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The Canadian Mining Review

Established 1882

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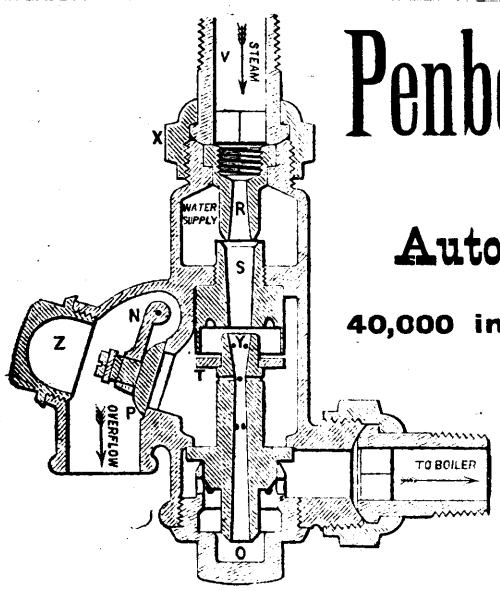

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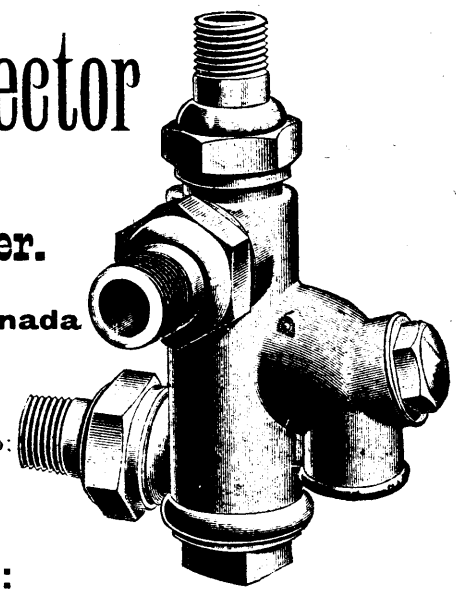

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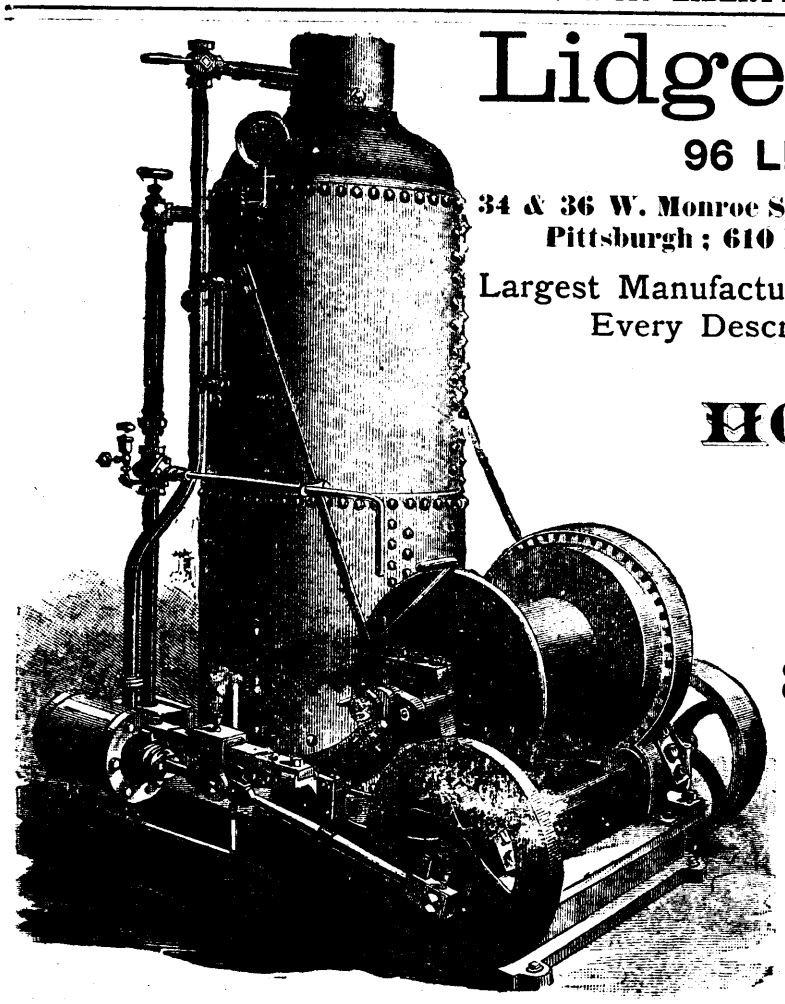

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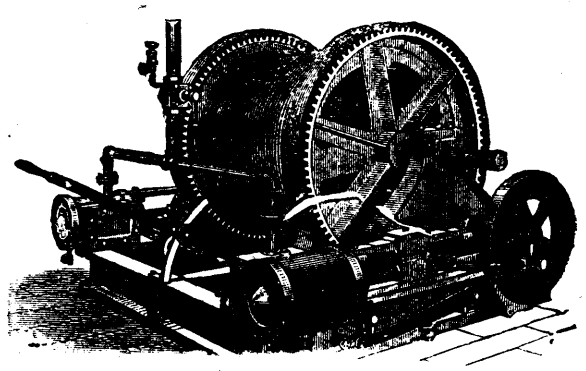

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PRECIOUS STONES.

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GOLD AND SILVER.

Under the provisions of chap. 7, Revised Statutes of Mines and Minerals, Licenses are issued for prospecting Gold and Silver for a term of six months, which can be extended by renewal for another six months. Mines of ld and Silver are laid off in areas of 150 by 250 feet, any number of which up to one hundred can be included in one License, provided that the length of the block does not exceed twice its width. Up to ten areas the cost is 50 cts. per area, for every area in addition in same application 25 cents. Cost of renewal one half the original fees. Leases of any number of areas are granted for a term of 21 years at $2-00 per area. These leases are forfeitable if not worked, but advantage can be taken of a recent Act by which on payment of 50 cents annually for each area contained in the lease it becomes non-forfeitable if the labor be not performed.

Licenses are issued to owners of quartz crushing mills who are required to pay Royalty on all the Gold they extract at the rate of two per cent. on smelted Gold valued at $19 an ounce, and in smelted gold valued at $18.00 an ounce.

Applications for Licenses or Leases are receivable at the office of the Commissioner of public Works and Mines each week day from 10 a.m. to 4 p.m., except Saturday, when the hours are from 10 to 1. Licenses are issued in the order of application according to priority. If a person discovers Gold in any part of the Province, he may stake out the boundaries of the areas he desires to obtain, and this gives him one week and twenty-four hours for every 15 miles from Halifax in which to make application at the Department for his ground.

MINES OTHER THAN GOLD AND SILVER.

Licenses to search for eighteen months are issued, at a cost of thirty dollars, for minerals other than Gold and Silver, out of which one square mile can be selected for mining under lease. These leases are for four renewable terms of twenty years each. The cost for the first year is fifty dollars, and an annual rental of thirty dollars secures each lease from liability to forfeiture for non-working.

All rentals are refunded if afterwards the areas are worked and pay royalties. All titles, transfers, etc., of minerals are registered by the Mines Department free of charge, and provision is made for lessees and licensees whereby they can acquire promptly either by arrangement with the owner or by arbitration all land required for their mining works.

The Government as a security for the payment of royalties, makes the royalties first lien on the plant and fixtures of the mine.

The unusually generous conditions under which the Government of Nova Scotia grants its minerals have introduced many outside capitalists, who have always stated that the Mining laws of the Province were the best they had had experience of.

The royalties on the remaining minerals are: Copper, four cents on every unit; Lead, two cents upon every unit; Iron, five cents on every ton; Tin and Precious Stones; five per cent.; Coal, 7½ cents on every ton sold.

The Gold district of the Province extends along its entire Atlantic coast, and varies in width from 10 to 40 miles, and embraces an area of over three thousand miles, and is traversed by good roads and accessible at all points by water. Coal is known in the Counties of Cumberland, Colchester, Pictou and Antigonish, and at numerous points in the Island of Cape Breton. The ores of Iron, Copper, etc., are met at numerous points, and are being rapidly secured by miners and investors.

Copies of the Mining Law and any information can be had on application to

THE HON. C. E. CHURCH,

Commissioner Public Works and Mines,

HALIFAX, NOVA SCOTIA.

MINING MECHANICAL REVIEW

CONDUCTED BY . . . . . E. T. A. BELL.

OFFICES:
Victoria Chambers, 140 Wellington Street,
OTTAWA.

Vol. X. NOVEMBER, 1891. No. 11.

Iron Ore Production in the United States.

The bulletin on this trade lately issued by the United States Census Bureau, has been compiled by John Birkinbine, C.E., whose well-known reputation for ability is fully maintained by the exhaustive treatment of the subject. The following extracts will give the principal features of this immense industry likely to be of practical interest to readers of the *Review:*

The quantity of iron ore produced in the United States during the year 1889, was 14,518,041 long tons, valued at $33,351,978, an average of $2.30 per ton. The total product reported at the Tenth Census was 7,120,362 long tons, valued at $23,156,957. Of the twenty six states and two territories producing iron ore in 1889 the four leading ones are as follows: Michigan, 5,856,169 tons; Alabama, 1,570,319 tons; Pennsylvania, 1,560,234 tons, and New York, 1,247,557 tons, aggregating 10,234,259 tons, or 70.49 per cent. of the total product. The number of employés engaged in mining iron ore was 37,707, who were paid in wages $13,880,108. The capital invested was $109,766,199, distributed as follows: Land, $78,474,881; buildings, fixtures, etc., $7,573,520; tools, implements, etc., $8,045,545; cash and stock on hand, $15,572,253.

The plants of concentrating works represent a cost of over $500,000. The quantity of iron ore passed through water jigs or magnetic separators in 1889, is stated at 95,425 long tons. The labor cost of ore mined aggregates $24,781,658, equivalent to an average of $1.71 per ton of ore mined, against $2.21 in 1880, a decrease of 50 cents per ton, or 22.62 per cent. The difference includes more than supplies and materials. The figures indicate the advance made in labor saving appliances and improved facilities for mining and handling the product of the mines. In cost of producing, Alabama is the only State which averages less than $1 per ton, viz., 82 cents. The cost in other States is given as follows: Texas, $1.05; Tennessee, $1.08; Pennsylvania, $1.10; Georgia and North Carolina, $1.14; Connecticut, Maine and Massachusetts, $2.73; New Jersey, $2.74; Michigan, $2.07; New York, $1.64; Minnesota, $1.80.

The production of the several leading countries in 1889 was as follows:

	Long tons.
Great Britain	14,546,105
United States	14,518,041
Germany and Luxemburg	11,001,042
Spain (shipments from)	5,067,144
France	2,500,000
Austria-Hungary	2,300,000
Russia	1,400,000
Sweden	985,904
Algeria	475,000
Cuba	256,278
Belgium	220,000
Italy	178,489
Canada	75,162

The importation into the United States in the same year was 853,573 tons, valued at $1,852,392. Of this quantity 243,255 tons came from the Island of Cuba, 477,654 tons from Europe, including 54,496 tons from England, 97,583 tons from Africa, 14,450 tons from Newfoundland and Labrador, 13,670 tons from British Columbia, from Quebec and Ontario 4,091 tons; and from Turkey in Asia 2,870 tons.

The following is a summary of the furnace yield of various ores in the different producing centres: The returns from Alabama show that a great majority of the ores used were obtained from local mines, although some was brought from Georgia. The average yield in the blast furnaces of the iron ores used was 46 per cent. Over 70 per cent. of these ores was red hematite, the balance brown hematite, with the exception of 2,100 tons of mill cinder. The blast furnace reports show that the ores used ranged from 30.5 per cent. to 51.6 per cent. of iron. The three New England States, Maine, Connecticut and Massachusetts, used local ores entirely, showing an average of 44 per cent. of iron in the brown hematites smelted, the only character of ore at present mined in these States. Most of the ores used in Georgia and North Carolina blast furnaces are local, the approximate proportion being one-third brown hematite and two-thirds red hematite, with a small amount of magnetite and mill cinder, the average yield being 44.7 per cent. of iron. Illinois produced no iron ores and obtained the entire supply of its furnaces from the Lake Superior region. The returns for the entire pig iron production showed a yield of 60 per cent. Ninety-four per cent. of the ore charged was red hematite, 2.5 per cent. magnetite, and 3.5 per cent. mill cinder. The yield of ore in the blast furnaces in Maryland, using nearly all local and Virginia ores, averaged about 41 per cent. of iron, but those consuming foreign ores imported from Cuba and the Mediterranean bring the average for the state up to 47.7 per cent. The location of the majority of the Michigan blast furnaces within convenient distance of the ore supply gave these plants, which use charcoal as fuel, some of the ores of lower grade than could stand transportation to distant points, and hence the yield of ore in these furnaces is lower than would be supposed, viz., 58 per cent. of iron, and lower than the yield of Lake Superior ores in furnaces at greater distances. The red hematites formed the bulk of the supply, but some magnetites and brown hematites were also used. The blast furnaces in New Jersey, while depending chiefly upon the local magnetites of that State, also receive a portion of their supply from the Lake Superior region, from New York, a small amount from Pennsylvania, and some foreign ores, the yield for the State being 51.9 per cent. About one-half of the ores used in New York are local magnetites; over 30 per cent. were red hematite from that State and the Lake Superior region, the balance being made up of brown hematite from New York and the New England States, carbonates from New York, and mill cinder, etc., the average yield being 47.6 per cent. of iron. Ohio obtains the bulk of its ores from the Lake Superior region and from its local carbonates, although some magnetite from New York, carbonate ores from Kentucky, and red hematite from Missouri are used. These ores yielded on an average 56.7 per cent. of iron. Pennsylvania is the largest consumer of foreign ores, fully 85 per cent. being shipped into that State, and several furnaces draw their entire supply from this source, with an occasional admixture of local cinder. It is also the heaviest consumer for the Lake Superior ores, obtaining most of its red hematite from that region, which are supplemented by some local ores. In addition to its supply of magnetite from the Cornwall ore hills, Dillsburg, etc., it obtains this class of ore from New York, New Jersey, and Lake Superior region. The brown hematites are mostly obtained from local mines, although some were sent from Virginia. Some local carbonates and some from Ohio are also used. Instances of dependence upon one class of ore show a yield from hematites obtained from Spain and Africa of 63.6 per cent. and 60.2 per cent. of all Lake Superior ores 61.5 per cent. to 59.5 per cent.; of all Pennsylvania magnetites 51 per cent. to 48.5 per cent.; of Pennsylvania brown hematite, 41.5 per cent.; of local fossil ores 37.9 per cent.; and of ore from Cuba and Mediterranean ports 56.6 per cent. The average for the State is 55.3 per cent. The brown and red hematites, which form the chief supply for the Tennessee furnaces, come from local mines, with additions from Alabama and Georgia. Some carbonate ore and mill cinder are also used, the yield for the State being 39.6 per cent. Furnaces using only brown hematites showed an average iron contents of 38.8 per cent. Virginia depends principally upon her brown hematite mines, which supplied over 85 per cent. of the ore used in that State, the balance coming from local red hematite mines, magnetites mined in North Carolina, and a small amount of mill cinder. These gave an average yield of 43.4 per cent. of iron. Local brown hematite and magnetite from British Columbia were used in the Washington blast furnaces, the latter yielding 64 per cent. of iron when roasted. West Virginia obtains most of the ore for its furnaces from the Lake Superior district, and, with the exception of some mill cinder, local brown hematite and carbonate ores, and a small amount of magnetite, is entirely dependent upon that section of the country. This raises its percentage close to 60 per cent of iron. Wisconsin's blast furnaces also draw their supply from the Lake Superior district, and with the exception of some mill cinder the red and brown

hematites were the only ores used, and gave an average yield of 57·2 per cent. of iron.

In no country has the transportation of iron ore assumed such proportions as in the United States. Most of the Lake Superior ores are shipped from Lake Erie ports to furnaces 60 to 475 miles distant. In reaching Troy, N.Y., these ores cross in transit cars from Lake Champlain, going south into Pennsylvania. Their smelting qualities bring them into use in the Hocking region of Southern Ohio, in New Jersey and Eastern Pennsylvania. For cheaply handling ore, the railroads from the mines to ports on Lakes Superior and Michigan, have terminal erections, consisting of docks with elevated tracks, 35 to 47½ feet high above water level, fitted with pockets into which the ore is dumped. From these pockets it is loaded into vessels by iron chutes. The investment for docks especially built and equipped for shipping iron ore approximated, in 1889, the sum of $4,000.000.

The Metallurgic Department of Sheffield Technical School.

To Prof. Arnold's laudable ambition of establishing a metallurgic workshop-school that should be an actual copy of the appliances and practical methods of the very best systems of steel manufacture and iron founding, is due the creation of this institution, for which it is claimed that it will "enable a student to perfect himself in the actual art of manufacture, and permit him, with a confidence born of actual experience, to take a prominent position amongst the supervising and controlling staff of a steel manufacturing establishment." If, in the very cradle of steel manufacture, an institution of this kind is necessary, and meets with the approval of the highest technical authority, how much more should the necessity for a still more complete equipment for instruction in metallurgy impress itself on the people of this country who have a wider range of mineral resources awaiting development, and the necessity before them of either educating their youth in metallurgical knowledge of the first order, or of remaining ignorant and inept as a people in these industrial enterprises which withdraws, year after year, millions upon millions for metal manufactures within the scope of native resources, and—more lamentable loss still—withdraw yearly a considerable portion of the industrious youth of the land.

Passing from the description of the engineering shops, physical laboratory and wood-working departments, the following is an outline of the equipment of the Metallurgic department, given with plans in an extra edition of the London *Ironmonger* of 10th ult.: The open-hearth steel-furnace—of 25 cwt. capacity—with a complete gaseous fuel plant, and hydraulic machinery; a 50-ton testing machine; a crucible steel house, with two melting holes, pot house and pot making tools; a flame and ore-annealing furnace for malleable iron castings; an iron foundry equipped with belted cupola, drying stove, and appliances for green sand castings. The Laboratory is equipped with the most modern apparatus for rapid and accurate chemical examination of iron and steel, fuel and refractory materials. Apertures are provided at various parts of the furnace for testing temperature, for aspiring gases for analysis, and for the spectroscopic examination of combustion and oxidation. By means of glycerine vacuum gauges, the pressure and velocity of the gases in any part of the furnace can be ascertained. It is, therefore, possible to obtain a complete diagnosis of the furnace—both thermic, physical and chemical—at any stage of its operation. The hydraulic plant in connection with the furnace consists of a compressor, accumulator, ladle crane, centre crane and ingot breaker. The iron foundry has a cupola for melting half a ton of metal. The gaseous fuel generating plant is fitted for demonstrating the various different characters of useful combustible gases from solid and liquid hydrocarbons.

Amongst the donors to this institution are the Dukes of Norfolk and Devonshire, Sir T. Mappin, the town trustees and Thomas Jessop, for a total of £8,000. Some ancient guilds and trading companies have assumed a yearly liability of £1,750 for five years, and Sir T. Mappin has given £1,000 towards a prize fund. The endowment fund is not fully quoted, but it is altogether likely that the above statement comprises the principal part of the equipment and sustentation fund.

An institution sufficiently comprehensive to take in the whole field of metallurgic operations, designed "to be an actual copy of the appliances and practical *modus operandi* of the best systems of iron and steel manufacture," with the addition of the Bessemer process, and also with a plant for the reduction of gold, silver, copper, nickel and lead ores, and for refining these metals, "such as to enable a student to perfect himself in the act of manufacture and to permit him, with a confidence born of actual experience, to take a prominent position amongst the supervising and controlling staff of a steel manufacturing," or indeed, any metallurgical "establishment," was submitted in outline to the consideration of the Ontario Government last year, in Inspector Slaght's report. Time will conclusively show that no other system for placing the foundation of mining as well as metallurgical enterprise on a sure basis can compare with this. But time is, in this country, the element which costs, although there is an oriental wealth of it everywhere. So many others get ahead. Even Russia, in the midst of her hunger-stricken peasants, is devising well laid plans for great iron manufactures which command the attention of western Europe, and will no doubt draw to her large sums for investment. Illustrations just like this will continue as the years go by until our forests become huckleberry jungles, and our mines the property of foreign enterprises, reaping wealth in fields of industrial activity which we seem unwilling to learn how to occupy—all this will come to pass, unless our governments, Federal and Provincial, will wake up.

The Quebec Petition.

The following letter has been received from the Deputy Minister of Justice respecting the petition to the Dominion Government to disallow Mercier's blundering Mining Bill:

DEPARTMENT OF JUSTICE, CANADA,
OTTAWA, 10th November, 1891.

SIR,—In reply to your letter of the 9th inst. respecting the petition presented by your Association with reference to the Quebec Mining Act, I am to state that no decision has yet been arrived at, but that it will receive attention at an early day.

I have the honour to be,
Sir,
Your obedient servant,
ROBT. SEDGWICK,
D.M.J.

B. T. A. BELL, ESQ.,
Secretary General Mining Association
of the Province of Quebec, Ottawa.

Just as soon as the decision of the Privy Council has been received, a full meeting of the Association will be immediately convened. At the next meeting, which will be the Second Annual General Meeting of the Association, a number of papers will be read, and the accounts, Report of Council, etc., presented. The meeting will be held in the second week in January.

EN PASSANT.

The fact known to most mowers is noted in *Iron*, that sunlight takes out the temper of a scythe. Edge tools exposed in shop windows are said to be injured in like manner, and the same effect is attributed even to moonlight.

Our series of portrait sketches will be resumed in our next issue, the subject being Prof. B. J. Harrington, formerly a prominent worker on the staff of our Geological Survey, and now a professor in the Faculty of Applied Science at the University of McGill.

Hadfield's manganese steel, after tempering, shows great power of resistance against longitudinal strains, but on breaking its extension increases in an unexpected degree. The quality experimented with contained 1.36 carbon and 13.9 manganese.

Florida's exposition building at the World's Fair will be a full-sized representation of the old Spanish fort at St. Augustine, 150 feet square, walls 20 feet high and 9 feet thick at the base. The structure will be a frame veneered with phosphate rock, and the walls in the court will be covered with pebble phosphate.

For the first half of this year the production of crude petroleum at Baku was 140,478,707 poods, as compared with 126,059,741 poods for the same period last year. The exports by the Caspian this year were as follows:—Crude, 4,957,575 poods; kerosene, 11,391,103; residues, 43,387,532; and lubricating, 291,882; total, 60,523,086 poods. By railroad they were:—Crude, 206,304 poods; kerosene, 22,104,575 poods; residues, 3,854,873; lubricating, 2,272,780; total, 28,438,622 poods. The total exports were:—Crude petroleum, 5,173,969 poods; kerosene, 33,995,678; residues, 57,227,398; and lubricating oil, 2,564,662 poods.

An immense steam shovel is used for digging phosphate on John's Island, near Charleston, S.C. The range of its work before requiring removal is a depth of 10 feet below its track and 45 feet distance on either side. The dipper can swing through two-thirds of a circle, has a capacity of 1¾ cubic yards, and about two dippers full can be handled in a minute. The machine weighs 56 tons.

A "new steel-making process" for getting rid of sulphur and phosphorus prescribes very fine sand and a small quantity of chromic acid crystals, 300 grammes to the metric ton, to be put into the metal before Bessemerizing. When the blow begins, pulverized ammonia carbonate "enclosed in small balls of pure pig" is added. The balls are not put in together, but in rapid succession. The ammonia is said to distribute the carbon of the pig in the bath.

Several meetings of the Explosives Commission appointed by the Nova Scotia Government have been held, but so far the work done has been confined to a desultory conversation and some preliminaary examination of witnesses. A number of experiments has also been made. The Commission is, however, awaiting the completion of a new explosive and will meet in a few weeks, when we hope the evidence will be of such a nature as to be of interest to our readers in these pages.

The faculty for illuminating dry facts by flashing epigrams is possessed by few enquirers in so remarkable a degree as by Dr. R. W. Raymond. He has lately discussed some legal questions with the acumen of a lawyer and the judicial insight of a jurist, and seems to be as fully at home in this field of enquiry as among professional themes. His testimony before the British Mining Royalties Commission, which merits this characterization, has been published at length in the *Colliery Guardian*. As an example of Dr. Raymond's vivacious style, nothing more picturesque than the following extract could be given. He is speaking of the law of the United States as to mining grants and rights, and passes thence to State legislation on the subject of covenants, and he goes at his subject as if he had Maine's "Ancient Law" before him, for Main tells us that the early conception of Contract was "obviously rudimentary." The first notion was "that persons under contractual engagement are connected together by a strong bond or chain," *nexum*, to which the parties were *nexi*. And so the American engineer carries us to the Homeric days of the Californian Argonauts: "Our Federal system west of the Rocky Mountains grew out of the peculiar circumstances following the conquest of California, and the ultimate purchase of California and Arizona from Mexico, and the discovery of gold and silver in great quantities on the Pacific coast. The country was over-run with a very large or rather a relatively large population, wholly in advance of surveys. It was filled up with active pioneers—adventurers who had not got a theodolite among them, and could not run a line, and who must needs assert and arrange their own rights among themselves, for they had no courts and no government officers, and we had no railroad connection and no telegraph, and could not govern the country. If it had not been for the Anglo-Saxon element in the population there would have been anarchy; but there never was anarchy. You could not bring together in a desert gulch on the Pacific coast one hundred red-shirted miners, no matter whether they were half French and Italian, but there would be American and English enough among them to assert the Anglo-Saxon principle of self-government. They would have a mass meeting the first day they began to dig; they would select a president and a secretary and make a law, and the next morning they would hang somebody for having broken that law, and then there would be order."

The good nature of the Ottawa *Evening Journal* is sometimes imposed upon by misguided "boomers," who, for purposes of their own, are always eager for an opportunity to palm off upon the public some highly-colored, and often spurious reports. Of such were the sensational stories published in that paper a few years ago, of rich gold finds in the Buckingham district, which created considerable excitement and did no little harm at the time. Just how much truth there is in its latest sensation, "Phosphate Looking Up," being the report of an interview with one Dwyer, may be gathered from the following excerpt of a letter from the head of an English phosphate company controlling large interests in Canada :—

"I know nothing of any rise in phosphate prices. A few small local purchases have been made by dealers who took foreign contracts last year at high prices and could afford to pay a good figure to complete these orders. I had an offer of 1s. 1d. at Hamburg, for 80% from such a party, but the best offer I have had from consumers was 10½d. at Liverpool, and 11d. at London. It is a singular thing that such prices should prevail when 60% phosphate from Carolina and Florida sells at 10d., but the market has been swamped by sales of Florida high grades. Probably deliveries will fall short and markets may rally in consequence during the winter."

A London letter of Oct. 14th, from Mr. G. D. Jennings, Secretary of the Anglo-Canadian Phosphate Co., Ltd., says :—

"The market continues in exactly the same position. No sales of Canadian 80% are reported. Florida 75 to 80%, has sold as low as 9½d., several cargoes at 9⅝, and is now quoted 10d., while 60% is quoted 10½d. The reason of the anomaly is that 75 to 80% is rushed upon a limited market and unwilling purchasers, while the 60% keeps quite steady in demand and supply. The estimate from Florida is 80,000 to 85,000 tons. Freights there have ruled very high, 18s. to 25s. being very common, and as much as 30s. having been paid. Most of the mines are in a very bad state financially and a complete collapse is talked of, but this of course would only be temporary and would clear the air for the solid concerns to come to the fore. All manurial products are low. Whole bones make £4 7s. 6d. per ton, and bone meal £4 12s. 6d. in bags."

The McDonald oil field, Washington County, Pa., is producing 40,000 bbls. a day. The Matthews well, in less than 90 days, produced 200,000 bbls. To the question, "Will McDonald repay all?" the *American Manufacturer* answers with these figures: The field contains 400 acres; 2,500 bbls. is the production of an acre of 'rich white sand,' but the McDonald field is exceptionally prolific, and may give 3,000 bbls.; in all, 1,200,000 bbls. Taking from this ⅛ for royalty, will leave the well-owners 1,050,000 bbls., worth, at 65 cents, $682,500. Two hundred wells have been put down at an average cost of $6,000 each.

A bar channeler, made by the Ingersoll-Sergeant Drill Company, is successfully operated in the Pennsylvania State quarries. Experience has shown that channeling machines moving in tracks are not suited for such quarries. This machine rests on four legs, is quite portable, capable of varied adjustment, and with the aid of a counterpoise weight attachment can be used on an incline, and the cutting engine fed up and down hill with satisfactory regularity.

A device has been introduced in anthracite mines for registering the ventilating pressure and indicating when the volume of air furnished by the ventilating fan falls below the required amount. To accomplish this result a small tube running from the return air-way at the ventilating machine or in the mine connects with a flexible diaphragm, and any change in the density of the air in the mine at once causes a movement of the diaphragm, which actuates a registering pen and makes a continuous record upon a revolving circular chart. This chart is a simple matter and is conveniently rotated by a clock, and is divided into distinctive spaces for seven days and seven nights. By this simple automatic arrrangement, a continuous record of the condition of the ventilation is kept for one week, at the end of which time a new chart is needed.

When the iron ore concentration works affect the market, the incredulous will lay aside their scepticism, it is to be hoped. The *Iron Trade Review* says that "producers of Bessemer ore that has found a tidewater market these two or three years when ocean freights were high, are somewhat disturbed over the reopening and successful working in New Jersey of abandoned mines. The process is of course patented, but if its operation could be extended to the Lake Superior country there would be no end of valuable property that has been abandoned for lack of paying results with ordinary methods." It is even so. The magnetic concentration process will come into use everywhere an ore can be found that admits of beneficial treatment under its operation with the necessary conditions for economical success. That is a safe proposition, and there will be "no end" of its application in the Lake Superior region.

Improved docks at Two Harbors and other points on Lake Superior, and the construction of several large steel boats, raise the expectation of important changes in the iron ore trade of Michigan and Wisconsin in 1892. The Cleveland *Marine Review* says the greater bulk of the ore will be carried in what are called "flyers," boats that are unloaded in a single day, and are handled between shipping and receiving ports with clock-like regularity; and that the result will be the construction of still larger vessels for the ore trade. The large iron milling companies are not expected to pay their customary big dividends this year, as well on account of the low prices of ore as from the extension of their operations in acquiring vessel property and terminal facilities.

A luminous spirit-level tube differs from the ordinary tube only in being backed by a phosphorescent compound, which is covered by water-proof lacquer. The instrument will doubtless be appreciated by mechanics working in poorly lighted shops.

The Solvay Process Company, of Syracuse, N.Y., is putting up coke ovens for experiment upon the production of ammonia from coke-oven gases, the company being a large consumer of ammonia in the manufacture of soda from the saline brines at Syracuse.

How a crank pin too small for its place was made to fit by heating, covering with soap to prevent oxidation, and again heating it for some time, but not enough to redden it or raise a scale, is told in the *Saturday Engineer*. At this stage it had swelled enough to make a good driving fit, and was again heated, then put in a lathe and polished. The crank was expanded with the aid of a gasoline blow-pipe, the pin pushed into place, and when crank and pin had cooled down the job was found a complete one.

Two new patent furnace bells and hoppers are announced. The invention of B. F. Conner, Columbia, Pa., is described as an outer or upper bell, which closes the mouth of the hopper and has itself a central opening closed by an inner bell. A counterbalanced beam above the hopper supports the outer bell, while a lever connected with the inner bell is attached to the piston of a steam cylinder, to which an adjustable arm on the piston is fitted to engage the counterbalanced beam. The bells may thus be operated independently of each other. The invention of W. L. Wise, of London, is an ordinary changing cone, the improvement in which appears to consist in varying the periphery so as to attain the uniform distribution of the materials, irrespective of size and density. After the charge is tipped over the cone and in falling is distributed over its periphery, the cone itself makes a revolution and thus the charge is equally sprayed over the surface of the furnace or kiln.

The immense commerce of the upper lakes and the certainty of the great increase awaiting it, attract attention to the prevalent low water phenomenon. It is said that it is lower at the Straits of Mackinac by 3 feet than at any time in 10 years, and lower by 4 feet at Kingston. There is a fall of 326·3 feet between Lakes Ontario and Erie, 8·4 feet between Erie and Huron and Michigan, and 20·4 feet between Huron and Superior. It has been recommended that a sill of very large cut stones should be built up from the bottom of the St. Clair River, where Lake Huron enters it, to within 25 feet of the surface. The river here is 800 feet wide and 60 feet deep. A similar work is said to be necessary where Lake Superior enters the Sault river, and where Lake Erie enters the Niagara river. Another recommendation is to fill up the Niagara River near Tonawanda with large stones. It is claimed and also denied that the deepening of the river channels helps to drain the lakes.

Compressed fuel for use under steam boilers has been an important factor in the development of the coal trade in France. Being less pure and more friable than English coal, the profitable use of fine refuse has always been of great importance in working French coal mines. The industry has grown from a production of 1,000,000 tons in 1820 to 24,000,000 tons in 1889. A factory for compressing coal dust requires steam generators, a crusher of pitch or kettles for melting pitch, a meter for pitch and coal to determine the proportions, machines for mixing and heating, a press to conglomerate, and an endless canvas for moving and cooling the briquettes. At Logniéres with an oven 1.50 by 7 metres, costing $1,372.50, the results were: In 10 hours the furnace treated 60 tons of washed coal, containing an average of 6 per cent. humidity, reducing it to 3 per cent. The humidity was still further diminished to 1.8 per cent. by passing the material through two pugging mills. The fuel used was 1.65 per cent. of the weight of the briquettes made. Dry pitch is mixed with the coal when it first comes from the furnace and before entering the pug mill. Compressed fuels made of peat coke, wood charcoal, and even saw dust, concreted with crude petroleum, tar, or glutinous material, such as refuse molasses, have been the subject of various patents probably now out of date. Patent fuel is now sold in South Wales from 6d. to 1s. per ton above the price of the best house coal, and the success of the manufacture is sufficiently evident to warrant experiment in this country with some of the forms of compressed fuel invented for saving the enormous waste of our saw mills.

The Rothschilds have joined the Baku naphtha syndicate, and it is expected the result will be an extraordinary development of the Russian petroleum trade. The naphtha spring recently opened gives a column 28 inches diameter spurting out of an 18 inch pipe to a great height. The daily product is 500,000 poods (9,000 short tons). Naphtha waste has for some time been used as fuel on the Caspian Sea, on the Volga, and in Moscow. The Black Sea merchant steamers are preparing to use liquid fuel, and the vessels plying on the Lower Danube are expected to do so shortly. Efforts are being made to extend the use of the new fuel to manufacturing and household purposes. The abundance of this material is due to the small proportion of illuminating oil in Russian mineral oil, and the great quantity of refuse turned out in the manufacture of an article that must compete with American oil. It is now proposed to refine the refuse called "astatki," for the extraction of a heavy lighting oil safer to use as fuel than crude waste.

The coming explosive for mines is ammonite, if the promise of its good qualities is not overrated. When tamped with clay and coal dust and fired by an electric detonator it gives no flame, either in a cartridge or scattered loose on an anvil; it cannot be fired by heavy weights falling from different heights; and though a cartridge was immersed in ice and water several hours, one piece of it was fired by a detonator and the other, thrown on a coke fire, burned rapidly without explosion. Among 10 explosives fired from a mortar throwing a cylindrical 29 lb. shot with a charge of five grammes, ammonite stood highest in power, gunpowder lowest.

Fuel gases made by certain processes, says the *American Manufacturer*, are better adapted to certain uses than they are to others. They may be roughly divided into three classes—water gas, producer gas, and what, for want of a better term, may be called illuminating gas. Possibly a fourth should be added to these — sprayed petroleum, which is not really a gas When petroleum is made into a fixed gas it should be included under one of the heads named. Water gas gives a very high degree of efficiency, but is somewhat costly. Producer gas can be made in great quantities at a cheap rate, but cannot be transported to any great distance; while illuminating gas is of a comparatively high cost and can only be used where the industry requires gas in no great quantities and can afford to pay a high price. To typify the uses of each of these gases it might be said that water gas answers admirably for welding purposes, producer gas for large operations—like rolling mills—and illuminating gas for domestic purposes and small manufactories. While there are several fuel gas processes that have great merit, it must, in all fairness, be said that there are a great many whose performance hardly justify the claims made for them. Some of the most absurd and impossible claims are daily made for the gas manufactured by certain processes. Most marvellous stories are told of the number of thousands of cubic feet of gas that have been made by certain processes from a ton of coal or a barrel of oil—statements that are as absurd as to say that two and two make fifty. Sometimes the promoters of these processes are self-deceived; in other cases they are simply dishonest, and show their dishonesty when parties desiring to investigate their processes, with the hope of using them, begin to make close enquiries as to methods of manufacture and analyses.

Interesting experiments were recently made at the Bedford Leigh Collieries, near Manchester, with an improved form of water cartridge, patented by Mr. J. J. Speakman, of Runcorn. Its main features are as follow: The explosive charge, which, in the experiments made, consisted of tonite, is placed in a tin tube of suitable size for an ordinary shot hole. This tube is filled with water and the cartridge partially suspended in the water by means of the wire connection with the detonator, which passes out of the side of the tube at one end. When the charge and water have been placed in the tube it is plugged at the open end and the projecting wire connected with the battery wire; the cartridge is then placed in the shot hole and rammed tight in the ordinary way. The advantage claimed for this cartridge is that there is no flame and no risk of explosion, simplicity in manipulating the apparatus, no loss of time or

work as under the old style of naked explosives, and that the coal is not shattered as in ordinary blasting, whilst the cartridge can be supplied at a sufficiently low cost not to interfere with general use. Four ordinary shots were fired in the coal with 4 oz. charges of tonite, and in no case was flame observable, whilst the coal was brought down in excellent condition. As a more severe test two blown-out shots were tried in the hard metal, and no indication of flame was seen, whilst as a final test a loaded cartridge was fired in the open on the mine floor near the pit-eye, and there was again no indication of flame. These experiments may be taken to have definitely proved the absolutely flameless properties of this cartridge. Tonite is a nitrated gun cotton, containing 47·5 per cent. of barium nitrate to 52·5 per cent. of gun cotton. In potentite potassium nitrate takes the place of barium nitrate.

It is reported that an order from the German Government, through its agents in the United States, for 85 tons of pure aluminum, has not been placed and will probably not be for some time. There are only two companies, the Cowles Company, of Lockport, N.Y., and the Pittsburgh Reduction Company, of Pittsburgh, Pa., which could deal with such an order, and neither can accept because of a patent litigation which is now waged between them, and the probability is the German Government will wait some time before they can secure the metal. It will be used for buttons, buckles and for field purposes; also in a certain newly-invented pontoon bridge, its great lightness especially commending it for this purpose. The Willson Aluminum Company has been organized with a capital of $45,000 to manufacture aluminum under the patents of Thos. L. Willson, of Brooklyn, N.Y. The works will be at Spray, Rockingham County, N.C., with a capacity of 400 lbs. per day. The company has had built a dynamo of 1000-horse power and has a large water power at command. Works will be in operation in the early part of next year. The aluminum will, it is said, be produced from corundum and bauxite. The Minet process for aluminum will soon be in operation at St. Michel, Savoy. The motor is a waterfall driving two dynamos of 3,600 amperes and 50 volts each. Six thousand horse power will be used to begin with, which will be increased to 20,000 horse power. The metal will cost by this process 70c. per kilogramme, exclusive of motive power, which can be estimated on the basis that 1 horse power yields 30 grammes of aluminum. The electrolysis of fused fluorides of sodium, aluminun and chloride of sodium requires for the production of 1 kilogramme of aluminum 1⅓ kilogrammes of aluminum fluorides, 2 kilogrammes of alumina and 1 kilogramme of sodium chloride.

As a postscript may be added the annouucement that the Pittsburg Reduction Company has coutracted to supply the German Government with a large quautity of aluminum for the manufacture of caps, cartouche boxes and knapsack linings, the object being to diminish the soldier's burden.

The Cleveland *Marine Review* mentioning the improvement in machinery for handling coal and ore on the lakes during the past few years, says that before 1878 coal was unloaded from cars into pockets and reached the vessels through chutes. This crushed the coal so that both shippers and purchasers soon saw some method must be adopted for handling it more carefully. When machinery was first introduced the vessels were mostly canal size, or of about 600 tons capacity, and all single decked. Soon afterward vessels began to increase in size, the capacity reaching 1,500 to 2,000 ton With this came a change from single to double decks, and the space from upper deck to bottom of the vessel was increased from 10 feet to 20 and 23 feet. The ordinary turn-over bucket which was tripped or turned over above deck was found to have no particular advantage over the chute system, as the distance the coal fell was being increased. Nearly every manufacturer on the lakes has been experimenting on buckets of different descriptions, hoping to get something that would enable them to put the coal into the vessel without dropping it. This was not accomplished until Mr. W. E. Ludlow introduced his bottom dump bucket, which not only places the coal in the vessel without breaking, but so distributes it that little trimming is required. They have now been in use at this and other ports for two years and have given entire satisfaction. Vessel owners are pleased with the bucket for the reason that it does not injure the hatches, and there is less dirt left upon decks and rigging. Mr. Ludlow has been using an automatic trip on one of the machines of the New York and Cleveland Gas Coal Company, so constructed that it can be set to trip the bucket at any distance from the bottom of the vessel that is desired and it will continue to do so until a change in the trip is made. With the trip, three buckets of coal can be put into a vessel as against two where the bucket is tripped by hand.

The progress of late made in mining and metallurgy in Russia, says the London *Mining Journal*, "must in a few years have an appreciable influence upon the industries of the west of Europe. The gold mines of the Oural Mountains, and the ironworks of Ekaterinburg are being exploited in a more systematic manner than ever before; at the same time branches of the industry are being established elsewhere, and the south-west district of Russia is destined before very long to become one of the most important iron producing centres of the Continent. The discovery of the Donetz coal basin opened the way to this growing industry, and allowed of the profitable utilisation of the minerals that are to be found in the neighbourhood. Private enterprise is displaying itself in the opening up of mines with native capital, and the authorities are stimulating the manufacture of iron by placing contracts with native makers that hitherto had gone abroad. The Russian Minister has given out contracts to native makers for the supply of metal sleepers for a period of 40 years; if this experiment is a success it has been determined to use metal sleepers upon all the lines throughout the country." Some of the early State grants for railways were conditioned on the use of rails manufactured in the United States. It is not impossible that Russian statesmen may have got the notion of "stimulating the manufacture of iron" in this way from the American source. It is said that in some Canadian provinces a few years ago, contractors on colonization roads were required to buy picks and shovels from Government supporters, but it is not known that it was required they should be of home manufacture. It would apparently be a useless attempt to trace to a Canadian source any notion of "stimulating the manufacture of iron by placing contracts with native makers."

A crack in the inner tube, near the muzzle of the 110-ton gun on H.M.S. Victoria, the "slight splint," reported on the inner tube of the 67-ton gun on the Howe, a similar defect in a big gun on the Anson, and the removal of the big guns of the Benbow for operations to strengthen them, are quite recent proofs of what the London *Post* calls 'constant gun failures." A correspondent of the *Ironmonger* says that steel is liable to be changed by the action of time apart from external mechanical or chemical influences. Of course this view will not be accepted by metallurgists, except in so far that time may be necessary for the development of the stress which results in rupture. The correspondent referred to says that at an engineering works in London several steel plates cracked spontaneously, with loud reports, some months after they had been received and before any work had been done to them. Another instance is the cracking of hardened steel shells several months after delivery to the authorities. This is attributed to the after effects of the hardening process, but he asks, Why did they not crack during the operation? Dr. Anderson, in a paper on "Tests for Steel Used in the Manufacture of Artillery," read at the May meeting of the British Iron and Steel Institute, says that the unequal tension of the metal caused by oil-hardening, or in some other manner, produces rupture, the exciting cause being a slight change of temperature, or "some other relatively slight cause." It is well known that some cutlery firms prefer to keep their cast steel ingots two or three years before working them, because experience has shown that the steel is thereby improved.

The following new alloys are announced: Nickel-aluminum—20 parts nickel, 8 parts aluminum—used for decorative threads; zinc-nickel pigment—90 parts zinc, 10 parts nickel; nickel hard lead type-metal—100 parts ordinary type-metal, 5 parts nickel; platinide, for crucibles and chemical utensils—60 parts platinum, 35 parts nickel, 2 parts gold, 3 parts iron; roseine, for jeweller's work—40 parts nickel, 10 parts silver, 30 parts aluminum, 20 parts tin; sun bronze—60 or 40 parts cobalt, 10 parts aluminum, 40 or 30 parts copper; metalline—35 parts cobalt, 25 parts aluminum, 10 parts iron, 40 parts copper.

A new metric system by Mr. Hanssen, a Danish engineer, detailed in the *Chemical News*, is simple and has many of the merits of the French system with few of its objectionable features. Nobody seems before to have noticed the approach to interchangeability between our principal units of weights and measures. Mr. Hanssen proposes to increase the inch and foot to 1·000403 times their length, or about $\frac{2}{5000}$ less than $\frac{2}{100}$ of an inch to the foot, and the ounce, pound, and imperial gallon will need no change. A cubic foot contains 436,971·78 grains of distilled water; the new cubic foot would contain 437,500 grains, or just 1,000 ounces avoirdupois. Sixteen cubic feet would equal imperial 100 gallons, or one hektogallon, which will weigh 1,000 pounds. The foot will be divided, like the meter, into decifoot, centifoot, millifoot, there will be hektogallon, dekagallon, gallon, decigallon, centigallon, milligallon and so on with others. Of course governments must first agree on the basis; but it could quickly be made what the French metric system may never become—a really popular utility, displacing old standards.

"The spontaneous ignition of coal," was the subject of a paper by Prof. Vivian B. Lewis, read at the Cardiff meeting of the British Science Association. The heat from the spontaneous ignition of pyrites, to which Berzelius ascribed the ignition of coal, would not if localized be sufficient to raise the temperature of the adjacent coal to ignition. The cause must be found, in Prof. Lewis' opinion, in the power of finely divided coal to absorb oxygen which causes the slow combustion of some of the hydrocarbon constituents at the ordinary temperature. The risk is greatest with large masses of coal and the ordinary air supply on board ship. Oxidation increases rapidly with the initial temperature, hence coal fires occur most frequently on ships while in tropical climates. It may be roughly estimated that the absorbing power of coal for oxygen is proportional to its power of taking up moisture.

The H. C. Frick Coal & Coke Company of Pittsburg, has completed arrangements for the illumination of its mines by electricity. The contract for the work has been awarded to the Westinghouse Electric and Manufacturing Company. The first two mines to be lighted were Leisenring No. 1 and Leisenring No. 2. The mines of the company are situated in Westmoreland and Cambria counties, Pa., and a number are shaft mines, varying in depth from one hundred to nearly one thousand feet. Owing to fire damp and gas in many of these mines the lighting has been a grave problem, because almost every known method of illumination included danger from fire. This led to electric lighting. The Frick Company has adopted the method of lighting each mine independently, and at every mine is installed Westinghouse direct current apparatus of sufficient capacity to light up the mine below, and the buildings above ground. The lamps are distributed underground throughout the main walks leading to the shaft. The engine house and other surface buildings are also lighted. The lamps range from 16 to 50 candle power. Electric light plants are now being put up at Leisenring No. 3, Trotter and Standard mine, but it will probably be a year before the plants for all the mines are installed.

The following is the story, according to a New York *Sun* reporter, told by an old man on whose land natural gas was first struck in the Findlay, Ohio, district:

"Wall, you know," he began, "my son Bill was a great hand to read. One day he had laid away a book he had been reading and says to me—'Dad, I've been reading up on minerals, and I am going to find somethin' right here on our farm.' 'Shoo, Bill,' says I, 'but you wouldn't strike nothing outside of the cobble-stones and worms.' But he must at it, and began to dig, and bore, and fool around, and leave me to hoe the corn, and one day he struck su'thin'. There came such an infernal smell that both of us was drove to the house, and then the smell got so bad that we was drove to a neighbor's, and we had to let the hogs out of the pens or they would have keeled over. 'Bill,' I says, when I got where I could breathe again, 'you said you'd strike sunthin', and you have. You've wasted three month's time gettin' down to where Christopher Columbus buried about a thousand tom cats, and we've all been driv off the farm in consekence. It's my turn now to strike sunthin, and you get ready for the all firedest lickin a boy ever got. I give it to him, gentlemen, and then I went spooking around to find somebody who'd buy the farm at about the cost of the barn. A fellow who seemed to have catarrh, and didn't mind the smell, closed up a deal with me and I had to grin as I walked off with his money under my arm. I kep on grinnin' for about a week, but then I heard some news that stopped me, and I guess it's three years since I've opened my mouth sideways. Them dead cats was worth $100,000 to me, and I sold em for $800, and walked around pattin' myself on the back for being so all fired cute."

It often happens that in starting work on a mine with a small stamp mill, the yield per ton of ore is for a time satisfactory and up to calculations, because the mill can be supplied with ore from the best portions of the vein; but on adding a large mill the conditions are all changed. The mine must be then worked regularly and systematically, and the large consumption of rock by the mill makes it impossible to pick out the ground as before, consequently the yield per ton runs down at once. This simple explanation of lower yield is often kept out of sight by specious assertions as to large loss in tailings. The following experience in some African mills, related by McDermott and Duffield, in their excellent little work, "Gold Amalgamation and Concentration," will serve to illustrate this fact by figures that can be understood by the most inexperienced: "The Robinson mine for several months produced in the neighbourhood of 4,000 oz. of gold with 10 stamps. When 30 more stamps were added, the yield of gold was 8,000 oz. from more than four times the quantity of ore formerly producing 4,000 oz. In other words, the grade of the ore dropped 50 per cent., when the crushing capacity was increased four-fold. The Jumpers mine, in its first workings, in 28,000 tons of ore gave an average yield of 20 dwts. gold per ton. In six months' work with 30 stamps, the yield was 18½ dwts. The result of the first month's run with 70 stamps gave 11¾ dwts. per ton; and the second month's run with 70 stamps, 10¾ dwts. In these two cases, the management being good, no question of increased loss in tailings has arisen, but in many smaller mines such explanation would be jumped at by directors, and inventors of new processes would be listened to respectfully."

The use of machines for preparing moulds for the iron-founder is extending among the Staffordshire and Warwickshire manufacturers, says the Glasgow *Engineer*. A new works on this principle has just been erected at Winenhall, and it is expected that with modern improved cupolas a heavy weight of goods will be turned out.

Shipments of Florida phosphate 75/80% from Fernandina are reported by our correspondent as follows:

October 16, Br. Str. Samara to Stettin		2,210 tons.
" 24, " Alceste to London.		1,100 "
" 28, Br. Bktine Severn	"	687 "
Total		3,997 tons.
Previously reported.		31,465 "
Grand total 1st 10 months 1891		35,462 tons.

Steam traction engines have been built to haul iron ore 100 miles across the Mojave desert from the mines near Haslett, San Bernardino County, Cal. Each engine hauls two trail waggons. The boilers are 20 horse power. Auxiliary engines are placed in the trail waggons and connected with the forward boilers by steam pipes. It is expected each set of waggons will make a trip every two days, hauling 20 tons of ore.

The French Government has ordered that 63 abandoned mines in France are to be conceded to any persons willing to operate them under certain conditions. Of these 21 are iron ore mines, 9 are coal, 11 lignite, and the remainder copper, lead and zinc mines. The State owns the mineral right generally throughout France, and mining concessions cease when the lessees fail to work the properties. It is believed that co-operative associations of miners will be formed to work some of these abandoned undertakings.

When the Countess of Aberdeen was in Ottawa last she was greatly pleased with the beauty and variety of the collection of gems and precious stones cut from Canadian material in the lapidary establishment of C. P. Willimott & Co., and before she left she ordered a handsome necklace of Quartz-Asteria and a smaller one of Amazon-stones. Those of our readers who are ignorant of the resources of the Dominion in gem material should read Mr. C. W. Willimott's excellent review of the subject in a paper just printed by the Ottawa Field Naturalist Club. Mr. Willimott points out that the idea that our crude material may be sold by the ton or hundred-weight instead of by the carat, as Oriental or European gems are, is entirely erroneous; for while some of our semi-gems, such as Agate, Jasper, Amazon-stones, etc., might be so obtained owing to the abundance of material, many of our stones possess a high value and are sold by the carat on account of their scarcity.

The cost of electric as compared with steam power is most favorable for the former in the case of some wharf cranes on a London dock. A 10-ton and a 2-ton steam crane required for their operation $1,250 worth of coal per year, steam being required night and day. The cranes were fitted with electric gear at a cost of $1,500. A gas-engine drives the dynamo, cranes, a chaff-cutter, a corn-crusher and a common friction-hoist, at an expense of $280 for the year.

CORRESPONDENCE.

The New Eldorado.

SIR,—If the average Canadian were asked what he knows about Leadville, he would be able, at least, to say that it is a well known mining camp in the United States; but ask him where and what is Kootenai, and there is not one chance in ten that he will know that it is a new mining field in British Columbia, often now referred to by Americans as a second Leadville. Frequent references in the Canadian press, however, during the last few months, have drawn more or less attention to this great and promising mining region, and now the question is being asked: "What about the Kootenai?"

British Columbia has long been known as an immense and promising mineral country, but its chief mineral production, so far, has been gold. Discoveries of the last three or four years have brought into prominence another precious metal—silver. The field of these important new discoveries is "The Kootenai."

Kootenay Lake is a body of water situated in the southern part of British Columbia, a few miles north of the State of Idaho. The lake is an expansion of the Kootenai River, which river takes its rise in British Columbia, near the source of the better-known Columbia River, thence flows southward into northern Montana and Idaho, then back into British Columbia and into the said lake. The outlet of the lake is an arm about forty miles long, through which the waters of the lake empty into the Columbia River. Thus it is that the waters of the two rivers have their course but a dozen miles apart, flow several hundred miles, one south and the other north, and then join each other, for better or for worse, in a long, long flow to the Pacific ocean.

Should one visit the Geological Museum at Ottawa, he might be shown specimens of ore from this region, brought in by our own Dr. Dawson. They are mostly in the form of silver and lead, or rather silver in lead, and called by miners "galena." A little enquiry would elicit the fact that Dr. Dawson was thoroughly acquainted with the locality which produces these ores, and that he has given us a very exhaustive report of his investigations, which has been published by the Geological Survey, and which, as was to have been expected, is as readable as it is reliable and instructive.

Two years only have elapsed since the visit of Dr. Dawson to this region, and yet it has changed from a mere "prospecting" ground known only to a few adventurous miners, mostly Americans, to an actual mining field, beginning to attract so much attention that a recent telegram to a United States newspaper referred to it as the "New Eldorado," with a prediction that the "coming spring would see one of the greatest stampedes since early Leadville days."

It is only a just tribute to the ability of Dr. Dawson, to assert that great as have been the changes brought about, and remarkable as have been late discoveries, they have been no greater or remarkable than a careful intelligent reading of Dawson's reports might have lead one to expect. Since the writing of those reports, mining men, by discovery and purchase, have acquired mining properties which as "prospects" are worth hundreds of thousands of dollars, and which as developed mines undoubtedly will yield many millions within a few years. In this short time railroads have pushed in, steam boats built, saw mills erected, live towns have sprung up, many "prospects" been developed into mines, and within the month of present writing the building of a large smelter and refining works (for the treatment of ores on the spot) has been begun! In a word, the theoretical and prospecting stage has given place to the realization of actualities.

In 1889 there were two mining "camps" only—known as "Nelson" and "Hot Springs." Last year was discovered "Trail Creek;" and the excitement due to the late discovery of two new promising camps has hardly subsided yet.

The best known and most developed camps are those of Nelson and Hot Springs. Nelson is distinguished by having the already famous "Silver King" mine, a mine characterized by the immense size of its ore deposit, and the ore high grade withal. Near Nelson, also, there are some very promising gold properties, quartz, one of which has been fairly well developed already.

Hot Springs is noted, not for any one big showing, but for the extraordinary character of its surface showings as a whole, and for its many well defined leads, or veins of ore, much of it high grade—often in fact running into the thousands. A Colorado mining man who recently visited the field stated to a reporter of a United States paper that "the surface showings were the most marvellous he had ever set eyes on." This was the impression of a man who is principal owner of a mine which has paid a dividend of $600,000 the last year, (J. H. Bolles, of the 'Mollie Gibson," Aspen, Colorado).

This verdict is really but a repetition of that given by a score of prominent mining men and experts during the past few years.

A mining expert from Australia, who visited the camp in 1890, stated that "without exception it was the most promising camp he had ever seen as to surface showings." Indeed the general reiteration of this opinion by new comers has become agreeably monotonous in the camp. There are several distinct veins which can be traced for from two to four miles. Their width is from two to four, eight and even twelve feet.

It was almost inconceivable that so great and exceptional a surface showing should be merely surface veins. The presumption of depth in such a case was infinitely more reasonable than if there had been only a few isolated croppings. The more reasonable presumption was that the whole mountain was, to use the words of Dr. Campbell, "perfectly saturated with mineral." Dr. Campbell has since shown his faith by his works, and has his reward in the successful development of several of the most valuable properties in camp, (the "No. 1" and "United," etc.)

But in the advanced mining of to-day, it is only the ore "in sight" that is counted upon, however promising the indications may be, and so it was that the ultimate value of these veins and the future of the camp were considered dependent upon the question of the *depth* of ore veins, which could be determined only by actual development—by digging. Thus the development of the prospective mines becomes a matter of importance to the miners of Kootenai, second only to original discovery.

Some little development work had been done up to the close of last year, but it was only during the past season that enough had been accomplished to satisfy conservative miners of the character of the deposits below the surface. Various claims have been exploited now to a depth of from fifty, one hundred, and two hundred feet and upwards. The latest reported development work was that of the "Skyline," at 200 feet. This being one of the most important mines of the camp, its working was looked upon somewhat as a test case, and the result was awaited with an anxiety almost feverish.

What the general result has been is best expressed by the fact of the building of the smelter referred to.

The vein of the Skyline not only was found, but it was well defined, and *twelve feet* of rich ore.

Indeed it is somewhat remarkable that there has been no disappointment so far in the showings of the claims after development.

In view of the fact that this wonderful wealth, which is now practically in sight, was forecast by Dr. Dawson's report, available to every Canadian, are we not to suppose that it was taken advantage of, and that hundreds of Canadians in different provinces, have taken a hand in this profitable mine development and are to be the medium through which the immense wealth stored in our mountains will reach and benefit our Canadian interests and enterprises? Unfortunately, no.

To one reader of Dr. Dawson's report who by it has been led to put in a dollar of capital, or a day's work, a hundred practical everyday miners who never read, and probably never heard of, any official report, have gone into the field in the last two or three years, and are now reveling in brightest prospects of wealth. And doubtless, nine out of ten of these are, not Canadians, but Americans. American prospectors and capitalists opened up the district, and the region and its wealth are better known and believed in to-day in centres south of the "line" than in British Columbia itself!

The visits of many prominent Canadians during the present season, and their almost uniformly enthusiastic reports, however, may have the effect to change all this as to future operations.

And it were well it should; for if, indeed, these mountains be full of golden treasure that is on the eve of being dug therefrom, it means great wealth, not only to individuals but to the little world about them. Whether that wealth stays in Canada, where nature produced it, or goes to the neighboring Republic, already highly favored by its own natural resources, depends upon the nationality of the men who discover or buy, or mine the rich deposits, for where men make their home, there they are most likely to expend their money.

W. H. LYNCH.

SPOKANE, Wash., 17th Nov. 1891.

The Minerals Under Railway Lines.

SIR,—During recent years, or since the construction of railway lines in mineral sections of the country, in many instances the railway right of way or road bed, has been located or constructed over or through lots of land on which minerals were known to exist. The land expropriated by railway companies is generally a strip of land sixty-six feet wide, measured parallel with the line of railway. The question of the ownership of the minerals underneath the railway right of way has been the cause of costly law proceedings on the part of the owners of mines, both before and after construction of the line of railway.

One memorable instance of injustice to the rights of mine owners, was the case of Messrs. Chambers and Jenkins, owners of an iron mine on lots 17 and 18, in the 8th Concession of the Township of Wollaston, the said lots being next to lots 15 and 16 in the same concession and township, which are better known as the Coe Hill iron mine. The owners of the Coe Hill iron mine are the same parties or part owners of the Central Ontario Railway. The Central Ontario Railway was located and under construction to the Coe Hill mine, and to acquire the adjoining iron mine on lots 17 and 18, the railway company, under their powers to expropriate private property, located a "station ground" of nine and nine-tenth acres in extent, exactly on the site or outcrop of this desirable iron mine, and made offer to the owners of $150 for the land and minerals so expropriated! Legal proceedings, however, prevented such a fraud being transacted under the pretended use of a "station ground," and the deposit of ore is now known as the "Station Mine!" A patent manner this of converting an iron mine into a condition closely related to "steal" by means rendered legal under an imperfect Railway Act. Other instances have occurred as to the ownership of minerals under the lines of railway companies.

The last instance which has come to our knowledge is that at the Murray mine, owned by Messrs. H. H. Vivian & Co., (Limited), near Sudbury, Ont. The main line of the Canadian Pacific Railway intersects the outcrop of ore while passing over this lot in an east and west direction. One of the mining company's shafts is located north of the line of railway, and another to the south of the track. The mine owners desire to connect the workings from these two shafts so as to admit of better ventilation by driving a heading or level under the right of way of the C. P. R., but to this the railway company objects. This is a case for the intervention of an Ontario Inspector of Mines on behalf of mining interests. It also calls for an amendment to the Railway Act of Canada to the effect that railway right of way locations are only a surface right and do not grant the locking up of minerals located several hundred feet under ground to a line of railway. The right granted by a railway charter to a company of crossing the surface of mining lands should not entitle them to hinder or prevent the mineral development of the country, nor ought it to aid them to acquire the ownership of minerals on account of the land being used for railway purposes. There need be no danger to the road bed or to the railway property by conducting underground mining operations when the same are conducted with care and under proper inspection as to the public safety. Mine buildings and whole towns are located over mines and there is no danger when the operations are properly conducted, and why more a line of railway than buildings or towns? We respectfully bring this matter to the notice of the Minister of Railways and Canals, and should he fail to take action, to the Attorney-Generals of the several provinces, to have them take action to protect the rights of miners to work the minerals located under railway lines.

"ENGINEER."

TORONTO, 15th Nov., 1891.

Electric Rock Drills.

SIR,—In view of the interest shown in the Electric Rock Drill, I send you enclosed some correspondence which will be interesting to your readers, and which explains itself. Mr. L. C. Trent is the western manager of Fraser & Chalmers, who represent the Rand Drill Company in his district.

I am, etc.,
MECHANICAL ENGINEER.

NEW YORK, 15th November, 1891.

"Electric Drilling in the Last Chance Mine."

(From the published advertisement of the Electric Drill.)

"The illustration on this page affords a good idea of the ease with which electricity is introduced into mines.

"It shows one of the Edison Drills at work in the Last Chance mine at Wardner, Idaho. Speaking of the operation of the plant, which supplants a pneumatic outfit, the engineer in charge of the mine says: 'Operating two air drills for 24 hours required five cords of wood, while for running four electric percussion drills for the same length of time, each drill doing more work than the air drills, it requires only one and one half cords of wood. The electric percussion drills have been found to do more work than the air drills, and in consequence the air drills have been replaced by electric drills. The air plant was situated 1,000 feet higher up the mountain than was required with the electric drills and the fuel had to be carried to the air plant this increased distance over that necessary for the electric percussion drill.'

"Testimony of this kind is hard to gainsay, and it is more than substantiated by the reports from other electric mining plants."

SALT LAKE CITY,
July 22nd, 1891.

Electrical Engineer,
150 Broadway, N. Y.:

GENTLEMEN,—We note in your issue of July 15th, on page 71, a short article entitled, "Electric Drilling in the Last Chance Mine."

We should be glad to know if this is simply an advertisement, or supposed to be authentic information. It is so grossly at variance with the facts, on which the writer is posted—having lately visited this mine and another where the electric drills have been tried—that we want to protest against it. There has always been so much falsification, exaggeration and misrepresentation in connection with the electrical business that reputable concerns ought to endeavor to stop this. The cause of electrical engineering and manufacturing can never be permanently benefited by such methods. On the contrary, the ultimate result will only be an entire lack of confidence in anything pertaining to electricity on the part of the public generally. We will add that the only reliable method of ascertaining the actual consumption of power in operating these drills has been very carefully suppressed in both of the above instances, as no ampere meter was used, and the writer was informed in the case of the two mines, that the 50,000 Watt generator furnished in each instance was only calculated to run six or seven drills.

Yours truly,
(Signed), L. C. TRENT.

Chas. Sweeny, Esq.,
Wardner, Idaho:

DEAR SIR,—In case that it may not have come to your notice, the writer encloses herewith a small article taken

from the *Electrical Engineer* of July 15th, as a sample of the methods used by some concerns in advertising their business, for you will be better able than anybody else to determine how far the statements contained therein are correct.

Yours truly,
(Signed), L. C. TRENT.

WARDNER, IDAHO,
August 2nd, 1891.

L. C. Trent, Esq.,
Salt Lake, Utah

DEAR SIR,—Your favor calling attention to article in *Mining and Engineering Journal* at hand. In reply, have to say that said article is wholly untrue. Up to date the electrical drills are not a success. We have discontinued their use. The plant is still here and the Edison Co. are experimenting with it. The great trouble seems to be the heating of the drill, demagnetizing, and consequent loss of power. When the drill heats it is perfectly useless. If they can devise some scheme to overcome that trouble, I think it will succeed. They had great mechanical difficulty to start with, but have remedied that pretty well. You will see no certificates signed or authorized by this company unless that company make some very material improvement over present condition.

Yours very truly,
(Signed), CHAS. SWEENY, Manager,
Last Chance Mining Co.

LEGAL.

Hon. George Irvine, Q.C., v. J. J. Williams et al.

Judgment by Mr. Justice Wurtele in the Superior Court, Montreal. This was an action to recover royalty on an asbestos mine. The plaintiff represented that by notarial deed at Montreal, March 26th, 1888, A. H. Murphy sold to defendants the undivided two-fifths of lot 32, range B, Township of Coleraine, of which he was the owner of four-fifths, and J. T. Wilson and W. S. Patterson of the other fifth; that it was a condition of the sale that the defendants had to open and work the asbestos mines upon the property in an efficient manner during the term of three years from December 31, 1887, and pay the vendor a royalty of $9 per ton of asbestos mined and shipped from the property, and that (except the first year) they were to mine at least 400 tons a year. The plaintiff, under assignment from Murphy claimed $5,040 royalty and interest. The defence was that Murphy had waived his right before the assignment, and was not entitled to any royalty at the time. There was also a claim of damages set up in compensation. The court held that the plaintiff was entitled to $2,520 royalty, and over-ruled the claim offered in compensation. The demand for royalty for 1890 was held to be premature.

Mining in the Yukon Country.

About 40 miners have returned from this season's work in the North Yukon districts. About 120 men will spend the winter on Forty-mile Creek, while about 40 others will winter at other points along the river. Among those who have returned is Wm. H. McPhee, who has spent four consecutive seasons in search of the yellow metal in the "frozen North," and during that time has gained a very good general knowledge of the country, and especially in the vicinity of Forty-mile Creek, where most of the mining has been done. He says that until the past season the principal mining was done on the bars, which were not yielding very good returns on account of the facilities for working and the limited time that they could be worked, so prospecting in the gulches was commenced quite extensively, and resulted in finding excellent prospects in Franklin and Nugget gulches, and quite a number of claims were located and work commenced. In one of those gulches a $100 nugget was found, which created considerable excitement, and a few days after a nugget worth $236 was picked up by Lawson and Dale, which augmented the excitement to a fever heat, and a general rush was made from the surrounding claims to the gulches, and every foot of ground was located in short order and work commenced in a business way, and in a short time everything resumed a normal condition. The finding of these two nuggets and a number of smaller ones, ranging from $10 to $50, caused great excitement. The miners say there are thousands of miles along the Yukon and its tributaries where diggings can be found that will pay from $4 to $10 a day, if only decent trails can be opened up.

New Brick Machine.—A very powerful dry press brick machine has been invented in the United States. The great power of the machine is due to the employment of four compound levers of the first order. The dry clay is first fed into a disintegrator, in which it is reduced to powder, and in this condition is elevated to a platform over the press, where it passes through a sieve to the hopper of the machine, the coarser portions of the clay being automatically returned to the disintegrator. From the hopper the clay in its powdered condition is fed to the moulds, of which there are four. A pressure of about 160 tons is then brought upon the clay in the dies by means of an upper and under set of toggles, which give about one ton per square inch pressure upon the bricks being formed. As soon as the pressure ceases the bricks are by a cam arrangement pushed forward from the moulds and delivered on to a table in front of the machine, whence they are removed by the attendant, who places them on a barrow, and they are wheeled away to the kiln.

The Mineral Resources of New Brunswick.

BY PROF. L. W. BAILEY, OF THE GEOLOGICAL SURVEY OF CANADA.

(Written for the REVIEW.)

New Brunswick has, as yet, certainly established no claim to prominence as a mineral producing country. This is the more remarkable as within her borders are not only to be found those geological formations which elsewhere are usually the seat of valuable ore deposits, but these occupy extensive areas, and present features in the way of plication, metamorphism, granitic and igneous intrusions, which would greatly enhance the probability of the occurrence of such deposits. It is, however, to be remembered that very large portions of the Province, and particularly those which might be expected to be metalliferous, are still densely forest-clad, and that while the limits and age of the different rock formations have been worked out and mapped with a considerable degree of accuracy by the officers of the Geological Survey, but little has yet been done in the way of intelligent and systematic prospecting.

It is proposed to give here a brief summary of what is known as to the distribution of useful minerals in New Brunswick, of such attempts as have been made to develop them, and of the directions in which further effort may be reasonably made.

Coal.—In no instance has the contrast between confident and even extravagant expectation and actual results been more forcibly illustrated, so far as New Brunswick is concerned, than in the case of this mineral. First recognized as occurring here at a very early period in the settlement of the Province, the reports of the earliest Geological Survey, under Dr. Gesner, led to the most exaggerated statements as to its amount and value. A very large area, comprising fully one-third of the entire area of the Province, was indeed correctly shown to be occupied by carboniferous strata, but the fact that these lie nearly horizontally, and may therefore possess a great superficies with but little thickness, if recognized, was not taken sufficiently into account, and for many years no attempts were made to ascertain the real depth of the formation, or the number and character of its seams of coal. In the meantime a greater or less amount of coal continued to be obtained from the locality in which it was first discovered, near the head of Grand Lake in Queen's County, the seam at this point being about 22 inches in thickness, and spreading horizontally over a considerable area, at a distance of only a few feet from the surface. At the same time a confident expectation was entertained by the residents of that vicinity that other and thicker seams might be found at greater depths below the surface, this belief being largely based on the alleged results of certain borings in which a record was made, at a certain depth, of *eight feet of coal and shale*, the relative amount of each not being stated. In consequence of this belief and prevailing uncertainty, a more careful examination of the region was undertaken in 1872 by the Geological Survey, and supplemented by numerous borings, with the result of showing conclusively that the total thickness of the Grand Lake or Newcastle basin could not exceed six hundred feet, and that the 22-inch seam already referred to was the only workable one in the region. At the same time the total amount of coal, supposing the seam to be continuous over the entire basin, as indicated by various outcrops, would be large, amounting to not less than 154,000,000 tons, while its general proximity to the surface would greatly reduce the cost of its removal.

The Grand Lake product is a bituminous coal, of the coking variety, igniting readily, but requiring frequent stirring for complete combustion, and yielding a rather large percentage of ash. It is capable of yielding about 8,500 cubic feet of gas per ton, but of inferior quality, and is not used for this purpose. It has been principally employed as a house coal and for manufacturing, and is especially adapted for blacksmith's use. The annual product amounts to about 6,000 chaldrons, and its market value from $5.00 to $7.00 per chaldron.

As regards other portions of the extensive carboniferous area of the Province, the facts so far ascertained are unfavourable to the belief that important coal deposits are likely to be found. Small seams do indeed occur at many localities, but the general character, relations, and fossils of the accompanying strata indicate that these belong generally, if not wholly, to the lower or Mill-stone Grit division of the series, and are too thin to warrant working.

Albertite.—Though at present apparently exhausted, no mineral found in New Brunswick has awakened greater interest or has possessed a higher pecuniary value than this. First discovered in the year 1850, as occurring a few miles distant from the town of Hillsboro, in Albert County, its development was for some time retarded by litigation, arising out of the disputed ownership of the mine—a dispute involving the consideration of the nature of the mineral itself, whether this was coal or asphalt—but immediately after the settlement of this difficulty, its prosecution was so rapid and its value found to be so great, that in the course of the years 1863-1865, the annual export amounted to from 18,000 to 20,000 tons, worth at Hillsboro from $20.00 to $22.00 per ton. This very high spot value, as compared with ordinary bituminous coal, finds its explanation in the nature of the mineral, and the consequent uses to which it was found to be applicable. Though pronounced, at the time of the litigation referred to, to be a true coal, and since generally so called, the facts as to its mode of occurrence, its physical and chemical characteristics and its associations, all indicate that although not identical with asphalt (differing in solubility and some other respects), it is more nearly related to this than to coal, and is of the nature of an oxygenated hydro carbon, derived probably originally from veins of fluid petroleum. Its mode of occurrence is quite like that of ordinary veins, being sometimes coincident with the bedding, but as often oblique or at right angles to the latter, besides varying greatly in thickness in different parts, and sending off innumerable smaller veins or veinlets, sometimes forming a complete network of the latter. The principal deposits, those of the Albert mines, occur in highly bituminous and petroleum-bearing shales, situated at or near the base of the lower carboniferous formation, and these are undoubtedly the original source of the mineral, but smaller veins are occasionally found penetrating both underlying and overlying strata.

The maximum thickness of the vein at Hillsboro, as found near the surface, was 22 feet, and was found to occupy a nearly vertical fissure, which was mined to a depth of over 1,400 feet. The mineral is jet black in colour, highly lustrous, breaking much like asphalt, and entirely destitute of stratification, being also destitute of microscopic structure, and of uniform quality throughout. It softens under the influence of heat, and ignites readily, burning with a sooty flame. Subjected to distillation it yields 100 gallons of oil per ton, and of gas about 14,500 cubic feet, the latter being of superior illuminating power. From it a burning oil, known as Albertine, was for a time manufactured, but its principal use was an enricher in gas manufacture, for which it was highly esteemed.

The decline of the Albert mine was as remarkable as its development. As early as 1870 indications of diminished supply began to be observed, and though every effort was made to ascertain the possible existence of other deposits of similar character in the immediate vicinity, these were found unavailing, and the mine, having been practically exhausted, was in 1879 finally abandoned. In the meantime, however, similar explorations were carried on at more remote points, chiefly by boring, while a careful survey of the area was undertaken by direction of the Dominion Government, and all available information bearing upon its further occurrence obtained and published. These surveys resulted in demonstrating the existence of Albertite veins at widely separated points, in connection with the enclosing Albert shales; but these were in all cases very small, and though considerable sums have in some instances been expended in proving them, they have in no instance proved remunerative.

Anthracite.—This mineral is found to a limited extent in the Devonian rocks of St. John County. In many instances it is evidently the result of the alteration, wholly or in part, of the individual trunks of fossil trees *(Dadoxylon)* scattered through the sandstones of the Devonian formation; but in a few cases the vegetable accumulations would seem to have been such as to give rise to actual beds of coal, though of no great thickness. The best known locality for these beds is that of Lepreau Basin, near the western border of St. John County, and not far from the mouth of the Lepreau River. A seam of mixed coal and shale is here met with, having a total thickness of fifteen feet; but the shale is irregularly distributed through the coal, and the latter, where purest, does not exceed a thickness of four feet, while it also contains much earthy matter. Analyses of samples from the outcrop, made by Dr. Harrington, gave 36·88 per cent. of ash. The beds at this locality are all highly disturbed, and the area over which they are distributed but small.

Bituminous Shales.—The bituminous shales or pyroschists which have been referred to as holding the mineral Albertite, constitute in themselves also, to some extent, a source of combustible material.

These shales are found at or near the base of the lower carboniferous formation in Kings, Albert, and Westmoreland Counties, where they form two or more belts, with a total length of fifty miles, and with a surface breadth rarely exceeding half a mile. They are remarkably fine-grained, dense and tough, varying in colour from dark grey to jet black, susceptible of polish though possessing little lustre, and emitting, especially when rubbed, a decidedly bituminous odour. At times they approach the character of a true cannelite, while at others they are saturated with petroleum. They contain also a considerable proportion of calcareous matter, and in certain layers abound in the remains of fossil fishes. In attitude they are usually much disturbed, their inclination at most points being high or even vertical, with numerous and abrupt plications.

Some twenty years ago an attempt was made to employ these shales in the distillation of oil, and works for the purpose were erected at Caledonia, in Albert County, about three miles distant from the Albert mines; but the product being unable to compete successfully with the enormous yield of natural oils then first brought to notice in Pennsylvania and elsewhere, these were soon abandoned. The yield of the richest bed at this point, known as the Black Band, and having a thickness of about seven feet, was 63 gallons per ton, while of somewhat similar beds on the Memramcook River, in Westmoreland, the yield was 37 gallons per ton. From the latter locality about 2,000 tons were removed in the year 1865, and are said to have sold, in the United States Market, at the rate of $6.00 per ton. The gas producing capacity of the Black Band shales was 7,500 cubic feet per ton.

Petroleum.—The Albert shales have been described as not only yielding oil upon distillation, but as containing a certain proportion of such material, naturally produced. The amount of petroleum thus contained varies considerably, and only rarely is in sufficient quantity to become

visible. During the course of the operations at the Albert mines, drops of oil were sometimes seen oozing from the walls of the galleries, more particularly from the sandy beds, associated with the shales, and it has also been observed at Upper Hillsboro, Belveau, Memramcook and Dover. At some of these points attempts have been made to collect the oil, but so far the flow of the latter has in each instance proved too slow to allow of profitable collection. In the case of the locality at Dover, the oil in coming to the surface in connection with a spring of water becomes slowly oxydized and hardened into a pasty semi-fluid and elastic mass, resembling pitch, and known as maltha. The oil-bearing strata frequently emit jets of inflammable gas.

Gypsum.—Gypsum is one of the most abundant of the economic minerals of New Brunswick, occurring in beds of great extent and thickness near the top of the lower carboniferous formation, especially in Albert, King's and Victoria counties.

The deposits which have been longest known and most extensively worked are those near Hillsboro, in Albert County, being the property of the Albert Manufacturing Company. The total area occupied by the plaster beds in this vicinity is not accurately known, but from the position and relation of the several quarries, it seems certain that this is quite large, while the exposed thickness of the bed varies from seventy to one hundred feet. Of this, however, a portion is anhydrite or hard plaster, the associated gypsum being mostly a pure white or slightly clouded alabaster, which is occasionally translucent, but more generally opaque. Small crystals of selenite occur in some portions of the mass, but are comparatively rare. The rock is distinctly stratified, and usually accompanied by limestones.

For some years the Hillsboro plaster was employed only for exportation in the raw state, but in 1861 works were erected for its calcination, and since that time have been kept pretty steadily in operation, supplying both the burned and unburnt product. The productive capacity of these works (in 1876) was 600 lbs. per day, giving employment to about 100 hands.

Of other localities containing workable beds of gypsum, one occurs upon the North River, a few miles from Petitcodiac Station on the Intercolonial Railway. It is remarkable, in contrast with that of Hillsboro, in being highly crystalline, nearly the whole mass, about 40 rods in breadth, being granular or fibrous, while a vein of coarsely crystallized selenite, from six to eight feet in diameter, is traceable through the mass for a distance of a mile or more. A large quantity of gypsum has been removed from this locality, but has not been subjected to calcination. Large and valuable beds of gypsum also occur upon the Tobique River, in Victoria County, but are less pure than those of Albert County.

Antimony.—Ores of this metal have been observed in several localities in New Brunswick, but the only one in which it is known to occur in quantity is that of Prince William, about twenty-four miles from Fredericton, and about four miles distant from the St. John River. It is here found in connection with a series of slates and sandstones believed to be of Cambro-Silurian age, and which, within a mile of the mines, are invaded by a great mass of intruded granite, by which they have been made to assume more or less of a crystalline character. Numerous quartz veins, from one-eighth of an inch to six feet, intersect these slates and sandstones, and most of them carry more or less of the metal. This is chiefly in the form of the sulphuret or *stibnite*, but in the course of the workings, native antimony was also met with to some extent.

The Prince William locality first came into notice about the year 1862, soon after which several companies were formed for its development. The first of these to undertake active operations, was the Lake George Mining Company, by whom a considerable quantity of ore was raised, while at the same time somewhat expensive works were erected, embracing crushers, rollers, jiggers, etc., as well as furnaces for desulphurization and smelting. When in full operation, these works yielded fifteen tons of metal every six weeks, the charges (of 500 cwt.) affording from 45 to 55 per cent of regulus. The product was partly exported in cakes or ingots to the United States, and was partly employed on the ground in the manufacture of Babbit metal by admixture in the proportion of twenty per cent. with lead, copper and tin. The value of the regulus was quoted on the ground at 12 to 14 cents per pound; that of the Babbit metal, according to quality, from 20 to 50 cents per pound.

The above works were somewhat interruptedly carried on for several years, but it was finally found or thought to be unprofitable to continue the manufacture, and they have since been idle. In the meantime several other companies have purchased leases in the vicinity, and through the rivalry of these, together with frequent changes of ownership and consequent litigation, the development of the whole locality has been greatly retarded. In October, 1883, about eighty men were employed in the Brunswick mines, (at wages varying from $1.30 to $1.50 per day), and during five months of that year about 29 tons of ore were sent off, chiefly to Medford, Mass., where it was largely employed in the vulcanization of rubber. Soon after this, however, the works were suspended and have not since been resumed. It is said that not less than $400,000 have been expended at this locality since the first commencement of mining operations.

Native Antimony. — This mineral accompanies the sulphide of antimony or stibrite at the Prince William or Lake George mines in York County, described above, but is relatively rare. It is found both massive and crystalline, and some of the specimens obtained here are very fine.

In addition to the locality in Prince William, gray antimony ore has been observed at several other points, as in Canterbury, York County, and Springfield, King's County, but only in small quantities.

Manganese.—The principal deposits of manganese are those of Markhamville, King's County, being about twelve miles south of Sussex Station, on the Intercolonial Railway. As is usually the case they here occur in connection with limestones lying at or near the base of the lower carboniferous formation, though also sparingly found in the underlying Huronian rocks. Their distribution is characterized by great irregularity, the ore being distributed through the limestone chiefly in the form of pockets, some of which are small, but others remarkable for their large size and purity. The ore itself embraces many varieties, though chiefly consisting of pyrolusite, both massive and crystalline, and is not infrequently associated with limonite and barite. The mines at this locality were first opened in 1863, since which time about 20,000 tons of ore have been removed, the annual production varying from 500 to 1,500 tons. The price, delivered at Sussex Station, varies according to quality, from $15 to $50 per ton.

A second locality in which manganese ores have been found in sufficient quantity to warrant their removal, is that of Shepody Mountain, in Albert County. From this place considerable quantities of ore have been removed at different times, and preparations are now in progress for a renewal of operations in that vicinity.

A deposit of manganese also exists upon the coast, not far from the Quaco Light, but so far as known to the writer is of but small extent and value.

Molybdenite.—Molybdenum sulphide, or molybdenite, has been observed in New Brunswick at several localities, but chiefly in connection with the gneissic and micaceous strata, which border the great central granitic axis of the Province, or in the granite itself. It has been thus found near St. Stephen, in Charlotte County, near the granite belt in York County, and below the Pabneau Falls on the Nepisiquit River in Gloucester County. At the second of these localities it appears to be quite abundant.

Lead and Silver.—Sulphurets of lead, carrying more or less of silver, have been observed at a number of localities in New Brunswick, and in some instances have been mined to a limited extent, but as yet without profitable returns. The most promising of these localities appear to be in Gloucester County, and not far from the line of the Intercolonial railway. On Rocky Brook, a branch of the Nepisiquit Millstream, in this County, a vein of quartz has been recently observed, which, according to Mr. Edward Jack, is about 20 feet wide and carries from wall to wall more or less galenite and pyrite, an assay of which, made by Prof. H. O. Hoffman, of the Massachusetts Institute of Technology, yielded, of silver, 11 oz., and of gold 0.24 oz. to the ton of 2,000 lbs. avoirdupois. An analysis of other samples from the same vein, made by Prof. Ricketts of New York, yielded 14.20 oz. troy, per 2,000 lbs. of the ore, as submitted.

Graphite.—Graphite or plumbago, in a finely divided state, is not unfrequently disseminated through the altered rocks of the older formations to which it imparts a dark colour and more or less glossy aspect. It is most abundant in connection with the pre-Cambrian rocks which are believed to represent the Laurentian system in St. John County. Much of the limestone of this formation is dark gray or even black from this cause, while in places the graphite assumes the form of veins, pockets or well defined beds. A band of this character crosses the mouth of the St. John River at the Falls, and is traceable both east and west for several miles. Mining operations for its removal have been frequently undertaken, and at one time (1868-1870), about 6,000 barrels per year, averaging when crushed and screened about 4 cwt. to the barrel, were removed. The beds vary in thickness from one to four feet. The mineral itself is somewhat impure and incapable of being directly applied to the uses for which the finer qualities of graphite are employed, but has been found to answer well for foundry facings, stove polishes and the like, and by appropriate treatment can be rendered available for other purposes as well. Quite recently these mines have been re-opened.

Of other formations containing considerable quantities of graphite may be mentioned the Cambro-Silurian and the Devonian. The slates and schists of the former, as found near St. Stephen and elsewhere in Charlotte County, and in the parish of Canterbury, York County, are often highly plumbaginous, but neither in these nor in the Devonian are there any known deposits of economic value.

Gold.—The amount of positive information regarding the presence of this metal in New Brunswick at present possessed is very small. Reports of its discovery have indeed been frequent, but in the very few instances in which these appear to have emanated from reliable sources the amount of gold observed has been so small as to discourage further efforts to obtain it. While, however, the amount of the metal actually obtained is thus insignificant, it is worth while to notice that rocks very nearly resembling those of the auriferous belt of Nova Scotia, and believed to be of the same age, are largely developed here, and further, that it is in connection with these same rocks that very many of the reported discoveries of gold have been made. The rocks referred to are those composing the slate and quartzite belts which border the great central granitic axis of York and Northumberland counties, and which with the latter traverse the entire breadth of the Province. Much of this region is still densely forest-clad and difficult of access, but should any portion of it prove to be auriferous the discovery would be of inestimable value to the Province, as helping to open up an extensive region otherwise likely to remain permanently in a wilderness condition. Among the points at which gold has been reported in small quantities may be mentioned the vicinity of the St. Croix River, in Charlotte County, the Nashwaak River above Stanley, in York County, the Miniac River, in Carleton County, and the Serpentine River, in Victoria County.

Copper.—The ores of copper found in New Brunswick include native copper, copper glance, chalcopyrite or copper pyrites, bornite or erubescite, cuprite and malachite.

Native Copper—Has been reported as occurring sparingly in connection with the triassic traps which form the northern half of the island of Grand Manan. It has also been observed at Clark's Point on the Mascarene shore of Passamaquoddy Bay, and is stated to have been found in small quantities along the coast, near the head of the Bay of Fundy. Little that is definite, however, is known of either locality.

Copper Glance—Accompanies the native copper in the traps of Grand Manan, where it has been described by Prof. E. J. Chapman as being sufficiently abundant to give promise of profitable extraction. Little effort, however, has as yet been made in this direction. The same mineral, and in larger quantities, has been found associated with other copper ores at different localities along the coast of Charlotte County, and on the adjacent islands, among which may be mentioned Crow Harbor Island, Simpson's and Adams' Islands. It is, however, a less abundant mineral than the species next described.

Copper Pyrites or Chalcopyrite—Is the most widely distributed as well as the most abundant of the copper ores of New Brunswick, and has been observed at many localities. The larger number of these occur along the southern sea-board, where a band of copper-bearing rocks, believed to be of pre-Cambrian age, is found to extend, with some interruptions, along the greater part of its length. Others are found in the interior, more particularly in connection with the older schistose rocks or the intrusive masses by which these have been invaded. A detailed list of these localities so far as they occur in the southern part of the Province, will be found in the Report of Progress of the Geological Survey for 1870-71. In the northern part of the Province, the most noticeable localities are Bulls Creek in the vicinity of Woodstock and the Tattagouche River, near Bathurst. In Westmoreland County, ores consisting in part of this species occur in connection with rocks of the carboniferous age, near the town of Dorchester.

Bornite or Erubescite—Sometimes known as peacock ore, accompanies the other ores of copper, more particularly about Passamaquoddy Bay and the head of the Bay of Fundy, sometimes occurring to the exclusion of other varieties. Where abundant, it constitutes a very valuable source of the metal, and the ore of some of the most promising mines yet opened has been chiefly of this species.

Nickel—Considerable deposits of pyrrhotite have for many years been known to occur in different portions of Charlotte County, usually in connection with copper pyrites, but until recently have been considered to be without value. Attention, however, having been re-directed to them in consequence of the developments at Sudbury, in Ontario, these also have been found to be nickeliferous, and attempts are now being made to test their value. The deposits appear to be large, but, as at Sudbury, the nickel contents vary considerably. A fair average sample of 72 lbs., analysed under the direction of Dr. Hoffmann, of the Dominion Geological Survey, yielded nickel, 1.718 per cent., the material very closely resembling, according to Dr. Hoffmann, a large proportion of the ore found at Sudbury, Ont.

Building Stones—Very extensive and valuable beds of granite freestone, slate, marble, etc., exist in the Province, and in the case of the first two have been largely quarried for exportation, but have not been thought to require extended notice in the present connection. The same is true of a number of other rocks or minerals, including limestone, clays, infusorial earths, bog-ores, salt, &c. These may be made the subject of a subsequent contribution.

Iron—All the usual ores of iron occur to some extent in New Brunswick, including hematite, limonite, siderite or spathic iron, and magnetite, though none are now employed as a source of the metal. By far the largest deposits are those of hematite, or mixed hematite and limonite, which form extensive beds near Jacksontown, north of Woodstock, in Carleton County. They may be traced across the greater part of this county in parallel and closely associated bands, and vary from 2 or 3 to 15 feet in thickness. Somewhat extensive operations were at one time (1848-1865) carried on near Woodstock, in the smelting of the ore, and a charcoal iron manufactured, which, for certain purposes, was highly esteemed. This was no doubt due to the fact of the ore naturally containing a considerable percentage (1·6 per cent.) of manganese, thereby adding materially to its tensile strength. It was, however, on the other hand also contaminated with a considerable amount of phosphorus (one analysis yielding 1·298 per cent. of phosphoric acid) and therefore apt to be cold short in a high degree. According to the report of Dr. Ells, of the Geological Survey, there were ten charcoal kilns, with an average capacity of 75 cords of wood, and a production of 2,800 to 3,200 bushels of coal. The quantity of ore used was, on an average, 3 tons to the ton of pig, and the cost at the furnace $1.20 per ton; 126 bushels of charcoal were required per ton, at a cost of 7 cents per bushel, and the cost of pig produced was $20 to $22 per ton.

The history of the Woodstock mines was a somewhat

checkered one, but too lengthy to be reproduced here. It is sufficient to say that after several stoppages and resumption of operations under the different parties, the works were closed down several years ago and have not since been resumed.

Limonite—In addition to the limonite referred to above as associated with the hematites of Carleton County, this same mineral is found at various localities in the form of bog ore. The largest deposits are upon the banks of the St. John River, at Burton, in Sunbury County, and considerable quantities of the ore were removed during the continuance of operations at Woodstock, for admixture with the hematites of that locality.

Spathic iron is only known to occur in the form of small veins in certain portions of Queen's and Charlotte Counties.

At West Beach, twelve miles east of the City of St. John, upon the shore of the Bay of Fundy, are beds consisting of red hematite mingled with specular iron ore, while at Black River, two or three miles east of West Beach, are beds of the last named mineral, some of them with a thickness of 20 feet. They have not, however, as yet attracted the favorable notice of such iron experts as have visited them.

Magnetite is not uncommon in the form of scattered grains in the crystalline rocks of the southern counties, and small veins are sometimes met with, but none has as yet been observed sufficiently large to warrant any attempt to remove them.

MINING NOTES.

[From Our Own Correspondents.]

Nova Scotia.

Cumberland County.

The new bank-head of No. 2 slope is about finished, and was connected on Wednesday the 18th. The Springhill collieries are working briskly. The output is about 1,600 tons daily and upwards. It is stated that another fault has been encountered in sinking No. 2 slope.

Considerable prospecting is being done in the vicinity of Springhill Junction. Mr. James W. Hickman, of Amherst, has a gang of men employed. A reported discovery of a six-foot seam some time ago is not confirmed.

A diamond drill is at work near Maccan station. Two holes have been put down about 600 feet on areas owned by R. G. Leckie and others. Another hole is now being sunk. The drill is working splendidly and it is probable that the owners will be rewarded by a valuable find of coal in that locality.

Judge Morse, of Amherst, and others are manifesting an interest in the reported asbestos discovery near Five Islands, in Colchester Co. They are disposed to invest some money to test the quantity and quality of the asbestos deposits there. The owners are confident that their property is valuable.

The Joggins Colliery is taxed to its utmost capacity. The quality of the coal has greatly improved, and there is a firm demand for this coal for domestic and steam purposes. The colliery has been enlarged and improved. From one slope the output is now 300 tons daily. Several railways are now being supplied with Joggins coal.

James Baird, manager of the Joggins Colliery, is greatly encouraged by the opinion of experts on his new railway frog, one of which is in use on the I.C.R. at Maccan station.

Dr. J. A. Byers, of Springhill, has invented an improved monkey wrench, from which he expects good results.

The water in the pits this season has been exceptionally heavy. In order to keep the rest of the pit clear, the sinking in No. 3 slope was flooded. The new pump will likely be started this month. This pump is the largest in the Springhill collieries.

New Brunswick.

My notes this month must be necessarily brief, as very little has been done in mining matters of late. Still every few days rumours of new finds and formation of local syndicates for purpose of exploration and development are heard of.

The action of American capitalists who hold bonds or options on a number of areas in St. Stephen, is anxiously watched for, as their time expires somewhere near the middle of the present month. Should they take the properties in question and pay the bond prices, it will be a confirmation of the supposed value of this nickel deposit in St. Stephen, which would be of great importance to the mining interests of New Brunswick.

It has also been rumoured that a valuable find of antimony has been discovered in Milltown, near same locality as the nickel-pyrites properties.

At Memramcook, in Westmoreland County, a gravel pit, formerly used for ballasting the Intercolonial Railway, has been found to contain marked evidences of gold; whether in paying quantities or not has yet to be demonstrated. It is reported that some Halifax and American capitalists will put in sufficient machinery at an early day to properly test the property.

Work of development on some galena or silver-lead properties in Gloucester County, is lately reported, and it is said that the indications are fairly favorable.

A number of St. John gentlemen have taken interests in some Nova Scotia gold mines which are reported as being quite valuable. How far this is correct remains to be demonstrated; but one cannot help regretting that these same gentlemen cannot see their way clear to investing some of their spare dollars in the development of our own Province minerals. Perhaps they may do so later on.

The latest information of importance is the statement of a gentleman named Prof. W. J. Roberts, who has been connected with the search for and development of anthracite coal in Musquash, not very far distant from St. John, and should it prove correct, it will undoubtedly be of vast importance to the Province generally, and St. John particularly. He reports that operations will be commenced in April next, when new shafts will be put down and the production of coal gone on with vigorously. Prof. Roberts says the coal obtained is the very best of anthracite, and he expects Musquash to become one of the important coal centres of America. Prof. Roberts belongs to Pennsylvania, but before returning home will examine some property near St. Andrews, on which there is said to be evidence of gold in paying quantities. He says New Brunswick is undoubtedly an undeveloped mineral country, and we trust his ideas are correct and that we may soon have some of the hidden wealth brought to light.

Work at the Plumbago mine, near the St. John suspension bridge, is being carried on regularly, and good quantities of plumbago obtained constantly. The owners are shipping it regularly and seeking new markets for it. The plumbago is said to be of a very good quality indeed.

There is not anything further of importance in the mineral line at present that I am aware of, but shall keep a bright look out on what is being done, and inform you of the progress in this direction from time to time.

Quebec.

Eastern Townships.

As agreed upon at the recent meeting of the mining companies, the following mines closed down on 31st ult.: King Bros., Johnson Co., Ward, Ross & Co., Beaver Asbestos Co., all of Thetford; the American Asbestos Co., Glasgow and Montreal Asbestos Co., King Bros., Central Mining Co., Reed's mine, Steel, Macdonald & Co., all of Black Lake. By this action a very large mining population will be thrown out of employment during the hardest months of the year, and the trade of the vicinity will be seriously affected. The people will doubtless remember to whose blundering legislation this unfortunate result has in very large measure been brought about. The sooner the government repeal their obnoxious Mining Bill, the better for themseves and us, is the sentiment hereabouts.

At Thetford, the only asbestos mines at present working are those of the Bell's Co. and the Thetford Mining Co., but it is understood that these, too, will soon be closed also.

At Black Lake, the Anglo-Canadian and the United Asbestos Co. are still in operation completing some outstanding contracts. The end of this month will see both of these properties shut up. In consequence of the universal stoppage of work here there is absolutely nothing to communicate to your readers.

Mr. E. Wertheim, managing director of the American Asbestos Company, left on 5th instant *en route* to Germany, his headquarters. His many friends here wish him a pleasant trip and speedy return.

Mr. Wm. Foerster, of Messrs. Wm. Foerster & Co., Hamburg, spent a couple of days visiting the mines here. He handles considerable quantities of Canadian crude yearly.

The next meeting of the Asbestos Club will be held at Black Lake on 26th instant, when a paper will be read by Mr. B. T. A. Bell, editor of the *Canadian Mining Review*.

Captain Richard Penhale, of the Albert Mines, whose health for some time past has been far from good, has gone south. The Review hopes to see Captain Penhale back to Capelton thoroughly restored to good health by the holiday.

On 30th instant a trammer named Joseph Allard was struck by a fall of rock in the Eustis Mine and instantly killed. At the inquest a verdict of accidental death was returned.

Templeton District.

Dr. Hjolmar Lundbohm, of the Geological Survey of Sweden, spent two or three days last week in the district examining the mines being worked.

Owing to the S.S. Amarinthian having to put back to Glasgow, by an accident to her machinery, she did not make her last trip to Montreal. This has prevented the shipment of about 300 tons of phosphate leaving Montreal as anticipated.

The Templeton Asbestos Company are erecting a large boarding house on their property, which will be completed early next month. Their principal work is now being done on the shaft which is now at a depth of 85 feet. The vein of asbestos is improving considerably, a quantity of inch to inch and a quarter of high quality now being produced.

The East Templeton District Phosphate Mining Syndicate are sinking two shafts on the hill back of their buildings. One of them, at a depth of about 50 feet, shows a well-defined vein the length of the pit by about 4 feet wide. In the old Blackburn "Big Pit" a drift is being run at the base of the old workings (140 feet down) which will connect with the shaft sunk last winter. The monthly output continues as large as formerly.

While working on a slope in the "Big Pit," at Lomer's mine, last month, the pit foreman, Eli Burt, a man about 35 years of age, was killed by falling rock. An inquest was held by Coroner Graham, of Hull, and a verdict was given by the jury that deceased came to his death by accident, and that no blame attached to the proprietors or management. The deceased leaves a widow and three children in Newfoundland.

A large meeting was recently held at Perkins Village for the promotion of a railway from East Templeton station to Portland West. Resolutions were passed favoring the petitioning of the Quebec Government subsidizing the same.

The old roadway through the Canada Industrial Company's lot, "The Post Mine," has been closed, and two or three fine shows of Phosphate exposed. About 50 tons of No. 1 were taken out last month with a small gang of men.

Pontiac County.

Owing to the presence of sulphur in the Bristol ore it is calcined before shipment, and while the mine is said to be capable of putting out some 60,000 tons of raw ore per annum, the quantity raised is limited by the roasting-kiln capacity to about 30,000 tons a year. By reason of the existing depression of the American iron trade the mine is not being operated at present, and though melters of ore look forward with confidence to 1892 for increased activity and profitable business, Canadian iron-ore raisers —primarily handicapped by a burdensome duty of 75 cents per ton—will have difficulty in marketing their product unless Canadian railroads meet them with helpful freight rates, and the Government abrogates its absurd royalty act.

Ontario.

Taylor Bros., Toronto, who own paper mills and pressed brick works on the Don river, near the city, have discovered extensive deposits of fire clay on their property, and will immediately erect works for manufacturing the article into fire brick, sewer pipe, etc.

Feldspar rock, described as an orthoclase, with sparsely disseminated fragments of quartz, to the amount of 300 tons, has been shipped from Whitefish Lake, County of Leeds, by way of Kingston to Cleveland.

Some Kingstonians have been speculatively acquiring various beds of talcose rock in the vicinity of Madoc, Ont.

Sudbury District.

It is currently reported that the Blezard and other properties owned by the Dominion Mineral Co. have been sold. The price is stated at $2,000,000, but at date of writing the rumor is not authenticated.

Dr. Bell's report on this district has not left the printer at date of writing; the map has, however, been issued.

Port Arthur District.

The East End Silver Mountain made a few days ago a shipment of ten barrels of silver ore to the Balbach Smelting Works at Newark. Three barrels are from the new vein, which is reported rich in silver, while the remainder is from the old workings. Work is to be greatly extended at this mine in the spring.

Work at the West End Mine recently cross-cut a new vein which shows rich in silver. Drifting was immediately begun and latest reports announce that the silver continues as rich as when first discovered. Prospects are reported to be bright at Silver Mountain.

British Columbia.

The coal shipments for month ended 30th October last were:

New Vancouver Coal Co.	27,345 tons.
Wellington.....	23,149 "
East Wellington.....	1,900 "

An examination of candidates for manager's certificate of competency under the Coal Mines Regulation Act, 1887, was held at Nanaimo on 12th inst.

Mr. W. H. Irwin, of the firm of Irwin & Hopper, Montreal, has returned from a visit to the Tam O'Shanter and other claims in the Kootenai District owned by his company (The Montreal & Kootenai Mining Company). A shipment of ore will be made this fall from the Tam O'Shanter to the smelter at Tacoma. Mr. Irwin speaks enthusiastically of the prospects of the district.

Mr. Edward Watts returned last week from the Toad Mountain District, B.C., where he has located two silver claims for an Ottawa Syndicate. Mr. Watts thinks that with railway facilities in a few years that district will be the most important one in Canada for silver mining. The two leading claims on which a considerable amount of development work has been done during the past two seasons are the "Silver King" and "Dandy." In the former a sink of about 35 feet has been made, and the vein exposed shows a width of over 40 feet. A bona fide offer of $1,300,000 was refused, the proprietors, Messrs. Hall Bros., contending that with nearly $200,000 worth of ore on the dump and six times that much in sight, was more valuable than the consideration offered. A good waggon road has been made to the mine at a cost of about $7,000. The Dandy mine in close proximity cost the present owners $175,000. The ore in both these claims yields from 300 to 1,500 oz. per ton, at a depth of 18 to 20 feet. The belt is about 20 miles long and nearly 2 miles wide.

The cross-cut tunnel in the Dandy has cut the north ledge, the ore being of the same grade as that taken from the bottom of the shaft. It is expected that the main ledge will be cut in less than 35 feet, and if it is, the Esler Company will have proved that the great Silver King ledge goes down at least 700 feet (as if a drift was run from the cross-cut tunnel on the Dandy to the east end line of the Silver King a depth of fully 700 feet would be obtained). On the Dandy the north ledge is not more than 8 inches wide on the surface, the vein matter being low grade. Where cut in the cross-cut tunnel there is a foot of good ore and fully 3 feet of vein matter. This, to say the least, is encouraging, and the Dandy people are elated over the fact that their "lucky" superintendent, E. C. Ray, is likely to add another good mine to their list of paying properties. The entire force are now at work in the cross-cut tunnel, pushing it ahead, also drifting both ways on the ledge. Some of the more sanguine of the people at Nelson expect to see work commenced on a concentrator at the Dandy within a month.

The hoist has been placed in position at the Krao mine, and superintendent McDonald reports it to work as smoothly as if it had been running for a year. The shaft was found to be unsafe, and it is being re-timbered. The pump has not been started up, the water in the shaft being handled with buckets. The Krao is looked on as one of the most promising properties in Hot Springs district, and is owned by McCune, Giegerich & Hoge.

CANADIAN COMPANIES.

The Kingsley Steam Boiler Company.—Letters patent, under the New Brunswick Joint Stock Companies Act, have been granted to this company under date of 6th November. Capital stock, $25,000, divided into 500 shares of $50 each. The directors are: Howard D. Troop, St. John, N.B.; James C. Robinson, George W. Jones, George Kingsley and Chas. McL. Troop, all of St. John. The company will manufacture steam boilers, &c.

The McNaughton Gold Mining Company.—This company, of which some notice was given in our last issue, received its charter of incorporation under the New Brunswick Joint Stock Companies Act on 5th inst.

The Picton Charcoal-Iron Company, (Ltd.)—The purposes for which incorporation is sought under Nova Scotia Joint Stock Companies Act are the manufacture of charcoal pig iron, and any other business in connection with and incidental to such manufacture; to develop and operate mines; to erect, operate, lease, sell and convey furnaces for roasting and reduction of ores and the smelting of iron; to manufacture coke and charcoal, wood alcohol and other products derived from the distillation of wood; to construct and operate mills, factories, charcoal foundries and steel mills, forges, shops, gas works, &c. The chief places of business to be at Bridgeville and New Glasgow, in the County of Pictou, Nova Scotia. Capital stock, $200,000, in $1 shares. Directors: W. B. Moore, New Glasgow; D. Roy Grant, New Glasgow; E. A. Sjostedt, metallurgical engineer, New Glasgow; A. Markham, St. John, N.B., and J. N. W. Winslow, Woodstock, N.B.

The Taylor Decarbonized Iron and Manufacturing Company.—This company gives notice of application for charter under the Dominion Companies Act. Capital, $150,000. Head office: Montreal. Directors: F. D. Taylor, M.E., F. Gilbert, F. Workman, all of Montreal. To acquire and work the Taylor process of decarbonizing iron; to acquire and work other processes for the manufacture of iron, steel and other metals; to acquire lands containing iron and other minerals and petroleum, not exceeding 20,000 acres, &c.

The Crescent Gold Mining Company of Marmora (Ltd.) applies for charter under Dominion Companies Act. Capital $100,000, in shares of the value of $1 each. Head office: Malone, Township of Marmora, Ont. Directors: P. A. Peterson, C. R. Hosmer, Montreal; H. C. Hammond and Robert Benny, of Toronto, and J. McFee, Belleville, Ont. Formed to acquire and work mineral lands and estate in the Province of Ontario.

H. W. McNeil & Company give notice of application for charter under Dominion Companies Act, to mine and extract coal, especially anthracite coal, in Canada, and generally to carry on the trade or business of colliery proprietors, miners and engineers, in all their branches, and also the trade or business of carriers, by water, of coal, minerals and other freight, from, to and within Canada. The company at present operates the mines formerly owned by the Canadian Anthracite and Coal Co. at Banff, N.W.T. Capital, $50,000, in 500 shares of $500 each. Directors; Hobart W. McNeil, Anthracite, N.W.T.; F. A. Hill, Seattle, Wash., U.S.A.; P. P. Padden, Anthracite, N.W.T.

Empire Mining Company of Ontario.—This company seeks a charter under Ontario Statutes, with the object of acquiring and working mineral lands and mines in the Township of Graham, Algoma District, Province of Ontario. Head office: Toronto, Ont. Capital, $75,000, in shares of the value of $100 each. Directors: John Jones, D. Hunter, J. S. Lockie, J. A. Huntley, J. M. McBrian.

Vermillion Mining Company.—At a meeting of shareholders held at the company's office, in Dennison Township, Ont., the following directors for ensuing year were elected: H. B. Payne, Stevenson Burke, John W. Evans, George E. Allen, T. W. Cornell, C. W. Bingham and H. P. McIntosh. The board organized by electing the following officers: president, T. W. Cornell; vice-president, Stevenson Burke; secretary-treasurer, H. P. McIntosh.

New Vancouver Coal Mining and Land Company (Ltd.)—The directors, in their report for the six months ended June 30th, state that the directors have declared an interim dividend at the rate of 5 per cent. per annum, payable, tax free, on Dec. 5, to the holders of shares on Nov. 18, 1891.

Cape Breton Institute of Mine Officials.—The following have been elected officers of the Institute during the ensuing year: president, J. G. S. Hudson; vice-president, Charles H. Rigby; secretary, S. T. Lee; treasurer, Daniel Hardy.

Latest Stock Quotations of Canadian Companies in England.

	Price.	
Nicola, Limited, £35,000 fully-paid shares of £1	—	
Shuniah Weachu, Limited, £99,888 fully-paid shares of £1	—	
Tilt Cove Copper, Limited, £160,000 fully-paid shares of £2	—	
Ditto, £80,000 5½ per cent. debentures	—	
General Mining, Limited, £219,752 fully-paid shares of £8	3¾	4¼
Low Point, Barrasois and Lingan, £509,100 fully-paid shares of £100	—	
New Vancouver Coal Mining and Land, Limited, £185,000 fully-paid shares of £1	⅝	¾
Sydney and Louisburg Coal and Railway, Limited, £50,000 cumulative 10 per cent. first preference shares of £10, £6 paid	4	6
Ditto, £14,560 fully-paid non-cumulative 6 per cent. second preference of £10	3	5
Ditto, £250,000 fully-paid ordinary shares of £10	¼	¾
Anglo-Canadian Asbestos, Limited, £11,500 fully-paid shares of £1	—	
Anglo-Canadian Phosphate, Limited, £46,510 fully-paid preference shares of £10	—	
Ditto, £25,000 fully-paid deferred shares of £10	—	
Bell's Asbestos, Limited. £140,000 fully-paid shares of £5	8⅛	8⅝
Ditto, £68,400 debentures, 5 per cent.; interest January 1 and July 1	—	
Canadian Phosphate, Limited, £100,000 fully-paid shares of £1	⅜	½
General Phosphate, Limited, 5 per cent. ordinary shares of £10, £2 paid	—	
Ditto, £5,000 fully-paid founders' shares of £10	—	
Leeds, Copper, Limited, shares of £1, with 10s. 6d. paid	—	

Nicola.—Accounts to September 30 submitted in November. No dividend yet. Further capital is needed; and operations temporarily suspended.

Shuniah Weachu.—Accounts to November 20 submitted in February. No dividend yet. Shares for £12,870 held by the Company.

Tilt Cove.—In March, 1890, the properties were leased for 99 years to the Cape Copper Company, Limited, at a rent of £4,400. The Cape Copper Company advance £15,000 at 5 per cent. interest, and when this is repaid out of profits, surplus profits are to be divided equally between the Cape Copper Company and the Tilt Cove Company. The lease may be determined by the Cape Copper Company at any time on twelve months' notice. Accounts annually to March 31 submitted in November.

General Mining.—Accounts to December 31 submitted in April, but an interim meeting is held in November. Dividend for 1884, 5 per cent.; for 1885 and 1886, 3½ each year; for 1887, £4 13s. 9d. per cent., and for 1888 1889 and 1890, 3¾. Reserve fund, £29,850.

Low Point.—Accounts to December 31. For 1887, 1888, and 1889, 5 per cent was paid each year on the ordinary shares publicly held; for 1888 the ordinary shares issued to the vendors got 3½ per cent., and for 1889, 2½.

New Vancouver Coal.—Reconstructed in 1889. Accounts to June 30 and December 31 submitted in November and May. For the two half-years to June, 1889, 5 per cent. per annum was paid; to December, 1889, 4 per cent.; and to June and December, 1890, 6 per cent. Reserve fund, £10,000. Debentures, £60,000.

Sydney and Louisburg Coal.—Accounts to December 31 submitted about May. In respect of 1889 15 per cent. was paid on the first preference, and for 1890, 10 per cent., leaving arrears of 50 per cent.

Anglo-Canadian Asbestos.—Reconstructed in 1889. Accounts to December 1st submitted in April. At general meeting held on 16th April, a dividend at the rate of 20% per annum was declared. Debentures, £3,450.

Anglo-Canadian Phosphate.—The preference shares rank first for 7 per cent., and after a like rate has been paid on the deferred shares, both classes rank equally. Accounts to November 30, submitted in May. No dividend yet on either class. Debit to profit and loss on November 30, 1890, £5,749.

Bell's Asbestos.—Accounts to December 31 submitted in January. Dividends for 1888 and 1889, 22½ per cent. each year; 1890, 15 per cent. Reserve, £45,000. The debentures are redeemable by 1913, by annual drawings at 115 from a sinking fund, which the directors may increase.

Canadian Phosphate.—Accounts to November 30 submitted in February. The working of the eleven months to November 30, 1888, resulted in a profit of £2,576, which was carried forward. A dividend of 6d. per share was paid November 1, 1891.

General Phosphate.—Registered June 13, 1890. To acquire properties in Canada and elsewhere. The founders' shares take one half the profits after providing for ten per cent. dividends on the ordinary.

Leeds Copper.—Registered January 16, 1891. To take over the properties of the Excelsior Copper Co., (Ltd). Authorized capital, £450,000. Accounts to Dec.

Nova Scotia Gold Yield.

The following returns of the quantity of quartz crushed and yield of gold from the Nova Scotia mines for the half year ended 30th June last, has been forwarded throughthe courtesy of the Mines Department:

District.	Quartz Crushed. Tons.	Cwts.	Yield of Gold. Ozs.	Dwts.	Grs.
Sherbrooke.....	253	..	69	12	..
Salmon River.....	2260	..	640	10	..
Oldham	413	9	1070	18	2
Waverley	155	..	56	17	..
Moose River, Caribou	2392	19	847	12	4
Uniacke	1051	10	1026	18	21
Lake Catcha.....	1501	..	325	8	..
Whitehorn.....	743	15	697	2	2
15 Mile Stream.....	2780	..	1445	8	..
Stormont	227	15	217	9	..
Tangier.....	42	.	13	3	12
Renfrew.....	31	..	4	..	..
Leipsigate.....	16	..	19	10	..
Wine Harbor..... ...	1336	..	610	5	..
Central Rawdon.....	510	..	342	..	..
Gay's River	210	..	17	15	..
Montague.....	468	..	761	4	..
Malaga	2916	..	2150	5	17
Killag.....	154	10	154	11	16
Beaver Dam	355	..	100	18	13
Scraggy Lake (Mortared Gold)	....	..	8	6	..
East Rawdon.....	340	..	60	16	15

Tandem Tanks for Hoisting Water From Flooded Slopes.*

By J. H. Bowden, Wilkes-Barre, Pa.

Water hoisting tanks have been designed for removing water from recently flooded mines, through their hoisting slopes, with rapidity proportional to the capabilities of the hoisting machinery available, the tanks being adaptable to slopes of small sectional areas and varying pitches.

The following features may be of interest to those operating mines liable to be flooded.

1. The arrangement of doors on each tank by which it may be automatically filled by immersion at any point on the varying pitch of a slope, the water being retained while hoisting on the flat as well as on the steep pitches, and quickly and automatically discharged at the top.

2. The arrangement, in connection with the above mentioned doors, of side wheels over the rear wheels of each tank and of side dumping tracks at the top of the hoist, for the automatic emptying and quick return of the tank.

3. The arrangement of two or more tanks, one in front of the other, so as to give as large a capacity in a single hoist as the engine power will permit, yet without making any tank too large for the sectional area of the slope, or of unwieldy length, or of such a shape that it cannot easily pass over vertical curves; and without concentrating too much weight on any one pair of wheels or on any point of the track.

The details of construction and method of operating may be gathered from the following description: At the end of each tank is a large iron door of almost the full size of the end of the tank opening inwards, so that when immersed the tanks fill almost instantly. To provide for holding the water while it is hoisted up flat pitches, a wooden door is attached to the front of each tank, opening outward. Each front door is attached to the door at the back by an iron rod, provided with a sliding link, so that the back door can open independently of the front; but the latter is held closed as long as the rear door is closed. This connecting rod, passes through the front door and through a spiral spring in front of it, so that the amount of pressure necessary to keep the water from leaking out may be readily applied. The tanks are mounted on self oiling closed wheels, so arranged as to exclude water from the bearings while the tanks are immersed, and to retain the lubricant. Each tank is provided also with side-wheels, vertically over the rear axle, which have a guage sufficiently wide to clear all other portions of the tank; and on the surface an elevated track is provided, upon which the dumping wheels run and thus raise the rear end of each tank as much as may be necessary to dump the water into a trough between the tracks; the tilting forward of the tanks opening the back door and releasing the front one. The tanks while emptying rest on their forward wheels and on the dumping wheels. By having the tracks at the surface slightly up grade, the tanks will run back when empty, as soon as the rope is slackened. To allow this dumping, the hoisting rope is attached to the tanks by a yoke reaching back on the sides and pivoting on the axle of the dumping wheels, the tanks back of the first one being attached by eye bars reaching from axle to axle of the dumping wheels on the tanks. A stop is provided, to prevent the yoke on the forward tank from dropping and catching in the track when the rope is slackened. This plan of "tandem tanks" was designed and used to hoist about 25,000,000 gallons of water which had been admitted to extinguish a mine fire in one of the Susquehanna Coal Company's mines. The slope was small in section, and 3,200 feet long, with single track, and with pitches varying from 4 to 20 degrees. The hoisting plant consisted of a pair of 26 inches by 60 inches direct acting engines with cast coned drum, 9 to 12 feet in diameter, carrying 1⅛ inch steel rope. These engines had been previously hoisting five cars, weighing about 4 tons each when loaded.

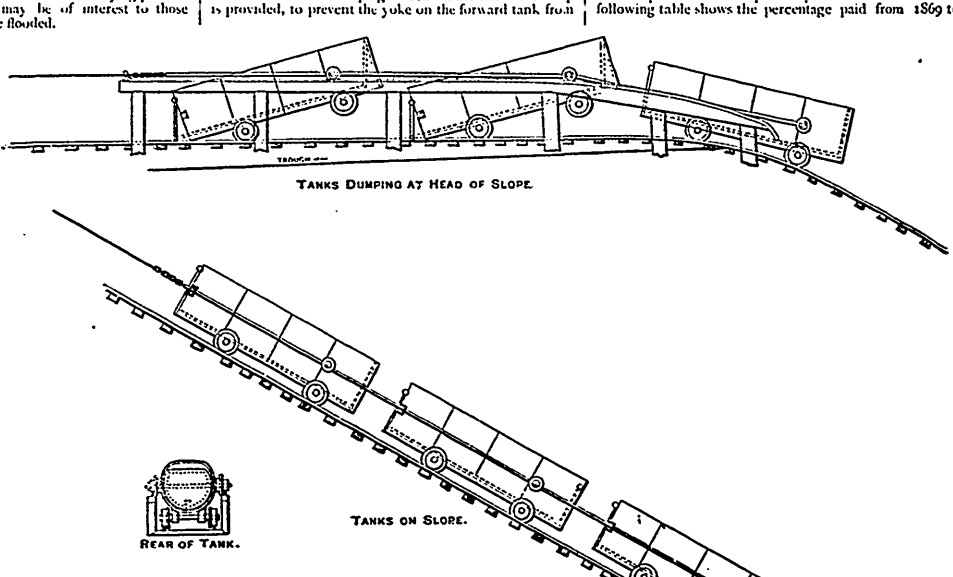
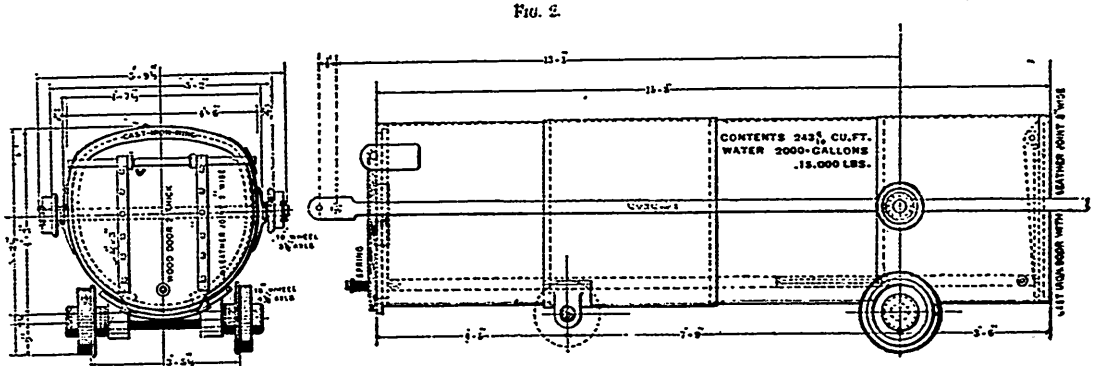


FIG. 1.—Self-Loading and Self-Dumping Water-Tanks.

FIG. 2.



Self-Loading and Self-Dumping Water-Tanks.

* Read at the Glen Summit meeting of the American Institute of Mining Engineers, October, 1891.

Profit Sharing in the Iron Trade.—Sir Alfred Hickman, proprietor of the Spring Vale Furnaces, Woverhampton, who is the largest pig iron maker in South Staffordshire, has issued a circular to his workmen, stating that he proposes to give them a direct interest in their labor by granting each man a substantial bonus out of the profits of his trade during the year ending next June. As soon as the result of the year's working is ascertained he will divide among them a certain share on their earnings. He wishes them to understand that they are not partners, and he reserves to himself the right to deal with them as to retaining their services or otherwise. An iron foundry at Gross-Ilsede, Hanover, employing from 600 to 700 men, has carried on the system of profit-sharing since 1869. All the employed who have deposits in the factory savings bank are participators in it. If the net profits of the firm exceed 5 per cent., a corresponding addition, up to 15 per cent., is made to the 5 per cent. interest given on the savings bank deposits. Hence, those deposits can bear up to 20 per cent. interest. The following table shows the percentage paid from 1869 to 1883: 1869, 8 per cent.; 1870, 9 per cent.; 1871, 10 per cent.; 1872, 18 per cent.; 1873-74, 20 per cent.; 1875, 6⅔ per cent.; 1876, 6 per cent.; 1877, 6¾ per cent.; 1878-79, 10 per cent.; 1880-83, 20 per cent. In the year 1883 the number of depositors was 566, and the total savings amounted to £25,850, a proof that the system had a strong influence on the thrift of the people employed. The factory also has a "workmen's bank," which any of the men may join. It is supported by contributions equal to 6 per cent. of the wages, half of which are paid by the men and half by the firm. The accumulated capital of this bank amounted in 1883 to £15,000. There are also two widows' and orphans' funds—one for the lower class of workmen, and one for the foremen and employés.—*Colliery Guardian.*

Great Coal Hoisting in Pennsylvania.—At the Nottingham Colliery, Plymouth, operated by the Lehigh & Wilkes-Barre Coal Co., 1,313 cars were hoisted in nine hours the other day. At No. 11 colliery, owned by the same company, 693 were hoisted on the same occasion.

INDUSTRIAL.

The Dodge Wood Split Pulley Company call attention to their advertisement in another place. Their system of rope transmission of power is one that has found much favor at a number of our mines and collieries, and well deserves the attention of such of our engineers as may be figuring on new power plants.

A most severe and very interesting test was made last week by Wm. Sellers & Co., of Philadelphia, upon a motor operated under the new principle invented by Mr. H. Ward Leonard. The motor used was a 10 H.P. standard shunt-wound Sprague motor. The motor's normal speed was 1,500 revolutions a minute. The motor was belted to a countershaft, and upon the countershaft was placed a brake, and in addition to the brake there was placed upon the countershaft a large fly-wheel such as is used upon punching machines, the purpose of the fly-wheel being to duplicate the inertia and momentum met with in practice in a great many kinds of work.

The motor was made to operate in either direction at any rate of speed desired, and it was found possible to run the motor perfectly and regularly under the full brake load at 15 revolutions per minute, that is, one per cent. of its full speed. While operating at full speed in one direction, the motor could be instantly reversed, the reversal being perfectly gradual and entirely without any spark or troublesome feature of any kind.

In order to get the most marked effect in overcoming the momentum of the fly-wheel the brake was taken off, and when the fly-wheel was running at its full speed of 300 revolutions a minute, the motor was reversed instantly. In thirteen seconds the motor had brought the fly-wheel to rest, and in thirteen seconds more had it running at full speed in the opposite direction, the entire operation being effected with the greatest smoothness and without any spark whatever.

The performance of the motor was extremely satisfactory to all concerned, and showed its perfect adaptability to any class of work to be met with in practice.

The Ingersoll Rock Drill Company of Canada has just closed a contract to put in several of their Sergeant coal cutters and other mining machinery in Cape Breton collieries. Mr. George R. Smith, who has just returned from the Pacific coast, reports that the company has also done well there, having made some good contracts with the collieries and mines.

The Jeffrey Manufacturing Company, Columbus, Ohio, reports business as good in their different lines of specialties. They have many large orders on their books for elevators and conveyors for handling material in bulk or package, and have recently purchased a tract of land adjoining their present extensive works, on which they have erected a large substantial brick building, that they may be better able to take care of their growing business.

Quarrying and Splitting Slate.

In quarrying slate, the methods vary greatly according to the disposition of the beds, and no attempt will be made here at a detailed description. Ordinary blasting powder is employed in loosening the blocks, and great skill and sagacity is shown by experienced quarrymen in so manipulating the blasts as to produce the desired effects of freeing the rock from the quarry bed without shattering the stone. After a block is removed from the quarry it is subject to special treatment, according to the purpose to which the stone is to be put. If for roofing slate, the block is taken from the quarry to the splitters' shanty, where it is taken in charge by a splitter and his two assistants. The first assistant takes the block and reduces it to pieces about 2 inches in thickness, and of a length and breadth a little greater than those of the slates to be made. This is done by a process called "sculping," which is as follows: A notch is cut in one end of the block with the sculping chisel, and the edge of this notch is trimmed out with a gouge to a smooth groove extending across the end of the block and perpendicular to the upper and lower surfaces; the sculping chisel is then set into this groove and driven with a mallet until a cleft starts, which by careful manipulation is guided directly across the block. The upper surface of the block is kept wet with water so that the crack may be more readily seen. If the slate is perfectly uniform in shape and texture, and the blows upon the sculping chisel are directed straight with the grain, the crack follows the grain in a straight line across the block. Almost invariably, however, the crack deviates to the right or left, when it must be brought back by directing the blow on the sculp in the direction in which it is desired to turn the break or by striking with a heavy mallet on that side of the block toward which it is desired the crack shall turn. Some slates can be sculped across the grain, but nearly all must be broken in this direction. From the first assistant or "sculper," the block goes to the splitter, who, by means of a mallet and broad thin chisel, splits it through the middle, continuing to thus divide each piece into halves until the desired thinness is obtained. It is necessary to keep the edges of the blocks moist from the time they are removed from the quarry until they are split. From the splitter, the thin but irregular shaped pieces pass to the second assistant, who trims them into definite sizes and rectangular shapes. This is done either by hand or by maching. To trim by hand a straight-edged strip of iron or steel is fastened horizontally upon one of the upper edges of a rectangular block of wood, some 2 to 4 feet in length. The trimmer then lays the sheet of slate upon the block, allowing the edge to be trimmed to project over this strip, and then by means of a long heavy knife with a bent handle, cuts off the overlying edge, thus reducing it to the required size and shape. Two kinds of machines for doing this work are now in use. In general they may be said to consist of an iron frame work some 2½ feet high, with a horizontal knife edge upon its upper edge. Against this knife is made to work, by means of a treadle, another knife, curved in outline, which is thrown upward again by means of a spring, after being brought down by the treadle-movement. At right angles to this knife edge, on one side of the machine, an iron arm projects inverted by the workman; this arm has notches cut into it for the different sizes of the slate. The difference between the two kinds of machines is said to consist chiefly in the arrangement of the cutting knife, one working as stated above, while the other revolves on an axle something in the manner of an ordinary corn cutter. Slates are sawn by means of an ordinary circular saw, such as is used in sawing lumber, and are planed by machines such as are used in planing metals, as are other soft stone. Some of the hard slates used for tiling have to be cut by means of circular saws with teeth of black diamond. In trimming out school slates at the Pennsylvania quarries, there is used a square saw of chilled iron, someten or twelve inches in diameter, and with one long projecting tooth at each of its four corners. This revolves with great rapidity and clips off the thin edges as quickly and neatly as could be desired.

The Pressure of Gas in Coal.

Coal in bituminous mine seams is more or less subjected to bleeding. This is known to the practical miner; he is constantly observing the sweating of the coal, accompanied with a hissing sound. The sweating is produced by the pressure of gas stored up in minute cavities and fissures of the seams. The pressure has been found in some cases to be nearly equal to the pressure of steam in the boilers of steamships. Pressures of 200 pounds and upward have been found to be common in deep seams newly opened. What is interesting about the matter is the co-relationship of the pressure of gas to the pressure due to a vertical column of water, measured from the seam to the drainage level of the rocks overlying the seam. To make this clear, let us suppose a seam to be 250 fathoms from the surface; again, let us suppose the drainage level is about 50 fathoms from the surface. Now by these data we may, with considerable accuracy, calculate the pressure of gas stored up in the cavities of the seam. Suppose the seam has not been wrought, but has been pierced by a bore hole. If a long iron tube was inserted in this bore hole and made to fit the hole so closely by some system of packing that no gas could escape, and a pressure gauge was screwed on the upper end of this pipe and allowed time for gas to accumulate in the bore hole, the pressure ultimately observed might be calculated as follows: Vertical height of water being 200 fathoms, then—

$$\frac{200 \times 6 \times 62{\cdot}5}{144} = 520 \text{ pounds pressure on the square inch.}$$

This calculation may be made by a simpler process: a square inch column of water having a vertical length or rise of 6 feet weighs nearly 2·6 pounds, therefore $200 \times 2{\cdot}6 = 520$, or is equal to a pressure of 520 pounds on the square inch, as before. Often, at faults and dislocations, water and gas are met with in unusual quantities. Sometimes on cutting a fault, gas is given off, generally at the bottom of the seam, and this often consists of sulphureted hydrogen. Water generally comes off at the fault at the top of the seam, and after it has expended itself, it is followed by gas. Now, why gas should be found at the bottom of the seam and water at the top, is a matter full of interest. Water is sometimes given off at the bottom of the seam, and when that is the case, the reason why requires observation and investigation. Some cavity in the neighborhood of the fault contains gas at a high pressure, but is situated above another cavity filled with water, so that while the gas is pressing on the water, water flows from the bottom of the seam, through some vent or parting in the fault, but as water is heavier than gas, if the water and gas are found in one cavity the bottom stratum of rock communicating with the fault or fissure, then gas only is given off, and sometimes at a high pressure. But it will be noticed that after a while the gas is all spent off, and the air in the neighborhood of the fault resumes its normal condition. The gas is expelled by the operation of Boyle's law; it exists in this bottom cavity at a pressure considerably above that of the atmosphere and if the pressure of the gas in the cavity was three times that of the atmosphere, on that pressure being removed it would expand into three times its original volume, or every cubic foot in the cavity would expand into three cubic feet, two of which would be expelled. When water is given off at a fault at the top of the seam, we may certainly expect it to be followed by gas, because, being lighter than water, it is pent up at a high pressure above it, and the high pressure of the gas causes a rapid or violent outflow of water. Now as gas cannot sink in water, if the bottom of the cavity communicates with the fault, then no gas will spend off until the water has all been expelled.

A Rope Four Miles Long.—A single rope, 4 miles long, and weighing 20 tons, has been turned out at the ropery of Messrs. Webster and Sons, Deptford, Sunderland. It is made of the best steel wire, and is intended for a colliery in the south-west of England, where it will be used for underground haulage. As the cranes at the rope yard and at the goods station are not strong enough to lift such a load all at once, the rope was made up into three coils, and, allowing the slack connecting these to hang, they could be lifted one at a time. Two were put on one rolley, a very strong one, and the third coil, which contained much less rope than the other two, was put on to an ordinary rolley. Several men carried the slack which hung from one vehicle to the other over their shoulders. The load was drawn by 20 horses, and the passage through the streets attracted much attention.

The World's Horse Power.—It is stated in *Handel's Museum* that the steam power of the world is equal to the strength of 1,000 millions of men, or twice the number of working men that exists. The horse power of England as regards engines, is estimated at 7,000,000, of the United States 7,500,000, Germany, 4,500,000, France 3,000,000, and Austria 1,500,000. These figures do not include the horse power of locomotive engines, of which it is estimated that last year there were in the whole of the world 105,000, representing horse power from 5,500,000 to 7,000,000. From further calculation it is considered that the total horse power of the world's engines is about 49,000,000, the average strength of each engine being equal to three horses, the power of the horse being equivalent to the strength of seven men. The steam engine, there is no question, has been of the greatest possible advantage to the working classes all over the world, for it has lessened their labor by doing the heaviest portion of the work, and so saving their strength. Yet machinery for economising human labor even now is strongly opposed by those who would be most benefited by it.

A Heavy Coal Train.—It is reported that last Sunday locomotive 955 on the Philadelphia and Reading Railway hauled a train of ninety 25 ton cars loaded with coal, from Palo Alto to Port Richmond. These cars were all about 34 feet in length, thus making the total length of the train about 3,100 feet, or considerably more than half a mile. The total weight of the train was estimated at 2,375 tons. The weight of the engine was about 75 tons. If this report is true the train hauled was probably the longest and heaviest that was ever taken over that road.

A Novel System of Coal Hoisting.—The Southwest Coal and Coke Company will introduce a novel system of coal hoisting when it gets the new air shaft at its Tarr's plant completed, as that work will be done by water. The big fan and part of the machinery are already in place awaiting the erection of the house and the sinking of the shaft which, at this point, will reach the coal at a depth of some twenty-five feet, although it is the basin for a goodly portion of the company's 2,500 acre coal field, and from it the drainage will be pumped. One of the cages will not differ from those in general use, while the other will have built on it a tank. When a waggon of coal for the boilers has been placed on the cage at the bottom, water from a pump discharge pipe will be turned into the tank until it is heavy enough to sink to the bottom, drawing the cage up as it descends. An automatic valve will then let the water run out, when the tank, being lighter than the cage and empty waggon, is in turn drawn to the mouth by them.—*Connellsville Courier.*

Money Orders.

MONEY ORDERS may be obtained at any Money Order Office in Canada, payable in the Dominion and Newfoundland; also in the United States, the United Kingdom, France, Germany, Austria, Hungary, Italy, Belgium, Switzerland, Portugal, Sweden, Norway, Denmark, the Netherlands, India, Japan, the Australian Colonies, and other Countries and British Colonies generally.

On Money Orders payable within Canada, the commission is as follows:

If not exceeding $4				2c.
Over $4, not exceeding			$10	5c.
" 10,	"	"	20	10c.
" 20,	"	"	40	20c.
" 40,	"	"	60	30c.
" 60,	"	"	80	40c.
" 80,	"	"	100	50c.

On Money Orders payable abroad the commission is:

If not exceeding $10				10c.
Over $10 not exceeding			$20	20c.
" 20	"	"	30	30c.
" 30	"	"	40	40c.
" 40	"	"	50	50c.

For further information see OFFICIAL POSTAL GUIDE.

Post Office Department, Ottawa.
1st November 1889.

NORTH-WEST MOUNTED POLICE

RECRUITS.

APPLICANTS must be between the ages of Twenty-two and Forty, active, able-bodied men of thoroughly sound constitution, and must produce certificates of exemplary character and sobriety.

They must understand the care and management of horses, and be able to ride well.

The minimum height is five feet eight inches, the minimum chest measurement 35 inches, and the maximum weight 175 pounds.

The term of engagement is five years.

The rates of pay are as follows:—

Staff-Sergeants.... .....$1.00 to $1.50 per day.
Other Non-Com. Officers .. 85c. to 1.00 do

	Service pay.	Good conduct pay.	Total.	
1st year's service..	50c.	——	50c.	per day.
2nd do ..	50c.	5c.	55c.	do
3rd do ..	50c.	10c.	60c.	do
4th do ..	50c.	15c.	65c.	do
5th do ..	50c.	20c.	70c.	do

Extra pay is allowed to a limited number of Blacksmiths, carpenters and other artizans.

Members of the force are supplied with free rations, a free kit on joining, and periodical issues during the term of service.

Applicants may be engaged at the Immigration office, Winnipeg, Manitoba; or at the Headquarters of the Force, Regina N. W. T.

PROVINCE OF NEW BRUNSWICK.

Synopsis of "The General Mining Act," Chapter 16, 54th Victoria.

—LEASES FOR MINES OF—

GOLD, SILVER, COAL,
IRON, COPPER, LEAD,
TIN and PRECIOUS STONES.

GOLD AND SILVER.

PROSPECTING LICENSES up to 100 areas, (each 150 feet by 250 feet), issued at 50 cts. an area up to 10 areas, and 25 cts. afterwards per area, good for one year. These Licenses can be renewed for second year, by payment of one half above amount.

LEASES for 20 years to work and mine, on payment of $2 an area of 150 feet by 250 feet. Renewable annually at 50 cts. an area in advance.

Royalty on Gold and Silver, 2½ per cent.

MINES, OTHER THAN GOLD AND SILVER.

LICENSES TO SEARCH, good for one year, $20 for 5 square miles. Lands applied for must not be more than 2½ miles long, and the tract so selected may be surveyed on the Surveyor General's order at expense of Licensee, if exact bounds cannot be established on maps in Crown Land Office. Renewals for second year may be made by consent of Surveyor General, on payment of $20.

Second Rights to Search can be given over same ground, subject to party holding first Rights, on payment of $20.

LEASES.—On payment of $50 for one square mile, good for two years, and extended to three years by further payment of $25. The lands selected must be surveyed and returned to Crown Land Office. Leases are given for 20 years, and renewable to 80 years. The Surveyor General, if special circumstances warrant, may grant a Lease larger than one square mile, but not larger than two square miles.

ROYALTIES.

Coal, 10 cts. per ton of 2,240 lbs.
Copper, 4 cts. on every 1 per cent. in a ton of 2,352 lbs.
Lead, 2 cts. on every 1 per cent. in a ton of 2,240 lbs.
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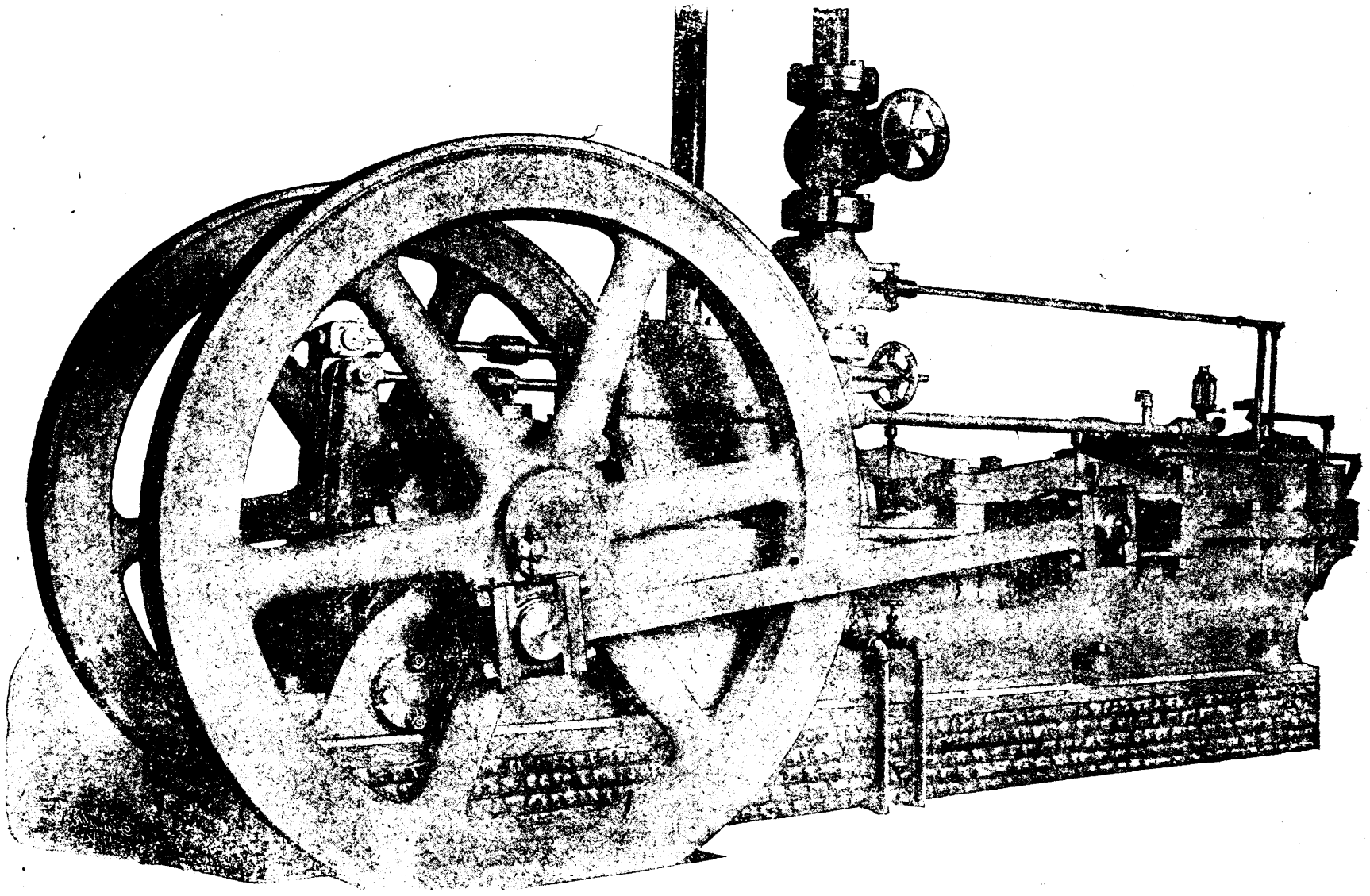

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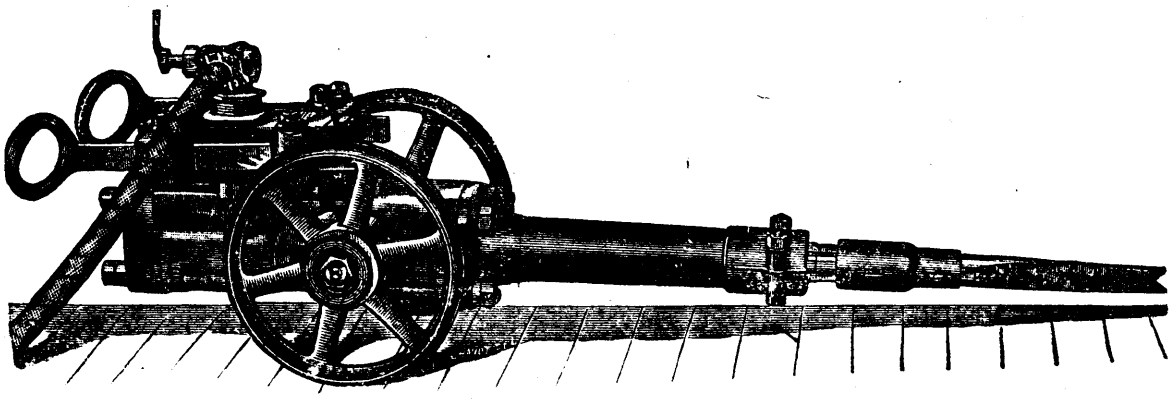

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