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18th YEAR OF PUBLICATION.

The CANADIAN MINING REVIEW

Established 1882

THE OLDEST AND ONLY OFFICIAL MINING AND ENGINEERING JOURNAL PUBLISHED IN THE DOMINION OF CANADA.

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A Model Mining Company's Report.

As we referred in our last issue to the need of more systematic and detailed reports of the operations of mining companies it may be in order to call attention to the statement recently issued by the Alaska Treadwell Gold Mining Company, which is nearly a model of what such a report should be. It gives a full account of all ore mined and all development work done, showing the quantities of ore available, points which are further elucidated by maps of the mine constituting a part of the report itself. This is certainly giving the stockholders every possible opportunity of knowing the actual condition of the mine. There is no opportunity of concealing facts by "glittering generalities" when such a clean breast is made of the status of affairs. The financial situation is presented in a lucid table, as follows, the quantity of ore mined and milled being 557,960 tons:—

	Total.	Per Ton.
Bullion sold	$1,153,368	$2.0671
Store and miscel. profits	34,696	0.0622
Total receipts	$1,188,064	$2.1293
Mining ore	$278,194	$0.4986
Milling and concentrating	110,903	0.1988
Sulphuret expense	79,385	0.1423
Bullion charges	7,022	0.0126
Office and legal expenses	11,014	0.0197
Totals	$486.517	$0.8720
Less credit, general expenses	2,451	0.0044
Balance	$484,067	$0.8676
New construction	30,036	0.0538
Total costs	$514,103	$0.9214
Net working profit	$673,961	$1.2079

Full details of duty of the mills, extent and kinds of repair, maintenance, etc., are also furnished from which we select a few items. Taking one of the mills containing 240 stamps, operated 312.4 days of 24 hours each, the number of shoes worn out was 500, the number of dies worn out 470, stems broken and replaced 150, new cams put in 10, new cam shafts 6, and mortars broken 7. The quantity of ore crushed was 225,722 tons, averaging 3.01 tons per stamp per diem of 24 hours.

The wages paid are fair, and might even be considered moderately high. Board and lodging are furnished by the company in addition to the money wage paid. The prices of labor were: machine drillers, $2.50 per day in summer and $3.00 in winter; machine helpers, $2.25; mine laborers, $2.00; amalgamators, $90 per month; feeders, $70; tanner men, $65 to $100; machinists and helpers, $2 to $6 per day; blacksmiths, $4; drill-sharpeners, $3.50; blacksmiths' helpers, $2. The complaint comes from Alaska, as it has from Canada, and from many parts of the United States, that labor was scarce, in spite of good wages. This is probably due to the unusual activity in prospecting, which for two seasons past has drawn off a large number of experienced operators, although in part the cause may be found in the increase in the number of working mines, creating a demand for help in excess of the supply.

Without abstracting that portion of the report dealing with exploratory work, which is given in great detail, we may point out that the ore reserves between the 220 ft. level and the 440 ft. level figure up in round numbers 4,000,000 tons. This has all been fully developed by drifts and crosscuts, and carefully sampled. It is management of this sort that establishes confidence in mining, and removes the reproach so often cast upon mining operations that they constitute a species of gambling—which they certainly do not except when the public insists upon making them such.

The Fuel Question.

In a recent address by Mr. F. G. Meachem, President of the South Staffordshire and East Worcestershire Institute of Mining Engineers, which has attracted wide attention, he said: "But for the use of coal Great Britain would not be as it is, and civilization would never have spread, even if it had reached a high state in one particular place. The greatness of most nations depends upon the development of industries and the use of some metal which is suitable for many purposes. This was an accomplished fact for the first time in the world's history when iron was smelted from its ores by the use of coal, securing a long epoch of industrial prosperity and an increase of power and intelligence, wealth and influence." He also pointed out that except for cheap fuel, such as coal had become, there could be no locomotives, no steamships, no expansion of industry. The situation in England with reference to its coal supply is justly regarded as serious. It is recognized that both in her exports of coal and of manufactured iron, in which latter it is in a certain sense the coal which is being shipped out of the country, she has been lavishly drawing upon her principal, and as this capital is an exhaustible quantity she will in time be reduced to a condition of industrial enfeeblement. With Great Britain the question is one of maintaining her power in the commercial world, and to this end she looks with no disfavor upon the growing foreign coal trade of the United States. It is seen to be wiser for England to allow others to supply the world with this commodity

in its raw state, while she employs her own reserves in the manufacture of iron and steel, and in other industries at home.

So far as Canada is concerned the question is different. Her industrial activity may be said to have only just begun. This has been materially aided by a policy of protective tariffs, but this cannot accomplish all. The fuel question must necessarily be in the end the determining factor. Mr. Meachem has correctly stated the matter. No great progress in commercial lines is possible without cheap fuel. Canada is peculiarly situated in this regard. Her best coal deposits are located in the extreme eastern and western portions of the country. The great centres of her population lie in Quebec and Ontario, which are destitute of coal. On closer examination we see that much of Quebec is favorably situated with regard to the coal supplies available in Nova Scotia, but Ontario is completely cut off. Coal can move but a short distance by rail before its price becomes prohibitive. The coals of Ohio, Pennsylvania, and West Virginia can be laid down at moderate prices at Lake Erie ports, and thence it can be transported cheaply to Canadian ports on Lakes Erie and Huron, and even to points around Lake Superior. It is a significant fact that coke can be delivered at Midland on Lake Huron more cheaply than at points on Lake Ontario, and the Midland blast furnace is undertaking to compete in the sale of its pig iron as far east as Montreal, using Connellsville coke as fuel, and this is apparently more economical than to use charcoal, in spite of the large forests of hard woods so easily accessible around Georgian Bay. This fact regarding the relative cheapness of imported fuels, and the existence of abundant water power in the same region, would appear to determine a tendency for the shifting of the manufacturing centre of Canada towards Lakes Huron and Superior. This will be materially aided by the recent discoveries of valuable iron ore deposits on Lake Superior, and north of Georgian Bay and Lake Nipissing. Still it is not to be expected that the manufacturing interests of Central Canada can be concentrated in any narrow belt. The raw materials should be worked up nearer the great centres of population. In this connection it is pertinent to point out that the policy of the Canadian Government has not been wise in respect of this fuel question. The exports of Canadian coal have nearly doubled in ten years, being 830,537 tons in 1899. It has probably nearly reached its maximum, and it may be said that this exportation represents a surplus produced at points where it could not be consumed at home. There is no occasion for restricting this, and the point to be considered is how to obtain supplies of fuel more cheaply at points where it can be profitably utilized. Certainly one way would be to remove the duty from this commodity altogether. Although not onerous it is nevertheless a burden, and a wholly unnecessary one. The revenue derived from this source is insignificant, while the increased revenue from larger prosperity, and more remunerative employment for the people, would be immensely important. Another burden operating with discriminative hardship upon Lake Ontario ports is the toll of 20 cents a ton plus 5 cents per ton on the tonnage rating of the vessel, charged for passing the Welland Canal. Certainly the best interests of the country are not subserved by such a tariff as this which gives to a single group of Pennsylvania miners and to a single railroad corporation a monopoly of the bituminous coal trade of a lake on which are situated some of the largest cities in the Dominion. From an economical standpoint the policy pursued in this case is without excuse.

There is much hope of relief in the efforts which have been making of late to utilize the deposits of peat which are very extensive in Ontario. England is already turning to the peat bogs of Ireland for supplies of fuel to partially replace coal, and modern plants for its manufacture are being established. How far this will improve the situation still remains to be seen. In the address previously quoted, Mr. Meachem affirms that "peat, however compressed, does not answer to the call, for though it may be suitable for household purposes it falls far short of yielding the required heat for manufacturing, smelting of ores and metals, and raising and maintaining steam." This may be true so far as smelting is concerned. It is certainly not applicable in its raw state, and the problem of making a satisfactory peat charcoal for such uses has not been solved. But for manufacturing purposes it should prove acceptable, the prime question being that of cost. If it can be put on the market at a price, per unit of available heat, no greater than coal, there should be no obstacle to its employment on a large scale. It should certainly make a rich producer gas, and the tendency in large industrial establishments is more and more toward an abandonment of solid fuels in favor of the more economical and efficient application of the same heat energy through the medium of a gaseous combustible. In this form it is available for all the operations of iron and steel metallurgy except reduction in the blast furnace.

The great difficulty in the use of peat has always been the high cost of drying and briquetting. This problem, it is simultaneously announced in both Canada and Germany, has been satisfactorily solved. At the works of the Trent Valley Peat Fuel Co. in Canada it is claimed that the total cost of manufacture will not exceed $1.00 per ton. Such a result would admit of placing it on the market in competition with coal. If the peat bogs of Ontario can be utilized, an immense relief of the industrial difficulties of the country will be experienced.

The Iron Ore Supplies of Nova Scotia.

The profitable manufacture of steel to-day is firstly a question of the cheapness of iron ore: secondly of its quality. We see for example a large development of Lake Superior ores, of high grade, and of lower grade ores in the Southern States and in Germany. The radius therefore of transportation of a cheap and high grade ore is greater than that of an equally cheap but lower grade ore.

This rule applied to Nova Scotia explains the dependence of the proposed Sydney steel works on the Bell Island ores of Newfoundland. Cheap surface quarry work, a few minutes haulage to the pier, and a short water carriage, enable the ore of this locality to be presented to the Sydney Furnaces at an extremely low rate. The ore has about the following composition:—

Metallic Iron	54·37
Silica	11·57
Alumina	4·55
Sulphur	.03
Phosphorus	.71
Titanic Acid	.25

This ore is king on the North Atlantic coast, not from its quality but on account of its cheapness. This pre-eminent qualification, assuming the uniformity of the ore in size and quality, will gradually decrease as the cover of rock increases.

A reference to a report of Dr. Harrington's, issued by the Canadian Geological Survey some years ago on the Iron Ores of Canada, bears testimony to the high quality of the Nova Scotia ores as well as to their extent. Since the date of this report additional discoveries of ore have been made until to the unbiassed observer the resources of the Province in this respect appear most promising. It is true that hitherto deposits have not been found permitting of extensive quarry or opencut operations as at Bell Island or in some parts of the Lake Superior district; but the deposits generally speaking are normal in their mode of occurrence as compared with those from which the great bulk of the iron ore of the world is derived.

The principal localities in Nova Scotia known publicly to contain specially large deposits of ore are Nictaux in Annapolis County, and the East River district of Pictou County. Other localities less known are Whycocomagh, George's River and Mira in the Island of Cape Breton, Guysboro', Arisaig, the Cobequid Mountains, Stewiacke and Clementsport in Nova Scotia proper. At all these points the indications are promising, but detailed information is wanting.

In the East River district of Pictou, there are spread over many square miles of territory, specular, red hematite, limonite and spathic ores, in deposits from four to forty feet in thickness, and varying in quality from a grade similar to that of the Newfoundland ore to one much higher. These ores require a rail carriage to Pictou Harbor of about nineteen miles, or would by the extension of the Sunnybrae Railway to Country Harbor, find, with a haulage of thirty-five miles, an outlet on the Atlantic.

As the mining would be more expensive than that of the Bell Island ore this district could not at present compete at Sydney.

At Nictaux, and Torbrook in Annapolis County, the presence of large quantities of magnetite and specular ore has long been known, and recent investigations have largely extended the limits of this field, until like Pictou it is bound to become an important addition to the world's supply. A haul of thirty five miles on the Dominion Atlantic Railway places this ore on tide-water at Annapolis. Much of the ore of this district is similar in character to that mined in Newfoundland, and is presented in deposits admitting of cheap and extensive mining operations.

The other localities referred to, are in several cases favourably situated for shipping; and exploratory work may show that they contain amounts and qualities of ore putting them on an economic basis approaching that of Bell Island. These brief remarks will serve to show that the opinions recently expressed that the iron ore resources of Nova Scotia have been overrated are not well founded. As a matter of fact the iron ore supplies of the proposed furnaces at Sydney are to be derived from sources practically foreign. The imposition of export or equivalent duties on Cuban or Newfoundland ores, no unlikely matter, would bring the Nova Scotia deposits into prominence as a source of supply, not only for the Sydney furnaces but also for exportation.

It can readily be understood that the imposition of such duties would be a temptation to a Government. It would yield a very considerable revenue, and would have to be borne by the companies affected until a point was reached when the output and exportation from these countries was threatened by competition from other sources. It is conceivable that conditions might be presented causing the promoters of these large undertakings to regret that they had not from the first relied upon native supplies of iron ore.

At present the vicinity of the Pictou ores to the coal fields of that county, and of the Nictaux ores to the Cumberland coal fields, warrant the belief that at both these points furnaces could produce pig iron at profitable rates. These rates of profit, while presumably not as large as those anticipated at Sydney, would in the opinion of competent authorities amply repay the investment of capital. In addition they could furnish unlimited quantities for export.

It is true that the Sydney plants contemplate the extensive manufacture and exportation of steel, but the development of the other localities need not at the outset call for equally immense amounts of capital.

If the continent of Europe calls for iron ore for steel making, etc, it is permissible to believe that a good opportunity offers to supply this demand by pig iron made here, as it undoubtedly can be, as cheaply as in England, etc., and presented more cheaply by means of the reduced freight of the pig as compared with the ore.

Mine Timbering.

From necessity mine timbering is largely a matter of "rule of thumb," a following of tried methods which experience has demonstrated to be safe. It is seldom possible to calculate the loads which will be thrown upon timbers below ground, since data are unavailable, but very often it is feasible to determine the directions of the strains, and in such cases much is gained by setting the timbers in accordance therewith. A truly scientific discussion of the subject can probably not be given. Certainly none has yet appeared in print. The treatment of this question in works on mining is distressingly vague, and there is usually a confusing representation of good and bad systems, offered without comment. We do not even find the paper on mine timbering by Wilbur E. Saunders in the *Mineral Industry*, Vol. VIII., any exception to the rule, though it is altogether the best of its kind in the English language. It is to be hoped that Mr. Saunders will make good this defect in his forthcoming book on the same subject.

The methods of timbering employed in most mines is far from being economical. The criticisms we would offer may be stated under several heads. First, there is a tendency to use too much material. Not that too many sets, or stulls, are used, but they are very generally too large, and of improper cross-section. For example, square columns are about one-fourth stronger than round ones of the same diameter, and yet round timbers are far more commonly seen in mines. Again, with increased length of timber, the area of cross-section is usually increased also, despite the well known fact that, where the longitudinal strength of the timber is availed of, the compressive strength per unit of area remains constant for the first 20 to 30 feet, beyond which there is a decrease amounting to about 40 per cent. at 70 feet. The safe load on a timber column is taken at 600 lbs. per square inch for heights under 20 feet which will apply to all the varieties of timber in general use. Cedar *(arborvitæ)* and aspen are the weakest of the common woods, showing an ultimate strength endwise of 4,400 lbs. per square inch, while red pine gives 6,300 lbs., white pine 5,400 lbs., black spruce 5,700 lbs., and white spruce 4,500 lbs. Another point which the timberman is prone to disregard is that the strength of the stick is proportional to the area of cross-section over which the load is distributed. For instance, if a post has an area of 12 inches by 12 inches, and the bearing on its head is confined to a space of 6 inches by 6 inches, the timber will carry no greater load than if its full cross-section were only 6 inches by 6 inches. Only 25 per cent. of the strength of the post is realized by such faulty application of the material. It is coming to be understood that the old method of square-set timbering for weak stopes, which was introduced in the Comstock mines by Philip Diedesheimer, and which subsequently came into wide use all over the world, is no longer economical; save in exceptional cases, since the means for providing rock for filling have been so enormously cheapened. Even where rock must be quarried on the surface for this purpose, and worked below by rock mills, its cost in the stope will rarely exceed 35 to 40 cents per cubic yard. Where the cost per set unit of volume, using timbers, will reach $5 to $6 or more, the same space can be filled with rock at a cost of less than $3.

An error of great importance is the use of freshly cut timbers. Not only is their strength from 25 to 50 per cent. less than seasoned timbers, but their life in underground situations is apt to be as much as 50 to 75 per cent. shorter. They are subject to rapid decay, and are peculiarly susceptible to fungus growth. It is also noteworthy that the longevity of timber is increased by maintenance of uniform conditions of dryness or moisture. This is an ideal difficult to attain in a mine, but in drifts and tunnels it is clearly undesirable to set posts so that they will absorb moisture from the floor, while they may be dry

above. This is deliberately inviting speedy decay, and it is wholly unnecessary, for in such situations the evil can be remedied by setting the post on foot plates with a ballast of broken rock beneath. Though it may add something to the first cost of setting the timber, it will so greatly enhance its lasting powers as to prove highly economical. It is good practice in any case to adopt this plan in all permanent gangways that require timbering, since it insures a bearing over the full area of the foot of the post, and protects the ends of the fibres from crushing, which weakens them and hastens collapse of the set.

In placing stulls which are to carry a load of broken ore or waste rock it is always desirable to determine the direction of the thrust which the wall rocks may exert, and to set the timber so that this line will make a small angle with its axis on its upper side. This will cause the timber to have a tendency to bend upward against its load of superincumbent rock. A tendency to buckling is thus counteracted, and greater stability is secured. It would of course be better to make the line of thrust coincide with the axis of the timber, but as this line cannot be determined with absolute accuracy, the plan suggested is more feasible.

Attention to such details as we have indicated will lead to far more economical mining, and render the mines safer and subject to less interruption of routine work by renewals of timbers. There are few points in mine management that require reform more than this one of timbering.

COAL MINING AND TRADE.

It may not be possible in the development of the mining industries of Canada, to profit to the full, from the experience of older countries, and especially to avoid those labor difficulties which have been so detrimental to the interests of all concerned; at the same time, it ought to be possible by carefully noting the character of the difficulties which arise, and their method of treatment, to learn some lessons which may enable us to minimize the results, as far as practicable. Chief among these must undoubtedly be classed the invariable indisposition on the part of employers to recognize Trades Unions. There was a time when most of these organizations were officered by men, not unjustly designated as "blatant demagogues," men with no special fitness for discharging the duties of what is in reality a most responsible and delicate position, requiring not only the strictest integrity of purpose, but natural gifts of a personal character, as well as intellectual capacity and business acumen. No wonder that the total absence of all these requisites in the early days of Trades Unionism engendered a widespread opposition on the part of capitalists, who made the mistake of opposing the principle of organization, instead of attacking the methods adopted. Since that day, however, great strides have been made, public opinion has conceded that labor has the same right to organize as capital. With growing intelligence, the workmen themselves have come to see that it is not to their advantage to he represented by incompetent officers, and as a result we may find at the head of the great labor organizations of England and America, men of equal capacity with those who direct the affairs of the employers.

In spite of this, however, the deep rooted antagonism of Capital to Labor dies hard, and during the last two or three years not a few large corporations have "ridden for a fall" by refusing to recognize the principle of Trades Unionism. In fact, whatever may have been the other questions raised, this one has been common to all the great strikes of recent date; and it is a noteworthy fact that in every instance, whatever else may have been refused to the workmen, this point has been conceded

It is not necessary here, whilst admitting that there are disadvantages in Trades Unionism, to point out the incalculable advantage of being able to treat with recognized and accredited representatives of Labor, and in any case, experience and the undoubted weight of public opinion on the question renders it impossible for any corporation to attack, successfully, the right of the men to organize and to be represented by such persons as they may appoint.

It will save trouble in Canada during the next few years, whilst large industrial and mineral concerns are under way if this point is fully recognized, and the Dominion will have learnt one excellent lesson, if no strike occurs through disputing this principle.

The other aspect of the labor question which clamors for careful consideration is that of importation of foreign labor. It is obvious that there is a great lack of mining labor in Canada, and that during the next two or three years there will be a difficulty in finding sufficient men to meet the requirements of our mines.

In the West, Mongolian labor has been excluded by law. We find, however, from the press, that labor of an even more objectionable character is largely employed. The Fernie *Free Press* of October 19th and 26th and of November 2nd devotes several columns to a discussion of this question, claiming that the town is over-run with Slavs and Dagos, who are highly objectionable as citizens, as well as a source of danger to their fellow-workmen. A case is cited in which a Dago recently fired the gas in his working place, seriously burning two men, and running into another part of the mine and repeating the performance.

The *Free Press* claims that these men are ignorant, insubordinate, and filthy in their habits; that they live on a maximum of 50 cents per day, and send the balance of their money out of the country. They have no stake in Canada, and are only here for exactly the same purpose as the Chinamen, to save sufficient money on which to retire to their native land.

The *Free Press* further states that they give a great deal of trouble in the town and constitute more than 75 per cent. of the police court cases although they are only about 20 per cent. of the population. It is well known that this record tallies with the experience of mining companies in the Western States, and indicates a condition of affairs which should receive attention. The *Free Press* maintains that the wholesale importation of these men is a breach of the Alien Labor Law; if so, it should be stopped.

As to the economic conditions, it is obvious that the development of the mines would be retarded if such labor as is available cannot be employed, and in this connection it is interesting to note the opinion of the *Free Press* that these men are "worse than Chinamen," who by almost unanimous consent have been excluded from British Columbia. Apart, however, from the economic question, there can be no doubt that when that of safety is involved the matter is placed upon a different footing, and it cannot be too strongly insisted upon in the interests of the other miners, that such incompetent and dangerous workmen should be rigidly excluded from the mine.

It is not a little singular that a company, which enjoys such unique advantages and which owes so much to the legislative enactments of the Dominion should, if the contention of the *Free Press* is correct, employ such a dangerous and objectionable class of labor, to the detriment of their workmen and the welfare of the community, and in violation of the Alien Labor Law.

Since our last report there has been a marked decline in English and American markets, both in the prices of iron and coal, and in the production of the former. This is worth noting in connection with the arrangements now under way for the exportation of Canadian coal

next year, and bears out our contention that periods of inflation and excessively high prices are generally of short duration and afford no criterion as to the possibilities of a market for Canadian coal. It is impossible at present to foretell the probable price of coal in Europe next year; there is, however, every reason to believe that while it will fall, it will still remain above the figure at which Canadian coal can profitably be landed on the other side of the Atlantic.

In sympathy with the general decline in trade, and owing in some measure to the liberation of shipping, monopolized during the past year by the South African war, freight rates from America to Europe have already been considerably reduced. The latest quotation from Philadelphia to Lisbon is $4.08, and from Norfolk to Genoa $4.56, a reduction of $1.00 per ton. The same remark applies to freights on British coal, which now range as follows:—From Cardiff to Genoal $2.28; St. Vincent, $2.22; St. Lucia, $2.40; Buenos Ayres, $3 36; Rio de Janiero, $4 06. No doubt during the next few months a stil, further reduction will take place, and it would not be surprising to find by the middle of next year that the Americans have a rate of $2.50 in operation from Philadelphia to the Mediterranean. This is working towards our own idea that a $1.50 rate is practicable from Cape Breton to Europe, and everything points that way.

During the month of October the average price of American coal at tidewater was $3.00, and it becomes more and more evident that under no circumstances can American coal compete with Canadian in the European market, when once our development enables us to ship, and suitable transportation facilities exist.

There are one or two features of the annual balance sheet of the Philadelphia and Reading Coal Co. which are of interest to Canadian readers, especially as affecting the important question of cheap fuel in its bearing upon manufacturing industries. We have previously pointed out that the American manufacturer enjoys an enormous advantage in having coal within a few cents of the actual cost of production, a fact which accounts in no small degree for the enormous expansion of many industries during the last decade. We know that the average price realized by this company at tidewater is $2.91, and the total cost $2.79, leaving a gross profit of 12 cents. From this, however, has to be deducted interest charges, 5 cents, leaving a net profit of 7 cents per ton. The cost is, for mining $1.67, and for transportation $1.12. The output for the year shows the large total of 9,379,427 tons, and the net earnings on the capital employed was 1.37 per cent. After having deducted .52 for fixed interest charges the actual divisible profit on common stock was .85 per cent.

We have no desire to see Canadian mines worked for so small a margin, nor do we for one moment consider that this is necessary for the development of the country; at the same time it emphasizes the value of cheap fuel, and is instructive as indicating an important consideration in the industrial success of our neighbors.

A recent enquiry at the Mines Office in Halifax elicited the interesting information that every coal area in Nova Scotia has been taken up, in addition to many areas on which it is unlikely that coal will ever be discovered.

For the nine months ending September 30th the Dominion Coal Co. had shipped to the Everett Gas Works no less than 465,307 tons of coal, or about one-third of their output. This is of course under contract, and is yet far below the figure which the Gas Co. is entitled to demand. In order to increase the tonnage next season the directors have just decided to put in another coal washing plant, near to the present one with double its capacity. The plant is to cost about $75,000 00, and will be in operation next season.

As the regular shipping season is drawing to a close it is interesting to note the coal shipments of the year as compared with 1899. The Dominion Coal Company for the ten months ending October 31st has shipped 1,561,238 tons this year as against 1,294,140 last, an increase of 267,098 tons. The Acadia Coal Co. has shipped 214,190 tons against 188,207 tons, an increase of 25,983 tons. The Intercolonial Coal Co. has shipped 192,172 tons, against 160,925 tons, an increase of 31,247 tons. The General Mining Association and the Cumberland Railway and Coal Co. both show a substantial increase, but in every case the output has been restricted for want of men.

Although the sinking in the large shaft of the Dominion Coal Co. is not progressing as rapidly as expected, development in the other new mines is making good headway. Dominion Nos. 3 and 4 are now shipping between them upwards of 500 tons a day.

The miners of Nova Scotia (including C.B.) have made a demand for a further increase in wages, and owing to the extreme scarcity of labor it seems not unlikely that they will get it. The matter was considered at a special meeting of the representatives of the colliery owners, held in Truro on the 27th October, and but for the fact that large contracts had been made at a low price it is not unlikely that the advance would have been conceded without delay. Under the circumstances, however, the employers are taking a little more time to consider their position, and have promised to deal with the matter before the end of the present month.

A well known Nova Scotian, who has recently made a tour of British mines, reports that there is very little difference between the wages paid there and in Nova Scotia, a conclusion in which we agree, and which largely explains the difficulty of inducing British miners to come to this country.

One of the natural results of the greatly increased demand for Canadian coal has been to stimulate exploration and the development of new properties. In Nova Scotia the Inverness Coal Co. and the Port Hood Coal Co. are both likely to become important producers in the near future. The companies are fully organized and financed In New Brunswick the Baltimore Coal Co. is meeting with fair success and hope to have a shipping mine next year.

The Newcastle Coal Co. has already commenced to ship coal from Port Morien, and it is now certain that the spring of next year will find a new company operating between Sydney and Mira.

The Cowan Company has commenced operations in Alberta, within a short distance of the Crow's Nest Co's areas; very good seams of coal have been discovered and satisfactory tests have been made for steam and blacksmith purposes.

No attempt has yet been made to coke the coal, but the more important question of the continuity of the seams is being investigated. It is well known that at several points on the railway between Pincher Creek and the Crow's Nest Station there are outcroppings of coal, the most important having been worked to a limited extent by Mr. McGillivery, a C. P. R. contractor. There is also an excellent seam about eight miles west of Pincher Creek on a property belonging to Mr. McLaren, the mill owner. Most of these seams, however, are subject to disturbance by igneous rocks and have not been traced any considerable distance. If, as is now claimed, other seams have been discovered which are comparatively free from disturbance, there is no reason why important developments should not take place.

We also understand that a seam of coking coal of the same character and probably the same geological formation as the Crow's Nest coal has recently been discovered on Lizard Creek, and the surrounding areas bonded by well known capitalists. Surveys have been made for a spur line to connect with the Crow's Nest Railway, three-quarters of a mile west of the mill. It is found that this line could be constructed on a 3 per cent. grade and would reach the coal deposits in a distance of five miles.

EN PASSANT.

The question of a supply of ore for the new works of the Dominion Iron and Steel Company at Sydney is receiving serious consideration. Apart from the fact that the Belle Island hematite is high in phosphorus and requires a suitable mixer, there is the further fact that the actual tonnage of this ore above water level is not so considerable as was at first supposed, and the necessity for securing large supplies from some other source is one of increasing importance.

Several properties have been offered to the company, including a large tract, said to contain valuable ore, near Antigonish, but we understand that the tests so far made have not justified the company in accepting any of these, although they are still under consideration.

They have also had an offer of the well known magnetic sand deposits, at the mouth of the Natasquhan River, of the quality of which they have satisfied themselves, but have hitherto been unable to come to terms with the owners. We understand that they are now contemplating the feasibility of bringing down Lake Superior ore by way of the Welland Canal, and a natural corollary of this would be that they would take up coal. Such a scheme would greatly benefit the coal trade of the Maritime Provinces, and would, for the first time, bring Canadian coal into competition with the American product west of Montreal. We do not see any reason why this plan should not succeed. Even if the company was unable to purchase ore-bearing lands in the Lake Superior region they could probably secure their requirements at a price in the neighborhood of $2 00 per ton at the Lakes, and should be able to transport it in barges to Sydney for another dollar. This would give them the highest class hematite ore in the market for $3.00 at Sydney.

Lake Superior ore costs the American steelmakers $5.75 at Cleveland and probably not less than $7.00 at the works, which leaves a good margin in favor of the Canadian company. This shows that the Dominion Iron and Steel Company should be able to compete both with the States and with England for the foreign steel rail trade as American rails are now laid down in China at $4.00 per ton under English prices. We shall watch with interest the development of this proposed scheme as being one of the most important yet suggested in connection with our Canadian industries, and one which will for the first time demonstrate the enormous value to the country of our waterways.

It will be especially interesting for Canadians to notice that the result of the first half year's management of the Rio Tinto mine by Mr. W. A. Carlyle has been to increase the dividend from 35 shillings to 40 shillings per share.

In view of the fact that the iron trade of Great Britain depends largely upon imported ore, it is important to observe that the great sources of supply hitherto relied upon are beginning to fail, and that in the opinion of experts it will be necessary before long to look elsewhere for this commodity. The statistics just published for the first eight months of this year have a very serious complexion, as the total importation was only 4,417,749 tons against 4,916,880, a decrease of 499,131, or 10 per cent. These figures are still more impressive when we remember that of all the iron ore imported into Great Britain 87.5 per cent. comes from Spain, and most of it from the celebrated Biboa mine. There is no country so likely to replace this deficiency as Canada, and we have every confidence that within the next few years the attention of English capitalists will be so drawn to Canadian mines that an export trade in iron ore will become an accomplished fact. It is only necessary to solve the ever pressing question of cheap transportation to insure this, and cheap transportation means vessels specially constructed for the purpose, running directly between the mines or shipping point and the consumer. The experience of the Nova Scotia Steel Company with their Wabana mine leads one to conclude that under such circumstances the cost of transportation to Europe should not exceed $1.50 per ton.

We are not surprised to hear that in spite of the advances paid to Cape Breton miners in the spring, continued demand and improved prices are leading to another application. This decision was announced at the late meeting of the Grand Council of the P. W. A. The advance asked for is 10 per cent., and we have little doubt that the men will get it.

Development work at all the mines of the Dominion Coal Co. is being vigorously pressed, and it is evident that they are fully alive to the urgency of future requirements. At a late meeting of the Board it was resolved to spend on capital account no less than $1,500,000. This will complete the equipment of the three new mines, Dominion No. 2, No. 3 and No. 4, and give the company a capacity of at least 3,000,000 tons a year. Shipments to the Everett Gas Works are still much below contract tonnage, and will have to be largely increasad next season. This, with an increased demand up the St. Lawrence and the starting of the Steel Works, will find the company all they can do.

Premier Dunsmuir has not found the labor question quite as easy of solution as he expected. He shut down on Mongolian labor with characteristic thoroughness, and by so doing greatly pleased the residents of British Columbia, but ever since that time the output of the mines has suffered through scarcity of men. An agent was sent to Scotland and upwards of two hundred experienced Scotch miners were imported. They were guaranteed a wage of $3.00 a day. What the other conditions of employment were has not been made public, but it is evident that these were not fully understood, for the men only worked a few days before a general strike ensued. According to latest advices a number of them went to the States, but some remained, and the difficuties are said to have been smoothod over. All the same, it is well that intending immigrants, especially from civilized countries, should thoroughly understand the conditions which prevail, and should have a carefully considered agreement entered into before they leave their old homes. It hinders the importation of desirable labor when new comers are disappointed, and their letters home counteract the efforts of immigration agents for a long time to come.

For the moderate price of three dollars (12/6*d.*) Messrs. Charles Griffin & Company, Limited, the well known London publishers have recently published a manual on "Practical Coal Mining," which will undoubtedly be of service as a handywork of reference to our colliery managers, under managers and colliery engineers. The volume, which covers close upon 500 pages, profusely and excellently illustrated, has been prepared by a well known Scotch colliery manager, Mr. Geo. L. Kerr, M.E., M. Inst. Min. E. Some idea of the scope of the work

may be gathered from the following divisions of Mr. Kerr's text book:—I. The sources and nature of coal; II. The search for coal; III. Sinking; IV. Explosives; V. Mechanical wedges, rock drills and coal cutting machines; VI. Transmission of power; VII. Modes of working; VIII. Timbering roadways; IX. Winding coal; X. Haulage; XI. Pumping; XII. Ventilation; XIII. Safety pumps; XIV. Surface arrangements; Coal cleaning, etc.; XV. Surveying, levelling and plans. Mr. Kerr in these chapters places a vast amount of useful matter under review, the whole forming a thoroughly practical and plainly written text book, which we can confidently recommend to our readers, not only to those who are endeavoring to qualify themselves for positions as colliery managers, but also as a daily guide and reference book for all engaged in and about our collieries.

Dr. Carl Hoepfner, whose name has figured very prominently in the agitation being promoted by certain Hamilton company-mongers to have an export duty placed upon our nickel matte, sends us the following concerning the so-called "Frasch Copper Nickel Process," under date of 16th ultimo:—

"This process seems to be nothing but a new edition of old inventions made twenty-five years ago and complete failures. Mr. Frasch seems not to have the faintest idea what difficulties he must encounter with the use of matte as an anode. This has been tried many times unsuccessfully."

In the same connection we commend to our readers the report, reprinted elsewhere in this number, on the wealth of New Caledonia in nickel, published lately by the Secretary of the British Iron Trade Association.

The conclusions reached by the recent Royal Commission appointed to inquire into the cause of fires in coal vessels, will be of interest as well to all large consumers of coal who maintain extensive stock piles of bituminous coal. The opinion has been quite widely held that coal was more liable to spontaneous ignition when damp than when dry. In all cases where this opinion was given before the commission the evidence broke down on cross-examination. It was proven that in a large majority of the instances of spontaneous ignition, where the starting point of the fire was known, the origin was in the fine coal under the hatches. As a result of its inquiry the commission has recommended that the coal should be wetted with a hose while being loaded into the holds of vessels. In stock piles safety is secured by adequate ventilation, but it would also appear that the presence of a considerable quantity of moisture would also prove advantageous, especially in warm weather.

The latest instalment of papers from the American Institute of Mining Engineers contains another of the remarkable series of articles on ore deposits presented at the meeting of the Institute in Washington in February last. The present paper deals with Metasomatic Process in Fissure Veins, being prepared by Waldemar Lindgren of the U. S. Geological Survey. It is important as being the first attempt at a systematic consideration of the phenomena of alteration and replacement of mineral matters occurring along fissure planes, and it furnishes a better basis than we have yet had for interpretation of the genetic processes involved in vein filling. His definition of that much abused term "fissure veins," will probably meet with very general acceptance, while still leaving it free for discussion whether open fissures can exist at considerable depths or not. He says, "For the present discussion, a fissure vein may be regarded as a mineral mass, tabular in form, as a whole, though frequently irregular in detail, occupying or accompanying a fracture or a set of fractures in the enclosing rock; this mineral mass has been formed later than the country-rock, and the fracture, either through the filling of open spaces along the latter, or through chemical alteration of the adjoining rock. Such alteration does not ordinarily extend far from the fissure. Only in regions where the vein-forming agencies have acted with unusual intensity may a partial alteration extend over larger areas." His distinction between metasomatism and pseudomorphism is clear and instructive, and his account of the alteration and production of minerals by ordinary hydrochemical operation will prove of great practical value to the mining engineer and to others interessed in the exploration of mineral deposits.

Economy of grade in mill design is often a matter of very great importance, and where the amount of grade available is limited the introduction of grizzleys, and feeding chutes from bins, is often a very perplexing problem. A simple means of overcoming this difficulty is to use both grizzleys and feeding chutes so mounted as to admit of giving them a reciprocating motion in the direction of their length, by cams or by eccentric mechanism. A reciprocating grizzley 3 ft. in length set at an angle of 10 degrees will do better work than a fixed one, 10 ft. long standing at an angle of 45 degrees. It can be arranged to automatically feed the lump ore from a bin to the crusher, and one man can then attend to as many as ten crushers. If the bin is constructed with a heavy swinging door constituting the front, the ore will seldom jam, but will feed regularly upon and across the grizzley. The reciprocating feeding chutes can also be set at an angle of 10 degrees and will draw off the contents of a bin with perfect regularity. The bottom of the bin should slope towards the front and open directly upon the chute, the lower edge of the sloping bin-floor being a few inches back from the line of the front wall of the bin. A somewhat similar device to the reciprocating grizzley is the finger bar screen in use at many coal breakers, but also adapted to the coarse screening of ores. In these every alternate bar in the grating is bent down at the lower end so as to rest upon a plate on which it is free to slide. The upper ends of these bars are attached to crank arms on a multi-crank axle, which on revolving causes the bars connected with it to rise between the fixed bars and move downward toward the discharge end, thus forcing the burden of ore ahead. As the cranks complete their revolution the moving bars descend and return below the upper level of the fixed bars, for the next stroke.

Another useful work to our mine operators, and for which its sponsor and publisher, the Ontario Bureau of Mines, is entitled to credit, is a "Manual of Explosives," prepared by Courtenay DeKalb, Mining Engineer, the able Professor of Mining and Metallurgy, Kingston School of Mines. In an introductory note by Mr. Blue, the late director of the Bureau, the necessity of such a Manual for the use of our miners and quarrymen is very well pointed out. The growth of the mining industry in Ontario, and the number of casualties which have occurred owing to the careless or ignorant use of explosives employed in the industry, have suggested, he says, the need of a book of instruction on the safest methods of handling the materials, both in transportation and at the mines. It is also desirable, where men have not not acquired experience, that hints should be given on the best means of using explosives to obtain the largest economic results. Safety and efficiency are the two chief objects aimed at in Professor De Kalb's serviceable and handy little volume. His own experience in practical mining, his training as a mining engineer, and his intimate knowledge of the conditions which exist in Ontario acquired in the inspection of mines for the Government, eminently fit him for the preparation of such a useful work. We understand the Manual is

issued by the Ontario Bureau of Mines for gratuitous presentation to all Ontario managers as well as to foremen and others using explosives.

A pamphlet on Bunker coal recently issued by the Dominion Coal Company, Limited, has the following:—"The shipping piers of the Dominion Coal Co., Ltd., have height and water enough to bunker quickly the largest vessels. The two piers at Sydney are extremely commodious, having berths for six steamers at one time, and are worked night and day (Sundays excepted), being brilliantly illuminated at night by electricity. During a period of six months in the past year 125 foreign-going vessels were bunkered, the time occupied averaging less than six hours apiece. Certain berths are reserved exclusively for bunkering, thus enabling steamers to come alongside on arrival at any time and to coal up with despatch. Three or four steamers have received bunker coal on the same day, and repeatedly steamers have sailed in two or three hours after arrival, having in the meantime received what bunker coal they required. Facilities for loading cargoes of coal are not excelled in any other port in the world. It is almost a daily occurrence for steamers carrying from 3,000 to 4,000 tons to arrive, load and sail the same day; and on several occasions vessels carrying from 1,800 to 2,200 tons cergo have sailed loaded six hours after the arrival."

The Nickel Ores of New Caledonia.

To those who labor under the delusion that Canada has a monopoly of the nickel resources of the world we commend the following excerpt from the official report of the Secretary of the British Iron Trade Association on the nickel resources and nickel mining industry of New Caledonia. This report is incorporated in a review of the iron and steel exhibits at the Paris Exhibition and is reproduced from the *Iron and Coal Trades Review*, under date of 5th October last. It says:

"This richly-endowed French colony shows examples of nickel ores, which are of the greatest importance to the iron and steel industries. The principal nickel mines hitherto worked have been those of the Société de Nickel, of Paris, in which it is well known the Rothschilds have for years held a large interest. Another important group of mines is controlled and carried on by the Nickel Corporation, which was floated in London in November of last year, to take over a group of mines from the International Nickel Corporation. A third series has only within the last week or so been acquired by a British syndicate, composed of Vickers, Sons & Maxim, and Sir John Brown & Co. of Sheffield, with W. Beardmore & Co., of the Parkhead Forge, Glasgow—all three of them manufacturers of armorplate and special steels, in respect of which nickel is likely to be largely called for.

The nickel lands of New Caledonia are said to extend to over 700,000 hectares, so that there should still remain a large area undeveloped. The importance of this fact to the British iron trade is not small, in view of the increasing use of nickel, and in view also of the fact that at the Paris Exhibition several French firms exhibit remarkable steels that contain from 20 to 22 per cent. of nickel, and answer to special requirements that are likely to extend.

The nickel ore of New Caledonia does not contain any copper, sulphur, phosphorus, or arsenic, while it does contain iron, thus giving the advantage of being more directly incorporated in the manufacture of steel.

In New Caledonia all the mines are at the surface, close to the seashore, where the ore can be conveyed by short tramways or wire ropes, whereas in Canada they are at a distance from the sea and at a considerable depth.

The New Caledonia ore averages 7 to 8 per cent. of nickel, and the cost of extraction is estimated at 25f. per ton of ore. Hitherto the nickel has not been treated in New Caledonia, but the ore has been shipped as ore to both Europe and America. The freight to Europe is about 40f. per ton of 7½ per cent. ore, deducting 15 per cent. for moist, showing 6¾ kilos. of metal per ton. Hence the cost of freight for, say, one kilo. of metal, is about 62 centimes, or say, 6½d., whereas if the ore were treated on the spot it would probably not exceed half a centime. For this reason the owners of group No. 3 have secured an important waterfall near to their mines, which will give them ample electrical power. By the treatment of, say, 1,000,000 tons of ore annually, a production of, say, 7,000 tons of nickel can be got. The items of cost, as computed by Messrs. Vivian, of Swansea, are put as follows:—

	d.
Cost of ore	2.00
Smelting charges	3.00
Freight	0.32
Insurance	0.15
Packing	0.21
Total	5.68 per lb. of nickel.

The selling price of nickel is at present 1s. 1d. to 1s. 2d. per lb., so that the business should leave a substantial profit. The nickel ore of New Caledonia has the following analysis:—

	Per cent.
Water at 100°	10.66
Combined water	8.92
Silicon	40.90
Alumina and iron	12.86
Lime	0.04
Magnesia	15.18
Combined sulphuric acid	0.17
Oxide of manganese	0.70
Oxide of cobalt	0·25
Nickel	7·79
Combined oxygen	2.17
	99.64

The only serious rival to New Caledonia, in the ownership of nickel ores, is the Dominion of Canada, which has large deposits of such ores at Sudbury, in the Province of Ontario. It is alleged that in this region the policy of the Canadian Copper Company has been all along, and especially of late years, to try and get a monopoly of these nickel mines, and to keep other companies out, as well as to control the market for nickel. Reports have been circulated persistently everywhere to the effect that this company owned all the Canadian nickel mines worth buying up. Over 60 ore bodies have been discovered, located, and taken up in the district; but the Canadian Copper Company own, all told, less than 20 of them, and a majority of the best and largest properties in the district are still in the hands of the original owners. The British owners of the Murray mine at Sudbury could not make it pay because the ore was of too low a grade—carrying only about 2 per cent. of nickel and 1½ of copper. The local standard for paying ore is 3 per cent. of nickel and the same or a little more of copper."

We are informed that the suits which Mr. S. J. Ritchie has been prosecuting against the Canadian Copper Company in Canada have been finally withdrawn. The suits in the United States brought by Mr. Ritchie against Messrs. Burke and others are still before the courts, but his complaints are all settled so far as the Canadian Copper Company is concerned, and there is no longer any litigation pending against that company on his account.

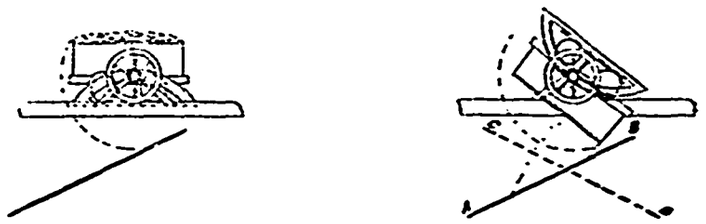
Colliery Surface Arrangements.

By Mr. S. A. Everett.

(Continued from October Number.)

The tippler illustrated in Fig. 11 makes a complete revolution under gravity, and is controlled by a brake. It is arranged that when the full tram is in position for tipping, the centre of gravity is in front of the centre of oscillation. This carries the tram round during delivery to a point where the wheels and axles, being now heavier, tend to complete

Fig. 11.



the revolution when the brake is released. The tram may be tipped either in the direction of, or against, the screen (see A B and C D, Fig. 11.) A considerable amount of breakage must take place with this tippler on account of the mass being suddenly precipitated onto the screen. It also has the disadvantage of not being a throughway tippler, the tram having a return over the road, causing increased labour, cost and delay.

Fig. 12.

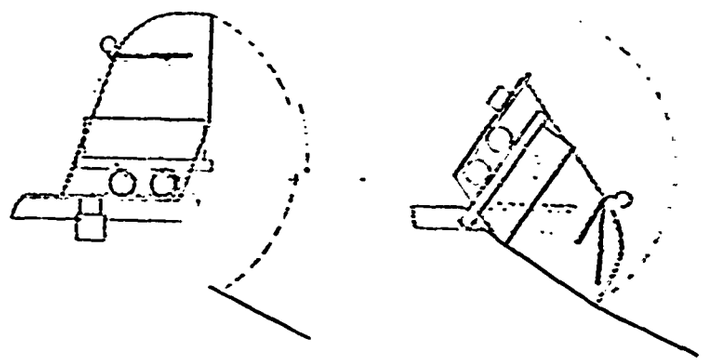


Fig 12 shows the Rigg tippler in two positions. It is so arranged that it tips and returns under gravity. The coal is tipped into a shoot which forms part of the frame of the tippler, and which serves to reduce shock and distribute the coal before delivery on to the screen, and the coal is further checked in passing out by means of a swinging door; the coal is delivered in the direction of the screen, and the tippler is controlled by brake. This is a good tippler to prevent breakage, but is at a disadvantage on account of the empty tram having to return over a portion of the full coal road, and for this reason it is getting somewhat out of date.

Fig. 13.

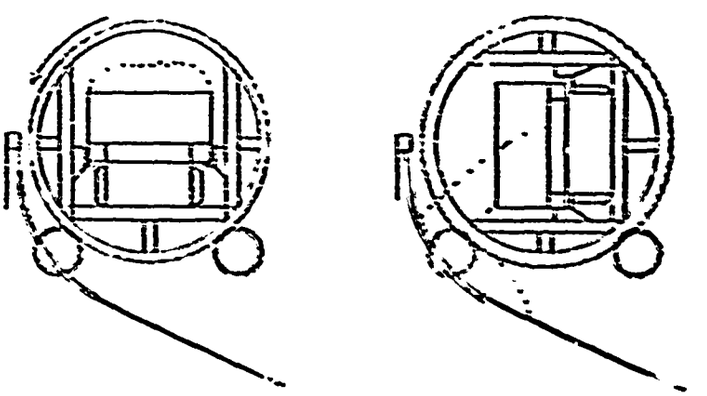
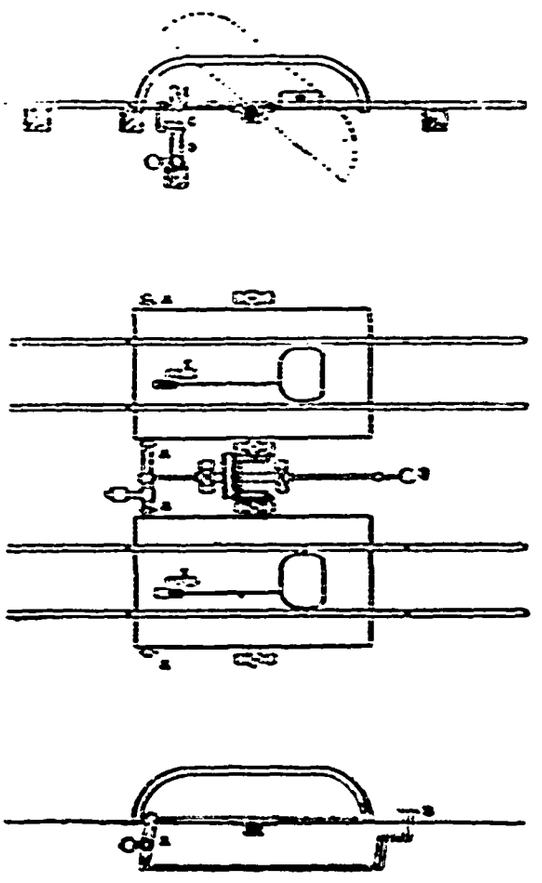


Fig. 13 shows a circular side tippler, power driven at uniform speed. As the tram is revolved the coal slides down a curved plate or hood, so that there is little or no direct fall for the coal on to the screen. After a complete revolution, the empty tram is pushed out of the tippler by the next full tram in passing in. This is a very expeditious method of tipping, and as the tram always moves in one direction, the gradient can be arranged in favour of the load from the weighing machine through the tippler to the creeper or hoist.

Fig 14 illustrates a throughway end tippler recently erected, and is a modification of the tippler shown in Fig. 10. Two tipplers are coupled together by bevel gearing, and may if necessary be controlled by brake. The full tram in one tippler works back the empty tram in the other. The tram is held in the tippler by means of the catches shown in Fig. 3: there is also an arrangement to prevent it falling too

Fig. 14.

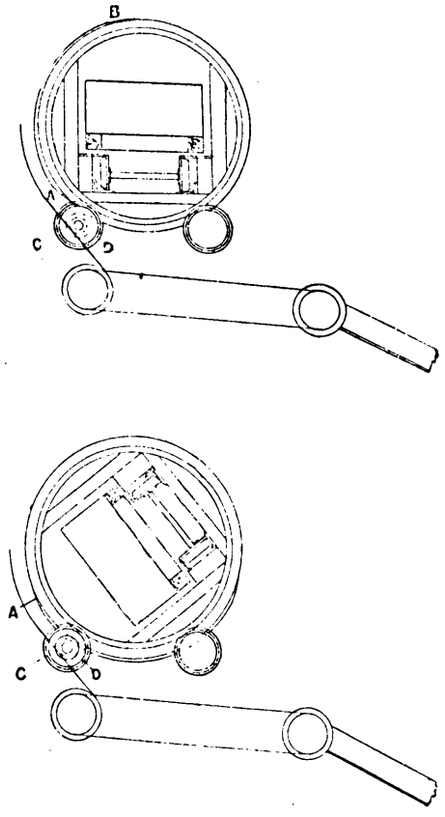


far forward when tipping. The full tram is placed on the tippler a little beyond the centre of support, so that when the catches A are released by pressing down the lever, B, the tippler immediately falls and discharges the coal: upon returning, the bent lever C comes in contact with the small kep D, which opens the catcher and allows the empty tram to pass out. The next tram in passing in pushes over the lever E, which withdraws the kep D, and closes the catches in time to arrest the full tram in the proper position for again tipping. This tippler has the advantage of being throughway, and the gradients can be arranged so as to work the trams automatically, and no power except gravity is expended in tipping, but in other respects it has most of the defects of the tippler shown in Fig. 10.

The best tippler, in the writer's opinion, is illustrated in Fig. 15, shown in two positions. It is a circular side tippler, power driven, of variable speed, and is arranged to automatically stop itself in the proper position after completing a revolution. The variable speed may be obtained by increasing the diameter of the ram of the rider on the tippler on a portion of the periphery A B, which engages with a small pinion

C ; this gives a slow speed during the time the coal is being delivered. The smaller diameter of the tippler then engages with a larger pinion D, which completes the revolution at an increased speed. To reduce any direct fall or breakage to a minimum, a curved plate, or hood, is placed, down which the coal slides, and is received on a short conveying belt, which distributes it and places it gently on the screen. It is essential to the success of this arrangement that the coal should be discharged slowly, in order that it may be carried away in a thin distributed stream as it is delivered on the belt. If the coal is discharged too quickly, it accumulates in a mass on the belt, and efficient screening is not possible. By this arrangement the coal receives little or no direct fall, and it is not precipitated with any violence into the screen. The angle of the screen requires to be a little steeper than usual, as

FIG. 15.

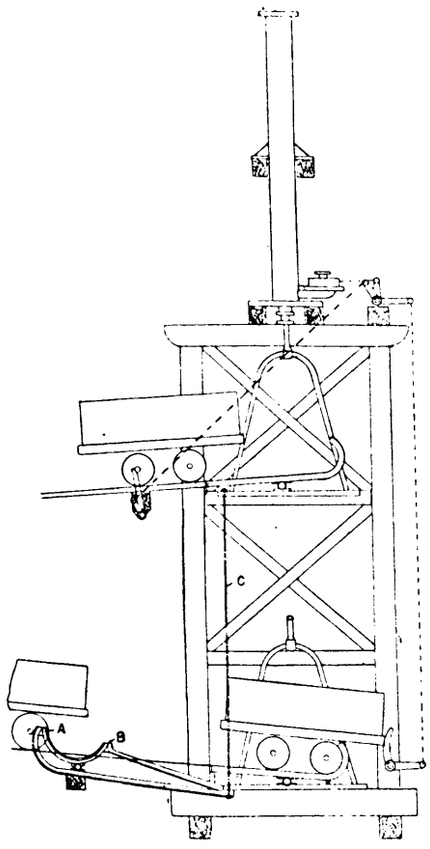


the coal does not receive the impetus which it gets in the ordinary tippler. By this method, thorough and effective separation of the small from the large is possible without undue breakage, and in the opinion of the writer this is the tippler which best fulfils the conditions of the ideal tippler enumerated above. The empty tram passes through the tippler and runs down to the chain bank or hoist, where it is elevated sufficiently high to admit of its running round to the empty side of pit.

The chain bank consists of an endless chain having stops or projections at certain distances which engage the axle of the tram and carry it over. It is a simple and effective arrangement, which requires little attention, and is not liable to get out of order.

Fig. 16 illustrates a steam hoist for elevating trams which is entirely automatic in action. The tram rests on the cage on a cradle fixed on a shaft, which is placed a little out of centre so as to keep the tram in position when travelling. It is fitted with the usual arrangement of levers for working the hoist by the tram in passing in and out ; it is also fitted with an arrangement for automatically controlling the supply of trams, which are run down a road with a gradient to the hoist. This is effected by means of the iron structure in the form shown. It is fitted on a shaft, and is placed between the rails ; when the cage is down, the axle of the first tram rests against A, and is thus prevented from entering the hoist When the cage is raised it carries up the rod C a certain distance, which depresses A sufficiently far to allow the

FIG. 16.



axle of the tram to pass over and rest against B ; then when the cage returns it pushes down B and raises A, thus allowing the tram to pass into hoist.

(3) SCREENING.

Screening may be defined as the sizing, cleaning, and preparation of coal for the market. The operation of screening does not usually cause as much breakage to the coal as that of tipping. Formerly screening was considered more or less of minor importance, but during the last decade, on account of severe competition, critical markets, and the demand for large and pure fuel, the question of screening has asserted its importance, and claimed the attention it deserves. This is evident from the complete and extensive plants for the treatment of coal which are now being established at many of the large and modern collieries in South Wales.

Fixed screens are almost exclusively used in the steam coal collieries of South Wales. The bars vary in length from 9 feet to 15 feet, and are placed 1 inch or 1⅛ inches apart ; they are placed at an inclination of 18 to 25 degrees ; the angle should be sufficient to allow the coal to slide down. The large coal goes over the screen and into the truck ; the coal which passes through the bars falls into a box termed the Billy Box, and is weighed by the Billy Fairplay, and deducted from the gross weight of tram, the collier being paid on the net weight of large coal only.

An ordinery fixed screen is illustrated in Fig. 17, making large and small ; sometimes another screen is placed underneath the large coal one, and the nuts separated from the small. This class of screen is very efficient if the coal is distributed before arriving on it ; this is most effectively done by the side tippler and short conveying band illustrated in Fig. 15. With the ordinery plate tippler the coal is placed upon the screen with such a velocity that great breakage results, and a portion of small coal is carried over into the large coal truck. The curved balance screen shown in Fig, 18 has been designed to admit of the coal being examined, and if necessary, cleaned before being passed into truck, and also to place it in the truck with the least amount of fall, and so prevent breakage. This screen is controlled by brake, but

FIG. 17.

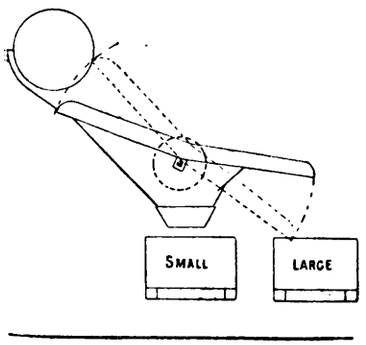
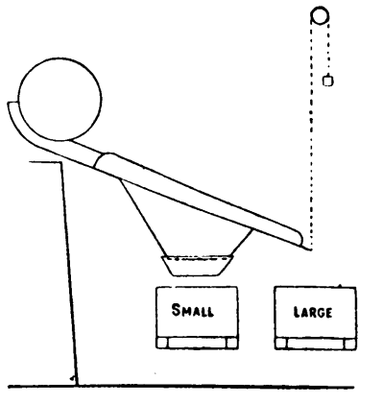


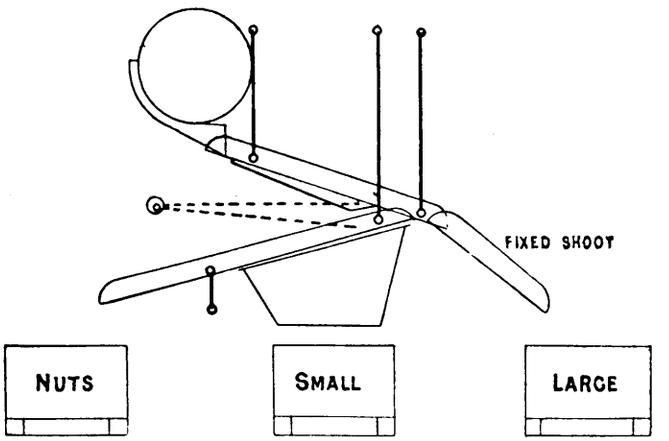
FIG. 18.



in the Rigg screen of this type a water cataract is sometimes used; the weight of coal carries it down, and it is arranged so as to right itself when empty.

The Jigging Screen, an example of which is given in Fig. 19, finds much favour In some districts; it is an effective means of dealing with a tender seam with a large percentage of small. It consists of a screen suspended at an inclination of about 1 in 6, and which receives a short reciprocatory motion by means of cranks, or eccentrics, and connecting rods. The bottom of the screen may be fitted with either the ordinary bar, a perforated steel plate, or a wire gauze of suitable mesh. The whole apparatus requires to be strongly built, as the wear and tear from

FIG. 19.

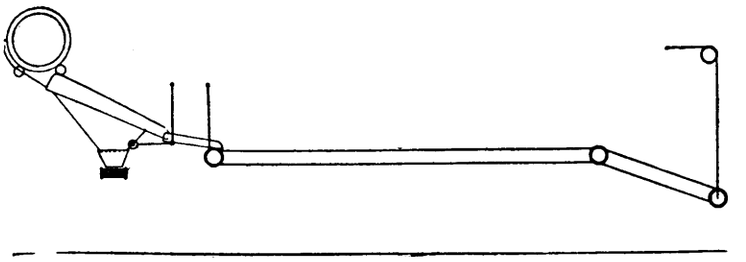


constant vibration is considerable. The shock due to vibration is counteracted to a certain extent by arranging two screens to work in opposite directions.

The screen may be driven with a long stroke and at a slow speed, say 6 inches and 100 revolutions, or it may have a short stroke and a high speed, say 2 inches and 250 revolutions. The shorter the stroke and the greater the number of vibrations, the more effective the separation, as the movement during the stroke need not be considered of any value, but it is the shock or jar at the reversal of stroke by maintaining a continuous vibration which gives the most efficient screening.

In designing apparatus of this kind, the aim of the engineer should be to obtain the greatest number of vibrations with the lowest possible bearing speed. Fig. 20 illustrates in outline the type of screen now being erected at many modern collieries in South Wales. It consists of the circular side tippler sometimes driven at variable speed, and the ordinary fixed bar screen. The large coal passes off the screen on to a shaking shoot, which delivers it on to a picking band. This shoot is suspended and given a reciprocating motion by means of eccentrics. The band is from 3 to 5 feet wide, 30 to 50 feet long, driven at a speed of about 50 feet per minute. There is a swinging jib at the end of the belt, which lowers the coal gently into the truck; a chain with links about 2 feet 6 inches, and the width of the belt, is sometimes placed on the lowering end of the screen, which prevents the coal sliding off into the truck when the angle is high. The coal which passes through the screen bars falls into the billy box, and is weighed; when discharged it falls on to a conveying belt, which carries it to the small coal truck, or, if further treatment is necessary, into the boot of an elevator. If three or four screens are placed in the same building the small coal conveying belt, if large enough, can be arranged to pass under all the screens, and convey the small to one point. Sometimes scraper conveyors remove the small coal from each screen to a belt which carries

FIG. 20.



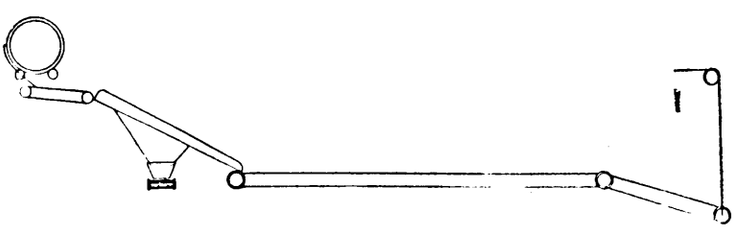
it into a truck, but unless properly attended to they become choked, causing delay, and in the writer's opinion, the broad conveying belt is to be preferred.

The screen illustrated in Fig. 21 is similar to the one illustrated in Fig. 20, except that the distribution of the coal takes place before passing over the screen, by means of the short conveying belt placed under the tippler, and the shaking shoot is dispensed with. This, in the writer's opinion, enables more effective screening to become possible, with less breakage to the coal, and the coal is better placed on the screen for cleaning and picking purposes.

A notable departure from the screening appliances of past years is the introduction of the picking belt. The cleaning of the coal should be done, as far as possible, at the coal face, and if a picking belt is erected, it should not be followed by any relaxation of watchfulness or supervision on the part of the underground officials. It should be considered supplementary to, and not instead of, the cleaning of the coal at the face, as the coal, however carefully filled, is not absolutely free from inferior matter.

If it is necessary to separate the nuts from the small in the billy coal from under the fixed screen, it is raised by an elevator to either a revolving or shaking screen—what passes over falls into a hopper holding, perhaps, forty tons, the small passing through falls into a similar

FIG. 21.



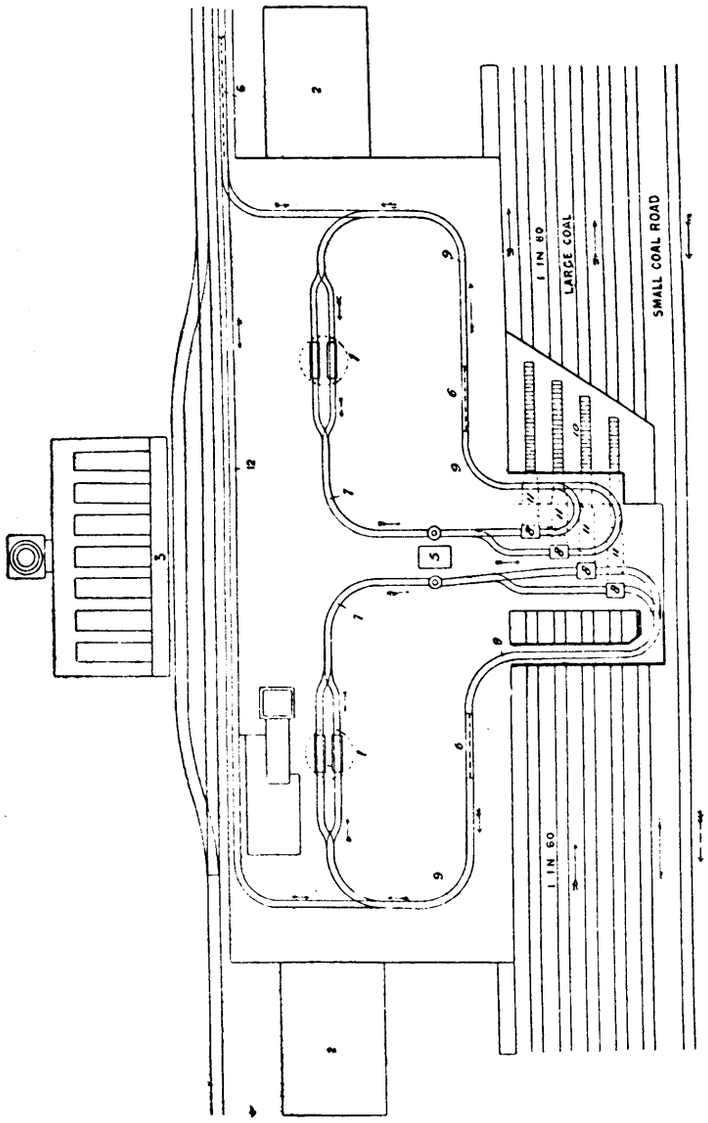
one placed at the side, or they can be passed direct into a truck. The revolving screen consists of a cylinder made of either bars, perforated plate, or wire gauze, with shaft through the centre, placed at an angle of about 1 in 6 and revolved; the coal is fed into one end, the nuts passing out at the other, and the small falls through. Great breakage takes place in this screen by the coal being carried round with the screen to a point where it falls back upon itself by gravity. If the coal contains much inferior matter, it is advisable to classify and wash it. Messrs. Humboldt, of Germany, in their screening arrangements, utilise the revolving screen with some improvements for the purpose of classification. The screen is in the form of a cone, and is filled with mantles with meshes of various sizes, the largest being placed inside. Between each mantle

spiral plates are arranged for the purpose of carrying the coal forward and preventing it falling back upon itself.

The same classification may be effected by shaking screens placed above one another, that is to say, the first and third are in one direction, the second and fourth are in the opposite The large nuts are taken off at the top screen. The coal which passes over each screen falls into a trough, and is carried away to the washing boxes in a stream of water.

The writer is of the opinion that it is not advisable to attempt to clean nut coal by hand. If the coal contains much inferior matter, it will require such constant attention that partial cleaning is only possible, and the speed would require to be a very low one. To effectually deal with coal of this nature the best arrangement is to classify as above and wash.

FIG. 22.



1. Shafts. 2. Winding Engines. 3. Boilers. 4. Fan. 5. Weighhouse. 6. Creepers. 7. Full Coal Roads. 8. Tipplers. 9. Empty Tram Roads. 10. Picking Bands. 11. Screens. 12. Road for Pitwood, &c.

Fig. 22 illustrates a colliery laid out for dealing with about 2,000 tons per day—1,000 from each shaft. It will be seen that the winding engines are placed on opposite sides, which gives great freedom for banking arrangements The full coal passes from the cages to the weighing machine under gravity; after weighing they fall to the tipplers —four in number, placed in one building—they pass out of the tippler, and fall to the creeper, which elevates them sufficiently high to admit of their falling to the empty side of pit; the shafts would be fitted with the automatic appliances for banking, to reduce, as far as possible, labour cost Pitwood and the various stores for the pits are brought to banking level up an inclined road, which is worked either by a creeper, or small winch engine. The screening arrangements are of the type shown in Fig. 21. The small coal may be passed direct into the truck, or conveyed to the washery for further treatment.

Storage sidings for empty and full trucks should be laid out to give ample accommodation for all requirements, and should be laid at sufficient inclination to work the whole arrangement by gravity alone. The writer considers that a gradient of 1 in 60 should give satisfactory result in all states of the weather. Perhaps it may be advisable to increase the gradient to 1 in 50 under the screens to allow the trucks to be passed quickly in and away.

On Safety Appliances and Precautions Necessary in Mines.

By J. R. GODFREY.

(*Continued from October Number.*)

Fig. 7 shows the top portion of a safety cage designed for an underlay shaft at the Gibraltar Consolidated Gold Mine at Adelong, N.S.W. The engineer, Mr. S. H. Vale, who kindly allowed me to copy his tracings, has modified the catch shown in the drawing by altering the shape of the cam, but the principle is unchanged—A A are the catches; B B the rollers for the guides; C C the spiral springs for throwing the catches into action; D the draw bar to which the rope is attached and which holds the cathes off the guides by means of the chains E; F is a spiral spring (square section) placed under the draw bar. The shaft in which this cage works is a difficult one to place a safety cage in, owing to the curves in it, but the catches have always acted satisfactorily when tested.

Guides should be of hardwood and from four to five inches in width, as the cage runs smoother in these wide guides, and they can stand the shock of the safety catches.

Cages should be covered by a hinged hood, should not be less than six feet in height, and be made of strong iron.

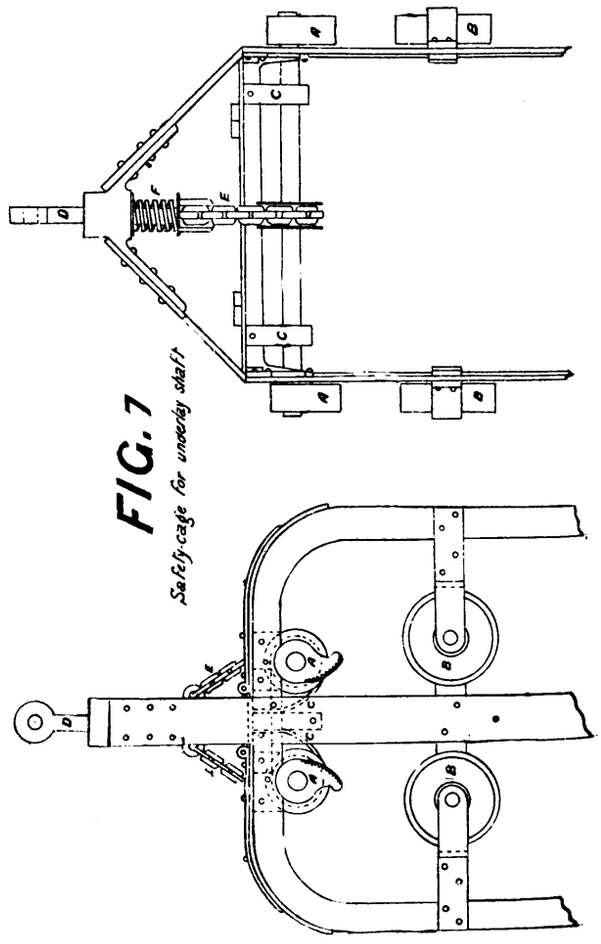


FIG. 7
Safety-cage for underlay shafts

Ropes—When made of wire, are either round or flat. Flat ropes are very useful in comparatively shallow shafts, where quick winding is required, but are not suitable for deep shafts. Firstly because they are too heavy, and, secondly, because they are wound on to a spider drum, and each lap of the rope passes over the previous one, and the nearer the cage comes to the surface the faster it moves for each revolution of the engine, which is exactly opposite to what it should do. Round wire ropes are either ordinary lay, Lang's lay, or lock coil. The first have spiral strands, the last has a perfectly smooth circumference. Whichever form of rope is adopted, the precautions mentioned under the heading of "Drums" must be carefully observed.

For winding purposes the ropes should have coarse wires about $\frac{1}{16}$ in. in diameter. Fine wires are excellent for stationary work, such as staying chimney stacks, ship's rigging, etc., but for winding they are not good, as the wires soon wear through, burr out, and become a nuisance; it is then almost impossible to examine the ropes or see whether the inside wires have gone. Coarse wire ropes, unless put round too small a drum, will wear for a long time, and if some of the wires break, it is easy to see whether the damage is serious or dangerous.

If wire ropes require to be spliced the "long splice" should be used, not less than from 30 to 50 feet in length. By using this splice the thickness is not increased, the flexibility is not impaired, and there is nothing to catch on passing over the pulley.

In Manilla or hemp ropes, a "short splice" is better, as a long splice does not hold so well, but these splices should not be less than 2 feet 6 inches.

Shackle—It goes without saying that this should be strong enough; but in addition to this it should be changed every six months, for it is a well known metallurgical fact that a sudden blow on steel or iron tends to make it brittle. The sudden lift of the cage and tightening of the rope on the shackle is in the nature of a blow, and is going on all day and every day, consequently crystallization of the shackle sooner or later takes place and it becomes brittle; so much so that cases have been known of a shackle, perfectly sound to outward appearance, having snapped like loaf sugar under the pressure of the fingers. Duplicate sets of shackles should therefore be kept, and interchanged every six months, the old ones being heated and annealed afresh; the coupling chains being treated in the same way. When mine water contains mineral solutions deleterious to steel or iron, the ropes and attachments must be kept under constant supervision, as well as all iron fittings, such as chains, knocker lines, etc.

When new ropes are being wound on the drums, it is highly important to lap them on evenly and closely, this is best done by winding them off a spare drum on to the engine, or by stretching them out on the surface with a weight fixed to a swivel on the end, and then winding them on. The rope should fit closely between the flanges, so that when two layers of rope are on the drum the under layer cannot spread and allow any of the laps on the upper layer to slip down between, as this often causes the rope to "ride" and gives a sudden jar to the cage. If the cage be deep in the shaft, a small slip of this kind will give a very heavy jar to the cage, may break the rope, and will most probably throw the safety catches into action and hang the cage up in the shaft. As a rule the even or uneven lapping of the rope depends upon the way it is wound on when new.

In changing a rope end for end, it is best to wind it up on to the drum, then carry it out on the surface, attach the old end to the drum, and stretch the rope out with a weight on the new end, and wind on anew. Never clamp the loose end at the surface and allow the light of the rope to go down the shaft, as this is very dangerous.

Shaft.

All entrances to the shaft underground should be securely fenced; this is usually done by means of gates, guard rails, or sliding doors. Gates are effective, but in small platts they take up room in opening and shutting, which is not always desirable. Guard rails take up very little room and are efficient, but care must be taken to have them at the right height, if too low they may send a man head-first into the shaft; if too high they may allow him to slip under; they should be placed about level with a man's diaphragm.

Sliding doors with a counterpoise are excellent, provided there is sufficient height in the platt to allow of their being put up out of the way when timber is being landed.

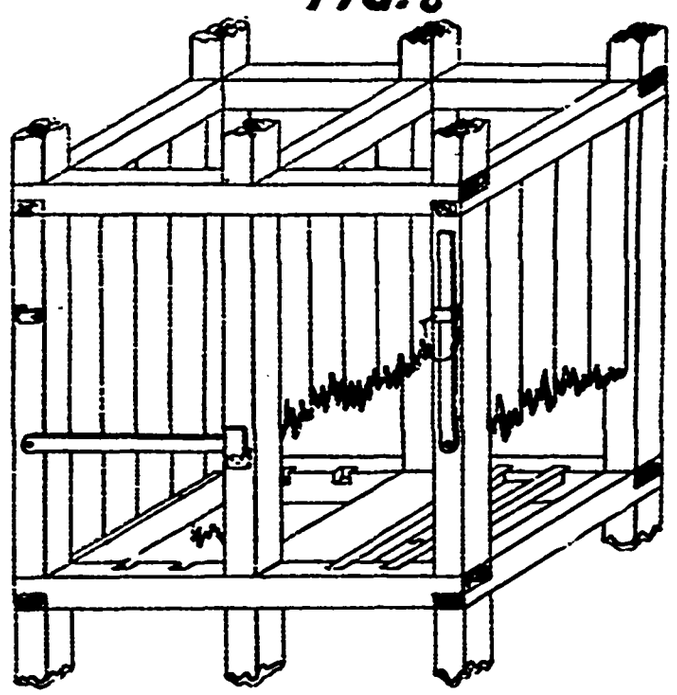
Some shafts are fitted with iron gates, which can be dropped across the shaft, forming bumpers or chairs for the cage to rest on; they are very defective, as any one getting oul ot the cage when they are up has to step over them.

Chairs or Bumpers should be provided at every platt for the cage to rest on. These may consist of iron chairs similar to those described (Fig. 5); or iron frames like a gridiron, hung on hinges, capable of being turned up on to the unused side of the shaft when not in use, or wooden bearers about 4 in x 4 in. in section, which drop into mortices cut in the wall-plates purposely for them.

If the chairs or frames are used the hinges must be carefully examined weekly. The wooden bearers are never likely to become broken or dangerous without its being at once seen, and are good in that way, but they, in common with the frame bearers, require a man to lean over the shaft to put them in

Fig. 8 shows the platt-set in a two compartment shaft. The right hand compartment shows the two wooden bearers or bumpers in position, the guard rail being folded up out of the way; while the left hand compartment shows the bumpers removed, the mortices they fit into, and the guard rail across the shaft

FIG. 8



For underground wet platts the wooden bumpers are preferable to either chairs or frames, as the hinges of the latter very soon get perished and have to be renewed or repaired.

When trucking is being done at any level the bumbers should always be in, and the cage resting on them, otherwise it may move away and the truck drag the man into the shaft.

It sometimes happens that two cages work to a certain level, and that only one cage can be sent to the next level beneath. In this case no men should be allowed to get into the cage until it has been lifted

off the chairs, proving that the other cage has been thrown out of gear, and the drive has the cage, in which the men are to descend, under his control.

Penthouses—When a shaft is being sunk, and the upper levels have to be worked, it is absolutely necessary to protect the men in the bottom from any risk of falling stones, drills, or other dangers. To ensure this a powerful penthouse is built into the shaft at the bottom working platt. In a three compartment shaft, for instance, the two winding compartments must have the penthouse *under* the platt; the pump and ladder compartment having it over the platt.

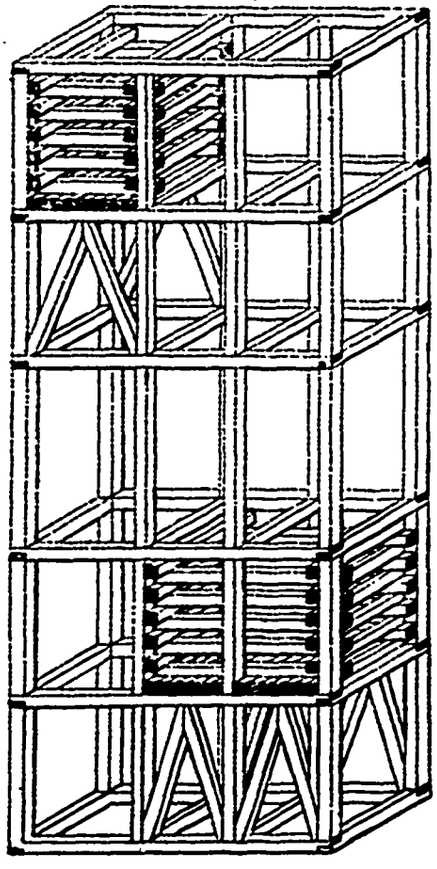
The two necessities in a penthouse are strength and rigidity; strength to withstand the blow of a loaded cage falling through the full length of the shaft, and rigidity to prevent the timber from springing; in other words, there must be inertia to resist momentum.

Penthouses are built as follows:—Strong bearers are put across the shaft eight or ten feet below the platt (or above it for the ladder compartment), or in a shaft timbered by frame sets, the frames serve for this purpose: a hollow bulkhead formed by stringers and spreaders is built up on these to the level of the platt, and the interior filled with mullock and covered with about two feet of clay. Saddle-backs are then put under the bearers to others beneath, or to the next frame set to strengthen the penthouse.

Fig. 9 shows the method of building a penthouse on frame sets. The central opening represents the opening set at the platt, the two right hand compartment is the pump and ladder way, and is temporarily used as the winding compartment to the bottom of the shaft.

FIG. 9

Method of building "Penthouse"



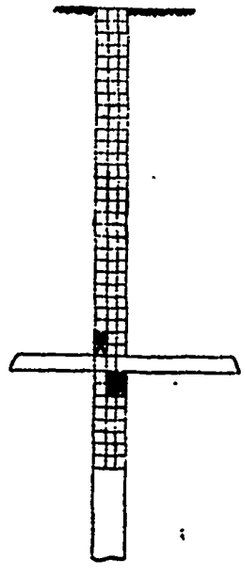
It will be seen how the bulkheads are built up, and how saddlebacks are put in; the mullock filling is not shown as it would complicate the drawing.

Fig. 10 shows the same thing diagramatically and makes it clear.

The object of using clay is to form a soft bed for the cage to fall on, as the blow is more gradually absorbed, and there is less danger of the timbers springing out of place.

By constructing the penthouse in the way shown the cages can work to the bottom level, and nothing can possibly go down the winding compartments to the bottom of the shaft. The left hand ladder compartment is covered over, and can be used by the men sinking to pull up mullock; for this purpose a steam or air winch is placed in the

FIG. 10



platt, and a head sheave and pulley placed under the penthouse; trap doors should also be placed over the compartment at the platt, which fall to after the kibble comes through, and prevent anything from falling back when emptying the bucket. The men are thus always under cover.

In cases where compressed air is not installed it is not always advisable to have a steam winch, on account of the heat and moisture, and a tail rope is then used; this rope is attached to the bottom of the cage next the sinking compartment by means of a hook; it passes under a pulley between the two compartments and over the head sheave—as the cage is drawn up it pulls the bucket from the bottom; the indicator on the winding engine must be marked to show when the bucket is drawn up to the platt, to prevent danger of overwinding.

In many of the larger mines it is now customary to carry down a special sinking compartment, by lengthening the shaft. The penthouses in the working part of the shaft are put in as usual, and the sinking compartment is used only for sinking; it is entirely independent of the rest, and has a special engine and driver. This method is altogether admirable as it ensures the maximum of safety.

In shaft timbering by frame sets, there is always a possibility of the men riding in the cage getting their shoulders jammed under one of the sets—especially in underlay shafts. This could easily be prevented by nailing lining boards 8 in. x 1 in. from set to set inside the timber; it is hardly ever done, but is a very necessary safeguard nevertheless.

In underlay shafts the grade should be kept as even as possible, as sharp turns are always dangerous; and shafts partly vertical and partly on the underlay should be prohibited. In very flat shafts, where trucks are used, there should be a special truck for lowering the men. This can have the seats put so that the men sit upright when the truck is travelling on the incline, and should be covered over by a punched iron screen frame; safety catches can be placed under it, and the rails laid upon longitudinal wooden runners, upon which the catches can grip.

When the shaft is on a steep underlay cages must be used, and bars of iron should be placed across the bottom of the cage, to give the

men a firm foothold, otherwise their feet may slip and become jammed between the cage and the timber; room is of course left to run the trucks on to the rails in the cage.

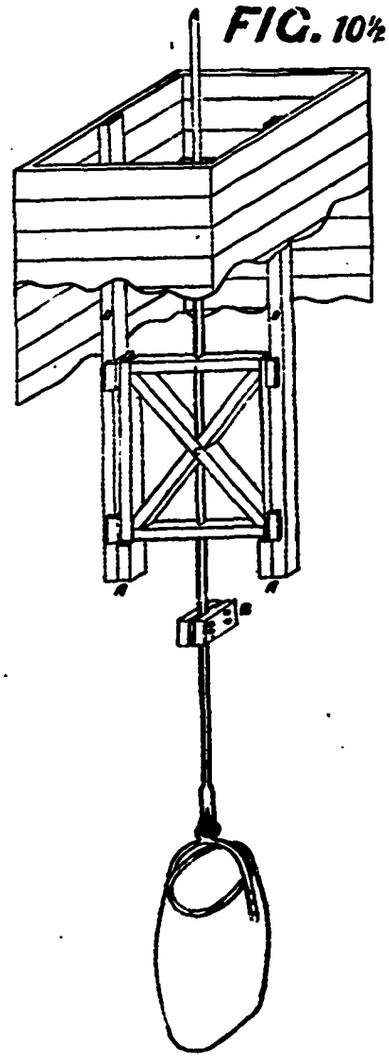
In some underlay shafts, such as those worked by whims, iron kibbles are used, which slide on skid boards; these skid boards should have no spring in the middle, should be securely spiked to the sets, and should have their ends flush with one another. To prevent springing, the skid boards should be 8 in. x 2 in., the span from set to set should not be too long, and they should be packed underneath; for spiking them 5 inch spikes should be used, and not wire nails.

If there be a spring in the skids, the weight of the bucket will constantly bend them in the middle, and the ends will tend to draw out, especially if wire nails are used; the kibble will catch in the end, draw the skid, and drop it down the shaft, and if men are sinking they may be cut in halves.

Kibbles should always have a good "belly" in the middle to keep the lip from catching in the timber.

When shafts are being sunk to considerable depths, say 300 or 400 feet before opening out, it is not uncommon to use a kibble with a winding engine, the cages not being put in until the mine has been opened out. Sometimes this kibble swings and spins dangerously; to obviate this a "jack" should be used, which consists of a light wooden frame with shoes or runners fitting between the guides. The rope passes through the centre of the frame, and a wooden chock, on which

FIG. 10½



the jack rests, is clamped on to the rope about six feet above the bucket. The wooden guides obviously cannot be carried to the bottom of the shaft when sinking, and are not usually brought down to within twenty or thirty feet, so that they shall not be smashed when shooting; on the bottom of the guides wooden blocks are spiked. Fig. 10½ shows this device.

As the bucket is lowered, the jack C comes down with it, resting on the wooden chock B on the rope, and sliding between the guides D; as soon as it reaches the bottom of the guides it stops on the blocks A, and the bucket continues to descend as shown in the sketch, the rope passing through the holes in the jack. As the bucket ascends the chock picks the jack up again. In this way there is never sufficient length of rope to allow the bucket to swing in a dangerous way, and it is quite steady when coming to the timbered part of the shaft, where men are most likely to get knocked off. The wooden chock on the rope must be strong enough to withstand the blow of the jack, should it become jammed between the guides, and get hung up and afterwards drop away—but with a fairly high jack, and two shoes on either side this is not very likely to occur.

Whips—Are perhaps the most dangerous form of ascent and descent for men, and should not be used for that purpose if it can be avoided; if they are used the following precautions are necessary.

When men are sinking under them, one portion of the shaft should have a strong penthouse kept over the men, and trap doors always placed at the brace, which will fall to after a bucket comes up, and preclude the possibility of its dropping down the shaft should the horse pull it up to the pulley.

A man-rope should be stretched from top to bottom, without knots and strong (not a discarded whip rope); unless it passes to the bottom, a man will most probably be thrown headlong out of the sling as his hands slide off the end of the rope; if there are knots on it he cannot keep a constant hold on it and it is useless.

A proper boatswain chair should be provided for the men to sit in, and the sling should have an iron thimble to prevent the shackle or hook from cutting it.

An open hook should never be used when lowering men, or when men are working under the whip, for if the sling or bucket caught, and the rope became slack, the hook would come out, and an accident would follow: either a shackle or safety hook should be used at both ends of the rope, or it may be laid down as a general rule that no open hooks should be used for raising or lowering men with any form of hauling appliance.

Whims—The same remarks apply as for whips as regards open hooks.

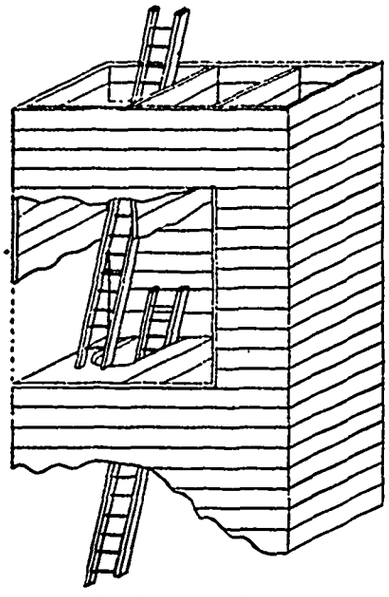
Brakes should always be placed on whims; this is hardly ever done: the nearest approach being a drag stick, which is a pole hinged to the arm of the whim, and with the other end shod with an iron ferrule; as the whim revolves the stick drags on the ground, should the whim begin to run backwards it digs into the ground and stops it. It is a most primitive, pre-historic arrangement, and is obviously of no use if the weight be on the descending bucket.

A brake can easily be attached by fixing a three-foot wooden drum on the bottom, a band brake passes round this and can be controlled by a lever fixed on the brace; the connecting rod passing under the horse walk.

Ladders.—The best method of fixing ladders is clearly shown in Fig. 11. Each ladder covers the manhole over the one beneath, so that the man cannot fall farther than the stage or sollar; to get on to the next ladder he has to land on the stage, and walk round the ladder. Some ladders are placed zig-zag and act as a very efficient guide for putting a man through the manhole should he fall away. Vertical ladders are prohibited in all the colonies. The most advantageous angle at which a ladder can be set is 70 deg. from the horizontal, because a man can then walk upright, with no weight on his arms; if they are straighter, he has to hold himself on the ladder; if on a greater underlay, he has to hold himself off, and both are equally tiring. As a

matter of practice it is impossible to set a ladder at this angle in a vertical shaft, for the shaft would require to be too wide or the ladder too short in a shaft 4 feet wide. The ladder should be about 15 feet long, with stages 12 feet apart, giving an angle of about 79 deg. from the horizontal, which is the nearest practical approximation to the theoretical angle; if the shaft be wider the angle can be increased or

FIG. 11



the ladders lengthened. Ladders should always project at least three feet above the sollar, or else staples driven in to serve as handles; if the ladder only comes level with the sollar it makes it very uncomfortable to get up or down, and one has to turn oneself round and catch hold of the ladder above. Little details like these take so little to do and yet are so seldom done—they save time, energy and temper, so why not attend to them?

St. Jacob's ladders and nailed rungs are dangerous and should never be used. Two sided ladders with round iron rungs, bolted across at the top and bottom, and in the centre, are the best.

When two ladders are being joined end to end always strive to get the distance between the rungs at the joint the same as between those in each ladder; this is another detail not often noticed, it saves curses both loud and deep. If one is stepping on rungs ten inches apart and suddenly comes to a gap of twelve inches, it jars the whole body and may cause a man to slip and fall. The best distance to have these rungs is ten inches apart, not more and not less.

Each ladder should be secured by staples and not hung one from the other; a defect often noticed in winzes and passes.

There should always be a ladderway to the stopes and winzes, etc. Where shooting is being done chain ladders can be used, but there should always be some good travelling road to serve as a get-away should anything untoward happen.

Timbering.

This subject would take a folio to deal with exhaustively, and it is impossible here to do more than touch upon the fringe of it.

Timber should always be at right angles to itself and to the ground. The only exceptions are in the spread put upon the legs of the sets in levels, and in the slight pitch given to stulls.

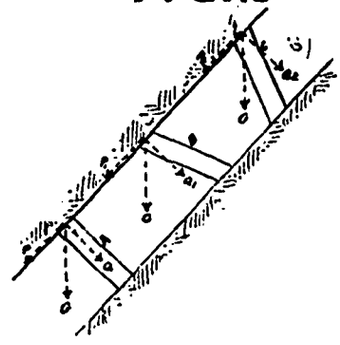
Fig. 12 represents an underlay shaft; now the only force tending to make the ground fall is that of gravity G acting towards the centre of the earth. This force can be resolved into two forces P and Q; one parallel to the underlay, the other at right angles to it. The force P clearly has no tendency to make the ground fall, since it is parallel to the underlay, so that we have a force Q, acting at right angles to the underlay tending to cause a fall; it is at once obvious that to counteract this force it is necessary to put the timber in, so that the force acts through its length, this being the strongest position in which timber can take weight, and since the force acts through it, there is no tendency to cause a collapse; hence the timber is put in as shown at A in the figure or at *right angles* to the ground.

If the timber is not put in at right angles, as at B and C, the force Q sets up a twisting movement, and will cause a collapse, in one case downwards, in the other upwards.

What is true of an underlay is equally true of a vertical or horizontal lode, shaft or drive.

Since the legs of the sets in a drive have each the same spread, it is not necessary to have them at right angles to the cap; but the set

FIG. 12



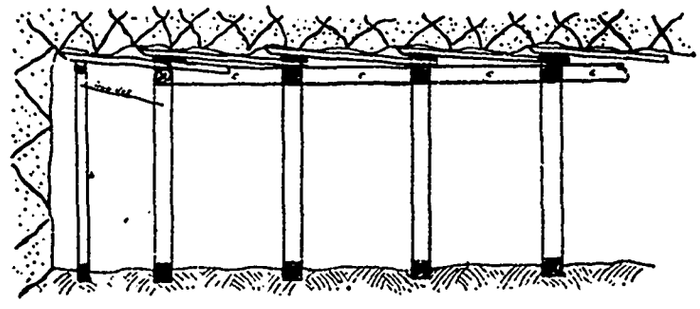
illustrating the principle of timbering

itself must be in the vertical plane at right angles to the drive; if it is set "skew" on the drive it will collapse sideways, if it is not truly vertical it will collapse backwards or forwards.

Stulls are usually set one or two inches above the right angle, as they have to carry the filling, and the weight of this filling then tightens the stull; if it were truly at right angles it might become loose and be pushed through.

When men are driving in ground with greasy heads it is necessary for them to be constantly protected by timber; this is done by keeping laths overhead from set to set, as shown in Fig. 13. A bridge, *a*, is

FIG. 13



placed over the cay, with a chock at either end and in the middle, to leave room for the laths, usually 2 in. in thickness, to be entered between the two; the laths from the preceding set rest on the bridge, while the laths for the succeeding set pass under it. As the ground is worked forward these laths are driven up, so that the men are always under cover. As soon as the laths are advanced half their length the leverage on the end is liable to break them or force the set out, hence "false sets," *b*, are put in to give a double support; the laths can then be safely advanced until the next main set is put in, and the process repeated—side laths are also used if required. To guard against the sets being levered out, studdles or toms, *c*, are placed from set to set; an iron dog being used to temporarily secure the false sets.

(*To be continued.*)

MINING IN NOVA SCOTIA.

The excitement of the month in mining circles has been the result of the crushing from the Thompson mine at Renfrew. Mr. Thompson brought into Halifax six bricks of gold giving a total weight of 2,700 ounces, valued at 54,000 dollars. This mine was bought by Mr. Evan Thompson some time ago, the figure we understand being $6,000. Since Mr. Thompson has owned the property he has cleaned up twice, the first brick being 735 ounces and the second clean up resulting in 2700 ounces, giving a total of 3435 ounces. The total cost of extracting this gold has been about $2,800; it is a regrettable incident that one life has also been lost. The assistant mill-man got caught in the turbine wheel while oiling and was dragged in and carried round several times before he was rescued. He expired soon after he was taken out.

Messrs. S. M. Brookfield and others have made a trial run of their mine at Cheticamp. The result is said to be highly satisfactory, but the assay returns have not come in at the time of writing. The concentrates, after being sampled and assayed by Mason & Askwith, of Halifax, will be shipped to the States.

Messrs. Dunn, Reardon & Co. have been prospecting their property all the summer, and have opened up a strong vein of low grade copper ore, carrying small values in gold and silver.

Their Mountain Top property, which is some half mile from this new copper vein, is shewing up exceedingly well, the average assay running over an ounce in gold besides small values in copper and silver. The ore is not free milling, and will require to be either roasted and chlorinated or smelted direct. The associated minerals are pyrrhotite and mispickel, while the gangue is hornblende slate with lenses of quartz.

During the last three months some excellent returns have come in to the Mines Office from the various mines, notably amongst them being 1292 oz. from 6257 tons from the Richardson; 1023 oz. from 3341 tons from the Blue Nose; 678 oz. from 2332 tons from North Brookfield; 249 oz. from 259 tons from the Oldham Gold Co.; 254 oz. from 814 tons from the Strathcona; 221 oz. from 301 tons from the Leary Mine; 161 oz. from 77 tons from the Sweet Mine.

We understand Mr. J. Neiley proposes to go ahead with his properties at Goldenville, and we sincerely hope that such may be the case.

The Cashon-Hines mines have been re-opened, and work started on the western part of the property.

Personal.—Mr. Harry Saunders has been appointed manager of the Harrigan Cove Mine, and will take residence on the property at once.

Mr. W. R. Askwith, of Mason & Askwith, has made an examination of the Owen Mine at Leipsigate.

Mr. H. Blackwell, of England, has spent some time in the province looking after gold properties.

Mr. Sidney Smith has purchased all the available tailing dumps in the province, and proposes erecting a cyanide plant to treat them. Mr. Todd C. Woodworth, his metallurgist, who has met with considerable success in the Western States, will design the plant and superintend the running of it.

Obituary.—We regret to have to announce the death of Mr. George A. Pyke. Mr. Pyke has been the president of the Richardson Mine since it first started, and has always been a prominent figure in the gold mining industry. Mr. Pyke was universally respected by the gold mining fraternity, to whom his death is a very considerable loss.

LAKE OF THE WOODS.

Mining is somewhat depressed just now, owing to suspension of work at several of the principal prospects in the district. The Gold Panner has stopped work, so has the Sirdar. The Triggs shut down some time ago, but we are promised important developments in regard to the Triggs in the immediate future. The last mill run from the Triggs dump did not yield very much per ton in gold, but then it is said that much of the stuff run through was only country rock.

At the Wendigo the vein is looking well in the shafts and in the drifts. One shaft is down about 130 feet, and the other over 50, and at least one of the drifts will shortly be through from shaft to shaft. The force of miners will be somewhat reduced during winter.

The Champion is just finishing a run of 500 tons at the Keewatin Reduction Works, and the bullion returns promise to be as good as some of the former good runs.

There is talk of a new company taking hold of the Stella, and the name of Mr. Motley, M.E., is connected with the enterprise.

At the Sakoose Mine the hoist and air drills are in operation—six drills. Shipments have been made to the Keewatin Reduction Works. At a spot where the vein had apparently pinched out a shot was put in which disclosed a paystreak about a foot wide rich in gold.

There has been a good deal of activity recently along the Manitoba Boundary where there are a number of very promising claims. Most of the development so far has been all on the Manitoba side of the line.

The water is extremely high in the lakes and rivers this autumn. Steady cold appears to have set in, and navigation will be at an end in a few days.

The exploration party, in charge of John McAree, O.L.S. and M.E., has returned to Rat Portage, after traversing the country north of the C.P.R. as far as the English River; the party went east as far as the Hudson Bay Company's post on Lac Seul, and west to the Manitoba Boundary.

RAT PORTAGE, Nov. 13, 1900. J. M.

Gold Mining in Nova Scotia.

We are indebted to the Department of Mines for the Province of Nova Scotia for the following official returns of the gold reported for royalty during the nine months from 1st January to 30th September, 1900. The returns as may be seen are not complete, many of the companies having still to report several months' crushing.

Name of Company or Operator.	District.	Quartz Crush'd		Yield of Gold.			At $19.00 per Oz.
		Tons.	Cwts.	Oz.	Dwt.	Grs.	
Evangeline Gold Mining and Milling Co.	Cow Bay (2 months)	48	..	10	8	11	$198.04
Tributors	Oldham	759	..	731	4	6	13,893.04
Bluenose Gold Mining Co.	Sherbrooke	10,685	..	3,451	11	..	65,579.45
Crow's Nest Mining Co.	do	1,730	..	79	5	..	1,501.00
Royal Oak Mining Co.	do (1 month)	337	..	96	5	..	1,828.75
Guffy-Jennings Gold Mining Co.	Caribou	2,888	..	800	4	..	15,203.80
Moose River Gold Mining Co.	Moose River, Caribou	1,753	..	138	14	1	2,635.34
Touquay Gold Mining Co.	do do (6 months)	850	..	247	11	22	4,704.33
Westlake Co.	Mount Uniacke (2 months)	32	..	59	13	..	1,133.35
Modstock Gold Mining Co.	Stormont (6 months)	3,408	..	1.185	19	..	22,533.05
Hurricane Point Gold Mining Co	Stormont	1,195	..	1,198	17	12	22,778.53
Richardson Gold Mining Co.	do	17,482	..	3,881	..	..	73,739.00
Strathcona Mining Co.	do	2,006	..	667	10	..	12,682.50
Tributors	do	25	16	12	4	12	232.28
Larre Mining Co.	do (6 months)	40	..	43	..	10	817.40
F. A. Sweet & Co.	do	259	8	204	..	..	3,876.00
Imperial Gold Mining Co.	Kemptville (2 months)	32	10	14	..	..	266.00
Hall and others	Killag (3 months)	56	..	80	8	..	1,527.60
Brookfield Mining Co.	Brookfield (6 months)	4,496	..	1.233	17	9	23.443.51
Sundries	Renfrew (5 months)	171	..	467	10	4	8,882.66
E. & C. Thompson	do (2 months)	47	..	758	10	..	14,411.50
J. Penman Lowe	Wine Harbor (7 months)	1,730	..	970	15	..	18,444.25
Guysboro Gold Mining Co.	do (2 month)	70	..	63	..	..	1,197.00
Old Provincial Mine	do	896	..	228	9	..	4,340.55
Tangier Gold Mining Co.	Tangier (3 months)	140	..	41	13	..	791.35
Shanghai Mine	Lawrencetown (4 months)	37	10	36	8	..	691.60
Montreal-London Co.	Salmon River (2 months)	2,100	..	348	..	..	6,612.00
Geo. J. Hiseler	Gold River (2 months)	28	10	19	6	12	367.18
Golden Group Mining Co., Limited—Tributors	Montagu (8 months)	397	12	312	10	10	1,537.90
Cashan & Hines	Leipsigate (3 months)	156	..	69	5	..	1,315.75
Owen Gold Mining Co. *et al*	do (5 months)	205	..	69	15	..	1,325.25
John H. Anderson and others	Lake Catcha (7 months)	388	..	214	10	..	4,075.50
Parker Douglas, Tributors	Malaga (5 months)	49	..	67	2	..	1,274.90
J. F. O'Leary *et al*	Harrigan Cove (7 months)	1,033	10	1,155	2	20	21,947.70
Moosehead Mining Co.	Shiers Point (5 months)	840	..	112	5	..	2,032.75
	Total	54,371	12	19,069	5	9	

COMPANY NOTES.

Consolidated Ca iboo Hydraulic—Word from this mine reaches us that the third and final wash-up for the season will be about $56,000, making the total gold yield this year something like $345,000. But for the very bad state of the roads, which seriously interfered with the getting in of supplies, such as powder, this satisfactory yield would have been still greater. The output next season is confidently expected to be quite $500,000. There is little doubt that this excellently managed property will be a dividend payer in 1901 and for many years, we hope, thereafter.

Le Roi.—November 5. October shipments amount to 16,100 tons, containing 7,466 ounces of gold, 11,691 ounces of silver, and 201 tons copper. Estimated value £45,979.

Payne Consolidated.—This company has issued to its shareholders under date of 9th November the following statement of its affairs for the quarter ended 30th September last:—Tons of ore shipped, 2,826; net profit, $113,220.73; less dividend paid Oct. 15th, $78,000.00; surplus, $35,220.73.

The Ymir Gold Mines.—The following circular has been sent to the shareholders—The whole of the expenditure connected with the duplication of the mill, thereby adding an additional capacity of 100 tons per day, has been provided out of the profits resulting from working the mine during the last few months. Included in this heavy expenditure has been the provision of a steam plant sufficient to run the whole of the mill should the water power become at any season of the year inadequate, a large compressor plant, and all the development work carried out, including that in connection with the vigorous opening up of the mine to a depth of 1,000 ft., by means of the shaft and the tunnel. This expenditure amounts in all to about £40,000, and although it may have appeared somewhat disappointing to the shareholders that these profits were not distributed, but were employed in this way, the directors nevertheless feel that the policy adopted has been in the best interests of the shareholders, who are now in the fortunate position of having on the property a first-class plant, capable of treating 200 tons per day, with the capital of the company remaining at the comparatively small amount of £200,000. The company being now free from debt, the profits which are being made from month to month will be available for dividend purposes—subject to any reserve which the Board may deem it prudent to make.

From the latest information the mine has never looked better than it does at the present time, and the development of the reef at depth is most satisfactory. It was found necessary to call Mr. Fowler, the company's consulting engineer, over to London recently, when the directors had the opportunity of going very fully into matters with him, with the result that they are more than ever impressed with the value and future prospects of the property.

The following cablegram has been received from the company's manager at Nelson, British Columbia:—"During the entire month of October (mill ran) 29 days 1 1 our; bullion, gross estimated value, $33,800; concentrates, $15,250 Complete returns cannot be expected much before the beginning of December on account of the bad state of the roads."

British Columbia Copper.—On the Mother Lode an upraise is being run to connect the 300 and 200 ft. levels; it is in magnetite with chalcopyrite and averages 6½ per cent. copper and $4.50 gold per ton. The ore bodies exposed above the 200 ft level measure in feet 350 x 300 x 100 about 900,000 tons; ore blocked out between 200 and 300 ft levels measures in feet 250 x 100 x 20=about 50,000 tons; this tonnage is all north of the shaft, and it is believed there is an equal amount south. Shipments are being made to the company's smelter at Anaconda, B.C., and it is expected that by Jan. 1 matte will be turned out; by that time 15,000 tons ore will be stored in bins at smelter. The building for ore sorting and crushing is now nearing completion. Crusher's capacity is 40 tons per hour. A 35 drill compressor is en route to the mine; with this addition the equipment will total 45 drills with which the company expects to output 1,400 tons per day. As all ore will be sorted, the average value of that smelted is expected to approach $28 per ton. The smelter has made a $4 freight and treatment rate to some adjacent shipping mines but as the capacity is at present limited to 250 tons per day it will not be long before it is obliged to enlarge or refuse custom work except to those shippers whose ore is well adapted for fluxing the Mother Lode ore.

Canada Corundum.—Work on this company's property in Raglan Tp., Renfrew Co, Ont., began April 1, 1900. The vein extends for about 4 miles with an east and west strike. The quarrying is at present all done by hand and the ore teamed to mill where it goes first to a Gates crusher and then through the concentrating, re-washing, drying and grading processes. The new mill treats 50 tons ore per day, but it is intended to increase capacity to 300 tons as the first plant was merely an experiment to determine best methods of treatment. The deposit is low grade, but owing to the regular distribution it can be worked very economically. From prospecting and development work done as well as from the several mill tests it is confidently believed the ore will average 12½ per cent. The corundum produced is of a very uniform grade. 500 tons of 13½ per cent. mineral are stored ready for milling.

Mond Nickel Co., Limited.—Registered in England Sept. 20, 1900, with capital of £600,000 to carry on general mining business Dr. Ludwig Mond, accompanied by his son and Dr. Mohr, arrived at the Victoria Mines, Sudbury, Ont, Oct. 19, from London, and will remain some weeks inspecting mines and plants The foundation for the treatment plant at Victoria Siding are in and the machinery is arriving. At the mines development is being pushed and the roasting of ore has begun. Mr. Hixon's brother recently arrived at the mine from Colorado to assume the position of mine foreman at the Victoria. Two diamond drills are working on the Levack claims optioned from Tough, Stobie *et al.* by the Mond Company.

Montreal-Boston Copper.—W. L. Hogg, Manager of the Montreal-Boundary Creek Mining Co., owning the Sunset, Crown Silver and C. O. D., Deadwood Camp, Boundary, B.C., announced in Greenwood, Nov. 13, that Boston capitalists had become heavily interested in a new undertaking to acquire and work these properties. A. E. Monroe, representing the Montreal-Boston Copper Co., is expected shortly from Boston and on arrival will outline plans for extensive work. This is regarded with great satisfaction, as the mines are highly promising and under a consistent and systematic management with plenty of capital will no doubt soon be shippers.

Rock Lake.—This company, owning a copper property in Algoma District, Ont., 35 miles east of the Soo and 9 miles north of Bruce Mines, has installed a concentrator specially designed by George Williams, Butte, Mont., and built by the Jenckes Machine Co., of Sherbrooke, Que. The plant, which is of 200 tons per day capacity, is situated on Rock Lake. The ore from the mine is dumped in storage bins, from which it is fed by gravity into a 20 x 30 inch Blake crusher, the product all passing to a revolving trommel of 1 inch mesh, the oversize going to a set of belted 16 x 30 inch rolls provided with ball and socket bearings. From these rolls the ore is elevated to the trommel mentioned above. From the trommel the ore passes to four sizing screens, ⅛, ¼, ½ and ¼ inch. The oversize from the screens is fed to jigs with parallel motion plungers. The last screenings from the finest screens are fed to a settling tank to be treated on finer jigs. The middlings from jigs are crushed in another set of 16 x 30 inch rolls and elevated to the set of four sizing screens mentioned above. The tailings from jigs are fed to a set of high speed 6 x 48 inch rolls, then elevated to a settling tank and after having been sized are fed over Wilfley tables. Concentrates from jigs and tables are settled in large bins. Adjacent to mill is an engine and boiler house 38 x 64 ft. in which are installed a 250 h. p. tandem condensing Corliss engine and three 80 h. p. tubular boilers, the power plant being designed to furnish power not only for the present concentrating mill and electric lighting plant, but also for a largely increased mill for which provision has been made. The management is in the hands of Chicago capitalists not heretofore interested in the copper mining industry, and the readiness with which they have met all demands for money to properly and systematically open their ground speaks well for the future of their property, the underground showing of which is decidedly above the average of the district. From present indications this property will within three years be a large and profitable producer.

Ottawa Gold Mining and Milling Co.—The company has published the following statement of its finances:—

Assets.

Cash expended in purchase of water power, developing same, construction of mill, milling plant, barges, etc.		$98,320 42
Present value of water power, exclusive of mill	$150,000.00	
Cash expended in betterments, securing information about the district, experimenting with ores, laboratory works, etc.		29,817 57
Purchase price of Sakoose Mine, timber limits, etc.		275,000 00
Machinery, tools, etc., lately purchased for Sakoose Mine		13,800 00
Expended for labor in developing Sakoose Mine since purchasing, viz, June 27th, 1900		5,651 46
Paid for mining location near Scotty Island and developing same		6,257 76
Goods on hand and other assets		3,610 79
Dominion Government subsidy for constructing seven miles of railway		22,400 00
Rebates due from C. P. Ry		5,000 00
500 tons ore on dump ready for shipment to mine, waiting for cars, at average value $11.66		5,830 00
		$465,688 00

Liabilities · Capital Stock.

Authorized	$1,000,000 00	
Issued and sold at 25 cts. per share, 218,752 shares		$54,688 00
Paid on account of property 150,000 shares at par		150,000 00
		$204,688 00
Bills payable secured	$45,000 00	
Balance of purchase money for Sakoose mine	122,000 00	
Sundry bills payable outstanding for purchase of new machinery, tools, etc., lately purchased for Sakoose Mine, also other indebtedness	94,000 00	
		261,000 00
		$465,688 00

Montreal-London.—The following, under date of 24th November, has been issued to the shareholders:—

By circular dated June 1st, 1900, we advised you of an option given to Captain James G Miller for the purchase of the Dufferin and Lake Eagle Mines in Nova Scotia, at the price of one million two hundred and fifty thousand dollars.

Captain Millar having failed to carry out his obligations, and especially that of erecting a plant for the purpose of treating the concentrates and tailings, and the company having refused to extend the time for his doing so, or to modify the terms of the agreement, the option has fallen through.

The services of Captain Millar's mining engineer, Mr. L. W. Getchell, who has had an experience extending over thirty years, have been retained by the company, and the following is a copy of the report he has just made:—

"Montreal, October 17th, 1900.

"Montreal-London,

"Gentlemen,

"Some sixty days ago I entered into a contract with you to work the Dufferin Mine for you sixty days, with a view of ascertaining something of the value of the ore bodies in sight, and determining what savings in running expenses and economies could be practiced. As a result of my labors and investigations I have to report:

"In the first place I re-arranged the ore bin, covered my steam pipes, put new guides in the shaft to work my counter balance. All these tended

to the economy of fuel. On September 1st with a part of my force, I began operations in the mine. On the 7th I had my full force at work; on the 17th I started the mill, and ran until October 9th.

"I milled 1399 tons of ore; on the east side of the mill I ran 470 tons from No. 1 A West, which gave me 5 ozs. in free gold and 15 tons of concentrates; on the West side I ran 27 tons from the Lake Eagle, which gave me 11 ozs. gold. I ran 902 tons from No. 1 A East and the slate lead of the 200 foot level, which gave me 193½ ozs. gold and 45 tons of concentrates. In the underground operations I had four drills developing, and opening new ground, and four drills producing ore. The result is, notwithstanding ore taken out, there is more ore in sight than when I began operations, and in addition to the ore milled, there is in the mine, broken and ready to come to the surface about 300 tons.

"From present prospects I shall have no trouble in keeping 30 stamps constantly running; if an arrangement is made for my continuing to handle the property, I shall have suggestions to make for future development and prospecting, which I believe will develop a better character of ore than that now in sight.

"Above ground I have kept a careful account of my fuel, and find my expense for September was $1,300, a cut of one-half of the amount used by my predecessor. I am indebted to Mr. Stuyvesant for a suggestion, and an arrangement which, should I adopt, will enable me to cut this cost again one-half. This, I will investigate and report upon when I go to New York. At present, owing to my inability to get coal, I am burning wood. Find two cords of wood, equal to one ton of coal, is costing me $3 50; a ton of coal costing $5.50. For years to come wood can be had not to exceed $2.00 a cord.

"The labor has been reduced one-half and speaks for itself in the month's pay roll.

"With proper treatment of the concentrates and tailings, which I think can unquestionably be done, I venture to predict that the Dufferin Mine can be made to pay handsomely. Anywhere from $100,000 to $120,000 profit per annum should be taken out of it.

Yours truly,

(Sgd) L. W. Getchell."

Memo. showing Revenue from the above-mentioned Mill run:

209 ounces bullion @ $19.00	$3,971.00	
60 tons concentrates values @ $12.00	960.00	
		$4,931.00

MEREDITH ROUNTREE, Secretary.

Your Board consider it imperative that a cyanide plant be installed on the property as soon as possible for the purpose of treating both the concentrates and the tailings.

Inquiries have been made as to the plant required for the purpose, and it has been ascertained that a guarantee can be obtained that at least 50 per cent. of the gold value of the concentrates and 80 per cent of the gold value of the tailings can be saved.

As you have already been made aware the company holds, amongst other securities, the following fully paid-up shares:

Slocan Sovereign Mines Company Limited..	250 000 shares.
Bullion Mining Company.....	50,000 "
Bullion Mining Company No. 2; expected to be forthwith issued.....	50,000 "
Mountain Lion Gold Mining Company	25,000 "
Black Tail Gold Mining Company.....	20,000 "

As the present time is most unsuitable for realizing on such securities, your board think it in the interest of the company to issue Preferred Shares to an amount not exceeding $150,000 which the company shall have the privilege of repurchasing at any time, on conditions set forth in the underwriting agreement hereinafter mentioned. The proceeds of the said shares will be used mainly to pay the floating debts of the company, and for the erection of a plant necessary to treat both the concentrates and tailings.

Four hundred thousand shares of the Preferred Stock have already been underwritten and subscribed, by the directors, as per the following:

"*To the Montreal-London Gold and Silver Development Company, Limited.*

"Gentlemen,—The undersigned underwriters, approving of the issue of Preferred Stock to an amount not exceeding $150,000 (625,000 shares), hereby agree to subscribe and take up the number of Preferred Shares in said company set opposite their respective signatures, on the following conditions, namely:

(a) "The said Preferred Shares shall be entitled to cumulative dividends at the rate of ten per cent. per annum, payable semi-annually.

(b) "The company shall be entitled to redeem said Preferred Shares or any portion thereof, at any time before the expiration of twelve months from the date of issue at a premium of five per cent. and accrued dividend, and at any time thereafter at a premium of 10 per cent. and accrued dividend.

(c) "The said Preferred Shares shall be payable at par, as follows:—Four cents per share in cash; five cents per share on the 15th day of January 1901; five cents per share on the 15th day of March, 1901; five cents per share on the 15th day of May, 1901; and five cents per share on the 15th day of July, 1901.

(d) "A discount at the rate of six per cent. per annum will be allowed on payments made in advance.

(e) "A circular shall be forthwith issued by the company to its shareholders offering the privilege of subscribing on or before the tenth December, 1900, to said Preferred Shares *pro rata* to their respective holdings in said company. Minimum subscription to be 50 shares, and each shareholder to be entitled to at least that number."

(Here follow the signatures.)

Apart from the cumulative dividends above mentioned "the holders of "the Preferred Shares shall be entitled to the preferential payment at the "par value of such shares, out of the assets available for the return of the "capital in priority to any ordinary shares in the company," as provided for by its charter.

In accordance with the terms of the above underwriting agreement you are entitled to subscribe for one share of Preferred Stock for every three of Ordinary Stock now held by you.

In order to avoid expense in connection with book-keeping, postage, etc., it is deemed advisable not to receive applications for less than 50 shares.

Please sign the enclosed subscription form, after filling in the blank with the number of shares you desire to take and return same on or before the tenth December, 1900.

MEREDITH ROUNTREE, *Secretary.* WM. STRACHAN, *President.*

Anglo-Canadian Gold Estates, Limited.—An English company registered in London in August, 1899, with an authorized capital of £61,000 sterling, has been granted by the Ontario Government a special license to explore for minerals over a large territory in the Rainy River district.

The blocks of land are five in number, and are situated as follows:—(1) All that portion of timber berth No. 61 north of the Seine River, and west of a line drawn due north astronomically from the 38th mile post of Niven's first base line, containing six square miles (2) Timber berth No. 1 east of Crow Lake, east of Lake of the Woods, containing 23 square miles. (3) Those portions of timber berths D. 3, D. 4 and D. 5 south of Lower Manitou Lake, which lie south of a line running north 68 degrees east, astronomically, and south 68 degrees west, astronomically, through a point on Nivens' 6th meridian line, 40 chains south of the 34th mile post thereon, containing 29 square miles. (4) The Dick and Banning timber limit south of Calm Lake, on the Seine River, containing 30 square miles. (5) A block of land lying west of the Dick and Banning timber limit, containing 29 square miles.

These several blocks of land are almost wholly unexplored, and for the most part lie outside of the regions upon which prospecting has been carried on. Whatever locations have been surveyed within the limits of the blocks are of course reserved from the license, which also provides for the protection of any existing right by virtue of discovery or otherwise. The term of the license is for three years from January 1, 1900, and one-fourth of the area drops from the operation thereof at the end of one year, from the said date, one half of the area at the end of two years, and the remainder at the expiration of the third year. The company is bound to expend in actual exploration, development and mining upon the lands, and in shipping or opening up, and in sinking shafts, or any other actual mining operations during the first year, dating from the 1st January, 1900, not less than $35,000, during the second year, commencing 1st January, 1901, not less than $40,000, and during the third year, commencing 1st January, 1902, not less than $45,000, making a total of $120,000 to be expended in prospecting for minerals during the three years. The company is to furnish such proofs of the expenditure of the above sums as may be required, and is bound to thoroughly explore every one of the blocks and not confine its operations to any one or more of them. In default of the expenditure of the money during any one of the three years or in the event of non-compliance with any of the other terms and conditions of the license, the Government may cancel and annul the same at any time.

It is understood that a considerable part, if not all, of the $35,000 to be expended during the present calendar year has already been so laid out. A large force of prospectors and miners will necessary be employed by the company, whose operations will also require large expenditures of money for supplies.

MISCELLANEOUS.

The Canadian Copper Company, operating its extensive copper-nickel properties in the Sudbury District, Ontario, now employs about 1,200 men at an average wage of $2 per day. It is running 9 furnaces and smelting about 900 tons of ore per day. The ores average about 4%, about equally divided in copper and nickel. The production is about 600 tons per day, so the stockpiles are reduced 300 tons per day.

We understand that Mr. Henry S. Poole, M.A., A R.S.M., who has been for many years general manager of the Acadia Coal Company, at Stellarton, N.S, has severed his connection with that company, and hereafter will reside at Halifax. Mr. Poole is succeeded by a Mr. Coll, who comes from the States.

Mr. Wm. Braden, M.E., is busy opening out the old Bruce mines, and installing an extensive mining and concentrating plant for the Bruce Copper Mines Limited, a wealthy English Syndicate.

We regret to announce the death of Mr. James Foley, the promoter, and latterly managing director, of the Petroleum Oil Trust Limited, operating at Gaspe, Ont.

The death of Mr. J. W. Pyke, of Halifax, removes a well known figure in Nova Scotia mining circles. Mr. Pyke was prominently identified with the well known Richardson, the Economy and other successful gold mining ventures in that Province.

The shipments of minerals over the Ottawa and Gatineau Valley Railway for the twelve months ended 30th June last are officially reported to have been:—

Iron Ore.....	251,000 lbs.	from	Ironsides Station.
Mica	1,573,430	"	Cascades, Wakefield, Aylwin, Gracefield.
Asbestos.....	172,140	"	Low.
Stone	5,760,000	"	Wakefield.

During the same period the Pontiac Pacific Junction Railway shipped 13,790 lbs of mica.

Mr. Malcolm Blue, for a number of years underground manager at Springhill, N.S., and more recently employed as a Deputy Inspector of Mines by the Provincial Government, has been appointed to the position of Assistant General Manager of the Intercolonial Coal Company's Drummond Colliery.

The gold production of the Yukon Region promises to show a considerable gain this year. In 1899 the Canadian Geological Survey put the total amount at $16,000,000. This year there are, as usual, various estimates, but the most probable, being based on the royalties collected by the Canadian officials at Dawson, puts the total for 1900 at $20,000,000. The Klondike excitement has largely passed over, but work is being carried on steadily and more carefully. Moreover, transportation facilities have been provided, so that machinery and necessary supplies are obtained at a reasonable rate. In short, operations are gradually settling down to a business basis on which they can be conducted for years to come.

Iron ore is being shipped from the following mines in Eastern Ontario, most of the product going to the Hamilton and Midland smelters, making coke pig-iron :—

Wallbridge mine, Hastings county, hematite. Magnetic ore from the following in Hastings county: St. Charles mine, near Millbridge; St. Charles mine, near Bannockburn; Coe Hill mine, Coe Hill; Malone mine, near Malone. Also magnetic ores from deposits along the K. and P. railroad: Calabogie mine, near Calabogie; Robertsville mine, near Sharbot lake; Wilbur mine, near Wilbur.

The following iron properties are being opened up with a view to shipping:—1. Empey mine, near Eldorado, hematite ore, operated by Messrs. Farnum & Wellington, of Madoc. 2 Childs & Sprague, properties near Hermon P.O., Hastings county, being high-grade magnetite, operated by the same parties. 3. A magnetic property north of Verona, Frontenac county, being tested by diamond drill by J. Kellerschon and others.

The Monarch group on Cadwallader Creek in the Bridge River district, has been bought by an English syndicate from the British Gold Properties Co., whose secretary, W. J. Dowler, is city clerk of Victoria. The price is said to be a large one. The same syndicate has bought the Lorne group and the Woodchuck properties. It is said to have invested $225,000 in all.