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THE

Canadian

Mining Review



Vol. V.—No. 8.

1887.—OTTAWA, OCTOBER—1887.

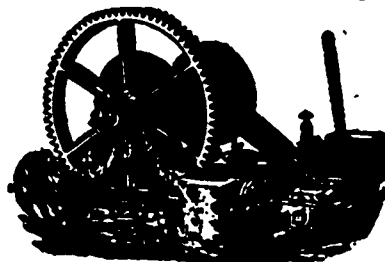
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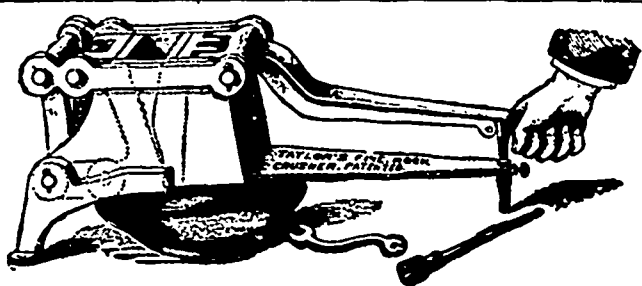
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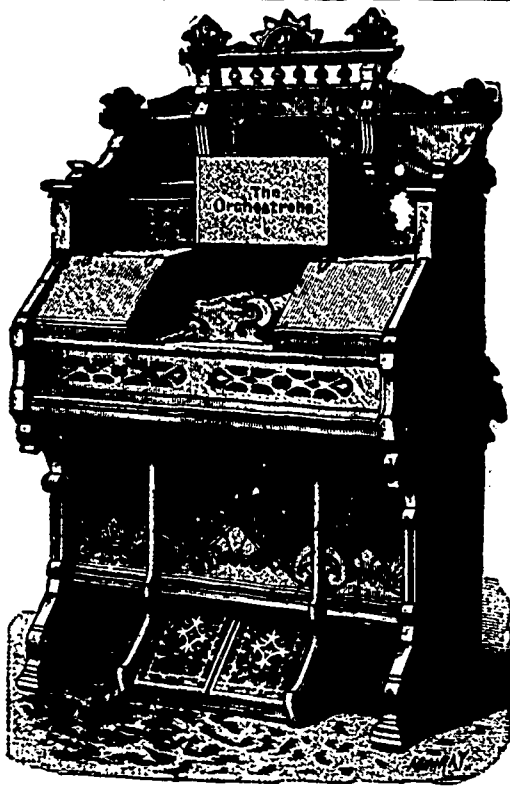
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Notice to Contractors.

SEALED TENDERS addressed to the undersigned and endorsed "Tender for Post Office at Gananoque, Ont.," will be received at this office until Thursday, the 3rd November, for the several works required in the erection of Post Office at Gananoque, Ont.

Specifications can be seen at the Department of Public Works, Ottawa, and at the office of the Collector of Customs, Gananoque, on and after Tuesday, 12th October, and tenders will not be considered unless made on form supplied and signed with actual signatures of tenderers. An accepted bank cheque payable to the order of the Minister of Public Works, equal to five per cent. of amount of tender, must accompany each tender. This cheque will be forfeited if the party decline the contract or fail to complete the work contracted for, and will be returned in case of non-acceptance of tender.

The Department does not bind itself to accept the lowest or any tender.

By order,

A. GOBEIL,

Secretary.

Department of Public Works,
Ottawa, 12th October, 1887.



NOTICE RESPECTING PASSPORTS.

PERSONS requiring passports from the Canadian Government should make application to this Department for the same, such application to be accompanied by the sum of four dollars, in payment of the official fee upon passports as fixed by the Governor-in-Council.

G. POWELL,
Under Secretary of State.

OTTAWA, 10th Feb., 1886.



Notice to Contractors.

SEALED TENDERS addressed to the undersigned and endorsed "Tender for Roofing," will be received at this office until Monday, the 10th October, for the several works required in connection with Copper Roofing to Main Tower of Western Departmental Building and Lead Roofing in rear of Commons and Senate Chambers, Ottawa.

Specifications can be seen at the Department of Public Works, Ottawa, on and after Monday, 3rd October, and tenders will not be considered, unless made on form supplied and signed with actual signatures of tenderers.

An accepted bank cheque, payable to the order of the Honorable the Minister of Public Works, equal to five per cent. of the amount of the tender, must accompany each tender. This cheque will be forfeited if the party decline the contract, or fail to complete the work contracted for, and will be returned in case of non-acceptance of tender.

The Department will not be bound to accept the lowest or any tender.

By order,

A. GOBEIL,

Secretary.

Department of Public Works,
Ottawa, Sept. 20th, 1887.

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Nov. 22nd, 1886.

Department of Inland Revenue.—An Act respecting Agricultural Fertilizers.

The public is hereby notified that the provisions of the Act respecting Agricultural Fertilizers came into force on the 1st of January, 1886 and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contains ammonia, or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year, and before offering the same fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that each jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, and which is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags, it shall be distinctly stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel or distinctly printed upon good paper and securely pasted upon the head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of

analysis and sample of the same shall have been transmitted to the Minister of Inland Revenue and the provisions of the foregoing sub-section have been complied with.

Every person who sells or offers or exposes for sale any fertilizer, in respect of which the provisions of this Act have not been complied with—or who permits a certificate of analysis to be attached to any package, bag or barrel of such fertilizer, or to be produced to the inspector, to accompany the bill of inspection of such inspector, stating that the fertilizer contains a larger percentage of the constituents mentioned in sub-section No. 11 of the Act than is contained therein—or who sells, offers or exposes for sale any fertilizer purporting to have been inspected, and which does not contain the percentage of constituents mentioned in the next preceding section—or who sells or offers or exposes for sale any fertilizer which does not contain the percentage of constituents mentioned in the manufacturer's certificate accompanying the same, shall be liable in each case to a penalty not exceeding fifty dollars for the first offence, and for each subsequent offence to a penalty not exceeding one hundred dollars. Provided always that deficiency of one per centum of the ammonia, or its equivalent of nitrogen, or of the phosphoric acid, claimed to be contained, shall not be considered as evidence of fraudulent intent.

The Act passed in the forty-seventh year of Her Majesty's reign, chaptered thirty-seven and entitled, "An Act to prevent fraud in the manufacture and sale of agricultural fertilizers," is by this Act repealed, except in regard to any offence committed against it or any prosecution or other act commenced and not concluded or completed, and any payment of money due in respect of any provision thereof.

A copy of the Act may be obtained upon application to the Department of Inland Revenue.

E. MIALL,
Commissioner.

gold, to a small extent, which is more than balanced by expenditure in police! From the accounts of the provinces named, from 1880 to 1886, the following is given as the revenue and expenditure under this branch of service:

Nova Scotia.		
Year.	Revenue.	Expenses.
1880.....	\$ 49,294.11	\$ 6,000.00
1881.....	70,602.82	6,638.79
1882.....	101,768.28	10,161.90
1883.....	198,977.84	10,785.36
1884.....	122,024.20	10,000.00
1885.....	100,692.50	10,720.75
1886.....	119,367.03	10,538.65
Total.....	\$972,726.78	\$64,844.86

British Columbia.		
Year.	Revenue.	Expenses of Provincial Secretary and Minister of Mines.
1880.....	\$18,966.50	.....
1881.....	43,813.60	.....
1882.....	46,098.70	.....
1883.....	38,197.75	.....
1884.....	32,652.50	.....
1885.....	37,642.60	.....
1886.....	70,500.00	\$13,390.00
Total.....	\$287,811.65	\$13,390.00

Ontario.		
Revenue from Sale of Mining Lands in Unsurveyed Territory.		
Year.	Revenue.	Expenses.
1880.....	\$ 938.98	.....
1881.....	120.00	.....
1882.....	1,820.00	.....
1883.....	12,073.00	.....
1884.....	12,213.00	.....
1885.....	3,551.00	.....
1886.....	9,023.00	.....
Total.....	\$39,738.98	.....

Quebec.			
Year.	Sales, Woods and Forests.	Revenue from Gold Royalty.	Expenses of Collecting Royalty and Police.
1881.....	.....	\$ 893.00	\$ 432.30
1882.....	Mineral Lands 7,905.85	mines 145.30	.....
1883.....	7,905.85	2,908.00	3,133.57
1884.....	15,907.48	1,620.00	4,037.30
1885.....	27,012.15	1,000.02	4,926.02
1886.....	Mineral Land Sales 1,966.60	Gold Mine Fees 525.00	4,078.53
Total..	\$52,792.03	\$7,091.32	\$16,607.72

Recapitulation.		
	Average Annual Revenue from	Average Annual Expenditure.
Nova Scotia—Rent or Royalty.....	\$96,103.82	\$9,263.55
British Columbia—Rent or Royalty.....	41,114.52	say 10,000.00
Ontario—sales.....	5,676.99	no figure given
Quebec—sales.....	13,128.02	3,321.54
Average royalty.....	\$1,418.26.	.....

It is, therefore, apparent that Nova Scotia has an average annual income from royalty or rent of minerals equal to \$96,103, collected at a cost of \$9,263, and British Columbia also receives yearly from rent or royalty \$41,114, at a cost of say \$10,000, while in Ontario and Quebec the mining interests are so mismanaged that little or no revenue is derived from rent or royalty, but the future welfare of the mining industry is sold unconditionally to speculators and farmers by the Local Legislators of the last mentioned provinces, "having no care for the future and letting the future of the mineral wealth of these provinces take care of itself."

The Mowat administration has a supreme contempt for "Old Tomorrow," and does not lay up treasure in the development of the mines and minerals of the country, although the Hon. Mr. Pardee writes an annual report in glowing colours of the great mineral wealth of the province, but sells as mining lands for a small sum to such of his unbelieving friends as do lay up treasure in the unconditional ownership of the miner's portion. What must our admiration be of his glowing reports which describe unbounded mineral wealth while no means are taken to make it a source of provincial revenue or advancement, but as is proved by the figures and doings of that department, this is placed in the hands of those who are party friends or agents, and held in reserve for these party agents even when applied for by prospectors and explorers? Hence the necessity for the location of a mineral discovery on the ground by the discoverer and then in the Land Office, and thereby avoiding the present legalized system of abuse—we had almost used a stronger term. The Hon. Mr. Pardee does not even condescend to state how much is actually received from mining land sales, except those in unsurveyed territory. Why is he ashamed to do this? Does he dread the exposure of the names and thousands of acres of mineral lands held by political friends possessing the special qualification of calling themselves "Reformers," but whose principal "reform" is to appropriate legally under the present unjust system of granting mining lands, the hard earned labour of such unfortunate explorers or prospectors as fall into the trap laid for the innocent and unsuspecting. Nor yet is the hon. gentleman content with writing a glowing mining report, but he has special agents. It would be interesting to know what the qualifications and remunerations are of these employees of the Ontario Crown Lands Office. Do they consist in *slaughtering* the interests of prospectors and miners who desire to earn an honest living? or of *sticking* and *bleeding* capital due to early trade experience which shows a strong hereditary tendency to develop, or *butchering* a good mining prospect? Or *fleeing* a good mining company which has to pay for errors and blunders due to ignorance or inexperience in the business? Does the Mowat Government do such an agent justice if they merely print a very self-interested report, and can such an expenditure of personal advertising be considered a wise expenditure of the people's money? We regret, exceedingly, the state of the Hon. Mr. Pardee's health, and trust that for his own sake and the good of the mining interests of the province he will retire into the sweet shades of private seclusion where he will better aid by his absence from office the interests of the mining community, and we sincerely trust that his successor will not encourage the present system of locking up large sections of our mining lands for party friends and special agents or reporters on mining matters.

In the Province of Quebec the condition of the mining laws is equally unsatisfactory with that of Ontario, and it is to be hoped that the present Government will consider this matter at least from a point of self-preservation if not from the higher motive of the greatest good for the largest section of the community, and not in the special interests of a few partisans as is the case in Ontario. In the report for 1880-81 it is stated "The Quebec General Mining Act was sanctioned on the 24th July, 1880, and consequently was not in force during the whole of the period embraced by the present report. However, during the short space of time which has elapsed, it has already begun to produce the two-fold effect which the Legislature had in view in adopting it namely, increasing the revenue and more especially developing the mining resources of the country. In proof of this statement I have but to refer to the figures given above and to the statement annexed hereto."

In 1885, however, the mineral land sales only amounted to \$1,966.60, so that the speculation in mineral lots was not even benefitted by the Quebec General Mining Act, as was expected. The craze for speculating in phosphate lands during 1882, 1883 and 1884 having collapsed in 1885, and in the report for that year it is stated that "a sum of \$525 for mining licenses was levied on the parties engaged in mining. The corps of police employed to collect these fees and maintain order in the Chaudiere mining division cost the province \$4,078 53!" When such is the state of affairs in Ontario and Quebec, is it not time that the example of the sister provinces of Nova Scotia and British Columbia was introduced? Mining statistics we hold to be within the supervision of the respective provinces, and is only a little closer related to geological work than is the agricultural industry, and if so why not open experimental mines for the development of the mining industry in new or unproved districts with free or convict labour?

Ground Phosphate.

A conviction of the utility of the application of crude phosphate to the soil is steadily gaining way. Experiments with Canadian phosphate at Newport during the past season have shown a marked effect upon grape vines in hot houses, and its effect upon garden plants has been established beyond dispute. Many small manufacturers are glad to get the ore in the pulverized state for treatment with acid, and there seems to be much encouragement for the erection of grinding mills.

The mills at the Basin du Lievre have been kept busily at work and a shipment of 300 tons of the ground ore has been made to Hull, England. In the future it is probable that the high grade ore will be selected for shipment abroad in the crude state and all the low grade ore will be ground and raised in quality by

freeing it from mica and other impurities. The market for this will be found in the United States and Canada. More active exertions ought to be made by the Department of Agriculture and the Geological Survey to impress upon farmers the desirability of using phosphatic manures.

It is thought that Kingston affords a favorable site for the erection of phosphate grinding mills. Coal can be had cheaply there and the phosphate can be brought to it at low rates by the Rideau Canal and exported as ballast in the lake schooners. It is likely that this enterprise will be undertaken before long and will have a marked effect in stimulating the phosphate industry.

On Some Canadian Minerals.

By B. J. Harrington, B.A., Ph.D., F.G.S.*

I.—SODALITE.

The mineral sodalite, though not the only silicate containing chlorine, is interesting on account of the considerable proportion of that element which it holds. Its occurrence in Canada was first noticed by Dr. Hunt, who, many years ago, detected it in small quantity in the nepheline-syenite (*granitoid trachyte* of Hunt) of Brome Mountain. Subsequently it was found by the writer in some of the nepheline-syenites of Montreal and Belœil, and more recently it has been discovered by Dr. G. M. Dawson, on the Ice River, a branch of the Beaver Foot River, near Kicking Horse Pass, in the Rocky Mountains.

The mineral from Montreal was described by the writer in 1875, and lately that from the Rocky Mountains has been examined. In both cases the results of analysis agree closely with the formula $3\text{Na}_2\text{Al}_2\text{Si}_2\text{O}_8 + 2\text{NaCl}$, and are as follows:—

CONSTITUENTS.	Montreal.	Ice River.	Formula.
Silica.....	37.52	37.50	37.1
Alumina.....	31.38	31.82	31.7
Ferric oxide.....	tr.	0.01	....
Lime.....	0.35	....	....
Magnesia.....	tr.	....	....
Soda.....	19.12	19.34	19.2
Potash.....	0.78	0.27	....
Sodium.....	4.48	4.61	4.7
Chlorine.....	6.91	7.12	7.3
Total.....	100.54	100.07	100.0
Specific Gravity.	2.220	2.293	....

Both varieties are of a fine blue colour, and that from the Rocky Mountains might be employed for the purposes of jewelry. A very beautiful polished specimen of it may be seen in the museum of the Geological Survey at Ottawa. The hardness in each case is 5.5.

The rocks in which the sodalite occur require further study. One of them is a nepheline-syenite, closely resembling, both macroscopically and microscopically, some of those found near Montreal, whilst another, in which the sodalite appears to be most abundant, is a grey gneiss-like rock containing a great deal of quartz, and possibly fragmental.

II.—HURONITE.

The name "Huronite" was long ago given by Dr. Thomson, of Glasgow, to a mineral which was found in a boulder of diabase on Drummond Island, in Lake Huron, and which was sent to him by the late Dr. Holmes, of Montreal. Thomson regarded it as a new species and

published a description and analysis of it in his "Mineralogy" in 1836.

Dana, in his "Mineralogy," speaks of it as "an impure anorthite-like feldspar," but also includes it with fahlunite, on the authority of Hunt. Its true affinities are evidently with the feldspars, and it may be looked upon as an impure or altered form of anorthite. One of the original specimens from Drummond Island is in the Holmes collection at McGill College, and an examination of this shows that Thomson's description is in several respects incorrect. The hardness, for example, is about $5\frac{1}{2}$ instead of $3\frac{1}{2}$, as stated by Thomson. Instead of being infusible, it is distinctly fusible (F about 5), while it contains alkalis, the presence of which is entirely ignored by Thomson.

As we have seen, the mineral from Drummond Island was found in boulders, and the origin of these was not known. About two years ago, however, an exactly similar material was discovered *in situ* by Dr. Girdwood near Sudbury, Ontario, where it occurs in rounded or somewhat angular masses in a dark green dyke of diabase, possibly the source of the boulders on Drummond Island. The Sudbury mineral, like that from Drummond Island, is of a light yellowish green colour, shows somewhat indistinct cleavage, and in places, faint striae, which are probably due to multiple twinning. It is translucent on the edges, and has a rather waxy lustre. The hardness is $5\frac{1}{2}$, or a little over, fusibility about 5, and specific gravity 2.814. Under the microscope, thin sections give evidence of considerable alteration, but with polarized light, the banding due to twinning can be seen in places. An analysis made by Mr. Nevil N. Evans, chemical assistant in the laboratory of McGill College, is given under I., while Thomson's is given under II.—

CONSTITUENTS.	I.	II.
Silica.....	47.07	45.80
Alumina.....	32.49	33.92
Ferric Oxide.....	0.97	FeO 4.32
Lime.....	13.30	8.04
Magnesia.....	0.22	1.72
Potash.....	2.88	.....
Soda.....	2.03	.....
Loss on ignition.....	2.72	4.16
Total.....	101.68	97.96
Specific gravity.....	2.814	2.8625

The rock in both cases is a true diabase, although that examined by Thompson was supposed by him to be hornblende. In each case, the microscope shows the presence of augite, a green chloritic mineral, titanite iron ore, and a more or less decomposed plagioclase, the altered portions of which are probably identical with the so-called "huronite."

III.—APATITE.

Though much has been written with regard to Canadian apatite, little attention seems to have been paid to its crystalline form. In so far as the writer's observation goes, the crystals of most common occurrence consist simply of a combination of the hexagonal prism and pyramid (∞ P.P.) A large proportion of the crystals from Renfrew County, however,

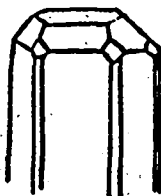


exhibit the end-face in combination with the above forms, and resemble the well-known crystals from Snarum in Norway. More rarely,

the Renfrew crystals have their vertical edges truncated by the prism of the second order, ∞ P₂, while in a few cases, which have recently come under the writer's notice, a pyramid of the second order (2P₂) is also present, the full combination in this case being, as shown in the accompanying drawing, ∞ P. P. 0P. 2P₂. ∞ P₂.

Mining Developments on the Northwestern Pacific Coast, and their Wider Bearing.

By Amos Bowman, M.E.

Continued from September number.

Gold-Bearing Rocks.—The gold region of Cariboo, one of earliest notable placer-fields discovered, and one of the most profitably worked after California, possesses many characteristics in common with California and Colorado, a few of which I will mention. Though it was the placer-deposits which first attracted attention, they were due to underlying quartz veins and to the country-rock, which was slate. The miners of 1858-61 scoured the plateau for "slate countries;" and they were rather fastidious about the kind of slate; it must be like that of California. I have frequently found the miners most excellent geologists within the limits of their knowledge. Now those slates containing the auriferous deposits were deep-water sediments, antedating the coal, and experienced squeezing, and then baking, and are at last broken, or cracked in places, while the coal-making was still going on. In Cariboo, they were underlain by a limestone formation of Palaeozoic age, containing fossils, and are much older in date of original deposit than those of California, which have been determined by its State geologist to be Triassic. In California, however, the fossiliferous rocks were very limited in area, and apparently lying in narrow belts, which may have been folded along with some non-fossiliferous Carboniferous or older rocks of the same slaty structure, such as are known to exist on the flanks of the Sierra; so that the evidences of their Palaeozoic age, in part, may yet be forthcoming.

But the crumpling, and the quartz-forming, or filling-in process, was simultaneous with that in California. We know this because we have found in Cariboo, Cretaceous rocks containing fossils of the Shasta group, which tell the story of the uplift, as it does in California.

What there may have been in this deep-water sediment and its underlying (deeper water?) limestone deposits, to give origin to a great abundance of auriferous pyrites, with accompanying free gold, would be hard to say. But we get a little light when we study it in connection with other things. The uplift generated older volcanic outflows of Neocomian age, along with which there must have been a great deal of solfataric action. In British Columbia the older volcanic traps are bedded, and cover considerable areas, while in the gold region of California I have seen them only in the form of dykes.

Enrichment and its Consequences.—Beside the solfataric action, the proximity of the slates to crystalline rocks—commonly best seen in the flanges of the plateau—and time, may have had a good deal to do with the enrichment of the slates. Whatever may account for their enrichment, beyond the causes mentioned, these deep-water sediments lying along the great plateau-chain in America, Asia and Africa, constitute a study in physical geology as well as in gold mining, worthy of the attention of

the best observers. Since the conditions of its wealth in precious metals appear to be similar throughout the statesman is no less interested, for where the precious metals are found in quantity, judging the future by the past, there the prospector, the capitalist and the immigrant will *some day* congregate in mass.

Northern Conditions.—What I have just said, having a general bearing, leads me back to my particular field of Cariboo, in the same connection. Theories have been constructed to account for a supposed inferiority of mineral wealth along the plateau in northern latitudes. Some have imagined that volcanic action was lacking in the north, or that when we get far enough north, the colder climatic conditions might have hindered the favourable chemical action under ground. Others have simply enunciated the theory, as based upon fact, that the moment we cross the boundary line into Canada the happy things of nature no longer happen.

But theories are unnecessary, because the supposed facts are not facts. Cariboo has yielded \$30,000,000, chiefly from a few miles of placer-diggings on two creeks, Lightning and Williams creeks. Omineca and Cassiar, in latitude 55° to 57°, have told their story in gold-dust; and many million dollars have been extracted where the working season is only two months in the year; where the auriferous gravel has to be thawed with fires out of an ice conglomerate in which it has been bedded since the Glacial period. Little by little the explorers have continued following the plateau northward, until at the present time they are prospering under the Arctic circle. There is a flourishing placer-mining camp on Stewart River at the headwaters of the Yukon.

PLACER DEPOSITS.—I have cited these localities in evidence of mineral wealth in the rock. I will now direct attention to the placer-deposits, which are as much more interesting to us, in most respects, as they are nearer to us in time of formation.

Three circumstances have to combine favourably, to make a good placer-mining region: First, the veins must carry free gold along with the baser metals; secondly, the conditions of natural concentration in streams must have operated upon them; and thirdly, after such operation, the product must be accessible to the miner. Either of the last two conditions wanting, though we walked over untold millions, we could not realize it through placer-mining. In California all three of these purely geological considerations happened to be superb. In British Columbia they are not exactly identical, nor are they the same in different parts.

Physiographical Comparisons.—The position of Cariboo in relation to the cordilleran aggregate corresponds with the higher portion of the drainage-basins of the Columbia, the Snake, and the Colorado rivers, within the western flange, while California is outside. In the raising of the plateau accordingly, the two areas were subjected to different degrees of movement, different influences in the matter of successive rest and re-elevation or depression, and possibly even to opposite movements. Certain leading facts, however, are alike in both regions. The streams of the northern plateau experienced the same period of erosion in the early Tertiary, as those of the south, including California outside of the western flange. Again, the Miocene brown coals of the northern plateau found the necessary conditions of growth and deposit at the close of the eroding period contemporaneously with the brown coals of Ione and Lincoln

in California. Again, in the Miocene and Pliocene periods there followed a silting up of the old eroded rivers in the northern interior, just as we have found them in California. And lastly, the Tertiary was concluded by volcanic outflows in both places.

Silted Channels—The Cause.—The most important feature of a placer-mining region, which I have barely hinted at as among the favourable conditions, is this filling of the old eroded canons as a means of arresting the gold. It was accomplished pretty much at the same time, and in the same way, everywhere along the great cordilleran region, so far as I have had the opportunity to observe.

The silting up was due to an alteration in the transporting power of running water, involving a different combination of its two factors of volume and grade. Professor Whitney attributes all to a change in volume, and Professor Le Conte all to a change in grade. Without discussing the amounts of depression and re-elevation experienced by those two different parts of the cordilleran region during the placer filling, and the present eroding period, which is a very interesting one, I will simply bear testimony to two facts bearing on the subject, viz:

1. At the outlets of the auriferous mountain streams of Cariboo district, we see them debouching upon the plains of the interior plateau, and underneath the surface in disconnected basins, a Miocene brown coal. Overlying the brown coal are seen bluffs of still-water bedded gravels, blending into the stream-bedded gravels, of the gold-gion. The gravels of the silting-period were dumped into standing water, which ran horizontally along the base of the mountains, not less than 100 miles, and vertically not less than 600 feet above the general level.

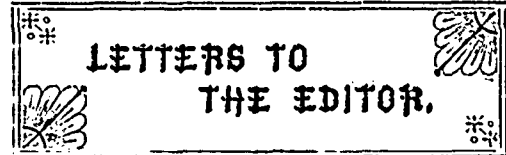
2. At the out-lets of the auriferous streams of the Sierra Nevada they are seen debouching upon the plains of the Sacramento, holding under the surface the brown coals already mentioned; while at Table Mountain, in Butte County, they are seen to have dumped their silts and gravels into standing water, at not less than 600 feet above the present sea level.

There was thus, at least, a change of grade, as one of the factors of the transporting power of water. To this change of grade, if not to an absolute uplift, I would especially direct the attention of experts, as an important consideration, in looking up and down the cordillera at the auriferous deposits which may call for their examination.

The Modern Streams—A Divergence.—I have now an interesting divergence to note, in the physical history of the rivers of the northern interior plateau, from the conditions obtaining in California. It is true, the resemblance of conditions continues to hold further, in the fact that the lower Sacramento River runs entirely in silt, as also does the lower Fraser. So does the Fraser above the bed-rock canon, where it passes through the coast or Cascade Mountains. When we reached the headwaters of the Fraser, on which Cariboo is situated, the gold bearing stream-beds are seen to have been filled like those in California; the waters at the *debourchure* have also subsided, and the modern streams have cut fresh canons, which are, for the most part, identical with the old, as they are in California. But the new erosions have not gone down to the bottom of the older canons, as they have in California. From 50 to 150 feet of the richest auriferous deposit is found underneath the stream-beds. All the rich placers of Cariboo have been mined by underground drifting, with all the difficulties of water and "slum" to contend with overhead. In

California on the contrary, the modern streams have cut down at mid-slope a thousand feet deeper than the Tertiary streams preceding them had done.

All the difficulties in the way of the placer-miner are accordingly multiplied, on the northern plateau at least; and while I am not prepared to say, of my own knowledge, how it is in other portions of the plateau, I think it may be found the case generally within the eastern and western rims.



An Improvement.

Toronto, 30th Sept., 1887.

The Editor

THE CANADIAN MINING REVIEW:

SIR,—May I suggest that if your paper was *paged continuously*, as periodicals generally are, so that they may be bound and *indexed* for reference, it would be much more useful, to us at least. When we first subscribed for the REVIEW, I ordered the back numbers in order to have the full series bound (as I thought it would constitute a good history of mining in this province), and I was much disappointed to find that each number was paged separately. I have kept all the back numbers still, hoping that you would soon adopt the paging I have indicated.

Please excuse this suggestion if it does not meet your views.

SUBSCRIBER.

[The improvement suggested by our Toronto Subscriber is one which has been kept in view since the management of the REVIEW came into our hands. The change will be made commencing January issue, 1888.—*Edit.*]

Theory and Practice.

Brandon, October 4th, 1887.

The Editor

THE CANADIAN MINING REVIEW:

SIR,—

The theoretical geologist is he who studies the nature of geological phenomena in the laboratory and constructs doubtful solutions of the order of rock formations according to known chemical formula with an exactness due to the precision with which chemical reactions take place. The correspondent to a mining journal who dares to trespass on the elucidation of a geological problem is in much the same position, both are guilty of entering on ground which belongs to the Field or Practical geologist, who has examined the district and strata in question. Being of a practical turn of mind at present, I consider this apology necessary to geologists for the liberty here taken.

The southern portion of the Province of Manitoba is, according to United States and Canadian geologists, underlain by strata of Trenton age that is holding Trenton fossils which again is overlain or capped by Cretaceous rocks. It has been proved by numerous drillings made in several parts of Ohio that the rock underlying a gas or oil producing region is Trenton limestone, over this is required a thickness of several hundred feet of strata so as to form a natural reservoir, as it were, to store or keep the oil and gas there generated, from such bituminous or animal remains as have been imbedded in what was once the bottom of

the Silurian sea, and now called the Trenton strata. The Cretaceous rocks form such a covering. The Manitoba limestone has not, however, the bituminous (oily or gaseous) shaley associations or look of the Trenton limestone, although the fossils, which by their presence and death there in ages past, are the cause or source of the gas or oil in the Trenton limestone are identical with those of the Manitoba limestone, this fact proves it to be of Trenton age. Is there or is there not an oil or gas producing area in Manitoba? By drilling through the Cretaceous strata till the Trenton is reached will the problem be solved. The question is one of such importance that its solution by a sufficient amount of drilling in Manitoba is a matter worthy of consideration. Here again is another matter for thought: ought not all Hydro Carbons, gaseous or fluid, as well as coal, lignite, soft, or anthracite be reserved in selling land to farmers? In what way can a farmer be entitled to receive as a gift a seam of salt, rock, or natural reserve of fuel 1,500 or 2,000 feet under his land, and of the existence of which he is ignorant? Salt or mineral springs may be reserved for health's sake, but the time once was when the salt of the earth was considered as valuable as the salt in the water. A very small royalty on such minerals would pay or compensate the Government for any outlay it might incur in the solution of questions such as this and possibly yield revenue, but more especially in a part where the liquidation of debt from Bonds would fluctuate any dryness there might be in the Provincial exchequer.

BRANDON.

The Gold and Silver Mining District Ouray County, Colorado.

Lennoxville, P.Q., 6th Oct., 1887.

The Editor

THE CANADIAN MINING REVIEW:

SIR,—Having just returned from the above named district I have pleasure in sending you a concise account of Ouray and the surrounding district as it may be of interest to some of your readers.

Now that the Denver and Rio Grande railroad is rapidly approaching this lovely mountain town of Ouray, it being only eight miles distant, its beauties will be made accessible to the travelling public. Ouray is the county seat of the county of the same name, and named after Ouray, Chief of the "Uncompahgre Utes"—or Indians. Uncompahgre means the "valley of Fountains," and in the town site of Ouray, and in the valleys below, there are numerous very large 'hot springs' which gush from the earth, and this fact is said to have given rise to the name.

Approaching Ouray by a well travelled toll road from the outer world, you pass through a level park traversed by the Uncompahgre river. It is about 10 miles in length and from one to one and a-half miles in width. At the lower end, close to the road, are some very large hot springs, the temperature of whose waters nearly reaches a boiling point, and are impregnated with iron, salt, lime and the alkalies. This park is bordered on the west side by a straight line of cliffs of sandstone, capped with volcanic rocks, gradually decreasing in height toward the north, and in the east by slopes more or less steep, from the "Uncompahgre Peak" group and its spurs. On either side of the road, as you drive through the park to Ouray, are flourishing farms, and the stream towards Ouray is well wooded with popular, pine, elder and willow.

Within about two miles of Ouray this park narrows into a magnificent gorge, bounded on the east side by precipitous cliffs of sandstone (of the lower Carboniferous formation), and sloping backward from the edge are dense forests of pine and aspen timber, the whole crowned by serried peaks and truncated masses of grey trachyte, the summits of these peaks being from 3,000 feet to 4,000 feet above the valley, and from 10,000 feet to 14,000 feet above tide water. From this gorge you emerge into the beautiful amphitheatre in which stands the town of Ouray.

In the SW portion of the basin, in which stands the town, and where the waters of Cannon creek flow into those of the Uncompahgre, there are some lovely canons and picturesque gorges; and here, in places where the hot springs flow down over the banks into the main stream, the rocks are covered with a perfect mat of "maiden hair" and other ferns. A short distance from here, up Cannon creek, is a large cave, the floor and roof are covered with stalactites and stalagmites.

On the north side, and where you emerge from the gorge into the basin where stands the town, are almost perpendicular cliffs of the old red sandstone, these partially encircle the town, while around the other portion the hills are more sloping and covered with pine timber of various kinds. I estimate the average height, or rather thickness, of this sedimentary formation to be 800 feet; above this is the layer of trachyte or volcanic rock of an average thickness in this district of about 3000 feet to 5000 feet.

On the south of the town is a stratum of sandstone, and in the southwestern portion of the town limits, where are located several mines, the lodes have for their walls so-called quartzite, or really altered sandstone, their ores being contained in a gangue or matrix of quartz property. There is also here a stratum of ribbon jasper, also conglomerates in the shape of both pudding stone and breccia. The effect of heat in metamorphosing the sedimentary rocks is here shown in a very marked manner.

Leaving Ouray at the south side, you ascend the picturesque and heavily wooded gorge of Canon Creek towards Sneffels and Virginus Basin, in which are located most of the celebrated mines of Sneffels district. About 3½ miles from town, and about 1,000 feet above it, you see the last of the red sandstone where the creek has cut through it, and you are now between walls of trachyte, the sheer bluffs on the east side stretching upwards in an almost perpendicular line for almost 1,000 feet. The west side is more broken and sloping. From this point of junction of the sedimentary and igneous rock to the summit of the highest peaks the trachyte prevails.

Professor Hayden, of the Geological Survey, claims this trachyte as No. 4, or the youngest of the four groups of trachyte rock. He says: "This group horizontally, is a restricted one, but fraught with occurrences of the highest interest, not only are the rocks themselves of very peculiar type for the position they occupy, but the presence of many metaliferous veins, lends additional importance to the group. Some of the highest mountains of the region are partly or wholly composed of it. The latest discoveries of ore-bearing veins seem to have been made at localities where the group occurs as merely capping the older ones. In other words instead of the vein being confined to No. 4, they extend through it, and can be reached in older formation." Speaking of these lodes, nearly all are found in trachyte No. 4. Sub-

sequent investigations have shown that they penetrate beyond the limits of this group, and without any appreciable change of course or character, enter the metamorphics which are covered by the trachytes. All the veins, located within the trachyte, which I had occasion to visit, were argentiferous, although it must be understood some of the lodes also carry gold.

South east of Ouray, is Red Mountain Park, which is distant about 10 miles. In this park, at the upper end, are some brilliant scarlet peaks. They are due to admixture of certain mineral substances, originally white, the presence of ferric oxygen compounds gradually changes this colour to yellow, red and brown.

The rock is a crystalline feldspathic paste of white colour, containing very minute transparent crystals of sanidite and small crystals of pyrite. Decomposition of pyrite releases the sulphur and changes the iron from a bi-sulphide to hydrates seaqui oxide. This in varying percentages, produces the colours and shades above enumerated.

In writing of the mines, I must needs do so in a general and concise way, as were I to particularize each one that I have seen, it would fill an extremely big book. My object now is to give a general idea of the ores which came under my notice during my survey.

To begin.—In the Red Mountain Park district, on No. 3 Mountain, there are being actively worked a number of mines, varying in depth to 800 feet. In this district in some of the best paying mines, such as the "Yankee Girl," "Silver Bell," and others, the ore is found in what is locally termed "chimnies" or "shutes," but in reality are extinct craters of volcanoes, which prove in working to be very regular and persistent in their character. The walls are composed of porphyry and trachyte, and are from wall to wall about 20 feet in diameter. The ore is a mixture of "tenorite" or black oxide of copper, grey copper and stromeyerite, the latter carrying about \$16,000 to the ton of silver.

The "Yankee Girl" has one main shaft (bratticed) sunk to a depth of 800 feet. Eight levels are driven out 100 feet apart to intersect the "chimnies." The general equipment is very fine indeed, no expense having been spared. This mine has paid \$1,200,000 in the last two years, and its daily output is about 20 tons per day, which is (after the ore has been classified) shipped to the smelters.

The "Silver Bell" is another mine, lying about 1 mile NE of the "Yankee Girl mine." This has a (bratticed) shaft sunk to a depth of 600 feet, with 6 levels running to the "chimney" in which the ore is found. The ore is a mixture of grey copper and galena, and runs about 200 ounces to the ton. The walls of the "chimney" are composed of porphyry and trachyte, and are well defined. The size of this "chimney" varies from 12 to 18 feet. The output is about 15 tons per day and is paying very big profits.

This particular district appears to be a volcanic centre, as the whole of the lodes in the outside districts seem to lead or converge towards this point, like the spokes of a wheel to the hub, I beg you will pardon the simile.

Outside mines in the fissure or lode form, are handsomely remunerative. Such mines as the "Virginus," "Ruby Trust," and others too numerous to mention, are being worked extensively, and are all well engineered and equipped.

In conclusion I would say that I regard this field as a most reliable one for investment of capital, and judging from the great influx of money which is pouring in, must, if judiciously

expended, place this district beyond rivalry on this continent.

I am, Sir, yours, etc.,

FRANCIS D. TAYLOR, M.E.



The following shipments of Canadian ore have been made from Montreal from 10th September to 3rd October, 1887:—

Date.	Shippers.	Ship.	Destination.	Tons.
Sept. 9	Lomer, Rohr & Co.	s.s. Earl King	London	223
12	Wilson & Green	s.s. Khrweider	Hamburg	320
13	Wilson & Green	s.s. L. Nepigon	Liverpool	216
16	Wilson & Green	s.s. Thorndale	London	318
16	Lomer, Rohr & Co.	do	do	225
17	Wilson & Green	s.s. Thunmore	Liverpool	256
23	Wilson & Green	s.s. Ocean King	London	359
24	Lomer, Rohr & Co.	s.s. Katio	do	230
24	Miller & Co.	do	do	535
30	Wilson & Green	s.s. Canopus	Liverpool	398
			Total	3,110

A well known English authority has estimated the phosphatic manures used during last year as follows:—

England.....	500,000
Germany and Austria.....	800,000
France.....	250,000
United States.....	893,000

Tons of phosphatic manure employed, 2,443,000

The following patents have been issued by the Department of Crown Lands:—To Messrs. Wm. H. Fuller, of Ottawa, and Peter White, of Pembroke, for N¹/₂ of lot 12, in 3rd range, Wakefield County, 100 acres as a phosphate mining location. Date of patent, 8th August, 1887. To Archibald Campbell, of Montreal, for lots 8 and 22 in 8th range, Denholm County, 272 acres as a phosphate mining location. Date of patent, 6th October, 1887.

The English market continues strong for 80 per cent. phosphate at a shilling per unit. with one-fifth penny rise, and enquiry is made for 75 per cent. at 10s. On the continent quotations are 13d. to 13½d. for 80 per cent. with one-fifth rise.

Rates from Montreal during the past month have been 7s. 6d. to London, and 4s. to 6s. 6d. for Liverpool. Large quantities could have been shipped at these rates as there was a scarcity of grain, but the low water in the Lièvre river prevented shippers from availing fully of the opportunities offered. Owing to the low freights for grain and deals one large steamer took phosphate for ballast and went to Norfolk, Va., to load cotton for Liverpool.

Kingston District.

A gentleman who has been successful in the iron mines of Lake Superior, has bonded or purchased several phosphate mines in the district north of Kingston, Ontario. He has also secured the refusal of several iron properties in the same region. It is supposed to be his intention to organize companies in the United States to work the properties that may be acquired.

Mr. John Foxton, of Sydenham, Ontario, has worked all the season upon a rich deposit of green phosphate, which, at a depth of seventy

feet from the surface, shows a width of several feet. All the drilling is done by steam and the hoisting by horse power.

The mines of Capt. Boyd Smith in Hinchinbroke and Bedford are producing a large quantity of phosphate, the bulk of which analyses 85 per cent. The deposits on this property are quite unique, being found in association with masses of magnetic iron. Seven distinct veins run for nearly a mile in a south-west and north-east direction, and contain on the surface either iron alone or iron and phosphate side by side. These seams when followed down sometimes turn wholly into phosphate and occasionally widen to a considerable extent. One pile of 300 tons is said to be composed of a larger average size of lumps than has ever been seen in Canada, showing that the deposits have been both extensive and pure.

Mr. James Bell has taken out a considerable amount of phosphate from his property near Lake Opinicon. Mr. Loishley, of Elgin, and Messrs. J. Smith & Co., of Sydenham, have also been producers this season. But with the exception of those mentioned before, no other persons have been shipping from the Kingston district. In past years the production of this region has mainly come from farmers, who were careless of the quality of their ore, and the low analyses obtained discouraged purchasers. By more attention to raising the grade, phosphate could be profitably mined in this section.

Perth District.

The Anglo-Canadian Phosphate Company, at the Otty Lake Mines in North Burgess, Ont., are sinking on a seam of phosphate in order to test the extent of the deposits at a depth. They are now down 100 feet and expect to sink another 100 feet before spring. Nearly three hundred openings have been made on phosphate on these properties and carried to depths of 20 to 30 feet. The seam now being worked has varied in width from one foot to seven feet of pure phosphate, besides several feet more of mixed phosphate and mica. If the seam is found to be large and pure at a greater depth it will support the supposition that many of the numerous openings will result similarly. As no deep mining has ever been done in this district, the experiment will be of great value and if successful will give encouragement for further operations.

Capt. Moore who has had a gang, of about 8 men prospecting on several lots here, has met with encouraging success. Some very large deposits have been uncovered. About 1,000 acres have been purchased, and offers have been made for several other locations.

Templeton District.

Messrs. McLaurin & Blackburn have made a division of the phosphate lands jointly owned by them, and the valuable mines in the 11th range of Templeton are now the property of Mr. Robert Blackburn, of New Edinburgh. The phosphate from these lots has gained the highest analyses ever obtained from Canadian phosphate in England and Germany, cargo lots this season having realized as high as 88 per cent. The mine is being timbered with reference to enlarged and economical methods of production. 1250 tons have been shipped during the present season.

Mr. Jackson Rae proposes to continue work, during the winter, in the deep shaft which has been sunk on a fine body of ore upon his lot in

the 10th range. The inclination of the shaft is so gradual that a skip railway is effectively used for hoisting the ore and rock.

The Canada Industrial Company have been working upon lots in the 10th range and have opened some good shows. They have erected substantial buildings and finished them with more taste than is usually displayed in mining regions. During the month bush fires have been very prevalent in this district, and they approached so close to this property that the buildings were for some time in imminent danger of being destroyed. As it was, several wooden outhouses were burnt to the ground.

Messrs. Gillespie, Paterson & Co., have been doing good work in the same locality, and have found some extensive seams. A small force is at present working in pit 2, from which the management state that about 150 tons have been mined this year. Nearly 250 tons have been mined from pit 1. Some negotiations have been made for the purchase of this property.

The Templeton & Blanche River Company, organized in Montreal during the present year, are making most satisfactory progress on their property. A first class road has been built, some very commodious buildings erected and a large number of pits opened. The surface indications are very rich, and the outlook of the new organization is very promising. Additional capital for enlarged working is being procured and machinery of the most approved pattern will be put in before the snow flies. Mr. Tom Hines, an experienced miner, is in charge of the work.

Messrs. W. A. Allan, Ottawa; E. K. Green and T. Trimble, Montreal; accompanied by a representative of the REVIEW, paid a visit to the mines of this district during the month.

The Lièvre District.

Mr. Jas. White, who was injured in the Little Rapids accident, has been removed to his home in Western Ontario. He expects to be able to resume work in the course of next month.

Messrs. Poupore & Thompson, the contractors, are now making satisfactory progress with the new Lock and Dam at Little Rapids. A frame house for the Lockmaster has been erected; most of the loam has been removed, and the rock-work, it is thought will be begun about the 15th of next month.

Shipments by the Lièvre River have been much retarded by the low water, there having been but two feet depth at the Little Rapids. Barges could carry but one-third of their usual load. About a thousand tons of phosphate have been delayed, and claims by steamers in Montreal for dead freight and demurrage are causing some vexatious disputes. The need for the dam and canal, now being built, after years of needless delay, is made clearly manifest, and it is to be hoped that the work will be hurried forward with all possible speed.

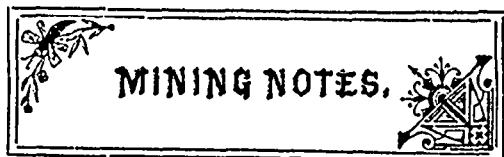
Latest reports state that the water in the Lièvre has risen several inches.

The High Rock and Emerald mines have each been giving large outputs, the quantity being a little restricted by scarcity of labour, as the lumber camps have been securing their hands for the winter.

The North Star mine, under its new manager, Capt. Tom Williams, has been producing a larger output, and its shaft is now down 650 feet. The phosphate seam still continues of large size, and the demonstration of the existence of the mineral at depths is of much value to the district.

The output from the Union Mines will be about 350 tons.

At Little Rapids work is being steadily conducted. A rich show has been opened about 2,000 feet from the main shaft, which is developing nicely. Mr. George Smith, the superintendent, has severed his connection with the mine to take a position with the Ingersoll Rock Drill Company of Montreal.



Nova Scotia.

Since they were opened up the product from the Oxford Gold Mines has been 10,000 ounces of gold, or say some \$20,000. This year 2,440 ounces have been obtained from 650 tons crushed, an average little short of 4 ounces to the ton. Only forty men are at present employed. The company owns 64 mining areas, covering a tract of land 2,100 feet long by 1,500 feet wide; but most of the gold so far obtained has been from a strip 500 feet long by 25 feet wide, and 47 of 64 areas have not been opened. Thirty-five leads have been cut on the property and nearly all have shown gold. The works are in the hands of Mr. J. M. Reid, a thoroughly competent manager.

The last crushing at the Brunswick Mining Company's property gave 26 ounces from 40 tons of quartz taken from the Forrest lead, and 36 ounces from 35 tons of quartz from another lead. The company own a district five areas in width by about $\frac{3}{4}$ mile in length.

The following are the official returns for September so far received at the Mines Office:—

District.	Mill.	Tons Crushed.	Oz. Gold.
Wino Harbour.....	Victoria.....	33	6½
East Rawdon.....	Rawdon.....	390	197½
Lake Catcha.....	Oxford.....	60½	234½
Dar's Hill Salmon river.	Dufferin.....	910	319
Whiteburn.....	Cushing G. M. Co.	10	21½
Stormont.....	Tributers.....	79½	78½

It is stated that the ore of the Eastern Development Company, Limited, shows wider streaks of the concentrated chalcopryrite as depth is attained. An assay of these streaks or bands of ore just made by the provincial assayer gives 31.71 per cent. of copper. All the concentrated ore streaks of the mine will run 20 per cent. copper and over, but when the entire width of the vein is crushed the intermingled barren rock brings the average down to from 5 per cent. to 10 per cent. The vein at the point the samples referred were taken is 10 feet in width, the depth being 220 feet.

Quebec.

Gold has been discovered on the property of Captain Bothwell, near Buckingham. Specimens sent to and assayed by Dr. J. T. Donald, Montreal, are certificated to have given 42 oz. 11 dwt. 16 grs. to the ton, or a cash value of \$800. The ore sent was not free milling, but

sulphurets. The vein has been traced through other properties, the owners of which are placing absurdly high valuations upon them. Several general specimens have been sent by disinterested parties to Dr. Hoffman, of the Geological Survey, to assay, and until his report has been received it would be unwise to place too much value upon the many reports now in circulation.

Mr. John P. Mullarkey, of Montreal, has secured a mining patent from the Department of Crown Lands for the W½ of lot 37, in 5th range Bersford, containing 9¼ acres, as an Inferior Metal Mining Location (Iron).

Ontario.

The siding from the Kingston and Pembroke Railway into No. 1 mine of the Calabogie Iron Company, is nearing completion. The lessees can then ship the accumulated ore, and realize on the product.

Silver has been found on the farm of a Mr. Racicot, near Lake Nobsong, in the Township of Ferris.

Messrs. Smith & Lacey are turning out large quantities of bright amber mica at their Ell Lake mines, near Sydenham. In the principal working there is now a vein ten feet in width composed entirely of mica crystals, some of them very large in size. The mica is of a light amber shade.

A very sad accident, whereby one man was killed and several others were seriously injured, occurred at the Calabogie iron mines on Friday, 7th instant. While eight men were working in the pit the roof gave way and ten or twelve tons of rock came down and completely buried them. The whole party had a marvellous escape from instant death.

Port Arthur District.

From the large variation of the needle, amounting to 135° in a number of places, Mr. M. J. Butler, P.L.S., is of the opinion that vast beds of magnetic iron ore will be found in the township of Marks, as it is scarcely probable that such a large variation would be caused by the presence of the small pieces of magnetite usually found associated with trap rock. One peculiarity which he has never seen noted before, was the constant variation; it is quite a common thing, he says, to see the needle 15° off the course for a distance of fifteen or twenty chains before any change in the variation would be noticed, when the needle would veer over suddenly to the opposite side of the pole and record 5° for a distance of ten or fifteen chains.

RABBIT MOUNTAIN MINE.—The management have completed the setting up of the last of the new machinery recently purchased, with a view to deeper and more extensive explorations. This machinery consists of: 1st. A large double drum hoisting apparatus of the most improved construction. These drums are independent, and may be used to work two shafts. With this they sink 1,000 feet at least. 2nd. An Ingersoll 7 drill compressor, with which they run four Ingersoll drills; and 3rd, a new six ton steel boiler, to supply the compressor and hoist. The compressor also works the underground pumps. Sinking with two drills is now being carried on below the 250 foot level. The vein here is very promising, and a rich ore body may be struck at any moment. At present the ore is, however, low grade. The 250 foot drift north is being pushed vigorously ahead through

dead ground, when it is expected that it will strike the continuation of the rich ore chute from the surface. The 200 foot level will now be pushed south with all speed. The vein in this direction looks very well, and it is confidently hoped that this drift will not go far before being in bonanza. The mill is not yet running, as they are awaiting the opening up of more ground.

THE BEAVER MINE.—This mine is still in bonanza. The main or lower adit having been found to be richest of all. The management are shipping a great deal of very high grade ore from above this level, part of which is sent to the smelting works direct as it is too rich to mill—the rest is milled. The ore is first stamped, then concentrated on true vanners, and the tailings are amalgamated. The ten head of stamps have been in continuous operation for some months, and by the look of things they will have soon to be increased. As it is the owners have ten head more on the ground and intend to erect them this fall. Owing to the soft nature of the ore the ten head at present working, stamp nearly 30 tons per day. They are now sinking below the level of the main adit, and the shaft is now some 40 feet down, still continuing in the rich ore body. The owners have decided to organize this mine as a joint-stock company, capital \$5,000,000; so it is stated. Mr. W. H. Furlong, M.E., is leaving at once to make the underground survey necessary for maps and reports. A new vein has recently been found on this property within half a mile of the Beaver vein. About 12 men have been working on this for a month with the most encouraging results. The vein, though small, is exceedingly rich in silver and silver ore, and though, as the workings continue into the hill, the width of the vein steadily increases, there has been so far no diminution in the quantity of silver. This vein runs almost at right angles to the Beaver.

THE PORCUPINE MINE.—This property, it is understood, has just been sold to Detroit people. Two experts have been here in their behalf and have submitted it to a most searching examination, the result of which will not be known for a couple of weeks. It is the intention, if the sale is affected, to at once commence operations on a large scale.

THE SILVER MOUNTAIN MINE is still being operated by a strong force of men, and work almost entirely exploratory in its nature is carried on. A good quantity of stamp rock has been got, both from their shafts and adits, but nothing extraordinarily rich; still, however, the prospects are extremely good, not to say flattering.

THE CROWN POINT MINE is being worked with a small force of men, and in the one adit level being opened they are getting some extraordinarily rich silver ore. It is reported that this mine is under contract for sale. In the event of this going through, we may expect to see a really valuable property worked as it deserves.

There are a number of new discoveries and properties being worked by two or three men that are not at present individually worthy of mention. The latest discoveries have been a short distance north-west of White Fish Lake, and north-east of Arrow Lake. When it is considered that the new railroad, a portion of which is now under contract, will pass through this district, the future is a very promising one.

Still further to the west, and near to the International Boundary, there has lately been found large deposits of hematite iron ore, and Americans, who have traced the belt through from Minnesota, have been taking up some thousands of acres of land there. This very place is located for the Canadian terminus of the new railroad. To the east of Port Arthur some of this iron has lately been found, which, if the deposits are extensive, will rival any iron on the north or south shores of Lake Superior. It will be spring again before the necessary explorations can be carried on.

Rat Portage District.

Though there is at present no gold mining carried on in this most promising district, there is certain to be, at no distant date, a great deal of it. The Gold Hill people did make an arrangement with a large London syndicate about the workings of their property. They were, however, unable to obtain their patents from the Crown Land Office, and it is said the agreement fell through. There are several other properties on the Lake of the Woods besides this, however, which, had they clear titles, could be made handsomely dividend paying mines. It is authoritatively stated that if patents are issued work will yet commence this year on more than one vein in this district.

Manitoba and North-West Territories.

The Medicine Hat Coal Mining Company are advertising for the sinking of a shaft, and will endeavour to have the same completed this fall. The prospects are good for the construction of the Medicine Hat Railway to the mines either this fall or early in the spring.

A correspondent who recently visited the Canadian Anthracite Coal Company's mines at Banff sends the following:—

The place is reached by driving five miles from Banff and then by walking down the railway track for a mile, for Anthracite has no wagon road to it. It is thus a sort of island in the mountains. The little mining village of some 200 or 250 people has grown up very rapidly—in less than a year—and, as every one knows, owes its existence to the discovery of workable beds of coal within a stone's throw of the railway. The obliging superintendent of the mine afforded every facility for visiting it, and the writer penetrated every tunnel to the very end. The work of coal mining is here very easy. The mouth of the pit is about forty feet above the railway track. The approach is nearly horizontal, as the mountain side is entered, and is some twelve feet in diameter. This allows a track to be laid, on which, drawn by horses, are the usual shaped trucks of the coal pit. Carrying lanterns, we penetrated the darkness, and reached the first seam. This is a splendid coal layer seven feet thick, with a dip of perhaps 30°. This had been worked both right and left. Entering the left hand tunnel we followed it to the very end, 520 feet, and secured from the men working at the extreme point a choice specimen of coal. Similar tunnels further in were followed, one where the coal was about three feet thick, and another of nearly five feet. On going into the extreme distances the air became heavy, and we were glad to learn that for the health of the miners ventilating apparatus will soon be introduced. The coal is thus very easily mined. It is brought out by the horse trucks and thrown down an inclined frame of iron bars. This in the meantime serves for sorting, but a rotating sifting apparatus is being prepared, which will be a great improvement. After picking over to remove any shale present, the workmen conducted the coal by spouts to the cars on the railway track. The expense of mining and moving the coal must thus be reduced to a minimum. The great question asked is as to the character of the coal. The government geologists in our North-West have been too timid. They for years decided against our Northwestern coal, but now such splendid deposits as that of the bituminous coal from the Galt mine are pushing their way into recognition. Scientific opinion should encourage, not raise doubts, as to important enterprises. To many it seemed too good to be true that we should find real anthracite on Canadian soil. It was wrongly said there is but one real anthracite deposit in the world and that in Pennsylvania.

Of course there are anthracite beds in South Wales and Peru, and now we know we have this valuable anthracite mine in the Rockies. The London *Times* correspondent calls our deposit semi-anthracite. Anthracite is simply stove coal. The specific gravity, percentage of carbon and hardness of the Rocky Mountain coal rank it with anthracite. The writer has burnt this coal. It has a small amount of flame, has intense local heat and no smoke. Its local conditions are similar to those of the Pennsylvania anthracite, for it is among the dislocated rocks where pressure and possible heat may have been applied, as is the case where the Alleghanies of Pennsylvania have changed the bituminous coal to anthracite. It is not easy to determine, without a full geological investigation, the age of the Rocky Mountain coal. Carboniferous rocks do occur in the Rockies, and at a higher elevation on the brow of Twin Peaks Mountain are silurian beds, but in the Rockies the carboniferous and cretaceous are very conformable, and it may of the latter. At any rate the practical tests of our black diamonds from the mountains are highly satisfactory, and while we were at the mine an order of 4,000 tons for San Francisco was being filled. It would not be surprising if this anthracite should drive out the poorer varieties of bituminous coal found on the Pacific Coast, for the bituminous coal of Nanaimo is somewhat inferior to our Galt mine coal. Our party returned from Anthracite rather begrimed and blackened by the visit to the coal mine, but filled with deep thoughts as to the possibilities in many ways of our Rocky Mountains.

Dr. Selwyn, Director of the Geological Survey, has just returned to Ottawa from an extended tour through the various mining districts. He is of opinion that the extent of the vein, upon which are the Banff and Lethbridge coal mines, is almost unlimited, and that there is sufficient to supply the entire North-West for many years to come, as well as a healthy export trade.

British Columbia.

Mr. T. H. Collins, F. G. S., the well known Mining Engineer and Metallurgist, of London, England, is now at Yale, British Columbia. His object is to become acquainted with the mining capabilities of the province, with a view to the introduction of British capital, and he will be glad to receive communications from *bona fide* prospectors and discoverers.

The Illecillewaet Silver mines have been closed down. Snow has fallen two feet at the upper mines.

A telegram from Illecillewaet to the Selkirk Mining and Smelting Co., announces that the company will ship to San Francisco their sixth carload of silver ore, weighing twenty tons, and valued by assay at \$1,600. This makes the aggregate of the shipments to date nearly \$8,000. The mines look better than they have ever done, and regular shipments will continue.

The total amount of coal shipped from Nanaimo for the month of September was 27,730 tons. Of this Dunsmuir & Sons shipped 17,700; the East Wellington Co., 2,340, and the Vancouver Coal Co., 7,530 tons.

From a letter dated Camp McKinney, Sept. 16th, written by Mr. J. W. Reade, a practical miner and assayer, we extract the following, re the Rock Creek Mines:—

"The 'Amelia' shaft is down 50 feet; the company will commence to cross-cut the vein on the 20th. The 'Cariboo' shaft is down 42 feet, with a vein at that depth seven feet wide; the ore will concentrate 25 per cent. of sulphurets that will assay from \$500 to \$300 to the ton. They have quit sinking on the main shaft, and are at present getting out free milling ore to run the little mill which will be in operation soon. I think, however, that the 'Cariboo' will change hands before the snow flies, as a mining expert from Montana, who has been here for two weeks sampling the ore, told me just before he left for Butte City, that he was well satisfied with the property, and Mr. Rice—one of the owners

—has gone to Spokane Falls in company with him. I expect to hear any day that the property has changed hands. I sampled some ore from the 'Alice and Emma Consolidated' mine, and made two assays obtaining splendid results. The district is looking better every day, and I am now fully satisfied that in the near future we will have one of the richest mining districts in British Columbia."

The latest news received from Island Mountain mine is of an encouraging character. The vein was tapped 300 feet below the first tunnel and run in on a fine ore of considerable width. Work on the mill buildings is getting along well. The mill is about closed in and a portion of the machinery is in position. The boiler house is up and the boilers bricked in. The brick for furnaces did not turn out as well as expected, being too soft. The development of the mine is proceeding, and it is expected that crushing will soon commence.

The Hon. Secretary of the Nanaimo Relief Fund has received a letter from the Hon. Jno. Robson, Provincial Secretary, stating that the plan of distribution and the mode of management of the Relief Fund, has been entirely satisfactory to the Provincial Government, and that \$5,000 would be donated by the Government towards the Nanaimo Relief Fund.

A large number of miners came down from Alaska on the Idaho, with sums varying from \$600 to \$2,000 as the result of their season's work. The general opinion of the miners is that the diggings are very productive, but the weather is frightfully severe, rendering it almost impossible to work but for a short time in mid-summer.

United States.

The quarterly report of the Plymouth Consolidated Gold Mining Company dated 1st October gives the following:—

Gold	
Bullion Produced.	
January, 1887.....	\$62,350.49
February.....	60,683.76
March.....	59,296.45
April.....	60,893.03
May.....	78,822.34
June.....	65,029.14
July.....	64,732.17
August.....	59,696.14
September.....	59,025.58
Total product for nine months, '87 \$570,529.10	
Operating expenses for same period 221,950.00	
Profit..... \$348,579.10	
Addition to Pacific Mill—40 Stamps. 44,324.20	
\$304,254.90	
Cash on hand, Jan. 1st, 1887..... 81,079.89	
Amount applicable to Dividends.. \$385,334.79	
Paid dividends for nine months	
Nos. 44 to 52..... 255,000.00	
Surplus, Oct. 1st, 1887..... \$130,334.79	

Having been short of water (on which the company depend for power) for two months past the Empire Mill has been compelled to run on short time, thus reducing the output for August and September below the average. The fall rains are now due, and will soon furnish a full supply. The dividend payable 5th of October will be the fifty-third consecutive monthly dividend, making a total of two millions one hundred and twenty thousand dollars paid the shareholders since the consolidation, June 1st, 1883, being twenty-one dollars and twenty cents per share.

MISCELLANEOUS PARAGRAPHS.

The Horrors of Fire-Damp.—No meteor, however terrible it may be supposed to be, can be compared to an explosion of fire-damp. Let one of those scourges of heaven be imagined (which appear sometimes as if designed for the punishment of human beings) a thunderbolt, a hurricane, a cyclone, or a whirlwind—burning, overthrowing, destroying everything in their course, and the effects produced by them will still be inferior to those caused by an explosion of mine gas. A discharge of a cannon loaded with canister shot, and fired point blank into a crowd; a powder magazine taking fire in the midst of a body of workmen; a gasometer exploding in a factory—can scarcely give an idea of an explosion of fire-damp suddenly overtaking the miner. The moment the mixed gas comes in contact with the flame of a lamp a tremendous explosion takes place, resulting from the combination of the components of the fire-damp, hydrogen and carbon, with the oxygen of the air. The two former separate to combine with the oxygen, with which they have the greatest affinity. The double phenomenon only takes place at a high temperature; without flame it would not arise. The reaction produces an effect like the most brilliant lightning, and makes itself heard by a clap of thunder. The explosion spreads instantly into all the galleries of the mine; a roaring whirlwind of flaming air destroys everything it encounters, overthrowing trams, and bratticing, and trap doors, mounts into the shaft, and lifts from their foundations the staging which covers its mouth, through which it discharges thick clouds of coal, stone, and timber. The men are blinded, thrown down, scorched and sometimes burnt to a cinder; often their clothes take fire, and not unfrequently they are buried beneath the ruins of the fallen roofs. When an attempt is made to fly to their assistance, there is not time to rescue them; there are only corpses left which are scarcely recognizable. The calamity spares nobody, even though as many as one or two hundred miners may be at work; death extends over the whole of the mine where the explosive gas was present. The air-doors are thrown down, the ventilation of the mine is reversed, the underground atmosphere is vitiated by the combination of the fire-damp, and the stalls are filled with steam and carbonic acid. Sometimes the temperature rises so much that the coal is converted into coke at the sides of the galleries, and the commotion is so great that the dams have to withstand both fire and water, and the wallings, raised for the purpose of resisting the thrust of the measures, are themselves overthrown. Then to a scene of already indescribable desolation are added the horrors of inundation, falls of the ground, and fire, when the explosion has already made only too many victims. To add to so many horrors the foul air, carbonic acid, the after-damp or choke-damp, spreads throughout the mine, and suffocation terminates the existence of those in whom the explosion had left a spark of life.

A Just Estimate. Perhaps no other industry has been so misunderstood as mining, and has been compelled to bear the burden of unjust condemnation which belongs to other, altogether foreign exercises, which like parasites have fastened themselves upon it. If a poor farmer

attempts to conduct business on a farm by methods altogether impracticable and contrary to the best experience of years, the failure, when it comes, falls upon the man and his lack of wisdom, instead of being made an argument against farming and the farm, but let a mine be ever so extravagantly mismanaged by the most inexperienced and dishonest superintendent, the loss of money and all the long train of disasters is charged at once, to the uncertainty of mining and the worthlessness of mines. Simple justice demands more discrimination, and we may say that, with the more general information prevalent, it will be more difficult hereafter for the mistakes, fraud and inefficiency of incompetent management to place the responsibility to the account of the mine or of mining. Coal, iron, zinc and lead mining have passed through this phase in the history of their development, and it is time that silver and gold mining were divorced from speculative excitement, stock fluctuations and everything outside of the line of steady production. All must come to this point before the best results can be achieved, and before mining can be justly estimated at its true value in its influence upon the steady improvement of national prosperity and substantial advancement. †

A Simple Process for Measuring Water.—To measure water roughly in an open stream, take from four to twelve different points in a straight line across the stream, and measure the depth at each of these points, and adding these together, divide by the number of measurements taken. This quotient will give you the average depth, which should be measured in feet. Multiply this average depth in feet by the width in feet, and this will give you the square feet of cross section of the stream. Multiply this by the velocity of the stream in feet per minute, and you will have the cubic feet per minute of the stream. The velocity of the stream can be found by laying off 100 feet on the bank, and then throwing a board into the stream at the middle, note the time passing over the 100 feet, and dividing the 100 feet by the time, and multiplying by sixty, gives the velocity in feet per minute at the surface. The velocity at the centre is only eighty-three per cent. of that at the surface, and so only eighty-three per cent. should be calculated. For example, suppose the float passes 100 feet in 10 seconds, that divided by ten and multiplied by sixty (seconds in the minute) gives 600 feet per minute as the velocity, and eighty-three per cent. of this gives 498 feet per minute as the velocity of the stream at the centre, and the area of the cross section multiplied by this will give you the number of cubic feet per minute in the stream. This, of course, is only a rough way of calculating, but it is often used, and is a good and simple way to obtain data to select a wheel by.

Ontario Gypsum Beds.—The gypsum beds of Paris on the Grand river have been worked for nearly half a century. South of the town they are found on the west side of the river, and on the north of it on the east side, extending a distance of about four miles along the river. There are two beds of three or four feet in thickness, interstratified with 16 or 18 inches of shale. They lie about ten feet above the level of the river and sixty or seventy feet below the table land. The quarries on the south side of the town have been worked during the past four years by Messrs. A. S. Gill & Co., who also have a mill in the town for grinding rock into the plaster of commerce. This quarry

has been worked for more than forty years and the tunnels have penetrated a distance of nearly 600 yards. Ten hands are employed on the works from October to May of each year—five miners, three mill hands and two teamsters. The average yearly product for the past four years has been 1,500 tons, which readily sells at \$4 to \$4.50 per ton at the mill. Owing, however, to its great weight and cheapness it will not stand the expense of shipment to any great distance for agricultural purposes, and the production is largely limited to the demands of the locality. The same company operate a quarry on the Jones tract, on the east side of the Grand river, in North Cayuga, their average annual output being about 650 tons. The cost of quarrying at Paris is ninety cents per ton and in Cayuga ninety-five cents, the average wages of workmen being \$1.25 per day. A new industry has been established in connection with the gypsum works of this town—the manufacture of alabastine. This article is produced from rock gypsum found in the mine near Cayuga, on the Grand River. It is used for painting purposes and takes the place of kalsomine. It is claimed by the manufacturers that as a first coating under oil paint on wood, brick or any other outside surface where paint is used, the saving in expense will be fully one-half. The deposits on the Grand river, below Caledonia, occur above Cayuga on the west bank of the river, while below the town, where the river turns and flows south-east, the beds occur on the north side. The deposits in workable thickness are confined to certain areas, having been formed, it is supposed, in ancient lake bottoms. The first bed, opened some forty years ago, was below Cayuga, and operated by Messrs. John Brown, of Thorold, and Wm. H. Merritt, jr., of St. Catharines. Large shipments were made to the United States—to Cleveland, Detroit, and other places; but on the discovery of the Michigan beds this trade was greatly reduced, although the Michigan gypsum is of inferior quality. This mine was worked in a small way on and off until it was reopened in 1879 by Wm. H. Merritt, who built a mill for grinding the rock. With much encouragement from the late Hon. George Brown the consumption of Canadian white land plaster in Ontario has been considerably increased in competition with the American gray, which comes over from Oswego, and which is very impure gypsum. There is a mill on Gill & Company's property, nearer Cayuga, which was built by the late A. W. Thompson and there are two above Cayuga, at Mount Healey and York, run by Donaldson & Bros., and Thomas Martindale, respectively. At Caledonia Mr. Johnson (late N. Garland & Co.) grinds some land plaster. The whole output along this lower part of the Grand river in land plaster and rock varies from about 4,000 to 5,000 tons per annum. The plaster is sold in Ontario for the most part, the duty preventing much from being shipped to the United States, while the rock, which is duty free, is chiefly shipped to that country.

A Miner's Heroism.—In a certain Cornish mine (South Caradon) two miners deep down in the shaft were engaged putting in a shot for blasting: they had completed the work, and were about to give the signal for being hoisted up; one at a time was all their coadjutor at the top could manage, and the second was to kindle the match and then mount with all speed. Now it chanced while they were both still below, one of them thought the match too long; tried to break it shorter; took a couple of stones, a flat and a sharp, to cut it shorter; did cut it

of the due length, but, horrible to relate, kindled it at the same time, and both were still below! Both shouted vehemently to the coadjutor at the windlass, both sprang at the basket; the windlass man could not move it with them both. Here was a moment for poor miner Verran and miner Roberts! Instant horrible death hangs over both, when Verran generously resigns himself: "Go aloft, Roberts," and sits down; "away, in one minute I shall be in Heaven!" Roberts bounds aloft, the explosion instantly follows, bruises his face as he looks over; he is safe above ground; and poor Verran? Descending eagerly they find Michel Verran too, as if by miracle, buried under rocks which had arched themselves over him, and little injured: he too is brought up safe, and all ends joyfully, say the newspapers. As Verran was anxious after this to work above ground, and also to gain a little schooling, a few hearty admirers of his heroic act were glad to subscribe a little sum to enable him to spend some months at school. Here he acquired the great arts of reading and writing, then established himself in a farm and married a schoolmistress, with whom he and his affairs have prospered as they deserved.

Experience, Essentially Requisite.—

Perhaps no other line of enterprise has suffered so much from inexperience and a total disregard of the fundamental principles of business, as the mining industry in this country. Methods have almost universally prevailed at times which now careful observation shows to have been most reckless and uncertain, having in them no evidence of reliability which would recommend them to the careful consideration of the intelligent and conservative business man as investment. It is now apparent that the almost general unfavourable results might have been safely predicted by any one of ordinary capacity, and it is also certain that at the present time it would be almost impossible to secure the investment of a dollar in any such proposition. This fact shows a marked improvement at the present time over the methods which have previously prevailed to such an extent and with such influence that its effects have as yet been by no means entirely removed. It may not be necessary to repeat that production is the chief object to be attained, and the security assured in this direction must be considered the only real basis of value in investigating the merits of any proposition in this great field, which promises such great results under proper management.

The Influence of the Mining Press.!!

The history of the struggling existence and final starvation of hundreds of local papers, in prosperous mining localities, is not a creditable record for an industry so broad and liberal in many other respects, especially is this true in view of the fact that the mines have been most faithfully upheld, and owe the larger proportion of their value and success to the very means which has been neglected and unrewarded. The report of mining properties, strikes of ore bodies in mines, shipment from smelters, value of ore and mill runs, has been most faithfully made by the local paper, to be copied by the metropolitan reviews in the capital centers, until a tide of inquiry and investment has been attracted to the locality, and a general condition of prosperous activity established by which hundreds have been benefitted. In many cases this gratuitous work, which has cost time and money, has been done faithfully and impartially for those who have never contributed the amount of an annual subscription to the paper

which has been the chief cause of their prosperity. The mining industry of the United States today owes its present promising condition, its general activity, the favourable state of public opinion, the investment of capital and the wonderful development everywhere witnessed, more to the influence of the press than to any one or all other influences combined, but its return for all this benefit has, as a rule, been most niggardly and certainly unjust.

The Pierce Method of Charcoal Manufacture.—In the ordinary kilns one cord of wood has yielded from 30 to 35 bushels, of about 20 pounds to the bushel, while in the Pierce process of distillation in retorts the average yield of charcoal is claimed to be 50 bushels to the cord, which is worth, at 60 cents per bushel, three dollars. There are also obtained three gallons of crude wood alcohol per cord, valued at 95 cents per gallon at the works, \$2.85; 150 pounds of acetate of lime per cord, 1 cent per pound at the works, \$1.50; and 1,000 pounds of combustible hydrocarbons, equal in value for heating purposes to the amount of three dollars of other fuel; a total of \$10.35, against about \$2.25 worth of charcoal under the old process. The first works in the southern United States were built at Gooderill, Tennessee. This plant consists of 20 charcoal kilns and a 25 ton furnace. The second works to use this process were erected in 1886 at Calera, Shelby County, Alabama. This plant consists of 38 charcoal kilns, now in operation, with a capacity of 10,000 cords of wood per annum. The charcoal produced by this process has also been used at the Warner Furnace, West Tennessee, and at the Etua Furnace in the same district. The Decatur Works, Alabama, with 48 charcoal kilns, having an average capacity of 56 cords per kiln, or a total annual capacity of 40,000 cords, are now nearing completion. Alcohol and acetate of lime departments are connected with the plant. A 50 ton furnace is to be built during the present year, the size of the furnace, 12 feet bosh, 60 feet high, with a blowing engine having a steam cylinder 36x18, and a blowing cylinder 48x84 inches. The works in course of erection by the Nashville Iron, Steel and Charcoal Company, are constructed to use this process, and will consist of two 60 ton furnaces, with two blowing engines to work in combination, of which the steam cylinder will be 36x48 inches, and the air cylinder 48x84 inches. For the manufacture of charcoal there will be 80 kilns, with an annual capacity of 80,000 cords of wood. The process will also be adopted at several other works.

Quicksilver Ores.—Speaking on the character of quicksilver deposits, Prof. S. B. Christie, of the University of California, in his testimony in a recent case in San Francisco said:—Quicksilver deposits, as a general rule, are very different from those of the ores of other metals. Many other metals occur in well defined fissure veins, so that there is no difficulty in following the ore, and in many cases of calculating before hand the amount of ore in sight; but with the exception of the deposit at the old Almaden in Spain, and to some extent the deposit at the Idria in Austria, the quicksilver deposits, particularly those of California, are characterized by a great and persistent irregularity, so that it makes the mining of those ores much more difficult than that of other metals. New Almaden is a striking example of this irregularity. It has often occurred in the history of the mine that there was none or scarcely any

ore in sight, and it has often looked as though the mines must of necessity be shut down, and it has only been by the most careful and painstaking prospecting or dead work that it has been possible to keep up the production of the mine. Very frequently large bodies of ore will almost completely run out, and there will be visible in the fall of the works only a slight colouration in the vein matter, which indicates that there is ore left in that particular place, and by following out this little spring of ore carefully it may lead into a large deposit. As a result of this the workings of the mine are necessarily very irregular, and it requires the greatest skill on the part of the engineer in charge of the works to keep up a regular and steady output of ore.

Mining in Alaska.—The general formation of the upper Yukon is slate, lime and porphyry. In this formation many veins of gold and silver-bearing quartz have been found, but as yet they remain unnoticed by the miner, and he has rarely taken the trouble to break open a piece of quartz to examine it. Quartz carrying an abundance of free gold was picked up this summer on Forty-Mile creek, but its course is as yet not discovered, and, in fact, unprospected for, the rich gravel bars alone being the attraction. In some places these latter are indeed rich, some miners during this summer having rocked out as high as thirteen ounces in a day at the new diggings on Forty-Mile creek. This place was first discovered late last fall by a man named Franklin, and upon his report of the discovery of coarse gold there, the miners on Stewart and Salmon rivers pulled out for that section, and soon nearly 300 men were on the ground. In fact Forty-Mile creek was the objective point of all who have gone to the Yukon this season. This stream empties into the Yukon river about 100 miles below Fort Reliance, having its source in the Alaskan range of mountains on the east divide and to east of Mount St. Elias and the headwaters of Copper river. Running from Copper river to the east is an immense copper belt sixty miles wide, and it has been traced over the divide 100 miles. The diggings on Forty-Mile commence about three miles up from the mouth, and are continuous ninety miles up, as far as this summer's explorations extended. Several of the small tributaries putting into the main stream were somewhat explored and found to be rich, but scarcity of water in them for washing is a prevailing drawback. The bars worked along the main stream yielded all the way from \$10 to thirteen ounces per day per man, all very coarse gold, the market price in Juneau of which is about \$17 per ounce. Two nuggets were washed out of \$15 and \$32 value. It is estimated that in the neighborhood of \$100,000 were washed out of these diggings this summer. All the miners, with the exception of those who did no washing to speak of, but spent their time prospecting, rocked out from \$400 to \$2,000 in dust. This gold was mainly taken out of the creek beds and very near to running water, for in no case could the miner wash farther back than four feet into the gravel banks on account of encountering hard frozen ground. The gold rather lies in bunches than otherwise. As one miner has said, several shovels of dirt could be taken up which would contain nothing but a few colours, while another would yield perhaps an ounce. The richest deposits lay behind the boulders and drifts. On one bar three men rocked out on the 25th day of July twenty-six ounces, which is equal to \$442, at the market price. About ninety days

can be considered as the extent of the washing season. High waters are a drawback in the early spring, and the streams commence to freeze up about the first of October. The ground there is covered to some depth with a thick matting of moss, which is impervious to the sun's rays, and in consequence when the ground underneath once becomes frozen it remains so. To obviate this very serious drawback, the miners have set fire to the moss, which in summer becomes as dry as tinder to the depth of several inches, and thus from the heat of the fire, and being uncovered and exposed to the sun, and atmosphere, it is thought that in a short time a vast amount of now frozen gravel will be thawed out sufficient to wash. Should this be the case, there is room enough on Forty-Mile creek and its tributaries for a thousand miners. There is no reason to doubt, and the boys from the Yukon believe, that other creeks that put down from the Alaskan range in that neighbourhood are equally as rich as Forty-Mile creek, but of course nothing whatever is known of them and will not be until explored. Alaska is a great country, and years will come and go before its resources are shown up.

Occurrence of Apatite in Slag.—Mr. W. M. Hutchings writes to *Nature* asking whether any of its mineralogical readers have come across, or have anywhere seen mentioned, the occurrence of crystallized apatite in a metallurgical slag or other artificially formed silicate. Having recently observed such an occurrence, and failing to find any record of such a formation, he says:—"The slag in which I have observed the formation of apatite is produced during the smelting of slag ores into a blast furnace. It is a basic silicate of lime and ferrous oxide, containing about 30 per cent. of silica. The principal "flux" used in the reduction of the ore is tap cinder from the puddling furnaces, and it is mainly from this source that phosphoric acid is introduced into the slag. The slag itself, in bulk, is dark brown to nearly black in colour. It flows into slag pots of about three hundred weight capacity and cools slowly. I recently prepared some thin sections of this slag for microscopic examination. The greater portion consists of a mass of crystals of olivine, surprisingly colourless and transparent considering how much iron is present. The spaces between the crystals are occupied by deep-brown and yellow amorphous slag, and black sulphides of iron, etc. Both olivine crystals and dark amorphous matter are penetrated through and through by great numbers of apatite crystals in long needles. It is a most beautiful occurrence, analogous in every way to what one sees in rocks. Nearly all the apatite crystals have taken up and enclosed more or less of the amorphous dark material, which forms in the majority of cases a rod running down the centre, but there are also many cases of symmetrical arrangement of dark matter parallel to the sides of the hexagon. The apatite does not only occur in the mass of the slag as above described; it is formed also in free crystals, lining cavities which are formed in the centre of the lumps of the slag, owing to gases carried over from the furnace and liberated during cooling. Some of these cavities are of considerable size, and are often lined entirely with a thick growth of apatite needles, some as thin as the finest hair, others of much larger dimensions. I have taken out crystals over a quarter of an inch long for microscopic and chemical examination. Most of them contain a good deal of the amorphous slag, etc., enclosed,

as in the case of those in the mass of the slag. Sometimes in such cavities very beautiful little crystals of volatilized sulphides are seen among and on the apatites. I have seen galena crystals in this manner, but it is very difficult to remove them from the cavities without damage or loss.

The Oldest Iron Mine in the United States.—The oldest iron mine in the United States that is now in operation is stated to be the Iron Hill Mine in Delaware. It was discovered in 1684. The ore obtained from the mine is now treated at the Principio Iron Works, Maryland, at which works a blast-furnace was first erected in 1720. There has been no blast-furnace work at Delaware for some years past.

Explosives for Fiery Mines.—Some important information relating to explosives suitable for blasting fiery mines is given by Hill.** Experiments with the high explosives show that dynamite will ignite a gaseous mixture containing more than 5 per cent. of fire damp. Nitro-dynamite and gelatine dynamite give more favourable results, even allowing 7 per cent. of gas to be present, without firing the coal-dust. The action of the water-cartridge is insufficient with blasting powder, but with dynamite it is safer, since the dust is not fired even with a 6 per cent. of gas. Nitro-glycerine and gun cotton have never caused an explosion even with 10 per cent. of gas. The same results are obtained with the new explosives, romite, carbonite and blasting gelatine. The Prussian Fire-Damp Commission consequently recommends the employment of dynamite with the water cartridge, and permits the use of other high explosives without the water cartridge. The latter, however, can scarcely be used in collieries, as they are too expensive and cause too much dust. Of the new explosives, *awigone* has been found thoroughly unsatisfactory. *Securite* proves to be a safe explosive, resembling dynamite in its action. The products of its combustion are not objectionable. The *Schulz-powder* offers no absolute security in

gaseous mixtures. *Carbonite*, while giving greater security than dynamite, has the same blasting action, and acts on the coal like the best blasting powder. If carbonite could be sold at a lower price, it would be the best explosive for use in the coal mine.

A New Process for the Manufacture of Aluminium has, it is stated, been recently patented in France. The operation is divided into two parts, in the first of which ten parts by weight of powdered alumina are mixed with four of lamp-black, a sufficient quantity of tar being added to form a thick paste. This is then placed in a suitable receptacle and calcined at a red heat till the oil or tar is completely decomposed, leaving a brittle solid, which is then broken into small lumps, and subjected in a closed vessel to the action of an atmosphere of carbon bisulphide, a current of which is kept constantly flowing through the vessel. On raising the temperature, it is said that this agent decomposes the carboniferous mixture with the production of carbonic acid gas and a sulphide of aluminium, from which the pure metal is afterwards obtained with the aid of hydrogen.

The Kimberly Diamond Mines.—The yield of diamonds from the Kimberly Mine alone, from the opening in 1871 to the end of 1885, is stated to have exceeded 17,500,000 carats, equal to 3½ tons weight of precious stones, in value about £20,000,000. To obtain this, as many thousand tons of reef and rock has to be excavated. The mine is 450 feet deep, and the cubical contents of this huge cavity measures about 9,000,000 cubic yards. Four thousand Kafirs are employed at this mine, and more than 20,000 natives of Africa arrive yearly at the mines in search of work; so that the employment of native labour and the development of native trade are incidental benefits conferred on South Africa by the discovery of the diamond fields.

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*Reproduced by permission of the author from the Transactions of the Royal Society of Canada, Vol. IV.
†Crystals from Bob's Lake, Bedford, Ontario, also show this form.
‡Chicago Mining Review.

§*Carlyle*.
¶*Chicago Mining Review*.
**Journal of the United States Association of Charcoal Workers, Vol. VII, pp 122-150.
***Berg-und Huttenmaennische Zeitung Vol. XIV, pp. 456-7

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2nd.—North half of lot 23, in the 5th range, containing 100 acres.

3rd.—Nine acres of lot No. 28, in the 5th range, with water privileges thereto appertaining, being site of mill dam, etc., etc.

The property formerly belonged to the Montreal Plumbago Mining Company, and was worked successfully for several years, until the company's mill was destroyed by fire, but the mill dam remains almost uninjured, and there are on the property several houses, sheds, etc., built for various purposes when mining operations were carried out.

The Plumbago Deposits

upon the property are regarded as amongst the richest and most extensive in the Dominion. As to the quality of the Plumbago, it has been extensively used in the manufacture of crucibles, lubricating leads, stove polish, etc., etc., and given unbounded satisfaction. This is established by the experience of consumers, and by a certificate from the celebrated Battersea Crucible Works, London, England, a copy of which is open for inspection.

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has also been discovered in quantities.

The lands are in the Phosphate region, and recent prospecting has disclosed a rich and extensive deposit of this mineral. There are unrivalled facilities for transporting the ore to and from the mines by the Ottawa River and C. P. Railway. Distance from mines to Railway Station 6 miles. Good road.

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TOWNSHIP OF ASCOT.

- 1st. Clark Mine, Lot 11, R. 7 Ascot 187 acres
2nd. Sherbrooke Mine, part Lots 12 and 13,
R. 7 Township of Ascot..... 329 "
3rd. Belvidere Mine, part Lots 9 and 10, R.
9 and 10, R. 8 Ascot..... 292 "
4th. Mining Rights in same vicinity on..... 250 "

All of the above properties lie within $1\frac{1}{2}$ miles of the Village of Lennoxville, at the junction of the Grand Trunk, Canadian Pacific and Passumpsic Railways, and have been developed to a considerable extent, and veins opened 6 to 20 feet in width, yielding 3 to 5 per cent. of copper, also silver, and 35 to 40 per cent. of sulphur. These mines are only $2\frac{1}{2}$ to 3 miles distant from the City of Sherbrooke, and evidently are of the same class of ores found at Copellor only four miles distant, owned and worked by the Orford Copper and Sulphur Company, and by Messrs. G. H. Nichols & Co., of New York, which have proved so remunerative.

TOWNSHIP OF ORFORD.

5th. Carbone Hill Mine, Lots 2 and 3 R. 14, and 2, 3, 4 R. 15. 718 acres. Same class of ore as is found in the Ascot properties above described, but yielding a higher percentage of copper.

TOWNSHIP OF CLEVELAND.

6th. St. Francis Mine, $\frac{1}{2}$ Lot 25 R. 12, 50 acres, with dwelling houses, smith's shop, ore sheds and office, large winding and pumping steam engine, with boiler, winding and pumping gear, and about forty fathoms Cornish lifting pumps complete, railway tracks, ladders, etc., situated three miles from Grand Trunk Railway. A considerable amount of mining work has been done at this mine. A well defined vein richly charged with vitreous purple and yellow sulphurets of copper traverse the entire length of the property, five feet in thickness, yielding 8 to 40 per cent. metallic copper.

TOWNSHIP OF GARTHBY.

7th. Fifty-six lots of land, 2,958 acres. This property for the most part is unexplored, but copper is found on the greater part of the property. On one of the lots a vein about twenty feet in width has been found. Samples of the ore have yielded as much as 22 per cent. of copper, being also rich in sulphur. Other samples of pyrites from the same property, free from copper, have yielded as high as 45 per cent. of sulphur. The only drawback to this property is in its distance from the railway, it being about four miles from Garthby Station, Quebec Central Railway. A new line is chartered, however, which, when built, will run directly through the property.

TOWNSHIP OF ACTON.

8th. The Acton Mine, 100 acres, with engine, boiler, pumps and appliances. Within three years after this mine was first opened it produced nearly \$500,000 worth of copper. It is situated about half a mile distant from the station of the Grand Trunk and South Eastern Railways.

9th. Brome Mine, part Lots 2 and 3 R. 4, 50 acres.
10th. Bolton Mine, two miles from Eastman Station, Waterloo & Magog Railway, 400 acres.

The above properties formerly belonged to the Canadian Copper and Sulphur Company, and were acquired by the present owner at sheriff's sale, giving an indisputable title thereto.

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Mining Regulations

TO GOVERN THE DISPOSAL OF Mineral Lands other than Coal Lands, 1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein, either by surface or subterranean prospecting for mineral deposits, with a view to obtaining under the Regulations a mining location for the same, but no mining location or mining claim shall be granted until the discovery of the vein, lode or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron on veins, lodes or ledges of quartz or other rock in place shall not exceed forty acres in area. Its length shall not be more than three times its breadth, and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mining.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provides for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall within sixty days thereafter, file with the local agent in the Dominion Land Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operations on the same; but the claimant is required, before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labor during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of the same.

No more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON.

The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area which shall be bounded by north and south and east and west lines astronomically and its breadth shall equal its length. Provided that should any person make an application purporting to be for the purpose of

mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The regulations also provide for the manner in which land may be acquired for milling purposes, reduction works or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st of August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect to quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry, bench, creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, etc., etc.

THE SCHEDULE OF MINING REGULATIONS

Contains the forms to be observed in the drawing up of all documents such as:— "Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed rock flume company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulations to govern the disposal of Dominion Mineral Lands the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests, and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR.

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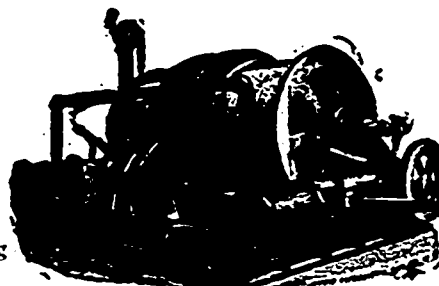
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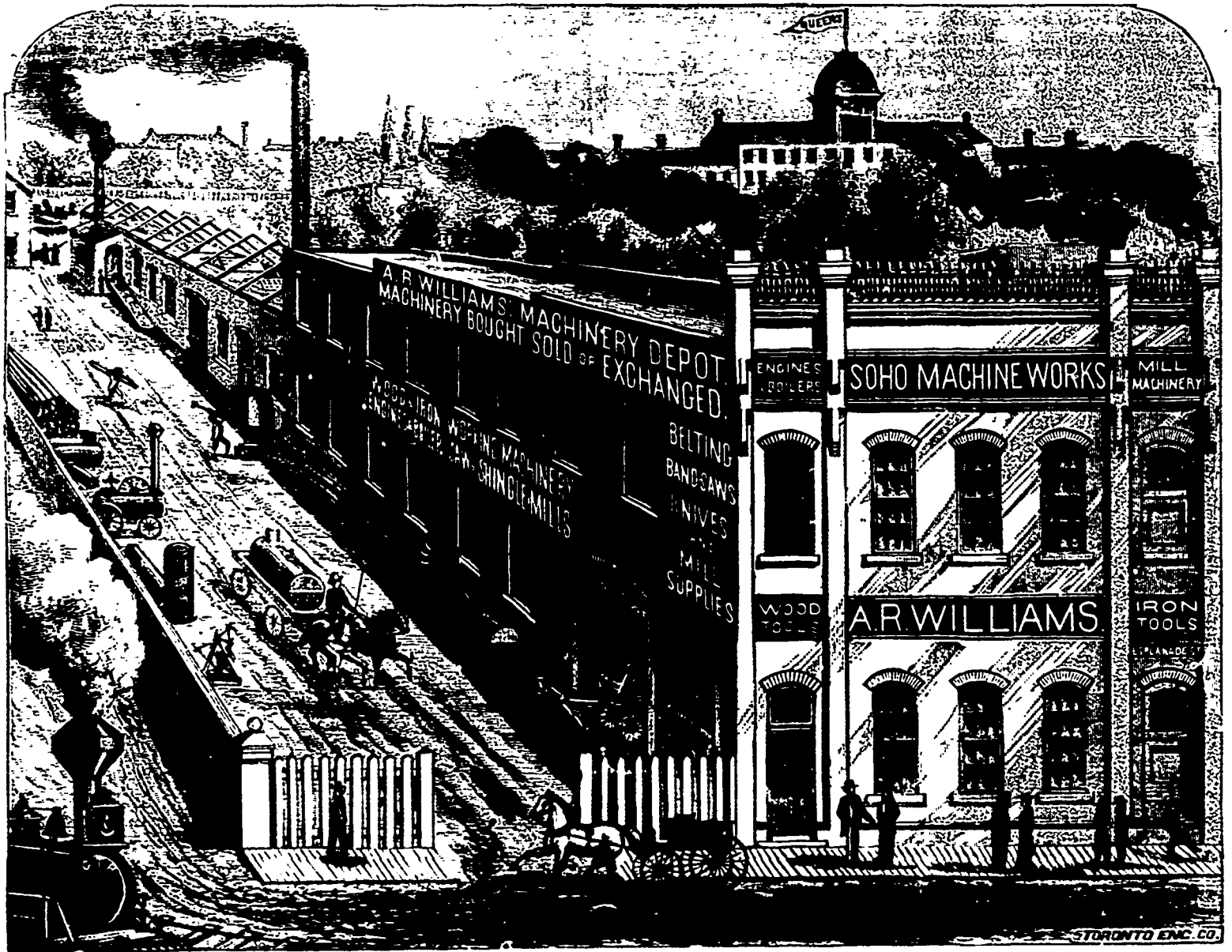
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