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Established 1882

Vol. XII.—No. 1.

1893—OTTAWA, JANUARY—1893.

Vol. XII.—No. 1.

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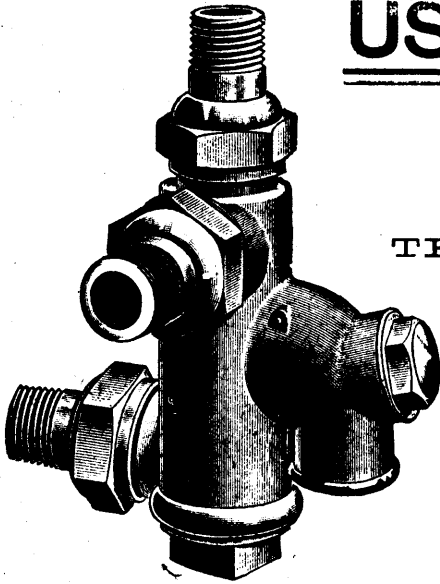
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**REFERENCES:**

- The Nichols Chemical Co., Capelton, (Seven Engines.)
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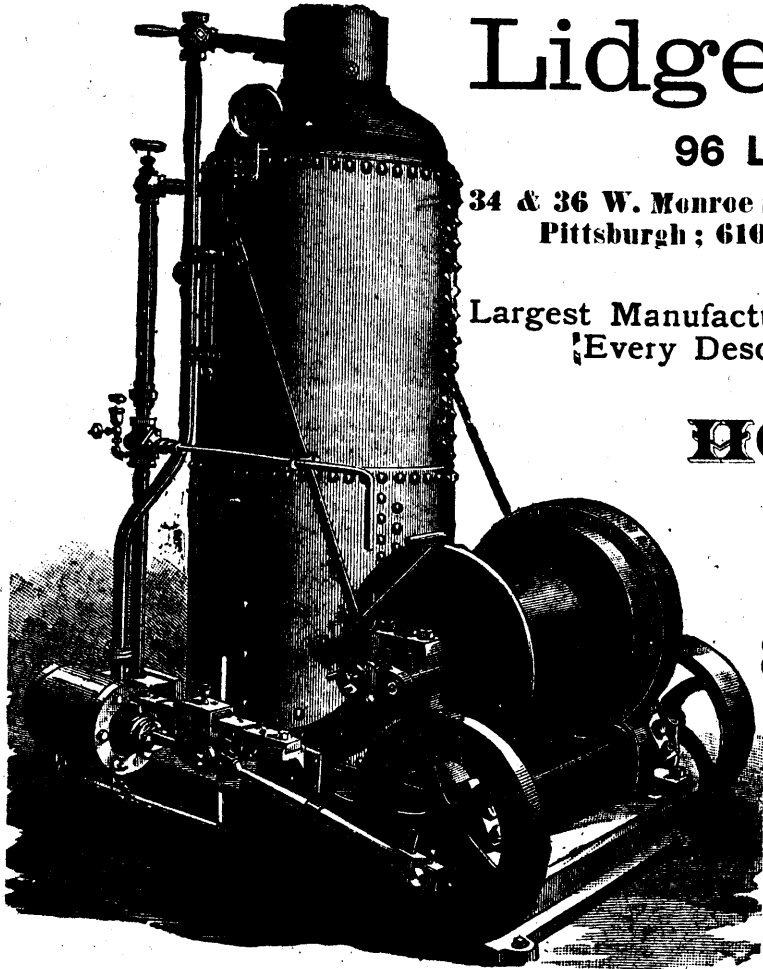
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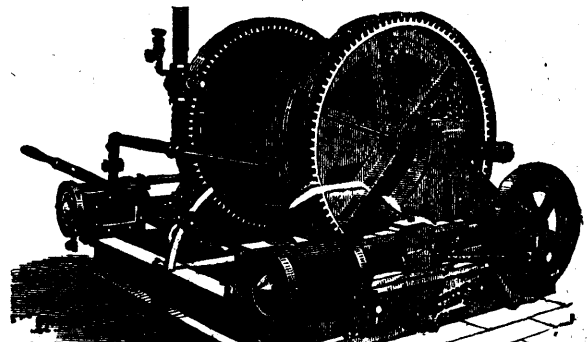
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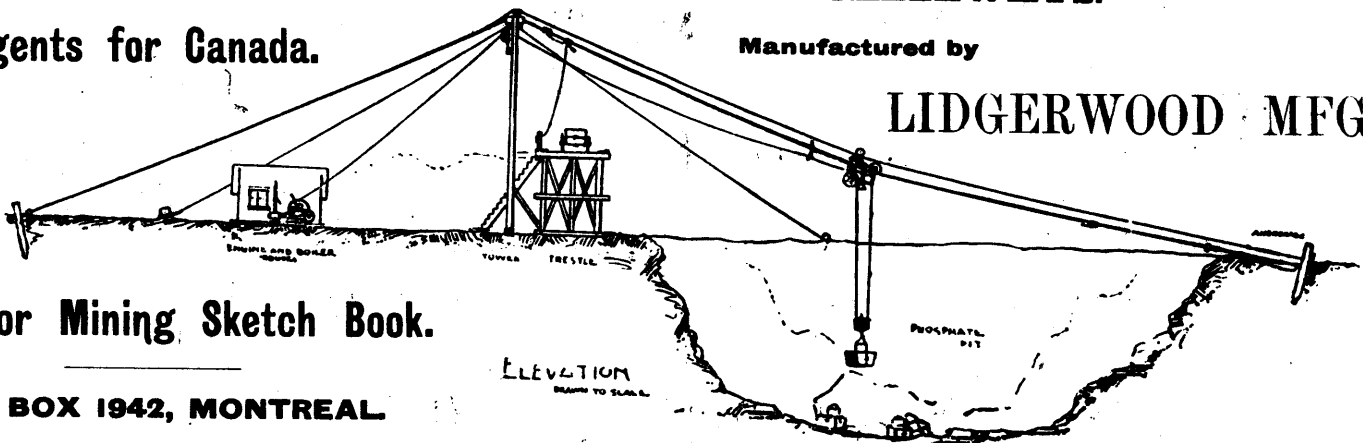
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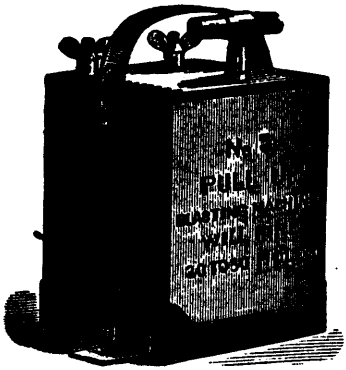
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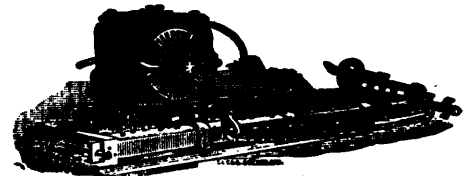
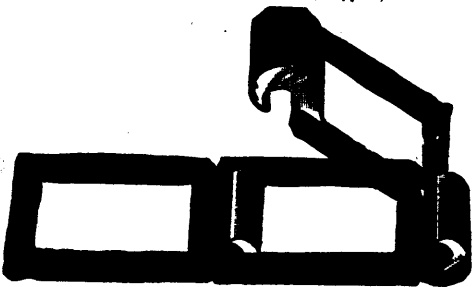
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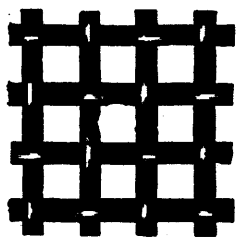
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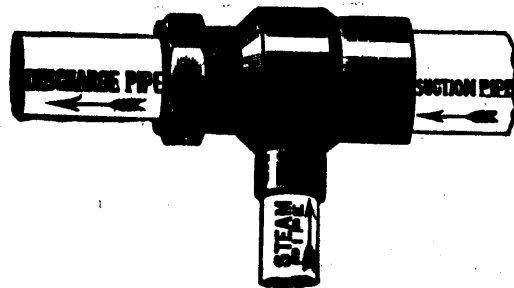
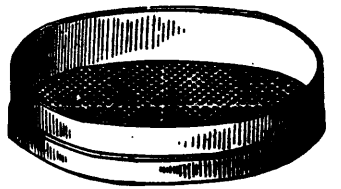
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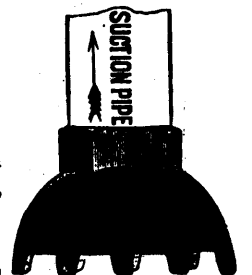
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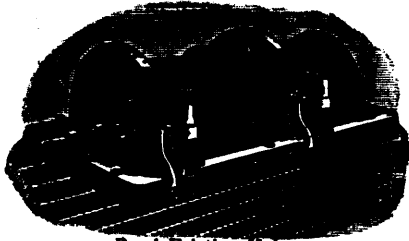


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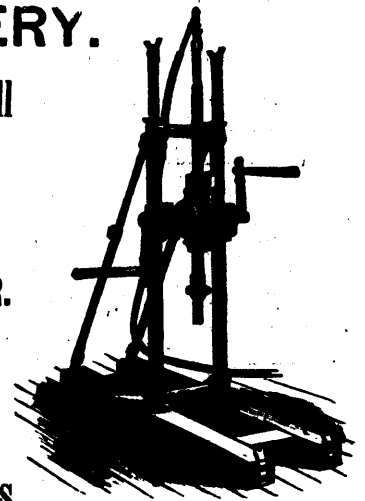
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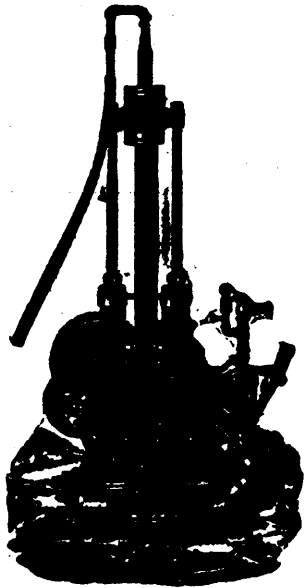
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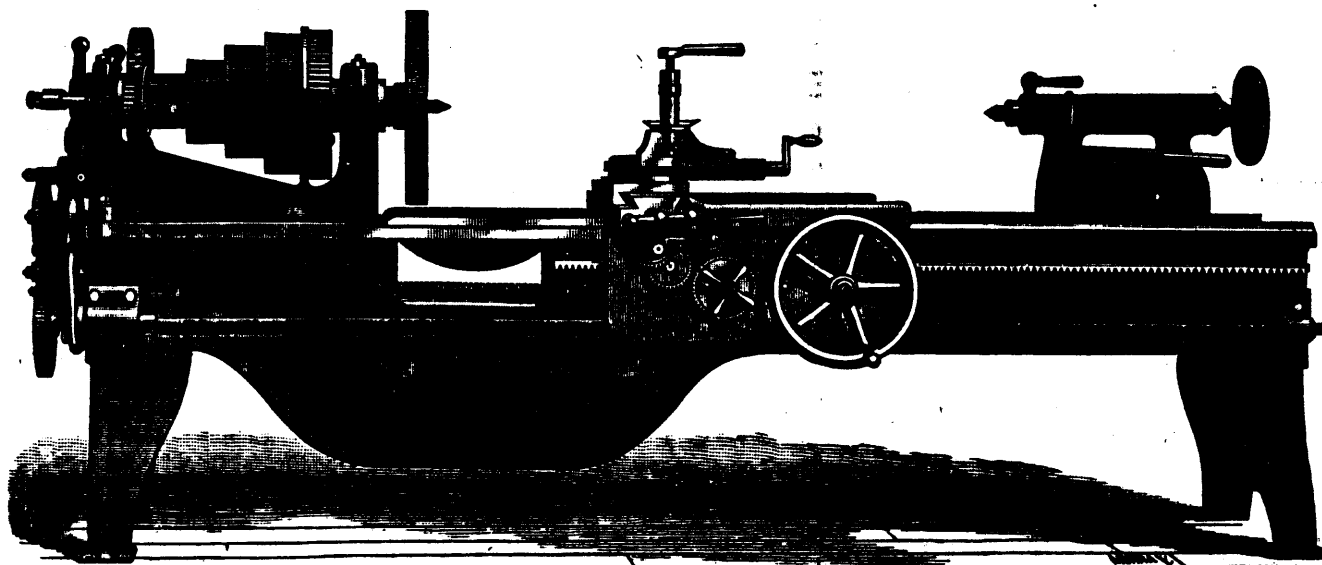
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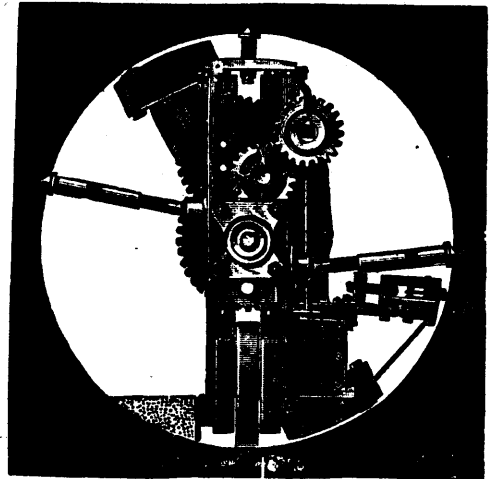
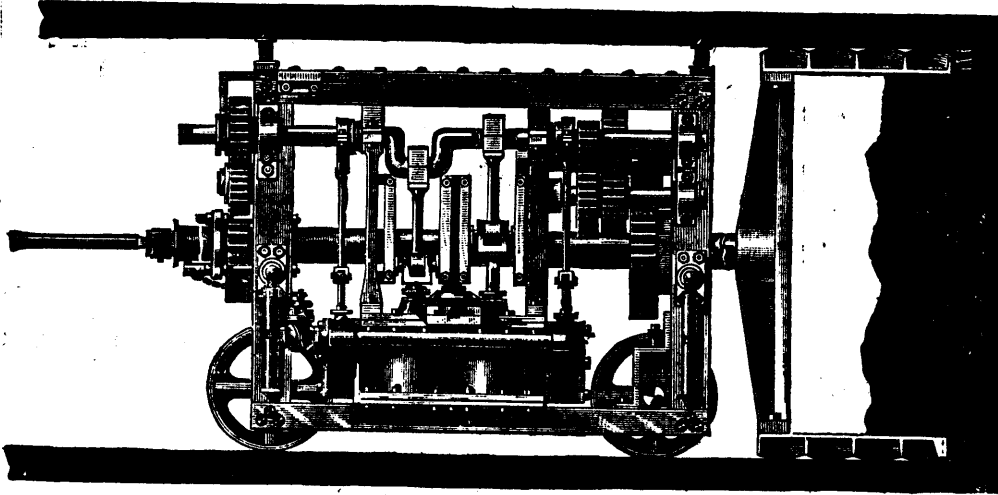
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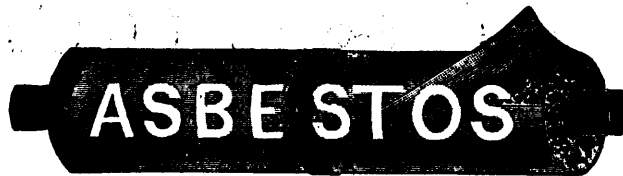
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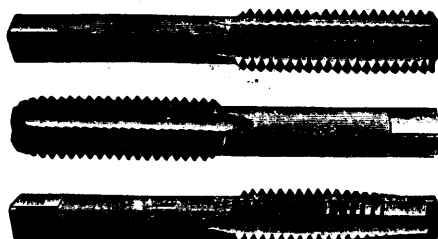
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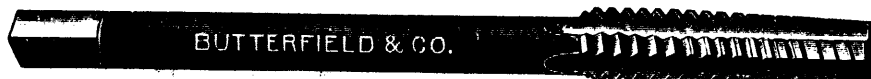
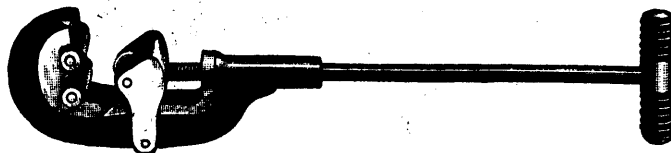
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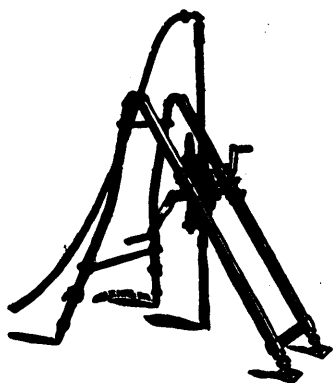
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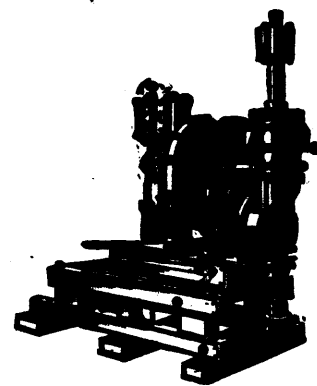
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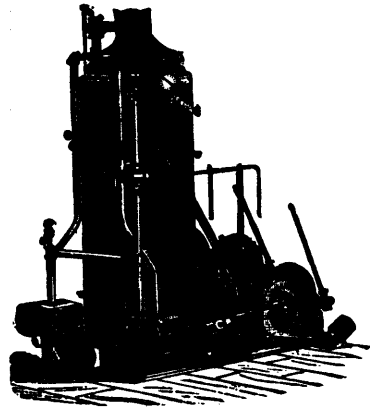
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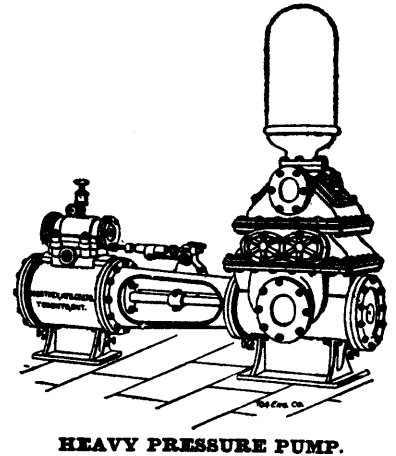
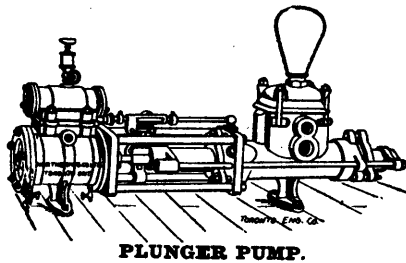
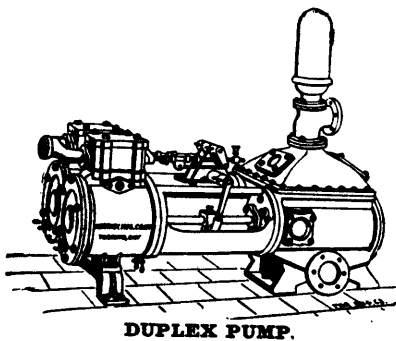
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THE UNITED MINING SOCIETY OF NOVA SCOTIA,

THE ASBESTOS CLUB, QUEBEC,

THE GENERAL MINING ASSOCIATION OF QUEBEC.

THE following Resolutions of Council indicate beyond a peradventure the status of THE REVIEW as the exponent of the Canadian Mineral Industries:—

### The Gold Miners' Association of Nova Scotia.

"At the annual meeting of the Gold Miners' Association of Nova Scotia, held at Halifax on 6th March, 1889, THE CANADIAN MINING REVIEW was adopted the official organ of this Association.

(Signed), B. C. WILSON, *President*,  
G. J. PARTINGTON, *Secretary*.

### The Mining Society of Nova Scotia.

"Moved by Mr. R. G. Leckie, seconded by Mr. C. A. Dimock, That the thanks of the Society be tendered to Mr. B. T. A. Bell for his kind offer placing the columns of THE REVIEW at the disposal of the Society; and that THE CANADIAN MINING REVIEW is hereby appointed the official organ of the Society."

(Signed), H. S. POOLE, *President*,  
H. M. WYLDE, *Secretary*.

### The Asbestos Club, (Quebec.)

"Resolved: That THE CANADIAN MINING REVIEW is, by authority of the Members and Council, hereby appointed the official organ of the Asbestos Club."

(Signed), D. A. BROWN, *President*,  
A. M. EVANS, *Secretary*.

### The General Mining Association of the Province of Quebec.

At a meeting of Council held at Montreal on Friday, 6th May, 1891, it was moved by Captain Adams, seconded by Mr. R. T. Hopper, and resolved: That THE CANADIAN MINING REVIEW be the official organ of the Association.

(Signed), GEORGE IRVINE, *President*,  
B. T. A. BELL, *Secretary*.

### OFFICES:

Victoria Chambers, 140 Wellington Street,  
OTTAWA.

Vol. XII. JANUARY, 1893. No. 1.

## Review of the Gold Mining Industry of Nova Scotia in 1892.

Pending the issue of the official figures the best estimate places the yield of gold for 1892 at 22,000 ounces, as against 23391 for 1891.

About four-fifths of this product is from the six districts of Oldham, Caribou (Moose River), Stormont, Malaga, Montagu and Uniacke—each having a yield in excess of 2,000 ounces.

The district giving the largest production was Oldham, with a total of 3,100 ozs, mainly (2944 ozs.) the product of one firm. This is the largest yield in the history of this district which has steadily increased its product each year from a total of only 824 ozs. in 1884, to 3100 in 1892.

Caribou and Moose River (which, although six miles apart are included in the one district) have a total yield approximating 3000 ounces, of which Caribou has about two-thirds and Moose River one-third.

The Dixon Mine, though not a heavy producer, is a very steady one, and is likely to continue its normal production throughout the year. The importance of the discoveries made in the latter part of the year on the property of the Truro Company is shown by the very large yields milled in November and December which have

swelled the total for this district over 1000 ozs. There is every reason to suppose that development of this property will largely increase Caribou's product for 1893. Stormont shows a gain of nearly 2000 ozs. over 1891, which is due entirely to the successful working of a large body of medium grade rock by the Antigonish Co.

In December the County Harbor Company cut the same lode in depth on their property, and as the latter company has now a 20 stamp-mill in running order the production of this district in '93 should be very much increased. The returns for 1892 are in the neighborhood of 2,700 ounces, of which the older portion of the district, Isaacs Harbor, contributes only 165 ounces. This small amount is due to the continued idleness of the Palgrave Company from long protracted litigation.

Malaga district shows a great decrease, amounting to over 2,000 ounces, having a total of about 2,600 ozs. as against 4,664 in 1891.

The total collapse of the Parker-Douglas Co. in January, 1891, and the low grade rock encountered in the last half of the year by the two other companies working there will account for the decrease. The yield for '93 is likely to show another decrease, as it is rumored that the Malaga Co. has closed down. It is a source of regret that this district should be the victim of mismanagement. The work of the last four years has proved the existence of some very rich veins, and of many others carrying pay ore, but it is doubtful if any other district in the province can show so many examples of bad management in recent times. Some day this district will pass into competent hands, when it will become a permanent and large factor in the annual production.

Montagu shows a total yield of about 2200 ozs., 1133 of which were won prior to the taking over of the properties in August by an English Company. This district may increase its product somewhat in 1893, and probably will do so, as a second mill has just been completed, and there should be at least three producing mines in the district for the year.

South Uniacke shows a large falling off compared with '91, due in part to the complete cessation of work by the Witherow-Putnam Co. and in part to the diminished output of the Thompson-Quirk Co.

The prospects for the next year are rather for a decrease than an increase, as the Thompson-Quirk Co. are getting into deeper and wetter workings and the pay chute is fast approaching the boundary line of the property. No new shaft in adjacent property can be sunk to pay rock and become a producing shaft to any extent within the year. The older portion of the district (Mount Uniacke) does not show any signs of vigorous life.

One of the large gains of the year is shown in the Waverley district, producing over 1000 ounces, and is due entirely to the work carried on there by the West Waverley Gold Co., Ltd., whose mill has only been in operation the last eight months of the year. It is to be regretted that the ore

of this company proves so low in grade as to leave little or no margin for profit. Should the Company continue in operation throughout '93 the yield will be somewhat increased. The vigorous working of the East Waverley Tunnel Company may also add to the total of the district. The extensive works of the Lake View Company have remained closed down during the past year.

Perhaps the most notable decrease has been that of the once famous Salmon River or Dufferin mine, whose yield for 1892 is less than 1000 ozs. The most notable part of the decrease is in the small tonnage crushed; with a new modern mill capable of handling over 12,000 tons per year, the amount actually milled is about 3,700 tons. Recent examinations have shown this lode to be as large as ever, so that the decreased tonnage must be due to some policy of the management.

Sherbrooke still lies idle, its product for the year being about 150 ozs. This district has been unfortunate in having its territory cut up into small areas held by people who have neither the capital, skill nor willingness to work them, and who have asked ten prices for their property whenever a possible purchaser appeared. From information received at the close of the year it would appear as if this unfortunate condition of affairs was in a way to be remedied, the consolidation of two of these small blocks having been effected by a gentleman controlling both skill and capital, and possessed of a willingness to exploit the properties.

Owners of small holdings should always bear in mind that capital requires a sufficiently large aggregation of property to induce it to come forward and spend the large sums which have to be spent before low grade propositions (which Sherbrooke is) can be put on a self-sustaining (to say nothing of a dividend-paying) basis.

From the western districts there was very little production in 1892. Gold River, Whitham, Brookfield, Carleton and Kemptville are practically idle and non-producers. Large sums of money, in the aggregate, have gone into these districts, but have failed to produce paying mines. Reasons for this are not easy to give: in some cases the companies formed were badly financed, and promising lodes remain in a condition of partial development; in other cases it was the common story of mismanagement; and in still other cases the properties selected were worthless. No substantial revival of these districts is looked for in 1893.

Rawdon (both Central and East) continues idle, and Renfrew has suffered a total collapse. The mammoth mill at Gay's River has remained mute. Killag has had a complete new plant which was in operation in December, and this district is expected to be a prominent producer in 1893.

The past year as a whole has been one of remarkable quietness. There has been no boom nor any attempt at such with the single exception of the temporary excitement of a local paper over the sale of some properties to English

parties. The large producers have worked away steadily and quietly, with a marked avoidance of any newspaper notoriety.

There is still a disposition amongst managing men to work out the surface streaks and to fail to provide, by means of proper development, for the inevitable rainy day. Moreover, although deep-mining has been talked about more or less for the past three or four years, there was only one mine in the Province in '92 that produced quartz from below 400 feet. The industry is yet far from occupying that position which it should (and will inevitably one day) occupy.

The yield for 1893, so far as can be foreseen, is not likely to run much ahead of 1892. There is always the chance of new discoveries being found and rapidly opened up, but this chance grows smaller each year, and the main reliance must be placed upon the older and better managed properties.

### Nova Scotia Mines in 1892.

The season of 1892 has proved a dull one in all branches of mining. Operations in the three principal coal producing districts were continued quietly. The usual amount of coal appears to have been shipped up the River St. Lawrence, but the local sales and railway supplies were unusually dull owing to the mildness of last winter. The demand in Prince Edward Island was light, and the destruction by fire of the city of St. Johns, Newfoundland, lessened the usual demand for coal from that island. At the closing of navigation the general opinion was that the sales of 1893 would show a gratifying progress.

There have been no developments of interest in the coal fields of Cape Breton this year. The Emery and Gardener mines have settled down to a good working basis and produce an excellent grade of coal. Nothing has been done at the Ontario Mine since its acquisition in the spring time by some United States capitalists. Some prospecting was done, but the results of importance were the testing of the two seams, each five feet thick, reported as underlying the entire Glace Bay district. If the seams maintain their thickness they will prove very valuable. The operations of a party of Boston capitalists who have secured options on all the working collieries in the Sydney coal field, with the exception of part of the holdings of the General Mining Association, have aroused much interest. The coal operators in this district have for thirty years pursued an undeviating policy of cutting one another's throats, until one wonders there is anything left of them. Each colliery has maintained its own machine shop, railway, agent, manager, etc., although common sense would have dictated consolidation in many points of common interest, if not in all.

Should the new syndicate succeed in acquiring these mines and working them under a common management, their economies will make unpleasant uphill work for the Victoria and Sydney Collieries in competing with them as pits are deeper in the case of the Sydney Mines,

and the coal steeper in the case of the Victoria mines. But it is to be presumed the average consumer will welcome competition, the more the merrier for him when he buys his coal.

It is understood that the large hulks employed by the General Mining Association, in the transport of coal by towage to Halifax have proved fairly remunerative, the barges of the Glace Bay Company do not appear to be of large enough capacity.

In Pictou County the Intercolonial Colliery took a new lease of life. A large contract was secured in Quebec and during a part of the season the mine was worked on double shift. An underlying seam said to be of good quality was also developed. Operations by the Acadia Colliery were not as brisk as usual. Late in the fall fire was discovered in the old workings of the Foord Pit in the main seam, and the shafts had to be closed, and the works were partially flooded. The opening of the blast furnace at Ferrona has assisted the mines in this district to get rid of their slack coal.

In the Cumberland County district an extensive underground haulage system calling for twenty-five miles of steel rope has been set up at Springhill, and has done away with a large number of horses. Other improvements have been made at the mines lessening the number of locomotives, concentrating the surface work, screening, etc. A company known as the Canada Coal and Railway Company, and backed by United States capital, purchased the Joggins Railway and Colliery and a number of coal areas between the Joggins and Maccan, and proposes to do a large business.

The total output, so far as returns are available, amounts to in round numbers 2,000,000 tons.

The Springhill Company has given contracts for three barges of one thousand tons capacity each and for a powerful steam tug to carry coal from Parrsboro to St. John, Portland, etc.

Manganese mining continued dull. A local syndicate purchased the well known Stephens Tenny Cape mine, and a few tons were mined from it and from the Moseley Mine, Cape Breton Co., amounting in all to about 100 tons of ore.

The production of plaster was about the same as in 1891. The Messrs. McCurdy, of Baddock, opened a new quarry at Port Bevis, and Col. Snow continued the development of his quarries at Mabou. As usual the bulk of the business was done in the Windsor district, and the quarries were worked steadily. There is a gradual increase in the local consumption of plaster for building purposes, and for fertilisers. The output was in the vicinity of 175,000 tons. The cessation of work on the Chignecto Ship Railway, and the suspension of all railway operations, diminished the output of the stone quarries of Cumberland and Colchester counties.

There has, however, been some progress made in iron mining and smelting. Work continued much as usual at Londonderry. This season, however, they have smelted large quantities of

ore supplied by the Torbrook Iron Company from a mine at Middleton in Annapolis County. The ore is a red hematite of good quality, and said to be abundant. The New Glasgow Iron Coal & Railway Company during the past season completed their railway from Hopewell to Bridgeville, and in the fall got their furnace situated at the forks of the East River into blast. The product of the furnace is of good quality and finds a ready market. The Pictou Charcoal Iron Company, taking advantage of the branch railway to Bridgeville, has located an excellent furnace, foundry, etc., at that point, and having acquired large tracts of timber land has commenced the manufacture of charcoal pig from the excellent limonites of that locality. The output of these furnaces commenced too late in the season to show much increase in the year's production of iron, but next year will, it is hoped, show a respectable figure. For the past year it is estimated at 35,000 tons.

### EN PASSANT.

3,000 lbs. of actinolite were shipped during the year from Belleville district.

Completed Consular returns of the exports of mica to the United States, from the Kingston district for 1892, show a value of \$10,249.30.

During the year 1892 the shipments of nickel ore and matte from the Sudbury mines to the United States, as reported by the American Consul at Prescott, amounted to 3,325,714 lbs. valued at \$203,748.23.

Every Canadian mine owner and operator who can afford the time should make a point of being in Montreal during the session of the International Mining Convention. The proceedings will open with a Reception given at Windsor Hall, at which a number of prominent statesmen will take part, and will last during the remainder of the week. The attendance promises to be large. Visiting mining men may be assured of an interesting meeting and an enjoyable time.

Mining machinery to the value of \$61,848 was imported into Canada free of duty during the fiscal year ended 30th June, 1892. Of this \$4,630 came from Great Britain and \$57,218 from the United States. By provinces the imports were :-

|                       |          |
|-----------------------|----------|
| Ontario.....          | \$25,824 |
| Quebec.....           | 12,096   |
| Nova Scotia.....      | 13,784   |
| New Brunswick.....    | 2,030    |
| Manitoba.....         | 6,364    |
| British Columbia..... | 1,750    |

On Wednesday 11th inst., a deputation from the General Mining Association of the Province of Quebec, had an interview with the Hon. J. S. Hall, Provincial Treasurer, and the repeal of the Powder License as applied to mines. The deputation was given a good hearing, and we understand that while remedial measures cannot be expected this year, the Government is favorably disposed to reduce the amount to a reasonable basis.

Mr. J. Lainson Wills, F.C.S., late manager to the General Phosphate Corporation, has gone to England to take a hand in the adjourned meeting of the Corporation. Mr. Geo. Stewart, one of the vendors, will leave for the same purpose in a day or two.

The marvelously rich deposits of wealth explored and developed in the Cariboo gold fields, British Columbia, are at present attracting the notice of mining men from the State of Washington, who are seeking safe and profitable investments for their capital. The quartz excitement for the past three years throughout the State of Washington and the Northwest, has kept investors in mining properties at a fever heat during that time; but a reaction is evidently taking place in favor of placer mining, for now there seems to be unusual activity around placer mining circles, and Cariboo, is spoken of as the favored centre of attraction, where the discoveries of gold in the valleys and small streams that traverses them, would appear almost like tales from fairyland were they not attested by thousands of miners and the cold unvarnished fact that \$60,000,000 worth of nuggets and dust has been produced from these sources. The bed of every gulch or creek in the district that has been worked has paid the enormous sum of \$50.00 to \$1,000.00 to the square foot of ground, and it is the general belief, based on well known facts, that there are immense deposits of gold in the deep channels that have never been explored. Like California and Australia, the deep diggings in Cariboo were beyond the limited means of the average miner. Thus, the richest placers have remained for the advent of capital to take hold and develop them.

By consulting the reports of the Department of Mines and the Geological Survey of Canada, it will be seen that there are immense possibilities for the investment of capital in this famous gold field. Gold abounds in every valley, and in every stream that empties into it. Should there be any doubt in the mind of the reader as to the richness of this Eldorado, a reference to the REVIEW of May, 1897, will set them at rest. In that issue it was pointed out that 202 pounds of gold was taken out by two men in one day. Thirteen hundred and forty feet of ground paid \$1,510,000, and one pan of dirt yielded 387 ounces = \$6,579. These figures are given for the purpose of showing the operations of the past, when little capital and machinery were employed, which necessarily confined explorations to the deposits that lay near the surface.

In view of these facts and a grant of three miles of ground from the Provincial Government of British Columbia, a company has been organized at Tacoma, Wash., with a capital of \$500,000, for the purpose of developing one of the principal streams in the gold basin of this district. The names and standing of the gentlemen who compose the Slough Creek Mining Company whose Prospectus is published in our advertising columns this month is a guarantee that they will perform the obligations of their lease, which requires an

outlay of \$5,000 annually for a term of fifteen years. The company commenced operations last June with a Chapman hydraulic jetting machine, and bored four shafts, locating the channel at a depth of 245 feet. The prospects encouraged the trustees in opening up a working shaft, which has been sunk 32 feet at this date. In connection therewith a drain tunnel is being constructed that will tap pay gravel at 40 feet below the surface. The drain when completed will be over 1,600 feet long. The capital stock of the company is divided into 500,000 shares at a par value of \$1.00 each. The stock is now being sold at 50 cents per share. The money derived from the sale of stock is to be applied exclusively in opening up the property.

We very much regret that through an oversight a letter from a Sudbury correspondent reflecting upon the *personal character* of Mr. R. H. Ahn, should have found its way into print in our October issue. It is neither the province nor the policy of the REVIEW to indulge in personalities of this kind. We therefore withdraw the imputation conveyed in A. M.'s letter and apologise for its publication.

The consumption of coal upon the ocean amounts to a far greater tonnage yearly than is generally recognized. A Cunarder spends about \$25,000 for coal per round voyage. But this is exceeded greatly by the ships making trips from Great Britain or United States to Australia. They will use nearly 8,000 tons of coal on the voyage out and in. These ships have, as a rule, some three coaling stations and can carry 2,700 tons in their bunkers. Hence it is apparent that the item for fuel in connection with steamers is about the most important. This is dependent upon the fact that speed is the great desideratum, and much as this has been the case in the past, it will be still more so in the future. In the competition of the day the quickest line of steamers will be the most economical and the ones that will be the most patronized. For hundreds of years the world was satisfied with the use upon the seas of the same force that speeded on the caravels of Columbus, but times have changed, and wind and wave are now subservient to coal. It may be fairly computed that at the end of the century, say in 1900, the coal tonnage of ocean consumption will amount to close in the neighborhood of 50,000,000 or 60,000,000 tons.

The second largest diamond in the world is now undergoing the cutting process at Antwerp. Its weight is at present 474 carats, but it will lose no less than 274 carats before it is ready for the market. Even then, however, it will be the second largest diamond in the world, standing between the 280 carats of the Persian diamond "Gre. Mogul," whose existence is considered very mythical to-day, and is said to weigh 193 carats, and the "Victoria," or "Imperial," diamond, the property of the Nizam of Hyderabad, and the Russian "Orloff" brilliant. The "De Beers Yellow" weighs 225 carats, recently sold to an Indian rajah. Roughly speaking, the

Antwerp stone will be about the size of a pigeon's egg. In its present state it measures 2 7/16 in. by 1 7/16 in. Its polished surface will measure 7/86 in. each way.

A trial is about to be made in Glasgow with vitrified bricks in the place of the stone and wood hitherto used for street paving purposes. Brick paving is common in some continental towns, but the difficulty of procuring the right kind of material for the manufacture of bricks in Scotland of a sufficient hardness and toughness has prevented that form of paving being tried for street purposes. Proper material has, it is said, now been found on the estate of Lee, near Braidwood, and the bricks are to be manufactured by the Omnia Fire Clay Company, which is erecting new works for the purpose. Whilst the material is called a clay, it is in reality a kind of hematite ore, and requires to be quarried. It is stated that the brick blocks are durable, clean, healthful, easy to repair, and comparatively noiseless, and that they are considerably cheaper than either granite or wood paving.

In a lecture delivered in England the other day Mr. Thomas Turner dwelt upon the waste products of iron manufactures. Economy in the matter of smelting might be said to have originated with Neilson in 1829, and since then there had been further developments and improvements by Bessemer, Siemens, Whitwell, Cowper and others, the great aim being to get the highest possible results with the minimum expenditure of fuel. He explained the various methods of utilising waste gases, stating that at Robert Heath's furnaces in North Staffordshire, and also at some of the works in Scotland, tar was extracted from the gas when it was hot, and ammonia when it was being scrubbed, and what remained served to fire the boiler. The furnace man, therefore, instead of being the enemy of the agriculturist, as formerly, interfered but slightly with the purity of the air, and supplied valuable manures, disinfectants, &c. Basic slags were also now being used for road metal in this district, and in the north bricks, cement, &c., were made of it. Large quantities were also being used in the work of reclaiming land from the sea. Besides this, a process had been discovered for the production of slag wool, a valuable article for packing purposes, although its manufacture was not very remunerative as yet. Tap cinder was now found to produce a cast iron not of special purity, but suitable for many purposes, and the hot air from the puddling furnaces was frequently used to fire a boiler instead of being wasted as formerly. In the Bessemer process phosphate of lime was extracted, and found to be a valuable recuperative manure when applied to the ground, and a valuable substitute for bone manure in the products of wheat and other bone-producing foods.

News comes from the "freest country on God's earth" of an unwarrantable infringement of the liberty of the subject. Hitherto the ingenuity of claim-holders in fixing up distine



tive and striking titles for their mines has been allowed the fullest scope and has been exercised without limit, but now a sort of censorship in regard to the titles of mines has been set up by the United States Land Office. The swearing, cursing and blaspheming miners are to have their wings clipped, and are to be deprived of the privilege of flaunting their disregard of sacred things in the faces of the public by means of the names they apply to their holdings. The Land Office has for instance refused to grant a patent to mining claims bearing the names of "Holy Moses" and "Jumping Jesus," and some of the mining journals have followed up their expressions of mock admiration of this sudden outburst of pious feeling by jumping very heavily on the chests of the Land Department, which is said to have winked at more frauds and been *particeps criminis* in more steals than any other department of the Government. It is wrong, very wrong, to interfere thus with the playful humor of the unsophisticated miner, and we sympathize heartily with our American friends whose wealth of resource in mine nomenclature has been ruthlessly curtailed by narrow minded State officials.—*Australian Mining Standard.*

In the annual report on the condition of British Guiana for 1891, forwarded by the Governor to the Colonial Office, there are some details with reference to the gold industry of the colony, which is a development of the last six or seven years. The report states that up to the present placer mining has been the only work, and this month by month draws increased expeditions to the goldfields. Ten years ago the output of gold amounted to £187, the following year the returns was *nil*. In 1885, washings produced £3,249; in 1886—and this may be accepted as the first year when the gold industry in reality commenced—the return was £23,342; in 1887, £44,427; in 1888, £55,566; in 1889, £109,234; in 1890, £234,324; and in the year under report, £375,289. Such strides as these cannot fail to have their attendant consequences. As everywhere else, embarkation in this industry is not without its speculative attractions, and in this respect an incident is narrated in the report. A year or two ago a prospector returned to town from the goldfields, having, as he stated, found a paying place. Not being in possession of sufficient ready money to work his find, he borrowed, or rather, had advanced to him by two gentlemen

in town, the sum of £50, on the understanding that they were each to receive a third share in the undertaking. Thus set up, the prospector returned to his placer, working, to commence with, only a "torn"; before long gold by the hundredweight was the yield, and to-day the fortunate trio each enjoy an income of not less than £10,000 a year. This is not the only rich find, some of the other placers giving a return of 1,000 oz. a month. Quartz mining in all probability will, the report says, before long be started on an extensive scale in the colony. Specimens of quartz of a friable nature picked up on placer claims in the northwestern district have been tested by the Commissioner of Mines, and found to give a result of 56 oz. to the ton, whilst from another district of the colony a sample of between 500 lb. and 600 lb. weight gave a return of 152 oz. of gold to the ton. It is a common thing in working the placers to find auriferous quartz containing visible gold, but as yet the local gold-seeker is content to work his placer, leaving quartz mining to the future. There are about 700 laborers employed in the goldfields of the colony, with an average wage of 2s. 8d. a man per working day.

The following little story is related in the *Engineering Magazine*. Comment would be superfluous:—"A real-estate lawyer and a mechanical engineer both do business in New York city, and they are neighbors and acquaintances in the country. The lawyer not long ago had made a blue-print frame to copy maps and other tracings that come into his temporary possession. He had difficulty in getting clear lines, and on the train one morning he stated his trouble to the engineer, who explained the necessity of a close contact of the tracing to the sensitised paper over the whole surface. Presuming on this assistance, the engineer a month afterward asked the lawyer a legal question relating to a leasehold. The legal man could not answer on board the train and invited the engineer to his office, where the desired information was given in 10 minutes. On the first of the next month the lawyer sent in his bill for the advice. Then the engineer sent in a bill for a similar sum for his advice. The lawyer says it is "ridiculous—friendly talk on the train—don't remember much about it, but never heard of a bill for a little simple thing of that kind." Now why is it ridiculous for a mechanic to charge reasonably for professional advice?"

### The Advantages of a Technical Education.\*

BY CHARLES RODENBERG,  
Division Superintendent Consolidated Coal Co. of St. Louis.

Horace Greeley, while at the height of his fame and influence as a journalist, is said to have made use of the expression: "Of all horned cattle, deliver me from a college graduate."

This is preeminently a practical age. The sentiment so picturesquely expressed by the great editor is, to some extent, still dominant. The theorist, the scientist, the scholar, have often been compelled to make room for the practical man. Especially has this been true in the occupation of mining where we so frequently find men, who, in early life, were denied the privileges of an education, occupying positions of trust and responsibility and satisfactorily meeting the requirements of their positions. These men are certainly entitled to credit for their advancement, based as it is in the greater number of cases on demonstrated merit and ability. While no one could possibly entertain greater respect and admiration than I for the men, who, through their own exertions, often alone and unaided, have reached places of honor and distinction; yet, in these enlightened times, when the means of an education are so easily accessible, I believe that ignorance may justly be regarded as a crime, and that knowledge gained merely from experience is no longer sufficient.

I am supported in this position by the change in sentiment that is gradually taking place. The necessity for a technical education, of better mental training, is being felt more and more. The handwriting on the wall has made its appearance. A revolution has taken place in the industrial world. Conditions are constantly changing. Methods that were in vogue twenty-five years ago no longer exist. Inventions and discoveries have worked miracles. The possibilities of steam and electricity have not yet been fathomed. We must adapt ourselves to our changed surroundings and keep abreast of the times if we expect to hold our own in the struggle for existence. Competition in every branch of industry is stronger, sharper, and more active than ever before. Especially is this the case in the industry in which we are interested. Only, that man who has the ability, tact, and education required to recognize, appropriate, and employ the best and most advanced methods of mining, will prove successful. The legislature appreciated this fact, hence the law requiring a higher standard of efficiency on the part of our mine-managers. The gentlemen who were instrumental in organizing this Mining Institute, which gives us an opportunity for the calm and intelligent interchange of opinions, also recognized this necessity.

The cost of books has in recent years been greatly reduced. The works of the ablest authors of the present and past, men who have made the consideration of the problems which confront us in mines, their life work, can now be purchased for almost nothing. A very respectable library can be had for fifty dollars. Weekly and monthly periodicals, ably edited by men of splendid scientific attainments, reflecting the best thought of the day and devoted exclusively to a discussion of mining questions, can be had at very reasonable figures. Connection with an Institute organized for such purposes as this one is, will not fail to widen a member's mental horizon. With such means at our command is there any plausible excuse why we, who are engaged in mining should not have a better technical education? Is there any excuse for the ignorance of the mine boss of thirty years experience who, when asked at one of the late examinations what he knew about carburated hydrogen, said he had never heard of such a machine! In fact, gentlemen, some of us are about as familiar with technical terms as was the young man who enrolled himself as a student at a college which had a theological department connected with it. When approached by the examiner and asked what course of study he intended to pursue, the young man feebly shook his head and said he did not know. The examiner, wishing to assist him to arrive at a conclusion, asked him if he wanted to take the classical course. The would-be student again shook his head and answered: "No." "Do you wish to take the scientific course?" Another shake of his head and the same reply as before. "Do you want to take the theological course?"

\* (Transactions Illinois Mining Institute.)

## ASBESTOS EXPORTS FROM CANADIAN MINES.

COMPILED FROM OFFICIAL RETURNS FOR THE FISCAL YEAR ENDED 30TH JUNE, 1892.

| GRADE.      | GREAT BRITAIN. |           | FRANCE. |          | UNITED STATES. |           | GERMANY. |        | GRAND TOTAL. |           |
|-------------|----------------|-----------|---------|----------|----------------|-----------|----------|--------|--------------|-----------|
|             | Tons.          | Value.    | Tons.   | Value.   | Tons.          | Value.    | Tons.    | Value. | Tons.        | Value.    |
| No. I....   | 581            | \$ 67,450 | 40      | \$ 8,039 | 1,777          | \$116,005 | Nil      | Nil    | —            | —         |
| No. II....  | 316            | 36,431    | 156     | 14,225   | 3,771          | 241,942   | Nil      | Nil    | 2,398        | \$191,494 |
| No. III.... | 59             | 3,108     | 6       | 283      | 398            | 18,009    | 212      | 8,920  | 4,243        | 292,598   |
|             | 856            | \$106,989 | 202     | \$22,547 | 5,946          | \$375,956 | 212      | 8,920  | 675          | 30,320    |
|             |                |           |         |          |                |           |          |        | 7,316        | \$514,412 |

NOTE.—Of the above, Ontario exported 77 tons of No. I, valued at \$3,115, the remainder being exported from Quebec mines.

Another shake. "Perhaps you want to enter the business course?" "No." Well, said the examiner a trifle vexed, "What course do you want to take up?" "I want to be a preacher!" was the answer.

Our experience teaches us that the inhalation of black-damp proves injurious to life, but we know practically nothing of the gases that enter into its composition. We know that fire-damp is explosive, but we don't consider it worth the trouble to ascertain under what circumstances, nor when it attains its greater explosive force. We, who so frequently come in contact with gases, breathe atmospheric air in blissful ignorance of the fact that it is composed principally of oxygen and nitrogen. Our knowledge of this most interesting branch of the science is confined to our ability to detect the gas when present and to remove it. Even this we are unable to do, unless we have witnessed the same thing done repeatedly. Practice enables us to drive entries and lay off rooms at certain angles and at given distances with almost mathematical exactness and without so much as a speaking acquaintance with sines and cosines. If asked "why" and "wherefore" we are completely at sea, and are obliged to give a woman's reason: "Because." To what is our ignorance attributable, and how can we become more proficient? Our lack of technical education is directly responsible for the condition in which we find ourselves, and this can only be overcome by adopting as our motto the dying words of the immortal Goethe: "More light."

I have already intimated that it is not necessary to take a collegiate course in order to secure a technical education. The world is full of self-educated men, prominent in all the affairs of life, who are abundantly able to cope with the brightest graduates at Yale and Harvard. We should take advantage of the opportunities with which we are surrounded; employ spare moments in study and mental improvement. Abraham Lincoln never attended college. Andrew Johnson was taught to read and write by his wife. The elder Atkinson rose from the humbler walks of life. Some of the distinguished gentlemen whom I have the honor of addressing and who are recognized throughout the state as among our ablest mining men, were never matriculated at college. Industry, energy, and perseverance remove all obstacles and overcome all difficulties. This Institute is a step in the right direction. It is the dawn of a brighter future. It will awaken a general interest in study and create a desire for greater proficiency. We should therefore contribute all in our power to make it a success. This can only be done by attending the meetings and conscientiously performing the duties assigned to us by the committee on programme.

Schools of instruction, membership in which costs but little, have been organized by the publishers of some of our more enterprising journals, and the experiment has proved highly satisfactory. The magnificent showing made in the examinations by the miners and mine managers who became pupils of The Colliery Engineer School of Mines is deserving of especial mention. It is a splendid demonstration of what close application and systematic study will accomplish. But the ulterior object of the technical education, of whose importance and necessity I am speaking, is not mere success at examinations. The possession of a certificate is not an evidence of superior ability. I regard the certificate only as a license to begin the study of the science of mining. The man who does not continue his studies, but whose ambition is entirely satisfied as soon as he has received his certificate, is deserving of profound pity. Indeed, it is a question whether the law should not require mine managers to be examined periodically, as the mine inspectors are. If the law should require this, would it not have the effect of making us cultivate a more intimate acquaintance with our books and periodicals?

A technical education carries innumerable advantages with it. The educated mine man is brought in contact with the master minds of civilization. The scholarly words of Wardle, Wilson, Atkinson, Fairley, and the host of other great authorities are open to him. He reads and comprehends. They are a source of profitable instruction to him. He can appropriate their ideas and employ the knowledge they have gained in years of study and experience for his own purposes. His education enables him to discriminate between good and bad methods, and to make a proper application of the former. He is prepared for every emergency and adapts himself quickly to changes in the system of mining. The educated mine manager doesn't require years of practical experience to understand the difference between hand and machine mining. He is thoroughly familiar with the new system long before the change is made. He is not helpless when placed in charge of a Longwall mine, although his previous experience has been confined to the pillar-and-room system. Scientific knowledge enables a man to apply his practical knowledge with less difficulty and more advantageously.

The educated mine manager is not in the habit of indulging in costly experiments that have been tried years before and an account of whose failure is to be found in any standard work on mining. It was lack of technical education that worked a hardship on a gentleman, whom, for convenience sake, we will call John Smith. John had been suffering for some time with a sore throat. He called on a doctor who gave him a hasty examination, wrote out a prescription, told him to use the medicine as a gargle and charged him one dollar for it. John had the prescription filled at a drug store and very cheerfully paid the two dollars demanded by the druggist. The gargle effected a cure. About a month afterwards John was again bothered with a sore throat. Remembering how much he was benefited on the former occasion, he hunted up the old prescription and started for the drug store with

it. He noticed that the prescription called for aqua pura and chloride sodium. When the prescription was filled and John asked how much it cost, imagine his surprise when the druggist replied: "Oh, we don't charge anything for filling a bottle with water and salt the second time!" John concluded then and there that education pays.

Education broadens our views, removes prejudice, and causes us to entertain the views of others. It makes us more tolerant of the opinions of others. We no longer consider our methods the only ones worthy of adoption. It keeps us out of the ruts and makes us desirous of being benefited by the experience and teachings of others. It affords great protection to life and limb, reduces the number of accidents of all kinds, and renders property more secure. It produces greater skill and skill leads to economy. It stimulates to greater mental activity and brings about constant improvement. It leads to investigation and discovery. It revolutionizes men and methods. It accomplishes unlooked for results. It makes mining easier, safer, and more profitable. In the words of the poet Spencer:

"Through knowledge we behold the world's creation,  
How in this cradle first he fostered was;  
And judge of nature's cunning operation,  
How things she formed of a formless mass.  
By knowledge we do learn ourselves to know  
And what to man and what to God we owe."

### New Gold Extracting Process at Mount Morgan.

[Australian Mining Standard.]

The cheap extraction of gold from the Mount Morgan ore has been an absorbing problem with all those engaged in that branch of science. The old battery system (writes the Rockhampton *Bulletin*) failed to get within 30 or 40 per cent of the gold. The chlorination process overcame this difficulty, but at great cost; and the aim has ever been to secure the same results at a much lower charge. The attempts made have been very numerous, the directors affording full opportunities of trial to all who had a feasible system to offer. The latest has been the Bohm patent, which is the property of the Refractory Ores Reduction Company, Limited, London.

The plant shows first an iron cylinder lined to suit chemical solutions which it is intended to pass through it. In some cases, especially where the ore to be treated is very difficult of filtration, a filter of peculiar construction is arranged at either end. The dimensions of the cylinder between filters are—diameter 5ft, length 12ft. The cylinder is supported on standards, so that it can be turned on trunnions attached to its centre by means of a worm wheel and gear. Covers attached to either ends by means of bolts contain the closely grooved, perforated filter board, over which a fine woven cloth is stretched and secured to its outer edge. To introduce the powdered ore the topmost cover is raised by a running screw gear, and run on one side. The ore is then allowed to drop out, and at the same time the solvent solution is forced upwards by means of a small pump. By the time that the vessel is fully charged with ore the solution will be almost on a level with the top. The cover is then bolted down, and a continuous flow of the solution maintained by the pump (the overflowing solution being taken up by the suction and returned to the vessel) until all the gold and silver are in solution. Should the top filter tend to clog during the operation by the accretion of fine slimes washed out of the ore, an ingenious device of a hollow trunnion, and simply but cunningly contrived pipes, permits of the reversing of the vessel, without stopping the flow of solution, so that the upper filter becomes the lowermost, and is perfectly cleansed by the flow of solution in the opposite direction. In order to concentrate the volume of solution to be dealt with subsequently, provision is made for driving the rich solution out of the vat to the precipitators by means of air pressure, and the necessary additional wash water is passed through by similar means. The moment the ore is clean, which is discovered by means of a simple test, the top cover is raised, and a half turn given to the vat, when out tumbles the 10 or 15 tons it contained like a shot out of a shovel, and the vessel is righted to receive its next load.

A plant erected some time since by the Great Sheba Gold Mining Company in Africa, is dealing with very refractory ore at the rate of three charges per vat per day; giving a gross output for each vessel of 45 tons in the 24 hours, of an ore which could not be treated by the old percolation process under seven days, and even then 10 per cent less bullion was extracted. From this fact alone it is claimed the advantage of the invention may be gauged. Imagine, says Mr. Bohm, the hundreds of square feet of tank space required to accommodate 315 tons of ore, and compare it with the 20 square feet necessary for this rapid plant. The saving in buildings alone would constitute an enormous item; in fact their cost would be almost prohibitive for treatment on a large scale by the percolation process. Modified forms of this filter vessel, worked on the same principle of hydraulic leaching, are in operation, and are made to suit the mines and localities for which they are intended. Amongst others are a stationary vat, from which the tailings are washed by means of a high pressure water connection, and another having a hinged drop down bottom also with the object of rapidly disposing of the refuse matter. These vessels are being employed for the rapid treatment of ores by means of cyanide of potassium at Sheba, and Waihi in New Zealand. It may here be

mentioned as a significant fact that the returns from this mine prior to the introduction of the plant, were only a little over £2,000 a month. On its erection they went up to £5,000, and have been fairly steady at that since. The principle is, however, adapted to any leaching process, and has been applied to an improved method of chlorination adopted by Mr. Bohm two or three years ago, with extraordinary results. He tells us that samples of the Mount Morgan ore, supplied to his testing works in London, were chlorinated and turned out in the short space of five hours, at a cost of only 3s. 9d. per ton of ore with an extraction of 98 per cent of gold.

The secret of the cheapness of the process lies in the fact that only sufficient chlorine to do the work is employed, and all the waste attaching to the use of a barrel process and its nauseating smells is avoided. While conducting operations in the well known Hungarian Government Works at Fernezeley, near Nagybanya, Mr. Bohm found that a solution of chlorine in water acted more rapidly and economically upon gold than the gas did, and after studying the various leaching processes at Capnikbanya and Chemnitz, he went over to London, and perfected and patented his process all over the world. It is his opinion, an opinion shared in by many scientific men in England, that the pressure necessarily generated in rapid leaching causes the solutions, chlorine or other, to act more readily on the ore, by keeping the surface of the metal free from saturated solution, and causing the solution to insinuate itself into any interstices that may exist in auriferous particles which may have been insufficiently fractured in crushing. Of course the gravitation of the ore acting against the upward flow of the solution causes a perfect separation of the mass, so that the best possible conditions for rapid work prevail. Included in the chlorination patent is a new precipitant for recovering gold from chlorine liquor (now being tested on the Mount Morgan solution) in a metallic state, which is working very successfully with a rapid chlorination plant in the east of Europe. This invention enables the gold to be taken from the precipitator in the form of a cement, the medium employed being attacked and dissolved by the solution as it rapidly passes through, to be recovered for re-use at a later stage. The saving of fuel, of loss by handling, and the immense gain by its cleanliness and efficiency for small bulk should recommend this precipitant to all users of chlorination processes.

On the Mount Morgan directors visiting the mine the other day, the new filter (12in square, and containing only 5in of precipitant) was passing as much solution as six large charcoal filters. Mr. Bohm, who returns shortly to New Zealand, where he is forming a company to take up some rich refractory mines for his process, has been at Mount Morgan for some time, arranging for the disposal of his plant, lately purchased by the Mount Morgan Company, which as stated has entered into an arrangement for the use of the process.

Mr. Bohm has lately purchased for his company the rights to a patented invention of the Chemist to the Russian Government which enables chlorine to be produced from a salt solution direct at one-fourth of the cost of any known method. The company have just received by cable an offer of £100,000 for the use of their process in one district of South Africa, which they have accepted under certain conditions.

### Electricity and Compressed Air in Mining.

Mr. David J. Lloyd, manager of the Edinburgh (Ill.) Coal Company, read a very interesting paper on this topic before the last meeting of the Illinois Mining Institute. He has used both forces in driving mining machines and he is most decidedly in favor of the latter, from its efficiency, cheapness and its greater utility. The following are the concluding paragraphs of his paper on the subject:

"I want to say that our compressed air plant is giving the best of satisfaction, and I doubt whether electricity can be maintained with as little expense. Since installing our air plant we have used 9 rubber buffers at a cost of 75 cents each, 4 leather buffers at 62½ cents each, and have broken two extensions which cost \$10 each. Our pipe line was laid upon the ground, excepting right at the receiver at the bottom of the pit, and we have never experienced any trouble from the breaking of the joints excepting at the receiver once, and at another time when the line passed over the track of a cross-entry overhead. I venture to say that the cost of laying the pipe will not in our case exceed the cost of hanging a wire. I will also say that taking pipe and wire of equal capacity for transmitting power the pipe will prove the cheaper. For it should be borne in mind that the transmission of electricity to coal cutters requires two wires, and not merely one, as in electric haulage; one to, and one from, the point where the power is applied. If the entries are in good condition and uniformly timbered, it is but a simple matter to fasten the brackets and suspend the wires; but with entries like ours and many others, where the top is irregular and the timber sometimes entirely omitted, it will be necessary to put up timber, or drill holes in the ribs expressly to carry the wires. Then when falls off the roof occur, if they do not break the wires, they will usually bring them to the floor, and frequently cut the insulation, and thus allow the current to be dissipated in the ground. With the compressed air pipes laid firmly on the ground, it is almost impossible to break or displace them, even by an extensive fall.

"Compressed air is not only perfectly harmless, but it is highly beneficial from a sanitary standpoint. You can operate compressed air machines in headings or cross-

cuts owing to the constant supply of fresh air derived from the exhaust, where it would be almost impossible to work by hand or with electric machines.

"In the presence of fire-lamp electricity may become very dangerous, and it is the judgment of some authorities that there are mines in this state in which it would be impossible to operate electric haulage because of the flaring sparks on the wires and rails, and the certainty of igniting the gas which might be minute near them."

"My main point, however, is that what the operator wants is power from a source which will give the highest degree of efficiency. So far as my observation and experience goes, this is not, as yet, electricity. That it may become so, I am quite prepared to admit; but at present, and for practical purposes, compressed air is the agency which in my judgment offers the best results, both in the matter of safety and economy."

### Some New Nickel Minerals.

By STEPHEN H. LAMSON, Youngwood, Pa.

I have of late had occasion to examine numerous samples of ores from the recently developed mining region known as the Sudbury District, in the Province of Ontario, Canada; and in the course of such examination I have met with the nickel-bearing minerals that appear to be distinct from any species hitherto described.

#### FOLGERITE.

This is found in the Worthington Mine, on the Algoma branch of the Canadian Pacific railroad, about thirty miles southwest of Sudbury. The mineral deposit there opened up is of a character similar to that usually observed in the mines of the district; that is to say, it consists of a mixture of pyrrhotite and chalcopyrite, forming ore masses of approximately lenticular form and of varying magnitude, imbedded in a greenstone dyke traversing the Huronian rocks that constitute the chief geological features of the region.

The pyrrhotite is in itself nickeliferous to a greater or less degree in every mine of the district; but at the Worthington mine it is found to be associated with a distinct sulphide (Folgerite), carrying a very high percentage of nickel. This sulphide is spoken of by the local miners and newspapers as being millerite, but it differs widely from that species. Its chief characteristics are as follows:—

Lustre.—Metallic.  
Colour.—Light bronze-yellow in mass, but almost tin-white when broken up into fine grains.  
Specific gravity.—Nodeterminer of the pure mineral has been made, but a fragment associated with adhering pyrrhotite showed a specific gravity of 4.73.  
Hardness.—3-5.  
Streak.—Grayish-black.  
Form.—Massive, with a platy structure. No crystals have as yet been observed.

Fracture.—Irregular. When comminuted the larger fragments preserve a platy form, while the smaller particles are finely granular and very brittle.  
Heat reaction.—When the powdered mineral is heated in a closed tube no sublimate is produced.

Solubility.—The mineral dissolves in nitric acid, with separation of sulphur and a green solution.

Magnetism.—In large fragments the mineral is non-magnetic. In minute grains it is magnetic. The finely-triturated powder is non-magnetic.

Microscopic appearance.—Under both lens and microscope the powdered mineral appears in the form of shining white grains of irregular form; very distinct from the shining spicules of a light brass-yellow colour which constitute the powder of true millerite.

Chemical analysis.—The specimens analysed were magnetically separated from the accompanying pyrrhotite and I gave the following results:—

|              | A      | B      | C      |
|--------------|--------|--------|--------|
| Nickel.....  | 35.20  | 31.45  | 29.78  |
| Iron.....    | 33.70  | 31.01  | 26.89  |
| Sulphur..... | 31.10  | 37.54  | 43.33  |
|              | 100.00 | 100.00 | 100.00 |

Specimen A consisted of platy fragments, each one of which was tested separately with the magnet; specimens B and C were separated in the form of a coarse powder from the accompanying pyrrhotite and probably still contained some adhering particles of that mineral. In the cases of B and C the analysis was conducted by first roasting the mineral and then fusing with potassium bisulphate, followed by solution, peroxidation, precipitation of the iron and electrolytic separation of the nickel—all with the usual precautions. In the case of A the raw mineral was dissolved in aqua regia. The sulphur was estimated by difference, and a check determination (by fusion of the raw mineral with sodium carbonate and nitrate and final precipitation as barium sulphate), for sulphur only, in a fourth sample, gave 3.4 per cent. It may also be mentioned that specimen A came from the Worthington mine, and that B and C were sent to me with the statement that they came from a deposit at the north-east extremity of the Worthington greenstone dyke. This deposit is distant about one mile and a half from the Worthington mine, and has recently been explored by the Emmens Metal Company. But when Mr. C. T. Mixer, the chemist of that company, paid a visit of inspection to the workings, the person in charge who had sent me the specimens in question could not point out the place whence he had taken them, and could not show any further occurrence

of the mineral *in situ*. It is probable, therefore, that A, B and C all came from the Worthington mine.

The formula corresponding with the above-mentioned analysis is Ni Fe S<sub>2</sub>, which corresponds to

|              |        |
|--------------|--------|
| Nickel.....  | 32.87  |
| Iron.....    | 31.30  |
| Sulphur..... | 35.83  |
|              | 100.00 |

This composition is between Ni S (millerite), and Ni Fe<sub>2</sub> S<sub>2</sub> (Pentlandite.) It is also distinct from that of the "feriferous polydimite" found at the Vermillion mine, a little to the north-east of the Emmens Company's working, and described by Clarke & Catlett (*American Journal of Science*, 1889, p. 372) as containing 43.18 per cent. of nickel, 15.47 per cent. of iron, and 41.35 per cent. of sulphur, and as approximating, therefore, to the formula Ni<sub>2</sub> Fe S<sub>2</sub>.

I have named this mineral Folgerite after Commodore W. M. Folger, the Chief of the Bureau of Ordnance in the United States Navy Department, in recognition of that distinguished officer's achievements in the utilization of nickel steel.

#### BLUETE.

This mineral has for some time past puzzled the Sudbury miners, who have locally dubbed it "Jack's tin." It is found in several mines of that district, and notably at the working of the Emmens Metal Company, where it is found associated with nicolite, gersdorffite, pyrrhotite and chalcopyrite, in the outcrop of a quartz vein cutting the before-mentioned greenstone dyke.

The following are the characteristics of the mineral:—  
Lustre.—Metallic, somewhat silky.  
Colour.—Pale olive-gray, inclining to bronze.

Specific gravity.—4.2.  
Hardness.—3 to 3.5.  
Streak.—Black.

Form.—Massive. No crystals have as yet been observed.

Fracture.—Sub-conchoidal, irregular; brittle.  
Heat reaction.—When the powdered mineral is heated in a closed tube sublimate of sulphur is produced.

Solubility.—The mineral dissolves readily in nitric acid, without separation of sulphur and yields a yellow solution.

Magnetism.—The mineral is non-magnetic.

Microscopic appearance.—Under the lens the powdered mineral appears to be composed of irregular grains of a dull gray colour. Under the microscope the colour appears a dull grayish black, and the particles are seen to be finely granular without any crystalline form.

|                              |        |
|------------------------------|--------|
| Nickel.....                  | 3.5    |
| Iron.....                    | 38.8   |
| Sulphur (by difference)..... | 52.3   |
| Insoluble.....               | 5.4    |
|                              | 100.00 |

After deduction of the insoluble matter (gangue), the figures for the mineral become:—

|              |        |
|--------------|--------|
| Nickel.....  | 3.70   |
| Iron.....    | 41.01  |
| Sulphur..... | 55.29  |
|              | 100.00 |

The sulphur is probably too high, as, owing to the character of the gangue, a portion of this latter may have entered into solution.

The formula Fe<sub>2</sub> Ni S<sub>2.4</sub> - (Fe Ni) S<sub>2</sub>, where Fe Ni 12 : 1, corresponds with the foregoing analysis, the figures of such formula being:—

|              |        |
|--------------|--------|
| Nickel.....  | 3.76   |
| Iron.....    | 42.06  |
| Sulphur..... | 53.28  |
|              | 100.00 |

The considerable percentage of nickel (a very rare element in pyrite), and the easy solubility in nitric acid without separation of sulphur, seem to preclude this mineral from being considered merely as a nickeliferous variety of pyrite or marcasite. I have named it *Bluete* after Mr. Archibald Blue, late Secretary of the Royal Commission appointed to investigate the mineral resources of Ontario, and now Director of the Bureau of Mines of that Province.

#### WILKINSONITE.

This mineral was brought to me by Mr. C. T. Mixer, from a mine situated about seven miles north-east of Sudbury, and about two miles from the Blezard mine, worked by the Dominion Mineral Company. It has been known locally as the Shepherd Mine, and is of a character similar to the other minerals of the district.

The following are the characteristics of the mineral:—  
Lustre.—Metallic.  
Colour.—Bronze-yellow.  
Streak.—Black.

Form.—Cellular; the cavities being lined with minute cubic crystals, and the intermediate substance being finely granular. This structure precludes the specific gravity and hardness from being determined with precision. A large piece showed a specific gravity of 3.73 and a hardness of 4.

Fracture.—Irregular; brittle.  
Heat reactions.—A sublimate of sulphur in a closed tube and fumes of SO<sub>2</sub> in an open tube. A sulphur fume is observed on heating a fragment held in forceps.

Solubility.—The mineral is soluble in H NO<sub>3</sub>, with separation of sulphur and a greenish yellow solution.

Magnetism.—On comminution about 10 per cent. of the mineral is found to be magnetic.

Microscopic appearance.—Under both lens and microscope the powdered mineral is seen to consist of grayish black grains of irregular form and finely granular structure, with occasional minute cubic crystals.

Chemical analysis:—

|                |       |
|----------------|-------|
| Nickel.....    | 5.40  |
| Iron.....      | 49.00 |
| Sulphur.....   | 45.00 |
| Insoluble..... | 4.80  |

After deduction of the gangue, these figures give:—

|              |        |
|--------------|--------|
| Nickel.....  | 5.79   |
| Iron.....    | 45.98  |
| Sulphur..... | 48.23  |
|              | 100.00 |

Separate determinations of iron and sulphur were made in the magnetic and non-magnetic constituents, respectively, with the following results:—

|              | Mag.  | Non-Mag. |
|--------------|-------|----------|
| Iron.....    | 66 55 | 40 41    |
| Sulphur..... | 7 00  | 52 61    |

A qualitative examination showed that the nickel was clearly with the non-magnetic portion.

The inference deducible from these observations is that the mineral is a mixture of a nickel-iron disulphide, with some magnetite; and taking the proportion of this latter as being 10 per cent., we have for the composition of the other constituent:—

|              |        |
|--------------|--------|
| Nickel.....  | 6.27   |
| Iron.....    | 41.44  |
| Sulphur..... | 52.29  |
|              | 100.00 |

This corresponds to the formula: Fe<sub>2</sub> Ni S<sub>1.6</sub>, or (Fe Ni) S<sub>2</sub> in which Fe : Ni = 7 : 1, and of which the figures are:—

|              |        |
|--------------|--------|
| Nickel.....  | 6.10   |
| Iron.....    | 40.68  |
| Sulphur..... | 53.22  |
|              | 100.00 |

It may be that this non-magnetic mineral is in part composed of pyrite, in which case the formula will require modification. The aggregate, however, is distinguished by its form and nickeliferous character from pyrite and marcasite.

I have named this mineral *Whartonite* after Mr. Joseph Wharton, of Camden, N. J., in recognition of that gentleman's eminence as the head of the nickel industry in America.

#### NICKEL AND NICKEL-IRON SULPHIDES IN GENERAL.

For the purpose of indicating the relations of all the known nickel and nickel-iron sulphides to each other, the following table may be found useful:—

| NAME.            | PERCENTAGE CONSTITUTION. |       |       | MOLECULAR CONSTITUTION. |                   |       |                   |                   |                   |
|------------------|--------------------------|-------|-------|-------------------------|-------------------|-------|-------------------|-------------------|-------------------|
|                  | Ni                       | Fe    | S     | Ni                      | Ni S <sub>2</sub> | Fe S  | Fe S <sub>2</sub> | Fe S <sub>3</sub> | Fe S <sub>4</sub> |
| Millerite.....   | 64.72                    | ..... | 35.28 | 1                       | .....             | ..... | .....             | .....             | .....             |
| Polydimite.....  | 59.47                    | ..... | 40.53 | 3                       | 1                 | ..... | .....             | .....             | .....             |
| Beyrichite.....  | 57.90                    | ..... | 42.10 | 2                       | 1                 | ..... | .....             | .....             | .....             |
| Ferrous.....     | 44.92                    | 14.26 | 40.82 | 3                       | .....             | ..... | .....             | .....             | 1                 |
| Folgerite.....   | 32.87                    | 31.30 | 35.83 | 1                       | .....             | ..... | .....             | .....             | .....             |
| Pentlandite..... | 22.03                    | 41.95 | 36.02 | 1                       | .....             | ..... | .....             | .....             | .....             |
| Horobachite..... | 11.24                    | 42.81 | 45.95 | 1                       | 1                 | ..... | .....             | .....             | .....             |
| Inverarity.....  | 10.44                    | 49.72 | 39.84 | 1                       | .....             | ..... | .....             | .....             | .....             |
| Whartonite.....  | 6.10                     | 40.68 | 53.22 | .....                   | .....             | ..... | .....             | .....             | .....             |
| Bluete.....      | 3.76                     | 42.06 | 53.28 | .....                   | .....             | ..... | .....             | .....             | .....             |

It remains to be added that the analyses of the new minerals herein described were made by Mr. C. T. Mixer.

#### Incline Truck Drop for Calcining Kilns.

A new incline truck drop for use in connection with calcining kilns, is described by Mr. C. Wood in a paper read before the Cleveland Institute of Engineers. This drop was designed for lowering the trucks from the top of the kilns at the Tees Ironworks, where the space was very limited, and for that reason a drop of the ordinary design was not admissible. After a description of the form of drop usually employed in the district, the details of the latter design are given. Four columns support girders, on which is mounted a shaft with four rope pulleys and a break-sheave. The counter-balance weights work inside the two main columns. These stand on one side of the centre line of the kilns, from which the truck is run on to the lowering table, its weight being so placed as to keep the guide wheels in position. The table at the bottom of its travel is tilted automatically, and the stops withdrawn so as to discharge the trucks on the same side as that on which they were received.

The Collieries of British North America.

The most important mineral—by values—produced in the Dominion of Canada during the year 1890 was coal, the quantity of which (3,117,661 tons, valued at places of production at 6,496,110 dols.) exceeded the production of the preceding year by 398,183 tons. As I have pointed out in an earlier contribution, almost all this coal was produced in the oceanic provinces of British Columbia and Nova Scotia, but the coal deposits of the North-West Territories are of enormous importance—nay, are apparently inexhaustible, the coal-bearing area being there estimated at 65,000 square miles, comprising seams of coal of varied thickness, estimated to produce 4,500,000 to 9,000,000 tons of lignite and bituminous coal per square mile. Inasmuch as the United States of America have hitherto controlled the production of anthracite coal, it is interesting to note that, in the proximate Rocky Mountains large quantities of anthracite have been discovered, and are now operated near Banff, on the line of the Canadian Pacific Railway, the Canadian Anthracite Coal Company and other concerns. All the coal consumed by the great transcontinental line from the town of Brandon west to the Pacific coast is now exclusively the produce of the native mines, and as a constant demand for anthracite is maintained at San Francisco, which is nearer to the Canadian mines than to the American points of production, I can hardly do otherwise than concede to the Banff mines a complete monopoly of the markets of California themselves. Furthermore, we must recognise the importance—from an imperial point of view—of large deposits of this smokeless coal within two days' journey of the principal naval stations of the North Pacific Ocean, and admit that this vast unexploited coal region of the North-West Territories is to be the field of lucrative enterprise in a near future. In considering these mines, and, in fact, all the mines of British America, I shall advance from Vancouver Island to Cape Breton, thus:—

BRITISH COLUMBIA.

In British Columbia, six coal mining companies, with an aggregate approximate authorised capital of \$5,508,000 are now in operation, viz.:—

The Cambrian Coal Company, Limited, with an authorised capital of \$83,100, divided into 831 £20 shares, and owns 831 acres of mineral land in the Cedar district of Vancouver Island, but the operations are either temporarily suspended or of little importance relatively.

The Crow's Nest Coal and Mineral Company, Limited, with an authorised capital of \$2,000,000, divided into 20,000 shares of a par value of £20 each, owns 11,000 acres of coal lands near Martin Creek and Morrissey Creek, in the East Kootenay district, but although \$30,000 have been expended up to October 1, 1890, in prospecting, &c., mining upon any extensive scale will not be initiated until more advantageous shipping facilities have been provided. The analysis of the seam is:—Hygrosopic water, 1.89; volatile combustible matter, 30.41; fixed carbon, 63.33; ash, 4.37; Coke per cent., 67.70.

The East Wellington Coal Company (Nanaimo Harbour) has a capital of \$1,500,000, and operates the East Wellington Collieries, at Nanaimo, directed exclusively by San Francisco men, who in 1889 employed 190 men and produced 51,272 tons of coal, of which 7,636 tons were consumed at home, and 43,089 tons exported. The seam varies from 2½ feet to 7½ feet in height, into which five levels have been driven and two good shafts sunk, and is connected with the wharfs at Nanaimo by a railroad four and a-half miles long. Two pairs of hoisting engines lift the coal to the screens, whence it is despatched in 34½ ton cars, drawn by two locomotives to Nanaimo.

The New Vancouver Coal Mining and Land Company of London, which was formed to acquire the properties of the Vancouver Coal Mining and Land Company, owns some 32,000 acres of freehold land, and operates the Nanaimo collieries upon Vancouver Island, the total output of which for the year ending 31st December, 1890, was 389,500 tons, distributed as to home consumption 98,340 tons, and as to exportation 292,809 tons. Four principal shafts are in operation thus:—

|                    | Seam.   |         |
|--------------------|---------|---------|
|                    | Ft. in. | Ft. in. |
| South Field, No. 2 | 5       | 0 to 10 |
| “ “ 3              | 5       | 0 “ 10  |
| Esplanade “ 1      | 5       | 0 “ 12  |
| North Field “ 4    | 1       | 6       |

From which railways diverge as to the South Field mines, five miles long with siding; as to the Esplanade mine, one mile; and as to the North Field mine, four and a-half miles to Departure Bay. The line is laid with steel rails 56 lb. per yard, gauged according to the standard, viz., 4 ft. 8½ in. The mines are equipped with eight hauling and pumping engines, twelve steam pumps, four locomotives, 200 6-ton coal cars, lumber, and ballast cars, fitting shops, lathes, boring, drilling planing, and screw-cutting machines, hydraulic presses, steam hammers, and diamond boring machines. Besides these facilities at the shipping port there are wharves of 1,070 feet frontage, at which ships of the largest size can load at all stages of the tide, at convenient localities with brick fields, stone quarries, &c. The net output from the East Field mine during the half-year ending June 30, 1891, was 75,226 tons. Electric haulage has here been introduced, installed by the Edison Electric Company, whose system is estimated to yield

\* Correspondence to the Colliery Guardian.

considerable savings in the cost of production. South Field No. 2:—The net output during the same period was 100,180 tons. A new shaft has been sunk 505 feet into 6 feet of coal, which indicates 1 foot more coal than encountered further away in the old shaft.

The net output from the South Field No. 3 was 35,000 tons of pillar-drawn coal, that of South Slope Field No. 4 (a driven slope) 624 tons, and that of North Field mine 42,257 tons for the half-year to June, 30 1891. An analysis of the principal seams by slow coking indicated:—Volatile matter, 38.40; fixed carbon, 51.45; ash, 10.50; coke firm.

Union Colliery Company of British Columbia, Limited. As mentioned in a prior contribution, the coalfields of Vancouver Island cropping out at the north-west corner of the island, trend south-east and again enter the water at Nanaimo upon the south-east coast, being thus, like those of Cape Breton, in the form of a fringe of a coalfield the main body of which reposes upon the bed of the Straits of Georgia, this fringe being divided by a synclinal into the Nanaimo and Comox basins, in the first of which the collieries just described exist, and in the last of which the Union Mine is in operation producing 31,204 tons in 1889, distributed as to exportation 23,790, and as to home consumption 100 tons; and 69,537 tons in 1890, distributed as before, 74,048 tons and 1,481 tons respectively. The seam is of good coal, 7 feet 6 in. thick, indicating hygrosopic water 1.70, volatile combustible matter 27.17, fixed carbon 68.27, ash 2.86, and is operated by twelve miles of railway, 4 feet 8½ in. gauge, two locomotives, fifty coal wagons, one diamond drill, four stationary engines, four steam pumps, one wharf, &c.

These Vancouver coal mines in the aggregate yielded 1,029,097 of bituminous coals in 1891, of a very high quality, commanding a better price at San Francisco—where they rank with Northumberland West Hartley—than any other coal of America, and compare therewith as to steam properties thus:—Wellington 1.407, Nanaimo 1.335, Seattle, Washington Territory, U.S.A., 1.330.

Their total production from 1874 to 1890 (both inclusive) was:—

| Tons. |         | Tons. |         |
|-------|---------|-------|---------|
| 1874  | 81,000  | 1883  | 213,000 |
| 1875  | 110,000 | 1884  | 394,070 |
| 1876  | 139,000 | 1885  | 365,000 |
| 1877  | 154,000 | 1886  | 326,636 |
| 1878  | 171,000 | 1887  | 413,360 |
| 1879  | 241,000 | 1888  | 548,017 |
| 1880  | 268,000 | 1889  | 649,409 |
| 1881  | 228,000 | 1890  | 759,517 |
| 1882  | 282,000 |       |         |

Making a total of 5,343,009, or an average per annum of 314,294, being an average of 1,072,964 tons less than the average of Nova Scotia bituminous coals over the same period, the total production of which was 23,583,395, with an average of 1,387,258. The following were the exports:—

| Tons. |         | Tons. |         |
|-------|---------|-------|---------|
| 1874  | 51,001  | 1883  | 271,214 |
| 1875  | 65,842  | 1884  | 245,478 |
| 1876  | 116,910 | 1885  | 250,191 |
| 1877  | 118,252 | 1886  | 274,466 |
| 1878  | 165,734 | 1887  | 356,657 |
| 1879  | 186,094 | 1888  | 405,071 |
| 1880  | 219,878 | 1889  | 470,683 |
| 1881  | 187,791 | 1890  | 508,882 |
| 1882  | 179,552 |       |         |

Making a total of 4,073,696, or an average per annum of 239,629, being an average of 51,177 tons greater than that for Nova Scotia over a similar period, the exportations of which were 3,203,701 tons, or an average of 188,452.

The markets for British Columbian coal are very important, viz., the markets of the North Pacific coast of America, and the home markets in a country where miners are rapidly developing the superior wealth of the allied mineral.

NORTH-WEST TERRITORIES (INCLUDING MANITOBA).

In the North-West Territories of Canada six coal-mining companies, with an authorised capital of 4,125,000 dollars, are in operation, thus:—

Alberta Coal and Railway Company.—This company owns the Lethbridge Collieries, at Lethbridge, in the Province of Alberta, and there operates the Coal Banks seam, 5 ft. 4 in. thick, capacity 5,500,000 tons per square mile, of which the following are proximate and ultimate analyses:—

| Proximate—                  | Per cent. | Lignite. |
|-----------------------------|-----------|----------|
| Hygrosopic water            | 6.50      |          |
| Volatile combustible matter | 31.59     |          |
| Fixed carbon                | 54.36     |          |
| Ash                         | 7.55      |          |
| Ultimate—                   |           |          |
| Carbon                      | 65.30     |          |
| Hydrogen                    | 4.30      |          |
| Oxygen and Nitrogen         | 15.65     |          |
| Sulphur                     | 0.70      |          |
| Ash                         | 7.55      |          |
| Hygrosopic water            | 6.50      |          |

These coals are similar to the class of fuels now largely mined and consumed on the western part of the line of the Union Pacific Railway, and are much superior to most of the lignites and brown coal which feed important industries in various parts of Europe. One hundred and seven miles of rail connect the shaft with the main line of the Canadian Pacific Railway, sixty-five miles of line with the international boundary, whence 133 miles of

rail connect with the Great Falls in Montana State. The average amount of labour employed is about 400 persons. The production in short tons in 1890 was 129,000, and in 1891 143,000 tons. The estimated value of the colliery equipments is \$1,000,000, and the seam is uniformly worked by the pillar-and-room method.

The Canada North-West Coal and Lumber Syndicate.—This company operates a 16 ft. seam of coal, dipping under 1,280 acres of the company's land at an angle of 45 deg., by means of a slope 270 ft. long, laid off as to a main heading 270 ft., east heading 1,500 ft., and west heading 700 ft. The system of ventilation is performed by a self-contained Guibal fan 6 ft. in diameter, 200 revolutions per minute; and the plant comprises multi-tubular boilers, Tolson's hoists in gear, of a capacity of 300 tons per day, Blake pumps 15-horse power, Ingersoll drills, two 20 ft. steel bar screens, and nut screen ½ in. mesh, pitched 35 deg., capacity 160 tons each. The average output on October 1, 1890, was 100 tons per day, principally consumed by the Canadian Pacific Railway. The quality of the mineral is determined by the following analysis: Fixed carbon, 86.80 per cent.; gas, 7.96; moisture, 2.06; ash, 3.16; and sulphur 0.02 per cent.

H. W. McNeill Company, Limited.—This company is an anthracite coal company, on the main line of the Canadian Pacific Railway Company in Alberta, operating a seam of anthracite coal 10 ft. thick by means of a slope 380 ft. long, and a main rolley-way 600 feet in length; seventy persons are employed, Clanny lamps, and fan ventilation used. The coal is won by pillar-and-room, and the output in 1891 was 4,000 tons. The mines, which are merely the pioneers in this region, shall aid in supplying with fuel the vast populations and the allied industries, which shall spread over the broad plains of the Canadian interland, and are even now surely, if steadily, pursuing a fairly even course of progress, as may be determined from the following figures, showing the output of coal in the North-west:—

|       | Tons.   |
|-------|---------|
| 1887  | 74,152  |
| 1888  | 115,124 |
| 1889  | 97,364  |
| 1890  | 128,953 |
| Total | 415,593 |

The markets are native, and exterior, such as the border states of the American Union.

NOVA SCOTIA.

In the Province of Nova Scotia, popularly termed “the coalhole of the new British nation, and the backbone of the West's creation,” sixteen colliery companies hold properties under a total authorized capital of \$12,700,000, approximately equivalent to £2,540,000 sterling, operated thus:—

Acadia Coal Company, Limited.—This company has an authorized capital of \$4,000,000, unhampered by bonds or mortgage, and is undoubtedly one of the most important collieries of British America. The collieries are four in number, thus:—

Albion Mine.—The second railway built in America was built at this colliery, where, until recently, the famous locomotive “Samson,” built in 1838, exhibited at Chicago Exhibition, and now sold to the World's Fair, remained. The shaft was sunk 900 ft. into the main seam, which is 38 ft. thick, and in which, inclusive of bank labour, 480 persons are employed, and at a depth of 1,048 ft. another seam is encountered 22 ft. thick, the analysis of both of which I give: 38 ft. seam, hygrosopic water 1.48, volatile combustible matter 24.28, fixed carbon 66.50, ash 7.74; 22 ft. seam, hygrosopic water 2.54, volatile combustible matter 20.46, fixed carbon 68.50, ash 8.50. The machinery is massive and includes—a hoisting engine, 38 in. cylinder, 5 ft. stroke, geared to an 18 ft. drum; Cornish pumps, 62 in. cylinder, 9 ft. stroke, 34 ft. beam, 7 ft. thick at the poise, weight 18 tons; 18 in. working barrel and steam revolving tippler; a Bricort movable screen from Drifton, Penn.; a 35 ft. belt for cleaning coal; shaking screens, steel pit head frames 50 ft. high, and compressors 36 in. cylinders, 6 in. stroke; ventilating fans, Mueseler lamps, and 125-coke ovens, beehive pattern, 10 ft. diameter.

Acadia Mine (3 miles distant).—This is a difficult mine to manage; the shaft has a perpendicular depth of 1,500 ft., and as the coal is tender and contains a large percentage of gas (32.17 per cent. of volatile combustible matter), the enormous pressure causes the gas to exude from roof and sides. No explosives are used, and the only lights in use are the Marsaut and the Mueseler lamps. Iron beams have been very successfully substituted for wood in the levels where the roof is bad, thus fully demonstrating the superiority of such as main hauling roads and airways at least. Concerning these, I have only one opinion, and that is, that they are superior. Seven years ago in this mine railroad rails were used to support a section of bad roof, and are at this hour as good and solid as ever; whereas, where the roof is good, the wooden beams have been renewed every two years. Bad roofs and fire-damp were prominent features in this mine. The seam, 10 ft. thick, dipping 27 deg., is entered by a slope 3,600 ft., operating in lifts of 400 ft., with counter balance planes every 400 feet. Primary narrow bords are driven inbye, followed by pillar workings outbye from boundary, ventilated by a fan 24 ft. x 8 ft., iron cased, drained by duplex compound condensing pump 22 in. x 11 in. x 24 in., rams 5 ft. 5 in., 2,400 column, 990 ft. vertical head, metal-flanged, unbreakable wrought piping, tarred for 6 in. at the upset ends, and 4 in. cased in infusorial earth from

a near-at-hand deposit, top steam pressure 105 lbs., and air feeder; an auxiliary duplex compound condensing engine 14 in. x 8 in. x 16 in. (at the shaft bottom, etc., equipped with a 32 in. cylindered hoisting engine, 60 in. stroke, acting directly on to a 14 ft. drum), 240 persons are employed at bank, and lighting is by Mueseler and Marsaut lamps.

**Vale Colliery** (six feet seam).—The longwall system has here been unsuccessfully introduced at a point 2,000 ft. from the entrance to the slope; the roof is of a very strong nature, and slips run into the face to an extent which renders it both troublesome and expensive to keep the working open. Pillar work, has, however, been more successfully carried on another portion of the pit, and the masters persevere. Considerable expense and loss has been incurred by several very heavy feeders of water. The seam, as I have related, is 6 ft. thick, the ingredients of which are, of hygroscopic water 2'22, volatile combustible matter 30'23, fixed carbon 59'70, ash (white) 7'85. The pit employs 240 persons, and is entered by a slope.

**Cumberland Coal and Railway Company's Springhill Collieries.**—Some 1,400 persons are employed in and about this colliery, which is situated in the Springhill coal fields, north of the Cobequid Mountains. The following is a section of the measures of this district: North seam, coal, 13 ft.; strata, 105 ft.; coal, 5 ft.; strata, 130 ft.; coal, 2 ft. 4 in.; strata, 185 ft. Main seam: 11 ft.; strata, 80 ft. South seam: 11 ft.; strata, 100 ft.; seam, 8 ft. 6 in.; strata, 190 ft.; seam, 4 ft.; strata, 176 ft.; seam, 2 ft. 9 in. The following is an analysis:—

|                             | North Seam.<br>Per cent. | Main.<br>Per cent. | South Seam<br>Per cent. |
|-----------------------------|--------------------------|--------------------|-------------------------|
| Moisture                    | 1'625                    | .78                | 1'39                    |
| Volatile combustible matter | 28'672                   | 31'32              | 31'22                   |
| Fixed carbon                | 65'431                   | 62'54              | 61'58                   |
| Ash                         | 4'272                    | 5'34               | 5'79                    |
| Sulphur                     | .783                     | 1'38               | .80                     |
| Evaporative power           | 8'99                     | .....              | 8'46                    |

From which we observe that the coal is suitable for domestic purposes, furnaces, locomotives, etc. The extent of country underlain by the productive measures has been estimated at 300 square miles. The district is intersected by the Intercolonial Railroad, whence a branch connects with the port of Parrsborough, where rather extensive docks have been constructed.

**Intercolonial Railway Company, Limited.**—This company, employing 350 persons, owns one and three-quarter square miles of coal land, under lease from the Nova Scotian Government, and operates the Drummond Colliery at Westville, County Pictou, where the seam is 11 ft. to 13 ft. high, of the following composition: Moisture, 1'52 per cent., volatile combustible matter (fast coking) 31'87, fixed carbon 57'78, volatile combustible matter (slow coking) 29'46, fixed carbon 60'19, ash 9'10, sulphur 1'62, theoretic evaporative power 8'24 per cent. It is wrought at a dip of 31 deg., by slopes 4,000 ft. long, divided into lifts per 500 ft., and a counter balance plane every 450 ft. to 500 ft., ventilated by a 20 ft. x 7 ft. exhaust fan, run at forty-five revolutions per minute, current 100,000 ft. per minute. There are twenty-five beehive coke ovens. The main levels are watered, a plan which relieves the horses and depreciates the liabilities of fire, and an economical feature in underground haulage is a tail rope running with twenty-two tubs per trip, under which circumstances one boy is able to do the work of eight horses and eight drivers.

**Canada Coal Company (Joggins Mine).**—This company leases three square miles of coal land and operates the Joggins Mine, near Maccan, Cumberland, where the seam is 6 ft. to 8½ ft. thick, 4 ft. to 5½ ft. of which is wrought longwall by 220 persons. (The seam has a clay band 1 ft. to 3 ft. thick.) It is entered by a slope 2,000 ft. long, ventilated by furnace, and lit by open lights. These Nova Scotia coals are slightly less bituminous than those of Cape Breton, known as Sydney coal, and are very well adapted for steam-raising purposes, and perhaps in a less degree for coke, although the several seams turn out an excellent coke; pertain to the bituminous system of Dana; the same geological horizon of the carboniferous system as those of England and Eastern America; and with the bituminous coal of New Brunswick, form an important section of the coal belt which nature has wound around the northern portion of the globe.

CAPE BRETON.

**General Mining Association of Landon.**—From 1785 to 1827 275,000 tons of coal came to bank, and on January 1, 1827, the mine passed into the hands of the present owners, who operate.

**The Sydney Mines.**—The Main seam, 5 ft. 4 in. thickness, is wrought by the pillar-and-bord system at an average dip of 1 in 12. It is entered by an 800 ft. shaft (bords 16½ ft. wide) and lighted by Mueseler lamps and naked lights. It is ventilated by means of Guibal fans, and is wrought by some 600 persons, inclusive of bank labor, producing about 160,000 tons of coal per annum. The mine is splendidly equipped with every requisite, and the produce is analysed as follows:—

|                             | Slow coking. | Fast coking. |
|-----------------------------|--------------|--------------|
| Moisture                    | .420         | .420         |
| Volatile combustible matter | 34'962       | 37'110       |
| Fixed carbon                | 59'993       | 57'845       |
| Ash                         | 4'625        | 4'625        |
|                             | 100'000      | 100'000      |
| Sulphur                     | .95          | .95          |

**Bridgeport Colliery.**—The Phelan seam, 6 ft. thick, is wrought by the pillar-and-bord system, at an average dip of 1 in 11. It is entered by a shaft 120 ft. deep; open lights and furnace ventilation being employed. It is operated by sixty persons, and in 1891 the production was 30,000 tons of round coal. The drainage is natural.

**Caledonia Coal Company, Glace Bay.**—This company holds two square miles of coal land, operating a seam 7 ft. in thickness, with a dip of 1 in 10, and entered by a shaft 185 ft. deep, and a slope of 1,600 ft. The seam is wrought by the pillar-and-bord system, and is ventilated by two brick furnaces. Naked lights are used, and the machinery includes a 20 in. by 30 in. piston-inlet Ingersoll engine, feeding twelve coal-cutters; 400 persons are employed, and 150,040 tons of coal were produced in 1891, distributed among the markets of Nova Scotia, New Brunswick, Prince Edward Island, Quebec, Newfoundland, United States, Miquelon, and others, of which the most important is Quebec. The following are the analyses:—

|                 |       |
|-----------------|-------|
| Volatile matter | 33'00 |
| Fixed carbon    | 57'37 |
| Ash             | 9'63  |

Cubic feet of gas per ton, 9,700.

**Gowrie Coal Company, Cove Bay.**—This company holds an area of two square miles of coal land, and operates Gowrie Colliery, of which a description was recently given in our columns. Since that article appeared the mine has been equipped with a 16 in. by 24 in. Ingersoll piston-inlet air-compressor, to feed seven coal-cutters.

**Glace Bay Mining Company Limited.**—This company holds 3¼ miles of coal land, and operates the colliery of Glace Bay, and holds the artificial harbor of Glace Bay, thereby extracting tolls from their contemporaries for shipping privileges. These areas include the "Hub" seam, 9 feet thick, which is easily worked, and of unsurpassed quality, and the Harbor seam, 6 ft. to 7 ft. thick, out of which the best gas coal of Cape Breton is produced (capacity, 10,000 cubic feet per ton). It is a locomotive and house coal, and analyses thus:—

|                 |       |
|-----------------|-------|
| Volatile matter | 30.21 |
| Fixed carbon    | 67.78 |
| Ash             | 2.01  |
| Sulphur         | .90   |

The machinery is good, and the production was 108,600 tons in 1890, and 110,000 tons in 1891.

**International Coal Company Limited.**—This company holds five square miles of coal areas, and operates at the International Colliery at Bridgeport, the Harbour seam of coal, 6 ft. thick, dipping 1 in 12, by a 90 ft. shaft, and a 2,800 ft. incline from the base thereof. It is wrought by the pillar-and-wall system, 369 men and 50 boys being employed. Naked lights are used, and the ventilation is by means of fans. The analyses, as per seam of the Glace Bay Company, with varied percentages, are:—

|                 | Per cent.                        |
|-----------------|----------------------------------|
| Volatile matter | Increase over Glace Bay seam 4.0 |
| Fixed carbon    | Decrease from do 4'86            |
| Ash             | Increase over do 0'98            |
| Sulphur         | do do 1'36                       |

**Sydney and Louisburg Coal and Railway Company Reserve and Emery Mines.**—The Reserve mine, situate in the Bridgeport basin, produces the magnificent Phelan seam, 8 ft. 8 in. thick, dipping 1 in 13. The composition is:—Volatile matter, 37'26; fixed carbon, 58'39; ash, 4'35; sulphur, 2'06; gas capacity, 9,500 cubic feet per ton. It is wrought by the pillar-and-room system, and ventilated by furnaces. The slopes by which the seam is entered are as follows:—The Main, 1,782 ft. long; and the French, 3,498 ft. long; vertical depth, 257 ft. Beckett's lamps are used, and suitable machinery employed, including a 20x20 piston-inlet Ingersoll compressor, with a capacity for twelve Sergeant coal-cutters, eight coal mining machines, two drills, with augers and attachments. The production averages 131,000 tons per annum.

The Emery Colliery produces the excellent Ross seam, 5 ft. thick, dipping 1 in 12; gas capacity, 9,500 cubic feet. It is wrought by the pillar-and-room system, and entered by a shaft 80 ft. deep. The ventilation is by natural means. Beckett's lamps are used, and the production was 47,414 tons of coal during seven months in 1891, giving an aggregate for both mines of about 178,000 tons.

**Low Point, Barrasois and Lingan.**—This company operates the Ross seam, 6 ft. 7 in. thick, dip 25 degs. The analysis is as follows:—

|                             | Slow coking. | Fast coking. |
|-----------------------------|--------------|--------------|
| Moisture                    | .75          | .75          |
| Volatile combustible matter | 26'85        | 32.13        |
| Fixed carbon                | 68'13        | 62'85        |
| Ash                         | 4'27         | 4'27         |

Gas capacity, 9,500 cubic feet per ton.

The seam is entered by a slope 1,740 ft. long, out of which about 100,000 tons of coal are drawn per annum. It is wrought by the pillar-and-bord system, and some 272 men are employed. Mueseler lamps and naked lights are used.

The total production of the various Cape Breton collieries, the property of the companies here treated, according to Mr. Gilpin's report, were, during 1891, as follows:—

| Name of colliery. | Raised.<br>Tons. | Sold.<br>Tons. |
|-------------------|------------------|----------------|
| Bridgeport        | 30,897           | 32,457         |
| Caledonia         | 159,985          | 144,995        |
| Gardner           | 18,746           | 17,105         |
| Glace Bay         | 117,767          | 110,212        |
| Gowrie            | 158,064          | 152,367        |
| International     | 133,179          | 124,677        |
| Reserve           | 170,844          | 154,656        |
| Sydney            | 170,691          | 146,645        |
| Victoria          | 111,037          | 96,479         |

The comparative analyses of these with other coals are:—

|                      | Volatile matter. | Carbon. | Ash.  |
|----------------------|------------------|---------|-------|
| Pennsylvania, U.S.A. | 29'50            | 64'40   | 6'10  |
| Virginia             | 33'68            | 57'76   | 8'56  |
| Indiana              | 39'00            | 52'00   | 9'00  |
| Illinois             | 36'59            | 59'47   | 3'94  |
| Iowa                 | 44'00            | 48'50   | 7'50  |
| Missouri             | 34'06            | 50'81   | 15'13 |
| Newcastle, England   | 37'60            | 57'00   | 5'40  |
| Staffordshire, do    | 37'86            | 59'64   | 2'50  |
| Derbyshire, do       | 35'10            | 61'65   | 3'25  |
| Yorkshire, do        | 35'67            | 62'08   | 2'25  |
| North Wales          | 36'56            | 57'49   | 6'25  |
| Pictou, Nova Scotia  | 29'63            | 56'98   | 13'39 |
| Sydney, Cape Breton  | 34'07            | 61'43   | 4'50  |

The number of accidents in 1891 was twenty, of which three were fatal, a list of casualties thus more excessive than that of Nova Scotia, where fifteen accidents occurred during the same period, none of which were fatal. The total amount of air measured in December 1891 was 343,632 cubic feet, 218,338 cubic feet less than the total amount measured in the Nova Scotian mines in the same month.

As to whether there is room for more mining enterprise in coal in Canada, I may say that I am distinctly of the opinion that either in British Columbia, the North-West Territories, Nova Scotia or Cape Breton proper, any colliery conducted upon fair and sound lines should earn a gradual increment of dividend. Of course, the coal operators of Cape Breton emphatically desire no more competition, but the coal operators are prejudiced, and prejudiced opinions are of no importance whatever.

Among all the vast centres of coal production of the globe, Nova Scotia ranks high for progressive legislation for her miners, and the superior social status thereof. During the year 1890, instructors were appointed at various collieries for the purpose of preparing persons desirous of presenting themselves as candidates for certificates of competency as underground managers—a position analogous with our own second-class certificated men—and overmen, and at an examination held on October 13, 1891, eleven certificates as overmen and twenty-three as underground managers were granted, the immediate benefit of which I, however, fail to perceive, inasmuch as wherever—as in Canada—undue protection afflicts a coal industry, healthy expansion is retarded, and if (as is here the sequence) no more collieries are to be opened up, where can positions as underground managers and overmen be found?

Trades unionism in Canada outside Toronto is of little importance, being marked by a strange lack of cohesiveness, which prevents too much arbitrariness upon the part of the men. Down in the coalfields of Nova Scotia no very acute strikes take place; the miners' unions are more passive than aggressive, and it is not to be anticipated that mining enterprise need fear much difficulty in this direction. The men are, however, not by any means free from folly in their unions, or outside in the village streets, and require a firm hand.

Meeting of the General Phosphate Corporation.—Accounts Not Yet to Hand.—Proposed Appointment of a Committee.

The third ordinary general meeting of the General Phosphate Corporation, Limited, was held on Wednesday, 22nd ult., at the Cannon Street Hotel, under the presidency of the Right. Hon. Lord Stalbridge.

The ASSISTANT-SECRETARY (Mr. C. S. Matz) having read the notice convening the meeting,

The CHAIRMAN said: Gentlemen,—In accordance with the note at the foot of the notice convening the meeting, I shall have to move the adjournment of these proceedings, but before doing so I must express my regret that the accounts have not been received from Canada in sufficient time for presentation to you now. We wrote from this side some months ago, and we have done all in our power to get them over. They are not here to-day, but we have every reason to believe that they will be over by the next mail. Therefore, in accordance with this notice, and feeling that as most of the shareholders had been kept away by it, it would not be advisable in any way to go into any question whatever, I will move "that this meeting be adjourned to Wednesday, 25th January, in order to permit of the completion and presentation of accounts from Canada." Before that is put, however, I should like to state that the Board, in the best interests of the Corporation, have agreed to ask for the friendly communications of shareholders, and we propose that a letter shall be addressed from the Board to the shareholders, asking them to place themselves in communication with each other as far as they can, in order that a committee may be formed who will confer with the directors, and who shall have everything at their disposal, of course, as far as is proper. I wish to repudiate in the strongest

way possible the idea that there is any wish on the part of the directors to hide anything. We court full publicity, and we think that in asking the shareholders to form a committee to confer with the directors—with which object I have already taken steps—we shall be able to have all matters thoroughly and clearly put before the proprietors, when they will be able to see for themselves the course which the directors have pursued. I beg to propose the motion which I have read.

The Hon. CECIL PARKER seconded.

Mr. HENRY GOOD rose for the purpose of proposing that the suggested committee be formed immediately. He was a dissatisfied shareholder, and he wished to give voice without delay to the dissatisfaction which he knew to prevail in the minds of the shareholders. He thought the course suggested by the chairman was the only one that could be adopted, and that it was a course which would receive the cordial concurrence of all the shareholders. But he thought the time was now at hand when they should give effect to that recommendation. He was aware that certain shareholders were engaged in litigation, or were threatening litigation against the directors, and he thought they should be exceedingly careful, when they appointed the committee, to select gentlemen who were thoroughly independent of all parties concerned. He was prepared to nominate a committee, and would do so if not out of order. He moved: "That a committee of five of the principal shareholders be appointed to inquire into the formation, purchases, and past management of the company, in order to ascertain whether the shareholders' money has been properly expended, and what steps are prudent to be taken by the shareholders—whether by future management, reconstruction or otherwise—to put the company's affairs on a satisfactory basis." He ventured to think that that conveyed no reflection upon the directors or anyone concerned in the company.

Mr. JOHNSON seconded the proposal of Mr. Good. He thought the suggestion of the chairman a capital one, and that it should be followed up immediately. In further remarks the speaker said he took up shares in the company because he saw the names of Sir James Whitehead and Mr. Sampson Lloyd on the prospectus, but he had heard with regret that day for the first time that Sir James Whitehead did not hold a share in the company now.

Mr. SMALL asked whether the proposal to appoint a committee at once was in order, in the face of the footnote on the notice calling the meeting.

The CHAIRMAN appealed to Mr. Good to abandon his motion, and to the shareholders to support his proposal for adjournment. The Board were pledged to the adjournment, and it would not be fair to absent shareholders to transact any other business.

Mc. GOOD, however, pressed his motion.

Mr. SMALLMAN was sorry the mover and seconder would not withdraw the proposal to appoint a committee. He agreed with the chairman that it would be unfair to absent shareholders to pass such a resolution, especially as there were many matters on which they wanted information before a committee commenced investigations. He had written to the directors asking questions on various matters, but they had not seen fit to reply to him, and he frankly admitted that he was not fully prepared at the present moment to ask all the questions he wanted to put to the Board. Before they appointed a committee they must have the accounts before them, they must know when proceedings were first commenced against shareholders in respect of calls owing, who else owed calls, and why they were not being proceeded against, because he found that the members of the Board were among the number. Examining the register ten months ago, he found, to his surprise, in respect of the call made in July, 1890, that hardly any of the directors made their full payments then. Some of the directors did not pay till February, 1892, and at the present moment Sir George Baden Powell was in arrear to the extent of £100. He would suggest that the directors, in sending out the notice for the adjourned meeting, should send out a list of those who had not paid their calls, and give their reasons for not taking proceedings against them. There were other matters to be gone into, including the relations of the Board with the promoter.

After some discussion as to which of the proposals before the meeting had precedence in the matter of voting, the Chairman put his motion for adjournment, which was agreed to.

In the course of a discussion which took place subsequently, the chairman stated, in reply to a shareholder, that Sir George Baden-Powell had resigned his position in the company.

Mr. GOOD: Will you give me an assurance that my motion shall be put on the agenda for the next meeting?  
The CHAIRMAN: Yes. (Hear, hear.)  
The proceedings then terminated.

**Petroleum Engines in Mines.**—The arbitrators have decided the question raised by the inspectors of mines on the use of petroleum engines in mines, and declare that their use is not dangerous. A series of experiments have been carried out at the maker's works, and evidence was taken. A number of recommendations are made as to the carriage and storage of petroleum underground. In the course of the proceedings it was stated that there are only three or four mines where these engines are in use, but that the engines possessed considerable advantages for hauling, pumping and drilling in underground work.

## MINING NOTES.

[FROM OUR OWN CORRESPONDENTS.]

### Nova Scotia.

#### Cariboo District.

This district has been brought into prominence during the last three months by the success which has attended Mr. Geo. W. Stuart's management of the Truro Gold Mining Company's property. During November and December the old mine plant was completely removed, the boiler properly re-set, a new engine placed, hoisting gear remodelled, new shaft and ore houses built, together with other buildings, and the mine pumped out and again producing quartz in the incredibly short time of twenty-six days. We believe this breaks the record for Nova Scotia. The result of the first clean up after the rebuilding was 750 ounces from 30 tons milled.

The Dixon mine continues to yield its average returns, and reports from this property are satisfactory to shareholders.

#### Killag.

Reports from this district are to the effect that the lode worked by the vertical shaft shows well at the 100 foot level, and is reckoned worth one ounce to the ton. It is nine inches in width. The mill, which started up in December, has run very smoothly and satisfactorily.

#### Montagu.

With the departure of Mr. Woodhouse, "official reports" from this district have ceased, and no large bars are apparently forthcoming. On reliable authority it is stated that the rock milled in November and December was low grade. The present manager, Mr. Thomas, is endeavoring to open the mine in a systematic way, and the district now has the best chance for being thoroughly proved that it has had during its thirty-two years of life.

#### Waverley.

The West Waverley Gold Co., limited, are preparing to sink another lift in their main shaft, to open levels 100 feet below the present set. The ore found in present levels is very low grade, and the management expect to get a better grade by sinking.

The East Waverley Tunnel Co., (Messrs. Gue & Wilson) are driving on the barrel lode, which is reported as showing well. An air drill plant will be put in commission next month, when the main cross-cut tunnel will be continued to strike other lodes lying further east.

#### Oldham.

The "Columbia Gold Mining Co." (which is the name the Attleboro-Providence syndicate has bestowed upon the property lately purchased in this district,) raised steam and started the mine pump on the sixth of the month. The company purchased the entire outfit of the defunct "Huntington Keef Co.," near Yarmouth and transported it to Oldham. The machinery is mainly from Fraser & Chalmers, Chicago, and is ample for a much larger property than the company now has. The boiler is 60"x14", engine, 16"x24", with cage for vertical shaft (not in use), mine cars, etc., a Lidgerwood hoist, 10 stamps of 850 pounds each, with water tank, plates, pipes, etc., etc.

The Oldham Gold Co. closed its Baker mine on Wednesday the 4th inst., and began the work of raising the pumps and saving such material as was valuable. It is understood that the 200 foot level south from No. 3 shaft will be prospected by a force of four men for a month or so yet, but all other shafts and openings have been definitely abandoned.

Next summer other lodes on the property will be prospected, and work on the West Dunbrack lode will be vigorously continued during the winter.

The Rhode Island Co., working on the western extension of the Dunbrack lode, have cut large quartz (from 6 to 10 inches thick) at a depth of 175 feet. This quartz shows some gold, with associated minerals, and the management express strong hopes of coming on a chute of pay ore.

#### Malaga District.

It is reported that the Malaga Mining Co. closed down its works on the Rabbit lode the first of January. This company's product for 1892 was between 1,300 and 1,400 ounces. There are many other lodes on the property that are pay lodes, according to good authority.

The Boston Gold Mining Co. are reported to have made a promising discovery of higher grade ore. The product fell off somewhat in August and September, but it is believed that the new discovery will bring the gold for 1893 up to the standard.

#### Fifteen Mile Stream.

The Egerton Co. and the Stanley Gold Mining Co., in this district, are reported as having consolidated their properties, and to be perfecting plans for development. Both properties have good records.

#### Renfrew.

The sale of machinery and personal property of the Empress Co., at this place, advertised for the 21st December, was postponed until March next. The judgments against the property aggregate \$4,000 and upwards. It is understood that the sale in March will include the mines, as well as the machinery and plant.

#### Goldenville.

Mr. Jas. A. Fraser has purchased the "Meridian" and "Chicago" properties here for about \$3,000, and rumor says will operate the same next season.

The district is very dull, absolutely no mining being carried on this winter.

#### Cape Breton.

Subjoined are a few brief notes in regard to the work done in 1892 at the various Cape Breton collieries.

#### General Mining Association.

(a.) "Old Sydney" Mine.—This colliery leads all the others in quantity shipped by a very handsome margin, and has established a record, not only for itself, but for the island. It has always been looked upon as the leading colliery in Cape Breton, and only once, viz. in 1891, when it was outstripped by the Gowrie and Reserve mines, has it failed to stand at the head in the list of shipments. Outside the ordinary work, the only noteworthy improvement effected last year was the lining of the main pumping shaft at the "Princess" pit with cast iron tubing to a depth of 330 feet. The pit is 11 feet in diameter, and it took 1,179 pieces of tubing, each cast to the curve of the shaft, and the weight of all was 378,000 lbs. The tubing was all cast at the company's own foundry. Three hundred feet of this shaft had been tubbed while the pit was being sunk to keep back a feeder of water, so that the shaft is now lined with cast iron to a depth of 630 feet. Its total depth is 709 feet. The last "tubbing" was done for the purpose of preserving the shaft sides which were wasting away, owing to the heat from the steam pipes, combined with the water from the pumps.

(b.) Victoria Mine.—A very material progress has been made at this colliery in the quantity of coal shipped, and it now takes rank well up among the leaders. No work of note, outside the ordinary routine, has been done here, but regretful reference must be made to the terrible accident that occurred on Christmas eve, when, through one of the boilers exploding, three poor fellows lost their lives, while two or three others were more or less injured. The other boilers were dislodged from their seats by the force of the explosion, and the effect of course was to render mining operations out of the question for some time. The company are putting in a new boiler supplied by Messrs. Robb, of Amherst, N. S. Mr. Thos. Brown has recently been made assistant manager here, under Mr. R. H. Brown, the agent of the Association.

Gowrie Mine, Cow Bay.—The Messrs. Archibald & Co. are to the fore, although not quite in front this time, with a shipment of 138,500 tons. The Gowrie has been making steady progress for some years past and is now second to none in public estimation as a steam coal. Last year Mr. Charles Archibald extended his deep 300 yards, and drove a new level east off the deep. He put in an Ingersoll air compressor, and is now driving the pumps in the mine with air instead of steam. A new pump was put in the lower deep. The greater part of the shipping wharf was re-trestled, and the greater part of the main pier new fendered, the planking renewed, and new drop and shoot frames erected. Satisfactory prospecting was done on the company's third lease with the diamond drill, and a six-foot seam traced all along the outcrop for half a mile.

Sydney and Louisburg Coal and Railway Company.—This company shows up well with a shipment of 136,000 from the "Reserve" and "Emery" pits. We do not know of any noteworthy feature in the year's work. The Ingersoll air compressor stationed at the Emery pit continues, we believe, to give satisfaction in working the coal cutting machines in the mine, and also in pumping. The management has recently offered up praise and thanksgiving for the discovery of a large body of coal underlying the "Reserve" area that was hitherto unknown and unexpected. It subsequently transpires, however, that the existence of this body of coal has been known to ever one, except the present officials, for many years past, and the shout of triumph has been abruptly stilled. A little work was unexpectedly done on the new coal area towards the close of the year, but was quickly discontinued.

The International Coal Company.—This company, foreseeing a falling off in the demand for coal, did very little banking in the early days of 1892, but their work after navigation opened was fairly brisk. They had the honor of establishing a record on July 9th, when they raised 1,452 tons from their shaft between 7 a.m. and 6 p.m. On this day they shipped over 2,700 tons from their Sydney pier. The company erected last year a slack bin adjoining their heapstead, into which the slack is conveyed from the screens for storage. The bin has a capacity of 750 tons, and the slack can be rapidly loaded into cars when occasion requires. It has been proved to work admirably and to be a great saving as regards time and expense. The heapstead has been raised and rearranged so that the coal as it comes from the shaft can be handled with more ease and expedition than before.

and by only half the number of men that were formerly required. The company's railway is quite a feature in their business, as, in addition to carrying their own coal, they carry the coal from the Old Bridgeport and Gardener collieries, and maintain a regular passenger and freight service between Sydney and Bridgeport. In addition to carrying and shipping the output of the Gardener colliery, the International Company has for the past two seasons purchased the output of the Old Bridgeport colliery, and disposed of same along with their own coal. They have also during the same period purchased about 50,000 tons coal each year f.o.b. from the Little Glace Bay Company, and carried same to Montreal in their own steamers.

**Caledonia Coal Company.**—This company shows a heavy falling off in their shipments for 1892, as compared with 1891. The principal cause of this was the loss of a large portion of the C.P.R. contract in Montreal, in which contract they participated to a large extent during the preceding seasons. The diminution in work done has not prevented the management from spending a considerable amount of money during the year in some very substantial improvements to the works. Foremost amongst these has been the acquisition of an Ingersoll air compressor, with which some coal cutting machines are worked, and a considerable amount of pumping done. A blast is also furnished therefrom to the blacksmith's forge. This addition to the plant has given the management every satisfaction. This company has kept up during the season its reputation for the rapid loading of their time-chartered steamers.

**Little Glace Bay Coal Company.**—The season was not marked by any unusual features for this concern. They shared in the general falling off in shipments, but managed to do an excellent business. The larger portion of their coal was purchased by the International Coal Company f.o.b. for disposal in the St. Lawrence market. The company has not been behindhand in improving their plant, having erected a new hoisting engine during the year, and also a new and powerful pump. They have also gone largely into the coal barge business and have now three barges of the whaleback type carrying their coal to Halifax, Prince Edward Island, Newfoundland and elsewhere. Towards the end of the year the company purchased the Steamer "Gulnare," which has of late years been employed by the Imperial Government in surveying the North American waters, to replace the tug-boat "C. M. Dinch," which they have so far used to tow these barges.

**Old Bridgeport Colliery.**—This colliery has been leased for several years past from the General Mining Association by Mr. Henry Mitchell, who has for two seasons past sold his output at the pit's mouth to the International Coal Company. On the 31st December it passed altogether into the latter company's possession, having been purchased by them from the General Mining Association. Under the new ownership it is expected that operations will be carried on upon a largely increased scale. The management of this mine under the late lessee, Mr. Henry Mitchell, has been highly successful.

**The Gardener Coal Company.**—This is the infant colliery of Cape Breton, but although the youngest, it has already given abundant evidence of great precocity. First started in 1891, it has more than doubled its sales in 1892. The Messrs. Burchell Brothers have shown great push and enterprise in capturing a fair share in the local markets. They have been aided in their efforts by the excellent quality of their coal which is especially popular as a steam coal. This is the only colliery where an Electric Coal Cutting Machine (Jeffery make) has been used in preference to those worked by air. We understand from the Gardener Company are getting excellent results from the machine in their pit. Under the vigorous management the Gardener mine is fast assuming the look of a busy and thriving colliery.

### Ontario.

During the month a miner named Enos. W. Bingley, working at the Blezard Mine, fell from the top of the shaft, a distance of 145 feet being instantly killed.

**The Engineering News,** under date of 19th, has the following regarding the Central Ontario Iron Mines:—"Central Ontario Iron Mines.—The mines owned by this company at Coe Hill, Ont., were expected to do a very large business, and at one time a considerable quantity of ore was shipped to Cleveland, O. The United States duty of 75 cts. per ton, however, makes it difficult to find a market in this country, and the establishment of ironworks in Canada does not seem very probable, as stated in the "Canadian Notes" in our issue of Nov. 3. The suggestion has been made to establish charcoal pig works at the mines. One Pennsylvania ironworks proposed a few months ago to take some ore if it could be delivered at the works for \$4.38 per ton. The ore is said to have 68% of metallic iron, with no phosphorus, but a disadvantage is its large proportion of sulphur, although modern improvements in the treatment of sulphury ores will probably eliminate the objection. Mr. T. D. Ledyard, of Toronto, in writing of these mines, says that where other injurious elements are absent, a sulphurous ore, after being properly roasted, can often be used in the manufacture of Bessemer iron. In the report of the

Royal Commission on Mines and Their Development, 1890, it is stated that "it seems to be three shafts, one 140 ft. and two 150 ft. deep. They are filled with surface water, but the pump pipes are in place, and it is said that no water was encountered in working." The hoisting plant is in good condition, and includes a powerful Gates (Akron, O.) winding engine and two boilers. The mines are now in charge of Mr. Johnson, the company's Foreman of Mines, who is an experienced Welsh miner, and is prospecting for the company. When at work night and day, the output was about 50 to 100 tons per day. Samples of the ore have been selected for exhibition at the World's Columbian Exposition."

### British Columbia.

From our Kaslo notes it will be seen that there are 17 mines going to be worked in the Slocan district all winter. Suppose those mines employ six men each, on an average, this means 102 men at work, and a pay-roll behind Kaslo of over 10,000 a month. This estimate is, from the nature of things, rough, but it is certainly not over-stated. Several deductions may be made from it which will help to bring the wealth of the Slocan before outsiders. Suppose the camp remains stationary for six months, or 150 working days, and that each man is responsible for half a ton of ore averaging net profit of \$100 per ton, that represents 7,050 tons of ore; say that shipping expenses and net profit come together to \$175, the result would be \$1,338,850 for the six months' work, of which \$765,000 would represent the profit to the mine owners. Or take another way of looking at it. Let us say seventeen mines include all the good properties in the Slocan. If, while doing development work and employing six men each on the average, they are capable of producing \$1,300,000 in six months, what will be their output when fully opened up and employing from twenty to thirty men apiece? Having worked out this little sum in proportion, let the outsider consider what part of the available wealth of Slocan is represented by seventeen claims, and then let him figure the whole thing out on the same basis, and he will have some conception of the future which every inhabitant sees sticking out big before this country.—*Miner.*

The secretary of the Westminster Slate Company has been notified that the contract for supplying slate to be used on the roof of the new drill shed at Victoria had been awarded to his company. The value of the contract is something in the neighborhood of \$1,500, and the number of slates contracted for is 30,000.

Duplicate samples of coal from the various collieries are being sent into the government office to Mr. M. Bray, who will forward them through Mr. A. Dick, inspector of Mines, to the Imperial Institute at London, England, and to the Columbian exhibition at Chicago. From the Protection Island mine and from the Wellington colliery blocks of coal of extra large proportions will be exhibited.

From a gentleman recently from the Cariboo country it is learned that the Victoria Hydraulic company and the South Fork company have been doing a good season's work on the Quesnelle Forks. The Victoria company have completed about 12 miles of ditch, five feet on the bottom, seven feet on the top, and two feet deep. Water from this ditch can be taken from Spanish creek to either the North or South Forks. There is a quantity of gold in the country, but it takes a heavy outlay to open things up. The time so far has been spent in getting matters into shape for next year. The Victoria company has a mile of iron pipe to connect with the from Spanish lake. They have not yet reached bedrock, though they are down about ninety feet in good ground.

The South Fork will do well during the coming year, as from present indications some eight or nine months working can be done. Each company has been employing a large force of men this year, and considerable work has been done. The South Fork company has finished eight miles of ditch four feet on the bottom and twenty inches deep.

W. W. Purdy is in town with a choice collection of mica brought down by him from his claim, 8,000 feet above sea level, on the Rocky Mountain range, and distant from Kamloops some 276 miles. The district is practically unknown, and Mr. Purdy himself cannot do more than locate his claim. It adjoins that of Louis Vie, of Kamloops, who located on the information of Indians, who spoke of "glass in the ground." The samples brought down by Mr. Purdy run from six inches to three feet square, and are really beautiful. Even the croppings are superior cuts. There is said to be an illimitable quantity of the mica.

## CANADIAN COMPANIES.

**Leeds Copper Co.**—At the annual meeting of the Leeds Copper Company, Limited, held on the 29th ult., voluntary liquidation was decided upon with a view of reconstruction. The capital of the existing Company is £285,071 in fully paid shares of £1, and for each old share it is proposed to issue one new share of 2s., with 1s. credited as paid.

**Ontario Natural Gas Co., (Ltd.)**—Is applying to the Dominion Government for Supplementary Letters Patent increasing the capital stock of the Company to \$500,000.

**Canadian Copper Company.**—Several prominent Canadian attorneys have been in Cleveland, O., on an important mission. It is an examination ordered by the High Court of Justice of Canada in the suit brought by the Central Ontario Railway against Senator H. B. Payne, Judge Stevenson Burke and H. P. McIntosh, of Cleveland, and S. J. Ritchie, of Akron. The claim set up is that funds of the railway were illegally diverted from the railway to the Canada Copper Company and the Anglo-American Iron Company, of Canada, and several millions of dollars are involved. Judge Burke is president of the railway and both the other companies and the other defendants are stockholders in all three of the corporations.

**Canadian Pacific Prospecting and Mining Co., Ltd.**—The annual meeting of the Canadian Pacific Prospecting and Mining Company, Limited, is to be held on the 11th inst. The Company has a subscribed capital of £10,000, of which £3,808 has been received. In the report to be presented to the meeting, the directors state that it has been suggested by some of the shareholders that the Company be wound up, but Mr. E. E. Rand, one of the directors who has just returned from British Columbia, is so impressed with the recent development of the mining industry in that country that he has advised the Board to defer the liquidation for a few months, as it may be possible during that period to acquire the option of a property with a view to its flotation in London or Canada.

**British Columbia Coal, Petroleum and Mineral Company, Limited.**—Formed to acquire by purchase from the Crow's Nest Coal and Mineral Company, (Limited), all their real and personal property for the sum of four million dollars, to be paid in fully paid up shares of the Company, and for the purpose of acquiring coal lands and lands producing coal oil and other lands, and working the said lands in a workmanlike manner for the purpose of getting and mining coal and coal oil and other minerals therefrom, and selling or leasing the same; and also for the purpose of guaranteeing the debentures or bonds to be issued by the British Columbia Southern Railway for obtaining money for the construction of the said railway, from Michel Creek, Crow's Nest Pass, to the international boundary, and thence to connect with some railway in Montana, U. S. A.; such guarantees to be limited to \$25,000 per mile for 175 miles of railway. Capital \$4,000,000, in \$40,000 shares of \$100. Trustees, Joseph D. Pemberton, E. G. Prior and Wm. Fernie, all of Victoria, B.C. Head office, Victoria, B.C.

**The Van Winkle Consolidated Hydraulic Mining Company, Limited.**—Formed to take over and acquire mining leases of the lands known as the Van Winkle Bar, in Yale district, B.C., and also certain grants and water rights, dated 27th October, 1892, granted to Frances Helen de Wolff and to William Monro, and to acquire all the rights and interest of all the parties interested in what is known as the Van Winkle Bar, and the water privileges in connection therewith, also to carry on hydraulic or other mining. Capital, \$500,000 in 50,000 shares of \$10. Trustee, R. G. Tatlow, A. T. Ceperley, J. M. Buxton, E. Mahon, and George de Wolff. Head office, Vancouver, B.C.

**Alberta Railway and Coal Company**—Gives notice of application to Parliament for an Act to extend the time for completion of its railway to Fort McLeod, and thence to and through Crow's Nest Pass and British Columbia, and to authorize it to lease or sell and convey to the Canadian Pacific Railway Company those portions of its railway and charter rights in respect thereof extending from (1) Dunmore to Lethbridge, (2) Lethbridge to Fort McLeod, (3) Fort McLeod to and through the Crow's Nest Pass and British Columbia, or from Dunmore to and through the Crow's Nest Pass and British Columbia, or any one or more of said portions of their railway, or to enter into an agreement with the Canadian Pacific Railway for giving them running powers over any or all of said portions of their railway, or for the operation by the Canadian Pacific Railway Company of any or all of said portions of said railway.

**Strathyre Mining Company, Limited**—Gives notice of application for Dominion Charter of incorporation. Authorized capital \$125,000 in 1,250 shares of a value of \$100. Directors, Duncan McIntyre, Montreal; R. B. Angus, Montreal; H. C. Hammond, Toronto; W. C. Van Horne, Montreal; C. R. Hosmer, Montreal; L. J. Forget, Montreal and Thos. G. Shaughnessy, Montreal. Head office, Vernon, B.C. George Attwood, M.E., F.G.S., Consulting Engineer. Formed to acquire and work tracts of mineral lands in the Province of British Columbia and elsewhere in the Dominion. At date it owns and is operating certain gold properties at Fair View Camp, in the Okanagan district, B.C.

**Asbestos Company of Newfoundland, Limited**—Registered by E. Eady, 8 Glenlyon-Terrace, London W., England. Capital £10,000 stg. in £1 shares. Formed to carry into effect an agreement with R. H. Jones of the one part and E. W. H. Eady, on behalf of the Company, of the other part; generally to search for and deal in asbestos and other minerals. Directors J. W. Shepherd and W. R. Mitchell.

**Y-One Mining Company.**—The regular annual meeting of the stockholders of this company was held in Chicago, November 9th last, and the following directors were duly elected: John T. Huntington, Col. J. S. Morgan, John W. Lewis, H. S. Sprague and P. N. Taylor. At a meeting of the directors held at the company's business office, 29 Euclid avenue, Cleveland, O., on November 15th, Col. J. S. Morgan was elected as president and general manager; John T. Huntington as vice president and assistant manager; John W. Lewis, secretary and treasurer, and Prof. R. J. Grant as superintendent of mines. President Morgan made a verbal report on the condition of the company affairs and property; he said a tunnel had been started in the fall to cut the five ore veins that are known to exist on the property. The tunnel has now reached 120 ft. from its entrance with a backing of 75 ft. The main edge on the property is exposed in the bed of Silver Creek for a distance of 80 ft. by 20 ft. wide, and assays from \$143 to \$223 per ton silver. The company intend erecting a concentrating plant of machinery on the property early in the coming spring, when concentrates and ore of very high grade will be shipped to the United States for treatment.

**Shafer Gold and Silver Mining Company.**—Registered under the Companies Act, (B.C.) to carry on the business of mining for gold and precious metals in British Columbia. Capital, \$400,000. Head office, Ainsworth, B. C.

**New Explosives.**

According to experiments by Cronquist, the blows required to explode the following explosives, each about 0.4 gramme in weight, were approximately as follows:—

|   | Foot-Pounds. |
|---|--------------|
| Nitro-glycerine.....                      | 2'1 to 5'7   |
| Dynamite.....                             | 3'5 " 12'8   |
| Gun-cotton, dry.....                      | 5'7 .....    |
| Gun-cotton with 20 per cent moisture..... | 16'5 .....   |
| Sebastine.....                            | 4'9 .....    |
| Romite, common.....                       | 4'3 .....    |
| Romite, naval.....                        | 13'7 .....   |
| Powder, (fired only).....                 | 27'2 .....   |
| Bellite.....                              | 44'8'4 ..... |

According to Lindall, on the other hand, plastic dynamite is much more useful than romite or bellite, which are also very much lighter—as much even as 40 per cent. Comparative experiments between plastic dynamite and bellite which were made near Stockholm showed advantages in favor of the former, though Cronquist states that bellite shows not the least trace of flame on explosion. A mixture of 20 per cent. of dynamite with 80 per cent. of ammonia powder is also stated to be a very safe explosive as regards freedom from flame.

Nordenstrom observes that explosives, such as romite and bellite, which contain hydro-carbon derivatives, have as yet been comparatively little used in metal-mining. Fifty tons of romite was used at Gellivaara, but details are not available. These explosives are of little value for wet holes, and require much stronger caps than those usually employed. On the other hand, their transport is a matter of very little danger.

According to E. Pellissier, comparative trials have been made in the district of Linares, Spain, of an explosive called nitramite and gelatine dynamite. In hand-boring the nitramite, though somewhat less powerful in its action, showed a saving in the expenditure, and this saving became considerable when compressed air boring was employed. In this case, too, the work performed in the twenty-four hours was greater in the case of nitramite than when dynamite was used. The tunnel being driven was advanced in the twenty-four hours 33.39 inches when dynamite was used and 34.97 inches when nitramite was employed, the respective costs being 2s. 11d. and 2s. 6d. per shift. The author observes that the action of the nitramite, though less violent than that of the dynamite, is more shattering. He recommends that in using nitramite the cartridges should be placed well home in the bore-hole and in intimate contact with each other, but not in any way compressed. The detonator must not on any account be allowed to detach itself during the charging of the hole from the central portion of the cartridge, as this has a different composition. If there is water in the bore hole, extreme care must be taken that none of it penetrates into the cartridge or detonator. This requires peculiar care if the charge is to be fired after filling the bore-hole with water. The chief experiments in Spain with this explosive have been carried out at the Arraynes mine under the direction of P. P. de Uhagon. The rock bored through in the experiments to which reference has been made, was granite in the case of the hand-boring, and vein stuff with some granite intrusions in the case of the machine-drilling.

A commission appointed by the Belgian government has recently experimented with a new explosive. This is stated to be named "Fortis," and to be from 30 to 40 per cent. more powerful than any other explosive known. A comparatively small charge placed in a 13-foot-bore hole in the face of a quarry dislodged a mass 200 feet in height, breaking it up into pieces mostly of from 50 to 60 pounds. n weight, and hurling some of these for a distance of 350 yards.

O. Muhlhauser describes an explosive made from hemp, and named nitro-hemp (nitro-jute.) It is produced by

treating one part of hemp with fifteen parts of nitro-sulphuric acid at a temperature of 15° C. After washing, this material is a brownish-yellow silky-looking wool, having the composition C<sub>12</sub> H<sub>15</sub> O<sub>5</sub> (ONO<sub>2</sub>)<sub>5</sub>. It is insoluble in water, ether, benzine or alcohol, but is soluble in acetic ether and nitro-benzine, or partially in ether-alcohol. In its explosive action it is almost identical with gun-cotton.

A new explosive named "Nico" has been tried at the corporation quarries, Clifton Hill, Melbourne. A 4-foot hole in the toe of a solid piece of rock was charged with one and a quarter pounds of cartridges and a little loose powder, the hole being too large for the cartridges. A second hole 6 feet deep was similarly charged with two and a half pounds of such powder, and a third with two pounds. Each of these shots gave successful results, as also did a number of others.

**Methods of Testing Explosives.**—To ascertain the duration of the explosive action, P. Vielle has devised a registering crusher gauge. A steel point attached to the steel plug which compresses the copper cylinder in a crusher gauge apparatus, is used to trace a curve on a revolving cylinder which is driven at a speed of about 33 feet per second. The pressure of the gases generated by the explosion can be calculated from the composition of the explosive, or can be found from the deformation of the copper crusher gauge, while the pressure at any instant can be found from an inspection of the curve. By means of this apparatus it is found that the duration and also the manner of combustion varies very greatly with different explosives.

**Fan-Testing Gauges.**—Some notes on fan gauges in connection with fan-testing and the adaptation of fans to mines, and also a comparison of the fan and furnace at Silver Hill colliery, are given by the Rev. G. M. Capell. It is considered that the most satisfactory position for taking the gauge is 6 to 10 feet away from the inlet in the larger part of the fan-drift. The German practice of deducting the work of the air due to its velocity is not considered fair. After many observations, the author advises that the end of the gauge should be plugged with cotton-wool and wrapped with soft flannel; but definite rules for the position and use of water-gauges ought to be drawn up and adhered to in all fan-tests. Where fans have taken the place of furnaces, some curious results have been observed, and this may arise from the fact that the gauge in furnace ventilation does not account for the shaft friction in the up-cast and down-cast shafts. Direct calculations probably give too high results for these factors. The author then proceeds to give the results of some tests with furnace and with fan ventilation, to illustrate the difference in the gauges obtained by the two methods.

**Association of Apatite with Beds of Magnetite.**—The frequent association of apatite in layers in the midst of magnetic iron ore, according to Mr. W. P. Blake, is significant of a stratified and organic origin of both minerals. The phosphate is usually more abundant towards the sides of the bed than at the centre, where the iron ore may be free from phosphorus, and near the planes of contact of the ore with the country rock apatite may abound. Several instances in which this is the case are given by the author. The Sanford ore bed in Northern New York carries large quantities of apatite in thin layers apparently interstratified or the result of segregation. This mineral, known locally as red sand, is most abundant towards the confines of the bed. Crystalline apatite may also be found in the outer layers of the bed of ore at Iron Mountain, and similarly in some of the beds of magnetite in Southern Utah.

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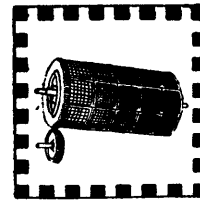
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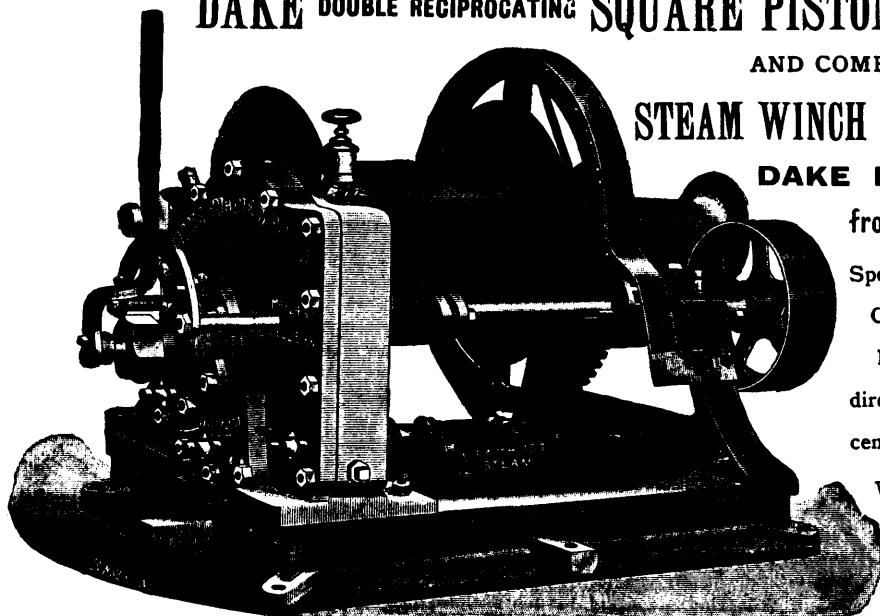
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Royalty on all the Gold they extract at the rate of two per cent. on smelted Gold valued at \$19 an ounce, and on smelted gold valued at \$18 an ounce.

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

### MINES OTHER THAN GOLD AND SILVER.

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

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John C. Smith, Supt. of the Ogema Mining and Smelting Co., says: “It gives me great pleasure to add my testimony in favor of the Crawford mill in every way, as to its ‘gold saving qualities,’ ‘practically no loss of mercury,’ ‘small volume of water required per ton of

ore,’ ‘great ease of manipulation,’ also as to its portability to mines remote from railroads, and ‘ease of setting up ready for operation.’”

L. J. Boyd, M.E., Supt. Montagu Mines, after personally supervising a test on arsenical ore says: “The results were simply wonderful. I am personally perfectly satisfied with this system of ore treatment, and should advise its adoption, as the experiments were carried on by my personal superintendence. Similar ore was treated by the Montagu stamp mill showing a difference of 100 per cent. in favor of the Crawford mill.”

Fredericksburg, Va., *Free Lance*, Sept. 6.—“L. G. Johnston, of this city, in an interview, said he sent to the M.G.E. Co., N.Y., one ton of very low-grade sulphuret ore from the mines of the Powhattan L. & Mining Co., Culpepper Co. He went to New York and personally

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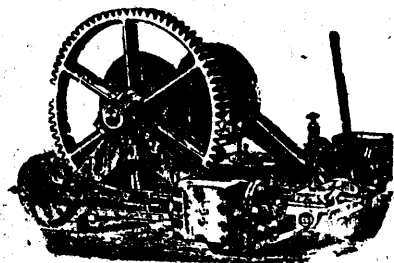
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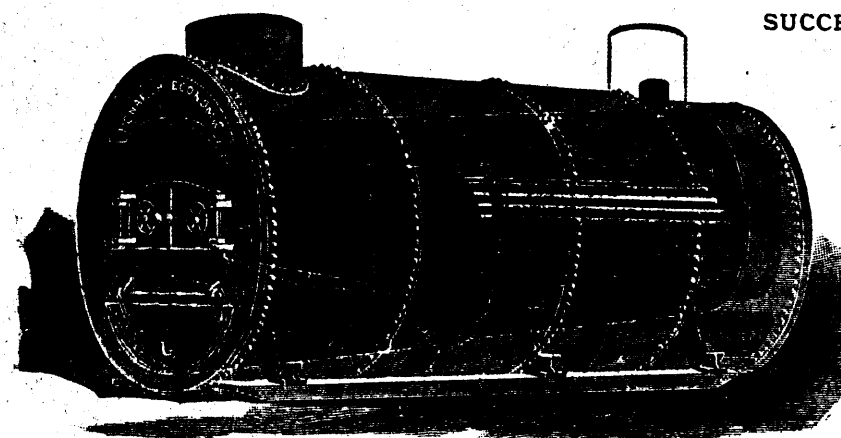
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