the heated metal in a bath into which hydrogen is introduced or in which hydrogen is evolved and reheating the metal after removal from the bath, substantially as hereinbefore described.

2. A process for treating low grade steel consisting in immersing the heated metal in a chilling or fixing bath containing or evolving hydrogen gas which under the action of the constituents of the bath unites with the carbon and iron of the metal to form hydro-carbide of iron, and in reheating the metal after removal from the bath, substantially as hereinbefore described.

3. High grade steel manufactured from low grade steel by the process substantially as hereinbefore described.

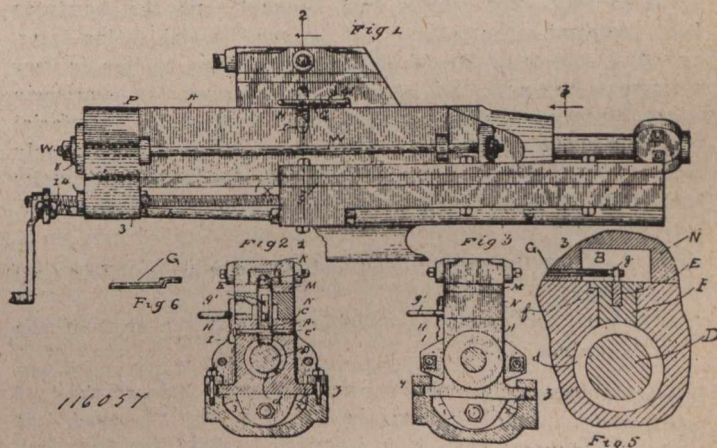
No. 116,043. Silver Precipitating System.—Frank W. Pugsley, Cobalt, Ontario, Canada, 12th January, 1909; 6 years. Filed 19th October, 1908. Receipt No. 163,344.

Claim.—1. The herein described process for precipitating silver from thiosulphate solution either calcium or sodium consisting of adding to the solution metallic aluminum in the presence of a fixed alkali, as set forth.

2. The herein described process for precipitating silver from a thiosulphate solution either calcium or sodium, consisting of first filtering the solution and then adding to the solution metallic aluminum in the presence of a free fixed alkali, as set forth.

No. 116,057. Rock Drill.—James S. Harlow, Mineral, Virginia, U.S.A., 12th January, 1909; 6 years. Filed 24th August, 1908. Receipt No. 161,887.

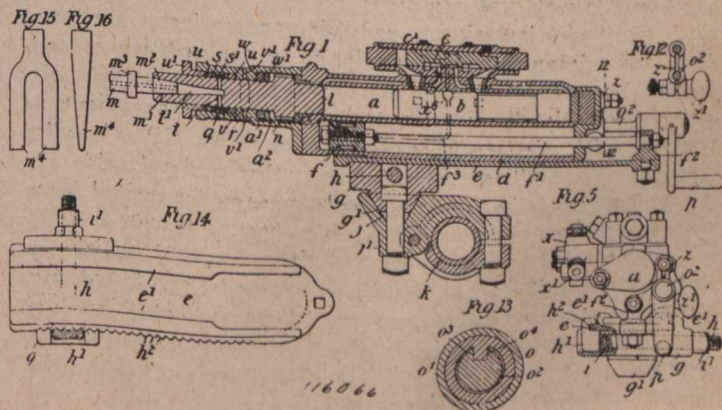
Claim.—A rock drill operating device consisting of a cylinder having suitable ports, a piston therein having shoulders, a tappet to be engaged by the shoulders, a sliding valve controlling ports leading to the cylinder



operated by the tappet, a lever pivoted to the tappet, and means for adjusting the end of the lever into and out of the path of travel of the shoulders of the piston.

No. 116,066. Rock Drill.—William Charles Stephens, Carn Brea, Cornwall, England, 12th January, 1909; 6 years. Filed 31st October, 1908. Receipt No. 163,710.

Claim.—1. In a percussive rock drill of the hammer type and wherein the feed motion is automatically effected by air pressure, the arrangement of the feed



cylinder and hammer cylinder side-by-side and parallel with each other for the purpose of shortening the drill, substantially as described.

No. 116,182. Alloy.—Enrique A. Touceda, Albany, New York, U.S.A., 19th January, 1909; 6 years. Filed 7th November, 1908. Receipt No. 163,933.

Claim.—1. A bearing composed of an alloy of lead and cadmium.

2. A bearing composed of an alloy composed of lead and cadmium in which the lead predominates.

3. A bearing composed of an alloy one of whose ingredients is lead toughened and hardened by the presence of cadmium.

4. A bearing composed of an alloy of lead and other metals, said alloy being hardened and toughened by the presence of cadmium.

5. A bearing metal composed of an alloy whose base

is lead hardened and toughened by the presence of cadmium.

INDUSTRIAL NOTES.

Sullivan Air Compressors—Booklet No. 106—The Sullivan Machinery Co., Railway Exchange, Chicago, U.S.A.

We have just received booklet No. 106 describing Sullivan air compressors. The booklet is not a complete catalogue, but is intended to afford an idea of the scope of the Sullivan Company as manufacturers of air compressors. The booklet describes briefly all the Sullivan lines, including "Straight Line," "Duplex" and "Corliss" steam and belt driven compressors.

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

Glace Bay.—The "Free Coal League" and the Dominion Coal Company.—The "Free Coal League," which, being interpreted, is said to be Mr. W. C. Milner, no more, no less, is very prominent just now, and, assisted by "Farmer," a gentleman whose literary style is strikingly reminiscent of the secretarial pronouncements of the "League," must relieve very largely the labours of the editorial staff of the Halifax Herald in its search for salty "copy." We have heard it said that Mr. W. C. Milner is—

"The cook and the captain bold and the mate of the 'Free Coal League,'

The bo'sun tight, and the midshipmite, and the crew of the captain's gig."

It would interest the public to see the yearly balance sheet of this society. Judging from the name of the "League," it might be supposed that it was formed to fight for free coal, but from the actions of the secretary the public may be pardoned if they assume that the "League" was formed to fight the Dominion Coal Company. Mr. Milner tilts everlastingly at the Dominion Coal Company, and nothing is too hard for him to say about this "bloated monopoly," this "grasping corporation." When the ordinary man has finished one of Mr. Milner's diatribes against this company he is left wondering at the iniquity of the coal barons, who must appear to him, if he believes all Mr. Milner says, as a compound of Standard Oil, Abdul Hamid and Auld Cloutie himself.

For example, Mr. J. S. Willison contributed an article to the Times, which was admitted by every informed person who read it to be a dispassionate and fair presentation of the Canadian coal mining industry in relation to the question of reciprocity in coal between Canada and the United States. Mr. Milner immediately informs the Herald that the article is "replete with misstatements of fact," as is Mr. Milner's polite manner. Mr. Willison presented in rather a novel table the per-ton profits of the Dominion Coal Company for several years past, and showed the steady decline in these from 1902 to 1908. Mr. Milner contradicts the figures given for 1907, which, he states, are a trifle of \$1,200,000 dollars understated, but Mr. Milner omits to say, what he very well knew, that this represented the extra price paid by the Steel Company during the progress of the litigation which is now ended, and that Mr. Willison's figures were quite correct.

Mr. Milner's chief contention appears to be that the Dominion Coal Company charges less for coal in Montreal than it does in Nova Scotia, and that because it now sends coal to Boston with the duty on, it could send infinitely more to Boston if the duty were taken off. Mr. Milner always carefully forgets to say that the coal now being sent to Boston by the Dominion Coal Company is slack coal, and the Dominion Coal Company only seek this contract as an outlet for their winter slack. The business is not a paying one, and everybody knows that any comparisons or figures based on this slack contract are utterly misleading when applied to the coal export trade as a whole. The Dominion Coal Company can mine coal more cheaply than anyone else in Nova Scotia, and they cannot look at New England business to-day, nor could they with the duty off. Mr. Drummond, of the Mining Record, is the bete noir of the secretary of the "Free Coal League," and we suppose if the last-named gentleman ever has nightmare, the Hon. Robert is the bogey. However, it must be admitted that Mr. Drummond knows what he is talking about when he is on the subject of coal mining in Nova Scotia. In the last number of the Record Mr. Drummond writes:—

"Take off the American and Canadian duties on coal, and then Nova Scotia will have in the New England States a market, so we are told, for millions upon millions of tons. How credulous some people are, or how deceitful. At the present time West Virginian coal is selling f.o.b. Boston at \$2.30 a ton, and in cars at \$3.00. How much money would there be in the New England trade for the Nova Scotia operators at that price? They could not look at it. West Virginia coal, for the time being at any rate, has forced Pennsylvania and Ohio coal out of the Boston market. If West Virginia can drive two neighbouring States to the wall so far as coal shipments are concerned, is it likely she would stand by and allow Nova Scotia to enter and hold the field? It is not to be imagined."

Suppose, for the sake of argument, that it were possible by the provision of costly and adequate discharging facilities for the Dominion Coal Company, or any other Nova Scotian company, to oust or successfully compete with United States coal in the New England States under a reciprocity arrangement (which is supposing an impossibility), what guarantee could a Nova Scotian company have of fair treatment in a foreign country if that country began to feel the pinch of Nova Scotian competition? Would any sane board of directors be justified in expending the huge sums of money that it would be

necessary to expend to get any portion of the New England market, under such circumstances, and what assurance could a Canadian company be given that the duty would not be reimposed? Surely the citizens of Canada have lived alongside of Uncle Sam long enough to know him better than that.

In Mr. Milner's contention that the Dominion Coal Company is doing injustice to Nova Scotian operators by the price of coal it is charging in the Maritime Provinces as compared with its St. Lawrence markets, he entirely ignores the fact that the Dominion Coal Company is supplying practically one-third of its entire output to the Dominion Iron and Steel Company at a figure which is below the cost of mining. Take away from Cape Breton the Dominion Coal Company and the steel industry, which the first-named company in a large measure supports, and what would be the consequences? Mr. Milner attempts to prove that the Dominion Coal Company is an incubus and a hindrance to the legitimate expansion of Nova Scotian industries and the province generally. The fact of the matter is that the incorporation of the Dominion Coal Company was the inception of the greatest impetus that has ever been given to the advancement of the Maritime Provinces. That is a fact that can neither be controverted nor denied.

Mr. Milner's other argument is that coal is sold to the railways and large business concerns in Montreal at a cheaper rate than it is sold to the householder and the Gas Company in Halifax. We very much doubt Mr. Milner's sincerity when he complains of the low price that is paid by the railway companies for their coal, but if he is willing to purchase coal in the same quantities in which it is purchased by the railway companies he could get it at the same price. This condition of affairs is not confined to Nova Scotia. In England coal is sold at the pit mouth to the railway companies at from \$1.50 to \$2 per ton. The same coal is sold to the workmen who mine it at from \$2 to \$2.50, and to outsiders under the screens at from \$3 to \$3.50 per ton. In London, about half the distance from the mines that Halifax is from Cape Breton, the same coal will retail at from \$5 to \$7 per ton. In Germany the same is true, and in the United States it is said the railways take the coal companies by the throat and squeeze them dry. Mr. Milner should take an elementary course in the laws of trade, and he might enquire how it is that Canadian cheese and Nova Scotian apples can be bought for less in London, England, than they can be bought for in Sydney, Nova Scotia, and why the American coal operators can "dump" coal in Canada at prices that may bring them 5 cents profit and may not.

It is a fond hope that the abolition of the duty on American coal would give Ontario and Quebec much cheaper coal. So far as Ontario is concerned, the price of coal would not be reduced one cent. For all practical purposes Ontario is outside the present available territory of the Nova Scotian coal companies. The only hope for Ontario to get cheaper coal is the construction of the Georgian Bay Canal. If this canal is excavated to a depth that will allow the transportation of ocean borne coal from the Maritime Provinces, it would immediately put the Nova Scotian operators in a position to compete with the United States operators in a territory from which at the present time Nova Scotia is barred. The price of coal would then be lowered by reason of Nova Scotia competition. Should this canal be constructed there is no reason why the Nova Scotia coal trade should not extend its territory until it meets the field of the Alberta mines, and Canada would thus be independent of the United States, so far as coal is concerned, throughout the length and breadth of the whole Dominion. So far as Quebec is concerned, a removal of the duty would for a time give the people of that province cheaper coal, but it would only be a temporary reduction. Under such circumstances there would only be three coal companies in the whole of Nova Scotia that would continue to exist, and their output even would decline until American mines would have absolutely no competition in

the Province of Quebec. Then what guarantee have the people of Quebec that the price of coal would remain at reduced figures? It might be raised—it would be raised. Such things have happened, and there are such things as "combines" in the United States. We are told that once upon a time American anthracite coal was sold at \$3 per ton in Ontario, and that to-day it sells at from \$6 to \$7. The same thing would happen to the price of bituminous coal eventually should reciprocity ever be introduced.

We submit that the Dominion Coal Company, Mr. Milner to the contrary notwithstanding, is not a grinding monopoly, but is a beneficent business enterprise which has very greatly increased the prosperity of the Dominion as a whole, and of Nova Scotia in particular. It has not extorted unfair prices for its product, and it has not used the "big stick" on the smaller operators. As an employer of labor its record is good, and in this particular it can challenge the majority of the coal mining companies in this continent. Since the date of its incorporation the company has never had a strike, or a serious labor trouble, and that is sixteen years ago. The present little disturbance has been engineered by a foreign organization, hailing from the country that is now asking free admission of its coal. The conditions of mining cannot be excelled on this continent, and when it is considered that the Dominion Coal Company have produced over 35,000,000 tons in sixteen years, and in that time, with the exception of one small explosion which caused the death of eleven men, they have had no serious disaster causing loss of life, it must be admitted that they are careful miners. This is partly due to naturally safe conditions, but not entirely so. We have advocated this point of view ad nauseam, but it seems necessary. The company is well managed, and conservatively financed, and when Dr. Milner says its stock is watered he does not write the truth. As a matter of fact the capital of the Coal Company is small compared with its vast holdings and possibilities. It possesses what is probably one of the most valuable bituminous coal deposits in the world, and has a plant which always astonishes visiting engineers by reason of its completeness and extent. If anyone doubts the excellent shape of the Dominion Coal Company's properties let him read the published accounts of the recent visit of the British Institution of Mining Engineers, and he will be enlightened from an English point of view. Many of the Coal Company's men have at times gone to the United States to better their fortunes, but they invariably come back, and in many instances have written begging for free transportation, as conditions in the States were not so rosy as painted. The same is true of men from the "Old Country." They go home, but always come back. Safety lamps are a thing of course, high explosives equally so, there is no "shooting" by unskilled men, no "shooting off the solid," and every precaution that is reasonable is taken to preserve life and property. The company's Rescue Station was the first this side of the water. All these matters are carefully ignored by the "Free Coal League."

If the "League" will change its name and call itself "An Association for the Villification of the Dominion Coal Company," it will appear in its true colors. Its present cognomen is not justified, unless by "free coal" we are to understand Mr. Milner would like to get his fuel for nothing at all!

The Aftermath of the Conciliation Board.

Some few days after the publication of the findings of the Board of Conciliation which recently sat at Glace Bay, two emissaries of the U.M.W.A. arrived in town with cheques to the amount of \$20,000, which they deposited in one of the banks. All the available newspaper reporters were asked in to the bank to assist in the ceremony, and their attention was carefully called to the fact that the cheques represented real money, and, further, there was lots more where that came from. This

theatrical proceeding was followed by various high-flown utterances, which duly appeared in all the glory of print, for the edification of all true believers. The consideration given by the local press to the utterances of the U.M.W.A. delegates has been carried to the point of indulgence, and whatever else these uninvited and unwelcome disturbers of the public weal may have done—and they have very much to answer for—they have plainly impressed the local newspapers. One Sydney newspaper thus described the journeyings of one of these walking delegates: "By the Interecolonial Express this morning Mr. H. W. Bousfield, plenipotentiary extraordinary of the United Mine Workers of America, who has for some days been visiting the Cape Breton coal region," etc. This was written in all seriousness, and was followed by three and a half columns of the things that the American ambassador had deigned to import to the listening reporter. It is no wonder that some of our visitors become afflicted with a further accession of vanity when they see how seriously supposedly reputable newspapers take their vaporings, and some of them really begin to think they are making a noise in the world. This particular agitation was begun and has been fostered right up to the present time by newspaper talk, and garbled, and even actually untrue statements have appeared in Montreal newspapers, that should have known better than to print unedited news from unreliable correspondents. Until we get two days' old newspapers from Montreal we never realize down here how interesting events have been in Cape Breton. A large proportion of the "news" about Cape Breton that has appeared of late in the Montreal and Toronto newspapers is really fiction, and such fiction as speaks volumes for the imagination of correspondents and the credulity of editors.

The latest addition to the forces that are seeking to disrupt the public peace in the mining districts is a rag that is outside the pale of decent newspaperdom. This broadsheet is called "Cotton's Weekly," and is printed at Cowansville, P.Q. Some persons unknown have kindly distributed broadcast a large number of copies of this paper, and a few excerpts may show the kind of literature to which we are being treated. Referring to the Glace Bay Board of Conciliation this sheet remarks editorially that the two arbitrators were "either knaves or fools." "These huckstering arbitrators, although they can get their opinions splurged through the columns of the capitalist press, will not befoozle the workers." This is rather a severe castigation of two gentlemen who voluntarily performed an irksome and thankless duty to the best of their ability. We would like to know exactly what operation is covered by the verb "to splurge." It is cheering to note that the total circulation of this poisonous rag is only 2,400 altogether, and Prince Edward Island takes but two copies. P. E. Island should be thankful. "Cotton's Weekly" bestows its blessing upon the U.M.W.A., and refers to the P.W.A. as "the pet of the big companies." It is interesting to know the company that is kept by the U.M.W.A., and it would be more interesting to know who paid for the free distribution of these papers.

"Cotton's Weekly," like its friend the U.M.W.A., has a decided dislike for the Lemieux Act, which it terms a "capitalistic law for squeezing the workers." Evidently the Canadian socialist does not know advanced social legislation when he meets it. The principles and the workings of the Lemieux Act have evoked warm encomiums from socialist newspapers and reviews in other countries. Just recently "Der Soziale-praxis," a prominent review dealing with social politics, published in Berlin, has devoted a good deal of space to the consideration of the Lemieux Act, and sums up its conclusions as follows: "The Canadian Parliament has evidently achieved something great in passing the Lemieux Act, which provides a Court of Arbitration, and so far its advantages have greatly preponderated over its failures. The happy solution Canada has found to the difficulties which are so often arising with

regard to coal mines, railways, etc., might well serve as a model for the legislators of many European countries." The German review pays a graceful compliment to the soundness of the legislation which has distinguished the over-seas Dominions of the British Empire. In Canada most people are content to judge by results, and there have been few pieces of legislation which have had such ample justification in so short a time as the Industrial Disputes Act of Canada. It is but natural that the U.M.W.A. should dislike the Lemieux Act. The U.M.W.A. has its headquarters in a country that is several laps behind Canada in the matter of social legislation, a country where industrial disputes are largely settled by such crude methods as strikes and lock-outs. We are a long way beyond that stage of development here, and in Canadian eyes the U.M.W.A. is a body of reactionaries, a reversion to the primal type. Industrial conditions in Canada are far better than they are in the United States, and so far as relates to the condition of the mining population life is much pleasanter for the miner in Cape Breton than it is in Pittsburg. Some interesting independent testimony was given on this in the House of Commons by Mr. Ralph Smith, the member for Nanaimo. Mr. Smith stated that he had spent some time in investigating the conditions under which the mining population of the Pittsburg district were living, and his remarks may be quoted with profit. Mr. Smith says: "After a man has gone through an experience of this kind he is prepared to regard even the worst conditions in Canada as favorable in comparison. I want to say that the coal miners of England fifty years ago were in a better condition than the coal miners in the surroundings of Pittsburg are to-day. . . . In hours of labor, in wages, in the prices of commodities that they require to use, our industrial classes in Canada are very much better off than those in that old settled district of Pittsburg. . . . Therefore I say that we have reason to congratulate ourselves that we are so favorably situated. To put it plainly, the Canadian miner, did he but know it, is in a position to act as teacher to his comrades in the United States, and he is doing despite to his privileges when he consents to follow the guidance of the U.M.W. of America."

QUEBEC.

Thetford Mines.—Work at the various mines is progressing on about the same scale as last season. It is expected, however, that the production will be materially increased as the season advances. The new properties are pushing their building and development as rapidly as possible. The Thetford Asbestos and Exploration Co. have three cable derricks under way, and are removing the earth-burden so as to be ready for mining operations as soon as the mill is finished. The plans for the mill are about ready and building will be pushed rapidly. The mineral showing is good. The Robertson Asbestos Co. have their mill nearly ready and hope to be producing early in June. The Imperial Asbestos Co., at Black Lake, have their plans under way for their mill. C. S. Saunders is appointed manager for the new company.

The Royal Trust Company, of Montreal, is reported to have bought one-third interest in the Ward-Ross property, s.w. half Lot 27, Range V., Thetford. The price named is \$100,000.

Recent visitors to the town are Earle C. Bacon, New York; Messrs. J. A. Jacobs and Mortimer Davis, Montreal; N. A. Timmins, Haileybury, Ont., and Messrs. Sam and Charles Turner, of Turner Bros., Rochdale, England. The McGill mining students, in charge of Mr. John A. Dresser, made an inspection of the camp on April 28th and 29th.

Black Lake.—The Union Asbestos Mines, Alfred Calmon, Hamburg, Germany, is under option till May 30th to McCuaig & Co., Montreal.

East Broughton.—The Boston Asbestos Co., the Broughton Asbestos Co., and the Ling Asbestos Co. are the present producers, with the Frontenac and Eastern Townships Asbestos Companies to commence at an early date. The Broughton Asbestos Company have just changed from steam motive power to electricity, which is supplied by the Shawinigan power lines. Mr. J. J. Penhole is appointed manager for the Ling Asbestos Company.

Danville.—The Asbestos and Asbestic Company are working their mill two shifts as usual. The new mill, which is about completed, is of particular interest on account of several new features introduced into the Cyclone whereby the deteriorating influences, which in the past have been the serious objection to this machine, will be reduced to a minimum.

Capelton.—The mines of the Nichols' Chemical Company have been closed for a considerable period. The old ore bodies were worked out as completely as possible. The company's chemical works are producing as usual from ore received from the surrounding locality, and particularly from the Eustis Mining Company. The Eustis Mining Company, under Superintendent Adsit, is working vigorously and producing about four thousand tons per month. A modification of the milling system similar to that used by the Granby Mines, B.C., is being employed and with good success. The motive power is supplied by an up-to-date electric plant.

Considerable speculative conversation is indulged in bearing upon the importance of the copper deposits of the Eastern Townships, and indications point to a movement in prospecting for this mineral and developing old, abandoned workings as soon as the price of the metal reaches the proper figure. J. R. Duckett, of Montreal, has taken option on several hundred acres of land near St. Joseph, Beauce, from which he shows very fine samples of bornite and chalcocite in a vein two feet wide. He purposes to proceed with development at once. Apropos abandoned workings and prospects, we are much interested in R. W. Brock's suggestion in April 15th Journal regarding an "Inventory of Promising Mineral Claims." We think Quebec heads the provinces for the number of mineral claims just opened up and now lying dormant, and also for lack of knowledge regarding these, and even of properties of proved importance. Mr. Brock's scheme would prove a great saving of time and capital and unquestionably an impetus to the mineral industry.

ONTARIO.

Cobalt.—Under date of May 1st it was stated that Mr. J. Houston, of the Right of Way Mine, had been appointed consulting engineer for the Nipissing. This was a mistake as Mr. Houston has been appointed consulting engineer for the Little Nipissing, not the Nipissing.

In our issue of March 15 the statement was made that Mr. Bannell-Sawyer had bought the Milne property. This has not been confirmed.

Three new boilers are being installed at the O'Brien Mine. Two are 150 h.p. each and one is 100 h.p., the working pressure for all three being 150 pounds. These boilers are manufactured by Goldie McCulloch and are to be used to supply power to run the big 250 k.w. generator, which will be direct connected to the engine.

The Kerr Lake will probably make an addition to their plant in the shape of a new 12-drill compressor. The main shaft on the No. 3 vein will be continued to greater depth. The vein in the lowest level shows a good width of very rich ore.

A party of business men from the Maritime Provinces recently came to Cobalt to look over some of the principal

mines and to obtain an unbiased opinion of the possibilities of the district. Although their stay was only a short one they saw enough to fully convince them of the greatness of the mines.

Captain Jeffreys has sent in his resignation as superintendent of the Chambers Ferland. Mr. Chas. Watson, of the Nipissing, is temporarily filling the position.

To those best posted on conditions in this district it would appear that before long the majority of the mines in Cobalt will be controlled by two or three syndicates. The Consolidation of the La Rose properties was one of the first indications of the change, and the recent change in the management of the Chambers Ferland would seem to indicate that this property will be absorbed by the Nipissing. The Lewishons have control of the Kerr Lake, and have also at the present time a deal on for the purchase of the Drummond. It is well known in camp that they are anxious to increase their holdings and that they have bid high for one or two other important mines. The Jacobs Exploration Company is also another important factor, owning many properties in Coleman and Lorraine. It is stated that the Nevins interest in the Cobalt Central have acquired control of the Foster.

A rich strike was made at Temiskaming Mine on April 30th on their No. 4 vein. The ore was encountered in a winze, sunk from a cross-cut, midway between the two shafts on the 250 foot level, and will run about 30 inches in width, of high grade ore. The find was made at a depth of 280 feet from the surface, which is so far the deepest working on the property, and will have a very important bearing on the future of the mine. Despite the many unfavorable rumors concerning the Temiskaming, the mine was never in better shape and the development work is kept well ahead of the stoping. The ore in the 250 foot level is even higher grade than that encountered in the upper workings and the work of sinking the main shaft is being steadily pushed forward so that new levels may be opened up.

The annual report of the Nipissing Mines lately issued shows that in 1908 the company shipped 2,803 tons of low grade and 702 tons of high grade, having a total silver content of 2,893,931 ounces, with a net value of \$1,363,783. The total cost of production was \$575,213, or a little over 20 cents per ounce. The cost of production may seem high in comparison with some of the other mines, but the large number of workings, located at considerable distance from one another, will account for a large administration and mining expense. The company has the largest acreage of any in camp, 846 acres, a large portion of which is still practically unprospected. The large ore body found some time ago in the No. 64 shaft is being developed, a drift having been run nearly sixty feet on the vein, which shows for the entire length an average of 16 inches of high grade ore. The ore reserves of the Nipissing are at present estimated to be about \$2,500,000.

After lying undeveloped for about five years work is at last to be started on the famous Lawson property. This property has been taken over by the La Rose and paid for by the issue of treasury stock which was kept for that purpose. For the present the base of operations will be in the old shaft at the northern end of the property, which was sunk by the Silver Leaf Co. Through an error in the survey this shaft was sunk and the Lawson lot instead of the Silver Leaf. Drifts will be run to the south on the vein, and it will probably not be long before shipments will be made.

On April 22nd a new vein was discovered on the surface, at the Chambers Ferland. The vein lies behind the company's office, about 250 feet distant from the No. 2 shaft, and is from two to three inches in width, carrying smaltite and some silver values. The east cross-cut from the 80-foot level of the No. 2 shaft will need to be continued only about forty

feet to tap the vein. Drifting is being carried on from the bottom of the No. 1 shaft and raise will be started from the drift to connect with the upper body preparatory to stoping. Work has been started on the La Rose vein, which was caught last fall by the Right of Way, while working for the Chambers Ferland, and the vein is holding its original width and values. Twenty-five additional men have started work surface prospecting, and this force will be largely augmented during the next few weeks. The management expect to discover several of the Nipissing and La Rose veins in the north and west ends of the property. The Chambers Ferland is one of the heaviest shippers in the camp and it is well within the range of possibilities that it should become a dividend payer in the near future.

It is reported that two new high grade veins have been discovered by the diamond drill working on the Drummond.

A plant will shortly be installed at the Bailey Mine which will probably consist of two 100 h.p. boilers and a 12-drill compressor. Meanwhile the development work is being pushed as rapidly as the limited facilities will allow.

The Silver Lode Mining Co. at Cross Lake, formerly known as the Queen Alexandria, will install a plant consisting of a 30 h.p. boiler, a hoist, and two drills. The shaft has already been sunk to a depth of 75 feet and will be continued deeper.

It is stated that the Haileybury Silver Mining Co. have sold the south half of their property, consisting of twenty acres, to New York and Buffalo parties for \$100,000. The money realized from the sale will probably be used in developing on a more extensive scale the remaining twenty acres.

A force of men are now engaged in surface prospecting at the Kerr Lake Majestic. The underground development is also making good progress, and the main shaft is now down over 75 feet. Sinking will be continued to the 125 foot level before a station is cut.

A surface vein showing good silver values has recently been discovered on the Farah property.

Good progress is being made at the Empire Mine, which now has a force of about 16 men at work. The shaft has been sunk nearly 100 feet, and will be continued to greater depth.

A contract has been let to sink a shaft on the property of the Cobalt Bullion Mining Co., near Sasaginaga Lake. It is probable that some diamond drilling will also be done.

Another strike has been made on the Right of Way while cross-cutting from their No. 3 shaft. The ore is high grade and was discovered on the 75 foot level about 350 feet from the shaft.

A new vein has been discovered on the property of the John Black Mining Co. The vein matter consists of calcite, with some smaltite and low silver values, and was discovered 200 feet north from the main shaft. The shaft is now down forty feet, and when the 100 foot level is reached a cross-cut will be run to tap the vein. The steam plant recently installed is supplying power for one drill.

The Little Nipissing expects to start work shortly sinking the shaft on their property at Short Lake. The shaft is now down 60 feet and will be continued to the 150 foot level. Air will be obtained from the Silver Queen Mine.

It is reported that the Silver Bird has been leased to the Michigan Development Co. and that work on the property will be started shortly. The mine is located north of the Colonial, on Farr Creek.

The Silver Cliff Mine, which has been closed down for some time, will again commence operations under the management of the original owners.

At the Otisse Mine a four-inch calcite vein with high values in native silver has been encountered in the cross-cut at the 70 foot level.

The Johnston Mines, Limited, owning seventeen claims in Coleman, have let a contract for sinking a 125 foot shaft on one of their properties.

The Motherlode Mine, in James Township, purpose sinking a 100 foot shaft near the mouth of the tunnel, and it is expected that the vein will be cut at that depth. So far all the work has been carried on from the tunnel, which is now in over 300 feet, and the vein continues to show good silver values. A winze has been sunk 50 feet below the level of the tunnel, and from the bottom a 60-foot drift was run on the vein which shows the same width and values as above.

Great activity is being displayed in the Elk Lake district, which promises to become one of the important mining sections. A steam plant is being installed on the Cummings properties and two of the boilers are already on the ground. A shaft will be sunk to the 100 foot level. The United States Mine have let a contract to sink two shafts, 100 feet each, with 200 feet of drifting at the bottom. The Silver Alliance Mine, adjoining the United States on the west, are sinking two shafts by contract, each of which is down about 45 feet. Good progress is being made at the Elk Lake Cobalt Mines and a large force of men are engaged in the mining operations and the installation of the plant, which will shortly be running. The shaft is down to the 100 foot level and will probably be continued much deeper. Several other smaller properties in this district are preparing to operate during the summer months.

The "Big 6" Mine is installing a plant consisting of two 40 h.p. boilers, a four drill Rand compressor, dynamo, pumps, etc. As some of the machinery arrived too late to be taken in over the winter roads the plant will not be in operation until after the opening of navigation, when the remainder can be taken in. The main shaft is now down over 75 feet and will be continued deeper before stations are cut. A force of 26 men are at present employed on the property.

The plant of the Montrose Syndicate, in Lorraine, is now running and the development work is proceeding much faster in consequence. A new head frame has been erected and also a new boiler-house near the shaft. The shaft is down 40 feet and will be sunk 100 feet before any drifting is done.

Air for the Pan Silver is being obtained from the Temiskaming. The shaft is now down about 150 feet, and 25 men are employed on the property.

A contract has been let by the Gifford Cobalt to sink their shaft an additional 90 feet from the 110 foot level.

Mr. J. Houston has resigned his position as superintendent of the Right of Way and will go up the river to take charge of the Bonsall claims. It is probable that he will be retained by the Right of Way as their consulting engineer.

Shipments for the month of April were 2,493 tons, and for the first four months of the year 9,459 tons. This is considerably in excess of the corresponding periods for last year.

The number of deaths lately, due to accidents in the mines of the Cobalt district, points more than ever to the need of an inspector to be located permanently in this district. The present inspection is excellent as far as it goes, but the field that the inspector has to cover is so large that visits to the mines here can only be made at long intervals and as a consequence many of his recommendations are partially, if not wholly, ignored. When an inspector has made his visit to the mine and notified the management of the changes necessary, he should have the time at his disposal to revisit the mine in the course of a week or two, to see that these changes have been made. Under present conditions this is absolutely impossible. It is undoubtedly true that in some of the mines the management is lax in looking after the safety of their men as it should be done, and there is plenty of work in this camp alone to keep an inspector busy all the time.

BRITISH COLUMBIA.

Rossland.—Indications point to a profitable year for the mines of this district, even though there have been a number of drawbacks so far this season. All over the province there is a healthy activity, and while some of the big mining companies are playing for time until copper strengthens a little, yet they are, or will be, in a splendid position to take advantage of a rise in price when it comes about, which we anticipate may be in the months of July or August. Here at Rossland the Centre Star-War Eagle group of the Consolidated Co. is right now in a position to more than double its output; the Le Roi 2, Limited, could also increase its output, although its main efforts will be concentrated on the retimbering and deepening of the Josie shaft from the 900 to the 1,200 ft. levels for a while to come. It is hoped that an extensive plan of operations will be laid out for the Le Roi and with the prices of copper and silver at an advance over present quotations there is a quantity of ore in the mine that could be shipped at a fair profit.

At the present writing there are about 570 men working at the Centre Star group, Le Roi 2, Limited, Blue Bird, I. X. L., Hattie Brown, and O. K. mines, the pay roll running about \$60,000 per month, but this force will be materially increased before the season has gone much farther.

The Le Roi 2, Limited, is making a very good showing. A diamond drill hole put down on the 400-ft. level to locate the continuation of the ore in the 301 stope met with ore from 299 to 308 ft., 5½ ft. of which assayed 1 oz. 10 dwt. gold and 1.81 per cent. copper. During the month of March the Le Roi 2, Limited, shipped to Trail smelter 2,620 tons of ore. The total smelter receipts were \$62,361, in settlement of 112 tons of concentrates at \$29.55, and 3,263 tons of ore at \$18.11, net over and above freight and treatment charges. This is a fine average for Rossland ore.

The Centre Star group of the Consolidated Co. continues to make over \$30,000 per month net on each month's operations. The average grade of ore extracted during March was \$11.10 per ton. The ore body on the ninth level of the War Eagle opened up 50 feet wide, carrying \$20 to \$50 gold per ton. During March the Centre Star-War Eagle group shipped approximately 14,000 tons of ore, which if it averaged \$11.10 per ton, and the freight and treatment charges are under \$5.55 would leave a gross profit on the operations of the mine for the month of over \$77,000. The last month at the Consolidated Co. Trail smelter was the largest in the history of that plant in the way of silver bullion production. A record was also made in the refinery turning out pig lead. Including the work at the St. Eugene, which is showing up a lot of new ore, it is estimated the Consolidated profits last month were about \$70,000 net. It is not thought that the Southern Alberta coal strike will affect any of the properties of the Consolidated as this concern has several months' fuel in the bins.

The ledge on the Hattie Brown has opened out to 6 feet in width and a strike of ruby silver is reported in the shaft. The lessees of both the O. K. and I. X. L. have ore sacked and ready for shipment. The prospects for activity in the leasing way in this camp during the coming summer are good as a number of the old miners who have their homes here have determined to keep themselves busy and try and make a strike in this way during the next few months.

The Boundary.—Ore shipments in the Boundary have dropped off a little in the last couple of weeks, the Oro Denoro not shipping and the Granby only mining enough to keep part of its furnace battery at the smelter glowing, two of the furnaces now undergoing the enlarging process. By July this augmentation of the entire eight furnaces will have been completed and the Granby will have a smelting capacity of 4,500 tons per day and the mines and smelter will be worked to full

capacity if the price of copper warrants such action at that time. This would mean 135,000 tons per month, or 1,620,000 tons per year, if steady operation could be maintained, but this is a physical impossibility as drawbacks in the way of labor, fuel and repairs are almost bound to crop up. It is anticipated, however, that the tonnage for this year will exceed that of last, when it was 1,037,544 tons, returning net profits of something over \$700,000. A mine like the Granby property, however, does more for the good of the community and classes than, we will say, some of the mines at Cobalt. Where the Granby has to employ extensive means and men and a big plant to take out and treat its million tons of ore and make a profit of \$700,000 it is said 2,000 tons of Cobalt ore will yield the same profit, most of which the classes never get a glimpse of—except the capitalist class.

The British Columbia Copper Co. has put a small force of men at work in the Oro Denoro mine. It is likely, however, that all of the property of the B. C. Copper Co. will be closed down unless the company makes arrangements for a coke supply other than that from Coleman, where there is now a strike in progress. A conciliation board, under the Lemieux Act, has been appointed, to settle some minor differences between the B. C. Copper Co. and the Miners' Union. A shut-down would give the contending parties a lot of spare time to talk things over.

A large body of good ore has been opened up in the Greyhound, which adjoins the Mother Lode. This is a promising property and will be heard from later in the annals of Boundary mining history.

Frederic Keffer, consulting engineer for the British Columbia Copper Co., has been over the coal fields of Nicola and Princeton districts. There is a probability of these coal fields supplying fuel for the Boundary mines and smelters in the not distant future. A considerable saving in freight could no doubt be effected over fuel brought in from the Crow's Nest and other outlying points.

The Nicola Valley Mines are now shipping more than at any time heretofore. During February and March 16,000 tons were produced, but it is estimated that April shipments will exceed both of these two months combined. A new steel tippie and other facilities will be installed soon, when shipments can be materially increased.

The Protective Committee in Dominion Copper affairs has appointed Price, Waterhouse & Co., chartered accountants, to audit the accounts of the company; it also states that a mining engineer of high standing in the profession is to examine the property. This committee claims to have 300,000 shares of stock and \$100,000 in bonds behind its actions. We can only trust that the thing will be equitably adjusted in the end, but the whole thing looks pretty hazy just now.

Nelson District.—The Canadian Metal Co. is going into voluntary liquidation at a meeting to be held in Nelson on June 12th. S. S. Fowler, engineer, Nelson, will be appointed liquidator. A new company is to be formed, known as the New Canadian Metal Co., with a capital of \$1,100,000; 100,000 shares par value \$10, and 100,000 dividend shares par value \$1 each. The shares in the new company will be issued 75 per cent. fully paid, leaving 25 per cent. to be paid by the subscribers for stock in the new company. This is where the old shareholders "dig up" or "drop out." The Canadian Metal Co. did not have much luck in its operations and has dismantled its zinc smelter erected at Frank, Alberta. The company is still interested in mines and at Pilot Bay smelter, these to be turned over to the new concern.

The new coal handling plant of the Crow's Nest Pass Coal Co. at Fernie, B.C., is now working. It is said to be one of

the largest in Canada, handling 12 tons per minute with 17 men. This work formerly required 68 men.

A good strike of magnetic iron ore is reported as having been made on Campbell River, Vancouver Island. J. McLennan, D. McPhee and S. Smith have each staked claims along the showing, which averages 20 feet in width. The property is easily accessible for development and there is coal and timber close at hand.

GENERAL MINING NEWS.

NOVA SCOTIA.

Sydney.—The Dominion Steel Company has received an order from the Great Northern Railway Company, of Sheffield, Eng., for 5,000 tons of steel rails. The rails are of standard lengths and 85 pounds weight. This is the first order the company has received from an English firm. New rolls have had to be made to fill this order, as specifications for contract call for bullhead rails, widely different from the ordinary flange in use in Canada.

A Sydney paper says: "At this date the Nova Scotia Steel and Coal Company have at least 120,000 tons of coal banked at its several collieries, and this quantity is ample to supply its steel plant for fully eighteen months, so that in the event of the miners being called out at these collieries the steel plant can still be operated to its full capacity for a year and a half."

The U. M. W. A. have applied for another conciliation board to adjust some grievances between the United Mine Workers employed by the Nova Scotia Steel and Coal Company and that company. An increase in the wages of miners compelled to work with safety lamps is demanded, as it is claimed that the lamps lessen the earning power. The men also claim that the employees at No. 3 Colliery are discriminated against because they are members of the U. M. W. A.

A syndicate has been formed to go into the coal carrying trade. One steamer has already been purchased, and the acquisition of a number of others this year is being considered. The syndicate was formed as a result of the withdrawal from the Canadian coasting trade of all foreign steamers of under fifteen hundred tons.

QUEBEC.

Thetford.—The Beaver Asbestos Mines have suspended operations for a time. The 250 men employed refused to work because an additional half hour's work every day was asked of them in order to pay for the laborers' insurance. This strike will not cause big damage, as the demand for the mine's products is not great at present.

ONTARIO.

Cobalt.—The La Rose has taken over the famous Lawson mine, which has been involved in bitter litigation practically since its discovery in 1905. The La Rose Company will start immediately to develop and prospect the Lawson, which is one of the richest properties in the Cobalt district.

Eight drills are at work on the Crown Reserve. Six machine drills are being used for development work and two stopping drills in taking down ore on the main vein.

The Kerr Lake is now mining the deepest in the camp, and have six inches of ore at a depth of 400 feet. There are seventeen veins on the property which show pay ore.

Of the 846 acres owned by the Kerr Lake Company, 383 are still unexplored, and the remaining 463 acres are only partially prospected and developed. The recent discovery of a well-defined vein of rich ore at the 172-foot level in shaft No. 64,

which is 16 inches in width and assays 1,700 ounces of silver to the ton, shows the possibilities of this partially prospected territory.

A shaft is down 140 feet on No. 3 vein of the Savage mine, with levels cut at the 75 and 135 foot levels. On the 75-foot level 100 feet of drifting has been done, and cross-cutting to the vein on the 135-foot level has been started.

Six concentrators are now in operation at Cobalt, and four more are in course of erection. During 1908 ten smelters treated ore from the camp. The shipments during 1908 were greater than the combined shipments of the four previous years. There are now 3,500 men employed in the mines in this district.

The Little Nipissing expect to start sinking the shaft on their Short Lake property shortly. Air connections have been made with the Silver Queen, and a drill will be installed. The shaft is down 60 feet on an 18-inch calcite vein, and the shaft is to be continued to the 150-foot level before a station is cut.

Gowganda.—C. H. Fullerton, civil engineer, has been sent north by the Department of Public Works to survey the route for the summer road to Gowganda. The estimated distance is 32 miles. Construction is to begin about June 1st.

Toronto.—The Ontario Government has decided to sell a portion of the Gillies timber limit, and tenders will be received until June 15th. One thousand acres in the north end of the limit are to be put on sale in parcels of twenty acres each, and will be sold subject to a ten per cent. royalty on all ore produced. The total area of the limit is 100 square miles, or 64,000 acres. The portion of the area containing the Provincial Mine is reserved, and will not be put on sale.

1,439,300 acres of land in the District of Algoma have been thrown open to prospectors. The land lies north of Sault Ste. Marie, and is to be open for prospecting until December 31st, 1910. Any iron, coal, iron pyrites or nickel is reserved for the Algoma Central and Hudson Bay Railway, under the terms of the grant made to the company when the land was set aside about five years ago.

ALBERTA.

Lethbridge.—Practically all the coal mines in Alberta are now idle as a result of the strike. A meeting was held at Taber, and the miners made a demand that none but union miners be employed in the mines. This was refused, and as a result the miners stopped work.

The situation continues practically the same throughout the other Alberta camps. Some places are beginning to suffer through shortage of coal.

BRITISH COLUMBIA.

Rossland.—At the present time the Rossland mines employ 565 men, and the pay roll is \$58,000 per month. The Centre Star leads with 410 men on the pay rolls, followed by Le Roi No. 2 with 125 men. In 1905 the average number employed was 780, and in 1908 it was something over 800.

Greenwood.—In the dispute over wages and hours between the B. C. Copper Co. and its men, the company has nominated Mr. E. Crown, barrister, of Toronto, as its representative on the Conciliation Board. Mr. John McInnes, M.P.P., represents the employees.

The B. C. Copper Company's Mother Lode Mine has been closed down as a result of the coal strike, and the smelter was expected to close down May 1st, as its reserve coke supply was all exhausted.

Ymir.—At the Yankee Girl there are at present 25 men at work. The tunnel is now in 1,500 feet in ore valued at from \$20 to \$60. Arrangements are under way to take up all deferred payments on the property. A tramway and concentrator are planned, but will not be erected at present.

Nelson.—At the Queen Mine at Salmo, work is at present being carried on in the 500-foot level. The lowest grade ore so far milled has averaged between \$8 and \$9 per ton. The property produces approximately a \$5,000 brick every 14 days. The mill capacity of 10 stamps has been doubled.

Harry L. Rodgers has taken a bond on the Iona group on Poreupine Creek, owned by Messrs. Price and Burgess.

The bondholders of the Summit group have decided to float a company to operate the property.

Kaslo.—At the Lucky Jim changes appear to have taken place in the grade of the ore as development work proceeded. The zinc zone has been worked through and an extensive body of silver-lead ore cut into.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

The Anthracite Miners' Association has demanded an increase of 5 per cent., on the ground of the high prices of anthracite compared with other coals. Should a strike take place, 12,000 men will be involved. The increase is over £60,000 a year.

On December 31st, 1908, there were 515 blast furnaces standing in Great Britain, of which 310 were in blast and 203 idle. This compares with previous quarters of 1908 as follows: March, 312 in blast; June, 308; September, 301. On December 31st there were five new furnaces under construction, and 70 being relined and repaired.

RUSSIA.

A committee of the Gold and Platinum Miners' Association of Russia has been investigating the possibility of substitutes for platinum, and it reports that there is little likelihood of a substitute being found to take the place of platinum in most of its commercial uses.

Experiments are being made in Russia to produce briquettes, using naphtha as a binding material. Hitherto the difficulty in the way of producing briquettes in Russia has been the need for importing the tar requisite for binding the small coal.

Owing to the depression in the platinum mining industry the platinum miners have applied to the Russian Government, asking that the industry be upheld until it is definitely decided whether the mining of platinum is to be made a monopoly of the Russian Government.

ROUMANIA.

The Roumanian Minister of Commerce has introduced a bill to authorize the leasing of petroliferous fields in the possession of the state. The fields are to be let in lots of 75 acres. Work is to commence within six months from the granting of the concession, and two boreholes must be set up yearly.

SOUTH AFRICA.

It is rumored that there has been an important reef discovery in the southern part of the Heidelberg district. The spot where the discovery was made is about 60 miles southeast of Johannesburg, and it is stated that investigations prove the

existence of this gold carrier over 12 farms. The reef in question is co-related to the main reef.

In 1907 the total applications of capital to South African mining enterprises was nearly a quarter of a million sterling. In the first three-quarters of 1908 these applications totalled nearly two millions sterling, and in the last quarter of the year they amounted to £865,000.

A discovery of tin is reported from Rhodesia, said to be the site of an ancient tin working. The ancient workers put a shaft down 12 feet, but a shaft recently put down 30 feet showed tin associated with iron and copper in chlorite schist. The formation is the same as the Herberton tin fields in Queensland.

At the present time there are four companies on the Rand which crush 50,000 tons of ore per month, whilst there are a number of plants with slightly less than this. According to the plans of some of the companies, in the near future these figures will be doubled or even trebled.

Over 25,000 tons of chrome ore, valued at about £68,000, having been already exported from Southern Rhodesia, it has been decided to proceed with the construction of a railway line from Selukwe to tap the chrome ore fields. This extension will considerably lessen the cost of transport of ore, and thereby give an increased impetus to mining operations in the Selukwe district.

AUSTRALASIA.

Further trouble has occurred amongst the miners at Broken Hill. Five hundred men belonging to the Junction North Mine have gone on strike as the result of the dismissal of a unionist miner. Employees at other mines threaten to strike owing to the employment of non-unionists.

The New South Wales Minister for Education has established day schools at the technical colleges at Ultimo and Newcastle. They will provide training in engineering, mining, and architecture.

UNITED STATES.

The farmers of Deer Lodge Valley, who have been in court actions with the Amalgamated Copper Co. in an effort to close the Washoe smelter at Anaconda, have abandoned the fight, and are now seeking to get a settlement with the company through arbitration or sale of their farms to the Amalgamated.

The Minnesota Senate has passed a bill placing a tax of about 5 cents per ton on iron ore mined in the State.

Copper stocks in the United States are estimated to exceed 182,000,000 pounds, which is 18 per cent. of the total annual production. The addition to this surplus during March amounted to 8,350,000 pounds, or 7.5 per cent. of the total monthly output. It is evident, therefore, that the stocks of marketable copper are not accumulating at an increasing rate.

Company Notes.

RIGHT OF WAY BONUS.

A bonus of 10 per cent. has been declared by the Right of Way Mining Co., payable May 20th, to stock of record May 15th.

COAL AND COKE DIVIDEND.

The International Coal and Coke Co., Coleman, Alta., have declared a dividend of 1 1/4 per cent. for the quarter, payable May 1st, to stockholders of record April 20.

EXTRA BUFFALO DIVIDEND.

The Buffalo directors have declared an extra dividend of 3 per cent., payable May 15, to holders of record May 5. The Buffalo pays 5 per cent. a quarter and 1 per cent. extra a month. This 3 per cent. extra just declared is presumably for February, March and April.

THE PACIFIC PASS COAL FIELDS, LIMITED.

A company has been formed in Montreal under the name of the Pacific Pass Coal Fields, Limited. The company's property consists of 30,000 acres, situated on the headwaters of the McLeod, Embarras and Pembina Rivers, about 40 miles from the main line of the G. T. P., in the Province of Alberta. It is held under a 21 years' lease from the Dominion Government,

renewable for another term of 21 years. The coal is bituminous of good quality. The measures lie almost horizontally, and practically all above water level, thus making the operations self-draining and capable of gravity haulage.

The company has a total outstanding bond issue of \$1,250,000 and an authorized capital of \$5,000,000, of which \$4,000,000 has been issued. The company will at first have a capacity of 750,000 tons of coal annually, for which there is already an assured market.

The Board of Directors is as follows: Mr. E. B. Greenshields, President; Hon. Robert Mackay, Vice-President; Mr. Wm. Molson Macpherson, John Theo. Ross, H. A. Lovett, K.C., R. Brutinel, Edmonton Mineralogist; A. H. Cook, K.C., A. de Bernis, J. W. McConnell and F. L. Wanklyn. Executive Committee—E. B. Greenshields, H. A. Lovett, K.C., J. W. McConnell. Secretary-Treasurer, R. P. Doucet.

SILVER QUEEN HOLDS ANNUAL MEETING.

The Cobalt Silver Queen Mining Company held their annual meeting April 27th. No dividend was announced, the directors having decided to withhold dividends while the mine workings are in poor ore, as they are at present. The financial statement showed liabilities outside of capital stock (\$1,500,000) of \$14,223. Against this the mine, equipment, offices and assay laboratory are set down at \$1,465,836. Other assets are: Sundry debtors, including smelter certificates, power rental, etc., \$7,751; ore on hand and at smelters, \$13,000; dump (estimated), \$25,000, and cash \$2,633. The ore on hand and in transit and cash balance amounts to \$40,633.

At the end of the last financial year cash on hand amounted to \$54,861.51. With this balance and what the mine has produced the company has paid to shareholders \$195,000 in dividends, besides what has been spent in development work and in installing a new and larger plant. The new 12-drill compressor is producing more air than required, and the excess is sold, realizing \$1,000 a month. The Northern Customs concentrator will begin treating the dump of May 5th.

The Board of Directors is as follows:—Lieut.-Col. John I. Davidson, President; F. L. Culver, First Vice-President; R. W. Gordon, Second Vice-President; J. H. Stephens, General Manager and Secretary-Treasurer; A. J. Young, Director.

STATISTICS AND RETURNS.

DOMINION STEEL OUTPUT.

The Dominion Iron and Steel Company's output for eleven months ending April 30 shows as follows:—

	1909.	1908.
	tons.	tons.
Pig iron	260,137	260,976
Ingots	259,984	265,560
Blooms	250,500	230,605
Rails	123,830	144,108
Rods	46,111	41,918

For the separate month of April the output was: Pig iron, 22,760 tons; ingots, 24,815 tons; blooms, 23,947 tons; rails, 12,836 tons; rods, 4,297 tons. Shipments for April were some 8,000 tons below March, which was the banner month in the company's history.

APRIL OUTPUT, DOMINION COAL CO.

The output from the Dominion Coal Company's collieries last month amounted to 288,835 tons. This is the smallest April

output since 1905. Last month's output in detail was as follows:—

Dominion No. 1.....	51,240 tons
Dominion No. 2.....	64,330 "
Dominion No. 3.....	24,407 "
Dominion No. 4.....	36,172 "
Dominion No. 5.....	45,851 "
Dominion No. 6.....	9,310 "
Dominion No. 7.....	14,762 "
Dominion No. 8.....	16,789 "
Dominion No. 9.....	25,974 "
Total	288,835 "
Shipments	180,919 "

DOMINION COAL'S FOUR MONTHS' OUTPUT.

Dominion Coal's output for the first four months of the year is 946,000 tons, against 1,243,080 tons a year ago:—

	1909.	1908.	1907.
January	195,971	312,358	231,606
February	206,970	283,358	225,716
March	251,585	344,129	310,220
April	291,934	303,249	316,384
Totals	946,570	1,243,094	1,083,926

Peterson Lake	132,960
O'Brien	128,018
Right of Way	1,205,672
Silver Queen	127,865
Temiskaming	132,800
Trethewey	191,988
T. & H. B.	610,600
Muggley Cone.	72,900

Ore shipments to May 1, 1909, are 18,956,166 pounds, or 9,478 tons. Total shipments for week ending May 1 are 1,013,196 pounds, or 507 tons.

NOVA SCOTIA STEEL AND COAL CO. OUTPUT.

The output of coal at the Nova Scotia Steel and Coal Company's collieries for the month of April was 500 tons greater than in the corresponding month last year. The output by the collieries was as follows:—

No. 1	20,540 tons
No. 2	4,011 "
No. 3	20,637 "
No. 4	2,522 "
No. 5	12,011 "
Total	59,721 "
Pig iron output	5,600 "
Steel output	6,600 "

COBALT ORE SHIPMENTS FOR THE MONTH OF APRIL.

	Tons.
La Rose	737.54
Nipissing	393.09
Right of Way	311.80
Crown Reserve	207.19
O'Brien	128.15
Trethewey	125.45
Temiskaming	122.69
Kerr Lake	62.45
McKinley-Darragh	62.12
Coniagas	661.66
T. & H. B.	60.10
City of Cobalt	53.82
Chambers-Ferland	49.80
Cobalt Central	42.98
Buffalo	42.52
Silver Queen	31.45

Total

CUMBERLAND COLLIERIES' OUTPUT.

Shipments for the month of April from the Cumberland Collieries, Springhill, were 34,435 tons.

COBALT ORE SHIPMENTS.

Following are the weekly shipments from the Cobalt camp, and those from Jan. 1, 1909, to date:—

	Week ending April 24.	Since Jan. 1.
	Ore in lbs.	Ore in lbs.
Crown Reserve	121,843	1,781,119
Kerr Lake	60,000	483,442
La Rose	261,300	4,456,518
Nipissing	321,272	3,831,572
O'Brien	128,598	589,918
Right of Way	128,102	1,205,672
Temiskaming	60,000	710,200

Ore shipments to April 24, 1909, are 17,942,970 pounds, or 8,971 tons. Total shipments for week ending April 24, 1,081,115 pounds, or 540 tons.

	Week ending May 1.	Since Jan. 1.
	Ore in lbs.	Ore in lbs.
Buffalo	44,620	384,640
Coniagas .....	.....	524,820
Crown Reserve .....	.....	1,781,119
Cobalt Central	43,270	248,515
Chambers-Ferland	40,000	520,440
City of Cobalt .....	.....	688,522
Kerr Lake .....	.....	483,442
King Edward .....	.....	98,030
La Rose	234,500	4,691,018
McKinley-Darragh	37,340	524,280
Nipissing	120,660	3,952,238
Nova Scotia .....	.....	480,810
Nancy Helen .....	.....	40,000

The following table gives the total shipments for the month up to the end of April:—

	Tons.
January	2,374.03
February	2,113.93
March	2,477.90
April	2,492.83
Total	9,456.68

For the corresponding four months of last year the camp shipped 5,650.01 tons.

BRITISH COLUMBIA ORE SHIPMENTS.

The following are the ore shipments for the week ending April 16th, and year to date:—

Boundary—	Week.	Year.
Granby	16,687	284,461
Mother Lode	9,120	122,936
Snowshoe	2,506	33,360
Other mines .....	.....	1,773
Total	28,313	442,530
Rossland—		
Centre Star	2,878	43,514
Le Roi No. 2	691	9,146
Le Roi No. 2 (milled)	260	3,740
Other mines .....	.....	9,393
Total	3,829	65,793

Slocan-Kootenay—	
Total	3,790
Grand total	35,932
Smelter Receipts.	
Week.	Year.
Grand Forks	16,687
Greenwood	9,120
Trail	7,270
Northport (Le Roi)	12,761
Total	33,077

	March.	Nine Months.
Value of gold	42.05	42.03
Value of silver	21.54	22.87
Value of copper	9.96	12.18
Value of lead	27.45	22.92
	100	100

RAND GOLD OUTPUT.

The Rand gold output for April is estimated in London at 600,000 ounces, or 7,500 ounces less than March, being the smallest output, excepting the short month of February, since last September. Comparison of values is as follows:—

April, 1908	\$12,017,000
March, 1909	12,902,000
February, 1909	12,004,000
January, 1909	13,064,000
December, 1909	14,031,000
April, 1907	11,405,000
April, 1906	9,329,000
April, 1905	8,475,000
April, 1904	6,497,000

MARKET REPORTS.

Silver Prices.

	New York.	London.
	cents.	pence.
April 16	51 $\frac{3}{8}$	23 $\frac{5}{8}$
“ 17	51 $\frac{3}{8}$	23 9-16
“ 19	—	—
“ 20	51 $\frac{1}{2}$	23 11-16
“ 21	51 $\frac{7}{8}$	23 $\frac{7}{8}$
“ 22	51 $\frac{3}{4}$	23 3-16
“ 23	52 $\frac{1}{4}$	24 1-16
“ 24	52 $\frac{1}{8}$	24
“ 26	52 $\frac{1}{8}$	23 15-16
“ 27	52 $\frac{3}{8}$	24 $\frac{1}{8}$
“ 28	52 $\frac{3}{8}$	24 $\frac{1}{8}$
“ 29	52 $\frac{7}{8}$	24 $\frac{3}{8}$
“ 30	53	24 7-16
May 1	52 $\frac{3}{4}$	24 5-16
“ 3	52 $\frac{7}{8}$	24 $\frac{3}{8}$
“ 4	53 $\frac{5}{8}$	24 11-16

MARKET REPORTS.

May 4.—Connellsville coke, f.o.b., ovens:—
Furnace coke, prompt, \$1.40 to \$1.50.
Foundry coke, prompt, \$1.80 to \$2.00.

Metals.

May 4.—Tin, Straits, 28.95 cents.
Copper, prime Lake, 13 cents.
Electrolytic copper, 12.70 cents.
Copper wire, 14.25 cents.
Lead, 4.20 to 4.22 $\frac{1}{2}$ cents.
Spelter, 5.02 $\frac{1}{2}$ cents.
Antimony, Cookson's, 8.25 cents.
Aluminium, 22 to 24 cents.
Nickel, 40 to 47 cents.
Bismuth, \$1.75 per lb.
Platinum, \$22.50 to \$23.50 per ounce.
Quicksilver, \$44.50 to \$45.00 per 75 lb. flask.

The following are the ore shipments for the week ending April 23rd and year to date in tons:—

Boundary—	
Week.	Year.
Granby	16,010
Mother Lode	8,946
Snowshoe	2,182
Other mines	1,793
Total	27,138
Rossland—	
Centre Star	4,077
Le Roi No. 2	711
Le Roi	20
Le Roi No. 2 (milled)	260
Other mines	9,393
Total	5,068
Slocan-Kootenay—	
Total	3,405
Grand total	35,611

Smelter Receipts.

Week.	Year.
Northport	12,761
Grand Forks	16,010
Greenwood	8,946
Trail	7,800
Total	32,756

CONS. MINING AND SMELTING OUTPUT.

Statistical statement of the Consolidated Mining and Smelting Company's Trail smelter, for the month of March, 1909:—

	March.	Nine Months.
	Tons.	Tons.
Ore received—		
Company's mines	26,865	223,416
Other mines	5,566	55,664
Total ore received	32,431	279,080
Ore smelted—		
Copper furnaces	26,590	223,096
Lead furnaces	5,689	45,237
Total	32,279	268,333
Metals produced—		
Gold, oz.	8,795	73,445
Silver, oz.	185,796	1,601,263
Copper, lbs.	354,110	3,179,674
Lead, lbs.	4,158,481	28,215,407
Total gross value	\$439,220	\$3,581,872