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Established 1882

Vol. XVIII--No. x.

OTTAWA, OCTOBER 31st, 1899.

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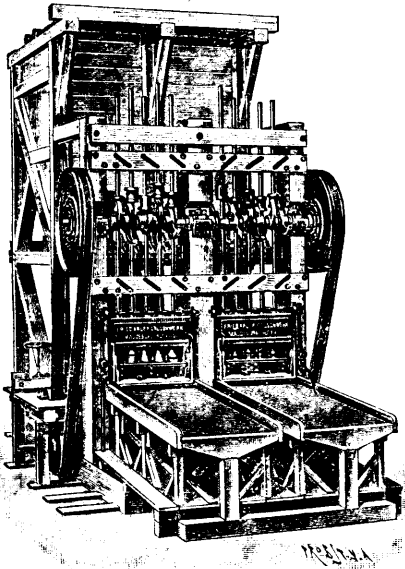
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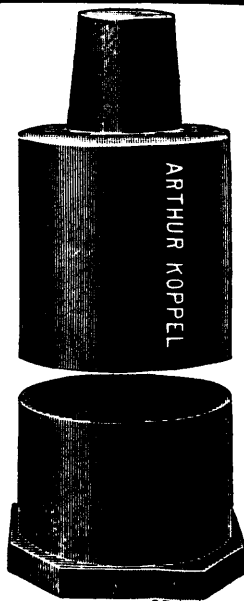
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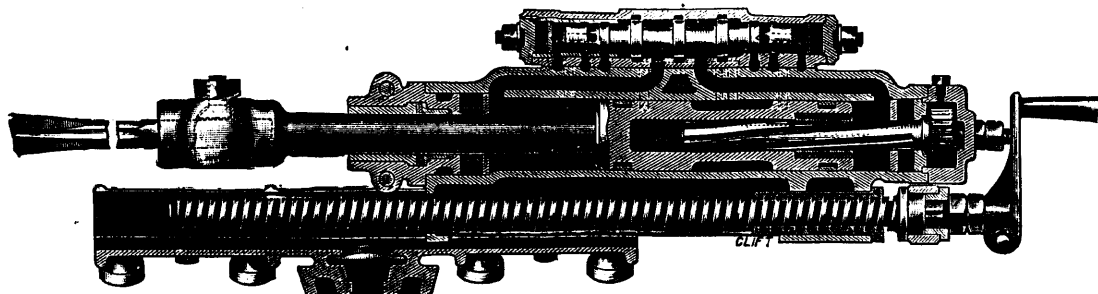
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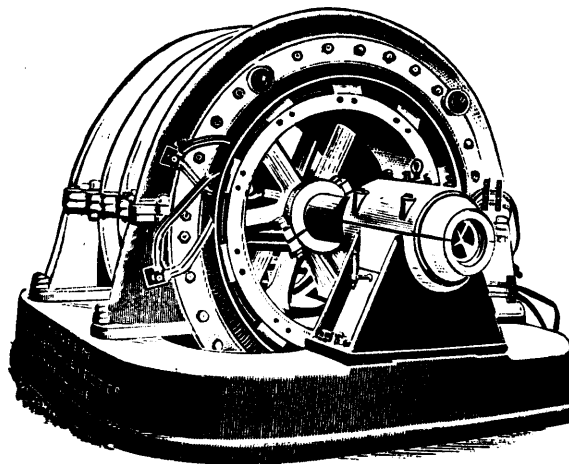
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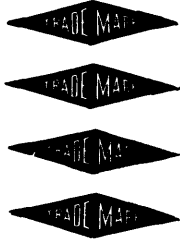
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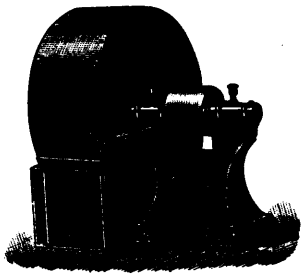
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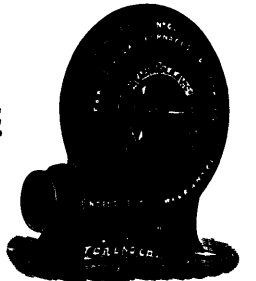
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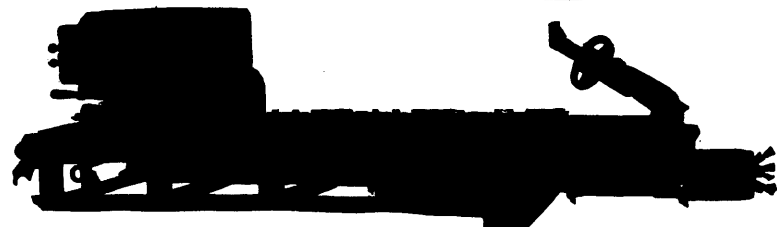
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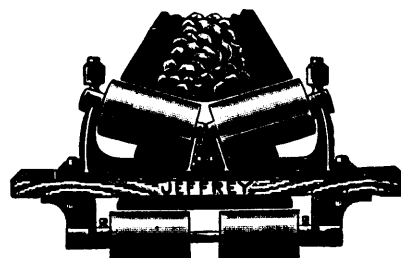
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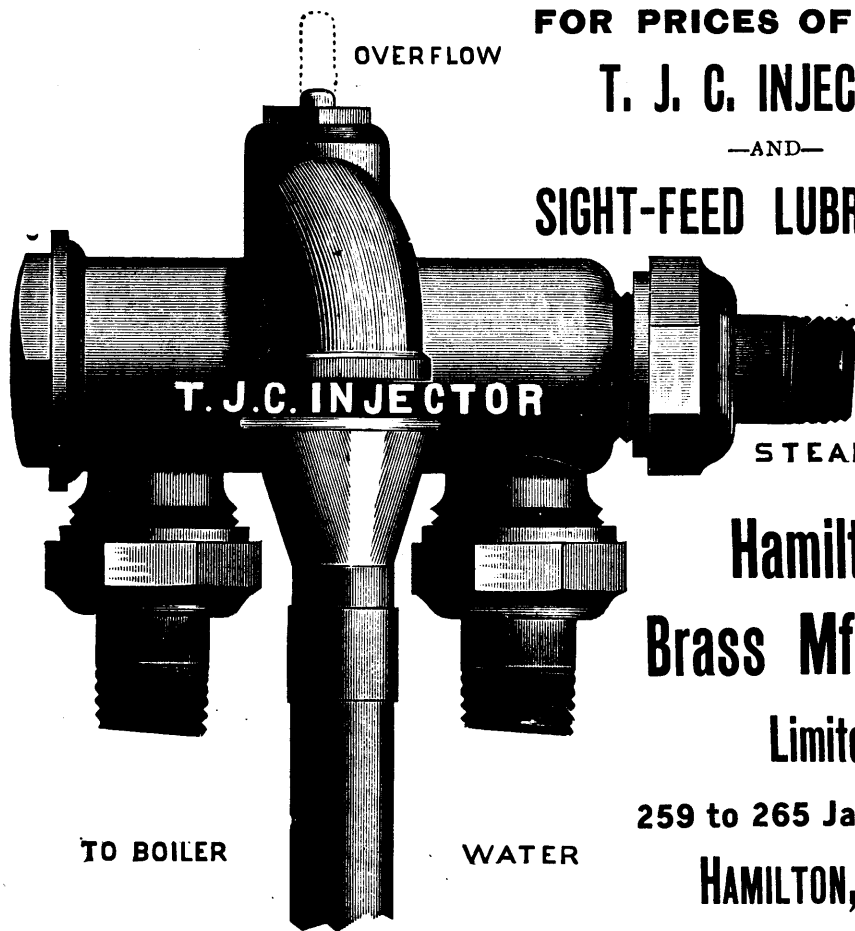


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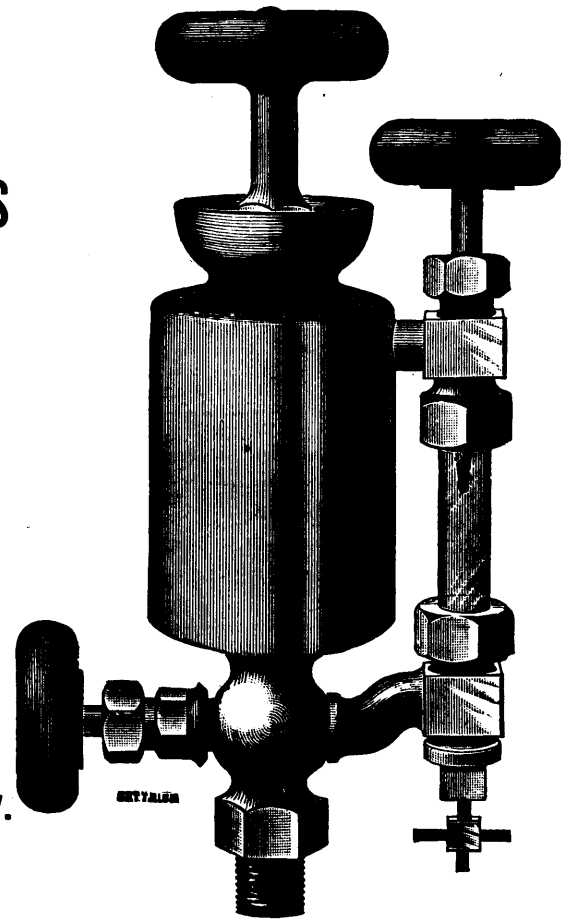


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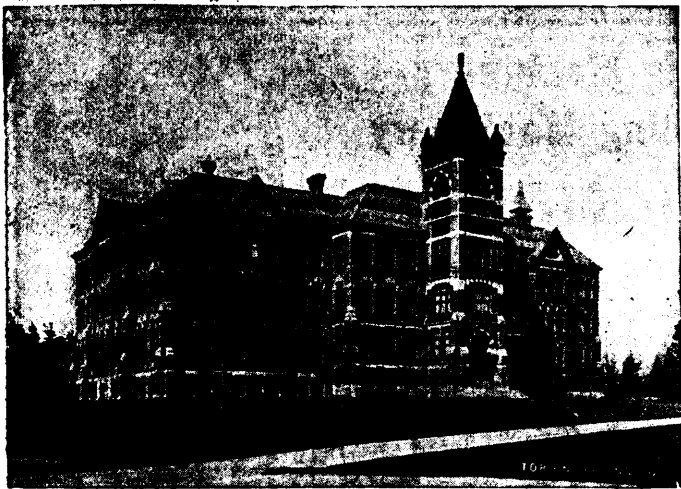
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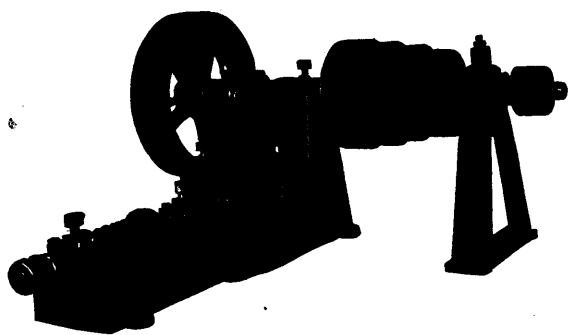
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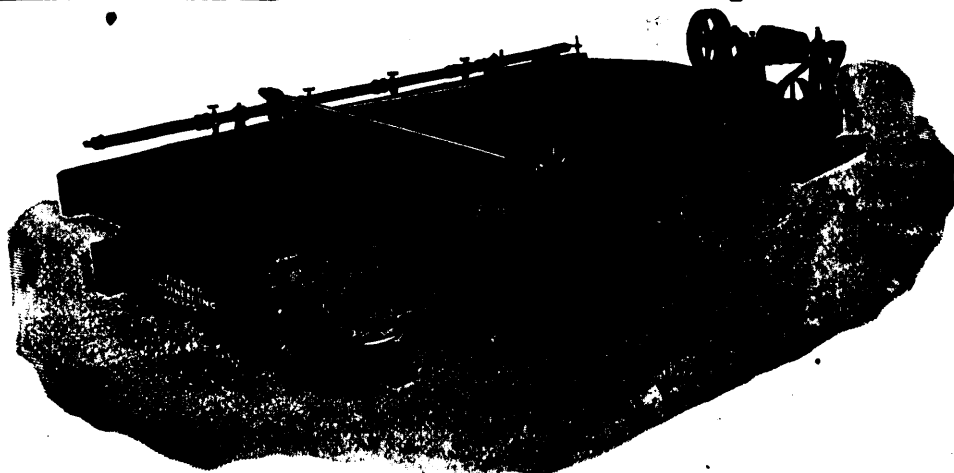
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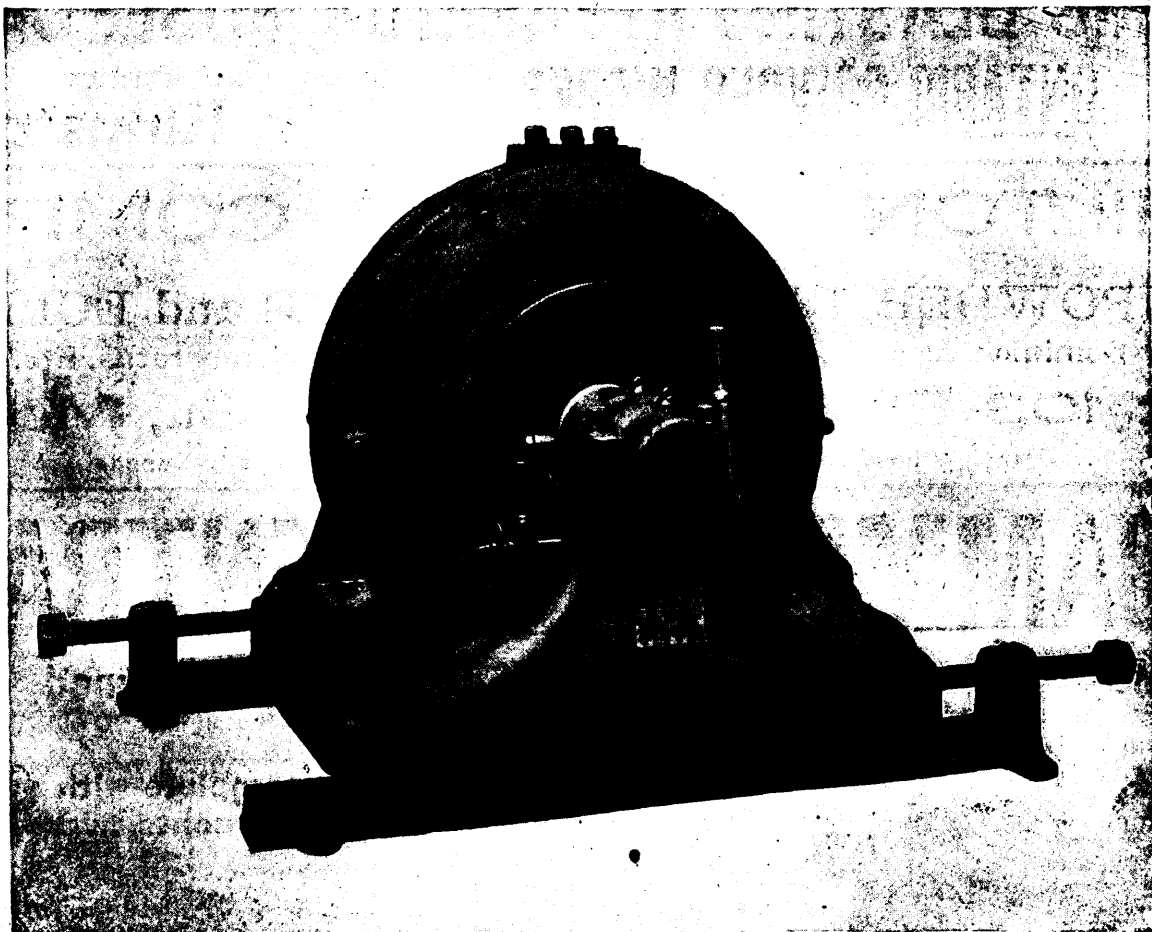
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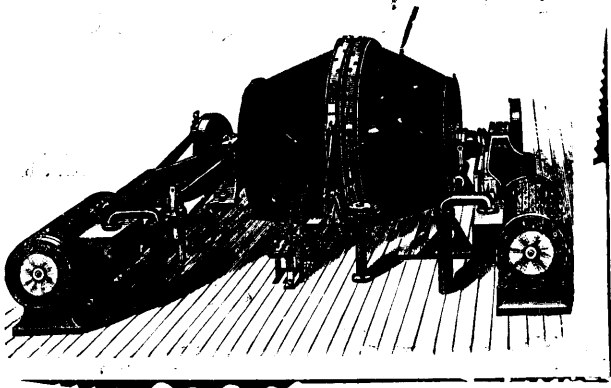
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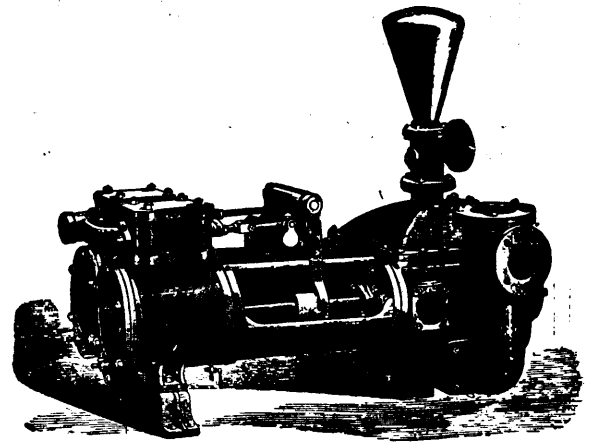


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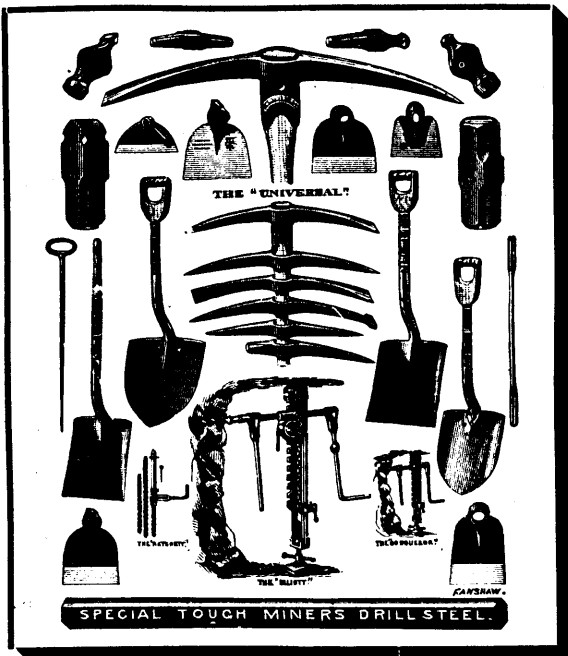
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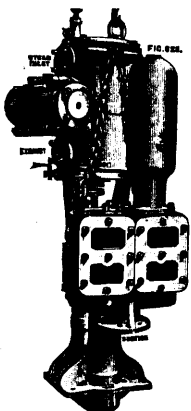


Fig. 620—"Griff"
Sinking Pump.

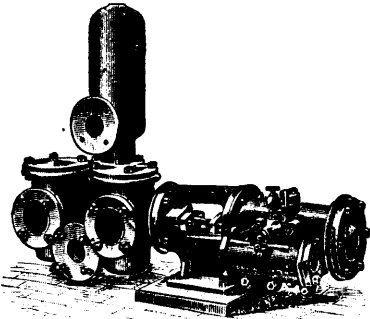


Fig. 598—"Cornish" Steam Pump
for Boiler Feeding, etc.

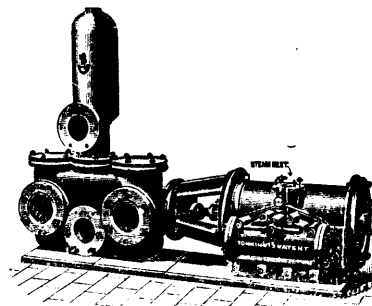


Fig. 600—"Cornish" Steam Pump
for General Purposes.

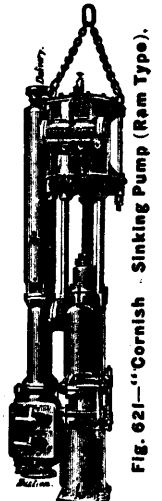


Fig. 621—"Cornish" Sinking Pump (Ram Type).

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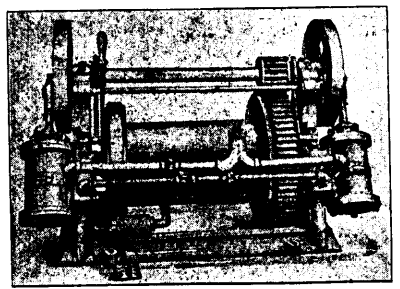
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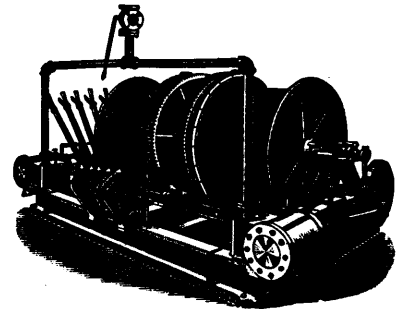
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VOL. XVIII., No. 10.

OCTOBER, 1899.

VOL. XVIII., No. 10.

The Prosperity of Cape Breton: Its Great Coal, Iron and Steel Industries.

History is repeating itself on a somewhat enlarged scale in Cape Breton. Early in the seventies the island—or at any rate that part of it underlaid by coal seams, enjoyed a well-developed “boom,” in which the late F. N. Gisborne, superintendent of government telegraphs in Canada, played a conspicuous part. Mr. Thomas Fenn, a well-known London stockbroker, paid a visit to Cape Breton in the summer of 1873, armed with what must have been then a rarity amongst tourists, a camera. He was charmed with the scenery and more than impressed with what he saw and heard of the commercial possibilities of the country. On his return to London his photographs testified to the natural beauties of the island, while his tongue did such ample justice to its mineral resources that his friends freely embarked their money in the Glasgow & Cape Breton Co., which, under the direction of Mr. Gisborne, was then opening up several mines and building the narrow guage railway between Sydney and Louisburg. Money flowed like water and splendid returns were promised from the lavish expenditure. But as it was with Brunel and his “Great Eastern,” so it happened with Gisborne, Fenn & Co. They were ahead of the age and dire disaster, culminating in hopeless bankruptcy, fell upon them. And as a consequence of this fiasco an evil odour attached itself to mining ventures in Cape Breton among English investors for some years. But history has eventually justified Brunel and his idea of mammoth steamships, and now that Cape Breton, after a lapse of nearly thirty years, has come to her own again, a measure of justice should be paid to Gisborne and his associates who shewed such genuine, if ill-starred, faith in the possibilities of the island.

The present remarkable revival of interest in the resources of Cape Breton has been mainly brought about by the genius, the magnetic and irresistible enterprise of one man, Mr. Henry M. Whitney, of Boston. Having built up that great corporation the Dominion Coal Company, he is now engaged in planting alongside of it another gigantic industry, the Dominion Iron and Steel Company.

When, six years ago, Mr. Whitney turned his attention to the development of the rich coal deposits of Cape Breton, Canada furnished practically the sole market for the output of his mines. By cheapening production and the cost of carriage and handling, he has very materially increased his hold upon the home market, but not satisfied with this, he has evolved an entirely new market for his coal at Everett, Mass, where the New England Gas and Coke Company another remarkable venture of Mr. Whitney's—is now using large and

steadily increasing quantities of Cape Breton coal. And now on the top of all this, and backed up by some of the best known business men in Canada, he is embarking upon the manufacture of iron and steel on the shores of Sydney harbor and thus providing another large consumer for his coal. These works have been in course of construction for the past two or three months and are being hurried along with all possible speed. The Federal Government having undertaken to foster the development of the iron and steel industries by an extension of the bounty on the manufactured article for a limited term of years, and on a scale which lessens year by year to the vanishing point, it can readily be understood that time is money in respect to the early completion of the work, and every effort is being made in this direction—only those who have visited the site for these new works can realise what is going on at present within the limits of the township of Sydney. A year ago Sydney had nothing whereon to plume itself save its traditions as the shire town, a pleasant situation and a good summer hotel. The benefits arising from the development of the coal mines had to a large extent fallen elsewhere, and nothing apparently existed to warrant a belief in any substantial growth of the place. But in a few short months the magic wand of Mr. Whitney has changed all this, and every inhabitant is fired with the expectation of being a citizen in the Pittsburg of Canada. The eastern shore of that arm of the harbor known as Muggot's Creek has been selected as the site for the furnaces and mills, and here some 450 acres of land have been expropriated by the town at a cost of \$83,000 and donated to the company, together with the privilege of exemption from taxation for a term of thirty years. About 1,200 men are employed day and night in clearing and grading the land, laying railway tracks and building the concrete foundations for the furnaces, etc. Cargoes of cement, fireclay, bricks, lumber and other materials arrive daily. The housing capacity of the neighbourhood was soon exhausted and large temporary boarding houses have been put up for the accomodation of workmen. About 100 acres of land adjoining the location have been secured for the company, and contracts have been given out for the erection thereon of a superior class of houses for employes. It is needless to add that a marked change has taken place in the value of real estate in and around the town. Property that was practically unsaleable a year ago is now held at fanciful prices, and it may almost be feared that the Winnipeg boom of some years back will find an analogy in Sydney, not only in the inflation of values of real estate but also in the ultimate overdoing of the thing. Be this as it may, however, Sydney is assuredly in for an era of prosperity, and from being a small town of some 2,500 scattered inhabitants must in a few years grow to a city of twenty or thirty thousand.

A conservative estimate places the expenditure upon the buildings and plant, blast furnaces, steel mill, coke ovens, etc., at six million dollars. The four blast furnaces will have a daily capacity of 250 to 300 tons each and the steel mill of 800 tons. Steel will be manufactured by the open hearth process. The largest manufacturers are now bending their energies in the direction of "open hearth" steel, which is found to command the highest price in the market, and is now preferred for structural purposes to steel made by the Bessemer process. These works at Sydney when completed will exceed in magnitude and capacity any individual concern on this continent. Other works, it is true, have gradually developed to greater proportions, but none have started out on a larger scale. And it may be looked upon as a moral certainty that these works as time moves on will also grow to greater dimensions, while industries subsidiary to the manufacture of iron and steel will spring up alongside. Already the Montreal Rolling Mills have prepared plans for the erection of a large plant in the immediate neighborhood and are in treaty with the town of Sydney for concessions on the lines of those granted to the larger company.

The choice of Sydney as a site for these works strikes us as being a singularly happy one. In fact, leaving out the fact that Sydney is not an all-the-year-round port, the location is almost an ideal one. Nowhere else can all the constituent elements of successful operation be found so fortunately combined. Labor is plentiful and fairly cheap. The cost of living is moderate and the climate so healthful and invigorating as to be all in favor of men putting in good and regular work. Cheap fuel of the right quality is on the spot, that is to say, within an easy haul of a few miles, and in inexhaustible quantity. The coking qualities of the coal have been tested with great thoroughness and in order to place the new company beyond all risks as regards the supply and cost of fuel, an arrangement has been entered into whereby the Iron and Steel Company has secured the option till Jan. 1, 1903, of leasing the Coal Company, lock, stock and barrel, for 99 years, on condition of paying all fixed charges and six per cent. annually on its common stock. Contracts have already been given out for the construction of 400 Otto-Hoffman by-product coke ovens. These ovens will, like those at Everett, Mass., be of the most modern design and will save all the by-products of coal which are allowed to go to waste at most of the coke ovens and blast furnaces in America. The water problem has been rather difficult of solution. The water from the adjacent harbor can be used for certain purposes, and it is estimated that by building a dam at a distance of some five miles from the site, a daily supply of sixteen million gallons of fresh water can be obtained.

In the Bell Island (Newfoundland) deposit of iron ore purchased for a million dollars from the Nova Scotia Steel Co., Mr. Whitney secured one of the most remarkable iron-ore properties in the world. This bed of red hematite consists of small blocks of ore, somewhat smaller than an ordinary brick, piled one upon another to a depth of about eight feet. The ore crops up at the surface and the blocks require only to be loosened up to be ready for shovelling into trucks at a trifling cost. The deposit underlies more than 800 acres and is estimated to contain 28,000,000 tons, without reckoning areas which can be followed out under the sea. This deposit alone will satisfy all the company's requirements for many years to come. The shipping facilities are good, and the water carriage to Sydney (or Louisburg in the winter) is a matter only of some thirty-six hours.

Limestone crops up all along the western side of Sydney harbor in quantity as inexhaustible in proportion as the coal and can be ferried across the harbor at slight expense.

Finally the works are situated at tide water in one of the finest harbors in the world and the manufactured article can be shipped into

steamers lying a few hundred feet distant at wharves connected by rail with the works.

From all this it must be recognized that the raw materials for manufacturing iron and steel can be collected more cheaply at Sydney than at any other tide water. This is no idle boast, but can be verified by a careful examination of the facts. Perhaps the closest analogy can be found at Birmingham, Alabama, which has hitherto claimed a natural supremacy in respect to low cost of production, but here the furnaces are distant some 300 miles from Mobile, the nearest shipping port. With steel so cheaply manufactured right on the banks of the harbor, it does not seem too much to expect that a great ship-building industry will, ere many years have elapsed, be in full swing at Sydney; but at this point let us pause and put curb on our imagination.

The enormous demand which Mr. Whitney is creating for his own coal by the coke ovens at Everett and now again by the Sydney Iron Works, opens up a prospect of marvellously increased activity at the mines. The necessity for forthwith increasing the output has been forced upon the management, and it has been decided to sink two large shafts (a coal shaft and a fan shaft) through the "Harbor" seam and down to the "Phelan" seam. On the latter seam the company has already three large collieries in operation. These two shafts are now being put down about two miles to the "dip" of those now working. The size of the coal shaft from the surface to the bottom of the "Harbor" seam will be 37 x 11 feet and 400 feet deep. From the "Harbor" seam to the "Phelan" seam it will be 21 x 11 feet and 450 feet deep—a total depth of 850 feet. The size of the fan shaft will be 34 x 11 feet and 850 feet deep. This latter shaft is intended to serve a double purpose. A part of it will be walled off for water tanks by which the pit water will be drawn to the surface instead of being pumped, as has hitherto been the practice. The producing capacity of this new mine will be about 4,000 tons per day, and it should be hoisting coal about the time that the ironworks commence operations. In addition to this a slope is being put down on the "Emery" seam from which the management hope to be winning a thousand tons a day next year.

But even with these large additions to the output it is doubtful if the company finds itself able to keep up with the demand, and it looks as if Dominion No. 2, as the new shaft has been named, would soon be followed up by other shafts.

The two corporations we have written about, viz., the Dominion Coal and the Dominion Iron and Steel Companies, combine to form an industry compared with which—if we except the Canadian Pacific Railway—any other Canadian mining or industrial enterprise sinks into comparative insignificance. The "front door of Canada," as Cape Breton has aptly been termed, is attracting a degree of interest which renders it likely that the western part of the Dominion will not henceforth enjoy so much of a monopoly among investors as in the years gone by. Very gratifying must it be to Mr. Whitney to find that the energy he has thrown into the development of Cape Breton has met with so ready and warm a support among the leading business men of Canada and that the prospects of success for him and them are so bright.

Millmen should always look closely to the adjustment of tappets in rapid-drop mills, for the wearing of shoe and die increases the height of drop, and a stamp set to clear the tappet when the shoe and die are new may strike when worn down.

The photos reproduced in our supplement this month have been specially taken for THE REVIEW by Spencer, of Glace Bay, C.B.



MR. JAMES F. LEWIS,
Sherbrooke, Que.
PRESIDENT CANADIAN RAND DRILL CO.

Atlin as it is.

Atlin, as a placer mining camp, may be said to have gone up like a rocket and come down like a stick. For months during 1898-9 the entire "boomster" press of the Pacific Coast was vigorously engaged in painting the district in the most glowing colours. Fully ten thousand people, carried away by the startling reports of the unequalled richness of the camp, madly rushed to the new Eldorado, full of hope, and confident of speedily securing fortunes, only to discover that Atlin, as a placer camp, was distinctly a fizzle and that not one claim in one hundred would pay wages.

In the spring there were all of ten thousand people in the district—in the autumn all but three thousand had vanished.

Beyond a few claims above and below discovery on Pine Creek, and about ten claims on Willow—a tributary of Pine—one or two on Wright, Spruce and McKee, there are none that have given substantial returns. Possibly some two hundred claims have paid wages only, while the balance—some thousand in number—have been worked at a loss and finally deserted altogether.

As a placer proposition Atlin is a distinct failure.

The prospects for extensive hydraulic projects are, however, of the most encouraging character. It would, indeed, be difficult to find a country more favourably situated for carrying on hydraulic mining to an unlimited extent. The gravel is apparently inexhaustible—enormous banks rising above the creeks for hundreds of feet. There is an abundance of water everywhere, and ample dump. Gravel, water and dump are in sight throughout the district, therefore only limited capital will be needed to determine the value of the ground. And, since the Alien Act does not bar American citizens from engaging in hydraulic mining we may confidently expect to hear some encouraging news from the district within the next twelve months, because several substantial Californian concerns have already secured some excellent ground.

As a field for quartz mining Atlin has a chance of outrivalling Johannesburg—the chance being, at the present juncture, somewhat slim, the ore being quite too low grade. But for quantity it is unequalled either by Western Australia or South Africa. The enormous body of quartz which stretches from the eastern shore of Atlin Lake clear through to Surprise, Gladys and Teslin, and north and south of Atlin City for nearly twenty miles, all and everywhere yields gold. It is one huge deposit of about twenty miles square, is free milling and as far as it has been tested will average about \$3.50 to the ton on the surface.

The "boomer" is, as usual, getting in his work and the newspapers contain some startling stories of phenomenally rich assays, but actual work and careful average of assays over an extensive area has not, as yet, demonstrated that the ground can be worked at a profit.

One of the many fairy tales told regarding the Atlin quartz has reached the New York *Commercial Advertiser* in the following shape:

"Rider Haggard appears to have turned his attention from literature to the more profitable pursuit of gold mining in Alaska. In company with Lord Ernest Hamilton he has proceeded to the Atlin gold fields. Certain claims there have been purchased by the novelist and his companion from Sailor Bill Partridge for half a million dollars. Sailor Bill was a few months ago a poor sailor, but is today a millionaire."

The truth is Sailor Bill Partridge, after knocking around Queensland, Johannesburg and Dawson, turned up at Atlin and immediately started in prospecting for quartz. He secured an option on the Anaconda group (three claims) just outside the town limits, and took the proposition over to London. He placed it with Haggard (not Rider

Haggard at all) & Pixley, the stock brokers, who interested Lord Ernest Hamilton in the property. Sailor Bill sold the group, on the statement that it would average \$7.00 to the ton, for £25,000 cash and £25,000 in shares. Mr. Haggard, Lord Hamilton and their expert, Mr. A. H. Bromley, started for Atlin to verify the report. Mr. Bromley at once placed a number of men at work and drilled the whole 150 acres with 4-foot holes at 100 yards apart, but the average of the assays made by the Bank of B. N. A. at Atlin and afterwards checked by Mr. Pellew Harvey at Vancouver hardly went more than half of \$7.00, and the deal as finally completed was that the purchasers paid Sailor Bill £2,000 in cash and one-tenth interest in the property. Mr. Bromley and his party passed through Ottawa last week *en route* to London. Before leaving Atlin, however, they placed a number of men on the property to make further tests by sinking pits at intervals with a view to making another average assay from depths of 25 feet. The results of the present development will determine whether they will place 500 stamps on the property or abandon it, and upon these results the future of Atlin hangs.

Before leaving the camp Lord Hamilton bonded the ground all around the town, and he is now applying to the British Columbia Government for 160 acres of land for a town site just south of Atlin.

The country is staked off for miles around. It was staked long ago and staked blindly, in this way:—A number of persons in Seattle had sent in representatives with batches of certificates to stake placer claims by power-of-attorney, but upon reaching Atlin these men found that the Alien Act did not permit them to stake placer claims. They then went it blind and staked miles and miles of quartz, and went out of the country. The Atlin quartz may be said to be held in Seattle; therefore, should the Hamilton-Sailor Bill prospect turn out successful, that is, run \$5.00 to \$6.00 to the ton, and say 90 per cent. of such values be recovered, there will be the biggest kind of excitement in Atlin in 1900. There is, of course, a chance of the ore becoming refractory with depth, and it is already showing a distinctly copper stain. Should this continue, and 4 to 5 per cent. copper be met, the whole district will be valueless for some years at least, because with 5 per cent. copper the ore would no longer be free milling, neither could it be cyanided—and unless coal is found quite close to Atlin it will remain for some considerable time an unavailable asset.

But should trumps turn no more ideal place can be imagined. The town is laid out at right angles, and commands a sublime view. The climate is delightful and infinitely ahead of Victoria. The scenery is grand, shooting and fishing abundant, and it is altogether a most charming place. Atlin, itself, has many substantial buildings. There are three banks—British North America, Commerce, and Merchants of Halifax. There are numerous stores, among which are the N. A. T. Company of Chicago, the A. C. Company of Frisco, the B. A. C. Company of London, McClennan McFeeley of Vancouver, Thos. Dunn & Co., Limited, Vancouver, the Parsons Produce Company of Winnipeg, the Seattle P. I. and the Victoria *Colonist*. There are the usual collection of saloons, restaurants and green cloth resorts.

Seven miles east of Atlin, over a fairly good wagon road, is Discovery, or Pine City, on Pine creek. This is really a much larger place than Atlin, but it is entirely a canvas town and, unless extensive hydraulic mining is undertaken in the future, is likely to vanish in a night.

Seven miles farther east (fourteen miles from Atlin) is Surprise, where the quartz is still found and where large tracts of excellent grass (prairie) may be had for the cutting.

The whole of this immense district can be reached in five days from Vancouver by boat and the White Pass Railway and is well worth a journey.

The Initial Development of Mines.

Prof. Courteney De Kalb, of the Chair of Mining Engineering and Metallurgy in the Kingston School of Mines, was engaged by the Ontario Government during the summer and autumn of 1898 on a tour of inspection of the mines of Ontario. His report was not published until a few weeks ago. From it are taken the following judicious remarks upon the economies in the initial development of mines which Prof. De Kalb observes to be lacking at various points during his tour. The tendency of development companies to introduce costly machinery before trying the possibilities of hand work within the limits of economy accounts for the loss of a great deal of capital at the outset of mining enterprises and the wreck of many undertakings that might have become prosperously established had they been directed by adequate skill and knowledge. The cultivation of these qualities under the instructions of competent professors now laboring in the mining schools of the Dominion should very speedily give a new direction to mining enterprise and render the losses from initial mismanagement of rare occurrence. Mr. DeKalb says:—

“The lack of a body of well-trained miners is a serious drawback to the mining industry in Ontario, and it so happens that the value of such skill is rather discredited among many local mine owners from the circumstance that inefficient stragglers from the camps of the West and South have drifted into the Province from time to time, assuming undue importance, and giving altogether a false impression as to the service which a really skilled miner is capable of rendering. The absence of any requirement as to the qualifications for mine foremen is a rather serious matter. The growth of a proper *esprit de corps* among the miners, leading to their own improvement, is not to be anticipated until the mine foremen themselves are required to pass examinations and to show a suitable amount of practical experience, to entitle them to a certificate before assuming direction of underground operations.

The inexperience of miners is shown perhaps most conspicuously in their misuse of dynamite, and their false setting of shots. I have rarely seen a hole drilled in any mine in the Province in such a position as to give the highest efficiency to the blast, and by inquiry I find that the consumption of dynamite per ton of ore extracted is excessive. In many cases powerful explosives are being employed where weaker, slower acting explosives would be far more effective in the practical work of winning ore.

There is a very general tendency at the smaller properties to carelessness in regard to the storage, inspection and handling of dynamite, to thawing dynamite, and to the keeping of fulminates separate from blasting materials. The regulations of the Bureau of Mines might advantageously be revised in so far as they relate to explosives.

Although the steam and compressed air drills are very widely used, it is manifest that hand drilling is necessary in prospect work, upon which just now the future of the mining industry in Ontario chiefly depends. Whatever will tend to cheapen this kind of effort will lead to wider operations for the development of outcropping veins discovered by prospectors. Hence the training of miners in the proper use of blasting materials, and the setting of holes, and in work of single-hand drilling, will render it possible to do far more, I think I might say 50 per cent. more, development work than is now done with the same money. I am not aware of more than one mining camp in Ontario where single-hand drilling has been carried on to any extent, and there the interest of the miners has been awakened to such a degree that single-hand drilling matches constitute part of the amusements of the men.

There is still a noticeable tendency on the part of development companies to introduce steam hoists and air compressors, and their equipments, before the possibilities of handwork within limits of

economy have been exhausted. This is to be deplored, for many a development company uses all its resources on a single vein without learning more than judiciously directed handwork would have revealed at far less cost, and so it ceases to operate, leaving a group of men who might have contributed strength to the mining industry more or less discouraged and disaffected, and consequently unwilling to venture anything again. The work of development is necessarily experimental in large part up to a certain limit, but the work of the mining company after proper exploratory work has been done should be upon a sound basis, with the element of chance virtually eliminated. It is unfortunate that too many companies in Ontario are still inclined to start upon mere development work on a scale which indicates that they expect to continue mining permanently.

The use of kibbles sliding on skidways in inclined shafts is unfortunately very common, the practice apparently being due to false notions of economy. To shallow depths this procedure is not unwise, but in a large number of mines it is persisted in even after it has become the most costly form of hoisting that could be adopted. The danger of hoisting thus from considerable depths is sufficient to warrant its condemnation.

Fortunately the great majority of the mines of Ontario are in rock so sound that little timbering is required. Where it is used, however, a quite general misunderstanding of the methods of setting it to obtain the full strength of the material seems to prevail, in consequence of which frequent breakages and dislocations of timber result, with their attendant evil effects upon the progress of mining operations.

In a few of the better conducted mines, on the other hand, the engineering is of an order not excelled in any mining camps in the world.”

Gold Dredging on the Saskatchewan in 1899.

Owing to the high stages of water which have prevailed all summer, little or no mining has been done by hand miners. None of the smaller steam dredges, such as that of the Star Mining Company, which worked so successfully during 1898, have been put in commission this year, owing to the high water and great freshets. The season of 1899 has been marked by the successful completion of experimental work. In the fall of 1898 the dredge “Otter” was completed. She is owned by the Saskatchewan Gold and Platinum Proprietary, of London, England, a concern formed by the Universal Corporation and the Discoverers’ Finance Corporation of that city. The dredge is of the bucket and ladder type, with a digging capacity of over 3,000 cubic yards in twenty hours. The digging machinery has been found to work perfectly. Not so the gold-saving appliances, which consisted of—(1) a jig which received the sand from the trommel or revolving grizzly; (2) a large tank, the upper part of which had perpendicular sides, and the lower part a Y shape, the portion represented by the stem of the Y being a shallow trough in which revolved an endless screw, the purpose of which was to keep the concentrates lively, and to force them out through taps to feed; (3) four Frue vanners—two on each side.

After trial the whole of this outfit, from jig to Frue vanner, was dismantled and a plain gold-saving table in three shelves covered with blanketing, or like material was substituted. With this, owing to the immense amount of material handled, the “Otter” earned at the rate of \$400 a day, working in gravel from which only fifteen cents per cubic yard of gravel was being saved. Out of this same material it was found that a hand miner with the common Saskatchewan grizzly, could save twenty-five cents per cubic yard.

As the result of comparisons between assays of the gravel and the amount of gold saved by the hand miner’s grizzly, made some years ago, showed that only 10 per cent. of the assay value was saved by that

process, the Proprietary are not at all satisfied with the inefficient gold-saving appliances at present on the Otter and they are sending their new manager, Mr. MacFarlane, to New Zealand to investigate, for adoption, the methods in use there, whereby gold in quite as minute particles (weighing 1000th part of a grain) as those of the Saskatchewan is saved to the extent of over 90 per cent. of the assay value of the ore. The Proprietary intend placing ten of the best modern dredges on the river in the spring.

The probability of obtaining the same perfection in saving gold here as in New Zealand is good. In that country gravel yielding only three cents per cubic yard can be worked on a large scale, with profit. The poorest gravel found on the Upper Saskatchewan has never yielded less than fifteen cents per yard to the most imperfect machinery, the "Otter's" average being twenty-five cents. Other conditions, such as cheap fuel, absence of overburden and cemented gravel, the lesser depth at which the gravel exists, the presence of an easily scraped clay bottom, and other natural advantages render dredging on the Saskatchewan a much easier proposition than similar work in New Zealand, where perfection has almost been attained in this class of mining.

Private dredge owners there are reticent as to their earnings, but the returns of joint stock companies show immense profits. One dredge, which cost £5,000, in six weeks yielded enough gold to pay its cost. The returns of the joint stock companies show a yearly dividend ranging from 30 to 210 per cent. on the stock, averaging over 100 per cent. per annum.

There is no question in the minds of those who are in the way of knowing what exists on the Saskatchewan, and the results of the experiments made up to date, that equally as good results as those attained in New Zealand will be obtained on the upper Saskatchewan. Even the cautious director of the Geological Survey of Canada, with full sense of his official responsibility, states this in his official report of 1898; and Professor Obalski, Professor of Mining at Laval University, and Government Inspector of Mines of the Province of Quebec, who examined the river last month, expressed himself in similar terms, and complimented the writer on the accuracy of the reports and soundness of the conclusions published by him on the subject from time to time. Likewise, Mr. A. E. Hogue, M.E., who has spent three seasons on the river investigating and experimenting; Messrs. Park and Hobson, of New Zealand, who worked on the "Otter" all summer; and Mr. MacFarlane, a gold mining engineer of wide experience, who succeeded Mr. Hogue on his resignation of the managership of the "Proprietary," have all expressed themselves perfectly satisfied that Saskatchewan gold dredging can be made a great success.

Mr. William Ogilvie, Jr., (son of the administrator of the Yukon), who has been employed as mining expert by British capitalists to report on properties in the Yukon, recently started down the river to examine 350 miles of leasehold acquired by Eastern Canadian capitalists. They intend placing a fleet of dredges on their concessions, should his report be favorable. The river from Prince Albert to the Rocky Mountains has been taken up, but it is doubtful whether ground on the lower river, which cannot afford wages to the hand miners, can be worked even on a large scale with as much profit as on the upper river, until the problem of saving 90 per cent., instead of losing that proportion, of the assay value has been solved.

However, it may be taken as a well established fact wherever hand miners have made wages, from \$1.50 per day and upwards, on that portion of the river large dredges will pay. No better proof of the value of any concession can be obtained than the experience of the hand miners, until a dredge has actually worked over the ground.

Besides the "Otter," only two other dredges have been operating at all this season. The Loveland dredge is of the dipper type—a style of machine not recommended by experienced gold dredgers, but it is

said to dig well. Its digging capacity is 600 yards per day. The gold-saving apparatus on this dredge has never been satisfactory, and has been altered again and again with the view of improving it. Even with this disadvantage it is said to have paid more than expenses.

The other dredge has recently been completed, and has made short tests of the machinery. The capacity claimed for it is 2,000 cubic yards per day. It is of the suction type, and if it be successful it must be a vast improvement on the older type of suction dredge, which has invariably been a failure wherever tried in gold mining. There is a reported exception to this world-wide experience in the case of a suction dredge on the Snake River, Idaho. The dredge now on the Saskatchewan is of similar manufacture, and its builders say it works perfectly among fine gravel which passes freely into the pipe or amongst large boulders which cannot be sucked into it; but stones a little over nine inches in diameter, small enough to be effected by the suction and too large to enter the pipe, choke the pipe, and the machinery has to be stopped, the suction raised and the obstructing stone taken out by hand, each time one of these obstructions occurs, causing great loss of time where such stones are plentiful. It is stated that the original cost of this kind of dredge is about one half only of that of the bucket and ladder type.

In conclusion, I assert, without doubt, that the problem of profitably working the vast deposits of auriferous gravel in the Northwest has been solved by the experiments made on the "Otter" dredge. But it may take years of costly and patient experiment to bring to perfection a system of saving anything approaching the full assay value of the ore in gold, platinum, osmium and the other rare precious metals.

ISAAC COWIE.

ONTARIO NOTE AND COMMENT.

The yield of the Mikado gold mine for September was 557 ounces from 982 (long) tons of ore crushed, and 329 ounces from 671 tons of tailings treated by the cyanide process. The estimated profit for the month was \$5,000. In giving to the public monthly statistics of this kind, the management of the Mikado sets a good example to other gold mining concerns in Ontario. The secrecy with which most of them surround their affairs is not calculated to inspire confidence in the richness of their deposits. Nothing would tend more to remove any doubt of the profitableness and probable permanency of the gold mining industry of the province than the publication of trustworthy statistics from all the producing mines, giving not only the number of tons stamped and ounces of bullion recovered per month, but also the cost of treatment, covering all the items in detail. Such information would be simply invaluable in interesting British or foreign capital, which seeks just such particulars when considering a proposition, and for the most part can get nothing better than the estimates of interested promoters. There is something to be said for the view that the early stages of a gold mining venture ought not to be exposed to the criticism of any but those financially interested, but this argument does not hold in the case of developed and producing mines. The expense and revenue sheets of at least half a dozen gold mines in Ontario might now be made public every month with great advantage to the industry as a whole, and also to the benefit of the mines themselves. A healthy emulation in keeping down costs can only grow out of a knowledge of what the other fellows are doing.

Fifty or sixty years ago there were hopes that Ontario would become a considerable producer of pig iron. Disappointment, however, chilled these hopes, and for a long time nothing better could be done than to export ore spasmodically to the United States until that market was closed by a hostile tariff. Once more the prospects are that this province will be supplying a large part of her own wants in pig

iron. The furnaces at Hamilton and Deseronto are, we doubt not, in the present pig iron famine, very satisfactory affairs to their owners, but unfortunately they are running for the most part on ore imported from Michigan and Minnesota. It is difficult for the hard, sometimes sulphurous, magnetites from eastern Ontario to compete with the high-class hematites from Lake Superior, and the latter have all the advantages that extensively worked mines and highly developed transportation facilities can give them.

Recent finds of good hematite at Michipicoton, and the extension of the Ontario and Rainy River Railway to the Mattawin and Atik-okan iron ranges will open up fresh sources of supply for the existing furnaces and the new ones in contemplation or construction. The Algoma Central is being rushed from Gros Cap to the Clergue mine, and will be ready to haul out ore in the spring, and the O. & R. R. will reach the Mattawin range in a few months' time. The iron range which extends from Gros Cap in a northeasterly and then northwesterly direction across the Michipicoton and Magpie rivers has already yielded at least two large deposits of hematite, and it is possible that further exploration will discover more. The withdrawal of iron lands in the Michipicoton Mining Division by the Ontario government has been variously commented on. Prospecting has largely stopped until it is seen what policy the government will adopt.

The demand for pig iron and iron ore is leading to the exploitation of numerous properties and the floating of many projects. In offering its stock the Equitable Mining and Developing Company of Ontario, Limited, improves upon the methods of some industrial concerns recently put on the market, and promises a dividend of eight per cent. per annum for five years on \$150,000 worth of preferred stock issued at par, guaranteed by the Trusts and Guarantee Company of Toronto. The Equitable Company's iron deposit is one of hematite, in the township of Storrington, on the Rideau canal. Prof. Willmott's report, embodied in the Company's prospectus, after describing the ore body, says "there is a probability of finding at least 100,000 tons," and the profit per ton is placed at \$2. As the company's capital stock is \$1,000,000, and \$2 per ton on 100,000 tons will yield only \$200,000, the shareholders would seem to have small chance of having their capital returned after providing for dividends. It is to be hoped the Equitable is not building too large a superstructure on too narrow a foundation.

The Mikado directors are contemplating an increase of their stamps from 20 to 50. At the Sultana the new owners have crushed little ore for six weeks or so, beyond sample lots from various parts of the mine for the purpose of proving their values.

The Ontario government has granted a concession of 1200 acres of corundum lands in Hastings and Renfrew counties to a syndicate headed by Mr. Joseph N. Shenstone, of the Massey-Harris Manufacturing Company. The concession is in the form of a lease for a term of ten years renewable. The syndicate is bound to expend at least \$100,000 during three years in developing the lands and erecting a plant for the crushing of corundum and manufacture of abrasive goods and other articles. Twenty-five thousand dollars are to be laid out on a plant. An unusual feature is the retention by the government of the right to fix the maximum price at which corundum or its products may be sold in the Dominion.

The syndicate also agrees to spend \$1,000 per year for three years in making experiments with the view of discovering a practicable method of producing aluminum and other useful substances from corundum or its gangue rock nepheline. Corundum is the richest

known ore of aluminum, but is not amenable to the present methods of reduction. Other possible products are the aluminates of soda and potash, ground nepheline for manufacturing crockery, etc. Besides the lands leased from the government, which are situated in Monteagle, Carlow, Dunganron, Raglan and Brudenell townships, the syndicate have acquired some large deposits on private lands. A couple of water powers on the York branch of the Madawaska are included in the concession.

There is scarcely any tale too incredible for belief, or scheme too bold for foisting on the public, when a mining "boom" is on. The Toronto Globe recently published a story to the effect that a cash offer of three million dollars had been made for the McGown copper mine near Parry Sound. The absurdity of such a statement will be understood by those who know anything of the property in question. A couple of shafts have been sunk upon it, the deeper one not more than 100 feet, and as is often the case in such deposits the rich bornite on the surface has been succeeded by the ordinary yellow sulphides below. The ridiculous three million dollar yarn may serve a useful purpose if it be taken as a warning against a possible *coup* in connection with this property, which may or may not be contemplated.

A new electric process for the separation of copper and nickel direct from the ore is being introduced by the Great Lakes Copper Company, a West Virginia corporation, whose headquarters are at Boston, Mass. The company has acquired large tracts of mineral land in Blezard, Davis, Trill and other townships, and proposes to erect a central plant for the operation of its process. No preliminary roasting of the ore is required, and it is claimed that the metals can be produced from the raw ore in as many hours as the present methods take months.

EN PASSANT.

The Wright silver mine at Temiscamingue has been acquired by the Canada Lead Company, Limited, and will be re-opened at an early date. The vendor is understood to be the Petroleum Oil Trust, Limited. The capital of the new company is £275,000. The Wright mine has been worked intermittently since 1887, the last owners, the Mattawa Mining and Smelting Company, closing down in 1890, owing to the failure of one of the principals, after equipping the property with a good mining and concentrating plant. The silver content of the galena is reported to be about 18 to 24 ounces to the ton. Mr. John Ashworth, a mining engineer from Manchester, England, has just returned from Temiscamingue, where he has been inspecting the property for the new owners. He believes the property can be worked at a profit. In the meantime shipments of the ore and concentrates are to be sent to the Balbach Smelting and Refining Co. at Newark to determine best methods of local treatment.

The Dominion Copper and Smelting Company has been formed in New Jersey with an authorized capital of \$2,500,000, in shares of \$10.00, to acquire and work the old Ascot mine, about 3½ miles from Sherbrooke, in the Eastern Townships.

Mr. J. Reid, Chairman of the Mikado Gold Mining and Development Company, sends some interesting data concerning the operations of this well known Lake of the Woods property. He says:

"The Mikado has been a live concern ever since the day the first blast was put in. There has been no hesitation nor lack of confidence on the part of the proprietors for a single instant. Seventy to 110 men have been constantly at work on it for the past three years. The

twenty-stamp mill has been going regularly night and day for over two years, and up to the 31st of August last twenty-one thousand and eighty-one (21,081) tons of ore have been mined and milled, yielding ten thousand seven hundred and fifty-eight (10,758) ounces of smelted gold, and in addition to which 5,466 tons of tailings have been treated by cyanide during the last nine months, producing 1,663 ounces of bullion, the total value of the gold and bullion being, roughly, \$185,000, every dollar of which, together with upwards of \$75,000 from other sources, in all some \$260,000 cash, has been spent on the property in developments, buildings, milling, air compressor and cyanide plants, wages, etc., and this large sum includes no part of the original purchase price of the property nor the expenses of the head office in London.

A great amount of development work has been carried out on the property, and on the great Mikado main reef four levels are being worked at 60, 120, 180 and 240 feet, and a great body of good milling ore has been opened up and is being rapidly increased under the present skilful and energetic management.

No greater depth than 240 feet is at present being worked, but the vein shows strength, increased width and richness at that level.

The main vein has been traced for a very great distance from the present workings and looks strong wherever pits have been put in to test it.

There are several other veins of great promise on the property, some of which may be separately dealt with at an early date, as to all appearance there is enough of ore in the Mikado main reef to keep a twenty-stamp or even a fifty-stamp mill going for a great many years.

The Mikado main reef has varied in width and richness from time to time. The average width is from five to six feet. At present, at the 240-foot level south work is being carried on in a magnificent body of ore seven (7) feet wide of solid quartz, and in the 180-foot level north drift we have a fine body of quartz ten feet wide.

The average value of the ore so far as we have gone may be judged to some extent by the results from the 21,081 tons milled, which shows something over \$10 from the plates, and the tailings from the 5,466 tons treated show about \$2.50, making a total extraction of \$12.50, and it is believed there is a considerable residue lost in the slimes, which with our present process we fail to recover.

It is, however, a moderate estimate to put the average value of the vein, so far as exposed, at \$15, or even more, as it must be borne in mind that no attempt at sorting the ore before milling has ever been made. Everything in the shape of vein matter, and no doubt a considerable proportion of useless rock, especially where the vein occasionally contracted, has been put through the mill as blasted out, so it is difficult to tell the exact value of the vein except by assays, which vary from \$5 to \$60 per ton.

It is intended to shortly erect a sorting plant, which will largely increase the returns at a comparatively small extra expense.

The great amount of work done, the results obtained and the satisfactory nature of recent developments leave no longer any doubts in the minds of the proprietors that the Mikado is of great value and a very sound proposition indeed, and that the large amount spent on the property to prove its value has been well invested."

It is hoped these facts will serve to correct the erroneous statements concerning the Mikado which have appeared from time to time in the *Globe* and the *Rat Portage* local papers.

Among our portraits this month we have pleasure in reproducing that of Mr. James F. Lewis, the genial President of the Canadian Rand Drill Company, whose large new establishment at Sherbrooke, Que., is a most important and notable addition to

the producers of high-class mining machinery. "Jim" Lewis is so well known to the mining and mechanical engineering profession of this continent that he requires no introduction to the readers of these pages. Since 1871 he has been identified with mining, coke-making, furnace work, and the manufacture of mining machinery, taking a prominent part in many important undertakings, such as the New York Aqueduct and, more recently the Chicago Main Drainage Canal. He is an active member of many engineering bodies, having held office as a vice-president for two terms, and as a director for eight years, of the American Institute of Mining Engineers. During the visit of the Iron and Steel Institute of Great Britain to the United States, in 1890, Mr. Lewis rendered signal service as an organizer and director of the lavish programme of excursions and entertainments for which that event will ever be memorable. The visitors suitably recognized Mr. Lewis's splendid efforts on their behalf by presenting him with a beautiful silver service and an address. Mr. Lewis also takes an active part in the American Society of Mechanical Engineers, the American Society of Civil Engineers, the Western Society of Engineers and, more recently, of our own Canadian Mining Institute. The new shops of the Rand Company are about 200 ft. long by 90 ft. wide, with power house, forge shops and offices to correspond.

We are compelled to hold over until another issue the large collection of snaps and photos of western mines taken during the excursion of the members of the Canadian Mining Institute to British Columbia. We hope to reproduce these in a handsomely engraved supplement next month.

Mr. Albert P. Low, who has been away since the spring of 1898, on an important exploration for the Geological Survey of the east coast of Hudson's Bay and the interior of Labrador has returned to Ottawa and is now engaged in preparing a report of his investigations in that comparatively unknown region. Mr. Low informs us that along the shore between Cape Dufferin and Cape Jones he found extensive beds of haematite and magnetite iron ores and beds containing considerable pyrites and galena. Mr. Low brought back with him a very large and valuable collection of mineral and other specimens.

The Survey has this month issued an exceedingly interesting Report on the Geology of that portion of the Rainy River and Thunder Bay Districts of Ontario covered by the Seine River and Lake Shebandowan, map sheets prepared by Mr. Wm. McInnes, B.A. In this report Mr. McInnes contributes a good deal of information which will prove of service and value to mining men interested in those sections of the country. Discussing the mode in which the gold was deposited Mr. McInnes says:—

"The source of the gold has not yet been well established, though its constant association with the edges of granitic areas which are evidently intrusive in the schists, makes it probable that the veins really represent the latest effusions from the magna which produced the granites at an earlier stage. The fissuring was probably the result largely of the squeezing due to the intrusion of the granitic mass, so that the process of fissuring and of vein formation in the fissures was a continuous one. The heated water and vapours, carrying silicates and various minerals, rising through the fissures, and depositing in them the quartz and other vein-matter which contains the gold. This mode of fissuring has produced what are ordinarily described as true fissure veins, where the fissure has remained an open crack until filled by the vein-matter. It has also produced zones of impregnated country-rock where there has not been any open crack but rather a zone of shattering and shearing, which has been equally effective for the passage of the

THE PROSPERITY OF CAPE BRETON.



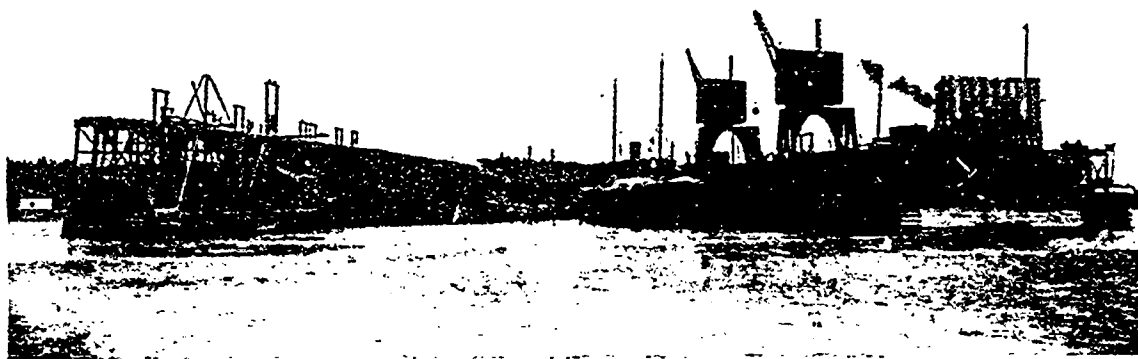
MR. HIRAM DONKIN, C.E., GLACE BAY, C.B.
General Manager, Dominion Coal Co., Limited.

THE PROSPERITY OF CAPE BRETON.



LOUISBURG PIER OF THE DOMINION COAL CO., LOUISBURG HARBOUR, C.B.

Winter Port. Length 1,290 ft.; height, 40 ft.; width, 32 ft. Built of Southern hard pine. Thirty-five feet of water at end of pier. High and low level tracks. Operated by drop tables. Shipped in April, 1899, 42,478 tons. Largest shipment in one day, 3,873 tons.



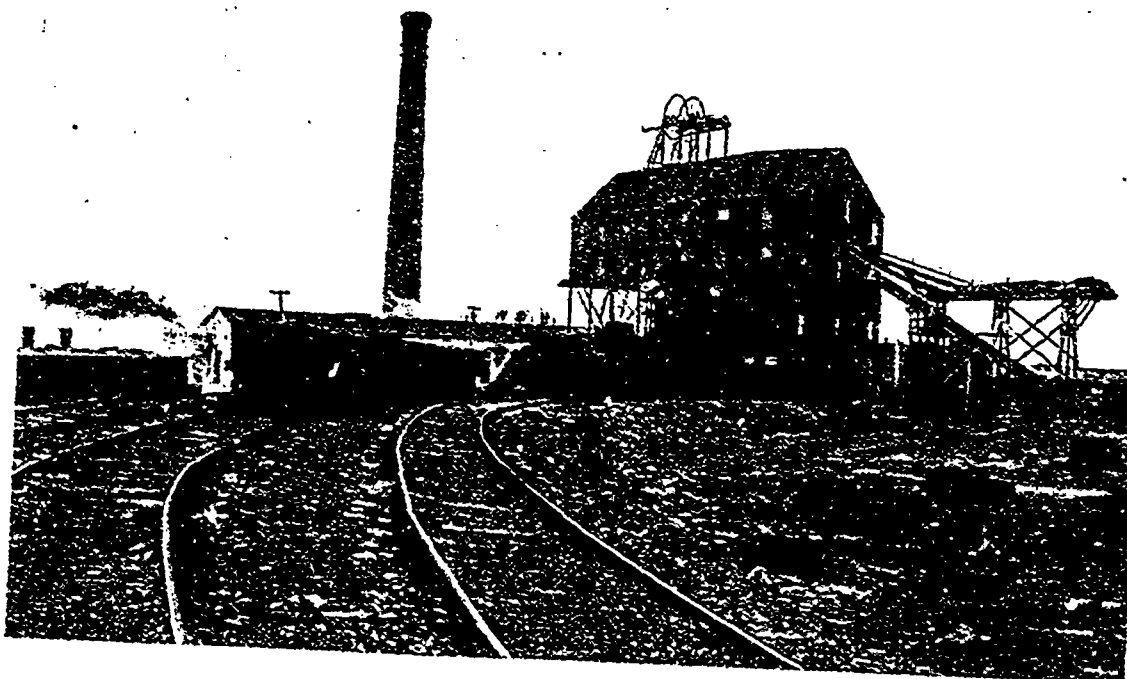
INTERNATIONAL SHIPPING PIERS OF THE DOMINION COAL CO., AT SYDNEY, C.B.

No. 1--Length, 1,150 ft.; height above high water, 27 ft.; width, 90 ft. Equipped with two Ludlow loading towers. Two cargo and one bunker steamer can load at one time, with two sailing vessels of smaller tonnage.
No. 2--Length, 1,150 ft.; height above high water, 37 ft.; width, 28 ft.; depth of water at low tide, 25 ft. Built of Southern hard pine; creosoted piles; can load two steamers at one time; high and low level track; two drop tables; lighted by electricity. August 18th, 1899, 8,445 tons shipped. Total shipments for August, 1899, 172,750 tons.

THE PROSPERITY OF CAPE BRETON.



BANK-HEAD DOMINION NO. 1 COLLIERY, DOMINION COAL CO., LIMITED.
Raised in 1898, 330,171 tons. Shipped 321,185 tons.



BANK-HEAD CALEDONIA COLLIERY OF THE DOMINION COAL CO.
Raised in 1898, 266,332 tons. Shipped 257,691 tons.

THE PROSPERITY OF CAPE BRETON.



BANK-HEAD INTERNATIONAL COLLIERY OF THE DOMINION COAL CO.

In 1898 raised 93,445 tons. Shipped 82,787 tons.



BANK-HEAD RESERVE COLLIERY OF THE DOMINION COAL CO. LIMITED.

In 1898 raised 211,812 tons. Shipped 231,865 tons.

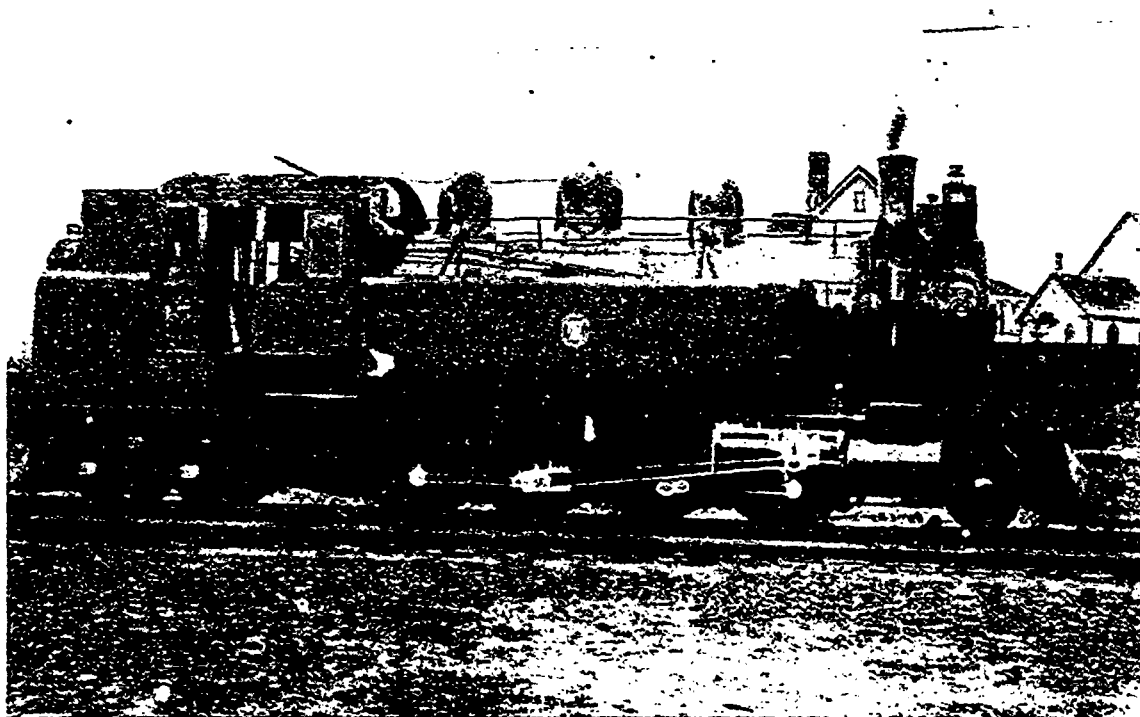
THE PROSPERITY OF CAPE BRETON.



COAL WASHING PLANT ON THE MAIN LINE OF THE SYDNEY & LOUISBURG RY., SEVEN MILES FROM GLACE BAY, C.B.

Capacity 1,000 tons slack per 24 hours. Used to decrease sulphur and ash in slack coal.

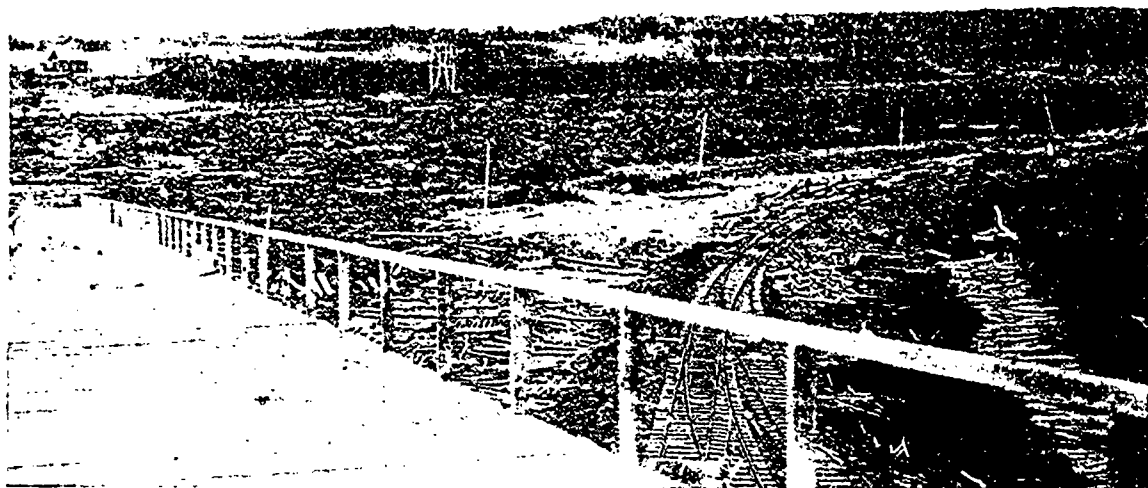
Unwashed Slack.	ANALYSIS.	Washed Slack.
2.51 per cent. Sulphur ; 8.90 per cent. Ash.		1.88 per cent. Sulphur ; 4.25 per cent. Ash.
Storage bin capacity, 2,000 tons.		



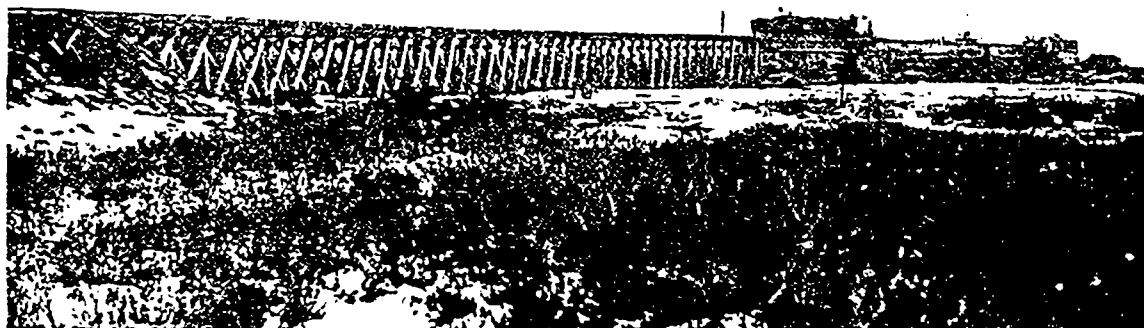
NO. 15 COAL LOCOMOTIVE, SYDNEY & LOUISBURG RY.

Built by Schenectady Locomotive Works. Cylinder, 22 in.; stroke, 28 in.; diameter of drivers, 55 in.; total wheel base, 36 ft., 3 in.; driving rigid wheel base, 15 ft. Weight in working order on drivers, 172,000 lbs. Total weight, coal and water, 243,000 lbs.

THE PROSPERITY OF CAPE BRETON.

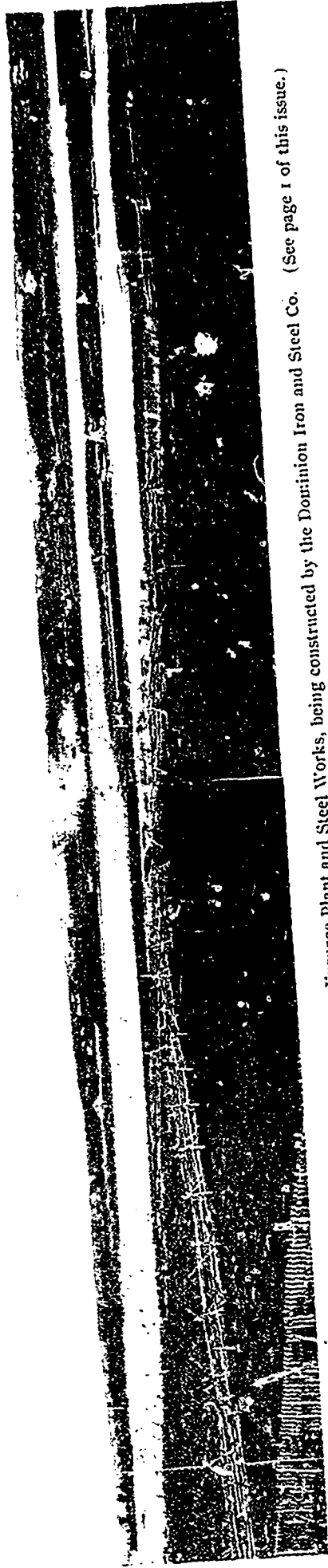


CENTRAL BANKING STATION ON THE MAIN LINE OF THE SYDNEY & LOUISBURG RY., THREE-QUARTER MILES FROM GLACE BAY.

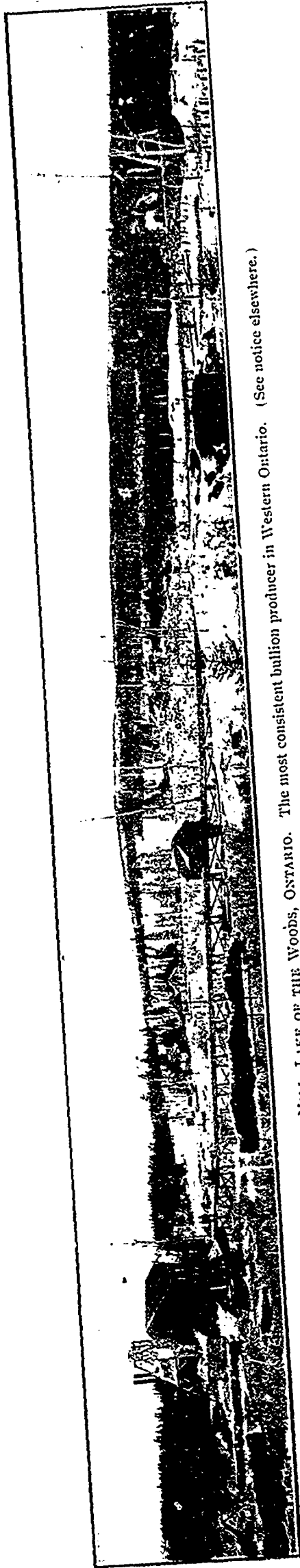


COAL BANKING TRESTLES.

Banking out trestle. Length, 1,450 ft.; height at end, 40 ft.; width, 16 ft. 4,000 tons have been banked out in one day. Coal is run out with the locomotive and cars as it comes from the collieries. It is then dumped into pockets, and through sliding doors into self-dumping cars of 4 tons capacity, which are run out with horses. The coal is refilled by two steam shovels (one of 1,500 tons per day and one of 1,000 tons per day) into 6 ton cars. These cars run by gravitation roads to the foot of an incline, and are then hoisted on an incline 500 feet long and 43 feet high to the rescreening plant. Then the coal runs over screens with bars 15.0 feet long, $1\frac{1}{2}$ to $\frac{1}{4}$ inch space for screened coal, and over knocking screens, mechanically driven, 10 feet long by 7 feet wide, with $\frac{1}{2}$ inch mesh, which makes nut and slack coals.



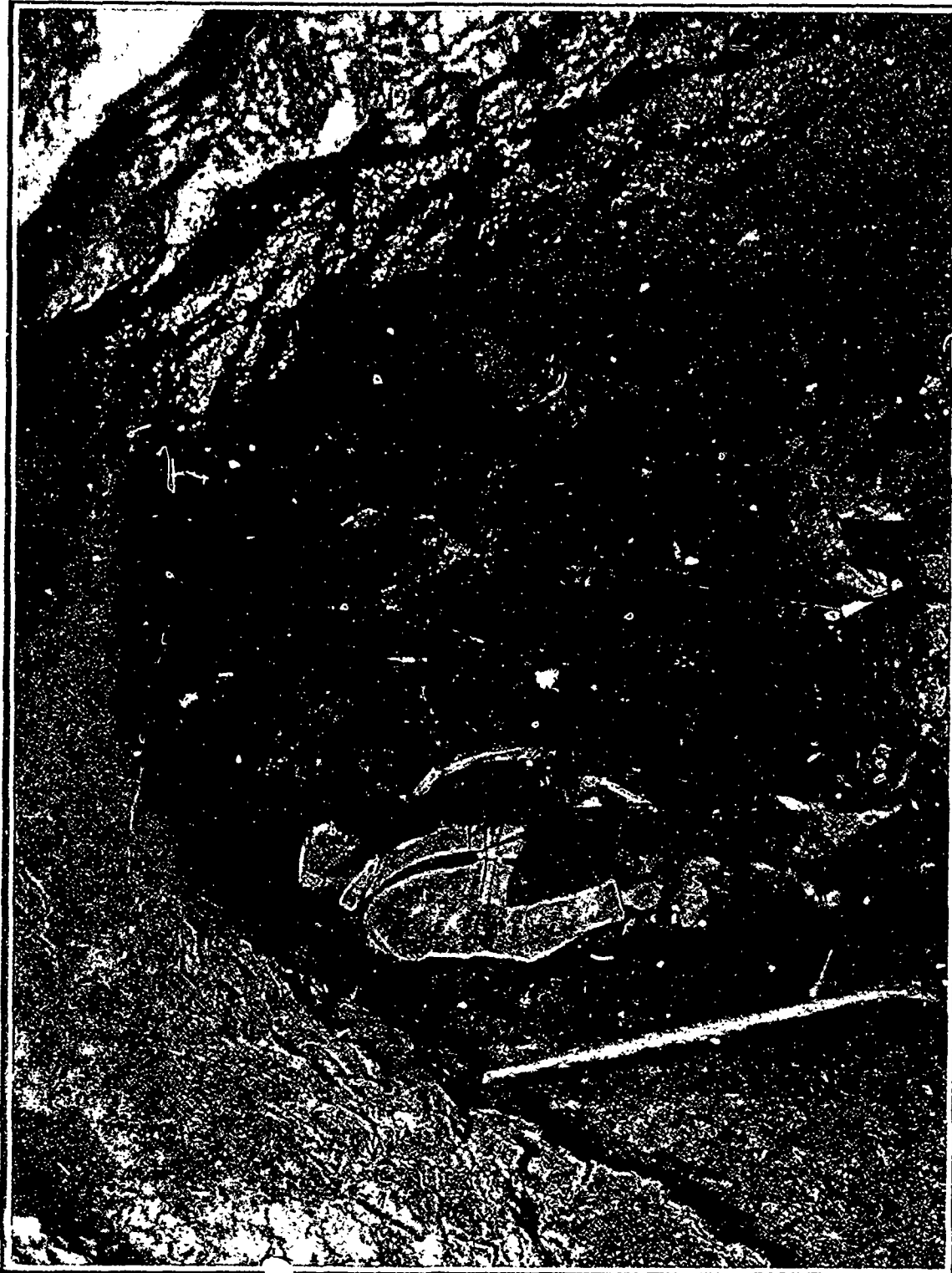
The Site on Sydney Harbour, Cape Breton, of the large new Furnace Plant and Steel Works, being constructed by the Dominion Iron and Steel Co. (See page 1 of this issue.)



THE MIRADO MINE AND MILL, LAKE OF THE WOODS, ONTARIO. The most consistent bullion producer in Western Ontario. (See notice elsewhere.)



NUMBER 2 DRIFT—150 FOOT LEVEL—BROOKLYN MINE, GREENWOOD, B.C.
Acquired by the Dominion Copper Co. Limited.



Crosscut - 115 foot level - Stem-Winder Mine, Greenwood Camp, Boundary District, British Columbia.
Acquired by the Dominion Copper Mines, Limited.

mineral-bearing solutions; and has in some cases where such waters have impregnated and replaced the country-rock, produced so-called bedded veins, where the pressure has parted the schistose rocks most readily along their lamination planes, causing the deposition of vein-material along the openings. There seems to be no good reason why any or all of these may not afford good working mines, though the two former would probably be more continuous and permanent."

Apropos of the sale of the Sultana mine a correspondent sends us the following particulars from London:—

"The registered name of the company is the Sultana Mine of Canada. The capital is £275,000 in £1 shares, 50,000 of which are reserved for working capital. Mr. Caldwell has received 225,000 fully paid shares for the property and everything connected with it.

"A sufficient amount of the working capital was privately subscribed by the directors and a few of their friends, and very soon a prospectus will be advertised for public information only, and not to solicit public subscriptions.

"The company took possession of the property on August 12th last, and acting upon the suggestion of their engineer, shut down the mill temporarily in order to make necessary alterations with a view to putting up more stamps in the near future, and also in order to turn the whole of the mining plant on to development work. There are now nine drills at work day and night on development, and large bodies of payable ore are being opened out. The manager expects that when the mill re-starts, he will have at least eighteen months supply of ore opened out and ready for stoping. In the meantime, another compressor plant will be put in, so that it will always be possible to keep the development well ahead of the mill."

The Port Hood Coal Company, Limited, owning a property comprising some sixteen square miles of coal areas at Port Hood, Cape Breton, has issued a call for \$750,000 twenty year coupon bonds bearing interest at six per cent. The issue is promoted by the Eastern Trust Company of Halifax, who certify the bonds and hold as trustees to the bondholders a mortgage upon the company's realty, coal leases and equipments. The capitalization of the new company is \$1,000,000, in shares of \$100, and provides for an output of 200,000 tons per annum.

The Bridge River Gold Mining Camp.

By FRITZ CIRKEL, M.E., Vancouver, B.C.

(Paper read before the September meeting of the Canadian Mining Institute.)

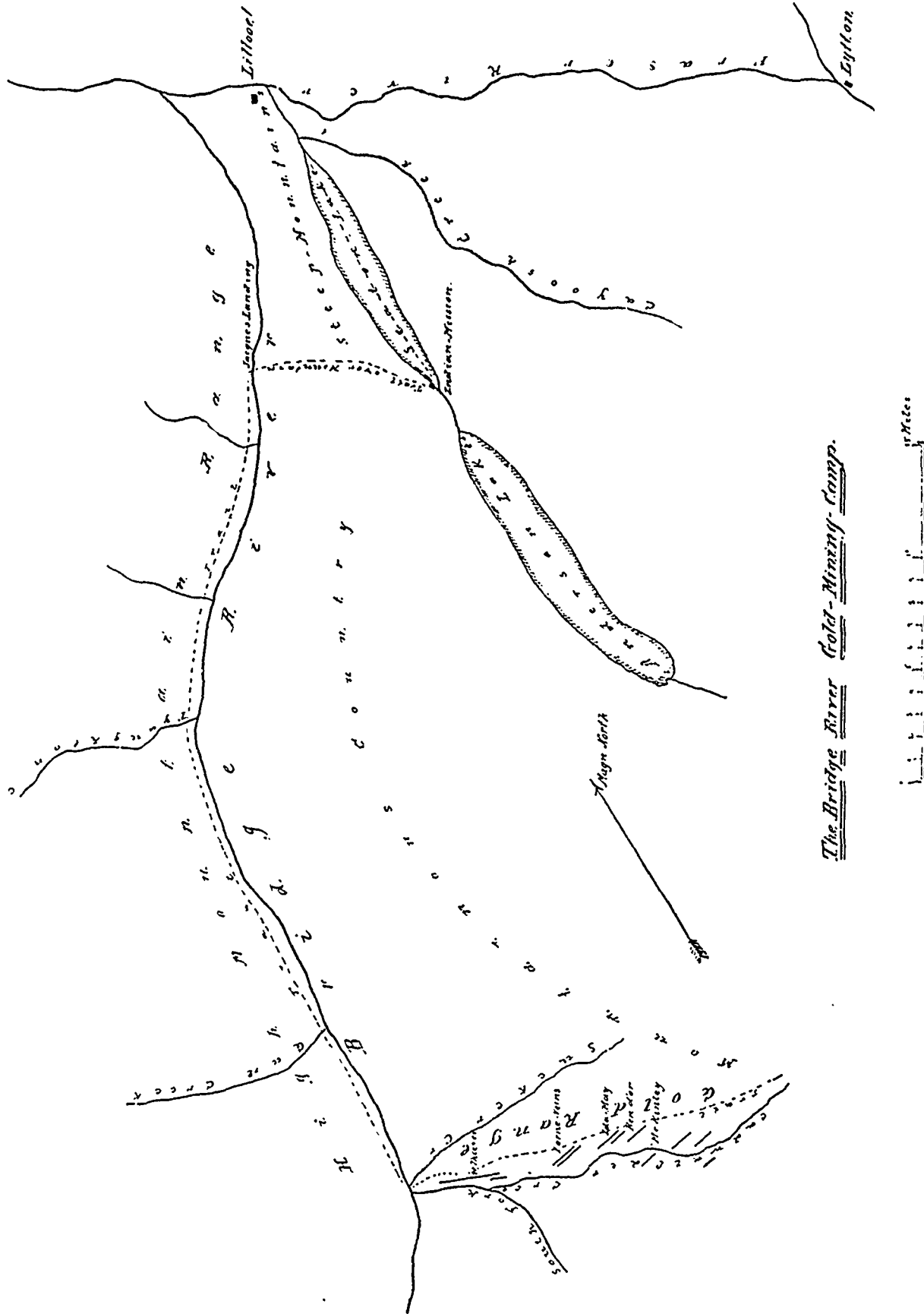
The discovery of gold in the Lillooet district dates back as far as 1858, when a great many prospectors, on their way to Cariboo *via* Lillooet, tested the bars and benches of the Fraser River, and its tributaries, Bridge River and Cayoosh Creek.

Indian and Chinese miners have since that time located and worked a number of placers with varying success. It is reported that up to 1890, about 2 million dollars worth of gold has been bought by the Express companies, not counting the amount which has been carried away by Chinese. But it was not until the year 1887 that endeavors were made to find the leads wherefrom some of the smaller creeks had derived their supply of gold and we find that in that year several claims were recorded, but no attempts to explore and to develop them were made and consequently the locations were abandoned. From 1893-95 however, we find a good deal of exploratory and development work going on on several claims along Cayoosh Creek and the information obtained concerning the mode of occurrence of gold, is interesting from a geological point of view. Amongst these

claims may be mentioned the Golden Cache and the Bonanza; the history of these claims is too well known to be repeated here. In 1897 the scene of excitement changed from Cayoosh Creek to the upper tributaries of Bridge River, when in the middle of August several quartz leads showing a fair amount of visible gold, were discovered on the right bank of Cadwallader Creek. Early in the spring of the following year we see a large influx of prospectors and it did not take long before both the east and west banks of Cadwallader Creek and South Fork were staked for over 15 miles. The epidemic for staking claims was evident, and certain parties, armed with axe and pencil, used to stake without any previous prospecting, several claims daily; it did not matter much whether there was any ore in place as the law required, as long as the reward was paid by the people who sent these prospectors out. The natural consequence was that most of the claims had to be abandoned, and towards the middle of the year 1898 we see only a limited number on which assessment or further development work was undertaken. Before entering into details regarding the results of the exploratory work on the various claims, a description of the route to the camp, the topographical and geological features of the country, may not be out of place.

The Bridge River Mining Camp is situated at a distance of 75 miles from the next post office and town of Lillooet, 138 miles from Ashcroft, and 122 miles from Lytton, both of these towns being stations on the Canadian Pacific Railway. The most practical route leading to the Camp is over Seaton Lake to the Indian Mission, a distance of 17 miles, thence over the Mission Mountain to Jacques Landing 7 miles; crossing the river at this point the trail follows the sinuosities of the river for 43 miles over Tyaughton to Sucker Creek; here the river is crossed again and the trail leads up to South Fork and Cadwallader Creek and parallel to the latter finally to the Ida May and Ben d'Or Camp. In glancing over the accompanying map we find that we are approaching more and more the Coast Range of mountains and if we draw a straight line from Upper Cadwallader Creek to the next salt water, Jarvis Inlet, the distance is not more than 50 miles. This route of course would be much shorter—approximately 300 miles—taking Vancouver as the starting point, but it appears that no one except Coast Indians, has ever attempted to reach the camp by this way; as the very high peaks and rough plateaus, visible from the mining camp, and covered all the year round with snow, do not look as if a practicable route could be established, especially during the winter.

From the Indian Mission on S Lake a good government trail built on a wagon road grade permits of an easy ascent of the Mission Mountain, which at its lowest point on the summit has an elevation of 3,200 feet. From Jacques Landing up, the river is closely bordered on both sides by high mountains, which as a rule slope up steeply from the river banks without any intervening flat lands. Sandy and gravelly benches are also found and around Tyaughton and Gun Creeks; they are very extensive. A few patches of agricultural land along the river have also been noticed, but so far no serious attempt has been made to make use of them. On an average most of the mountains are pretty fairly covered with good timber, a species of Norwegian pine predominating. As to the Bridge River proper it must be mentioned that, although for 35 miles the difference in elevation is not more than 125 feet, it is entirely unsuitable for navigation by reason of its shallow and rocky spots. The river rises every summer for about 15 feet, presenting then a very swift current, and many difficulties are experienced in crossing at that time, as no bridges have been built yet on any of the ferry points. From Gun Creek to Sucker Creek the river valley gradually widens out; the mountains are not of the abrupt and cliffy nature as observed on the lower part of the river, and on Sucker Creek a magnificent view is obtained all over the surrounding country at different points of the trail, which ascends a gently sloping and sparingly wooded mountain to the south. This mountain forms the



The Bridge River Gold-Mining Camp.



base for a long mountainous range, which composes the east bank of South Fork and Cadwallader Creek for over 15 miles, and which has been the scene for the activity in mining of late. The first group of claims we cross by trail is the Forty Thieves; this group is staked along the course of and on both sides of South Fork, which runs in a deep narrow gorge, bordered to the east by a cliff of a height of 1,200 feet. After ascending the next series of hills, the trail leads for several miles with small interruptions across a level and wide wooded terrace; we pass the Lorne group of claims and from here up the country and the east bank of Cadwallader Creek for the next 10 miles presents an open intervening flat, sloping gently towards the creek covered for the greater part with a light second growth of timber; further to the east it is bordered for several miles by a steep and bluff mountain range of apparently 8,000 feet height, which is devoid of any timber. From different points of this mountain we obtain a magnificent view over a part of the Coast Range, and the appearance of this region is that of a rough, irregular, mountainous country, in which the higher points are grouped towards the centre of the mountains, which are divided by each other by the valleys and gulches of the smaller streams. The height of a great number of these mountains exceeds 8,000 feet and considerable snow remains throughout the summer on some of them. The country is generally wooded and in the lower and more sheltered valleys much good timber is to be found, especially on the west bank of Cadwallader Creek. In a number of places along the west side of the valley the tracks of snowslides are apparent, but these are confined to the higher part of the mountains and do not come down to the creek.

As to the geological structure of the region traversed it must be stated that it appears to be very complicated, especially along the the course of Bridge River, and the scanty information obtained is not sufficient to allow of a systematic and satisfactory description of the rocks occurring in them. It suffices here to mention that the rocks along Bridge River differ widely if not in age, at least in lithological character and degree of alteration from those met with on the Ranges of Cayoosh Creek. Most of the rocks met with up to Tyaughton are highly altered greenstone, overlain by various schists, quartzites, conglomerates and dolomites. From Tyaughton further up the river we find groups of dark banded rocks composed apparently of tuffs and ash rocks with limestone, interrupted at places by granite intrusions. From Gun Creek to Sucker Creek we find to a great extent porphyrites of various kinds, gabbros, breccias, diabase, agglomerates and fine grained slaty ash rocks. Exposures of a fine grained green eruptive can be noticed on the high mountain range east of Sucker Creek in the vicinity of the Forty Thieves to the east. This belt of diorite follows approximately parallel the course of South Fork and Cadwallader Creek beyond the Ben d'Or group of claims for over 7 miles, flanked to west by a succession of various porphyrites, syenite and hornblende schist, and to the east by a series of greenish metamorphic schists, gneiss and granite. About half a mile beyond the Lorne group of claims we notice a highly metamorphosed reddish granite, apparently setting through the formation at right angles. Descending down to Cadwallader Creek we notice a hard glassy porphyry, replaced in the vicinity of the creek by blueish argillites, dipping to the west with a strike N.E.—S.W. At the Ida May group of claims the formation consists of coarse syenite, flanked to the east by a succession of diorite, fine grained gneiss, and greenish schists. The high lofty mountain ridges surrounding the Cadwallader Mining Camp appear to be composed of various eruptives and volcanic rocks in association with porphyries; fragments of these rocks are strewn all over the lower part of the country, while also, granite boulders of the biotite variety can be noticed wherever the soil has been removed. Glaciation of hard rock surfaces was observed at various places in the vicinity of South and Fork and Cadwallader Creek, and the striation and glacial grooving appears

to follow the direction of the valley in a southerly sense. Evidences of this kind, clearly the result of the movement of glacier ice were found at a distance of about 4 miles from the Forty Thieves in south-easterly direction, at an elevation of 4,100 feet, where the mountain slopes away towards the creek, and also on projecting points of rock.

The auriferous quartz lodes so far discovered occur in what may be termed the metalliferous belt, which commences at the confluence of Bridge River and South Fork and extends for over 15 miles along Cadwallader Creek. The rocks occurring in this belt, the various eruptives and adjacent members of the formation are charged with granular iron pyrites, and more abundantly so in the vicinity of the quartz leads. In some places the entire superficial portion of these rocks has been more or less oxidised to a depth varying from a couple of feet to twenty feet and over; at one place about half a mile south of the Ben d'Or group near the river bank the decomposition near the quartz lead is so complete that the rock may be removed easily with pick and shovel. The majority of the quartz leads occur either in diorite or in syenite and porphyry near the contact with the former; on upper Cadwallader Creek several claims have been located in a hornblende and argillitic schist crossing the strata, but so far they have not proved of importance. All veins possess a certain degree of similarity; with the exception of the Forty Thieves vein, which strikes N.W. 70°, all quartz leads of importance have a N.E. strike, and although some of the locations are miles apart, the veins appear on the map as a parallelism of straight leads. Their dip is east and where surface disturbances have not displaced the original vein as observed only in two cases, the same varies from 65 to 85 degrees. They possess all characteristics of fissures, in having very distinct well-defined and perfect walls, which cross the strata wherever such is noticeable. Small cross veins or so called feeders occur only on the Lorne group, but they are of minor importance, as the small values obtained therefrom do not warrant further development work. Judging from the surface exposures, and the development so far done on the veins, it is worthy of note that no large faults or displacements of any account are noticeable; it must be inferred therefrom that the encasing formation has undergone hardly any movements and shiftings by dynamic forces, after the deposition of the quartz out of the mineralizing solutions in the fissure. A small breakage is noticeable at the Ida May and McKinley veins, where a part of the vein near the surface outcrops, is broken off and subsequently tilted over. In treating some of the leads on the surface one cannot but be impressed with the great regularity as to their horizontal extension. Reference is made to the main vein of the Lorne group of claims; this vein strikes N.E. 70 degrees with a dip of 85 degrees east and has been opened up by some 15 cross-cuts and one shaft of 70 feet depth all over a length of 1,200 feet; the same shows in all its openings such striking regularity as to its structure and mineralization as will be seldom met with in any mining camp in British Columbia. Another fine example is that of the Forty Thieves vein, which has been traced for over 4,000 feet without showing the slightest alteration in its strike, dip and general character. The same applies to the Ben d'Or vein. The breadth of the quartz lodes varies considerably; some maintain a width of 2 feet wherever observed, others show from a few inches up to 4 feet. The largest quartz vein—though low grade—so far observed, is the Blackbird and McKinley veins, which appear to maintain a width of from 7 to 12 feet.

The quartz met with throughout the country is of opaque, white, flinty, and near the surface of rusty appearance. The gold associated with a small amount of silver occurs through the gangue generally in a coarse and often nuggety state—and specimens have been obtained, where pieces of quartz were held together by gold nuggets weighing half an ounce. In this respect it must be mentioned that a great quantity of the finest specimens were obtained during the progress of the work at the Ben d'Or and Ida May mines, while at the Lorne

group a large quantity of float quartz containing small gold nuggets were found strewn all over the slopy side of the hill. From a number of different assays of different sections of several veins in the district, it appears that the gold is very irregularly distributed throughout the gangue; while some parts of the leads average high values, others in immediate vicinity are entirely barren, devoid of even a trace of gold and to arrive at a final conclusion as to the average value of the ore in a vein is a task which presents many difficulties.

From a number of experiments made with large quantities of ore it appears that from 40 to 70 per cent. of the gold is free milling, the lower percentage being obtained from ore below the line of oxidation. Sulphides occur in most of the leads, in some to the extent of 5 per cent. of the ore. They consist of different sulphides of iron and copper, stibnite, magnetic iron and sometimes galena. Carbonates of copper were also observed in the Lorne vein, Why Not, and McKinley, in the latter at places to such extent as to render the ore all refractory. At the Ida May a peculiar steel gray mineral was observed, accompanying the gold wherever such was visible, which proved upon further investigation to be an iron sulphide. The gold values contained in the sulphides are throughout very high and are in some cases as high as \$1,000.00 to the ton. It may be of interest to give here the results of a test made with 490 pounds of Ida May ore in San Francisco:

The assay value per ton was:	Gold 4.44 ozs. equals	\$91 93	
	Silver 7 ozs. equals	4 56	
			\$96 49
The 490 pounds amalgamated gave:	Gold 1.82 ozs. equals 41 per cent.		
	Silver 0.21 ozs. equals 5 per cent.		
Amount of concentrates approximately	5 per cent.	
These yielded per ton:	Gold 40.97 ozs. equals	\$847 00	
	Silver 77.30 ozs. equals	46 38	
			\$893 38
The final tailings assayed:	Gold 0.50 ozs. equals	\$10 66	
	Silver 3.65 ozs. equals	2 19	
			\$12 85
Therefore			
	Amalgamation gave 39 per cent. of assay value.		
	Concentration gave 45 per cent. of assay value.		
Total extraction.....	84 per cent.	

As far as the writer is aware there are in the neighborhood of 15 quartz leads discovered along the banks of South Fork and Cadwallader Creek, and also nearly all are auriferous, only in a few of them ore chutes have been established, which warrant the expenditure for further extensive development work. The Ben d'Or mine has opened up a well defined quartz lead, which can be traced on the surface for 1,600 feet; the width of the same varies from a few inches up to 3 feet and developments are said to be of such satisfactory nature that, a 10 stamp mill is now in course of construction, which considering the costly transportation of machinery for 150 miles, partly over a bad mountain trail is an undertaking of more than ordinary importance. On the Lorne group of claims an arrastra has been installed about a year ago, and although eastern capitalists have relinquished a bond, which they had on the property, it is learned on good authority that the above primitive apparatus is turning out about \$500.00 worth of gold weekly from ore obtained in a recently discovered lead, particulars of which are not to hand. On the Forty Thieves group of claims a tunnel has been driven for 200 feet, but not far enough to cross-cut the lead, which outcrops on the top of a steep bluff about 350 feet high. It is reported that the tunnel will be continued shortly and as some good values are obtained on the surface, it will be very interesting to learn what the developments are at the above depth. The Forty Thieves vein has been traced over three claims and is considered by experts as the strongest quartz lead in the Lillooet district. Very high values are obtained from the outcrops of the Ida May vein, and although the quartz which is 20 inches wide, has been replaced to some extent by secondary rock matter as a result of lateral pressure,

it is not unlikely that the original pay chute may be located in lower levels.

Looking at the Bridge River Camp as a whole it must be stated that out of a quite a number of discoveries only a few, so far, have proven of value. At the present juncture it would be rash to prognosticate what the future developments will be as the work with only a few exceptions consist so far of surface scratchings; but those few prospects of value have steadily brightened during the last 12 months, and great hopes are entertained that they eventually will turn into mines. Several factors however, seem to retard the healthy progress of the Bridge River Camp, and one of them is the remoteness from railroads. The present road from Jacques Landing to the camp is not fit either for safe travelling or for proper transport of supplies and the Government should at least build a proper trail and provide for bridges over the river for proper communication. The writer has had the experience that during the high water in the summer months, pack trains with supplies from Lillooet were 6, 8 and even 10 days on the trail, and communication several times came to a standstill. The lack of good roads and bridges seems to be also one of the causes why the district has not been given more attention by the investing public and mining men, and as capital is proverbially cautious in recognizing the merits of the new camp, we cannot wonder much that so far very limited capital has found its way into the Bridge River Camp.

Again it must be mentioned that this camp has been held by the investing public as being identical with another in close proximity, where several failures in quartz mining have been recorded—on upper Cayoosh Creek. It would be beyond the scope of this paper to enter into details concerning the mode of occurrence of the gold bearing quartz in this locality, it suffices here to state that while we have on Cadwallader Creek in an eruptive formation as outlined above, fissure veins which can be traced for thousands of feet, the occurrence on Cayoosh Creek may be described as irregular wide and narrow bands, nests and disconnected pockets of barren looking quartz, conformably imbedded in the argillitic schist formation and from the development on several claims it appears that these highly irregular quartz deposits are more frequent, wherever the formation has undergone considerable fracture and disturbance. Reference is made to the Bonanza claim, where bands and small pockets of gold bearing quartz occur in a twisted, contorted and much wrinkled argillitic schist, in a reversed fault, and development work has shown that these quartz deposits were of very limited extent and for the greater part entirely barren. Examples of the same were noticed on other claims in immediate vicinity, and although some of the larger quartz deposits have yielded the finest gold specimens it must be stated that mining on these uncertain occurrences has to be undertaken with the greatest reserve.

VANCOUVER, B.C., 9th September, 1899.

Nova Scotia Gold Fields.

DEVELOPMENT OF THE DUFFERIN AND OTHER MINES DESCRIBED.

Mr. E. R. Faribault, of the Geological Survey, whose investigations in the gold fields of Nova Scotia have proved of such importance to that Province, has returned to headquarters after another season spent in the study of the gold bearing rocks of that Province. Mr. Faribault's work this year was confined to the counties of Halifax, Hants and Queens. In an interview with Mr. Faribault the REVIEW gleaned the following particulars of his work.—

The surveys made in the western part of Halifax and Hants counties were executed to complete the general geological mapping of the eastern part of the Province, as far west as Halifax city and the town of Windsor, and also to bring to a close a general report covering that section.

Especial attention was directed to the study of five anticlinal folds into which the gold-bearing rocks have been plicated here, and along which numerous auriferous quartz veins have formed in series, at certain well defined points which have now become mining centres.

The region surveyed last summer comprises the important gold-mining districts of Renfrew, Mount Uniacke, South Uniacke, Central Rawdon and East Rawdon, and the more recently opened but promising localities of Ardoise, where a belt of slate several feet wide has been found auriferous for a long distance; McKay Settlement, where profitable alluvial washing was being done on a small scale on the Meander River; and West Gore, where two new veins of auriferous antimony ore have recently been discovered and are being developed.

Special plans have been made on a large scale of the more important gold districts of Renfrew, Mount Uniacke and South Uniacke, similar to those already published of Isaac's Harbor, Forrest Hill, Goldenville, Dufferin, Fifteen Mile Stream, Killag, Caribou, Moose River, Mooseland and Oldham.

These gold districts, with those surveyed last year, Tangier, Lake Catcha, Lawrencetown, Cow Bay, Montague and Waverley, include nearly all the most important gold mines of eastern Nova Scotia, and when these plans will be published they will form, together with a general report on that section of the country, a most valuable guide in the future development of the most important portion of the Province.

A visit was paid to the Dufferin mine, where the Montreal-London Gold and Silver Development Co. are at present sinking on the dome of the anticlinal fold a vertical shaft, with cross-cuts and levels, which has reached a depth of over 300 feet. They have cut auriferous saddle reefs and legs underneath one another, as Mr. Faribault had predicted, and they have in sight enough ore to keep their 60-stamp mill running for a long while. In extending their vertical shaft to 1,000 feet, as they intend doing, they will cut large saddle veins one after another, and will have more ore with 17 air-drills than the 60-stamp mill can handle, and if proper care is taken to block and stope only in payable ore, which should be located very carefully by suitable tests along the crosscut and levels, the results will certainly be crowned with great success. This development may be considered the first important step in the introduction of a new system of mining, and will no doubt, if properly managed, be an object lesson for the inauguration of a new era of extensive and permanent deep mining in most of the gold districts of Nova Scotia.

At Waverley Mr. McNulty is using a diamond drill with similar good results; a bore-hole some 200 feet deep on the dome of the anticline has cut three saddle-veins underneath the celebrated "barrel quartz" vein. He says he is well satisfied with the results obtained with the diamond drill, and he intends doing systematic testing by a series of bore-holes to greater depths.

The diamond drill might certainly be used very advantageously in most districts in Nova Scotia, to prove the re-occurrence of saddle reefs under one another, and to satisfy the company operating of the existence of important veins besides those outcropping at the surface, so as to warrant the erection of a first-class up-to-date plant.

A LARGE ORDER FOR WIRE ROPE.—The Hall Mines, Limited, of Nelson, B.C., have just closed a contract with the Dominion Wire Rope Co., of Montreal, for a new steel wire tramway rope 50,000 feet in length. This rope is of a high grade steel, and has a breaking strain of 70 tons, and weighs about 35 tons. It is to replace the old cable, which connects the mine with the smelter, and will be specially manufactured for the work. This will be the fourth cable used at the mine, each cable lasting an average of a year. The two last cables were manufactured by the Dominion Wire Rope Company.

The Copper Deposits of Vancouver Island.*

By WILLIAM M. BREWSTER, VICTORIA, B.C.

Until quite recently, in fact within the past two years, but little attention has been given to the outcrops on the west coast of Vancouver Island, and their copper contents. During the past few months the writer has been engaged in examining and developing some of these prospects.

In many respects he has found characteristics associated with these prospects which, in his experience, are unique. In the first place nearly all the outcroppings which overlie chalcopyrite ore along the west coast of the island are composed of a high-grade magnetite. The magnetic qualities of some of these outcrops are so pronounced that the magnetite possesses polarity. Although the writer himself had no analyses of this magnetite made, yet from its appearance he can readily believe that analyses made for other parties, which show a yield of 62 or 63 per cent. of metallic iron, with only traces of phosphorus and silica, are correct.

At a very shallow depth, masses of chalcopyrite, yielding in some instances as high as 32.6 per cent. of copper, occur associated with the magnetite; and in one instance, which recently came under the writer's observation, a solid body of high-grade chalcopyrite, fully 4 feet in thickness, occurs within 6 feet of the surface.

Usually this solid sulphide-ore carries low values in gold. Probably an average of \$2 per ton would be fairly representative. But in some instances development has determined the occurrence of narrow stringers of pyritous quartz, associated with the sulphide-ores, which yield by assay more than \$20 per ton in gold.

In the districts examined by the writer, the country-rock is usually crystalline limestone, with dikes of igneous rock as intrusions. Sometimes the outcrops of magnetic iron-ore are found in the limestone itself; but they usually occur at the contact between the limestone and igneous rock, or in fissures cutting through the igneous dikes.

Most of these dikes are apparently composed of quartz-diorite; but as no specimens have been microscopically examined, to the writer's knowledge, this classification may not be exactly correct.

The trend of the country-rock is conformable with that of the island, *i.e.*, northwesterly; but the line of strike of most of the ore-bodies is usually northerly, or northeasterly.

As lode-mining on Vancouver Island is merely in its infancy, it is impossible to present as many facts with regard to these extraordinarily rich outcrops as one would desire. In fact, 175 feet is the greatest depth which has yet been attained on any of the ore-bodies. In one instance where this depth had been attained the writer is informed that both the continuity and the grade of the ore were maintained. At another location, recently visited by the writer, he found that high-grade chalcopyrite occurred at a depth of about 120 feet; but as this had not been either cross-cut or drifted on, he is not prepared to give any data as to its extent.

Although the outcrops of magnetite are usually quite persistent in length, especially when they occur in fissures in the igneous dikes, yet the writer has failed to find any instance where the lodes can be traced for any very considerable distance without a break. On Bear river, at the head of Bodwell sound, which connects with Clayoquot sound, some of the outcrops can be traced easily for a distance of from 500 to 700 feet. Another instance where the outcrop can be traced for about the same distance occurs on Anderson lake, which empties into Uchucklesit harbor, which connects with Barclay sound. Still another instance occurs near Goldstream, about 10 miles northwesterly from Victoria. This last outcrop, however, is composed of gossan instead of solid magnetite.

* Paper read before the September meeting of the American Institute of Mining Engineers.

Usually, when the outcrops are found on the contact between the crystalline limestone and igneous rocks, they cannot be traced as readily along the line of strike as when they occur in fissures in the igneous dikes. The writer's observations have demonstrated to him that the contact-outcrops occur in masses or pockets, sometimes covering a considerable area of ground, and often disposed in a tolerably regular line, but with no indications on the surface that there is any connection between the different pockets. It is not safe to form an unqualified opinion as to the non-maintenance of continuity along the line of strike, because the ground is often covered with such a thickness of moss or, at other times, *debris* from slides, that it would be necessary to do considerable work on the surface to prove the existence or non-existence of the outcrop. At no location known to the writer, where masses of outcrops occur along the contact, has sufficient underground work been performed to determine the continuity of the ore-bodies between the masses of outcrop.

The writer has observed several places where the outcrop of magnetic iron-ore occurs in the crystalline limestone. Such occurrences are apparently limited in extent, and do not appear to possess permanency, but rather impress one with the idea that their structure has the same pockety and irregular characteristics as belong to the limonite ore-deposits in the Southern States. The correctness of this impression can only be proved by actual mining operations, which have not been, up to the present time, sufficiently extensive on this class of outcrops to determine either the extent or permanency of the ore-bodies.

So far as the grade of the various outcrops is concerned, the writer has observed that there is but little, if any, difference between those occurring in the igneous rocks, on the contact, or in the limestone.

Besides the outcrops of chalcopyrite, bornite occurs in some localities, with heavy spar as the gangue. There is such an occurrence on Deer Creek, which empties into Tofino Inlet, where a fairly high-grade bornite is quite plentiful at and near the surface; but the writer is informed that as depth has been attained, the bornite has given place to chalcopyrite of good grade. A syndicate is developing this property to determine its value as a mine. According to information received, it appears that bornite is more plentiful northwest than southwest of Clayoquot sound. Except the deposit on Deer Creek, the writer knows of no other discovery, where bornite has been found in any quantity, to the southeast of Sidney inlet, which is about 35 miles up the coast from Clayoquot.

The portions of the island to which the writer has given most attention are in the neighborhood of Goldstream, about 10 miles from Victoria; the Alberni canal, which connects with Barclay sound about 110 miles northwest from Victoria; and the country adjacent to the inlets which connect with Clayoquot sound, about 160 miles northwest from Victoria. Of the coast and the interior of the island, northwest from Clayoquot sound, the writer is unable to speak, except from information.

The geology in the sections to which he has given personal attention is quite complicated. The rocks around Victoria are apparently chiefly eruptive. To the northwest, near Goldstream, there occurs a wide belt of semi-crystalline slate, slightly graphitic, in places highly metamorphosed, as, for instance, on Skirt mountain, in which the copper-deposits referred to earlier in this paper occur. This belt of slate has a general trend about N. 60° W. On the northeast of this belt occur crystalline limestone, granites, diorites and other igneous rocks, which comprise the formations, until the sandstones and conglomerates of the coal measures are encountered, near and along the eastern coast of the island. Along the southwestern coast-line a narrow belt of sandstone occurs, dipping westerly into the straits of Juan de Fuca, but broken in many places by erosion.

The belt of country in which the crystalline limestone and the igneous rocks occur forms a very interesting study in geology. But it is so complicated, and in places the faults are so numerous, though limited in extent, that a much longer period of time is requisite to make a thorough survey than the writer has been enabled to devote to such observations.

The mountains on the island vary in altitude from 1,000 to about 7,000 feet. They are covered with a densely heavy growth of timber and under-brush, which renders exploration in the interior extremely difficult. Consequently, prospecting operations, up to the present time, have been confined to the immediate vicinity of the shores of the inland waters and streams emptying into them. The numerous navigable waterways connecting with the Pacific ocean on the west coast of Vancouver island have furnished the means, in the past, for prospectors to explore the country near their shores, and in the future will prove one of the most important features to aid in the development of the country, because they will furnish the cheapest possible transportation for supplies, ore, etc.

Mineral occurs in apparently three distinct zones, each of which has a northwesterly trend, while each mineral deposit has its own individual line of strike. The most southerly of these zones is the belt of semi-crystalline slate, which traverses the extreme southern portion of the island from Goldstream to near the head-waters of the San Juan river. This zone furnished, some 30-odd years ago, a considerable amount of placer-gold, which was found in the Leach and Sooke rivers and their tributaries. Northeasterly from this belt of slate occurs the main belt of igneous rocks, which, in places, is several miles in width.

An imaginary line, drawn from Saanich inlet, on the southeast coast of the island, northwesterly, passing along the head of the Alberni canal, and thence to the northwest coast at Quatsino sound, would practically mark the division between the sandstones and conglomerates of the Coal-measures and the crystalline area.

On some of the numerous islands in the sounds which connect with the Pacific ocean, deposits of magnetite, with some associated copper pyrites, have been discovered; but on none of them, to the writer's knowledge, has there been any extensive development work performed.

It may be safely said that the western portion of Vancouver island presents to-day features of great promise, so far as copper deposits are concerned. There are also ledges of gold-bearing quartz, some of which yield high values at or near the outcrop; but none of these have yet been thoroughly developed. Work has been carried on, however, in the vicinity of Alberni, as well as near the head of Bear river, the results of which should determine before many months whether these occurrences of auriferous quartz possess value as mines.

Mining in the Boundary District, B. C.

In visiting a few of the mines of the Boundary district, I went from Grand Forks northwesterly to Phoenix, eighteen miles distant. This point is near the summit which forms a water shed between the Kettle river valley at Grand Forks and the Boundary creek at Greenwood. Near Phoenix are such well-developed properties as the Winnipeg, Old Ironsides, Knob Hill, Stemwinder and Brooklin. Five miles farther to the northwest is the town of Greenwood in the narrow Boundary creek valley. In the vicinity is the Mother Lode mine and others. Greenwood is well built, with good street improvements, and has a population of 2000. Following down the Boundary creek to the international line, ten miles from Greenwood, is Midway, a growing little town on a beautiful site. Twelve miles northeasterly from Greenwood is Summit Camp and the town of Eyholt, near which are the B. C. mine, the Oro Donoro and others.

The Crow's Nest branch of the Canadian Pacific, building through this section, is locally known as the Columbia & Western. This line is complete as far west as Grand Forks and Columbia, with most of the grading done from the latter place to Greenwood. It will doubtless be operating as far west as Greenwood before the end of the year. Spurs are being built to all the mines of note in the section traversed. The further destination of the mine is Midway, Camp McKinney, Penticton and the Pacific coast.

The Winnipeg mine, of which Duncan McIntosh is managing director, is developed by a 325-foot shaft, following the dip of the ledge. There are 1374 feet of drifting on the vein at the 50, 100 and 300-foot stations. The ores are an iron and copper sulphide, with values averaging about \$30 gold per ton. Above the 100-foot level there are from 6000 to 8000 tons of ore blocked out, with considerable blocked out below this level. The ledge of ore ranges from 2 to 17 feet wide. There are small values in copper and silver. The Winnipeg has been under development since November, 1897.

The Old Ironsides mine, owned and operated by a Canadian company of that name, has two shafts, 200 and 320 feet deep, respectively, which are connected by a 200-foot crosscut at the 200 level. Drifts on this level in opposite directions aggregate 750 feet. A crosscut of the ore body at this level shows it to be 83 feet wide. On the 300-level a 110-foot drift has encountered the same ore body.

The Granby Con. M. & S. Co. own and operate the Victoria, Phoenix, Etina and Fourth of July. On the Victoria, development is being done through the Old Ironsides levels. A drift extends 350 feet into the Victoria grounds, crosscutting 25 feet of good ore.

The Knob Hill, adjoining the Old Ironsides, is being developed through a crosscut tunnel, which cuts the ledge diagonally and is in 650 feet. Drifts on the ledge aggregate 700 feet, with a 140-foot up-raise to the surface. All this work, about 1400 feet, is said to be in ore. The Old Ironsides, Granby and Knob Hill companies are all under the general management of Jay P. Graves, with Wm. Yolen Williams as Superintendent. As an evidence of the magnitude of the ore bodies on these properties, the width of the ledge at three different points is given as 83, 145 and 220 feet, respectively. The values in the main are gold, with from $2\frac{1}{2}$ p. c. to 3 p. c. copper. A 10-drill compressor runs the drills in the mines.

In this vicinity there are four or more parallel lodes, consisting of basic eruptive rock, carrying gold-bearing chalcopryrite. The Brooklyn, Idaho, Stemwinder and others belong to the Dominion Copper Co., controlled by McKenzie & Mann, of Montreal and Toronto, and are in charge of Supt. Frank C. Robbins. The first two are on the same ledge. The Idaho is opened by a shaft 250 feet deep and is equipped with hoisting and compressor machinery. The Stemwinder and others are on a different ledge and are well developed.

The B. C. mine, in charge of Supt. John M. Scraftord, comprises eleven claims, 500 acres. The main shaft sinks on the ore body to a depth of 165 feet with extensive drifting at the 50 and 150-foot levels. The development aggregates about 1000 feet. On the ledge there are ore shoots which average 27 feet wide. The vein is at contact of porphyry and diabase. The ores are similar to those described above, though the values here are chiefly copper, with small amount of gold. The copper runs from 5 p. c. to 10 p. c. On the dumps are 3000 tons of first-grade ore, valued at \$75 per ton; 5000 tons of second-grade valued at about \$20 per ton. These values are based on smelter tests. The plant is equipped with a steam hoist and air compressor. A hoist and compressor of much larger capacity have been ordered and will be put in place as soon as the railroad is complete to this point. With new hoisting facilities provided the shaft will be sunk to 1000 feet depth. Thirty-five men are employed. There are building accommodation for 100 men. The Oro Donoro, in the same locality, is opened

by a 200-foot shaft, in which are good grades of copper and small values in gold.

The Gold Drop, near Phoenix, belongs to Montreal people and is being developed under the direction of Geo. A. Sonneman, consulting engineer, and Stanley Easton, superintendent.

The Mother Lode, near Greenwood, is the most thoroughly developed mine in that locality. This property belongs to the British Columbia Copper Co. of New York, represented on the ground by Manager Frederic Keffer. The mine is well equipped with operating machinery, having two 60 h. p. boilers, with feed-water heaters, 10-drill air compressor, sinking pump, electric light plant, hoisting engine (30-inch drum) and other useful equipment. The shaft house is built over a two-compartment vertical shaft, now at a depth of 250 feet.

The ore at 150 feet depth was found of such grade as to admit of profitable treatment, and so far as the workings go, the grade holds the same. At the 200-foot level 600 feet of drifting and crosscutting have been done, disclosing an extensive body of ore. The property is expected to become a shipper as soon as the railroad reaches the Boundary valley. The outcrop of the ledge appears for 1100 feet. The foot wall is limestone and the hanging wall diabase. The three classes of ores are described by Mr. Keffer as follows:—"Calcite carrying copper and iron pyrites, with some quartzite present; a silicate of lime, iron, magnesia and alumina, carrying both copper and iron pyrites; an excessively hard magnetic oxide of iron, with silica and copper pyrites." Practically all these ores carry gold, the calcitic and siliceous carrying small silver values. On the 200-foot level galena and zinc blende were found in the calcite gangue. The gold is carried chiefly in the iron pyrites; samples of copper pyrites contained no gold. One sample assayed 15 per cent. copper and \$16 gold; while another mass of chalcopryrites, with no iron pyrites, assayed 28 per cent. copper and only \$1 50 gold. Tests have been made which show that a large proportion of the low-grade ores may be concentrated to the saving of at least 95 per cent. of the gold contained therein. The company owning this property have decided to erect a smelting plant on Boundary Creek.

In the Boundary country, generally, there are a dozen or more air compressors, having a combined capacity of 90 drills. It is estimated that the entire district can begin shipping as high as 600 to 800 tons of ore per day as soon as the railroad shall have been completed to Greenwood. The wages paid in the district are \$3.50 per day for machine drillers, \$3.50 for hand drillers, \$3 00 for muckers, all shifts being eight hours.

The Granby Con. M. & S. Co. are erecting a smelter at Grand Forks and are well under way with the construction. It will be a matting plant.

The mines herein described are typical of the entire district and illustrate their general characteristics and the extent of developments.

MACHINE FOR MEASURING THE VELOCITY OF WINDING.—A small appliance of some merit is employed for measuring the velocity of a winding engine recently set to work at the Skalley Shaft No. 2 at the Dudweiler Colliery near Saarbrücken. From the illustration appearing in a German journal, we notice that it consists of a small fan 23 $\frac{1}{2}$ in. in diameter, connected by a rubber tube with a vacuum gauge and an indicator and recording cylinder. The fan is driven by a belt from the shaft of the depth indicator. The fluctuations in the rate of winding are recorded by vertical lines drawn on the paper surrounding the cylinder, while the actual velocity at any given moment is shown by the pointer and scale. When men are being conveyed, the maximum velocity being 5m., the depression line is $\frac{1}{2}$ in. long, and the fan makes 260 revolutions, correspondingly higher values being obtained during the winding of tubs. As the apparatus is not complicated by springs or any intermediate gear liable to work loose or wear out, it indicates the velocity of the cage with accuracy and ease.



EXCURSION TO BRITISH COLUMBIA

Meetings at Rossland and Nelson—A Large Addition to the Membership.

The excursion of the members of the Canadian Mining Institute to British Columbia last month, while very disappointing to the promoters in the character and number of the attendance from the East, was a very enjoyable affair and covered a vast amount of territory replete with interest to those interested in the development of the mineral wealth of that Province.

The party started from Montreal on Friday evening, Sept. 1st, travelling by C. P. R. steamer from Owen Sound over the lake route and arriving in Fort William on the following Monday. Here the members were accommodated with a special sleeper.

The first stop of any consequence was made on Wednesday afternoon at Anthracite, where the members were received by Mr. W. F. Little, the manager, and Mr. O. L. S. Whiteside, the mining engineer of the H. W. McNeil Co. Ltd. Before visiting the Anthracite pit of the company, the members were entertained to luncheon at the residence of the manager, a very delightful affair for which the members will ever gratefully remember Mrs. Little, their charming hostess. An interesting time was thereafter spent in an inspection of the surface plant and underground works of the company. The President having fittingly expressed the obligations of the party to Mr. and Mrs. Little and Mr. Whiteside, the members went on to Banff, where the night was spent at the beautifully situated and excellently appointed hotel of the Canadian Pacific.

Early next morning through the courtesy of Mr. Douglas, the genial Park Superintendent, the members greatly enjoyed a drive through the magnificent scenery of Canada's famous National Park. On the return journey a visit was made to the celebrated Sulphur Springs, where the majority enjoyed a refreshing and invigorating dip.

The journey was continued in the evening to Revelstoke and next morning to Arrowhead. Here the fine C. P. R. steamer was taken and the weather being delightful the beautiful scenery of Kootenay Lake was greatly enjoyed.

At Robson the party was welcomed by Mr. James D. Sword, Mr. Alexander Dick and others who had come out from Rossland.

On arriving at Rossland later on in the evening, the members were received by Mayor Goodeve, the Secretary of the Board of Trade (Mr. Jackson), and other prominent citizens.

After dinner, as the guests of the Board of Trade, the members were taken to the skating rink, where they spent the evening at an excellent concert given by Dan Godfrey's Band.

Early Friday morning the members were driven up the rugged slopes of Red Mountain, where an inspection was first made of the fine plant and extensive underground works of the famous War Eagle mine, an excellent luncheon being served at noon on the commodious premises of the company. The Centre Star was next visited and thereafter the celebrated Le Roi.

The visit to Red Mountain greatly impressed the members with the sound and substantial character of the mining operations being carried on by the Le Roi, Centre Star and War Eagle Companies, and they were greatly indebted during their stay to the officers and staff of these companies for the great trouble they took to make their visit pleasant and profitable.

The thanks of the Institute are particularly due to Messrs. J. B. Hastings and E. B. Kirby and Messrs. W. F. Ferrier and A. A. Cole of the War Eagle, and to Messrs. W. A. Carlyle and R. E. Palmer of the Le Roi.

MEETING IN ROSSLAND.

A very largely attended meeting of mining men was held in the Miners' Union Hall in the evening.

Mayor Goodeve, who presided, in an excellent speech, extended a very hearty welcome to the members of the Institute, dwelling at some length upon the progress and prosperity of Rossland and the mines in its immediate vicinity.

Mr. Hardman, President, briefly and appropriately acknowledged the welcome and returned thanks on behalf of the visiting members of the Institute.

After the City Band had entertained the audience to a choice selection of instrumental music, Mr. W. F. Ferrier, for many years lithologist to the Geological Survey of Canada, and now an officer of the War Eagle Consolidated Mining and Development Company, gave an exceedingly interesting address on the geological conditions of the Rossland Camp. The veins of the camp, he stated, were true fissure veins; in fact, typical fissure veins, though they lacked the smooth, ultimate walls which were found in the "text book" veins, but which are the exception rather than the rule in actual mining. In Rossland mines the chemical solutions have in many cases obliterated the original plane which gave them access to the surface. There were in the camp several varieties of fissure veins which might be divided into three classes. First were those which had filled open fissures, probably of later occurrence than the others, and found, for instance, on O. K. mountain, where the filling was quartz, in which fine specimens of free gold are found. Second, the simple fissure veins, filled completely with metallic sulphides from wall to wall. The principal productive veins of Rossland belonged to the composite, or scharzone class, in which a series of parallel fissures have been mineralized, constituting, however, one vein system. The speaker said the replacement of the silicates in the country rock by mineral had been accomplished by the slow permeation of the formation by heated solutions from isolated reservoirs comparatively near the surface of the earth.

Touching on the values contained in the ores of the camp he gave an instance in which the ore carried over 4 ozs. of gold. The individual minerals in the sample,

with the values in gold contained in a ton of each were: Pyrrhotite, 2.80 ozs.; mispickel, 21.24 ozs.; chalcopyrite, 130 ozs.; while the tailings carried 4 ozs., demonstrating that the values in that instance were mainly in the chalcopyrite. Referring to the working of the mines, Mr. Ferrier said the managers would find a system of assay plans, showing the distribution of values through the veins, of the greatest assistance in defining form and mode of occurrence of the pay shoots and in mapping out future operations. (We regret to be unable to publish Mr. Ferrier's remarks in this issue, for in consequence of his illness we have been unable to get the stenographer's notes revised in time for publication.)

Mr. W. A. Carlyle, Superintendent of the British America Corporation, was the next speaker. He said very few people, even in Rossland, realize the work going on down in the dark. One fact he mentioned, to give an idea of the extent of development in progress, was that in the B. A. C. properties there had been done over 23,000 feet of underground work. The work accomplished in Rossland had been development work, yet the camp had paid \$1,400,000 in dividends. The work now being done is with an eye to the future, and the time is approaching when more and larger dividends will be paid. The policy of the Le Roi is to prepare still larger reserves of ore, and only small shipments, comparatively, have been made, yet the company has to its credit a sum that would make a very respectable dividend. He entirely agreed with Mr. Ferrier's remarks regarding the camp. It is a very hard district to work, but improved methods are being adopted and greater speed in working is being reached. In driving in the Le Roi, a rate varying from 110 to 160 feet a month is attained; with three shifts over 200 feet a month has been driven. The mine is equipped with a 40-drill compressor, which has proved equal to all demands, and this will be supplemented by a new 60-drill plant. The introduction of electricity, which is now being successfully applied to mining operations, will work wonders in the future. Speaking of the condition of the Le Roi, Mr. Carlyle said the consulting engineer of the London and Globe Finance Corporation, who had examined the property, thought so highly of it that he had agreed to a very extensive plan of development, and before long there would be a great increase in the amount of work carried on in the property which would add very materially to the prosperity of Rossland. He alluded to his approaching departure for Spain, where he will undertake the management of the famous Rio Tinto mines, and said he would retain the liveliest interest in Rossland. He predicted a wonderful future for the camp when the known veins are fully developed, and said still other veins would be disclosed in the mines.

Mr. Gerald V. Hopkins, of the B. C. Bullion Extraction Company, Limited, operating at Silica, followed with some details of the work being done at his company's mill, with a view to rendering profitable the low-grade ores of the camp. (A description of this fully equipped mill appeared in these columns last year.)

Mr. F. H. Oliver, of the B. A. C. Corporation, favored the company with a couple of excellent songs and was followed by some humorous remarks by Mr. J. B. Hastings, managing director of the War Eagle.

Then came a capital song from Mr. E. Lorne Beecher, manager of the Deer Park mine.

Mr. E. B. Rathbone, late inspector of mines on the Witwatersrand, paid a high tribute to Mr. Ferrier's ability and the value of his address on the geology of the camp. He went on to say that when he first visited the camp, two years ago, he was greatly struck by the resemblance of the Rossland ore bodies to those of the Witwatersrand in one particular—the remarkably even distribution of the gold values throughout the ore. This condition was of very exceptional occurrence and of favorable significance. He was perfectly astounded, he said, to see the enormous amount of work that had been accomplished in the last two years. It was of the greatest importance that the outside public should be kept informed of the increased ore production and values, and he emphasized the necessity for the constant publication of information regarding the camp. To the managers of the mines he recommended the policy of sound, careful development work, in utter disregard of the demands for dividends made by shareholders. This province, he was sure, was about to experience one of the greatest mining booms the continent had ever seen, and he believed it would be concentrated in Rossland.

Mr. Feodor Boas, on behalf of the members of the Institute, and in an excellent address, moved a vote of thanks to Mayor Goodeve, the members of the Rossland Board of Trade, the citizens, the mine owners and managers for the generous hospitality and the liberal entertainment provided for the party that evening and during their visit to Rossland.

Mr. Hector McRae contributed a highly humorous review of the characteristics and peculiarities of a number of prominent mining engineers and mining experts, well known to the camp.

After a number of songs and recitations by Mr. H. Allan, W. J. Nelson, L. H. Webber and Jas. D. Sword, a thoroughly enjoyable and interesting evening was brought to a close by the singing of the National Anthem.

EXCURSION TO SILICA AND TRAIL.

On Sunday morning the party visited the mill of the Bullion Extraction Company at Silica, as the guests of Mr. L. H. Webber, the managing director, and in the afternoon drove over to the Columbia and Kootenay mine, where a very profitable time was spent in inspecting this fine property.

On Monday morning, Sept. 11th, a party visited the fine smelting plant of the Canadian Pacific Railway at Trail, where the greatest courtesy was shown by Mr. W. H. Aldridge, the manager, and his assistants.

In the evening the members travelled on to Nelson, which was reached at 7.20.

MEETING AT NELSON.

An Ordinary General Meeting of the Institute was held in Nelson, B.C., on Tuesday evening, 12th September.

There was a large attendance of members, local mine managers and mining men. Mr. John E. Hardman, President of the Institute, occupied the chair.

The Chairman called the meeting to order at 8.30, and opened the proceedings with an address in which he stated he was glad to see so many of the citizens present at a meeting of the Canadian Mining Institute. He briefly referred to the aims and objects of the Institute and of the benefits which had already accrued through it to the members. He added that if any of the gentlemen present were desirous of becoming members he would be glad to have their applications handed in at once to the Secretary in order that they might be voted in at this meeting.

The minutes of the last meeting were held as read.

OBITUARY NOTICES.

The Secretary announced the death, since last meeting, of Mr. McGregor, mining engineer to the New Vancouver Coal Mining and Land Company at Nanaimo, B.C., and of Mr. Nelson, secretary-treasurer of the Intercolonial Coal Mining Company at Montreal.

NEW MEMBERS.

The nomination of the following new members being approved, they were elected:

J. B. Hastings, M.E., War Eagle Con. M. and Dev. Co., Limited, Rossland.
 W. F. Ferrier, do do do do
 E. B. Kirby, do do do do
 A. A. Cole, do do do do
 R. A. Palmer, Le Roi Mining Co., Rossland.
 Capt. T. R. Duncan, Duncan Mines, Limited, Nelson.
 J. Roderick Robertson, London and B. C. Gold Fields, Limited, Nelson.
 Ernest Woakes, M.E., Duncan Mines, Limited, Nelson.
 Bruce White, Molly Gibson Mining Co., Nelson.
 H. Montgomery, M.A., B.Sc., Ph. B., Trinity University, Toronto.
 W. J. Sutton, M.E., Victoria, B.C.
 E. Lorne Becher, Manager Deer Park Mine, Rossland.
 L. H. Webber, Bullion Extraction Co., Silica, B.C.
 G. V. Hopkins, do do do do
 G. B. Meacham, Montreal.
 J. Percy Taylor, Montreal.
 D. J. McDonald, Mining Engineer, Rossland.
 J. R. Giffard, Ontario Boulder Mining Co., Rat Portage.
 Chas. Dundee, Dundee Gold Mining Co., Rossland.
 A. B. Clabon, Rossland.
 John Stevenson, Jr., Newcastle, Pa.
 A. W. Crookston, M.E., Glasgow, Scotland.
 John P. Kinghorn, Glasgow, Scotland.
 John Knox, M.E., Calumet, Mich.
 H. G. Nicholls, M.E., Nelson, B.C.
 J. L. Parker, M.E., Rossland, B.C.
 A. R. Heyland, M.E., Nelson, B.C.
 Ronald Harris, M.E., Greenwood.
 Alexander Sharp, Mine Supt., Greenwood, B.C.
 R. W. Brigstock, Nelson.
 H. A. Barton, Nelson.
 Wm. Bennett, Rosekear Fuse Works, Rosekear, Cornwall, England.
 G. W. Hughes, Idaho Mines, Idaho Basin, Slocan District, B.C.
 John L. Vanstone, Nelson.
 Robert B. Ross, Board of Trade, Montreal.
 J. Herbert Larmonth, Mechanical Engineer, Ottawa.
 Frank Robbins, Mining Engineer and Metallurgist, Phoenix, B.C.
 A. C. Ross, North Sydney, Cape Breton.
 Walter Ross, Rat Portage, Ont.
 F. S. Wiley, Port Arthur, Ont.
 C. B. K. Carpenter, Gaspé, Que.
 Wm. Mann, Imperial Bdg., Montreal.
 George T. Marks, Port Arthur, Ont.
 W. G. Turner, Imperial Bdg., Montreal.
 Ed. Wallingford, Perkins Mills, Ottawa Co., Que.
 J. M. Harris, Sandon, B.C.
 Geo. B. McDonald, Manager Noble Five Mining Co., Sandon, B.C.
 Clarence J. Smith, Sandon, B.C.
 Prof. G. R. Mickle, School of Practical Science, Toronto.
 Bruce R. Warden, War Eagle Con. M. and D. Co., Rossland.
 Edward C. Musgrave, M.E., Duncans Station, B.C.

GOLD DREDGING MACHINERY ADMITTED FREE.

THE SECRETARY intimated that by recent legislation at Ottawa gold dredging machinery was now admitted duty free. The following items would be of interest to those members interested in this industry in British Columbia and in the North-West Territory. An Order in-Council, under date of 26th June, 1899, provides:

"That the declaration of the Board of Customs that elevators of floating dredges used in mining submerged alluvial gold-bearing deposits, shall be free of duty under tariff item 555 as being elevators for hydraulic mining be approved—the Treasury Board so recommend."

The attention of dredging companies is also directed to tariff item 542, which provides:

"* * * And iron, steel or brass manufactures, which at the time of their importation are of a class or kind not manufactured in Canada, when imported for the construction or equipment of ships or vessels."

THE EIGHT HOUR LABOR TROUBLE IN BRITISH COLUMBIA.

THE PRESIDENT—I have been approached by one or two members of the Institute on the labor question, and I feel sure that it is quite within the Province of the Institute for any British Columbia member who may wish to do so to introduce a motion on that question and have it adopted. He called on Mr. Hill.

MR. LESLIE HILL—It is quite unexpected to me to have to speak on this question. There has been no resolution prepared, but perhaps one may be submitted later on. As you know, the passage of the eight hour amendment has been detrimental to this Province. The miners were being paid \$3.50 per day, which I consider much too high a rate of wages. They were perfectly satisfied with the situation in every way. I do not think the trouble arose with the miners at all. It has been said men can do as much work in eight hours as in ten. It has been the custom here that where men have had to work in wet drifts or wet ground they have only worked eight hours, but in the Slocan mines, in particular, the ore has been stoped in dry stopes. There we cannot hurry them, because they have to sort the ore carefully, and there is no advantage in working eight hours, and it is absurd to say they can do as much in eight hours as in ten. This action of the Government has been very unfortunate and it had been very detrimental to the mining interests in this Province.

MR. H. E. CROASDAILE—I understand, Mr. President, that it is the intention to bring in a resolution affecting this question later on to which members can speak.

PAPERS READ.

THE PRESIDENT—Very well: we will then proceed to the regular business of this meeting. On the printed programme there are enumerated five papers to be read at this meeting, but I may now announce that I have had a letter of regret from Mr. Pellew-Harvey that he has been unable to get his paper ready in time for presentation at this meeting. I have also a letter from Mrs. Blakemore, informing me that her husband has been, and is still, ill with typhoid fever, and therefore unable to finish his paper in time for this meeting. I therefore must first call upon Mr. S. S. Fowler to read his paper on mining and milling practice at the Ymir mine. Mr. Fowler, gentlemen, is one of those men who require no introduction to this audience.

THE YMIR MINE AND MILL.

Mr. FOWLER then read his paper on "The Ymir Mine and its Milling Practice" (reproduced in our last issue), at the conclusion of which the President spoke of the great interest of the paper and invited discussion.

Mr. WOAKES (Duncan Mines, Limited)—I would like to ask Mr. Fowler what he said the extraction was?

Mr. FOWLER—Of the total extraction of gold, 82 per cent. is recovered in bullion by amalgamation.

Mr. WOAKES—You said the pulp in the battery tended to bank up in the end of mortar. Do you think that is due to the issue being too high?

Mr. FOWLER—Possibly; but I hardly think so.

A VOICE—How do your stamps drop?

Mr. FOWLER—1, 3, 5, 2, 4.

THE PRESIDENT—My own experience some years ago, when milling in North Carolina, was of a similar nature, as I found the ore banking in one corner or end of the mortar. I was able to prevent this by changing the order of drop of my stamps to 1, 5, 2, 4, 3, and I would like to suggest that possibly a change in the order of drop at the Ymir mill would remedy this banking action. I would like to ask Mr. Fowler if the 12 ft. copper plates mentioned are silver plated for their whole length?

Mr. FOWLER—Yes.

THE PRESIDENT—At what depths do you get the carbonates referred to?

Mr. FOWLER—At 115 feet. They do not go down over 200 feet.

THE PRESIDENT—Are they accompanied by a watercourse?

Mr. FOWLER—No, they are perfectly dry.

THE PRESIDENT—I noticed one other thing in Mr. Fowler's paper, which was an allusion to a method of feeding water to the stamp battery, mentioned by Mr. Bernard MacDonald in a paper contributed to this Institute last March. I should be very glad indeed to have the method tried at the Ymir mill, as in other cases than the one quoted by Mr. MacDonald it has been found that the regulation of the water supply was a matter of great difficulty, and that the usual result of this method of feeding water was to make the dies wear unevenly by leaving the coarser material upon one side of the die.

COL. HAY (Port Arthur)—I wish to ask Mr. Fowler in what form the carbonates are found?

Mr. FOWLER—So far as we have gone the stopes in that material are not over 25 feet in length, and the strike is parallel with the vein. That body is fairly continuous; no break in the body so far as gone. It is perfectly continuous so far for about 25 feet.

ON THE SMALL ECONOMIES IN MINING.

Mr. HOWARD WEST, A.R.S.M., New Denver, presented his paper on this subject (reproduced in our last issue).

Mr. DICK—I would like to ask Mr. West whereabouts and when, in Quebec or in the Lower Provinces, has ore carrying 10 per cent. lead and 6 ozs. silver to the ton been mined profitably?

Mr. BELL—We have the Government Inspector of Mines for Quebec, Mr. Obalski, here to-night with us, and I think Mr. Obalski can answer that question if anyone can. I might say, however, that several carloads of high-grade argentiferous galena have been shipped this year to Belgium from the Grand Calumet mine in Pontiac county, and several shipments have also been made from the Zenith mine at Rosspoint, on the north shore of Lake Superior, in Ontario.

THE PRESIDENT—I might refer to one machine which Mr. West has spoken of in his paper, viz., of the Wilfley table, as being most efficient. It is now being used in one of the largest concentrators in the greatest copper camp in the world, viz., Butte, Montana, and used successfully. I think I may also say that a modification of almost all the concentration plants which have heretofore gone into the Slocan district would tend to effect a great saving.

Mr. West has asked us in his paper to look up the meaning of the word "economy" and has given us the definition. If I have understood his language rightly there was an economy when the saving resulting from an operation was greater than the expense connected therewith, or in other words when the amount expended was less than the amount realized. I must question this as being a definition of economy. I think rather that it is a definition of "profit." For example—a man may be producing an ore, realizing a total amount of \$10 per ton, and the expense attendant upon the realization made be \$12 per ton. Now if a new management comes into effect which produces that same \$10 at a cost of only \$11, obviously an economy has been effected, but there has been no profit because the amount expended has been greater than the amount realized. I would suggest a revision of this definition.

Attention to small economies in the Province of Ontario during the last year or so has changed the condition of some mines there very materially. I might say (although not pertinent to this discussion) that I have had occasion to go through that country frequently as well as through British Columbia, and that the opportunities for small economies are greater in Ontario by far than in British Columbia.

MR. R. C. CAMPBELL-JOHNSTONE—I might say in regard to some of the points which have been mentioned by Mr. West in his paper that silver values do not always run with lead values, and that the losses of silver in the Slocan are due to losses of mineral which is not in combination with the lead ore of the vein.

Mr. FOWLER—I consider the problems of concentration of very great importance. I have had to do within the last year with one of the more recent mills in that country, namely, the Whitewater. I had hoped to be able to prepare some notes on operations at the Whitewater, but I have been too busy to put them together in form. However, as Mr. Johnstone suggests, I can back him up in saying that the principal losses in silver in the Slocan are due to losses in silver not in combination with lead. We find in the Whitewater there is silver in slate, silver in siderite, in quartz and in calcite, and often we cannot get any lead even by wet tests.

Another matter attention should be called to is the system of making lead assays by fire. We have found by repeated tests that the fire assays when applied to such material as low-grade tailings do not afford a reliable index to the efficiency attained—for a fire assay of lead showing, say, 1/2 of 1 per cent. might become 2 per cent. by wet method, and while there might be an apparent efficiency of 80 by the former, the latter might only show 50. I would point out that it is a matter of extreme importance in this or any other country that lead assays by fire are not dependable upon very low-grade material, and there should be a more general adoption of wet lead tests, thus permitting the exact study of means leading to increased savings.

COL. HAY—Our friend (Mr. West) who has just read this paper, thought it very advisable to put a man in charge of a mine who, whether or not practical, is theoretical, and it is often overlooked that a man who is a mining engineer may be both, but for that reason his mind is so much absorbed with the details of mining that he is apt to overlook the business detail. There is as much room for economy in business detail of mine management as in the technical.

Mr. WEST (replying to Mr. Fowler)—There is one method effective when ore is not too low in lead: if you put a certain amount of silver in the crucible with the lead, etc.

Mr. LESLIE HILL—In regard to what Mr. Fowler says about the presence of silver in lead, in the Vancouver mine we find that we actually shipped ore higher in silver in 40 per cent. lead than in 60 per cent. lead.

A paper on "The Bridge River Gold District, B.C.," was presented by Mr. Fritz Cirkel, M.E., Vancouver, (reproduced in this issue), and read by title.

THE PRESIDENT presented a paper on "A Method of Cost Accounting" (reproduced in our last issue).

THE EIGHT HOUR LAW.

THE PRESIDENT—Now that all the papers have been read we are ready to receive any resolution which will open for discussion this vexed question of the eight hour law in this Province.

Mr. CROASDAILE—We take this matter up as the Institute is interested in mining throughout the Dominion, and as this matter affected mining in this district. We lately had legislation imposed on us which was not desired, and a class of legislation generally approached with the greatest caution, interfering as it does with freedom of contract. In New Zealand, where labor legislation has been carried to the greatest extreme, there is no interference with freedom of contract. In the British Columbia Legislature at the end of the session legislation was brought in interfering with freedom of contract. Men can work in railway tunnels 12 to 14 hours, but because it is the mining industry men cannot work more than 8 hours. I do not want to go into the political part of the question. I therefore beg to move the following resolution:

"Be it resolved that this Institute feels the necessity of recording its strong disapproval of recent legislation in this Province, legislation that was unasked for by the miners and which interferes with freedom of contract by restricting the hours of labor underground; and which has led to the closing down of many active mines in this Province and has caused a disturbance of the cordial relations which had hitherto existed between capital and labor.

"Also resolved, that the Council of the Institute be authorized to take such action in the matter as it might think fit, and forward a copy of this resolution to the Hon. the Minister of Mines for the Province of British Columbia."

Mr. LESLIE HILL—I beg to second this resolution.

Mr. BELL—What steps have been taken by the mine operators themselves to have the obnoxious legislation repealed? I suppose you would like to have the Institute as a body take action upon the resolution?

Mr. CROASDAILE—I do not know whether the local house would be much influenced by what the Institute thought, but we would be glad if the Institute saw fit to take any action in the matter.

THE PRESIDENT—I may say that many of the members from the East have only heard of this Act through the newspapers. The distinction is made that men can be employed on railway work underground for as many hours as they like, whereas mining companies can only employ men for eight hours underground.

Mr. J. R. ROBERTSON—I would like to say that this matter has been discussed by most companies and in the general press of the Province. At a recent meeting held in Rossland of the Associated Boards of Trade of British Columbia, a strong resolution was passed and sent to the Minister of Mines requesting the withdrawal of this legislation. That is the position the Boards of Trade of British Columbia have taken on this matter.

Mr. FOWLER—I might also remark that not only have the Boards of Trade sent this request to the Government, but soon after we learned of the importance of the legislation passed, delegations proceeded to the Coast representing this district, the Slocan and the Rossland districts, presenting their views and requesting the rescinding of this legislation.

THE PRESIDENT—Have the mining men obtained a legal opinion as to the validity of this section of the Act?

Mr. FOWLER—Yes; it is not unconstitutional.

Mr. CROASDAILE—We had the privilege of a visit from the Minister of Mines, who introduced this amendment to the Mines Inspection Act, but in answer to a question by myself, the only request the Government received for this legislation was from one member of the Rossland Union, but the Government took no steps whatever to ascertain the views of the employers of labor, or to take the views of the miners throughout the Province, but considered it advisable to bring in a resolution and smuggle it through the last session of the House without anyone knowing about it.

THE PRESIDENT—Is this a paragraph of the Mines Inspection Act?

Mr. CROASDAILE—Yes.

Mr. ROBERTSON—The clause as at first printed referred simply to boys under sixteen years of age. There was no mention of the eight-hour clause for adult miners, and it was brought in as an amendment on the 24th of February and the Legislature prorogued on the 27th, and there was no getting of newspapers before that date. The whole thing was run through without any discussion of the matter.

Mr. CROASDAILE—In our own mines we occasionally work three shifts, but it is exceptional. Most mines cannot work three shifts, and the result is the actual production of the mine is reduced from 20 hours to 16. It might be argued that we can put more men on, but you cannot where only two shifts can be worked. There is only room for so many men in the stopes and drifts, and naturally the output of the mine is actually lost by about 15 per cent. owing to this legislation.

Mr. ALEX. DICK—I doubt very much whether it is advisable for this Institute, representing all of the Provinces, to interfere in local matters in British Columbia. I do not know that at any meeting we ever had in Nova Scotia the Canadian Mining Institute ever took any prominent part, and I think, Mr. President, you will bear me out in that statement. I believe out here the mine owners have formed associations, and no doubt any moral support given by the members as a whole would be welcome, but I doubt whether it would be wise for the Institute to take any action.

THE PRESIDENT—I must take exception to one of the words Mr. Dick has used, viz., "interfering". It is not interfering in local matters in British Columbia to have this Institute discuss a matter which is of vast importance to the Province's interests. Furthermore the language of the resolution only records "strong disapproval" of the Government's action.

Mr. BELL—I think this is a question upon which the Institute may be fairly called upon to exert its influence. Any legislation which is so detrimental to the successful development of the mining industry as this eight-hour Act has proved itself to be in the Slocan, should be combatted by the mine owners and mine managers, not only of this Province, but by their confederates in the other sections of the country. The Institute, while partaking largely of a technical character, is, I take it, primarily a protective organization. It has been so in the past. Mr. Croasdaile's resolution appears to me to be perfectly in order, and I think we should do all we can as an Institute to secure a repeal of this obnoxious interference with the mining industry of the Province.

Mr. ALEX. DICK—I think an appeal should be made to the Federal authorities at Ottawa praying for a repeal of the Act, and at the same time we would be doing a greater service to British Columbia than by petitioning the Provincial Government, which is to my mind a repetition of what has already been done.

Mr. CROASDAILE—There has been no resolution sent to the Government by the local organizations. I do not know what your methods are, but I think it is a perfectly legitimate matter for the Institute to take up.

The resolution was then re-read, put to the meeting and carried.

PUBLICATIONS.

Mr. BELL—I should be pleased to have our British Columbia members express their opinion upon the present form of our publications. It has been suggested by some of our members that instead of the bound volumes we should issue in pamphlet form the proceedings of each meeting and the papers which are read separately. These pamphlets might be issued immediately after a meeting, and by being paged continuously could be bound for those members who desired to have bound copies at the end of the year. The point to be gained would be an earlier publication of individual papers than is possible in a bound journal on the lines of our publication hitherto.

Mr. CROASDAILE—I think we find it most convenient to have the book in its present form.

VOTES OF THANKS.

Mr. FEODOR BOAS—I think it will be in place for the Institute to express its thanks to the two British Columbia gentlemen who have favored us with papers. I am sure all those who have listened to Mr. Fowler have been struck with the excellence of his paper. Mr. West has given the mining men ample room to think also.

Mr. Boas referred in eulogistic terms to the great and brilliant future of British Columbia, and said that the Institute would use every effort to make known its great mineral wealth that only needed capital to develop, and concluded with a warning against bogus companies and wildcat schemes.

Mr. STEVENSON—I have pleasure in seconding this motion of Mr. Boas. I consider the eight-hour law most serious, and think very little capital will come into British Columbia so long as such obnoxious laws are on the Statute Books, and when the mining men get together and do some missionary work with the Provincial Legislature and get that Act repealed the mining situation will be much improved.

THE SECRETARY submitted the following:—*Resolved*, that the members place on record in the minutes of this meeting their hearty appreciation of the many kindnesses and courtesies extended to the members and the very excellent local arrangements which had been made for them during their excursion to British Columbia, and that the Secretary be authorized to send a letter of thanks at the earliest opportunity to the Canadian Pacific Railway; the H. W. McNeill Co., Limited; Mr. Douglas, Superintendent of the National Park; the officers and staff of the British America Corporation, Limited, and the War Eagle Con. M. and Dev. Co., Limited; the Mayor, Corporation and Board of Trade of Rossland; the officers and staff of the Canadian Pacific Smelting Works, and to Messrs. H. W. Croasdaile, S. S. Fowler and Captain Troop at Nelson.

These resolutions being carried unanimously, the meeting adjourned.

MINING IN ONTARIO.

County of Frontenac.

Hematite Iron Ore.—The search for this ore has been entered upon along the frontier of the Huronian formation. On the Potsdam outcrops on Lot 3, 11th Concession, and Lot 4 in 9th Concession, very good hematite has been found, carrying 60 per cent. metallic iron. Some 20 miles east on the same range, on the banks of Dog Lake in the Rideau Canal waters, hematite has been found in considerable quantity. West of the first named locality the ore has been found near Enterprise in Camden township. Thus along some 30 miles the exposures give encouraging testimony of the existence of hematite at the contact between the magnesian limestone and the sandstone of the Potsdam group. The parties engaged in the search so far do not appear to be sufficiently equipped for adequate tests. No doubt the ore will be found as elsewhere overlaid by drift. Boring with the common well-borers outfit will be pretty sure to reveal ore bodies of considerable value which will prove an important addition to the known magnetic ore resources of this county.

Magnetic Iron Ore.—The Hamilton Steel and Iron Company have concluded leases for the Martelle Mine and the Caldwell Mine in the township of Bagot, County of Renfrew, for the Mississippi Mine in Palmerston township, and the Glendower Mine in the Township of Bedford. The royalty payable for three of these mines is 15 cents per long ton, on a minimum output. In Bagot township the mines have not as yet railway connection. A bonus in aid of this necessary work was given to the K. & P. Railway Company last Session of Parliament. The stock piles are daily growing until the branches will remove them during the coming winter. The magnetic ore deposits of the ranges crossed by the Kingston and Pembroke Railway are of great extent, and during the present healthy condition of the iron trade should receive the attention of parties interested in securing sources of ore supply.

Amber Mica.—The townships of Bedford and Loughborough are turning out weekly several tons of thumb-trimmed mica. The Lacy Mine which was culpably allowed to cave-in after a long record of large outputs, has been attacked at another point and is giving excellent results. Tett Bros. on Lot 4 in the 8th Concession of Bedford are working in a mica bananza. The Bedford Mining Company have in this vicinity about 1200 acres which they promise to explore.

Galena.—There is some talk, as yet in the air, about working the Frontenac Lead Mine. The galena range, a wide vein or dyke of calcspar which has been traced some 40 miles from Dog Lake in Storrington to Fermoy in Bedford, has never been intelligently explored. And yet in view of its neighborhood to water and railway communication and accessible supplies there is no more inviting prospect for lead mining in a large way.

Sandstone.—Very fine specimens of sandstone flags are found in the township of Pittsburgh. There is a Grindstone Island in Rock Lake, Storrington, composed of a close-grained sandrock. Some sandstone fronts have been erected which advertise the beauty of this building stone. Mr. C. F. Gildersleeve, general manager of the R. & O. Steamboat Company, a few years ago endeavored to bring the stone into notice, but the time was not favorable. Now that a "growing time" is on, those desiring a handsome house front should turn their attention to the sandstone quarries near Kingston.

J. B.

Lake of the Woods.

Regina Mine.—Operations have been resumed to a limited extent; two of the Tremaine mills are running day shift, and a drift is being run at the 475-foot level. The vein in this drift is showing remarkably well, being nearly 8 feet wide, almost all quartz, with well defined walls and the gangue carrying good values in gold. Mr. Meiville is still in charge, with Captain Jones as mining captain. General Wilkinson has been at the mine for some time, but will not spend the winter in this country.

Camp Bay.—The Combine Mining Co. will soon have the ten-stamp mill ready to start crushing. The railway from the mining property to the mill, which is built on the shore of Camp Bay, is about completed.

At the Boulder nothing has been done since the diamond drill operations were concluded. Mr. Gifford, the late manager, has gone west to a similar situation out there.

Col. Atwater continues to work a small force, drifting on his dyke on Crow Lake, but it is doubtful if work will be continued much longer before laying off for the winter.

On Denmark Lake, Alan Sullivan, C.E., has been sinking two shafts, and has now begun to drift in one of them. The prospects are very encouraging on these properties. Mr. Sullivan's large party of prospectors are still in the field and will remain until snowfall.

Virginia Mining Company.—Mr. Rayburn is in charge during Mr. Brockunier's absence in Virginia. Mr. Dalby, who has been at the Lizzie mine from the beginning, has lately severed his connection there.

The two portages between Lake of the Woods and Sturgeon Lake have presented quite a lively appearance during the last few days, with men and teams portaging supplies for winter for the Sullivan and Virginia mining camps and for two lumber camps.

The Triggs Mine.—A drift is being run along the large composite vein to which the crosscut was run some 50 feet from a point 108 feet deep in the shaft. A complete steam outfit has been ordered and will soon be in operation. It consists of hoist, pump, two air-drills and a saw-mill. The company have recently acquired from the Crown a block of 250 acres in the neighborhood of the mine; there is much valuable timber on this land. A notable feature at the Triggs is the presence of good values in gold in the band of altered trap running alongside the vein. Much of this hard-jointed trap shows gold in the pan, and it is nothing unusual to find visible gold in specimens of this rock. A sample of it taken for 40 feet along the crosscut, when assayed at the Keewatin Reduction Works, yielded at the rate of \$6.07 per ton.

The Union Mine.—This is the name of a prospect not far from the Triggs, which was taken up this summer and upon which work is to be done this winter. It is owned by Dr. Edmison and others of Rat Portage. Some distance west of this, and north of the easterly end of Witch Bay, several locations have been surveyed this fall, some or all of which are claimed to be on the extension of the Gagné vein.

Treasure.—The shaft is being unwatered and it is said that work is to be resumed.

At a meeting of the directors of the Bullion Mining Co. held in Rat Portage on the 7th instant a company was organized to develop mining location S. 28, situate west of Mud Lake, north of the Lower Manitou, which has been in the Bullion people's hands for a considerable time. It is highly probable that work will commence shortly on this property.

Quite a number of strangers, being men interested in mining, have visited the district this autumn, and although not many deals can be reported it is yet hoped that there are good results yet to follow from these repeated personal investigations by outside parties.

After a wet summer we had about three weeks' fine weather, and then it was rainy and raw; we have had our first fall of snow—about half an inch—and the weather is disagreeable. Miners and other workmen are scarce, a number of the former having been drawn off to work on rock work on the Rainy River Railway.

J. M.

RAT PORTAGE, Oct. 18, 1899.

MINING IN NEW BRUNSWICK.

The mining boom that has attracted so much attention in the west and in the Klondike has created no particular stir in New Brunswick. Nevertheless the fever has been somewhat contagious, and within the past year the Government has received a considerable revenue for mining claims of one kind and another, whether the owners of the said claims ever come out right or not.

The discovery, or alleged discovery, of gold-bearing quartz at a point called Cross Creek, in York Co., not far from Fredericton, brought on a mild craze, and in the dead of winter when the ground was covered with snow and ice some thousands of areas were taken up by men in various parts of the Province who probably are somewhat wiser to-day.

Just what ground there is for the assumption that there are paying lodes in this district is not apparent as yet, though I have been reliably informed that the precious metal is in place there—whether in paying quantities remains to be seen. At any rate there is very little stir over the matter just at present.

In Albert County the last summer has seen considerable development and work of negotiating the sale of the immense shale deposits of Baltimore and vicinity—now termed canal coal—by American capitalists. It is reported that the deal has gone so far as to cause owners to transfer their holdings, but how far this is correct is not positively known. The mining of a quantity of the material is however going on for some purpose or practical test, and what results will finally be remains to be seen.

Capitalists, or supposed capitalists, have also been busy examining copper deposits in Albert Co., and eminent geologists and experts from the U.S. have been floating about freely—large talk of big capital to be spent in the development of several mines, etc., but as yet the mines are unworked. It seems strange these properties are not investigated by some capital and proved. All surface evidences, veins and quality of copper yielded are of a high grade and very promising, and yet no one seems to get down to business. It seems to be a case of wanting "something for nothing," or else there is no backbone to the boasted capital behind them. Some day though the copper mines of Albert Co will be heard of.

The Gypsum works at Hillsboro' continue to mine and ship large quantities of their well-known rock and calcined plaster, and cause a considerable expenditure of money in that section of the country.

The Manganese works at Dawson, owned by the Mineral Products Co. of New York, are, I believe, working away vigorously. Just what progress they are making in the production of the Ferro-Manganese at the furnaces in Nova Scotia I cannot say. They seem to be most actively engaged in cornering all the most important manganese deposits in New Brunswick and Nova Scotia at present time.

Quite a little interest is being taken in the attempt to bore for oil once more in various parts of the province. Our local Government legislated very generously in the matter last session, so that a number of our prominent business men have formed a company with a million dollars capital, and are now about organizing. Meantime some one else is finding the money, and work of boring has commenced again on the ridge of land between Moncton and Memramcook at or near Dover, where it is hoped, if borings go deep enough, they will strike the wished for oil. Some years ago an American company bored in both places but without success, but it is alleged the borings were not deep enough. Meantime the proprietors of this idea are covering every possible square mile of territory where it is thought oil might exist. The efforts of this company will be watched with great interest, as it is firmly believed the oil exists and possibly gas from former evidences of both.

The work of development of the pyrrhotite or nickel belt near St. Stephen is going on vigorously, and its promoters look for big results in the near future. Work of putting down a shaft for a thorough test is now going on. Latest development shows considerable copper with the pyrrhotite, which is encouraging. This deposit is very large and well defined, and if necessary percentage of nickel is obtained it will bid fair to be quite a rival to Sudbury, as the mines are within two miles or so of good sea shipment. It has long been thought this deposit was worthy the attention of capital, and now it bids fair to be given a good test. Quite a large amount of territory is now covered by mining rights by various parties in New Brunswick, Ontario, etc.

There are also other promised developments in copper mining in Charlotte County in vicinity of Le Tete, Simpson's Island, Adam's Island, etc., all on the seaboard. Numerous mining claims are held by various parties, and lately an organization known as the Copper Isles Mining Co. has been organized under the New Brunswick mining laws, the principal promoters and stockholders being Bostonians. Of this more at a later day.

Considerable development work is going on at Dorchester, Westmorland Co., N.B., in what is now known as the Intercolonial Copper Mine. The property is being explored by American capitalists from Providence, Rhode Island, and has some very good men on its list. This mine is near the old "Couch Mine" so called, which created such an excitement in New Brunswick some years ago, and on which a large sum of money was spent to the sorrow of certain Massachusetts capitalists. It is said the prospects look very promising.

A well-defined body of Baryta has been covered by mining rights by New York parties, and prospects are that quite a bit of development work will be gone on with this fall and winter. This deposit is in Memramcook, Westmorland Co.

There is a prospect now of the valuable Manganese Mine, near Sussex, N.B., being sold to American capitalists and worked on a vigorous scale at an early day. This is beyond doubt one of the best deposits of the kind in Canada.

I have thus briefly outlined to you the principal movements in mining matters. There are numerous other deposits in various parts of province, such as magnetic iron, hematite, silver and lead, coal, gypsum, etc., all worthy the attention of capital. These of course are only prospects and require the attention of practical men and a small amount of development money.

I have faith to believe that New Brunswick may yet command a fair share of attention at the hands of capitalists in the near future, and will be glad to give the readers of the CANADIAN MINING REVIEW any information in such matters as far as lies in my power.

Yours, etc.,

New Brunswick, Oct. 17, 1899.

CRYSTAL.

LARDEAU DISTRICT, B.C.

The changed aspect of the hills around us, the gorgeous autumn tints of the vegetation, and lastly the snow-crowned peaks, all announce the advent of the customary long Kootenay winter. Supplies are being sent up to the various camps that intend working through the snowy season with all speed, as any day now may bring such a downfall of "the beautiful" as to render access except on snowshoes impossible for some months to come. It is, however, very gratifying to note the increasing number of claims that are being worked all the year round; whereas a few years back it was quite the rule to shut everything down on the first approach of snow, and to spend the time till spring in the town, such practice is now quite the exception and every effort is made to continue work rather than to stop it. This fact of itself proves that our incipient mines have something in them worth attention, and that the wonderful tales told about some of them are not entirely mythical even if in some cases they were exaggerated. At the risk of appearing to boom any one property unduly, I am glad to say that a personal visit to the claims now being worked by the celebrated Boston and B. C. Company has assured me that what they have exposed on their claims is amply sufficient to justify a company taking hold of it and developing further, as the ledge is a very large one and well mineralized throughout. Whether further development will result in success or failure to make a mine remains of course to be seen, but the winter's work of some ten men will put that matter out of doubt; and inasmuch as a good copper mine in the Big Bend district will materially assist the quarter of Kootenay, fervent wishes are expressed for its prosperity.

The Carnes Creek Co. have, as already noticed in other mining papers, struck a very fine vein of copper ore in their Roscherry claim (the main body of which is highly

arsenical pyrites carrying good value in gold), which will considerably increase the worth of their property and ought to make their shares a desirable investment. This copper vein appears to run parallel to the main lead, and to be quite distinct from it; so much is this the case that it will in no way interfere with the cyaniding process which it is intended to use in the treatment of the ore generally. Another good feature about this mine is that the values do not diminish at all as depth is increased, and the ore body is stronger than ever. A personal visit recently to Keystone Mountain (some 8 or 10 miles from the Boston and B. C. property) proved a veritable "eye opener" in regard to the amount of mineral showing, although not very much has been done yet beyond staking claims as the camp is comparatively a new one. Still, some tunnels have been driven and short shafts sunk, all demonstrating the presence of ore, usually galena and pyrites, but with very strong indications of copper. No doubt a year or two more will be sufficient to call investors' attention to this most promising locality. As with most if not all the best prospects, there is the great difficulty of access, though when one is once at the top of the mountain travel is easy enough, the scarcity of timber making the country more like a park than a mining district. There are of course the usual apologies for trails, which in most cases seem to have been thoughtfully arranged to cost the most money with the least possible useful work—such a troublesome job as cutting out a fallen tree is not to be thought of; turn the trail round it; and for fear of ill-conditioned people saying that such a proceeding was unnecessary, the usual way seems to be to go some hundred yards or more out of the way to make it look as if it was not done to avoid the fallen timber, but for some wise reason. And why a trail should be constructed a long way up a steep hill for the sole object of coming down again, instead of going round more nearly on the level, is one of those things that passes all understanding, and causes a free use of language that some people would consider profane. Notwithstanding all these inconveniences, however, a week or two in the mountains is most enjoyable, and the views of apparently illimitable snowy peaks and glaciers, particularly at sunrise and sunset, so lovely as to repay one for the exertion of climbing some 8,000 feet above sea level.

To return, however, to the subject of the mining matters in this district, good reports are to be heard from the Adair claim on Laforme Creek, a very fine stringer of copper ore having been cut while extending the tunnel. The ore certainly looks very much like that from the Rosebery referred to already, and the vein which the tunnel is expected to tap some 30 feet further is arsenical pyrites also; but it does not follow that it is the same lead. That seems rather a common error, to take it for granted that because the ore in one claim chances to be like that in another perhaps 20 miles away, both are on the same lead. Of course it may be the case, but it will be very difficult to prove.

From Illecillewaet we have the news that the Tangier, which has been working with a considerable force of men all the summer, is shut down for the winter. Rumors about the management of this mine are plentiful, and not complimentary, but it would be most unfair to condemn any manager without far better evidence than we have. Both the Waverley and the Tangier are in a good neighborhood for minerals, and will very likely turn out all right after further development. It takes more than one or two years work to make a mine, though in this country it certainly ought to show what to expect.

The Lardeau is holding its own well, and some extensive deals have been made lately in the mining properties there, notably perhaps the Towser, which has been sold to a Chicago syndicate for a cash price of \$40,000. This is next to the Silver Cup, and will probably turn out as well as that has done. Most of the more developed claims in the Lardeau will be worked all the winter; especially the Nettie L., which has been spoken of frequently—at this mine the ore is being sacked just as it comes from the stopes, and will be shipped out as soon as there is sufficient snow for rawniding. Two men recently took out 150 sacks of ore in one day, all of high grade and not sorted.

In the Fish Creek camp again, some very fine strikes of ore have been made quite lately, notably on Sable Creek, (tributary to Fish Creek), where both the Trilby group and the Revenge group have "struck it rich," one to three feet of galena on the surface that carries very high value in silver and lead, as well as some gold. But it is really a difficult matter to pick out any one or two groups of claims, when all are so very promising and most of them so wonderfully valuable; it must suffice for the present to merely mention the St. Elmo, near the Great Northern ledge, and the Crack Shot, which is in the opposite direction on McDonald Creek, near the Gleggarry claim, both of which have remarkably rich ore actually from the grass roots. Still others come to mind, the Hidden Treasure, close to Trout Lake, and the Chief Mountain on Surprise Creek, which latter is showing a marvellous vein of copper ore, some samples from which are said to assay as high as 60% copper, though of course an average sample cannot go anywhere near that point. Enough, however, has been said to indicate that the Lardeau district contains vast bodies of high-class ore, and that the railroads now in course of construction through it, will reap a grand harvest; while the erection of a smelter in the vicinity, which is already being seriously considered by men well able to judge as to the profit to be derived, would seem to point to a very promising future to this district in particular, and to the country generally.

Revelstoke, B.C., Oct. 15, 1899.

A. H. H.

COAL MINING IN CAPE BRETON.

The main shaft at Dominion No. 2 is now in the hands of the contractor, who will continue the sinking until the Phalen seam is reached.

For sinking purposes a battery of boilers has been installed to furnish steam for a pair of 8 in. x 12 in. and a pair of 12 in. x 24 in. engines used in hoisting material from the shaft.

The compressor for supplying power to air drills is a 20 in. x 30 in. steam end and 18 in. x 30 in. air of the straight line type. All the shaft water will be lifted in iron tanks, and an effort will be made to keep it dry without the aid of pumps.

A shaft is being sunk to the Phalen seam near Caledonia colliery for the purposes of lifting the water from the workings that were flooded during the recent fire.

When completed, the pumps to the rise of this point will be taken out, and as the workings proceed the water will be pumped to this shaft and there raised to the surface.

Two 12 in. bore holes for pumping purposes are being put down at Dominion No. 1, and will strike the seam at the lowest workings of this colliery.

The Dominion Copper Company, Limited.

Among our illustrations this month we reproduce a number of excellent engravings of the underground and surface works at the Brooklyn, Stenwinder and other properties in the Boundary District of British Columbia which Messrs. Mackenzie & Mann have turned over to the Dominion Copper Company, Limited. The new company has an authorized capital of \$5,000,000, in shares of a par value of \$1.00, of which 2,000,000 fully paid shares are taken by the vendors in full satisfaction of the purchase consideration; 500,000 shares are offered for subscription; and 2,500,000 shares are to be held in reserve for future purchases and operations. The officers and directors of the company are: President, Hon. George A. Cox; Vice-President, Wm. Mackenzie; Managing Director, Hugh Sutherland; and Messrs. D. D. Mann and J. W. Flavelle. The properties are all situated in the Phoenix Camp, Boundary District, and comprise the Brooklyn, Standard, Stenwinder, Montezuma, Rawhide and Idaho copper mines. In reporting upon these properties, Mr. Frank Robbins, M. E., formerly manager of the new Elkhorn Mining Company at Leadville, Col., who has been appointed mining engineer to the new company, says:—

Brooklyn.—A number of surface cuts and small pits, showing the direction and width of the lode—from all of these samples are of record showing good values in gold, silver and copper.

An incline shaft of 240 feet in depth, this has been sunk upon the limestone foot-wall; from top to bottom, with exception of a barren bar, or horse, at sixty feet in depth, (twenty-five feet in thickness); this shaft has been sunk entirely in ore. (Upon June 1st this shaft had reached a distance of 260 feet, the same ore condition continuing.)

At 150 feet from the surface a crosscut has been driven from foot-wall to hanging-wall, a distance of one hundred feet; for fifteen feet from the foot-wall this crosscut was in ore. From this it passed into still mineralised, but lode matter of no real value, this condition obtained until it reached a point thirty-five feet from the hanging-wall where it encountered and continued in lode matter containing numerous small seams of high grade ore for thirty feet, then passed into barren matter for the remaining five feet.

A drift has been driven in the fifteen foot vein, lying upon the foot-wall, for a distance of fifty feet; this work has been entirely in ore, which still continues as the drift proceeds. (Upon June 1st this drift had reached a distance of 86 feet, the same ore condition continuing.)

A drift has also been started in the thirty feet containing the rich seams with the idea that these seams form feeders to a more concentrated body of ore, or in other words to a pay-shoot.

I am purposely omitting the values of the ore in this generalized report, as you are fully acquainted with this from the weekly detailed letters; but it may be well to here state that the ore in which this drift was started at the station level, carried five per cent. copper besides the gold and silver values. It may also be well to note here that copper ores of less than four per cent. are now being mined and treated at Butte, Montana, and at other places.

As soon as the shaft has reached a sufficient depth to give a sump for accumulation of water, another drift will be started at 250 feet in depth. That is, about the time this communication will reach you.

The Brooklyn is well equipped, having a good, iron roofed shaft house, a steam hoist of sufficient power to sink 500 feet; there are also two boilers of ample size for this purpose, and a pump of a capacity of 100 gallons per minute is ready to handle any influx of water, although, so far, the water has been easily handled by the engine and hailing tank.

Idaho.—There has been no work done upon this claim, beyond surface cuts and one small pit 30 feet in depth. The surface-showing made by these is as good, if not better than that upon the Brooklyn at a similar stage of development, of which lode, I have already stated, I believe this to be the continuation.

Stenwinder.—The workings here consist of, besides the open surface cuts, a tunnel 86 feet long, striking the lode at a depth of 60 feet; a crosscut from this crossing the lode for 78 feet; a drift; a winze from the end of the last—this winze was sunk upon a vein of good ore. A shaft 56 feet deep, which is caved and inaccessible; this, I am informed, crossed a vein some 12 to 15 feet wide, of very good ore—some of this ore is in evidence on the dump. There is also another shaft 90 feet in depth, which crossed the same vein just spoken of, at a point where it was 21 feet wide; from the bottom of this shaft a crosscut was driven to encounter this vein, but owing to the faulting of the formation, this was displaced some 40 feet and then recovered. From the point of recovery a winze was sunk upon the vein for 25 feet, and a crosscut driven across it for 18 feet. Upon the foot wall of this winze a portion of the vein about 2 feet in thickness consists of solid chalcopyrite—a valuable copper ore.

The above described workings, being extremely primitive and unsuited for permanent work, a double compartment shaft was started and sunk to strike the lower portion of the faulted vein. This was struck at a depth of about 90 feet. The shaft has been continued to a depth at this time of 162 feet. At 114 feet a crosscut was started; this has been driven in ore, with exception of some small breaks, for a distance of 64 feet. (Upon June 1st this crosscut had been driven to a distance of 114 feet, the same ore condition continuing.)

The equipment of this shaft consists of a building sufficiently large to accommodate any machinery which may be required for several years to come; a boiler; and a hoisting engine and pump similar to those at the Brooklyn. Here, too, no water has been encountered greater than the hoist can easily handle.

Montezuma.—This has had no work done upon it other than the pits and surface cuttings to expose and explore the croppings.

Rawhide.—This has numerous surface cuts upon the ledge, by these the continuity of the vein is traced for almost the entire length of the claim.

The outcroppings are very bold and very fine, and fair values are sustained through all of them. These croppings are much oxidized, pointing to the fact that, as in most copper mines, the copper has been leached out and will be found re-precipitated below. As a fine opportunity occurs here for development to a considerable depth by means of a crosscut tunnel, such was started, and is now in 400 feet, and is now very close to the ledge.

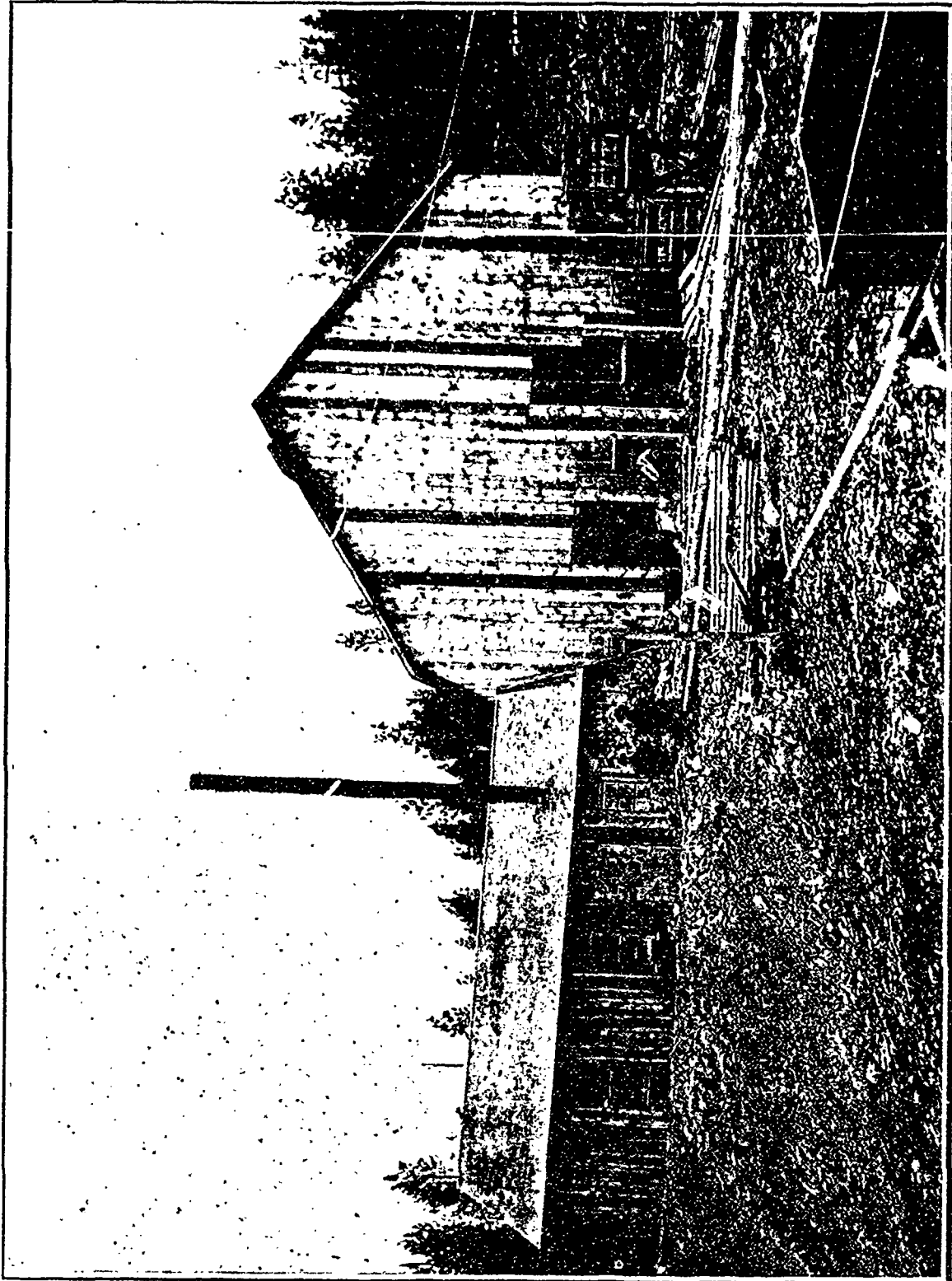
Conclusion:—I will add that never have I seen greater surface showings than those of "Phoenix" or "Greenwood Camp"; and none of these, I make no exception, is better than any of the three lodes I have endeavored to describe. It is further my opinion that with more development, veins, pay chutes and deposits of great profit will be uncovered in all three of these lodes. It may take some little time, but every foot of work done encourages this opinion."



Brooklyn Shaft House, Boundary District, B.C.—Owned by the Dominion Copper Company, Ltd.



Foot Wall Drift—150 Foot Level—Brooklyn Mine.



Stem-Winder Shaft House of the Dominion Copper Company, Ltd.

Mistakes in the placing of pumps sometimes occur in mining practice ; and as they are always the result of miscalculation or oversight, the causes of these failures should be known. *Mines and Minerals* points out that one of the causes is too great a length of suction pipe for the available head, the result being that the inflow to the pump, especially in a fast running one, is too slow. Under such conditions, the pump does not fill—it knocks, and the valves are injured. Our contemporary gives a series of calculations to prove the reasons of these occurrences, all of which possess interest to the young engineer ; but it is unnecessary to give the figures here, as they must be well known to all mine engineers and constructors of mine pumps, and are, moreover, accessible in most of the text books on pumping machinery. The remedy, of course, lies in lowering the position of the pumps, but if it is as low as may be necessary, and yet the suction continues sluggish, then improvement must be effected by increasing very much the diameter of the suction pipe, and perhaps reducing the speed of the engine.

The quantity of water required to hydraulic 1,000 cubic yards of gravel daily depends upon the available head, character of gravel and dump grade. No arbitrary quantity can be given without knowledge of the conditions. Free gravel washes much more rapidly than clayey or lightly cemented gravel, and a given amount of water under a high head will remove a larger quantity of gravel than the same amount of water under low head. The grade below the working face may be too light to carry off the debris to the full capacity of the water and head to wash it down.

Never run a crosscut tunnel when one on the vein can be driven. Follow your vein, and when you have pay ore stay with it until it is developed. Crosscutting in the neighborhood of the vein is always advisable. Good veins and shoots of ore have frequently been overlooked from neglect to perform this essential work.



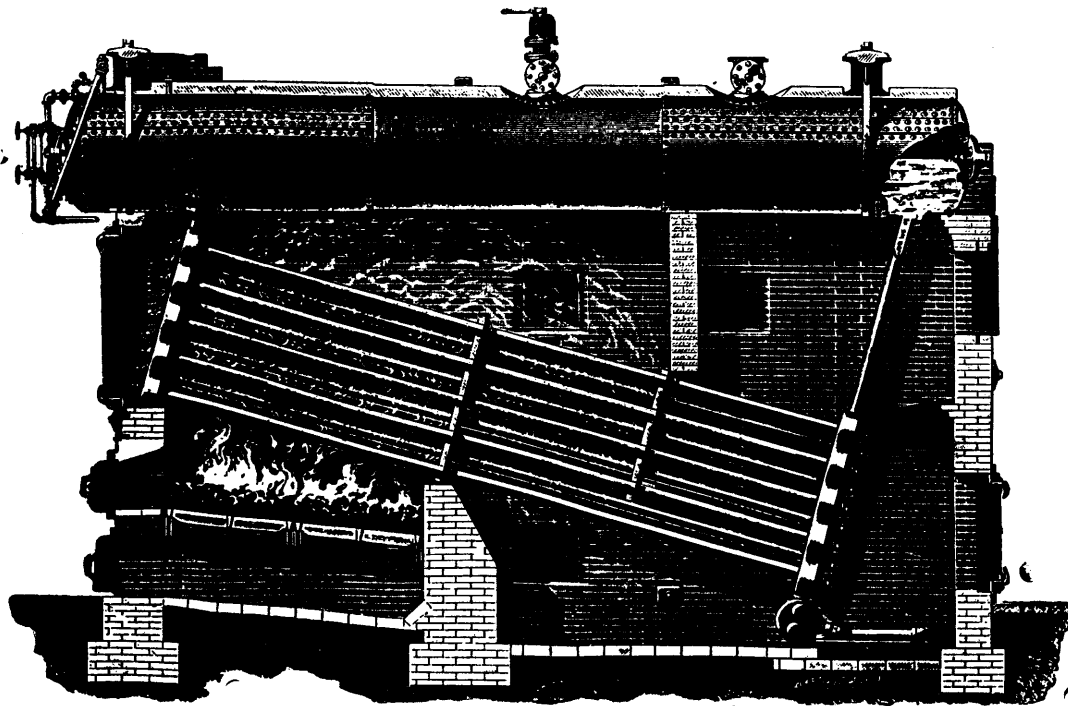
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We are, Dear Sirs, Yours faithfully. (Signed) pro S. PEARSON & SON, E. W. MOIR.

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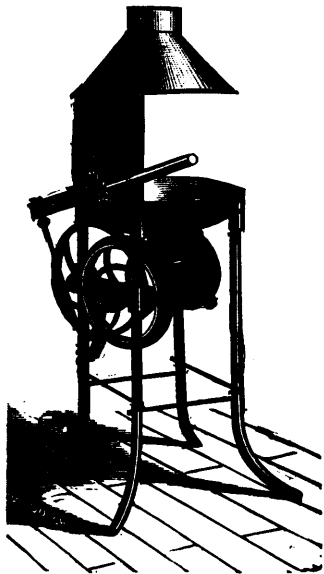
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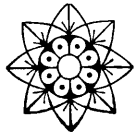
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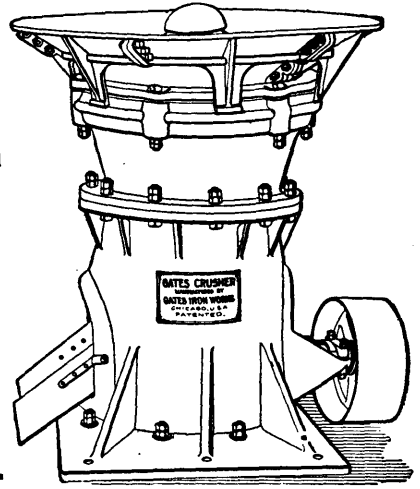
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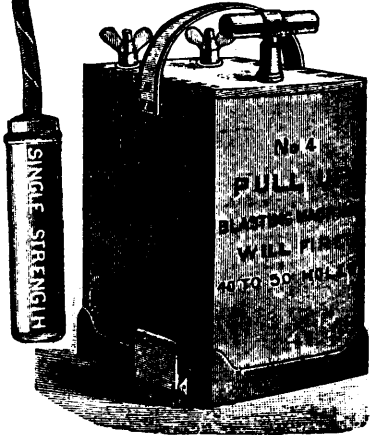
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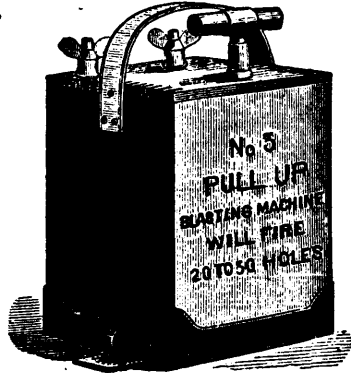
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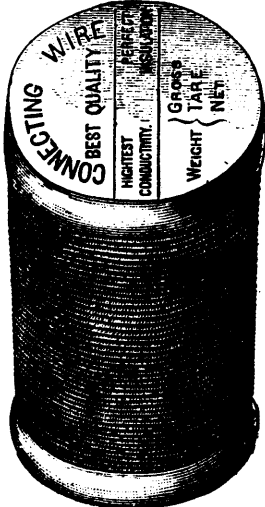
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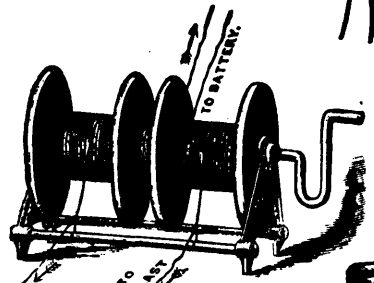
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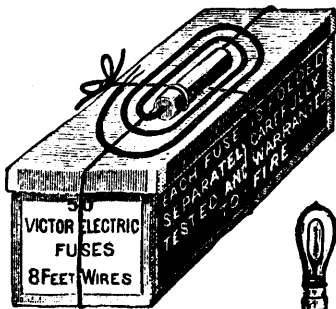
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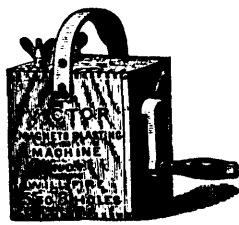
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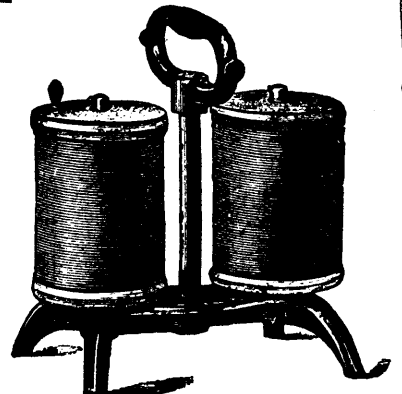
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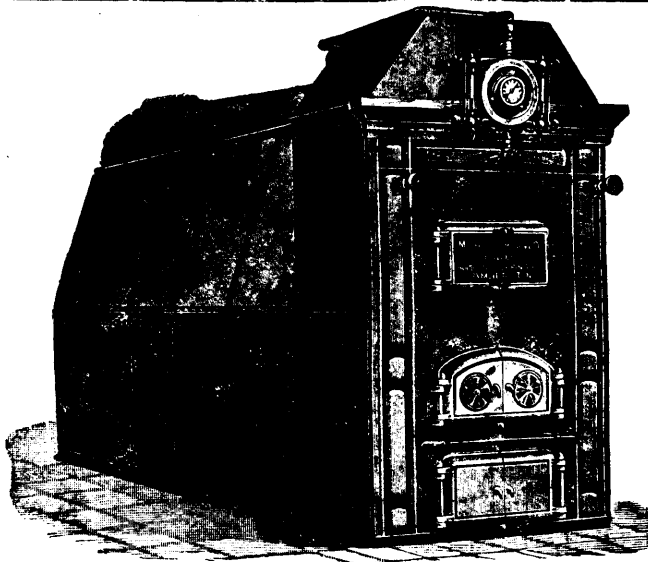


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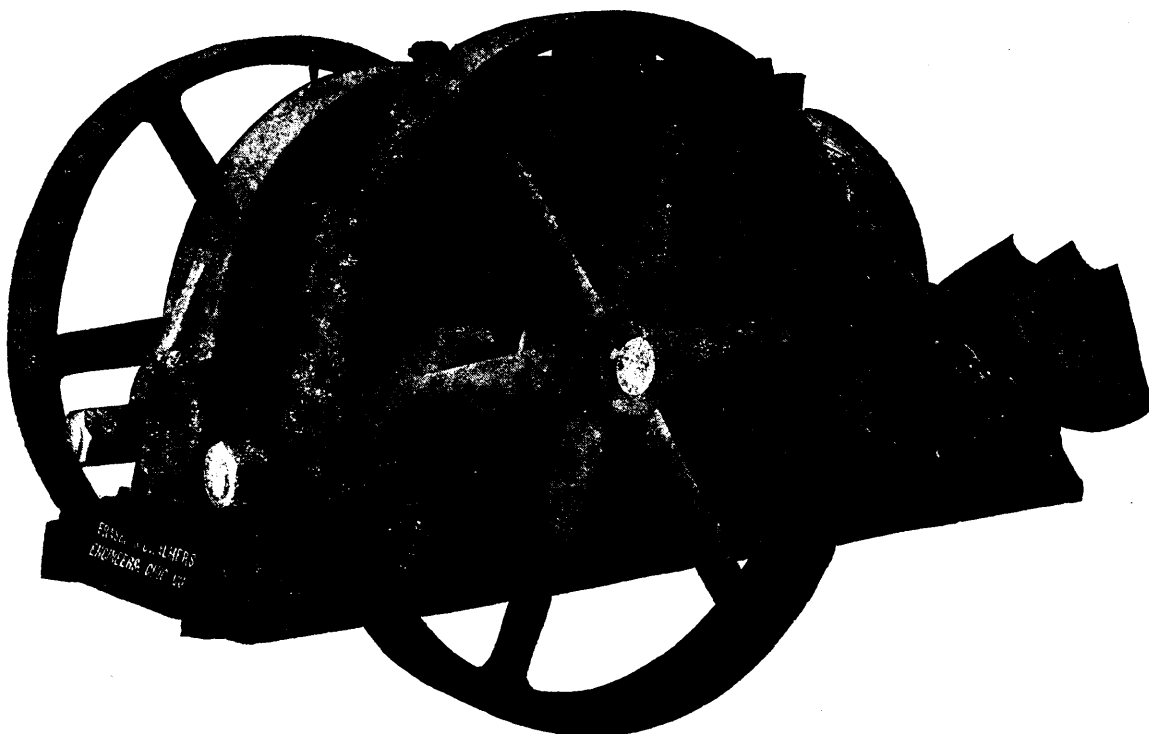
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