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## THE ROYAL COMMISSION OF INQUIRY ON TECHNICAL EDUCATION.

Mining men have a just cause for complaint in the fact that the mining industry has been quite overlooked by the Dominion government in the recently-appointed Royal Commission on Technical Education. Of the five gentlemen appointed to the Commission, none is qualified to represent mining interests. This is a most regrettable oversight. The situation is rendered worse by the fact that some time ago the Minister of Labour was notified of the omission.

The mining industry is of such importance to Canada that a large department at Ottawa is kept up for the special purpose of promoting the development of Canadian mines. Five of our universities supply instruction in mining engineering. Very many young Canadians are devoting themselves to the study of this profession. In short, mining and its allied industries are every day becoming more and more essential factors in our national development. Where then can excuse be found for the deliberate failure of the Minister of Labour to see that the Commission included a representative mining man?

More than all other industries, mining requires special representation. Its conditions and its requirements are unique. In no other industry is specialized training so important. The lay mind is quite incapable of appreciating these facts. True insight into the meaning of the industry can only come through years of experience. No matter how admirably equipped the members of the Commission may be, they assuredly are not capable of sitting in judgment upon matters pertaining to technical mining education.

We believe that it is the duty of all Canadian mining men to protest against the manner in which the Royal Commission on Technical Education has been appointed. We believe also that the powers that be will hardly care to ignore such a protest.

### THE TRANSVAAL STOPE DRILL CONTEST.

The stope drill contest, conducted under the joint auspices of the Transvaal Chamber of Mines and the Transvaal Government, has resulted in victory for two machines—the Holman and the Siskol. The first prize of £4000, was divided between the manufacturers of these two machines. The Chersen came second, winning a prize of £1000. Including these and other prizes the total cost of the contest was £17,500.

Of the nineteen original entries, only four survived the lengthy trial. The conditions were particularly severe. No changes were permitted to be made during the progress of the competition. The machines were tested

exhaustively over a period of eleven months. Whilst undoubtedly the failure of some of the drills must have been fortuitous, the success of the winners is altogether creditable.

The history of the contest we shall not touch upon. It is appropriate, however, to mention one or two of the lessons that are to be adduced. The first and most important conclusion is that the hammer drill cannot replace the reciprocating drill on the Rand. This conclusion must not be misunderstood. The Rand stopes are distinctive. They are characteristically regular. Usually they are wide. It pays, therefore, to employ a drill that has the advantage of strength and weight. Moreover, labour conditions on the Rand may have much to do with the conclusions reached. Coloured miners, supervised by Englishmen, do all the work. Thus it is probably the case that hammer drills, the efficient use of which demands more than ordinary intelligence, do not win proper recognition. All over Canada and the United States the hammer drill is proving its usefulness. It will be wise, therefore, to take South African experience with a grain of salt.

Another point particularly emphasized by the experience gained in the drill contest is that each drill works most efficiently at a certain definite air pressure. Some of the competing machines did their best work at a pressure of about sixty pounds. Others did not perform economically until higher pressure had been supplied.

The results of the contest may be summed up as indicating in general that the machine drills at present in use are susceptible of improvement only in incidentals.

#### A WISE APPOINTMENT.

It is a matter of much satisfaction to the mining fraternity that the Ontario Government has selected Mr. R. W. Leonard to succeed the late Dr. Goldwin Smith as one of the governors of the University of Toronto. The dignified participation by mining men in public affairs was never more necessary than at present. Mr. Leonard will prove a distinctly strong and capable member of the Board of Governors. As the only mining man on the Board, his position will be unique.

We have time and again adverted to the fact that the mining industry needs more representation on all our governing bodies. Whilst this is eminently true of our universities, it is even more true of our legislatures. Mining communities cannot hope to receive adequate assistance from governments, from railways, or from other public corporations, until such time as the mining industry has been recognized as an integral and vital part of our industrial life.

First and foremost the industry requires parliamentary representation. This is so obvious a fact that it is hardly necessary to dwell long upon it. Only thus can unwise legislation be choked, just tariffs be arranged, and numerous petty grievances be adjusted.

In the second place the profession of mining engineering and the industry of mining must be paid more attention by our educational authorities. Not one of our primary schoolbooks touches upon any phase of the industry. Our children grow up in ignorance of this supremely-important branch of professional and industrial activity.

In the third place our railways habitually ignore the claims of mining districts. Only through constant fighting can fair freight rates be secured. As a rule freight schedules, as applied to products of the mine, are arbitrarily fixed at the highest possible point. No rational basis has been developed. This is a vitally urgent problem. Upon its proper solution rests the whole future of mining in Canada.

In another editorial we have expressed our regret that mining received no consideration in the organization of the Royal Commission on Technical Education. The Dominion Government should lead in this respect. It has remained for the Ontario Government to set an example. We feel confident that the University will have every reason to congratulate itself upon the addition of a representative mining man to its Board of Governors.

#### CONCERNING OURSELVES.

Possibly because we are constitutionally modest we have been accused of erring in the direction of reticence concerning ourselves. Thus we hope that our readers will forgive one short excursion into the realm of self-congratulation.

Not very long ago the travelling representatives of a large Canadian manufacturing concern foregathered at their annual love feast. In comparing notes as to the merits of various media, there was found to be a singular unanimity of opinion regarding the CANADIAN MINING JOURNAL. One traveller went so far as to assert that the company's sales of mining machinery were in large part directly traceable to its advertisement in our pages. This sounds too pleasant to be true. Yet we accept it with surprisingly few qualms. In any case, it is delightful to meet this particular brand of candour. Too often the manufacturer and the sales agent prefer death to any admission of this kind.

Let us conclude this brief confession of faith with an invitation to all our advertisers to give us all the encouragement that they feel we deserve.

#### EDITORIAL NOTES.

Twenty-six tons of ore, sixteen tons of which was high grade, was shipped from the Wyandoh mine, on the Gillies Limit, near Cobalt. The ore was sent to the Coniagas smelter at Thorold.

Gold ore assaying \$2.46 per ton is being milled at Cripple Creek at a profit of \$1 per ton.

The market outlook for zinc is distinctly favourable. Supplies on hand have diminished until there is now not more than enough for forty days' consumption.

The Nevada Consolidated Copper Company, during the month of May, produced copper at a net cost of 5.91 cents per pound. This is probably the lowest figure being attained anywhere.

The purchase of a large coal mine in West Virginia by the Lake Superior Corporation is a piece of excellent commercial strategy. Coal of first quality can be landed at the Soo at a price substantially lower than was heretofore possible.

During the year ending March 31st, 1910, the Dominion Government paid \$340,542 in bounties upon lead ore. The quantity of ore upon which this amount was 45,467,545 pounds. The corresponding figures for the previous year were respectively \$307,432 and 42,533,287 pounds.

The Los Angeles Stock Exchange has adopted unusually stringent listing requirements. Henceforward no mining shares will be quoted upon its floors until the new regulations are complied with. In addition to a sworn statement of assets and liabilities, an engineer's report, certified and sworn to, is demanded.

The fire loss throughout Canada during the month of June is estimated at nearly seven million dollars. The use of mineral products instead of wood could easily have prevented this loss entirely. Canada loses at least thirty millions every year through fires in towns and cities. Surely it is time to prevent this calamitous waste.

Our leading editorial refers to the lack of mining representation of the recently-appointed Commission on Technical Education. A number of our readers have urged us to suggest the name of Mr. F. H. Sexton, Director of Technical Education for Nova Scotia. No name could be more suitable. Not only is Mr. Sexton admirably qualified to advise on the subject generally, but he also possesses special knowledge of mining. We doubt, however, if Nova Scotia can be persuaded to spare him.

Reports from London, England, indicate that passenger agents are attempting to profit by circulating exaggerated stories concerning gold finds in British Columbia. The tale of gold "reef," 25 miles long, near Stewart, is a fabrication. The region about Stewart is promising enough; but no good can come of such fairy tales. Incidentally, in the Portland Canal country the green prospector can not thrive. Only those who know something of hardship and of travelling over broken country can expect to "sit in."

A timely letter from Mr. F. C. Loring appears on another page. Mr. Loring touches upon the loss of time experienced in the mines of Cobalt because of insufficient ventilation. This is a subject that is too frequently overlooked by managers of metalliferous mines. As Mr. Loring points out, this neglect is attributable to the fact that the losses in efficiency are not noted. Their effect upon the balance-sheet is beyond question.

### INDUSTRIAL SECTION.

While wire cloth has the advantage over perforated metal for sieving purposes, in many cases the rough or uneven surface of the former has been a great disadvantage. This has been overcome by passing the cloth between heavy rolls to flatten the crowns of the wire. The B. Greening Wire Company, Limited, has always done more or less of this work, and lately, finding the demand for same very largely increased, installed rolls to take care of the demand for medium weight screens. This proved such a success that the firm was encouraged to put in heavier rolls. These rolls are now installed, and are without doubt the heaviest rolls to be found in any wire cloth plant on the continent.

The installation of these rolls marks the completion of a wire-weaving plant that is equal to that of any concern in the world making the same class of work.

The main shaft of the Temiskaming Mine, Cobalt, will soon be the deepest in the district. It is now down more than 460 feet, and is being rapidly sunk to the 500-foot level. At this level the sixth station will be cut. At each hundred feet there is a level. There is also one at 350 feet. Below 425 feet there is no ore in the shaft itself. From the 500-foot station cross-cuts will be driven to explore for all the main veins.

Flourspar, as mined near Jamestown, Colorado, contains 70 to 85 per cent. calcium fluoride. Veins less than 1 foot thick can hardly be worked profitably. Few veins exceed 6 feet in thickness. The principal handicap to the industry is the absence of railways. Wagon hauls of 13 miles are not uncommon.

At the Ragged Chutes plant of the Cobalt Hydraulic Company, the "blow-off" rises to an enormous height when power is shut off from the mines. It is estimated that the fountain is fully 350 feet in height. It attains its maximum on Sundays when all the mines are idle.

Rumours of the discovery of large bodies of zinc-blende in the Thunder Bay district, Ontario, are current.

In Stewart, B.C., lumber costs \$33 per thousand. Carpenters are paid as high as \$6.50 to \$7.00 per day. There is an enormous amount of building going on.

New Zealand intends to restrict the influence of the Standard Oil Company. Anti-trust legislation is being framed with this object in view.

# THE MECHANICAL CHARGING OF BLAST FURNACES.

BY EDGAR J. W. RICHARDS AND THOMAS LEWIS, GLENGARNOCK.

(Abstract of paper read before the Cleveland Institution of Engineers, Middlesbrough, England.)

In our manufactures we have always been a conservative nation, and there has been a tendency to let other countries try experiments and develop new ideas, although there never has been a lack of inventive genius in this country. As in other things, so it has been in the matter of the mechanical filling of our blast furnaces, for although various classes of machines have been introduced, and their benefits proved almost in every other industry, yet at the blast furnace, which is in reality the prime factor in all our manufactures, we for the most part adhere to our old-fashioned methods.

We will show you later a photograph of a mechanically-filled furnace in operation at Lowmoor Iron Works, as far back as 1800, and we understand many years ago, the late Mr. Snelus had a mechanically-charged furnace at the West Cumberland works. It

casts were irregular in quality, slips occurred more frequently, and the furnace manager had a worrying time generally.

With such defects recognized, steps were taken to overcome them, the result being that we have now diverse methods to give a better distribution, such as deflecting plates, double bells, revolving hoppers, etc., but in spite of all this, many furnace managers still look askance at mechanical chargers, and consider that in the majority of cases, the benefits to be derived are more than counterbalanced by objections peculiar to mechanical charging, which are not found where hand filling is in vogue.

The last sentence seems to throw some light on the road to be followed if mechanical charging is to be a success. It is believed that almost no one will question the assertion that careful filling with barrows, conscientiously carried out by experienced labourers, is the most successful way to charge, and if such a

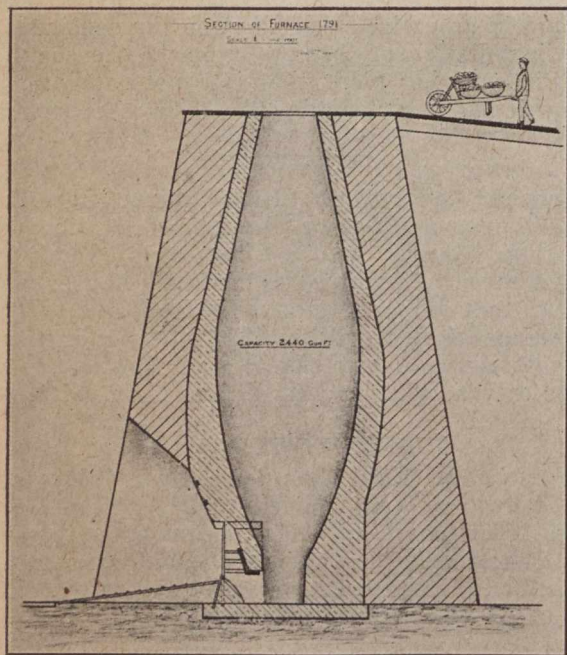


Fig. 1

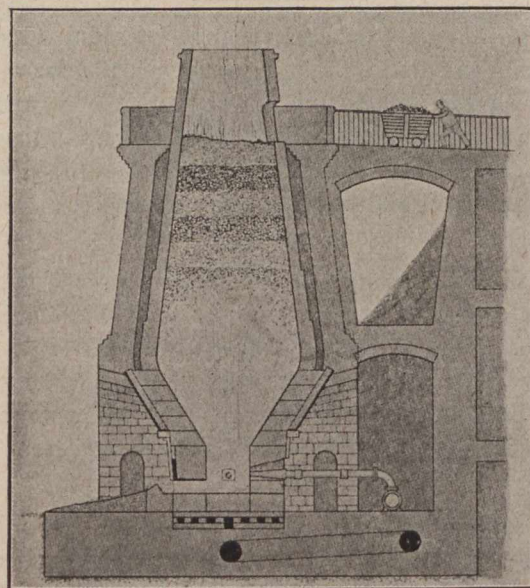


Fig. 2

is, however, in America and Germany that most attention has been devoted to the subject.

In America, mechanical methods were forced upon them, owing to the opening out of the famous Mesabi ore fields, the ore from which, being easily reduced, necessitated the charging to be conducted at such a high rate of speed as to be beyond the power of physical endurance. The engineer was called to the assistance of the furnace manager to supply a means of keeping the furnace full.

The full extent of the besetting difficulties of the subject were not at first realized, and it was thought to be merely a question of elevating and emptying on to the bell the required charge at the proper rate. They soon found they were labouring under a delusion; furnaces burnt down at one side owing to irregular distribution (the tipping of the skip shooting out the lumps across the hopper and dropping the fine on the near side), hot spots developed, linings were burnt out,

charger, having the latter functions, could be got to work mechanically in an efficient manner, the initial objection would be removed.

Others contend that for large outputs exceeding say 1400 to 1500 tons per week from one furnace, mechanical methods may pay, if they are not indeed absolutely essential, but for makes up to this tonnage, there is no necessity for any other means than manual labour. We do not agree with such a contention.

Wherever there is the human element, there is the liability to err, and therefore, there is no assurance that the distribution is going to be perfect, however carefully the fillers are instructed.

Even for comparatively small makes, we are convinced that a machine can be found that will answer all requirements, work with precision and exactitude, handle the materials carefully, be under perfect control, be of course untiring, work with a steady regularity unattainable by manual labour, and generally be as

indispensable to the economical and regular working of the blast furnace as is the hot blast stove.

There is another point worth consideration. Any furnace is liable to work down quicker one day than another, and there is a difficulty in getting the fillers to keep the stock line up to the level, whereas, with me-

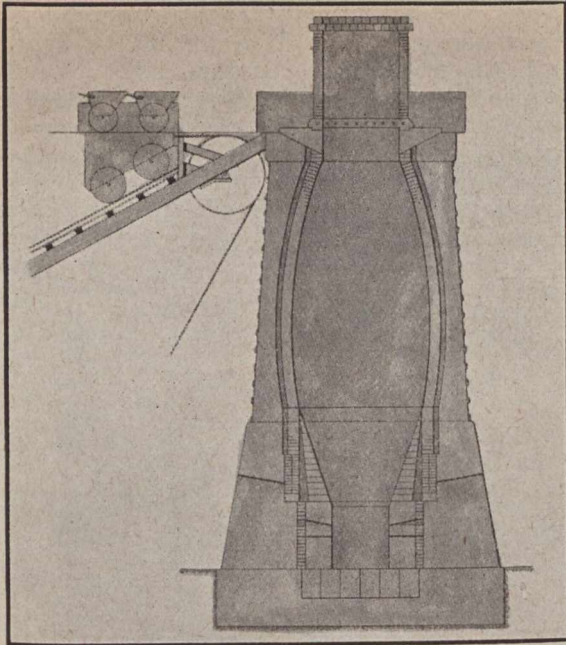


Fig. 3

chanical filling, the rate of charging can always be regulated to suit the requirements. Moreover, a much greater regularity of working of the furnace can be obtained when the furnace is kept at one constant level; a difficult condition to fulfil with hand labour, but one which should always be possible with mechanical charging.

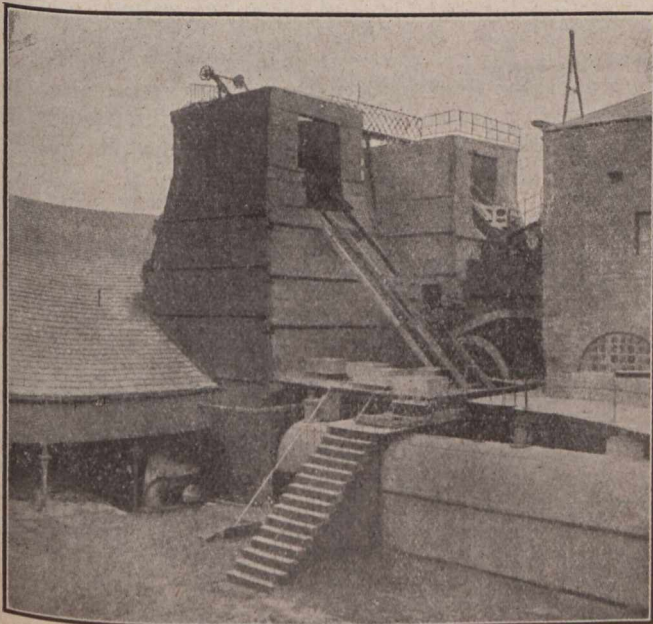


Fig. 4

It must also be remembered that everything that conduces to regularity of working of the furnace brings us nearer to that ideal state of perfection, which is the aim of every metallurgist, viz:—that, given the composition of the charge, the results of the cast can

be foretold with as much exactitude as can be obtained in an experiment by the chemist in the laboratory.

Mr. Uehling has stated that in his opinion 90 per cent. of all blast furnace troubles are due to faulty charging apparatus, and he has been supported in this statement by many other authorities. The object of this paper is therefore to examine and discuss the points to be studied in the design of a suitable mechanical charger, and the faults which experience has shewn are to be avoided.



Fig. 5

We propose to summarize the chief points to be considered, to examine some of these points in detail, and then to show by diagrams typical of different designs, what has been done, and is being done, with regard to the question of mechanical charging.

The points of supreme importance which occur to us are:—

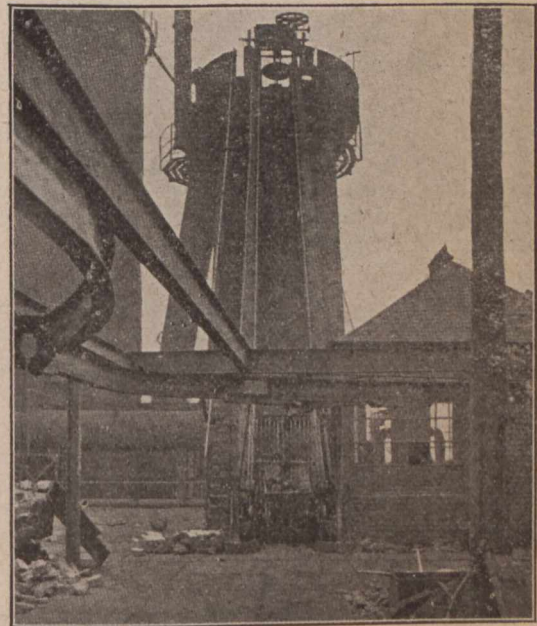


Fig. 6

1. That the material should be put into the furnace with as little breakage as possible.
2. That the material should be distributed evenly all over the surface of the stock.
3. That there should be as little machinery as possible on the furnace top.

4. That there should be no escape of gas during charging.

5. That all the movements of raising and discharging the material, the lowering of the bell, and the means of distributing the charge should be capable of being controlled from one point.

6. That the first cost and upkeep charges should be as low as possible.

7. That the design should admit of some flexibility in details to suit local conditions, and the different methods of charging.

Having summarized these points, let us refer for a little time to what is involved in the statements, and why we should consider them as essential.

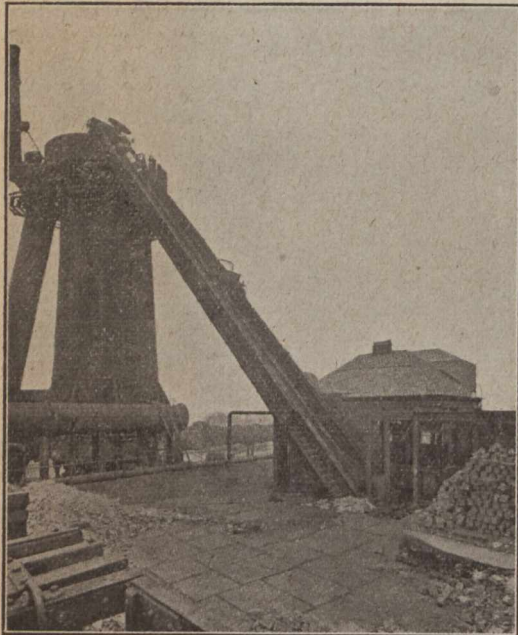


Fig. 7

#### Breakage of Materials.

One of the strongest objections to many of the systems of mechanical charging is the dumping and consequent breakage of the materials, particularly of the coke, and undoubtedly this is a very serious consideration, and one which has hitherto prevented many furnace managers from adopting mechanical means.

Some of the arguments in this respect appear, however, to be based on fallacious premises, and might equally well be applied to hand as to machine filling. Certainly there are chargers that do knock about the materials much more than is necessary, and we will again refer to this point when some typical designs have been illustrated, but in many cases this argument does not apply.

It is a common thing to find a furnace manager object to a charger because of the drop of from 5 feet to 10 feet on to the bell, but does it never occur to him that if the stock line were visible to his sight, the drop on to the bell would appear insignificant compared with the drop from the bell into the furnace?

On the other hand many mechanical devices err, not so much in the height of any one drop, but in the number of such drops, the material being thrown this way and that way several times in its passage from the stock ground to the furnace, with the idea of getting the materials well mixed, but greatly to the detriment of the more friable portions of the charge, and for this

reason the double bell types with connecting sleeve have fallen under a great deal of condemnation.

The ideal charger, then, must be one that eliminates as far as possible the breakage of materials by reducing the drop to a minimum, and especially by avoiding the multiplication of the number of such drops.

#### Distribution.

Furnace managers may have various opinions with regard to the method of charging, and as to whether the materials should be mixed or charged in layers—local conditions may require special consideration on these points—but on one point all are agreed, that the materials must be evenly distributed over the furnace.

This principle is recognized in charging with barrows into the ordinary cup and bell, where the charge is dis-

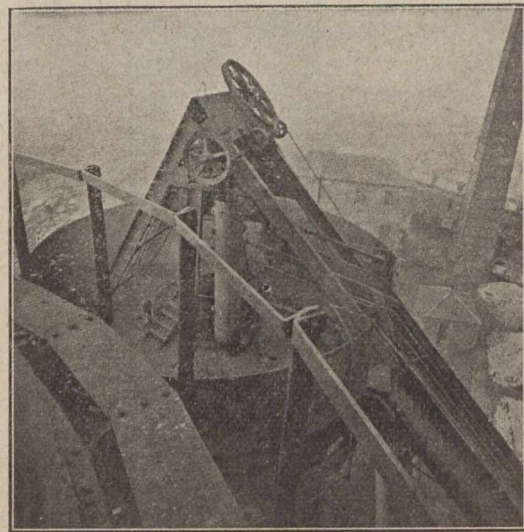


Fig. 8

tributed evenly all round the hopper, so as to give an even distribution of fine and lump, and a good mixture of the materials of the charge.

Several attempts have been made to get a better arrangement for distributing than Parry's cup and bell, but hitherto none has been very successful, and they require too much attention to be of much service in mechanical charging.

Although several of these devices are very ingenious, yet by studying the conditions in each individual case, the class of material, and the diameter of the furnace at the stock line, the authors are convinced that a size of bell can be got for any furnace, which can give quite satisfactory results so far as radial distribution is concerned, provided that other parts of the furnace are proportionate, and certainly nothing simpler than the cup and cone can be devised.

It is when we come to the circumferential distribution around the furnace that we have to give the matter more careful consideration, for with the high pressure and speed of working of the modern furnace, a very slight difference in the density of the materials at one point may cause an infinite amount of trouble. For example, a bell that swings slightly off the centre for a short period has been found to be sufficient to destroy the lining at one side, by leaving a freer passage one way than another. Might not this be taken as an argument for balancing a bell as carefully as one would balance a flywheel? Another case is on record of a furnace where the charge was deposited on four points of the bell continuously, and it was found that the

furnace lining burnt out to a rectangular shape, the four angles of the rectangle corresponding with the points midway between the points of dumping, where the percentage of lump was highest. Instances might be multiplied but the examples given above are sufficient to indicate the importance of the question of cor-

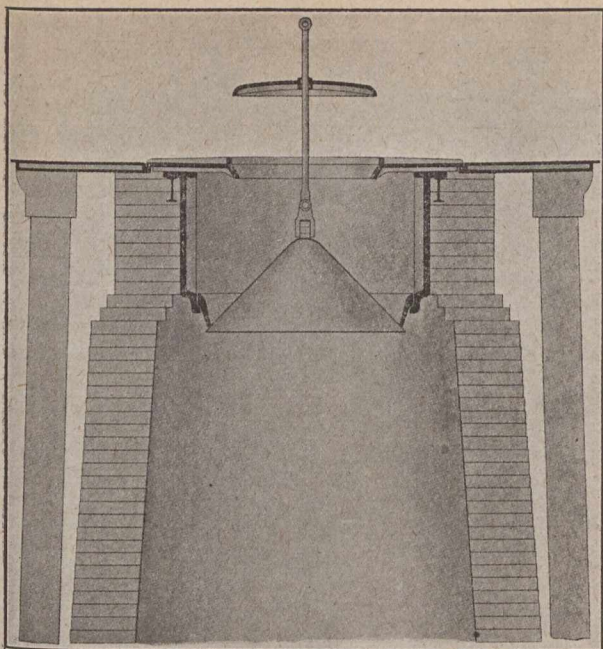


Fig. 9

rect distribution. However carefully the charge is deposited, it may yet happen that the stock line becomes uneven, and it may be found necessary to fill up one part of the furnace, or, to use the furnaceman's phrase to "put in blanks." We must, then, in designing a charger, have such a method of control that we can

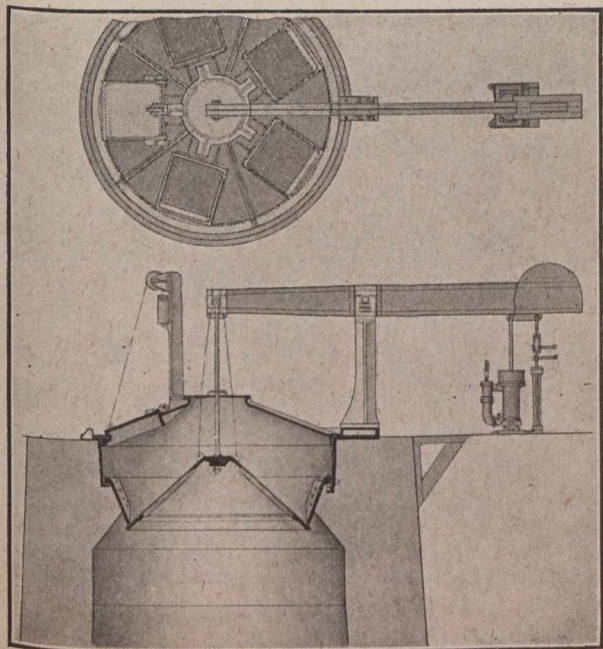


Fig. 10

do this, otherwise we are going to discount the advantage gained at the furnace top by introducing trouble in the furnace itself.

As before mentioned, it is almost universally admitted that no better distribution can be got than by the

system of filling by hand barrows, if it is carefully and conscientiously carried out, and the aim in mechanical charging should be to adopt methods as nearly as possible approximating to the conditions of hand charging.

**Gearing on Furnace Top.**

Under conditions such as prevail on a furnace top, exposed to the inclemencies of the weather, and to heat, dust and gas, the upkeep of elaborate gearing is a costly item of expenditure. To make a serviceable charger, some gearing is necessary in order to distribute the

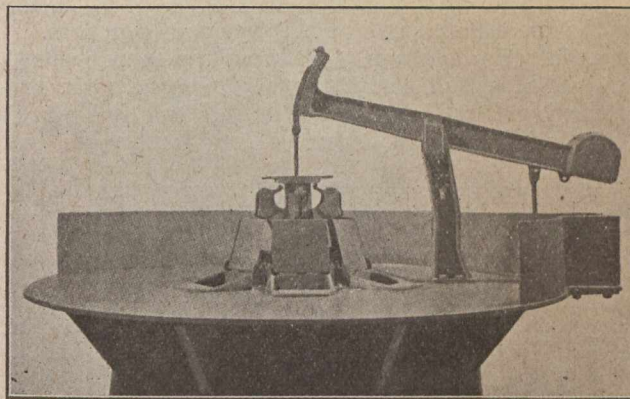


Fig. 11

charge, but this should be reduced to a minimum, and be as much as possible protected from the deteriorating influence mentioned above. In several designs there is a great complication of gear wheels and shafting carried right over the furnace in the most exposed position, and it is a matter of no surprise that furnace managers condemn them. Unfortunately the sins of a few are visited on others to whom these strictures do not apply.

**Escape of Gas.**

Now let us devote a little time to the question of the escape of gas from the furnace top during the lowering of the bell, if no means is used for preventing this.

Putting aside other considerations for a minute, look

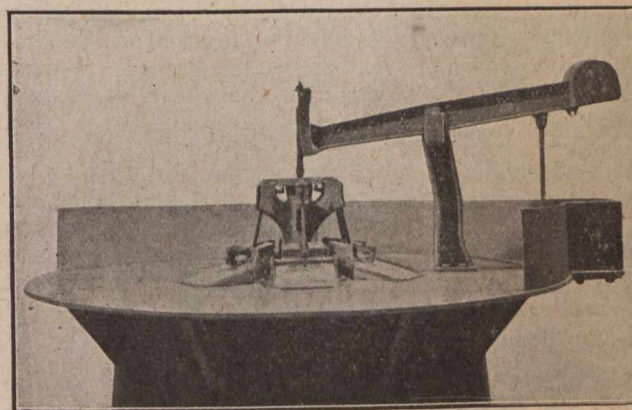


Fig. 12

at what the loss of gas alone means in times when every cubic foot is either a valuable asset, or of considerable value in the works, whether for heating stoves, firing boilers, or driving gas engines.

Take the case of a furnace with an output of say 200 tons per day, or say with a burden of mine and fuel with fluxes of 800 tons per day, and let it be assumed that each hopper-full lowered into the furnace represents 15 tons, then in the course of a day the bell is

lowered 53 times, and gas is lost on each day's work to the amount of about 20 to 25 minutes' production. For larger outputs the loss would, of course, be proportionately greater. Besides the actual loss, we have to consider the effect on the works plant. This is so well known to you as to need no description.

It may be said that mechanical charging is not the only way to eliminate this evil, and the authors readily admit it. Several devices have been used to prevent the escape of gas, even with barrow charging; one of the authors of this paper patented such an arrangement some years ago, and a similar arrangement is in use on all the furnaces at one of the works of our firm.

One point of advantage in a closed top soon becomes evident when a bell sticks for any reason, as it prevents the far from beautiful pillar of fire and smoke which is too frequent a feature of our landscape.

how the materials should be put into the furnace, it is advisable that a charger should be capable of being modified in details to suit local conditions. Thus, at one place it may be required to take a skip with about say a 6-ton burden, and at another place a smaller skip may meet the requirements, or it may be preferred to send up the ordinary barrow to be automatically

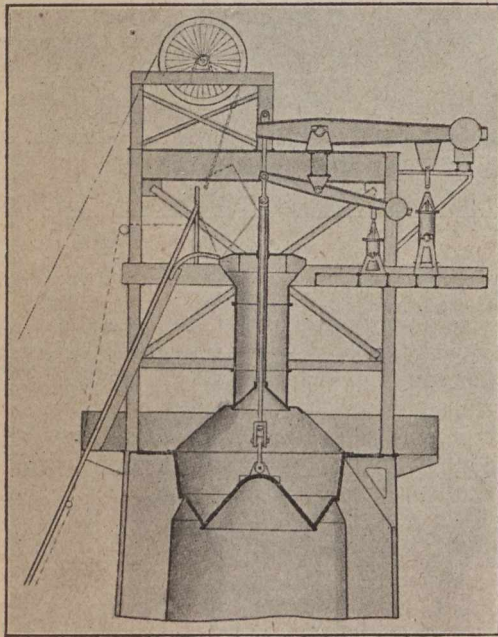


Fig. 13

The prevention of gas escape, which, even in barrow charging is advisable, to say the least of it, becomes absolutely imperative in many mechanical chargers where there is a head gear over the top of the hopper.

**Control from One Point.**

That the control of all the mechanism, raising and lowering of the bell, distribution, etc., should be concentrated at one point is so apparent as to need no arguments to support the statement, and the perfection attained by instrument makers in the manufacture of recorders and indicators, makes it a simple matter to arrange for a central control.

**Capital and Upkeep Cost.**

That the first outlay, and the cost of upkeep should be a minimum is also self-evident, and the charger which can combine efficiency with low cost is the one of the most commercial benefit. With the complicated gearing in use on some chargers, the gain effected to the manufacturing department is outbalanced by the extra labour devolving upon the engineering staff to keep the plant running.

**Flexibility of Design.**

As different ores may require different methods of charging, or managers may have their own ideas as to

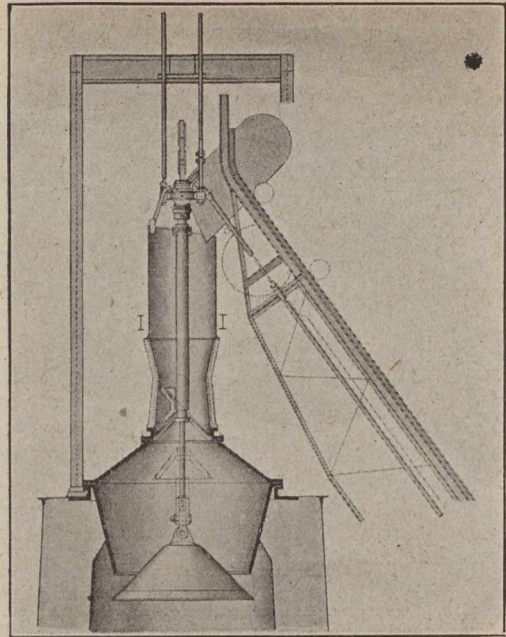


Fig. 14

discharged. Where so many works have their own coke ovens, it would also be an advantage to send the coke oven skip to the top without further handling.

It is preferable, therefore, that a charger should be capable of embracing these several requirements, and

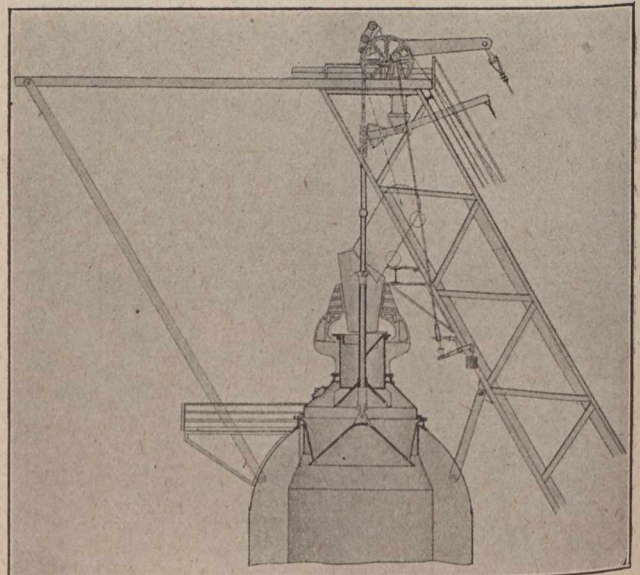


Fig. 15

not be designed to suit one particular form of charging only.

Having discussed the chief points of interest and importance in mechanical charging, we will now look at some illustrations of different methods of filling furnaces, mechanical and otherwise, which will show the progress that has been made in this direction.



By the kindness and courtesy of Mr. Woodcock, we are enabled to show (Fig. 1) a copy of an old drawing of one of the original Lowmoor furnaces, built in 1791, and the method of charging by baskets, in a manner similar to that in use at many cupolas at the present day.

We see here an old type of furnace filled by a four-wheeled bogie (Fig. 2). It will be noticed that the filling is effected from one side, a method in vogue in Staffordshire in the early seventies.

This system was altered by the late Sir Lowthian Bell to charging from four points, which effected a radical improvement both in economy and output, and is referred to by him in his papers on blast furnaces, published in the "Iron and Steel Institute Journal" of 1872.

Note also the bank behind the furnace, which was an essential feature of all blast furnaces at one time. As furnaces were raised in height, or built in localities where there was not a convenient hill, it became neces-

thus tipping the contents of the truck into the furnace.

Although not in chronological order, it is interesting for the purpose of comparison to see the next four views, (Figs. 5-8) which show a charger at present in use at the blast furnaces of the Langloan Iron & Chemi-

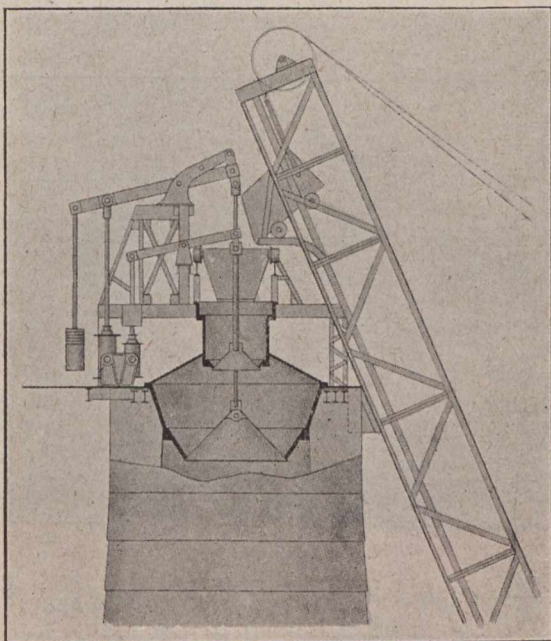


Fig. 16

sary to use some description of hoist, and here (Fig. 3) we see one type of hoist, viz.:—an inclined plane with a level staging on which the barrows were placed.

We show this type in place of the usual vertical hoist because in mechanical charging an incline is always used, and it is interesting to note the points of resemblance between this and the next view, (Fig. 4), viz.: the mechanically charged furnace at Lowmoor already referred to, and for the reproduction of which here we are also indebted to Mr. Woodcock.

This arrangement was adopted in 1800 in place of the basket filling, already described, and the method of working was as follows: The four-wheeled trucks seen in the photograph were filled with the charge and brought on to the lower staging, from which they were run on to the travelling carriage on the incline. This carriage has a frame running on four wheels on the track, and an inner swinging frame pivoted on the sides of the carriage, this inner frame receiving the truck which was secured in position. On running the carriage up the incline, two pulleys on the front of the swinging frame engaged with two projections on the rail,

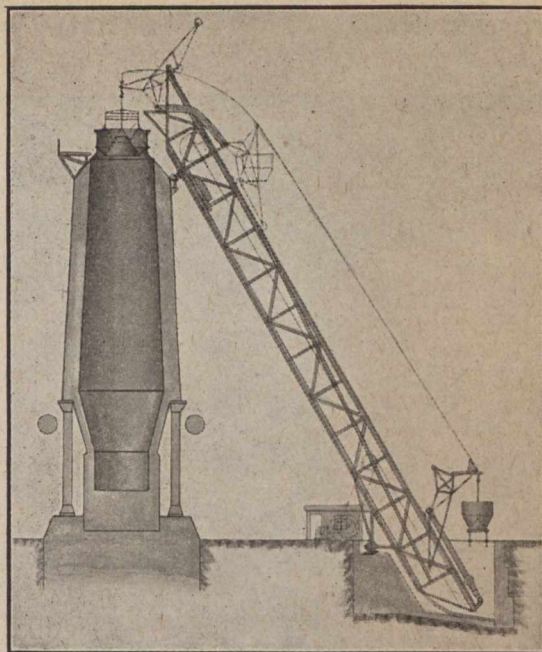


Fig. 17

cal Company, Limited, Coatbridge, this being the only mechanical charger in use in Scotland. The authors have to express their appreciation of the kindness of Mr. A. Moore, manager of Langloan, in permitting them to show you these slides.

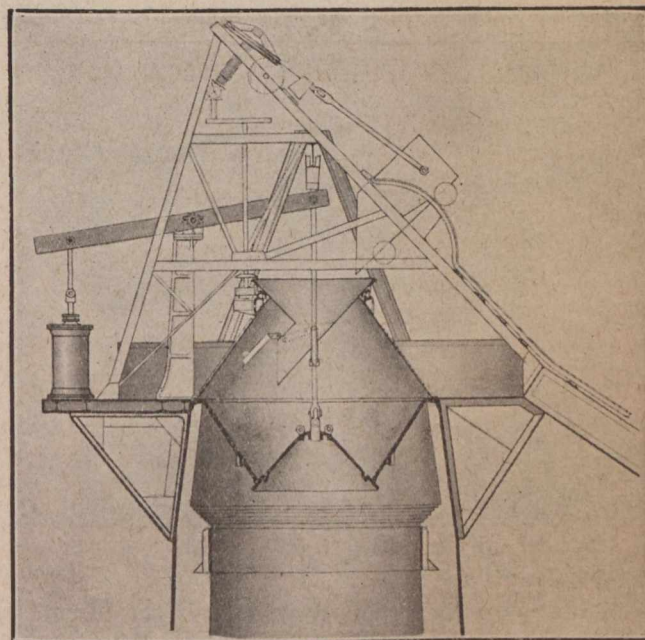


Fig. 18

The next two views show different methods of preventing the escape of gas in hand-filled furnaces at the Clyde Iron Works of Messrs. James Dunlop & Company, Limited (Fig. 9), and at the Ardeer Iron Works of the Glengarnock Iron & Steel Company, Limited, Ayrshire (Fig. 10). We have to acknowledge the kind-

ness of Mr. Rogerson and Mr. Main respectively in supplying us with the drawings.

The top shown in the next two, is one patented by the reader, and already referred to. (Figs. 11 and 12.)

To come now to what we might call the present era of mechanical charging, let us examine a few types, and try to find out the object in view in their design, and whether they fulfil the conditions we have formulated.

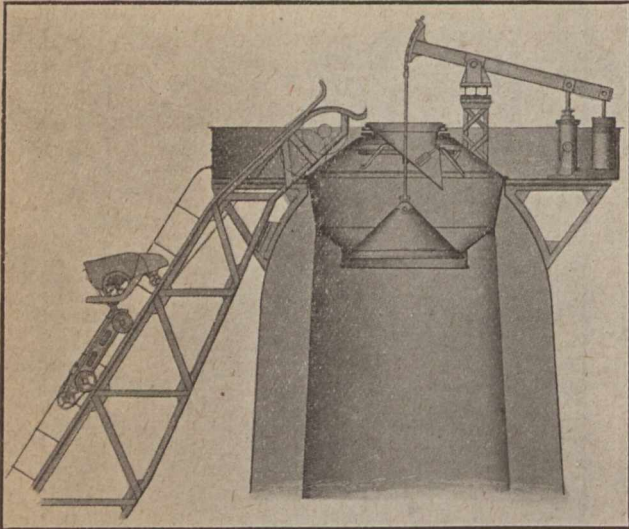


Fig. 19

The next illustration (Fig. 13), shows an early type as made in America, before the difficulties of the subject were realized.

It will be noticed there is no revolving mechanism—the charge is dumped into the long sleeve-like top hopper, discharged from that into the main bell, and thence into the furnace.

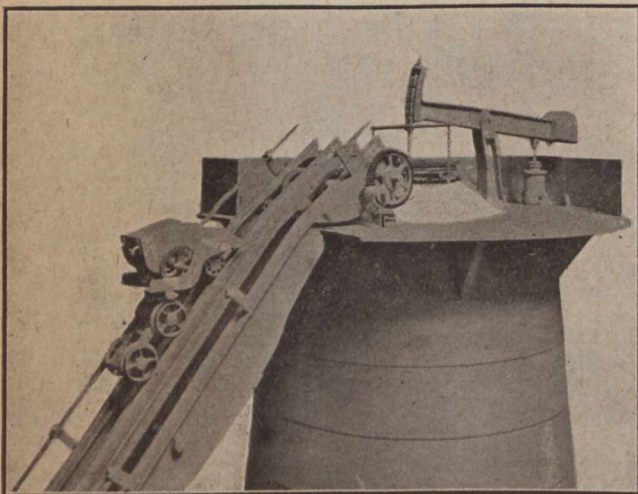


Fig. 20

The long sleeve was adopted in this type to concentrate the charge as much as possible on the centre of the main bell, with the idea of giving each part of the hopper its correct share of the charge. It was found, however, that this was not sufficient to mix the material, and it also caused considerable breakage of the coke. The fine and lump, separated owing to the action of the skip in discharging, kept their relative positions, more or less, in moving down the sleeve, and were discharged on to the main bell with the finer material

collected, for the greater part, on the side next to the skip, and the coarser on the opposite side.

The natural result was that the furnace lining burnt out on the side where the coarser material was thrown, and as the blast was concentrated chiefly at that side, the life of the furnace was very much shorter than if there had been an even distribution, not to speak of the increased liability of slips and scaffolds.

It was after this was noticed that deflecting plates were introduced, and here is seen (Fig. 14) a typical charger with deflector and revolving hopper. This certainly is an improvement, so far as distribution goes, but in the majority of this type the long sleeve is retained, and the drop of the material before reaching the furnace is excessive. The top gear, too, is cumbersome, and makes the bell difficult of access for repairs, and also the mechanism for revolving the top, is, in most cases, too delicate for a blast furnace, and causes a great deal of worry and loss of time in upkeep.

That this type of charger still has its advocates is indicated by the adoption of it on the new plant of the United States Steel Corporation at Gary, though from the illustration here shown of it (Fig. 15) it seems to

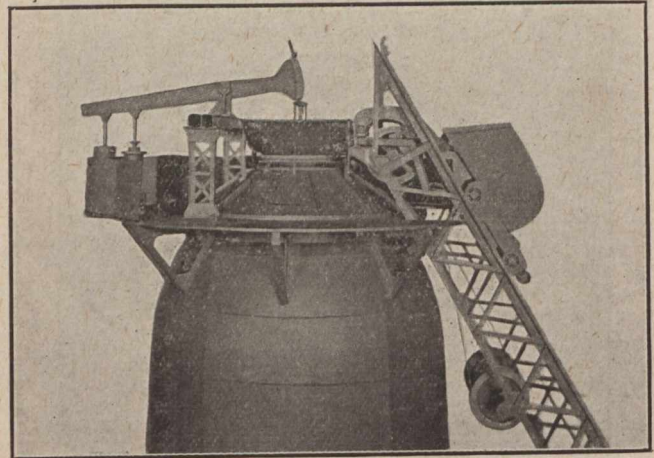


Fig. 21

us it would hardly recommend itself to managers in the Middlesbrough district, owing to the heavy top gear, and the levers and mechanism on the furnace top.

Another type of distributor for use with a double bell, and one which is known to the Middlesbrough district is here shown (Fig. 16). In place of revolving the top hopper, this is made in two pieces which can be drawn back, or inclined at various angles to effect a distribution according to the class of materials used. The idea is well worked out, but the objection seems to be that the material gets too much knocked about, and the distribution is not sufficiently positive.

This illustration (Fig. 17) may be taken as a type of charger greatly favoured in Germany, the method of raising and depositing the hopper varying somewhat in different designs, but it is typical of the general method employed. Here a hopper fitted with a bell on the under side is conveyed from the stock ground to the furnace top, and placed on a casing over the main bell and hopper, the material being thence transferred to the main bell by lowering the conical bottom.

This removes the distribution trouble from the furnace top to the ground, and does away with the necessity of gearing at the top of the furnace to revolve the hopper. There is still the difficulty of how to fill the hopper on the ground level. At some places the hopper is filled from bins placed on opposite sides of a

central railway along which the hopper travels, but we have already pointed out the effect of dumping at four points of the bell, and its bad effect on the furnace, and this would be aggravated in the case of filling from two points. Of course the hopper may be revolved during filling, but the arrangement is apt to be cumbersome, and in very few cases could it be applied to an existing plant.

The next type which you see reproduced here (Fig. 18) will be recognized by many of you as that made by The Brown Hoisting Company, and shows a distinct improvement on those preceding it. This is almost universally acknowledged to be the best system of charging hitherto in vogue, and the reason of it seems to be, that it is the nearest approach to barrow charging that is in use at the present time. There are still, however, in our opinion, one or two defects, such as the high top gear, and the mechanism above the hopper (though these details have been modified somewhat in later designs by this firm), we should also think that difficulty

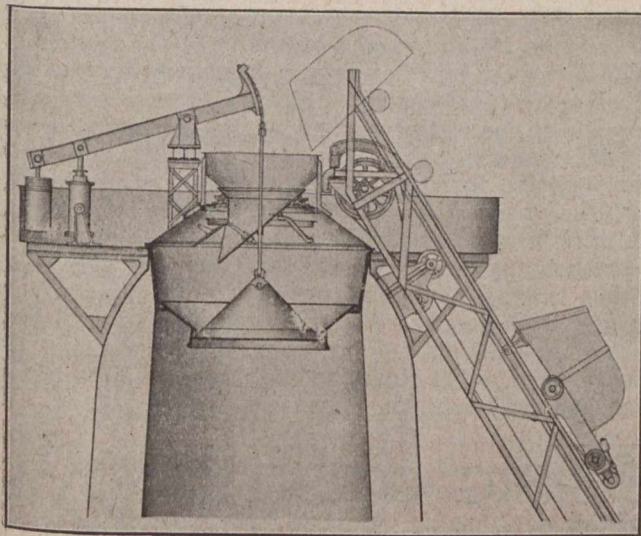


Fig. 22

might be experienced with the levers inside the furnace top for closing the door, and while it approaches very nearly to the method of barrow charging, it does not quite get there.

The next illustration (Fig. 19) is the charger which the authors have been experimenting with, and in the design of which are embodied all the points which we have enumerated as being essential to a satisfactory charging machine.

On first sight the charger seems to bear a certain facial resemblance to that last shown, but on closer examination it will be seen that certain improvements have been introduced, which have effected a radical change in its efficiency. Let us study the charger more closely to see what these improvements are.

The revolving of the chute is actuated by an intermittent motion, the chute moving forward after every second skip is discharged, and the mode of operation is as follows:

There is provided a double track, so that one skip may take up ore and limestone, and the other one the fuel. The ore skip first ascends and deposits its charge on a point of the bell in accordance with the position of the revolving chute at that moment. The skip of coke is then discharged at the same point and over the ore, precisely as is done in hand filling. Before the next charge reaches the top, the chute has revolved

through part of a revolution, so that the ore is placed slightly round the bell, and its lot of fuel placed on the top of it, and so on, until the round is completed, but notice that the gearing is so arranged that on the completion of the round the chute has travelled slightly more than a full revolution, and that therefore the dumping points are continually moving on round the bell in a gradual precession.

This disposes satisfactorily of the question of circumferential distribution, and as already stated, the question of correct radial distribution is one merely of the correct proportion between the size of the bell and the throat of the furnace, modified by the class of material in most constant use. This proportion is one that cannot very well be fixed by any formula, but is best arrived at by experiments on a model, the sizes of materials being proportioned to the scale of the model.

Another important feature of this design is the facility which it affords for the placing of "blanks" at any circumferential point of discharge into the hopper. The

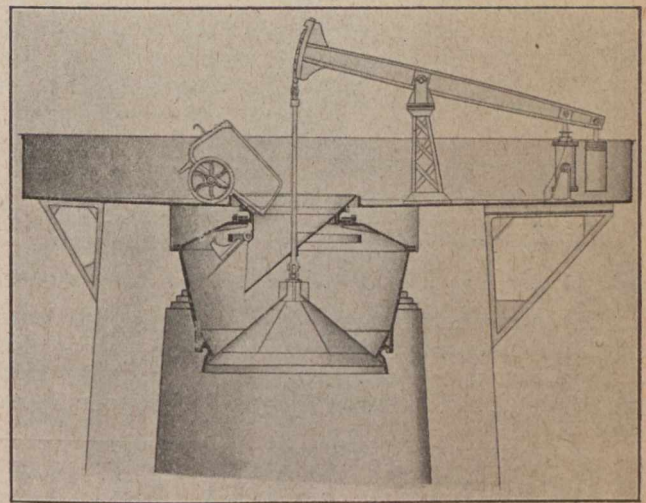


Fig. 23

intermittent motion of the chute already referred to is transmitted from the hoisting mechanism to the chute through a clutch (Fig. 20), therefore by throwing the clutch out of gear, as many skip loads as desired may be deposited at one point in the hopper.

To eliminate as far as possible the breakage of materials, the height of the charger is brought down to the minimum, and the changes of direction of the materials in passing from the skip to the bell are made as easy as possible. The charger can be used with an ordinary furnace barrow, avoiding the dumping into a skip, or the coke oven skip may be used, and thus one fruitful source of breakage in mechanical charging may be adopted as indicated in this slide (Fig. 21), where the movement of the chute is continuous instead of intermittent.

Let us now consider the question of gas escape. It has come to our notice that though means have been devised for this purpose, they have not always been successful, and we have therefore aimed at attaining a method at once simple and effective.

The means adopted by us consists of a ring encircling the chute, which, when lowered, engages with an arm on the door, and thereby closes it. The ring may be operated simultaneously with the lowering of the bell by attaching it to the bell lever as here shown (Fig. 22), or by means of a separate cylinder actuated by fluid pressure, an electric or otherwise driven winch,

or any other mechanical means. The use of the ring commends itself on account of its simplicity and positive action, irrespective of the position of the chute.

When the ring is worked by independent means the door may be closed before commencing to lower the

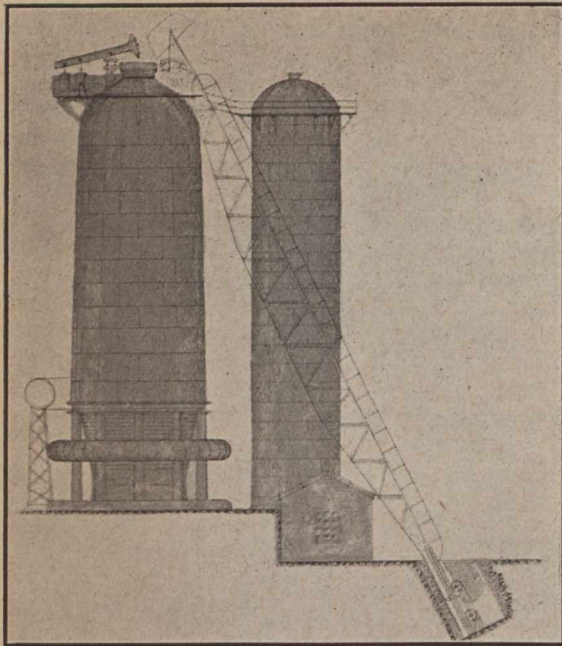


Fig. 24

bell. If, however, it is hung from the main bell lever, the bell travels a short distance before the door is closed. To minimize the escape of gas during this period, there is added to the lower edge of the hopper an ex-

tension or sleeve, which fits as closely as practicable to the bell. This retains the greater part of the charge on the bell till such time as the door of the chute is closed, and thus practically eliminates the escape of gas.

If it should happen that a firm cannot see its way to make the outlay for an individual hoist for each furnace, but still wish to prevent gas escapes from the top while lowering, then the same type of top may be used without the hoist and automatic tip. This involves, of course, the use of barrows, but it is only necessary to wheel the barrow to the point nearest to the hoist, and the distribution may be effected by a crank handle worked by hand, or by mechanical means, the arrangement of the top for this purpose being shown on the slide now before you. (Fig. 23.)

The simplicity of the whole design, the low height, the small amount of gearing, and this kept below the hopper lever, the consequently comparative low first cost and upkeep charges, do not require any words to commend them, as a look at the general view now shown, (Fig. 24), makes them apparent to the sight, and this can be confirmed by a study of the model.

We have now laid before you our views on the subject of mechanical charging, and we have endeavoured to make an impartial review of the chargers in use hitherto, none of which completely fulfils the conditions we have formulated, and we have placed before you a design of a charger, which, while we do not say it is the last word on the subject, appears to us to come closer than any other to that ideal charger which every furnace manager wants, that will keep his furnace working with steady regularity, cheaply and efficiently, and by putting a limit upon the vagaries of the blast furnace, will reduce the worries of that sometimes much harassed man, the furnace manager.

## SOUTHERN PART OF LUNENBURG COUNTY, NOVA SCOTIA.

By E. R. FARIBAULT.

(From Summary Report of the Geological Survey.)

### Introduction.

During the past season, the writer was occupied in completing the geological and topographical mapping of the southern part of Lunenburg County, along the Atlantic Coast southwesterly from Mahone Bay to Volger Cove, and extending inland to Bridgewater. This completes the surveys and other field work necessary to finish the Malone Bay sheet, No. 88, and the Lunenburg, No. 89.

The assistants in the field were Messrs. J. McG. Cruickshank and M. Y. Williams.

For the purpose, particularly, of indicating the lines which prospecting should follow in the district, as well as to facilitate the work of operating mines, attention was given, in an especial degree, to the structural geology; since it has been established that the gold-bearing veins occur, almost exclusively, along anticlinal folds. The development in the rocks of a strong, slaty cleavage, obscuring the bedding planes, and the widespread drift cover, concealing the surface, made the accurate location of the various anticlines and synclines both difficult and tedious.

### Character of District.

The district surveyed is for the most part covered by

low, undulating hills of glacial drift, seldom over 300 or 400 feet high, having a general north and south trend and forming prominent headlands along the sea coast. The intervals between the hills are generally occupied by swampy land and chains of small lakes; or by rocky barrens affording good rock exposures; or they are strewn with granite boulders and debris from the north.

Lahave River crosses the area in a southeasterly direction, and occupies a marked depression; which is continued as an inlet of the sea, less than a mile wide, for 12 miles to Bridgewater; affording good navigation for large and small vessels. Petite Rivière, a stream of less importance, runs into the sea six miles farther west, and has several waterfalls along its course that are partly utilized for small mills.

Lunenburg and Bridgewater, the two chief towns of Lunenburg County, are situated in the area examined. Lunenburg, the most important fishing station in the province, has an excellent harbour, and has a large trade with the West Indies. Bridgewater is a progressing railway and lumbering centre at the head of navigation on Lahave River. Settlements of fishermen are scattered along the sea-shore of the mainland and islands; especially on many small, rocky coves and inlets which afford good shelter for boats.

In the vicinity of the coast there is little land suitable for agriculture. Small farms and gardens are successfully cultivated by the use of an abundant supply of fish refuse and seaweeds as fertilizers. Inland, between Bridgewater and Mahone Bay, there are good farms and several fine orchards.

### Geology.

With the exception of a few small patches of lower carboniferous limestone and gypsum on Second Peninsula, and some of the adjoining islands, the whole area is occupied by the series. No rock exposure could be found on Second Peninsula, because of a heavy covering of glacial drift; but numerous angular blocks of shell limestone and grey compact limestone were observed at several places along the north shore, from the Government wharf to Bluff head, also on the north and south side of Mason Island lying between the two peninsulas. These deposits indicate the position of the outer edge of the lower carboniferous basin of Mahone Bay and St. Margaret Bay referred to in the Summary Report for 1907, page 79.

Several specimens of invertebrate fossils, obtained in 1907 and 1908 from various localities in the Mahone Bay basin, were examined by Mr. Lambe, who reports that they consist of one species of coral and two species of brachiopods; all characteristic of the lower carboniferous limestone. The respective species, together with the localities from which they were obtained, and Mr. Lawrence M. Lambe's descriptions, are as follows:

(1) *Lithostrotion Cœspitosum*, Martin.—Specimens from Sheep Island, Goat Island, and the south end of Stephen Island, in Mahone Bay. These specimens are of interest, as the species has not hitherto been recorded from this side of the Atlantic. *L. cœspitosum* was originally described from the carboniferous limestone of England.

(2) *Dielasma Sacculus*, Martin.—Half a dozen specimens, from Mahone Bay, belong to this species, which was primarily described under the name of *Terebratula sacculus*, also from the lower carboniferous of England, and was later recorded as occurring in rocks of the same general horizon by Sir J. William Dawson (see *Acadian Geology*) at a number of localities in Nova Scotia.

(3) *Productus Cora*, D'Orbigny.—Specimens of a large *Productus* from Goat Island, Sheep Island, south end of Stephen Island, Seaboyer's on the south side of Deep Cove, and north shore of Second Peninsula. The species represented appears to be an unusually large form of *P. Cora*, d'Orbigny, which is found abundantly, but of smaller size, in the carboniferous limestone of Nova Scotia, and is widely distributed in the carboniferous of Europe as well as America.

### GOLD-BEARING SERIES.

Practically the whole of the district examined, with the exception of the small areas of lower carboniferous limestone and gypsum on Second Peninsula, is underlain by the quartzites and slates of the gold-bearing series. In the absence of fossils or other conclusive evidence, this great series of rocks has been referred to the lower Cambrian, though, possibly, it may be Pre-Cambrian.

The whole series falls naturally into two distinct lithological divisions: a lower one, called the Goldenville quartzite; and an upper one, called the Halifax slate.

The Goldenville division is mostly composed of thick-bedded, bluish and greenish grey quartzite, locally called "whin," interstratified with numerous beds of slates

of different varieties and colours, and from a fraction of a foot to several feet in thickness. This division constitutes the productive gold-bearing rocks of the province.

The Halifax division is made up of argillaceous slates, generally of a dark grey colour, in many places graphitic and pyritous, and varying to greenish-grey or light grey in colour. Some beds are quite arenaceous with occasional thin layers of flinty, quartzose rock, generally heavily charged with iron pyrites.

The rocks of the Goldbearing series in the region examined have been forced into a succession of parallel folds, running northeasterly and southwesterly.

The greatest width of the area of the Goldbearing series in the district examined, measured at right angles to the folding, is 16 miles. A transverse section along a line from Bridgewater to West Ironbound Island gives eight major anticlines and seven synclines, with a few minor folds. The courses of the axes of folding were all located and traced across the area surveyed.

The following list of anticlines and synclines, gives the order in which they occur along Lahave River from West Ironbound Island to Bridgewater, together with the gold mines situated along the anticlines:

Moser Island anticline.

1. Spectacle Island syncline.

Dublin Shore anticline. The Ovens gold mines.

2. South Parks Cove syncline.

Park Creek anticline.

3. North Parks Cove syncline.

Pentz Section anticline. Indian Path mine and Somerset gold discovery.

4. Middle Lahave syncline.

Wentzel Lake anticline.

5. Pleasantville syncline.

Juniper Brook anticline.

6. Upper Lahave syncline.

Conquerall Bank anticline. Dares Lake gold discovery.

7. Dayspring syncline.

Bridgewater anticline. Leipsigate and Blockhouse gold mines.

As already stated, the greater part of the area is occupied by the Halifax slate division. The Goldenville quartzite is brought up to the surface only in the southwestern part of the Lunenburg sheet, where the Dublin shore anticline and the Pentz Section anticline have a pronounced pitch to the eastward, forming two prominent, broad domes of quartzite extending southwesterly beyond the limits of the area examined.

The southern dome of quartzite begins on the seashore half a mile east of West Dublin post-office, spreads out in a broad circle and extends southwesterly on both limbs of the Dublin Shore anticline, including Green Bay with the inner part of Cape Lahave Island on the south, and the mouth of Petite Rivière and the head of Broad Cove on the north.

The northern dome of quartzite begins 3 miles to the northwest of the southern one, on the eastern side of Petite Rivière, 1 mile east of Crouse Town post-office, where it circles around Brown Lake on the eastern pitch of the Pentz Section anticline; the south limb extends southwesterly toward Volger Cove, and the north limb westerly toward County Line station on the Halifax & Southwestern Railway.

On these two domes the interstratified slates, at certain horizons, are in much greater volume than the quartzites, especially near the top of the division, where they attain a great thickness. The line of demarcation between the two divisions is thus not nearly so well de-

fined in this district as it is in the eastern part of the province, the passage from quartzites to slates being more gradual.

#### IGNEOUS ROCKS.

The only igneous rocks observed were four dioritic dikes on the Ovens Peninsula. The dikes are well exposed on both the east and west side of the peninsula, at a distance of a quarter of a mile south of the Ovens gold mine, and immediately south of the old mill of the Acadia Gold Reduction Company, still standing on the eastern shore of the point. All four occur within a distance of 250 feet; they vary in width from 3 to 9 feet, and are generally conformable in strike and dip with the stratification of the slates, though in many cases, they distinctly cut across them. The only other instance of a basic eruptive occurring in the Goldbearing rocks along the coast is at Tangier, where a dike cuts across the sediments at right angles to their strike. In the Gaspereau Valley and its vicinity many similar dikes have also been observed intruding both the Goldbearing series and the Silurian.

#### GLACIATION.

The entire area must have been covered with moving ice at the time of the glacial period. The general course of the ice, as indicated by striæ, was toward the south and southeast, conforming to the directions of the valleys of Lahave, Petite Rivière, and other main streams, and to the general trend of the hills. Glacial drift, largely made up of till, with granitic boulders, and of debris transported from South Mountain, covers most of the hills. Debris of amygdaloidal traps and other characteristic basic eruptives from North Mountain on the Bay of Fundy coast, was also observed at many places, showing that at some period, at least, the ice field moved across the whole province.

#### Economic Geology.

##### GOLD.

The slates of the Halifax division of the Goldbearing rocks are generally considered by the miners to be much less likely to bear auriferous veins than the quartzites and slates of the Goldenville division, because, so far, no important mine has been located on them anywhere within the province; except at Caribou. Rich veins have been found in them, but these were generally small and irregular, and without the uniformity and extent of those occurring in slate belts lying between rigid walls of quartzite. It may be remarked, however, that in the eastern part of the province, on account of the deep glacial erosion, the slates of the upper division seldom occur along the anticlines, and much less often on the domes which are the only favourable places for the formation of gold-bearing veins.

In the region under study, every one of the eight anticlines occurs in the slate of the Halifax division, and only two of them have brought the quartzites to the surface, namely, the Dublin Shore and the Pentz Section, where these rocks occur at the southwestern end of the anticline. The Dublin Shore anticline passes through the "Ovens" gold district, and the Pentz Section anticline passes through the Indian Path gold district and the Somerset gold discovery. Special detailed surveys have been made of the gold mining districts of the Ovens and Indian Path, but a report on the structure of these districts must be deferred until all the surveys are plotted and compiled.

**Somerset Gold Discovery.**—On May 20th, 1905, rich "float" gold quartz was discovered by Nathaniel Slaughenwhite of Italy Cross, at Somerset, on the west side of Petite Rivière, one mile south of A. Slaughen-

white's house, at the south end of Beach hill. The quartz is dark, ribboned, and striated, indicating that it came from an interbedded vein having a thickness of about 10 inches. During the following two summers a surface pit was sunk 63 feet north of the first discovery through 26 feet of drift to the bed-rock, and a tunnel was driven north for 57 feet, on the bed-rock. No float of the rich ribboned quartz was found in this exploratory work. This may have been due to the fact that the discovery is situated on the eastern pitch of a broad anticlinal dome of quartzite and slate, where the veins, conforming to the stratification, have a general north and south direction. East-west, or at right angles to the probable direction of the vein, should, therefore, be the more promising direction for exploratory tunnelling.

The same rule should be applied in prospecting at the Augustus Reinhardt discovery of rich gold float, similarly situated on the same anticlinal dome, about one mile west of the Slaughenwhite discovery.

##### IRON ORE.

Some of the dark, rusty-weathering slates of the Halifax division are heavily charged with iron pyrites, generally occurring in small cubes distributed through the rock, or in massive form along the bedding planes. From the decomposition of these slates have originated deposits of bog iron ore found in various low, swampy places, along rivers, and about lakes. Several such deposits were observed, notably along both banks of Lahave River, and on the hill extending to the north of Kingsbury to Rose Point. It is doubtful if any of these deposits are of sufficient extent and depth to be of commercial value, but they might be worth investigating as they are nearly all situated within easy reach of good shipping points.

##### LIMESTONE AND GYPSUM.

The presence of limestone on Second Peninsula appears to have been generally overlooked by the present inhabitants, though it was certainly known to the earlier French settlers, who had a limekiln on Limestone Hill, opposite the Government wharf, and one on Goreham point, once thickly settled by the French.

Gypsum was not observed anywhere, but several large funnel-shaped "sink-holes" were located on the Second Peninsula, on the farms of John Young, George Acker, and Freeman Berringer, testifying to the occurrence of deposits under the heavy drift covering. As these deposits of limestone and gypsum are quite close to the Government wharf, where good shipping facilities are available, they may prove of commercial value.

##### CLAY.

Extensive deposits of alluvial clay occur at many places along the low, swampy intervals, and glacial clay, largely made up of granite debris, is abundant on many hills. Samples of some of the more promising clays were collected for examination as to their value for brick making.

A brick-yard was in operation about 65 years ago near Lunenburg, at the Saltpit wharf on the south shore of Back harbour. It is reported that bricks were also made by the early French settlers on Brick Hill, situated on Goreham point on Second Peninsula.

##### Archæology.

Indian implements, including arrow-heads and spear-heads, flint, and pieces of earthenware, have been found on Backman beach on the north side of Second Peninsula, and at other places along this part of the coast. Specimens of these are on exhibition in a small museum in the town hall at Bridgewater, and in the archæological collection of the provincial museum at Halifax.

## RAMBLER-CARIBOO MINE, SLOCAN, B. C.

By E. JACOBS.

In the course of a recent trip through the Slocan district of British Columbia, I visited the Rambler-Cariboo mine, among others. As reports of discoveries of ore in that mine during the last few months have renewed interest in it, the following information relative to the property is contributed:

The Rambler-Cariboo group embraces five mineral claims, having a total area of 175 acres, situated in Mc-Guigan Basin, Slocan mining division, West Kootenay, and distant from the Kaslo & Slocan Railway about three miles by wagon road. It is owned by a company incorporated on July 31st, 1899, as the Rambler-Cariboo Mines, Limited, with British Columbia office in Kaslo. Mr. W. E. Zwicky is general manager.

Prior to 1904 development work consisted chiefly of a shaft with levels opened from it. This shaft was sunk 500 feet from what is known as the 300-foot level, the original workings, down to 300 feet, having been adits in the mountain-side above it. Levels were opened from the shaft at each 100 feet down to what is known as the 800-foot level, below which it was found to be impracticable to work the mine with the power plant with which it was then equipped, for in the spring of each year pumping especially would have been too heavy for the available power. By that time much ore had been extracted, and from the profits earned, \$230,000 had been paid to stockholders as dividends.

At the beginning of 1904 the directors found themselves in this position—they had to choose between buying and putting in a larger power plant, with its necessary increased cost of pumping and hoisting; driving a long adit to cut the vein at greater depth and thus provide for the drainage of the mine at little or no cost after the vein should have been intersected by such deep level working, and, too, keep the hoisting costs down; or abandoning the mine. Another important consideration was the altitude of the surface works—concentrating mill, mine buildings, etc.—which was about 6,000 feet above sea-level, and in a place where snow-slides were troublesome every spring.

Mr. Zwicky strongly recommended the driving of a deep-level adit. At first this proposal did not meet with favour, for it involved a large expenditure of money, and the work, while it would take a comparatively long time to carry out, would not bring in any revenue until after its completion and the mine had been opened at levels below the old workings. Eventually the directors recognized the wisdom of adopting their general manager's recommendation, and financial arrangements were made to carry out his plans. My recollection is that \$75,000 had to be provided for the work, but whatever the amount, the money was found and the work proceeded with. This was the most important deep-level work that had been undertaken in the Slocan, and it was known that if success should result, other mines would be opened in a similar way.

The work of driving the adit was commenced on July 9th, 1904; it was completed on April 16th, 1906. The portal is at a level 1,450 feet below the highest point at which the vein had been opened, and 2,400 feet lower than the apex outcrop on the summit of the mountain; it is 650 feet lower than the 8th or former bottom level of the mine. At 4,523 feet from the portal, driving the adit was discontinued. Allowance having been made for running off water, the depth at the face of the adit is 1,425 feet below the highest point at which the

vein had been opened. I have stood at the breast of the adit and from there seen daylight at the portal, distant nearly seven-eighths of a mile. The excellence of the engineering and workmanship in driving this adit, which is 7 feet by 7 feet 6 inches in the clear, was therefore plainly evident.

Writing of conditions as he found them about the close of 1907, Mr. Robert R. Hedley, in his description for the Dominion Department of Mines' Report on the Mining and Metallurgical Industries of Canada, 1907-1908, observed: "The manager of the Rambler-Cariboo mines states that owing to some disturbance or fault at or about the point to which the vein had been projected on this level, the vein was not found, though the tunnel was driven for some 90 feet beyond. He consequently concluded to cut the vein at the nearest possible point under the main shaft. A diagonal drift was then run, and from this drift a raise made to the upper workings. In 200 feet of raise the 1,250-foot level was reached, and a cross-cut started, which, after being driven 47 feet, cut the vein. It was there 8 feet wide and showed several streaks of clean galena. Raising was continued, and some driving done at the 1,150-foot level. Stations were established at the 9 and 10 levels. Some stoping was then undertaken in the upper levels, and the work of connecting the tunnel by a suitable shaft proceeded with. The requisite equipment of the portal was installed, and suitable cottages, bunk-houses, etc., for the new camp near the mouth of the tunnel, were erected."

When in the Slocan last January I was informed that the 900, 1,000 and 1,100 levels had been opened, and ore had been found in several places down to the 10th level. The ore was silver-lead, with but little zinc. Here it may be mentioned that during the period from 1893 to 1906, inclusive, shipments of ore from the mine aggregated about 14,500 tons, having average metal contents as follows: Lead, 37 per cent.; zinc, 14 per cent.; silver, 127 ounces per ton. The output in 1909 was in excess of 1,000 tons of a somewhat lower grade than the average above stated, yet sufficiently high to pay mining costs and, as well, provide enough money for cost of the exploration included in the 1,200 to 1,300 feet of development work done in that year. Latterly production has been maintained at the rate of about 100 tons per month, and it is well known that recent discoveries of ore have been such that a larger output could be regularly made without difficulty were it considered advisable to increase production at this time, when prices of silver and lead continue comparatively low.

The ordinary annual meeting of stockholders in the Rambler-Cariboo Mines, Limited, was held in Kaslo on June 14th, but little, if any, publicity was given to the proceedings thereat. One of the directors, however, was reported to have made the following statements at Nelson to a press representative:

"The new ore shoot has been opened on three levels—the 700, 800 and 900; these have been connected by a raise in ore all the way. On the 700-foot level the ore-shoot has been opened for a length of 40 feet; it has an average width of two feet of solid galena. On the 800-foot level the ore-body is 82 feet long, and the vein varies in width up to 18 feet. The 900-foot level has been in ore for more than 90 feet; the vein ranges in width from 8 to 12 feet, and an estimate shows 18

inches of clean shipping ore. This ore shoot is entirely distinct from any other heretofore found or worked in the mine, being a long way to the south of the old workings. It contains native silver, which had not previously been found in the mine. A general average of the ore thus far developed gives a value of 65 per cent. lead and 174 ounces silver per ton. Practically all the ore is of excellent grade, but there is some concentrating ore on all three levels, especially on the 800-foot. We have still about 150 feet to drive on the 1,000-foot level to reach the ore shoot; when that shall have been done we shall raise in it to the 900-foot level. After that work shall have been accomplished, two still lower levels will be driven to find the ore shoot at greater depth. Meanwhile stopes are being opened above the 900-foot level, and then production will be increased. The last round of drill-holes on the 900-foot level fired while we were at the mine broke down nearly a carload of ore.

"Lessees are now working the company's concentrating mill on the dumps from the old workings, and from this source there will be shipments of concentrates made, in addition to the ore from the lower levels. We are now employing 35 men at the mine."

To the foregoing it may be added that before any considerable increase in output shall be regularly made more development work will be done, so that later a proportionately larger tonnage can be produced. It is characteristic of Mr. Zwicky that he keeps his development work well ahead of his ore-stopping, which policy has proved a prudent one.

There is no doubt the Rambler-Cariboo is now in better condition to return substantial profits above ordinary operating costs than at any other time for years. The successful outcome of the enterprise planned six years ago by Mr. Zwicky, whose wise foresight was not at that time generally recognized, is of much moment to the Slocan district as a whole; indeed, this has been proved by the subsequent action of other mine-owners, for at least two other deep-level developments have been carried out, one with success and the second with good prospects of also justifying the enterprise with which it has been undertaken. Recognition of the pluck of the directors of the Rambler-Cariboo Company, themselves large stockholders, in financing what at first seemed a somewhat hazardous as well as costly undertaking, is also merited. They had full confidence though in their manager's skill and good judgment, and the sequel has proved that it was well grounded.

**DIAMOND DRILLING IN NOVA SCOTIA.**

Written for THE CANADIAN MINING JOURNAL.

The government of Nova Scotia has for some years encouraged diamond-drill prospecting by keeping a number of drills in commission for bona-fide prospectors. Last year, or, rather, during the twelve months ending September 30th, 1909, eight drills were operated.

Four of these were diamond steam drills, three were Calyx steam drills, and the remaining two were hand drills, diamond and Calyx respectively. The core dimensions ranged 15/16-inch to 7 inches, the latter being the diameter of the core drilled by a Calyx steam drill. The range in depth is from 400 feet up to 3000 feet.

In the twelve months mentioned above, the total number of holes put down was 14, their combined depth being 5,577 feet. More than half of this footage was done by diamond drills, which have 3,378 feet to their credit, leaving 2,198 feet put down by Calyx drills.

No. 8 drill, a light steam diamond drill with a capacity of 1,500 feet, was purchased and operated during the year. It has the latest type of hydraulic feed, and produces a two-inch core.

The total expenditure during the year for maintenance of drills, store-house, repairs, wages, etc., including the purchase of No. 8 drill, was only \$6,012.55. Since the year 1899, when the government purchased the first drill, the total expenditure has amounted to \$71,385.47.

No holes were lost during the year. The average cost per foot for all boring was \$1.405. The average cost per foot for boring by diamond drills was \$0.79; by Calyx drills, \$2.166. The carbon-cost per foot for boring by diamond drills was \$0.037; while the shot-cost for Calyx drills was \$0.055.

The following comparison of costs is useful:

	1908.	1909.
Cost per foot for all boring.....	\$1.06	\$1.405
Cost per foot for all boring by diamond drills .....	0.845	0.79
Cost per foot for all boring by Calyx drills .....	1.34	2.166
Shot-cost per foot for all boring by Calyx drills .....	0.056	0.055
Carbon-cost per foot for all boring by diamond drills .....	0.077	0.037

Drill No. 1 was employed from September 28th, 1908, to November 17th, 1908, putting down a hole for the Nova Scotia Steel & Coal Company, near New Glasgow. No. 1 is a 6-inch core, steam Calyx. The mineral sought was coal. The total depth of the hole was 361 feet 3 inches. Shales and sandstones, the former often very hard, alternated irregularly. Fireclay was encountered at 177 feet. The total cost of this hole was \$647.54, or \$1.80 per foot, made up as follows:

Labour .....	\$277.18
Management .....	170.82
Fuel .....	147.50
Light oil, waste, etc.....	5.13
Shot .....	6.75
Lumber .....	16.66
Casing-pit .....	14.00
Shot-bits .....	7.50
Gravel .....	2.00

Total ..... \$647.54

The average rate of boring was 0.7 of one foot per hour. The fastest rate of boring was 5 feet 10 inches in one hour. Double shift was worked.

Drill No. 2, a steam diamond drill producing a 15/16-inch core, capacity 850 feet, operated from September 26th, 1908, to October 15th, 1908, in No. 1 Allan shaft of the Acadia Coal Company, Pictou County. The mineral sought was coal.

Banded gray shales and dark gray shales with bands of hard brown ironstone were encountered. A total depth of 318 feet 9 inches was reached. The hole cost \$189.21 or \$0.595 per foot. The average rate of boring was one foot per hour. The fastest rate of boring was 4 feet 4 inches in one hour. Another hole put down by the same drill in the same locality cost \$109.70 for 191 feet, or \$0.574 per foot. This hole was stopped in 14 feet of coal. In one other hole sunk by a hand diamond drill, a considerable amount of conglomerate was cut. In this instance the cost per foot went up to \$1.38.

Drill No. 6, a 6-inch core steam Calyx, sunk a hole at River Inhabitants. The total depth was 851 feet 6 inches. Boring double shift, the average rate of pro-



gress was 0.4 foot per hour. The fastest rate of boring was 11 feet 5 inches in one and one-half hours. The total cost was \$2,832.23, or \$3.33 per foot. Coal was the mineral sought. Blue and black shales, and hard gray sandstones made up the strata drilled.

Drill No. 8, a two-inch core diamond drill, 1,500 feet capacity, sunk a hole 710 feet on the property of the Interecolonial Coal Company, Stellarton. The average rate of boring was 2 feet per hour. The fastest rate was 3 feet 8 inches in one hour. The total cost was \$643.87, or \$0.906 per foot.

The department supplies and maintains drills. Applicant pays all operating expenses, including freight.

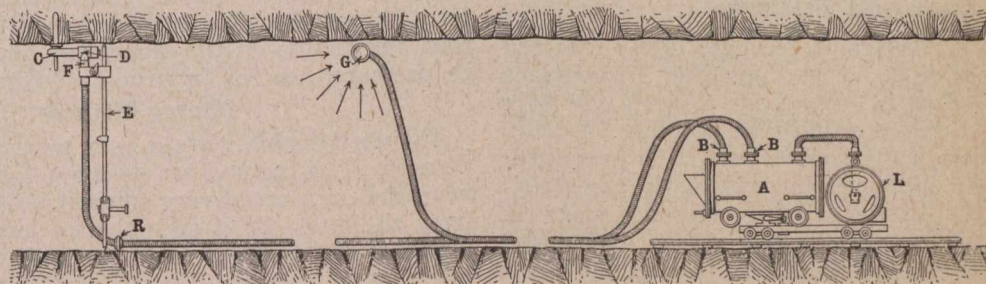
**WEAR ON FILTER LEAVES.**

When transferring vacuum filter leaves into the wash tanks the heaviest wear is at the corners, which scrape on the sides of the tanks. As soon as the canvas is worn through the leaves become useless. To avoid this heavy canvas patches should be sewed over the corners. This will considerably prolong the life of the leaves.

**ELECTRO-PNEUMATIC APPARATUS FOR REMOVAL OF DUST IN MINES.**

BY FRANK C. PERKINS.

The accompanying drawing shows the construction of an English design electric fan apparatus for the removal of dust in mines and indicates its method of operation. The use of percussion rock drills on hard stones in mining has the disadvantage that the miners in charge of the drills are obliged to inhale the fine par-



ticles of rock giving rise in some instances to a disease known as "Miners' Phthisis." The electric-driven apparatus noted in the drawing has been successfully used to overcome this difficulty and remove the dust which caused the trouble by utilizing a small cylindrical tank indicated at A, this being partially filled with water and chemical absorption agents if required.

This apparatus mounted on a truck has two or more branches, BB, to which rubber hose are coupled by means of patent rapid couplings; at the end of one hose is fixed a light aluminium sucker C, which fits around the drill hole, and is held in position by an adjustable arm, D, and stretcher bar E, which are made very light and portable, and of very easy adjustment; into the second hose is fixed an arrangement for clearing the gases produced by blasting. Into the sucker the dust and small particles of rock, as they are ejected by the action of the drill, are drawn by powerful air suction, the heavier particles being caught in a separator to trap at F, and in another at R, from which they can be conveniently removed, the dust-laden air being conveyed through the hose into the tank A. The attachment for use in clearing the fumes created by

blasting, consists of a slotted pipe shown at G, which can be rapidly fitted across the drive, into which the noxious air and dust are quickly drawn and passed away to the tank, the atmosphere being thus very rapidly cleared.

It will be noted that the tank, with its motor and fan, is carried on a carriage running on rails. Partitions are fixed inside the tank, carrying on their lower ends hinged flaps pierced with holes. The dust-laden air enters the tank through the branches, BB, and by reason of the partitions is compelled to pass through the water on its way to the outlet branch, thus leaving behind it all dust and impurities. It flows through the fan and is discharged as pure air. The fan is of the small compound centrifugal type, driven by an electric motor.

The whole apparatus is compact and portable, the tank itself being provided with wheels, so that it can be lifted off the carriage by means of handles, placed on the rails, and moved to any convenient place for filling or emptying.

The Portland cement output of Canada during 1909 was 2,303,263 barrels.

According to statistics published by the Mines Branch, Ottawa, the value of gold won from the placer deposits of the Saskatchewan River (the only gold with which Alberta is officially credited) totalled \$299,458 during the period 1887-1908, inclusive. During the three years 1895, 1896, and 1897, the annual outputs were respectively \$50,000, \$55,000, and \$50,000. The output for 1908 was \$1,037.

**ELECTROLYTIC COPPER REFINING AND SMELTING IN AUSTRALIA.**

Electrolytic copper refining and smelting plants are at work in Australia at the Great Cobar mine, and at Port Kembla in New South Wales. The latter plant is largely owned by the Mount Morgan mine. The multiple system is employed at both plants, and at Port Kembla double tanks are used, and an adaptation of the three-wire system is employed. At the Port Kembla works during 1909 some 5,850 tons of electrolytic copper, valued at £350,000, and bullion to the value of £124,000, were produced. Most of the blister copper treated came from the Mount Morgan mine. In former years the Mount Morgan's blister copper was electrolytically treated in America, but local treatment means a great saving in time and expense. It is surprising that the Mount Lyell mine does not send its blister copper to the local companies instead of continuing to send it to America. Probably a long contract stands in the way. As so much more of the red metal is produced in the United States of America than is consumed, to continue to send Australian copper there is like sending coals to Newcastle.

# NOTES ON RECENT DEVELOPMENTS IN ASBESTOS MINING IN QUEBEC.

BY W. J. WOOLSEY, Thetford Mines, Que.

(Abstract from the Journal of the Canadian Mining Institute.)

It is generally conceded that the asbestos industry is now better established than ever before, and with stable conditions of trade must, in the near future, greatly increase in volume. Financiers have shown more than ordinary confidence in asbestos mining, and the various propositions offering have been accepted only too readily, especially if vouched for by competent authorities. Some have very severely deprecated, with justice in some cases, this recent great optimism prevailing in regard to asbestos. On the other hand, however, it must be recognized that asbestos is coming into much more general use. The increased demand, therefore, coupled with the adequacy and eminent suitability of most of the Quebec mineral, seems a sufficient reply to any who may be unduly pessimistic.

The present prices for the various grades of asbestos are from five to fifteen per cent. lower than in 1907 and accordingly shipments have been less than in that year. The outlook for the coming year is for increased shipments and a gradual improvement in prices.

The decision on the part of the operators in the Black Lake and Thetford districts to establish an Asbestos Bureau to keep the public advised of any new uses for asbestos, and the development of asbestos properties the world over, should afford the very greatest assistance in the industry.

## Geological Features.

The geology of the asbestos area has lately received considerable attention from the Canadian Department of Mines, and an effort is being made to work out fully the important features as rapidly as possible. During the past thirty years many papers have been presented, and many theories advanced to explain the peculiarities observed in the district, having reference more especially to the questions of the true origin of the serpentines, the contrast between the growth of the chrysotile deposits throughout the world, and the origin and manner of growth of these fibres. Thus, valuable data bearing on these problems have been presented by Ells (a), Merrill (b), Low (c), Cirkel (d) and Dresser (e). The serpentines of the district are conceded to be of igneous origin, derived principally from rock of the peridotite class, though there are frequent instances where pyroxene appears to have been an important original mineral. The formation of the chrysotile veins has been discussed by Merrill (b), who states, "Cavities are due to shrinkage and the vein filling to processes of crystallization, extending from either wall inward." The subject is also well treated by Low (c), who states that "The cracks were probably formed by shrinkage of the mass. . . . The asbestos appears to the writer to have been deposited in the cracks under great pressure from superheated waters . . . ."

(a) Bulletin on Asbestos, 1903, Geological Survey of Canada.

(b) Mining World, 1905.

(c) Geological Survey of Canada, 1906.

(d) Asbestos, its Occurrence, Exploitation and Uses, 1905.

(e) Journal of the C.M.I., Part of Vol. XII.

masses and dykes have been intruded into the serpentines, and these probably account for the necessary pressure and heated waters to form the asbestos there."

A good opportunity for studying the relations of some of the rocks containing and associated with the asbestos deposits may be found on the property of the Robertson Asbestos Mining Company, on Lot 16, Range IV, of the Township of Thetford. Here the surface outcrop measures 1,400 feet along the strike, northeast, by 600 feet in width, and consists of serpentine and a greenstone, probably diabase. The rocks lie between two beds of sedimentary rock, and all dip to the southeast at an angle of about 50 degrees. Both contacts are well marked, an interesting feature of the upper one being those fragments of the sedimentary found in the igneous rocks.

Another significant feature is that the serpentine is found along the lower or foot-wall side, while the diabase, which is a lighter rock, is near the hanging or upper wall.

Following out these observations, the purest serpentine should be found along the footwall. The writer has kept careful watch for change in the amount of asbestos, but has not found any noteworthy change towards either wall, in the amount of asbestos contained in the serpentine. The crystallization of serpentine to form chrysotile seems to be affected by other agencies than the quality of the serpentine alone. These might be pressure, heat or intrusion of dykes.

## Mining Methods.

The use of cable ways is very general throughout the district. This method has been much criticised, but has, nevertheless, proved very efficient in removing material from the pits. To it may also be largely ascribed the fact that the cost of mining has been maintained at the low rate of between twenty and thirty-five cents per ton of rock delivered and loaded on the cars. The variance in costs referred to is dependent on the extent of crushing and separation of rock material in the pits. All the mines are very completely equipped. This equipment usually comprises an air compressing plant and cable ways, provided with steam, air or electric hoists. In general, electric power is in use. It is especially well adapted, when continuous service can be maintained, for the operation of the mills, as well as for mine plant. It has also been successfully applied in the operation of drills, although an electric drill has yet to be devised in which the drawback of abnormal wear of certain parts shall be overcome.

Underground mining, although successfully carried on by Bell's Asbestos Company for the past four years has not been adopted at other mines by reason of the increased cost. It is, meanwhile, interesting to note that the Bell's Asbestos Company is now installing a steam shovel plant. Mining by this method promises to be effective in the case of large holdings. A level bottom, of course, is desirable.

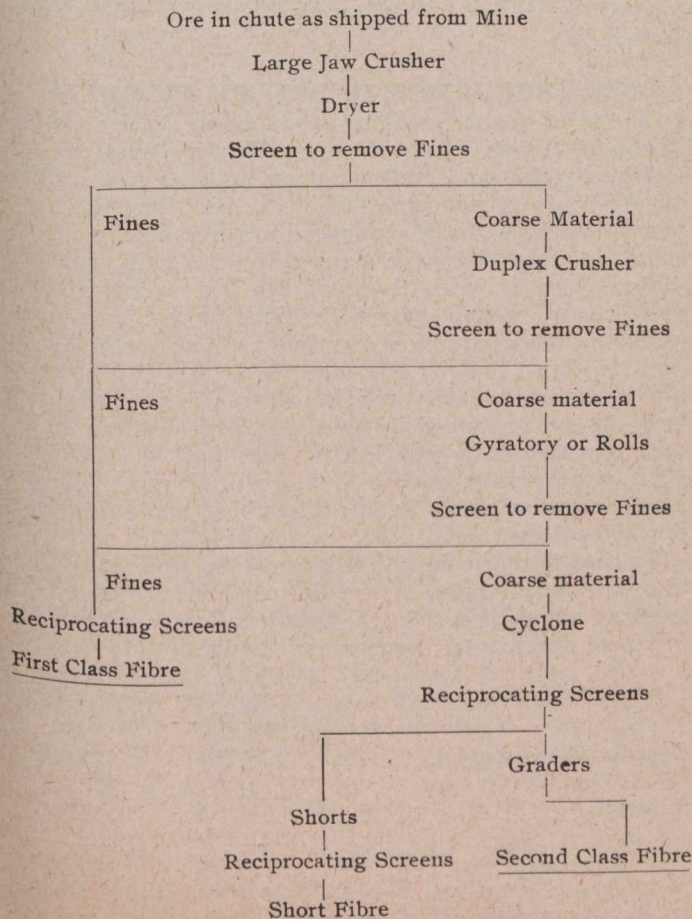
## Milling Methods.

The question of efficiency of milling plant is one of paramount importance to those engaged in the production of asbestos fibre; but there is great divergence of

opinion in the matter of mill design. There is, nevertheless, much truth in the contention that the processes necessary for producing the best results vary considerably according to the class of rock to be handled. In the opinion of the writer, however, much benefit would accrue if the designing of mill plants were standardised, so far as practicable, by the adoption in all plants of the several methods which experience has taught constitute the best practice. Thus, there are several mills in the district which possess distinctive and desirable features; but it is quite possible that none is in itself absolutely perfect in design. For example, rolls have proved very efficient, since they preserve the qualities of the fibre excellently well; at the same time these machines have not yet been installed in such a manner as to provide a maximum production in proportion to the cost per ton. Again, the cyclone has proved invaluable, considered from the point of view of large production and low cost, but in determining the most desirable class of mill, the question of preserving the more valuable qualities of the fibre must, of course, be considered, and in the writer's opinion only low-grade materials should go to the cyclone, the superior grades having been saved before this stage of milling shall have been reached. The accompanying flow sheet illustrates a mill design, which in the judgment of the writer would afford the best results in respect of efficiency and simplicity of operation.

**FLOW SHEET**

**SHOWING ASBESTOS TREATMENT THROUGH MILL**



A new machine has been designed by Edward Torrey and installed by the Asbestos & Asbestic Company, of Danville, Que., to overcome the difficulties met with in the old style cyclone. In the new machine the reduction of the ore is effected more directly by

impact than by pulverization, which is the principle of the old style cyclone, where the beaters revolve in opposite directions. It is claimed for the Torrey cyclone that the injury to the fibres occasioned by the old style cyclone is largely overcome, and that the operation of the new machine is less costly.

**ADDRESS BY F. H. SEXTON, DIRECTOR OF TECHNICAL EDUCATION, NOVA SCOTIA.**

At the recent sessional closing of the Nova Scotia Technical College, Halifax, N.S., an address was read by Director F. H. Sexton. Part of this appears herewith. Mr. Sexton has accomplished much for the cause of modern and sane education in Nova Scotia:

"This is the first commencement day of the Nova Scotia Technical College—an event that is bound by the mere circumstance to be important in the educational annals of Nova Scotia. For this is the People's College, established by the people, maintained by the people and for the purpose of offering special opportunities to the children of the people. Its motto is "Science for the common weal" and it is to be dedicated to the advancement of science and industry. It stands primarily for applied science and its aim is to give the people that scientific knowledge which shall give them such power over nature that by industry their leisure and well-being may be advanced. This college will grow into an inspiration and bulwark of the highest industrial life of this province if its motto and dedication are adhered to, and to-day we stand at the first milestone.

"The mere presence of the college is fraught with import to the community in which we live. It is of great value to the ten or twelve thousand homes that constitute this community to have such an institution where their boys—or girls, either (applause)—can secure an engineering training of the highest order, for a mere trifle and still be at home. It means much to have a staff of experts in engineering who may be consulted on specific questions. It is important to have in the midst of a city, a college with well equipped scientific laboratories and libraries for the purpose of experimentation and research. It is also no mean advantage to the community to have placed within it a large imposing expensive building with ample lawns. The fact that students gather from other points in the province and spend eight months of every year, besides many hard-earned dollars, is no serious menace to the city. There are other advantages that I could enumerate if I had not already far trespassed into the confines of modesty. I honestly think that the people of this community do not give the educational institutions such as Dalhousie College, St. Mary's College and Technical College, and the many other ones with which the city is blessed, half the consideration and appreciation that they deserve.

"The college will also mean much to the industrial life of the whole province. It will turn out young men thoroughly trained to eventually become our captains of industry. These men will be the ones who will conserve our natural resources and turn the wastes of manufacture into dividends. It has been stated by a competent designer of power plants, that if the installations were all built on the most approved design, a saving could be made on the production of the average plant of 1/4 cent. per H. P. hour. This would mean a saving of nearly \$400,000 yearly in Nova Scotia alone. Somebody has figured out the true value of a trained engineer to the community and it is a fabulous amount over and above the amount it cost to educate him. Nova

Scotia shall train Nova Scotians to manage Nova Scotia industries and we shall not have to import trained men to occupy the least servile position. The college will also carry on industrial research as applied to the special needs existing in Nova Scotia, and will eventually be of the greatest service in developing the future industries of the province.

"It is interesting for us to note that the establishment and maintenance of this institution by the provincial legislature is in harmony with the growth of the state universities of the United States. Some of the universities are bidding fair to outstrip even the most ancient and honoured of the privately endowed institutions such as Harvard and Columbia, both in number and income. Universities like Wisconsin, Michigan and Minnesota, recently received grants of between one and two million dollars for a two-year period. People are also leaving large bequests to state universities at present, a practice that was not nearly so frequent in the early history of these institutions. It is to be hoped that some large-minded patriot will realize the sphere of usefulness that this technical college is striving to occupy and will assist in some handsome way the efforts to train men for a practical useful life, either as a captain or non-commissioned officer of industry. The state university idea has spread eastward during the past year and President Schurman, of Cornell University, whom we are all proud to acknowledge and honour, has secured a change in the charter looking toward state control, and, consequently, aid by state appropriations. Thus we see that the establishment of the Technical College by and for the people is in entire accord with the most significant movements of the times in university support and control.

"Again, it is interesting to see how the Technical College in its relation to the secondary schools under its direction has reached the same solution of an educational need as the most advanced policy of the University of Wisconsin, which has led the other colleges of the United States. The fact that correspondence schools as private corporations were so successful in giving practical instruction to men in different trades pointed to a great need for such instruction. The university, in striving to be of as much educational service to the state as possible, started a whole series of correspondence courses of its own. These were based on the soundest educational principles, and were not conducted on a money-making basis, as were the private correspondence schools. The success of these courses in Wisconsin startled even the men who had charge of them. It was found necessary after a short time for the greatest success of this work to hire local or travelling teachers to explain the correspondence work. In this way local classes and schools have been formed.

"In Nova Scotia it is estimated that a sum of \$60,000 or \$70,000 went out of the province every year for correspondence courses. This showed the great need that existed for secondary technical instruction. This need was met by the establishment of local technical evening schools for workingmen. These have been most successful, but it has been found that all the needs cannot be filled without establishing correspondence courses under the Technical College. Equal needs are ultimately satisfied with equal measures.

"In establishing secondary technical schools under the direction of a college, the University of Wisconsin and the Technical College were leaders in America. The tendency of most universities in Canada and the United States has been too conservative. They have consulted their own interests selfishly in their require-

ments for entrance. They have constantly raised these, as more and more was demanded of the college graduate in order to keep the course in college the same length. The high schools and academies have strained to make the graduation requirements the same as the entrance into college. This was to the great detriment of most of the students in the academies, because only a small percentage entered college at all. Thus the college was responsible for the fact that by far the largest portion of the pupils in the higher grades of the public schools were being trained to go to college instead of being trained primarily for actual life.

"I think it was the agricultural college which set the example of greatest educational service to the people whom it was intended to serve. They were the first who went to the people to find out exactly what was needed and then to try to make every effort to supply the needs. They were the pioneers who took the education right to the door of the man who should have it. Their methods of travelling dairies, lectures from the rear ends of trains, and many more organized efforts were looked on askance by other more conservative faculties of the university. Now that the state universities have taken the cue from the agricultural colleges it is possible that we shall see the application of the principle of carrying the higher and more special kinds of training to the whole people. We shall also see the university guiding and inspiring the whole work instead of autocratically dominating it for the special ends of the University. It is right that the highest end and aim of the university should be the same as that of the leader and followers in the Christian church service."

#### ORE PRODUCTION IN BRITISH COLUMBIA.

The total quantity of ore produced in British Columbia in 1909 was 2,057,000 tons. This includes ore put through stamp and concentrating mills as well as that smelted. It is not practicable at this time, when returns available for the purpose are necessarily incomplete, to judge how the figures for the half year just closed compare with those of the last calendar year, and even an estimate would be little more than a guess so far as the production of mines in Ainsworth, Slocan and the Coast district are concerned. Yet it is practicable to make a fairly reliable comparison of the tonnage of ore produced by mines in two or three of the more important camps in the first half of 1909 and 1910, respectively, and since this will serve to indicate in a general way that progress has been made this year, it will be done.

Taking first the larger mines of the Boundary district, which produced about 70 per cent. of the total tonnage of ore mined in the province last year, the following approximate figures are shown:

Mines.	Tons.	
	To June 30, 1909.	To June 30, 1910.
Granby Company's .....	478,000	625,000
B. C. Copper Company's.....	139,000	170,000
Snowshoe .....	60,000	85,000
Totals .....	677,000	880,000

The figures for the first half of 1908 were: Granby, Company, 533,000 tons; B. C. Copper Company, 50,000; Dominion Copper Company, 2,000; total 585,000 tons. It should be noted that the B.C. Copper Company's mines were closed for several months in 1909, and for a shorter period in 1910, owing to labour difficulties. It is noteworthy that the tonnage for the first half of

1910 shows an increase of 30 per cent. as compared with the corresponding period of 1909, and of 50 per cent. with that of 1908, and this notwithstanding the long-continued low price of copper, which is the chief marketable metal contained in the ores of the mines under notice. Further, the indications are that the increased production will be continued.

Turning now to Rossland mines, it is gratifying to find an increase this year as compared with the first half of last year, though the position is not favourable in comparison with the corresponding part of 1908. The decreased tonnage has been in the production of the Le Roi mine only, the two other important producing mines of Rossland camp, showing increases. The tonnage for the three half years, respectively, is shown in the following round figures:

Mines.	Tons.	Tons.	Tons.
	To June 30, 1908.	To June 30, 1909.	To June 30, 1910.
Centre Star Group	84,500	83,000	97,500
Le Roi .....	39,000	9,000	7,500
Le Roi No. 2.....	15,000	15,000	16,500
Others .....	500	500	500
Totals ... ..	139,000	107,500	122,000

The second-class ore milled at the Le Roi No. 2 concentrating plant, about 1,550 tons per month, is not included in the figures given in the table, which shows an increase of 13 per cent. this year over last.

The production figures for East Kootenay mines do not exhibit similar progress, for the quantity of lead-silver concentrate received at the Trail smeltery during six months of 1910 was but 9,000 tons, as compared with approximately 11,000 tons for the corresponding period of 1909, and 10,000 tons for 1908. However, this decrease is in part compensated for by receipts of about 6,000 tons crude ore from the Sullivan group mine; only in part, though, for there is of course considerably less lead and silver in crude ore from the Sullivan mine than in a similar quantity of concentrate from the St. Eugene. The North Star mine, also, has this year produced less ore than last. On the whole, then, East Kootenay's ore production shows a decrease for the expired portion of the current year.

In Ainsworth mining division, the mines that were the largest producers last year have not made so good a showing this year. In the Slocan there has been improvement, to some extent, in production, in much larger degree with development that gives promise of a substantially larger output of ore. The most noticeable increases were those of the Standard and Van Roi, on Slocan Lake, and the Richmond-Eureka, near Sandon. The figures for the Standard are about 600 tons of high-grade silver-lead ore this year, as against 400 tons for the first half of last year; those for the Van Roi are 700 tons of silver-lead concentrate shipped to Trail, and last winter's mill output of silver-lead concentrate (about 1,200 tons) in course of shipment to Oklahoma, U.S.A., as compared with no production at all during the first half of 1909. Then the record for the Consolidated Mining & Smelting Company's Richmond-Eureka group was as follows: To June 30, 1908, 900 tons; to June 30, 1909, 1,700 tons; to June 30, 1910, 2,200 tons; all of silver-lead ore, shipped to the company's smeltery at Trail.

Incidentally, it may be mentioned, that the Silverton Mines, Limited, developing the Hewitt-Lorna Doone group, and the Van Roi and Standard, all in Silverton or Four-Mile Creek camp; the Ellis Silver Mining Com-

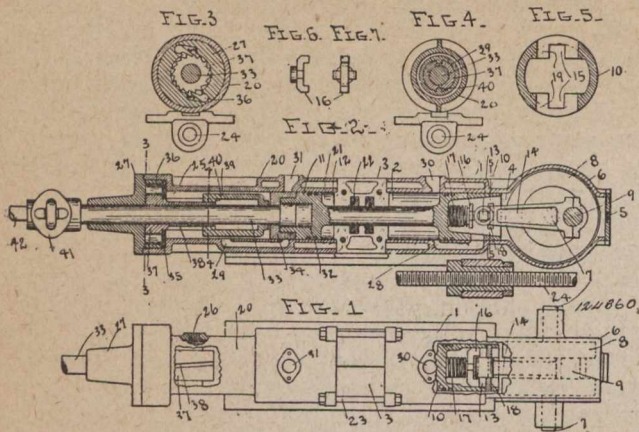
pany's Westmont, on Ten-Mile Creek, Slocan Lake; the Richmond-Eureka, Slocan Star, and Ruth-Hope groups, all near Sandon; the Surprise and Sunset, above Cody Creek; Rambler-Cariboo, in McGuigan Basin; Lucky Jim, near Bear Lake, Eastern Slocan; Whitewater group, in Whitewater camp, and Cork, on the south fork of Kaslo Creek, have each done development work which has made available more ore, and consequently considerably improves the prospect of increased tonnage during the latter half of the current year. In two or three instances the outlook is distinctly gratifying, so that it appears quite reasonable to look for a marked advance as a direct result of development work done in the mines.

In Nelson division there have been several increases in tonnage shipped, while the total quantity of ore put through stamp mills may also have been larger. The Queen Victoria, near Nelson, shipped about 700 tons of copper ore to Trail, as against none last year; the Silver King's production fell off 200 tons—1,600 as against 1,800 tons; the Yankee Girl, at Ymir, has 3,000 tons to its credit this year as compared with 500 tons to June 30th, 1909. Reliable statistics of gold-quartz ore milled are not available at present.

Other interior producing mines are the Silver Cup, in Lardeau district, owned by the Ferguson Mines, Limited, which usually maintains an average monthly production of about 140 tons of high-grade silver-lead ore, also containing gold, and the Hedley Gold Mining Company's Nickel Plate mine, which last year milled 31,000 tons of ore of an average value of between \$12 and \$13, and is now paying a quarterly dividend of 3 per cent. on its issued capital. Coast metal mines, as a rule, are not shipping ore; exceptions must be made in favour of the Marble Bay and Cornell mines, on Texada Island, both of which are stated to be returning profits to those operating them. There is development work in progress in other parts of the Coast district—on Howe Sound and in the country behind it; Valdes, Lasqueti and Queen Charlotte Islands; in several widely-separated parts of the Skeena River country, and elsewhere in the extensive region comprising what is comprehensively known as the Coast district. The part now attracting most attention is Portland Canal, in which district there are two mines sufficiently developed to give promise of proving productive, namely, the Hidden Creek Copper Company's big copper mine, on Observatory Inlet, an arm of Portland Canal, and the Portland Canal Mining Company's gold-silver-lead mine on Glacier Creek, a few miles from the head of the canal. The former has about 300,000 tons of copper ore in sight, and Mr. M. K. Rogers, of Seattle, Washington (well-known as the man who developed the Nickel Plate mine, near Hedley, Similkameen) states that \$400,000 has been expended on the property and that it is intended to erect a 500-ton smeltery there before long. The latter has also had much development work done on it during the last two or three years, under the supervision of Mr. C. H. Dickie, of Duncans, Vancouver Island, director, who early obtained the advice of Mr. W. J. Elmendorf, M.E., of Spokane, Washington, who has since been engaged as resident manager. A concentrating mill is being equipped with the requisite machinery, and an aerial tramway, to connect mine and mill, is now in use. These two companies have done much work and little talk, and have consequently made material progress towards proving whether or not mining on a commercial basis, not on paper only, can be made a profit-earning industry in the Portland Canal district.

CANADIAN PATENTS.

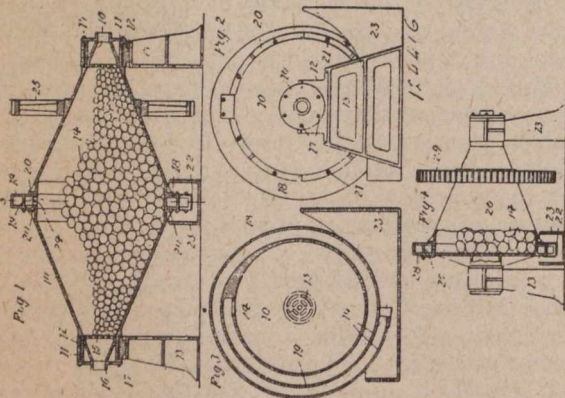
**No. 124,360. Internal Combustion Rock Drill.**  
*Foret à roc à combustion interne.*



Lewis L. Scott, Joplin, Missouri, U.S.A., 8th March, 1910; 6 years. Filed 3rd November, 1909. Receipt No. 176,002.

Claim.—A motor drill comprising a pair of opposed two-cycle explosive engines including pistons mutually connected, a crank shaft connected with one piston, a drill rod connected with the other piston, and means for rotating the drill rod, said drill rod projecting from the corresponding engine, and the remaining removable parts of the motor drill being entirely enclosed within the cylinders thereof, etc.

**No. 124,416. Pebble Mill. Moulin à galets.**



Max Frans Abbé, New York City, New York, U.S.A., 15th March, 1910; 6 years. Filed 10th February, 1910. Receipt No. 179,598.

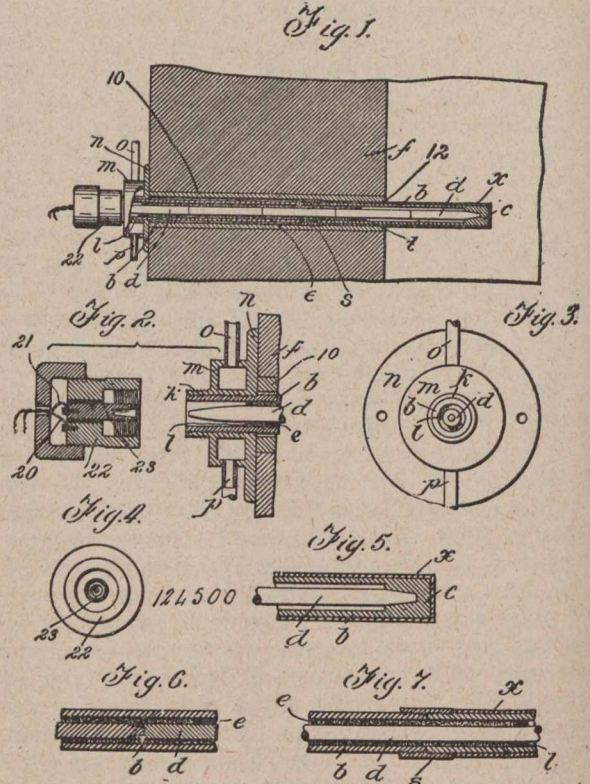
Claim.—1. A pebble mill comprising a coniform shell having a peripheral inlet opening at the widest portion thereof, a pair of supporting bearings, means for axially rotating the shell, grinding bodies inclosed within the shell, a casing encompassing the shell at the widest portion thereof, a spiral conveyer within the casing and communicating with the inlet opening, and trough into which said conveyer is adapted to dip.

2. A pebble mill comprising a coniform shell having a peripheral inlet opening at the widest portion thereof, a pair of trunnions, one of which is hollow, means for axially rotating the shell, grinding bodies inclosed within the shell, a casing encompassing the shell at

the widest portion thereof, a spiral conveyer within the casing and communicating with the inlet opening, and a trough into which said conveyer is adapted to dip.

3. A pebble mill comprising a coniform axially rotatable shell having a peripheral inlet opening at its widest portion, grinding means inclosed within the shell, and a spiral conveyer encompassing the shell at its widest portion and communicating with the peripheral inlet opening.

**No. 124,500. Thermo-Electric Pyrometer.**  
*Pyromètre électrique.*



Alfred Stansfield, Montreal, Quebec, Canada, 15th March, 1910; 6 years. Filed 21st December, 1907. Receipt No. 154,070.

Claim.—1. A thermo-electric couple comprising a graphite tube having therein an amorphous non-graphic carbon rod, substantially as described.

2. A thermo-electric couple one member whereof is of tubular form and the other a suitable conductor thermo-electrically different from and located within the tube, and a suitable electrical connection between such members, substantially as described.

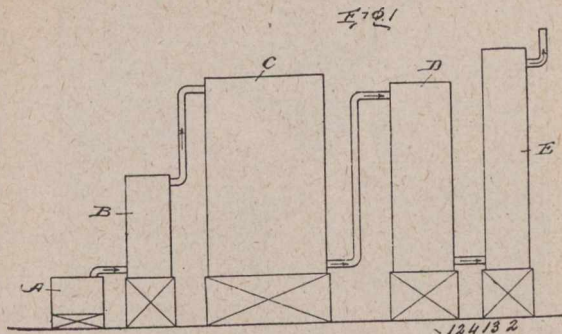
3. A thermo-electric couple one member whereof is of tubular form and the other a suitable conductor thermo-electrically different from and located within the tube, the electrical connection between such members being within the tube, substantially as described.

4. A thermo-electric couple one member whereof is of tubular form and the other a suitable conductor thermo-electrically different from and located within the tube, such tubular member having its fire end closed and the inner member being supported at one end by the said fire end and at another point by an insulating device within the tube and spaced from the fire end, substantially as described.

5. The combination with a thermo-electric couple and the terminals thereof, of a portable plug containing the terminals of a pair of conductors, such plug being adapted to be attached at the end of the couple and effect electrical contact between the respective terminals, substantially as described, etc.

**No. 124,132. Apparatus for the Manufacture of Sulphuric Acid.**

*Appareil à fabriquer de l'acide sulfurique*



Frederic J. Falding, New York City, New York, U.S.A.,  
1st March, 1910; 6 years. Filed 19th November,  
1909. Receipt No. 176,551.

Claim.—1. In an apparatus for the manufacture of sulphuric acid the combination of a source of sulphurous acid, a Glover tower, a lead chamber, having its vertical axis considerably exceeding any horizontal axis, cooling means for the reaction products and a Gay-Lusac tower, substantially as described.

2. In an apparatus for the manufacture of sulphuric acid the combination of a source of sulphurous acid, a Glover tower, a lead chamber having its vertical axis in the proportion of 3 to 2 for any horizontal axis, cooling means for the reaction products and a Gay-Lusac tower, substantially as described.

3. In an apparatus for the manufacture of sulphuric acid, a source of SO<sub>2</sub>, a Glover tower, a lead chamber having a height so far exceeding its length and breadth as to allow relative zones of reaction and inaction to be formed therein, cooling means for the products of such reaction and a Gay-Lusac tower, substantially as described.

4. In an apparatus for the manufacture of sulphuric acid, a source of sulphurous acid, a Glover tower, a lead chamber having its vertical axis in the proportion of about 3 to 2 over any horizontal axis, and a Gay-Lusac tower, substantially as described.

5. In an apparatus for the manufacture of sulphuric acid, a lead chamber having a vertical axis substantially in the proportion of 3 to 2 over any horizontal axis.

6. In an apparatus for the manufacture of sulphuric acid, a single lead chamber having its vertical axis greater than any horizontal axis.

Carload lots of fluorspar from localities in Colorado, Kentucky, and Illinois, consigned to steel manufacturing centres, range from 96.01 per cent. calcium fluoride down to 60.9, the average being about 85 per cent. Silica contents range from 1.22 per cent. up to 27 per cent., although usually the percentage of this impurity is below 12.

**BOOK REVIEWS.**

**THE COAL AND IRON INDUSTRIES OF NOVA SCOTIA, BY C. OCHILTREE MACDONALD; THE CHRONICLE PUBLISHING COMPANY, LIMITED, HALIFAX, N.S., 1909.**

No question can arise as to the usefulness, timeliness and authoritativeness of this book. The author, Mr. C. Ochiltree Macdonald, has long been identified with Nova Scotia's mining development. He has for some years collected material. The volume before us is the result.

In Mr. Macdonald's review of the coal-mining and iron industries, he traces historically the growth of each. He also touches sufficiently upon the geology of the coal and iron ore deposits, upon present industrial and social conditions, and upon the general possibilities of the province. The investor will find much miscellaneous information that can be found in no other collected form. The general reader will discover many interesting bits of history. Except for the fact that the book is execrably printed, it is worthy of commendation.

**CORRESPONDENCE.**

Home Life Bldg, Toronto, Ont.,  
July 6th, 1910.

Editor CANADIAN MINING JOURNAL,  
Confederation Life Building,  
Toronto, Ontario.

Sir,—The discussion in the Journal of July 1st with reference to the reduction of the percentage of oxygen in compressed air furnished by the Cobalt Hydraulic Power Company for power in mines, calls attention to the general question of mine ventilation.

In every mine in Cobalt, considerable time is lost by miners waiting for the workings to be cleared of fumes and gases produced by blasting. The amount of time thus lost is often considerable. There is also the loss in decreased efficiency of the miners because of constant bad air. Were these losses noted and itemized, the result would in many cases astonish the management, but like rich ore thrown over the dump, they are not accounted for and consequently are ignored. A system of ventilation by fans, or otherwise, is inexpensive to install and to operate, and would be paid for many times over during the year in increased efficiency and amount of labour, were the air pure.

Aside from the question of economics, the miner has a natural right to breathe pure air. Undoubtedly consumption and other diseases of the respiratory organs are contracted or stimulated by this impure air. It is little known how many men are carried to the surface unconscious because of breathing the poisonous gases incident to blasting, and many a man has been killed thereby.

In some mining districts compulsory ventilation is established by law, and I advocate that this be done in Ontario. No liberal-minded mine manager would oppose legislation which yields profit to his company, and is but justice to the miner.

Yours truly,  
FRANK C. LORING.

Imports into Canada of ferro-manganese and spiegel amount yearly to about 18,000 tons, having a money value of considerably more than half a million dollars.

## PERSONAL AND GENERAL.

Mr. R. B. Brinsmade, professor of mining engineering, University of West Virginia, examined several mining properties in the Lake of the Woods district during the latter part of June.

Mr. A. Erskine Smith, managing director of the Red Cliff Mining Company, Portland Canal, is now at the mine arranging for the development of a local water power to operate the plant.

Professor F. A. Thomson, head of the department of mining engineering of Washington State College, Pullman, Washington, lately sampled a "dry ore" silver mine in Sloean district, B.C.

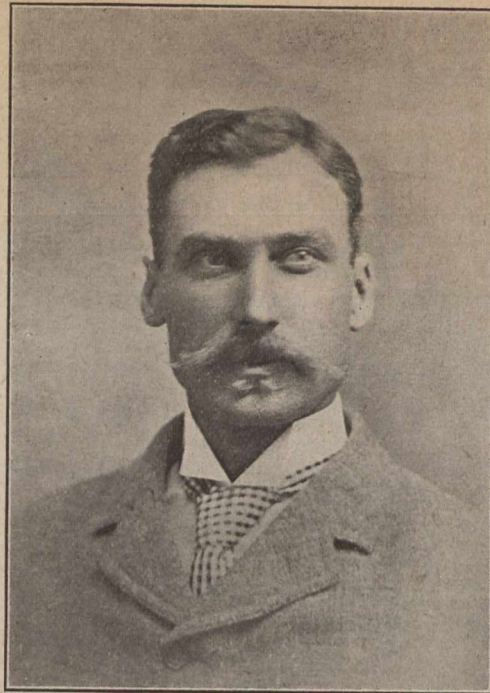
Mr. A. J. McMillan, managing director of the Le Roi Mining Company, early in July, left Rossland, B.C., on a business trip to England. He will probably return to British Columbia in August.

On Wednesday, June 29th, Dr. W. G. Miller left Toronto on his way to Stockholm, Sweden, to attend there the International Geological Congress. Dr. Miller will first visit Scotland. He will probably join the excursion to Spitzbergen arranged by the Congress.

Mr. Charles T. Mitchell, who for several years has been construction engineer at the Granby Company's smelter at Grand Forks, B.C., at which large and important additions and extensions have been made, is now with the Canadian Copper Company, at Copper Cliff, Ontario.

Our readers will be interested to learn that Messrs. Keuffel and Esser have established a repair department at the Montreal office, 252 Notre Dame Street, West, Montreal. The new department will be fully equipped to undertake the repairing of all classes of surveying, drawing, and measuring instruments.

Mr. Peter Christianson, until recently one of the district mine superintendents of the Dominion Coal Company, has been appointed general superintendent of the operations of the Pacific Pass Coalfields Company, in northwestern Alberta. It is with genuine and unanimous regret that the workmen and officials of the Dominion Coal Company see Mr. Christianson depart. His record in Cape Breton is a remarkable one. Mr. Christianson is a Dane, and when he landed from a Norwegian sailing vessel over twenty years ago he was not acquainted with the English language. From the lowest position in a coal mine, Mr. Christianson has worked himself from overman to manager and from manager to superintendent, gaining at the same time a reputation for modest integrity which any man might envy. While Mr. Christianson's departure from Cape Breton will be a distinct loss to the mining community, he will be an acquisition to our western colleagues in his new position, and the good wishes of Cape Breton friends will follow him. Mr. Alexander MacDonald, for many years manager of Dominion No. 4 (Caledonia) Colliery, has been appointed as superintendent of No. 3 district in Mr. Christianson's stead. The new collieries at Lingan, now rapidly becoming an important part of the Dominion Coal Company's operations, are not included in the district allotted to the new superintendent, and it is said they will be constituted a new and separate district.



R. W. LEONARD.

Mr. R. W. Leonard, St. Catharines, Ont., has been appointed by the Ontario Government to fill the vacancy on the Board of Governors of the University of Toronto, caused by the death of Dr. Goldwin Smith. Mr. Leonard is the only mining man on the Board. The choice is a good one. For years Mr. Leonard has been closely identified with mining. He is a graduate of the Royal Military College, Kingston. Always an enthusiastic member of the Canadian Mining Institute, last winter he was elected to the position of vice-president. Fortune has smiled substantially upon him. He is one of the chief owners of the Coniagas mine, Cobalt, from which something more than travelling expenses is received annually. As president of the company, and of the subsidiary smelting concern at Thorold, Mr. Leonard has moulded the policies of both. Incidentally, he is a prominent member of the Canadian Society of Civil Engineers, a military enthusiast, an inventor in a mild way, and an all-round good citizen. The University is warmly to be congratulated.

Mr. H. Harris, formerly superintendent, under Mr. R. Hedley, of the Hall Mining & Smelting Company's smeltery at Nelson, B.C. and of the Brown Alaska Company's smeltery at Hadley, Prince of Wales Island, Alaska, is now general manager for the Tasmanian Smelting Company, Limited, at Zeehan, Tasmania, where he also has charge of two mines.

Dr. T. L. Walker, of the University of Toronto, was in British Columbia recently in connection with an investigation of the molybdenum deposits of Canada he is making for the Mines Branch of the Dominion Department of Mines, for the purpose of completing and publishing a monograph on this subject.

Professor Milnor Roberts, dean of the school of mines of the Washington State University, Seattle, lately again visited the coal mining district in Nicola Valley, B.C.

Mr. J. B. Woodworth has returned from a professional visit to Newfoundland, during which he inspected a large number of promising mining claims.



Mr. W. L. Coulson, of Somerset, Pennsylvania, formerly in charge of coal mines in Virginia, Kentucky and Pennsylvania, respectively, has been appointed general manager for the Canadian Collieries (Dunsmuir) Limited, which recently acquired the Wellington Colliery Company's collieries on Vancouver Island, B.C.

Mr. James Ashworth, of Fernie, B.C., general manager of the operating department of the Crow's Nest Pass Coal Company, Limited, has been giving expert evidence at Victoria in connection with an action for damages brought on behalf of the widow and children of one of the 32 miners who lost their lives in the Wellington Colliery Company's Extension coal mines, Vancouver Island, when an explosion took place there last October.

Mr. E. Hibbert, for several years superintendent of the mines of the Le Roi No. 2, Limited, at Rossland, B.C., has succeeded Mr. Paul S. Couldrey as superintendent of the British Columbia Copper Company's Mother Lode mine, near Greenwood, Boundary district, B.C.

The annual consumption of coal in Canada is approximately 20,000,000 tons. Of this quantity the United States supplies slightly more than 50 per cent.

The annual consumption of coal per capita has risen in Canada from 0.758 ton in 1886 to 2.83 tons in 1908.

Since the year 1895, Canada's coal production has shown a steady annual increase. Since 1876, only during four years, namely, 1883, 1885, 1892, and 1895, has there been a falling off in annual outputs.

## SPECIAL CORRESPONDENCE

### NOVA SCOTIA.

**Dominion Coal Output.**—The output of the mines for the month of June exceeded all expectations, being over 359,000 tons. This is 4,000 tons in excess of last June, and is a record for this particular month. Only on one previous occasion has the monthly output ever been larger than was obtained in the past month. This was in July, 1908, when the tonnage reached 368,000 tons. The prediction made in a recent letter that 16,000 tons would be reached in one day was justified in the last week of the month, for which the daily figures were as follows:

	Tons.
Monday, 27th .....	14,263
Tuesday, 28th .....	16,541
Wednesday, 29th .....	16,289
Thursday, 30th .....	13,824

These figures constitute a record for continuous production over several days. On one occasion, in 1904, the output for a day reached 16,600 tons, and in July, 1908, the figure of 16,359 was reached, but no four days in the company's history ever before yielded as much coal as the ones detailed above.

The output of the individual collieries was as follows:

	Tons.
Dominion .....	50,056
Number 2 .....	67,944
Number 3 .....	34,703
Caledonia .....	42,030
Reserve .....	33,904
Number 6 .....	23,789
Hub .....	20,036
International .....	16,450
Number 9 .....	35,357
Emery .....	13,876
Number 12 .....	16,742
Number 14 .....	3,476
Number 15 .....	758

359,121

It will be noticed that the new collieries at Lingan, namely Nos. 12, 14, and 15, contributed the respectable total of 20,000 tons to the general output. Owing to the incidence of the Dominion Day holiday with pay day, and Saturday the beginning of July showed much smaller outputs, and as there are fewer working days in July than last month it will be difficult to exceed the figures which were obtained in June, and the output will probably be about the same.

**The Colliery Relief Societies.**—The consolidation of the Colliery Relief Societies is now an accomplished fact, the Dominion Coal Company Employees' Benefit Society having commenced its corporate existence on the 1st of July. The election of officers and the details of organization will be completed at the first general meeting of the society, which is to take place on the 5th of July. The new scale of contributions and benefits becomes effective from the first of the month. Further details of the completed scheme will be communicated to the Journal probably in the next issue.

### ONTARIO.

**Cobalt.**—The Beaver quarterly report for the period ending May 31st shows a cash balance of over \$22,000. On May 4th a car of high-grade ore, assaying over 3,000 ounces, was shipped, but the returns are not included in the cash balance shown.

The annual statement of the La Rose will show a production for the past year of 3,150,000 ounces, which is a slight increase over 1908. In view of the action of the directors in cutting the dividend rate from sixteen to eight per cent., this production is, however, very encouraging. The company is paying dividends at the rate of \$600,000 a year, so that there will be a very considerable amount to put into the cash reserve, which will, it is believed, amount to nearly \$600,000. Developments on the different properties are encouraging, particularly on the Lawson and Princess. On the former there are now two good ore shoots, on the No. 11 and No. 2 veins, that are producing high-grade ore. The Princess shows signs of becoming a steady producer, and is now in much better shape than formerly.

The Nipissing Company will sink two new shafts on veins discovered this season. One of these will be near the boundary of the Chambers Ferland, and the other near the Gillies Limit line, in the vicinity of Cart Lake. The latter is in the Keewatin formation, and very good silver values were found a short time ago. This company has declared its regular quarterly dividend of five per cent., with a bonus of two and one-half per cent.

The Little Nipissing has received word from the Peterson Lake Company that it has been granted a five-years' extension from the present date of expiry of its lease. This will mean that the Little Nipissing will have over seven years ahead of it, and the management will have more encouragement to go ahead and develop their holding. A decided improvement has taken place in the vein at the bottom of the winze at a depth of 225 feet. The vein is under and is carrying better values.

The management of the Haileybury Frontier Company has ordered a five-drill Canadian Rand power-driven compressor for its property in South Lorrain. This will be installed as soon as possible, as the work is badly handicapped for lack of power. The shaft is now down 125 feet, and will be sunk to the 150-foot level before a cross-cut is run to top the vein. Several promising leads have been found on the surface, and it was on one of these carrying good values in silver that the shaft was sunk.

Some time ago the Right-of-Way dump was purchased by several local people, and the first shipment from it has been made to one of the concentrators. The returns were very satisfactory, and the owners have decided to have the whole dump, which amounts to about 6,000 tons, treated.

In the Gillies Limit the Wyandoh is getting high-grade ore above the 110-foot level. Some values have also been encountered in a winze, on the same vein, to the east of the shaft. Some good ore is also being taken from the Waldman, and a winze is to be sunk on the vein from the bottom level.

The new Victoria vein, of the Crown Reserve, which was found on May 24th, promises to be one of the best yet opened upon the property. It is of good width, and carries remarkably high grade ore. From the 200-foot level a crosscut is being run parallel to the Kerr Lake line, which it is expected will open up the veins located by the diamond drill. The German government has become a buyer of Crown Reserve ore, and has contracted with the company to supply it 1,000,000 ounces. The ore will be very high grade, assaying approximately 4,000 ounces to the ton, and it will take about eight carloads to make up the required amount. The German government is operating a smelter and treating low grade ores, but as these were found to be too low to be profitable, they will be used in combination with that produced by the Crown Reserve.

A cross-cut from the bottom of the winze at the 280-foot level of the Cobalt Lake, has opened up the Morrison vein. When first cut it showed a number of small stringers, but when drifted on for about twenty-five feet, four inches of high-grade ore was encountered. It is expected that the Pellatt vein will also be caught in a short cross-cut from the 280-foot level.

The annual report of the Chambers-Ferland states that on May 15th, which is the end of the fiscal year, the company had cash on hand and ore in transit to the value of \$117,217. Of this \$14,400 has to be paid to the Ontario government as royalty. The gross value of ore produced during the year amounted to \$130,968.24, and the total cost of production was \$83,689.85, leaving a total profit of \$47,278.39. On May 15th there were thirteen cars of ore ready to ship. These were medium grade, assaying approximately 250 ounces to the ton. The ore reserves are estimated at 240,000 ounces.

A very satisfactory report, issued by the Buffalo Mines, Limited, shows a general increase. During the year 33,708 tons of ore were hoisted, and all of this went to the concentrator. The average assay was 40 ounces to the ton, and an extraction of 78.60 per cent. was made. The production from the cyanide plant was 54,872 ounces, bringing the total extraction up to 82.67 per cent. Thirty cars of ore were shipped during the year, containing 654 tons of concentrates and 115½ tons of high grade. The concentrates averaged 1,570 ounces to the ton, while the average for the high grade was 3,126 ounces per ton. The total production for the year was 1,491,750 ounces, being an increase of 559,761 ounces over the previous year. The increase in profits was \$197,723.89, while \$142,000 in excess of the previous year was paid in dividends. There was also a very large increase in the ore reserves.

The following dividends will be payable during the month of July: McKinley-Darragh, three per cent. regular and two per cent. bonus, \$112,348.85; Nipissing, five per cent. regular and 2½ per cent. bonus, \$450,000; Right of Way, two per cent.

regular, \$29,971.08; Buffalo, five per cent. regular, \$50,000; Crown Reserve, six per cent. regular and nine per cent. bonus, \$265,322.10.

Some rich ore has lately been found on the No. 16 vein of the O'Brien. On the 150-foot level the vein was practically barren, so it was decided to sink still further. When the winze was down a short distance, it passed into the diabase formation, and the values came into the vein again. The new shaft sunk through the mill, through which all the ore will eventually be hoisted, is practically completed, and will be in operation when the electric hoist is installed.

There are at the present time three cyanide plants in operation in this district, at the Buffalo, O'Brien, and Nova Scotia. The former was started last August and treats only the slimes from the concentrate. Since it has been in operation it has treated 6,424 ons of slimes, assaying about thirteen ounces to the ton, and containing a total of 83,034 ounces of silver. The total ounces recovered were 54,872, giving an extraction of 66 per cent. The Nova Scotia plant has been in operation only a short time, and, although good results are believed to have been obtained, no official figures are as yet available.

The Dominion Reduction Company has decided to erect a 100-ton custom concentrator on Kerr Lake, to treat the low grade ore from that section of the camp. It is understood that arrangements have been made to erect the plant on the property of the Crown Reserve, and that this company's ore will be the first to be treated. The Cobalt Central mill in that section also treats custom ores, but the location is against its being used to any great extent.

The Lucky Godfrey Company, at Elk Lake, has lately been the victim of a most sensational high-grading case. Last April a car of ore was shipped from the property to the smelter at Thorold. It was supposed to have a value of approximately \$40,000, but when the sacks were opened at the smelter they were found to contain low grade ore and waste rock, the whole car being worth a very small sum. It appears that several employees of the mine were implicated, and that before the ore left the property, the worthless material was substituted for the high grade ore. By this time it is probable that the ore is scattered all over the country and it is very doubtful if the company will be able to recover much of it.

At the Temiskaming mine high-grade ore is now being produced from two veins on the 400-foot level, one of the veins having been opened up from the shaft, while the other was picked up in a winze from the 350-foot level. The shaft has now reached a depth of 475 feet, and it is probable that another level will be opened up at this point. The new concentrator is running steadily, and is treating about 90 tons a day.

Ore is now being hoisted from the No. 3 shaft of the Tretheway, which was put down near the boundary of the Hudson Bay. The new concentrator is operating to full capacity, and is putting through between 80 and 90 tons a day.

**Gowganda.**—The first full thirty tons of ore to be sent out of this district by water, were shipped a few days ago from the Millerett Mine. This is somewhat in the nature of a trial shipment, and whether or not more will be sent out depends on the cost and the ease with which it can be handled. The ore had to be hauled over thirty miles by wagons, and then was transported down the river by boat. The roads are in very bad shape and teams can only haul from a thousand to fifteen hundred pounds a trip. No repairs have been made on the road since it was first built, but it is now expected that some of the prisoners from the jails at North Bay and other places will be sent in to keep it in shape. This high cost of transportation and the slight possibility of a railroad being built into the district makes it imperative that some method of concentrating the low and medium grade ores be used. The management of the Reeves Dobie has decided to put in a small plant, including two Nissen stamps. These will have a capacity

equivalent to an ordinary five-stamp battery, and will effect an important saving. It is probable that the Millerett will also install a somewhat similar plant in the near future.

**Porcupine.**—Excellent results have recently been obtained on the property of the Crown Chartered Company, and they now have better showings of free gold at a depth of seventy feet in the shaft than were originally obtained on the surface. As the different properties develop and larger plants are installed, as will be the case with several mines next winter, the question of power will have a more and more important bearing. The only fuel is, of course, wood, and the immediate supply of this will naturally decrease rapidly. In order to provide against this difficulty a syndicate of Montreal men has obtained the right of a water-power about forty miles distant from the centre of the district. Several engineers are at present engaged in making a survey of the power and an estimate of the cost of putting in a plant. The work of getting in supplies is becoming more difficult every day, on account of the low water. The rivers and lakes are falling rapidly, and it is thought that the gasoline launches will have to stop running very shortly, and that transportation by canoes will be the only method available. It is understood that New York capitalists are negotiating for a sixty per cent. interest in the Timmins-McMartin properties. They offer the present owners \$1,000,000 and further agree to put \$500,000 in the treasury for working capital, the only stipulation being that the owners complete the payments that are still due on the properties. It is doubtful, however, if this offer will be accepted, as the Timmins' contemplate forming a company of their own.

#### BRITISH COLUMBIA.

Mr. John B. Hobson has been preparing for hydraulicking on his placer-gold claims on the north fork of Quesnel River, in Cariboo district. He has been constructing a pipe-line about 3,000 feet in length, for the purpose of bringing in water for gravel-washing.

Zinc ore and concentrates are being shipped from Slocan mines to the United States. The Lucky Jim, Whitewater group, and Van Roi are the shippers. Mineral claims on Pingston Creek, in the Arrow Lake division of West Kootenay, are being prospected by New York men, who have bonded a group on which there are large showings of zinc ore.

A wagon road is being made from Phoenix to the No. 7 mine, Central camp, Boundary district. The Consolidated Mining and Smelting Company has between 40 and 50 men at work on the No. 7, to which a four-mile aerial tramway is being constructed, starting from the railway near Boundary Falls. A 10-drill air compressor, recently put in to supply power for this mine, is now in operation.

The "Ferne Free Press" lately published the statement that "the largest tonnage of coal in the history of the Crow's Nest Pass Coal Company's mines, at Coal Creek, was being mined there. On several recent days more than 3,000 tons of coal were taken out during twenty four hours."

The West Kootenay Mining Corporation, Limited, has been registered in London, England, with a capital of £125,000 in £1 shares, to adopt an agreement with Emissions Minières, Limited, a French company, which had acquired the Joker and other mineral claims situated at the head of the south fork of Kaslo Creek, in Ainsworth mining division.

Announcement has been made that the Canadian Collieries (Dunsmuir) Limited, will open four new mines on Vancouver Island, two at Extension and two at Cumberland. Mr. Wm. Mackenzie, of Mackenzie and Mann, president of the new coal-mining company, has been credited with the statement that the company will, two or three years from now, be producing coal at the rate of 2,000,000 tons annually. At no time during the Dunsmuir (Wellington Colliery Company) ownership of these mines has their annual total production been as high

as 1,000,000 tons—of late years it has been 700,000 to 800,000 tons.

At the first annual meeting of the New Dominion Copper Company, held a short time ago in New York, a statement was presented showing that wages claims against the old company, totalling \$13,389, had been paid, and that diamond drilling in the company's Rawhide mine, and other expenditures during the fiscal year ended March 31, together with \$26,938, had also been paid.

The lowest tunnel in the Lucky Jim mine, Slocan, which last December entered one of the large shoots of zinc ore that had been mined at higher levels, is now in the second big shoot of ore, distant between 800 and 900 feet from the portal of the tunnel. This development will largely increase the tonnage of ore available for shipment to the smelter. An aerial tramway from this low-level adit to the railway below, is being constructed, and other preparations for shipment of ore on a larger scale than in the past are also being made.

**Slocan Lake.**—In the western part of Slocan district, about Slocan Lake, mining is being carried on in several camps. The Mollie Hughes, near New Denver, has been sold to Vancouver, British Columbia, men. A recent discovery of ore on the Madonna claim, about three miles from New Denver, has been reported. The California, situated up on a mountain near the same town, has again been leased, and development work commenced; this mine gave a former lessee profitable returns from his operations.

There are some of the finest showings of ore at present to be seen in the Slocan in the faces of two drifts in the Standard mine, on Four-Mile Creek, near Silverton. In one level the lode is large—up to 30 feet in one place, with 4 to 5 feet of galena, in which also occurs fahlerz carrying high value in silver. The remainder of the lode is chiefly quartz with silver-lead and zinc through it. After the best ore is sorted out the remainder is placed on the dump to await the provision of concentrating facilities. Another level has a 12-foot lode, about one-third of which is shipping ore, and the rest of it concentrating material. Another level is being opened, at greater depth, and in this adit there are indications of the occurrence of ore which encourage the expectation that the valuable ore-shoot cut in the two levels above will also be found in this working.

About 100 men are regularly employed on the Van Roi, ore from which is concentrated at the Wakefield Company's mill, leased by the Van Roi Mining Company. Approximately 30,000 tons of ore have been mined and milled during the nine expired months of the company's fiscal year. Last year, to September 30, the output was 11,127 tons, but operations did not extend over a full year. Some 1,200 tons of zinc-silver concentrate, which accumulated at the mill during the winter months, is being shipped to Oklahoma, U. S. A.; it is expected this will bring the company \$25,000, after payment of freight and smelting charges. The other mill product, a high-grade silver-lead concentrate, is sent to the Consolidated Mining and Smelting Company's smeltery, at Trail. The chief work being done in the Van Roi mine is on levels Nos. 3, 4, and 5, on the main vein, and on No. 4 in the south vein. The latest and most important and satisfactory results have been those from development work in the south vein. This was only recently reached, by a cross-cut from the main vein on No. 4 level. The ore has been found to be of good width, and assay returns from it have been excellent, so it is thought this vein will prove as valuable as the main vein from which latter a large tonnage has been mined and which has heretofore been the mainstay of the mine. More development work will have to be done, though, before it can be regarded as reasonably certain this hope will be realized. The work now in progress is further development preparatory to opening stopes. All the ore taken out in the course of drifting on this vein has been milled, but

stopping has been in the main vein only, and that above No. 4 level. There is equally good ore ready for being stoped on No. 5 level, but, as the portal of that adit is on the east side of the mountain, from which as yet there is no tramway connection with the Wakefield mill, no stoping has been done here. Nos. 3 and 4 levels are entered from the west side of the mountain, and the upper terminal of the tramway connecting with the mill is near the portal of the latter, while a "baby" tram provides a means for bringing the ore down from No. 3 to the terminal.

This mine gives employment to more men than any other in the Slocan, and its development is proving the existence in this part of Silverton camp of extensive and valuable shoots of ore, as has also been shown to be the case in other mines in the vicinity.

No ore has been shipped from the Hewitt-Lorna Doone group for several years, the policy of the Silverton Mines, Limited, the present owner, being to do much development work and block out much ore before commencing to ship. There is much silver-lead-zinc ore blocked out already, and lower levels are being opened to ensure a still larger tonnage before milling operations shall be undertaken.

Higher up Four-Mile Creek development work is also being done on the Fisher Maiden property, at which a tunnel is being driven at a lower level than that of the old workings.

The Westmont, on Ten-Mile Creek, is being worked by the Ellis Silver Mining Company. Some 25 men are employed, and the work in progress is reported to indicate that a productive mine will be established here. The Ottawa and Neepawa, both also in the Slocan Lake section of the district, are having work done on them, but with only a few men each.

Mr. Alfred McMillan has again leased the Velvet mine, near Rossland, to Mr. Ed. Ehrenberg, of Spokane, Washington. Some time ago Mr. Ehrenberg had a lease of this property, but, owing chiefly to the bad state of the road to the mine and consequent difficulty and expense of getting supplies in and ore out, he threw it up. Arrangements having been made to repair the road, he will try again to make the mine a profitable producer, and is sanguine he will succeed. Already men have been put to work, and development will be vigorously proceeded

with. The ore is gold-copper, and the value of that shipped in earlier years was generally good.

A revival of interest in mining in the northern part of Fort Steele mining division, and in Windermere mining division, both in East Kootenay, is looked for as likely to result from the building of the Kootenay Central Railway, the construction of 30 miles of which is to be undertaken shortly. The Cranbrook Prospector expects the opening of a large mineral territory on the west side of Kootenay River, from Elk River north to Windermere. Along the route the new railway will take there are a number of mining properties on which much development work has been done and which have ore on the dump awaiting the provision of railway transportation facilities. It is quite probable a considerable improvement in matters connected with mining in the upper Kootenay and upper Columbia valleys, and along the valleys of creeks tributary to those larger streams will follow the opening of a railway through the district.

Up to May 10 the chief development work done on the Portland Canal Mining Company's Gipsy claim was as follows: No. 1 tunnel was in 225 feet; No. 2, 180 feet; and No. 3, 540 feet. An incline raise, 100 feet, connects Nos. 2 and 3. This constitutes the most development done on any claim in the camp. An aerial tramway, 8,500 feet in length, and 2,100 feet difference in altitude of its terminals, is in use. The first unit, nominal capacity 75 tons per day, of a concentrating mill is being equipped with the machinery and plant usually put in for concentrating ores containing silver and lead. This mill will be in operation before the end of August, unless something now unforeseen delays completion. A 6-drill air compressor is also being installed; it will be direct-connected to a Pelton water wheel. Water will be brought in a distance of 1,000 to 1,200 feet, and will furnish about 270 h.p. The Portland Canal Mining Company was the first to do much development work in the camp, and its management has from the first shown its bona-fide by mining in the ground rather than on paper only. It is satisfactory to know that with Mr. W. J. Elmendorf as resident manager, the property is under the direction of a competent and experienced mining engineer, so that it may be expected to be worked to best advantage.

## GENERAL MINING NEWS.

### NOVA SCOTIA.

**Halifax.**—Mr. Justice Drysdale has granted an order in the case of the Cumberland Railway and Coal Company vs. McDougall and others, restraining the defendants and all members of the U. M. W. A., resident in Nova Scotia, from intimidating employees, and from watching places of business. The order holds until final judgment shall have been given in the trial of this action.

**Halifax.**—A lease of the Cumberland Railway and Coal Company's coal areas in Cape Breton, with option of purchase within that time for \$500,000 to the Dominion Iron and Steel Company has been recorded. It is understood negotiations were opened when there was trouble between the Dominion Steel and Coal Companies over the coal supply for the steel works, and it was thought possession of the Cumberland Company areas would make the Steel Company independent as to its coal supply.

### ONTARIO.

**North Bay.**—The property of the Montreal Reduction and Smelting Company, at Trout Mills, Ontario, is offered for sale by the liquidator. It is stated over \$275,000 was spent on the smelter. It is not stated how much was spent in selling the stock of the company, which was being boomed here not so very long ago.

**Sudbury.**—The new stamp mill at Long Lake, belonging to

the Canadian Exploration Company, was started at the beginning of last week and everything is running in a most satisfactory way. Ten stamps are in operation, and these, with the cyanide plant, will be experimented with and any desirable modifications noted. As the ore deposit is very extensive, the crushing capacity of the mill will be increased as required. Sudbury already feels the benefit of this new enterprise in its neighbourhood.

**Long Lake.**—The Canadian Exploration Company, Limited, made its first mill run at the plant at Long Lake during the month of June. As this is a private corporation details are not furnished, but it is understood that the new metallurgical process was very successful and that an extraction of 92 per cent. was obtained.

### ALBERTA.

**Coleman.**—A discovery of platinum is reported near Coleman. The report has not been substantiated.

### BRITISH COLUMBIA.

**Hosmer.**—The daily output of steam coal from the Hosmer collieries is 250 tons.

**Phoenix, B. C.**—It is probable that the Granby Consolidated Company will take options on some of the properties in the Franklin camp and develop them with a view to adding to the Granby ore reserves. O. B. Smith, superintendent of the Granby mines, has just completed an examination of several

properties on the north fork of the Kettle River, particularly those in Franklin camp.

The McKinley and Glouster are the particular groups of claims which Granby interests have under consideration. The McKinley has a tunnel in about 250 feet at a depth of 175 feet, and 115 feet of drifting. The property is owned by the McKinley Mines Company (Ltd.), which claims to have secured assays running up to 10 per cent. copper, 10 ounces silver, and \$1 in gold. Close to the McKinley are the Ajax, Jumbo, I. X. L., Manhattan, and Gold King, all of which have good indications of ore.

The Glouster property is on the Banner Mountain, close to which are the Banner, Bullion, Mountain Lion, Alpha and Home Stake claims. The Glouster has a 50-foot shaft, and is said to have ore running 13 per cent. copper with \$2.50 in gold and silver.

Franklin camp contains numerous deposits of self-fluxing sulphide ores, with values running from \$8 to \$40, and with the Granby smelter only 45 miles away there are good prospects for a flourishing camp.

**Vancouver.**—Material for the largest gold dredge in the world is now being shipped from Vancouver to Dawson. The plant will be installed on Bear Creek, at the mouth of the Klondike River. It is planned to have the hull of the dredge assembled and the machinery in place in time to make some test runs before the end of the present season, so that everything may be in shape to start permanent operations as soon as Bear Creek opens next spring. The dredge is owned by the Canadian

Klondike Mining Company, which controls a large area of ground on Bear Creek. All the material entering into the construction of the hull of the dredge is being purchased in Vancouver. Over 500,000 feet of lumber will be contained in the hull of the dredge.

**Victoria, June 30.**—That the plaintiffs, Henry Croft et al., are entitled to registration of their option on certain coal lands was the ruling of Chief Justice Hunter to-day upon a point of law arising out of the suit of the aforementioned against Hon. James Dunsmuir, Whiting, Percy et al., for \$4,600,000 damages. The suit stands over until after the vacation.

It is alleged that the defendants persuaded the owners of the lands in question to break their contract with the plaintiffs, and give a second option to Whiting which he attempted to register before the plaintiff's options were registered.

The lands in question are included in those ceded to William MacKenzie in the purchase of the Dunsmuir coal interests for \$11,000,000.

**Victoria.**—Mr. R. W. Riddell, until recently manager of the British American Trust Company, with headquarters in this city, has been promoted to the position of managing director of the International Coal and Coke Company, Limited.

Mr. Riddell is well known locally, having for several years been manager of Saunders' grocery establishment and other commercial concerns here. He will now be stationed at Coleman, Alberta, the headquarters of the International Coal and Coke Company, in which concern A. C. Flumerfelt, of this city, is largely interested.

## MINING NEWS OF THE WORLD.

### UNITED STATES.

**Los Angeles, Cal.**—The bringing in of three more gushers in the Midway district has further complicated the oil situation and assures the further congestion of conditions in the field. With a few months in which to complete the storage and pipe line projects, together with the entering into new contracts with the railroads and other large consumers of fuel, who are inquiring into the merits of California oil, there is little doubt but that the present situation would be greatly clarified. But with the bringing in of more gushers the production is advancing with such gigantic bounds that many of the best informed oil experts are freely admitting that a policy of curtailment must be immediately inaugurated if the present price of the fuel is to be maintained.

**Los Angeles, Cal.**—Latest advices are to the effect that the Navy Department is considering the more extensive use of fuel oil for the American navy, now that a practically inexhaustible supply has been demonstrated in the California fields. The battleships Delaware and North Dakota, the two biggest fighting craft in the world, consumed oil for fuel in their trial trips, and the results have proven eminently satisfactory to the naval officers. The battleship Utah, the monitors Florida, Wyoming, and Arkansas, and some destroyers, have been equipped with oil burners in addition to their coal bunkers. Those in a position to know regard it as certain that the American warships will largely use fuel oil in the future, particularly when on the western coast. The recent completion of the Producers, Associated and Standard lines insures prompt deliveries of the oil to the government stations.

**Cripple Creek, Colo., July 2.**—The Cripple Creek gold district for June produced 61,515 tons of ore of the value of \$1,249,302. The month was featured by the commencement of operations at the new mill of the Portland company on Battle Mountain. This plant uses the secret process invented by the company's employees and is handling the low-grade dump ores with success. Ore of as low an average grade as \$2.46 per

ton was put through the mill during the month, and the profit is said to exceed \$1 a ton. No official figures as to the actual saving have been made public, though the amount handled is placed at 8,863 tons.

**Boston, Mass., July 2.**—What is believed to be the first move on the part of the Amalgamated Copper Company in an extended plan for the curtailment of its output has just been made in the discontinuance of all Sunday work upon its properties. Heretofore the mines have been working from one-half to one shift on Sunday, but now both shifts are laid off and the action taken means practically a 10 per cent. reduction in output.

**Ely, Nev.**—Since the inflow of water in the lower pit of the Nevada Consolidated last week two steam shovels have been working on ore on the level above, extracting on an average of nearly 9,000 tons of ore per day. A survey has been made for a new line of churn drills on the south of the pit, which will bring the machine to within 200 feet of the north line of the Chispa, owned by the Ely Central. The overburden in that section is heavy, and is growing heavier as the work progresses. But it is stated that the best grade of ore is now coming from that section of the pit. All of the ties and most of the steel have been laid for the railroad at the new steam shovel pit on the Liberty claim, a half-mile west of the old pit, but the shovels have not yet arrived.

**Salt Lake City, Utah.**—A body of ore 10 feet wide, which carries values of \$28 a ton in copper and gold, has been cut by the long tunnel of the Utah Mines Coalition Company. It is the first material result to be obtained from the systematic campaign of development started by the company about 16 months ago, and its importance is not so much in the direct result itself as it is in the promise these indications afford.

**Spokane, Wash., July 2.**—Miners' Protective Association of Pine Creek has been organized by 30 operators and prospectors on the north side of the Coeur d'Alenes in Shoshone County, Idaho, to save the standing timber on mineral ground at its harvesting would injure the mining industry.

**SOUTH AFRICA.**

A cablegram from Johannesburg states that during May the mines of the Rand alone (i.e., excluding outside mines) crushed 1,785,821 tons. The average yield per ton was 28s. 3d., the working costs per ton were 17s. 6d., the profit per ton was 10s. 9d., and the aggregate profit 958,347 pounds. Compared with April (which contained one working day less) 22,717 tons more were crushed, the yield improved 2d. per ton, and as costs remained the same the profit was 2d. per ton more, and the aggregate profit was 31,103 pounds greater.

The annual report of the Transvaal Chamber of Mines for the year ended December, 1909, shows that while the number

of stamps at work on the Rand only increased from 9,035 to 9,252 during the year, some 148 tube mills enabled the average duty per stamp to be increased from 4.86 tons per 24 hours in 1902, when there were no tube mills, to the average daily duty of 6.85 tons in 1909. The tonnage milled was equal to the capacity of 13,161 stamps of the 1902 capacity. In eight years the crushing capacity has increased by nearly 41 per cent, largely through the use of tube mill auxiliaries. Another feature of the return is the reduction in working costs. In January, 1908, the average for the Rand was 19s. 5d. per ton, and the average profit was 12s. 7d. per ton. In December, 1909, working costs had declined to 17s. 2d. per ton, while profits had only declined 1s. 5d. to 11s. 2d. per ton.

**COMPANY NOTES.****NIPISSING'S DIVIDEND RECORD.**

With the payment of the recent 7½ per cent., the Nipissing Mines Company will have disbursed to its stockholders the sum of \$5,040,000 in cash since July 20th, 1906.

This does not include the amount paid by the operating company, the Nipissing Mining Company, Limited, to the syndicate prior to the above date, which amounted to about \$400,000 between October 20, 1905, and June 20, 1906. Adding the amount to the surplus being carried by the company, of about \$1,000,000, makes a total of \$5,440,000 taken out of the property in less than five years, or more than the entire capital stock of the company at par.

While the company is in a position to increase its quarterly disbursements to stockholders, no such action is contemplated, but it is probable that interim dividends will be declared from time to time. It is stated on reliable authority that another interim dividend will likely be declared the latter part of the year, bringing the total amounts disbursed for 1910 up to 40 per cent.

The production of the Cobalt camp is expected to show a substantial increase over that of last year, which, in view of the advance in the price of silver, will mean gratifying increases in earnings of all of the producing companies. The output of both the Nipissing and the La Rose companies for 1910 are expected to be the largest in the history of the properties.

For the five months ended May 31 last the Nipissing Mines Company makes the following exhibit:

	Expenses.	Shipments.
January .....	\$40,591	\$187,114
February .....	35,966	174,528
March .....	47,300	214,785
April .....	37,371	216,192
May .....	.....	208,537
Total, five months .....	\$161,318	\$1,001,156

**THE NEW DOMINION CO.'S FIRST REPORT.**

At the first annual meeting of the New Dominion Copper Company, held in New York recently, Newman Erb, vice-president, made a report for the fiscal year to March 31, 1910, as follows:

"The New Dominion Copper Company, on June 17th, 1909, acquired the property of the Dominion Copper Company, from the reorganization committee together with \$347,999 cash. There having been no net earnings during the period, no payments were made on the income bonds on April 30.

"There was paid off \$13,389 labour claims outstanding against the old company, while other expenses totalling \$26,936 were incurred through diamond drill operations on the Rawhide mine for five months.

"An experimental contract has been entered into whereby the British Columbia Copper Company will treat 25,000 tons

of our ores. Indications are that the New Dominion cannot furnish from 1,000 to 2,000 tons of ore daily, so that the erection of a new mill would not be justified."

John A. Sleicher has been succeeded as director by Clifford A. Chaffee, while at the first annual stockholders' meeting the following were reelected for the ensuing year: Newwan Erb, N. Bruce Mackelvie, F. L. Sommer, Charles A. Starbuck, Lucius W. Mayer, who will be elected president, and W. W. Foster.

Le Roi No. 2 has paid \$1,033,200 in dividends. This sum includes the dividend of 50 cents per share payable on July 8.

**NEVADA CONSOLIDATED COST RECORD.**

The Nevada Consolidated Copper Company, in the month of May, established a new record in cost per pound of copper produced. The net cost was 5.91 cents per pound, which bears out the contention of the management that the Nevada Consolidated can produce copper cheaper than any other mine in the United States.

The net earnings of the Nevada Consolidated for that month were \$400,000, after depreciation deductions, which were at the rate of \$4,800,000 a year. Nevada Consolidated is now paying at the rate of \$3,000,000 a year in dividends.

Nevada Consolidated's world-breaking record in low copper costs was made in the face of the fact that only seven-eighths of the plant was in operation during the month of May. Production for the month amounted to approximately 6,000,000 pounds, which was at the rate of 72,000,000 pounds a year. Had the plants operated full, production for the month would have exceeded a rate of more than 80,000,000 pounds a year.

**VAN-ROI MINING CO., LTD.**

The following cable has been received by the London office from the company's managers at Rossland:

"Shipped during May, 220 tons concentrates.

"Received from smelter, \$15,651 for 151 tons concentrates.

"Mill report for the month of May: Total amount crushed, 2,709 tons, yielding 120 tons lead concentrates, assaying 167.9 ozs. silver, 61.4 per cent. lead, 13.7 per cent. zinc; and 100 tons zinc concentrates, assaying 56.6 ozs. silver, 2.7 per cent. lead, 44.3 per cent zinc. Total approximate value, \$14,169. Mill ran 533 hours.

"Estimated expenditure for corresponding period including mining, milling, development, and other expenses, \$15,975.

"No. 4 level (main reef) advanced eastwards 70 feet. South reef: Near the hanging wall west of crosscut, advanced 70 feet, of which the first 40 feet, 6½ ozs. silver, 2 per cent lead, 11 per cent. zinc; width of 2 feet. For the last 20 feet ore in footwall. End of drive 66 ozs. silver, 3¼ per cent. lead, 14¼ per cent. zinc; width of 2 feet. Near the footwall 20 feet to the south, advanced east 22 feet and west 18 feet—promising.

"Zinc shipments delayed, shortage cars. Diamond drills finishing soon. Expenses will be less."

# STATISTICS AND RETURNS

## COBALT ORE SHIPMENTS.

Following are the shipments from the Cobalt camp for the week ending July 1, and those from January 1, 1910, to date:

	July 1.	Since Jan. 1.
	Ore in lbs.	Ore in lbs.
Beaver .. .. .	60,167	180,617
Buffalo .. .. .	51,900	1,015,268
City of Cobalt.. .. .	58,900	422,735
Chambers-Ferland .. .	59,600	773,200
Cobalt Central .. .		293,286
Cobalt Lake .. .		260,900
Cobalt Townsite .. .		68,000
Colonial .. .		148,900
Coniagas .. .		745,176
Crown Reserve .. .	171,000	3,313,238
Drummond .. .		664,200
Hargraves .. .		101,800
Hudson Bay .. .		241,435
Kerr Lake .. .	300,600	4,920,416
King Edward .. .	46,330	221,296
La Rose .. .	79,800	6,315,541
McKinley-Darragh .. .	135,440	1,623,639
Nipissing .. .		5,407,337
O'Brien .. .	110,040	758,086
Peterson Lake.. .. .		330,710
Provincial .. .		65,000
Right-of-Way .. .		818,247
Silver Cliff .. .		159,990
Timiskaming .. .	120,000	921,830
Trethewey .. .		503,950
Waldman.. .. .		63,992

Ore shipments for the week ending July 1 were 1,193,777 pounds, or 596 tons.

Total shipments from January 1 to July 1 were 30,338,789 pounds, or 15,169 tons.

Following are the shipments from the Cobalt Camp for the week ending July 8th, and those from January 1st to date:

	July 8.	Since Jan. 1.
	Ore in lbs.	Ore in lbs.
Beaver .. .		180,617
Buffalo .. .	55,400	1,070,668
City of Cobalt .. .		422,735
Chambers-Ferland .. .	64,000	837,200
Cobalt Central .. .		293,286
Cobalt Lake .. .		260,900
Cobalt Townsite .. .		68,000
Colonial .. .		148,900
Coniagas .. .	120,480	865,656
Crown Reserve .. .	213,420	3,526,658
Drummond .. .		664,200
Hargraves .. .	78,000	179,800
Hudson Bay .. .	56,400	297,835
Kerr Lake .. .	300,000	5,279,816
King Edward .. .		221,296
La Rose .. .	231,000	6,546,541
McKinley Darragh .. .	55,830	1,679,469
Nipissing .. .	347,930	5,755,267
O'Brien .. .		758,086
Peterson Lake .. .		330,710
Provincial .. .		65,000
Right-of-Way .. .	63,500	881,747
Silver Cliff .. .		159,990
Timiskaming .. .	80,740	1,002,570
Trethewey .. .	87,900	591,850
Waldman .. .		68,992
Wyandoh .. .	48,300	48,300

Ore shipments for the week ending July 8th were 1,802,900 pounds, or 901 tons.

Total shipments from January 1st to July 8th were 32,201,089 pounds, or 16,100 tons.

## BRITISH COLUMBIA ORE SHIPMENTS.

Nelson, June 25.—The ore shipments for the past week are decidedly satisfactory. Both the shipments and the smelter receipts for the first half of the year are now well over the million ton mark, an excellent showing indicating steady progress in the mining all over the Kootenay.

Appended are the details.

Property.	Boundary.	Week.	Year.
Granby .. .		23,014	609,092
Snowshoe .. .		4,074	86,547
Mother Lode .. .		4,200	153,905
Oro Denoro.. .		376	6,389
Jack Pot .. .		378	1,361
Nickle Plate (Hedley) .. .		116	364
Other mines .. .		—	163
Total .. .		32,158	857,821

### Rossland.

Centre Star .. .	3,403	94,801
Le Roi .. .	241	7,283
Le Roi No. 2 .. .	667	16,137
Le Roi No. 2 milled .. .	300	7,500
May Flower .. .	16	25
I. X. L. .. .	2	131
Other mines .. .	—	268
Total .. .	4,629	126,145

### Slocan-Kootenay.

St. Eugene, milled .. .	2,775	69,375
Whitewater, milled .. .	600	15,000
Van Roi, milled .. .	800	20,000
Kootenay Belle, milled .. .	70	1,750
Granite Poorman, milled .. .	250	6,250
Queen, milled .. .	420	10,500
Nugget, milled .. .	110	2,750
St. Eugene .. .	282	8,604
Richmond Eureka .. .	84	2,182
Yankee Girl .. .	125	2,838
Sullivan .. .	218	5,889
Standard .. .	33	562
Second Relief .. .	27	64
Queen Victoria .. .	133	658
Ottawa .. .	20	20
Other mines .. .	—	24,246
Total .. .	5,949	170,689

### Smelter Receipts.

Granby, Grand Forks .. .	23,014	609,212
Consol. Co., Trail .. .	9,057	241,290
B. C. Copper, Greenwood .. .	4,954	121,655
Total tons .. .	37,475	1,012,157

The Consolidated Mining and Smelting Company of Canada, Limited, Trail Smelter statistical statement for May, 1910:

Tons ore received: Month, company's mines, 31,031; other mines, 7,993; total ore received, 39,024; eleven months to date, company's mines, 376,824; other mines, 73,332; total ore received, 450,156.

Tons ore smelted: Month, copper furnaces, 35,687; lead furnaces, 5,446; total, 41,133; eleven months to date, copper furnaces, 398,903; lead furnaces, 51,656; total, 450,559.

Metals produced: Month, gold, 13,691 oz., \$279,171; silver, 282,727 oz., \$152,182; copper, 473,480 lbs., \$59,615; lead, 3,119,639 lbs., \$84,614; total, \$575,582; eleven months to date, 125,451 oz., \$2,566,355; silver, 2,019,464 oz., \$1,057,991; copper, 5,464,157 lbs., \$715,622; lead, 38,624,422 lbs., \$1,080,769; total, \$5,420,737.

Month, value of gold, 48.5 p.c.; value of silver, 26.4 p.c.; value of copper, 10.0 p.c.; value of lead, 14.7 p.c.; total 100 p.c.; eleven months to date, value of gold, 47.4 p.c.; value of silver, 19.4; value of copper, 13.3 p.c.; value of lead, 10.0 p.c.; total, 100 p.c.

**SHARE MARKET.**

(Courtesy of Warren, Gzowski & Co.)

Miscellaneous—July 8th, 1910.

	Bid.	Ask.
Amalgamated Asbestos .....	..	21
Dominion Coal Co. ....	..	..
Dominion Steel Co. ....	56 5/8	56 3/4
Nova Scotia Steel .....	..	78
Granby .....	25	26
Consolidated Smelting .....	60	75
Crow's Nest Pass .....	..	88
Dominion Steel & Coal Corp.....	58 1/8	58 1/2

Cobalt Stocks—July 8th, 1910.

Amalgamated .....	.03 1/4	.04 1/2
Beaver Consolidated .....	.23 1/8	.23 1/4
Buffalo .....	2.20	2.60
Chambers-Ferland .....	.17	.18
City of Cobalt .....	.20 1/2	.21
Cobalt Central .....	.09	.10
Cobalt Lake .....	.14 1/2	.15
Coniagas .....	4.40	5.50
Crown Reserve .....	2.70	2.74
Gifford .....	.06 1/2	.07 1/2
Foster .....	.09 3/4	.14
Green Meehan .....	.01 1/2	.02
Great Northern .....	.05 1/2	.06 1/2
Hudson Bay .....	96.50	102.00
Hargraves .....	.16 1/4	.17
Kerr Lake .....	8.05	8.20
La Rose .....	4.10	4.25
Little Nipissing .....	.14 3/4	.14 7/8
McKinley Darragh Savage .....	.90	.91 1/2
Nancy Helen .....	.03	.05
Nipissing .....	10.55	10.90
Nova Scotia .....	.29	.35
Ophir .....	.15	.30
Otisse .....	.03 5/8	.04 1/2
Peterson Lake .....	.19 3/4	.20
Right of Way .....	.23	.25
Rochester .....	.14 3/4	.15
Silver Leaf .....	.07	.07 1/8
Silver Bar .....	.03	.06
Silver Queen .....	.05	.10
Timiskaming .....	.62 1/4	.63 1/2
Trethewey .....	1.15	1.20
Watts .....	.05	.10
Wettlaufer .....	.65	.71

New York Curb—July 8th, 1910.

Boston Copper .....	15	20
British Columbia Copper .....	4 7/8	5
Butte Coalition .....	17	17 1/2
Canadian Mines .....	6 1/4	6 3/8
Chino Copper .....	10 1/4	10 3/8
Davis-Daly Copper .....	1	1 1/8
Ely Consolidated .....	.45	.50
Gila Copper .....	..	..
Giroux Mining .....	6 1/4	6 7/8
Goldfield Consolidated .....	8 15/16	9

Greene-Canadian .....	6 7/8	7
Harcuvar Copper .....	..	..
Inspiration Copper .....	6 15/16	7
Miami Copper .....	18 5/8	18 7/8
New Baltic Copper .....	5	9
Nevada Con. Copper .....	..	..
Ohio Copper .....	1 5/8	1 11/8
Rawhide Coalition .....	15 1/2	16
Ray Central .....	2 1/8	2 3/8
Ray Consolidated .....	16 5/8	17
Union Mines .....	1 1/8	1 15/16
Yukon Gold .....	4	4 1/8

**SILVER PRICES.**

	New York cents.	London pence.
June 21 .....	53 3/4	24 3/4
" 22 .....	53 3/4	24 3/4
" 23 .....	53 5/8	24 3/4
" 24 .....	53 1/2	24 11/8
" 25 .....	53 3/8	24 5/8
" 27 .....	53 1/2	24 11/8
" 28 .....	53 3/8	24 5/8
" 29 .....	53 1/2	24 11/8
" 30 .....	53 1/2	24 11/8
July 1 .....	53 1/4	24 5/8
" 2 .....	53	24 1/2
" 4 .....	Holiday	24 5/8
" 5 .....	53 1/4	24 5/8
" 6 .....	53 7/8	24 15/16

**TORONTO MARKETS.**

July 8.—(Quotations from Canada Metal Co., Toronto).

- Spelter, 5 1/2 cents per lb.
- Lead, 3.65 cents per lb.
- Antimony, 8 to 8 1/2 cents per lb.
- Tin, 34.00 cents per lb.
- Copper, casting, 13.15 cents per lb.
- Electrolytic, 13.15 cents per lb.
- Ingot Brass, 9 to 12 1/2 cents per lb.

July 8.—Pig Iron. (Quotations from Drummond McCall Co., Toronto).

- Summerlee No. 1, \$23.50 to \$24.00 (f.o.b. Toronto).
- Summerlee No. 2, \$23.00 (f.o.b. Toronto).
- Midland No. 1, off the market.
- Hamilton No. 1, \$20.50 (f.o.b. Hamilton).
- Hamilton No. 2, \$20.00 (f.o.b. Hamilton).
- Clark's, \$20.25 (f.o.b. Toronto).
- Cleveland, \$20.50 (f.o.b. Toronto).
- Coal, anthracite, \$5.50 to \$6.75.
- Coal bituminous, \$3.50 to \$4.50 for 1 1/4-inch lump.

**Coke.**

July 6.—Connellsville Coke (f.o.b. ovens).  
 Furnace Coke, prompt, 1.75 to \$1.80 per ton.  
 Foundry Coke, prompt, \$2.10 to \$2.25 per ton.

July 6—Tin (Straits), 32.87 1/2 cents.  
 Copper, Prime Lake, 12.60 to 12.70 cents.  
 Electrolytic Copper, 12.30 to 12.40 cents.  
 Copper Wire, 14.00 cents.  
 Lead, 4.45 cents.  
 Spelter, 5.35 cents.  
 Antimony, 22.25 to 23.00 cents.  
 Sheet Zinc (f.o.b. smelter), 7.50 cents.  
 Antimony, Cookson's, 8.25 cents.  
 Aluminium, 22.25 to 23.00 cents.  
 Nickel, 40.00 to 47.00 cents.  
 Platinum, ordinary, \$34.00 per ounce.  
 Platinum, hard, \$36.00 per ounce.  
 Bismuth, \$2.00 per lb.  
 Quicksilver, \$47.00 per 75-lb. flask.