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CIRCULATION.

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A FORWARD MOVE.

In making provision for courses in mining and metallurgy the University of Toronto, although largest of all Canadian universities in point of numbers, has lagged sadly behind her sister institutions, Queen's and McGill.

The School of Mining of Queen's University and the department of mining at McGill have world-wide reputations. Graduates of either institution have much of which to be proud. At Kingston and Montreal strong staffs of professors and assistants take care of some hundreds of students in mining and allied branches of study. At both places there are ample mining and metallurgical laboratories.

With the University of Toronto the case is different. While nominally there are courses in mining and metallurgy, in actuality the two subjects, geology and mineralogy, which should be entirely subordinate branches, have grown at the expense of the other essentials.

This condition has arisen, no doubt, because of the facts that geology and mineralogy have long been included in the general University curriculum, and not until within comparatively late years has mining been dealt with at all.

But, whatever the cause of this undesirable reversal of usual relations, the effects are evident. Queen's and McGill have more mining students than they can take care of. The University of Toronto is not in the race.

But the fact that the University of Toronto has neglected mining in the past does not prevent her from making a good beginning now. The recent appointment of Mr. H. E. T. Haultain to the chair of mining and metallurgy is a most hopeful symptom. Mr. Haultain is vigorous, competent, and enthusiastic. In the course of his professional career he has worked in many parts of the globe, including Canada and the United States. He has, moreover, the good fortune to be a Canadian.

We take it that the selection of Mr. Haultain to fill this most important chair is merely the first step towards a complete recognition of mining and metallurgy, as the foremost subjects in the curriculum of the School of Practical Science.

In its progress towards the goal of efficiency and practical usefulness, the School of Practical Science may count upon the support of Canadian mining men, and no better means could be desired to secure and retain that support than the appointment of such men as Mr. Haultain.

SPECULATION AND MINING.

Our excellent contemporary, the Mining and Scientific Press, has contracted a habit that is not in keeping with its normal tone of healthy, discriminating, and

alert intelligence. On more than one occasion it has emphasized its belief that mining is essentially speculative. To this belief we taken strong exception. Most of the catastrophes that have marked the history of mining in this and other countries would never have occurred had reasonable precautions been taken to remove the speculative elements in mining investment. It is true that mining promotions, as permitted by the lax administration of laws, or by the absence of a healthy public sentiment, are highly speculative. But it is wholly wrong to characterize the industry of mining as inherently speculative. The properly conducted mining enterprise carries no greater risks than does the ordinary commercial concern. Risks there are, and always will be, in all branches of human activity. Mining risks, sanely controlled, need be no greater than those taken by merchants or manufacturers. But it is illogical to damn mining merely because mining risks are described in different terms and because mining ventures are too often launched by predatory brokers. "Speculative" is a vague word. The Mining and Scientific Press is published in San Francisco. San Francisco was recently destroyed by earthquake. Another earthquake may raze the whole city to-day or to-morrow, or—not until doomsday. This adds an instructively speculative feature to the construction of buildings in San Francisco.

The green-grocer purchases perishable garden truck. He is a loser if he cannot dispose of his purchases within a given time. Millions of dollars are made and lost in gambling in wheat. Yet farming is not described as a speculative calling.

But it is unnecessary to multiply instances. Speculation may be defined as accepting heavy risks in the hope of making great profits. Every industry furnishes opportunity for speculation. No industry is free from the effects of human errors. Strikes and "Acts of God" cannot be foreseen. But it is the business of trained men to estimate possibilities, guard against error, meet competition, and provide for contingencies. In no industry are the rewards of industry, perseverance, and skill so rich as in mining. In no industry is there such utter need to root out the parasitic speculator.

Safeguards are provided for the mining investor. For a relatively small outlay he can ascertain the probable value of a prospect or the minimum value of a mine. He need not look far for honest and competent advisors.

In a word, it is idle and harmful to predicate for mining any higher degree of speculative uncertainty than is manifest in all the ordinary vocations of mankind. Mining should be a "business" in the strictest sense of that word.

A NEW FLOTATION PROCESS.

In our exchange column will be found an extract from a contemporary describing a new concentrating machine, which in simplicity of design is almost revolutionary. The machine is the invention of a Glasgow metallurgist. It consists essentially of a revolving iron tube, the inner side of which is grooved like a bolt-nut. A thin stream of water carries finely-crushed ore through this tube. Here each particle is repeatedly subjected to the surface tension of the water, as the grooved tube revolves. The impermeable sulphides are rapidly surrounded by a supporting envelope of air, and the permeable silicates and other gangue material are penetrated by the water. Thus when the ore enters the discharge apron the sulphides and gangue are completely separated. In practice three or four successive tubes are found necessary.

Unlike other flotation processes, the one in question depends entirely upon the surface tension of water. Neither oil nor chemicals are used.

From results reported it would seem that the new process is to have a large application, especially on the concentration of complex sulphide ores.

COBALT AND THE GLOBE.

Some weeks ago the Toronto Globe published a scathing arraignment of the morals of Cobalt town. Cobalt was condemned utterly by the Globe's sanguinary editor.

Cobalt, as a striving and self-respecting town, resented the Globe's utterances. A Cobalt newspaper demanded an apology from the Globe. No apology was forthcoming.

In this instance the Globe, unable to shift the responsibility of its indiscretion, and unwilling to make proper amends to the citizens of Cobalt, bethought itself of the expedient of using a Saturday supplement in which Cobalt should figure largely. This was done.

Cobalt itself may be left to decide whether this does or does not remove the *casus belli.*

NEW BRUNSWICK OIL SHALES.

The Dominion Government early this summer sent Dr. R. W. Ells, of the Geological Survey, to Scotland with instructions to look into the Scotch oil-shale industry. From the property of the Albertite Oilite and Cannel Coal Co., Limited, a parcel of 42 tons of New Brunswick oil-shale was shipped to Pumpherston, Scotland, for experimental purposes.

Dr. Ells' report is to appear shortly. Meanwhile, from unofficial sources, we are informed that the test was most satisfactory. The Scotch shales, which are the basis of an exceedingly prosperous industry, yield an average per ton of 28 gallons of crude oil and 75 pounds of ammonium sulphate. As compared with these figures the New Brunswick shipment showed a yield per ton of 40 gallons of oil and 75 pounds of ammonium sulphate,. This indicates that this comparatively large shipment was richer than the richest Scotch shales.

The property of the company that controls the New Brunswick oil-shale deposits covers 190 square miles in the counties of Westmoreland, Albert and Kings. Seven veins, ranging in thickness from 4 feet to 8 feet, have been opened. They lie between well-defined walls. The

veins show a dip of about 25 degrees N. Their strike is roughly east and west. There is every promise of an enormous supply.

When it is remembered that the Scotch oil-shale companies pay dividends at as high rates as 50 per cent., and, further, that the New Brunswick deposits are probably more workable in every respect than the Scotch, it becomes a matter of wonder that these rich deposits have remained so long unworked.

In a later issue the Canadian Mining Journal will publish a complete account of these Canadian oil-shales.

CORPORATIONS AND POLITICS.

The Nova Scotia Steel and Coal Co. and the Dominion Coal Company have issued a notice to their employees instructing them to refrain from active participation in the canvass at the approaching Federal elections. All officials of the companies are prohibited from using their official positions to influence unduly any voter. The notices state that it is expected and desired that every employee will use his vote according to his convictions.

It is well that large corporations should clear their skirts of complicity in politics. We use the word "complicity" advisedly, for it seems a fitting term as politics are conducted to-day. It is extremely undesirable that corporation officials and their policies should be dragged into the political game. Whenever this has happened the results have been anything but happy.

There are officials, and there always will be officials, who are unable to understand that any power or influence attached to their position, is the power of the corporation, and none of their own. A corporation official is the servant of his employers in his official capacity. In that capacity he may be temporal lord of thousands, but as a citizen he is the possessor of one vote, and nothing more. If he cannot divorce his official power from his position as an elector, he loses, or should lose, his usefulness to the corporation he is supposed to serve.

We think the straightforward pronouncement of the two Cape Breton corporations referred to is in every way commendable.

DOMINION COPPER.

The Dominion Copper Company, successor to the Montreal and Boston Consolidated, has applied for a receivership. Dominion Copper inherited a legacy of trouble from its predecessor. From October, 1907, until July of this year, its mines were closed. This summer, for a period of seven weeks, the plant and mines were active. Failure to make a payment of sixty thousand dollars, due on its sinking fund under terms of a mortgage held by the National Trust Company, is the immediate cause of the receivership.

The Dominion Copper Company is capitalized at $5,000,000, in shares of $5. It has also a bond issue of $1,000,000, only a small amount of which has been retired.

The Dominion owns and operates five mines near Phoenix and Greenwood. It also owns some high-grade gold-silver claims. Its smelter at Boundary Falls has a daily capacity of 800 tons of copper ore.

Its largest mines, the Rawhide and the Brooklyn, are in good condition, and show heavy reserves of fair copper ore. Within the last two years large sums have been expended in plant and mine improvement. At present, therefore, the physical condition of the company's properties is apparently excellent.

Re-organization is to follow. There is every reason to believe that the Dominion Copper Company will soon resume production.

YUKON'S GOLD.

Cheering news comes from the north. Changes and improvements in the methods of hydraulicking have made possible the handling of gravels in greater quantity than heretofore. The enlarged scale upon which dredging is performed makes profitable much gold-bearing material neglected in the past. The season of work has been lengthened, power cheapened, gold recovened, gold recovery gradually improved, until the effects are tangibly expressed in a largely augmented annual gold output.

For 1907 the reported production of gold in the Yukon was $3,150,000. The figures for 1908 will probably exceed $5,000,000.

MOISTURE IN COKE.

The moisture contained in coke is a serious item in metallurgical works. When immersed in water, coke absorbs as much as 35 per cent. of its weight. So pronounced is this hygroscopic power that coke containing 4 to 7 per cent. moisture after quenching often is found to carry 10 to 12 per cent. when received by the purchaser. The absorption depends of course upon the humidity of the atmosphere. But the facts adduced accentuate the need of great care in quenching.

The production of quicksilver in the United States has been falling off steadily during the past five years. Where there were 20 producing mines in 1904 there are now but ten. During this period the production has decreased from 32,000 flasks of 75 lb., to about 17,000.

The singular phenomenon of hard steel being cut by a rapidly revolving disc of soft steel has been somewhat puzzling. A microscopic examination by an English engineer, F. W. Harbord, has now shown that the metal acted upon is heated nearly or quite to the melting-point of steel, but only at the point of contact with the disc.

The Development of the Lash Process for Making Soft Steel in the Electric Furnace.

In our February 1st, 1908, issue we published a description of the Lash Process for making steel, and outlined in a general way what The Canadian Lash Steel Process Co., Ltd., was undertaking in the way of the development of this process in the electric furnace, and promised our readers a report of the results after

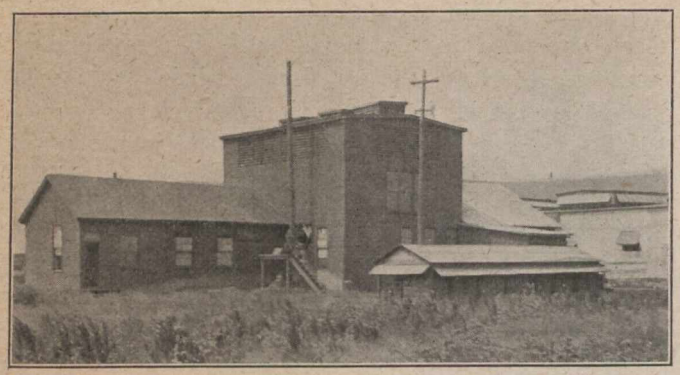


FIG. 1—BUILDINGS—CANADIAN L. S. P. CO.

the plant was in operation. This company having built their plant, and completed their test runs, we give below a description of the same, and the results of these runs. A brief description of the process is as follows:—

The Lash Process consists of making a mixture of concentrated magnetic ores, or iron ore sands, granulated pig iron and carbon, and charging the same into either an electric or open hearth furnace and producing steel. It is not a direct process in the strict sense of the word, but is an ore and pig process, the ore, however, being greatly in excess of the amount of pig iron used, and practically eliminating the scrap, using only such scrap as is made in the regular operation of a steel works.

The amount of pig iron required to make a ton of steel is less than one-half of what is required in regular open hearth practice when the mixture is used in an electric furnace, on account of its non-oxidizing atmosphere; this feature, coupled with the fact that the rest of the mixture is iron ore, which is, of course, the cheapest source of metallic iron, helps to produce a ton of steel ingots at a price much lower than they are produced in regular practice, either in the United States or Canada, figuring the electric power required at its regular market price as sold in large quantities.

Figure No. 1 gives a view of the plant, which is located in Niagara Falls, N.Y., corner 28th Street and Buffalo Avenue.

Figure No. 2 gives a view of the furnace just before starting the plant, which furnace is of the Heroult type of 1,000 horsepower capacity, and is capable of making 4 to 5 tons of steel in one heat.

Figure No. 3 shows the same furnace in operation, and was taken during the making of the twentieth heat.

Figure No. 4 shows the hydraulic tilting mechanism of the furnace, and the back of the furnace in a tilted position while pouring.

Figure No. 5 shows the transformers, which were made by the General Electric Company, and are of 750 k.w. capacity.

Figure No. 6 shows the casting crane with the slag ladle hanging thereon, and a view into the pit, where the casting was done. (All ingots cast at this plant were bottom poured in groups, and were 6x6 inches square, weighing on an average 500 pounds each.)

Figure No. 7 shows the mixing plant, in which the material was mixed that was charged into the furnace, the ore, granulated pig iron or cast iron borings, and carbon in the form of coke, charcoal or anthracite caol, being put into this plant and thoroughly mixed with a small proportion of slacked lime, the slacked lime being used to keep the material in bond.

The operation of this plant was as follows: A mixture of 67 per cent. of magnetic iron ore, 23 per cent. of cast iron borings or granulated pig iron, 10 per cent. of coke dust was put into the mixing pan in batches of about 500 pounds and allowed to thoroughly mix for 10 or 15 minutes, when about 4 per cent. of the slacked lime was added. After this material was thoroughly mixed and a sufficient quantity had been accumulated, a sufficient amount of the same to make 4 tons of steel was charged into the electric furnace; about 100 pounds of steel scrap was scattered over the top of the same, and a small bar was put into the furnace to form an arc for the electrodes; the electrodes were then lowered into

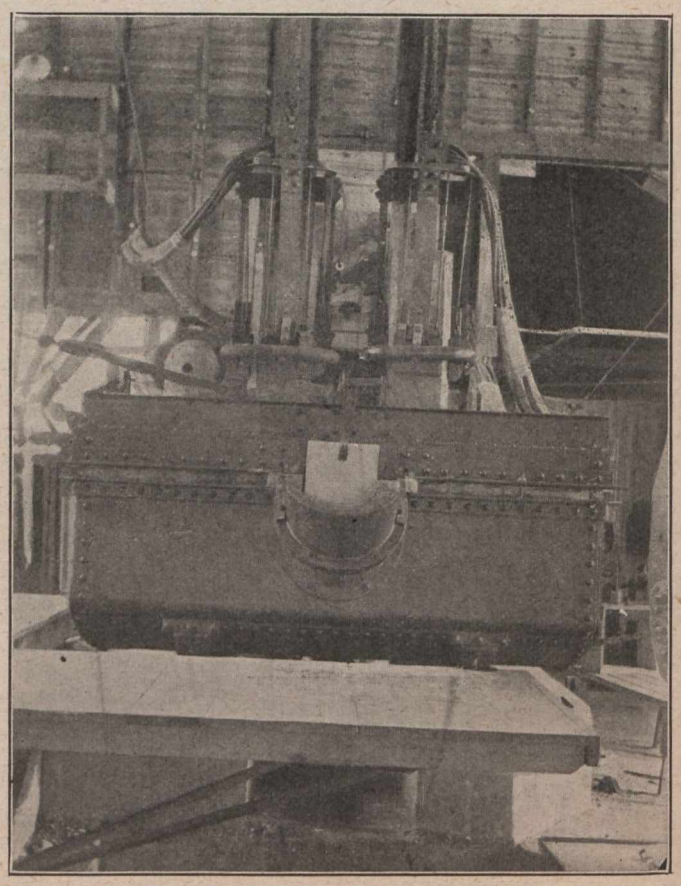


FIG. 2—ELECTRIC FURNACE, 100 H.P. CAPACITY.

position, the current turned on, the furnace closed up tight, and the entire batch of material was melted After the same was thoroughly melted, the slag was poured off into the slag ladle, and a refining slag put into the furnace for the final refining of the metal; on completion of this operation, the metal was poured into

the casting ladle, thoroughly draining the furnace, and then cast into ingots, when the next charge was added and the operation repeated as described above.

A full report describing the entire operation at this plant of all the heats made would be very lengthy.

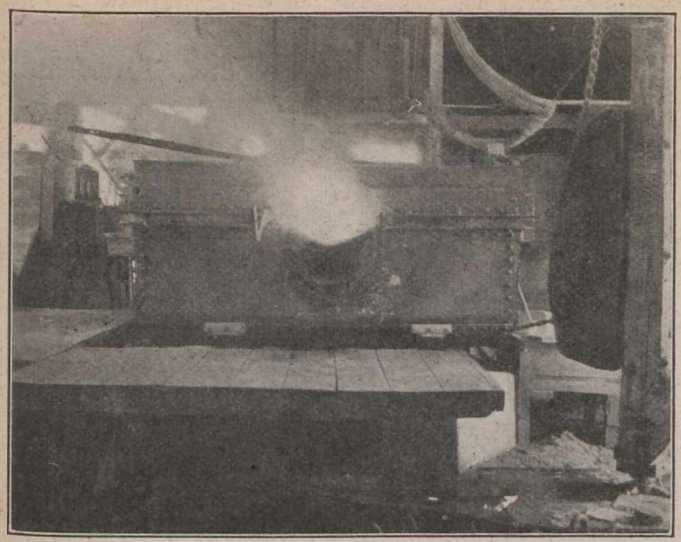


FIG. 3—FURNACE IN OPERATION.

During the making of the first ten or twelve heats no attention was paid to getting definite results, but the first runs were for the purpose of familiarizing the men with the process and the furnace operation, and also to ascertain the best methods of charging, refining, etc.

Some of these heats were made with the material in the form of bricks, which were being preheated in the stack of the furnace before charging, and while this method did not give the best results in every respect, it is believed that the future operation of a large plant would be along these lines, or along the lines of preheating the mixture without briquetting, because from a theoretical standpoint, this method is ideal, making use, as it does, of the waste heat of the furnace for a partial reduction of the material.

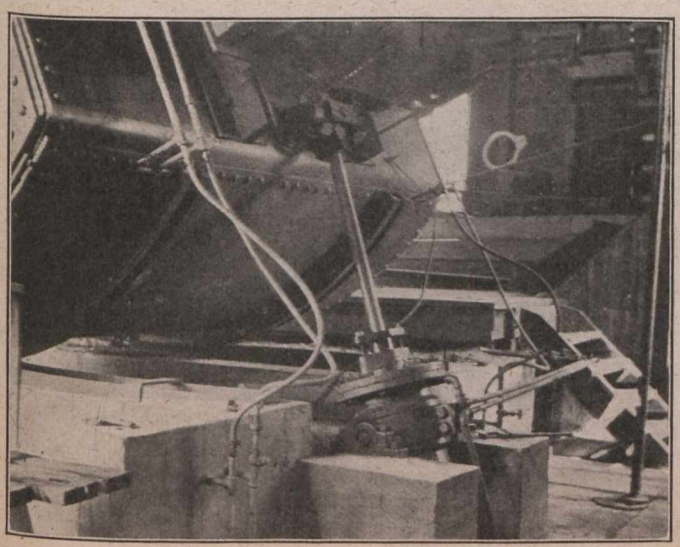


FIG. 4—FURNACE TIPPING ARRANGEMENT.

The best results obtained came from the method of charging loose material into the furnace in bulk; these results proved beyond a doubt the commercial possibility of the process for making steel from a mixture in which a large quantity of ore is used, and it leaves the possibility for still better records, when proper arrangements are made for a preliminary treatment of this mixture by the waste heat of the furnace before charging.

An average of the second half of the run in which the material was charged in bulk, as above described, gave a result that proves conclusively that one gross ton of steel can be easily made for one-quarter of an electric horsepower year.

An average of the same heat proved that the electrode consumption would be less than 50 pounds of electrodes per gross ton, and the yield of the metallic contents charged into the furnace, owing to its non-oxidizing atmosphere, is better than that obtained in the regular open hearth practice.

In making steel by this process, and laying aside entirely the fact that it is a commercial proposition, owing to the low cost of production, the results obtained in the quality of steel made were more than satisfactory. It must be borne in mind that the largest part of the material from which this steel is made is iron in its native state, in the form of ore, and that when this material is mixed with granulated pig iron all of the metallic contents come direct from the native

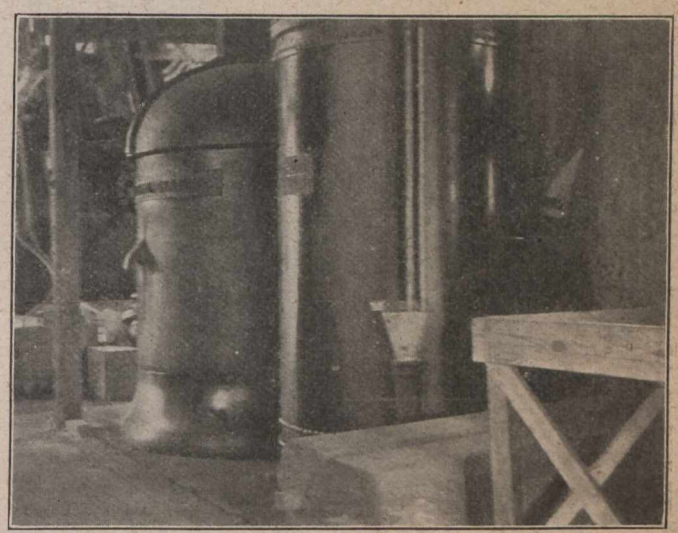


FIG. 5—TRANSFORMER ROOM.

iron. The physical qualities of the steel thus made are in every respect superior to steel made by the regular process of scrap and pig, even when the chemical analyses are about the same.

Then the high heat in the electric furnace permits of a better condition for refining and pouring. In a number of heats made at this plant, in which the sulphur and phosphorus in the mixture were above 0.2, these in the steel were almost eliminated, a result that it would be impossible to bring about in the regular open hearth practice.

Mr. Horace W. Lash, the president of The Canadian Lash Steel Process Co., Ltd., is a steelmaker of national reputation, and for years has been closely associated with the steelmaking world; he is vice-president of the Garrett-Cromwell Engineering Co., of Cleveland, Ohio. Mr. Lash has spent four years perfecting this process in an experimental way before these tests were made, and the results of the tests have proven beyond a doubt that the Lash process is in every respect a commercial proposition. Particularly is this so for Canada, which country is greatly blessed with numerous water powers, and an abundance of magnetic iron ore, which

is just what this process requires for its development.

The tests at this plant were under the supervision of Messrs. FitzGerald & Bennie, of Niagara Falls, N.Y., and Mr. Robert Turnbull, of St. Catharines, Ont. Messrs. FitzGerald & Bennie and Mr. Turnbull stand high in their profession of metallurgical and electrical experts, and the greatest care was exercised on their part to obtain accurate results.

We quote the following from Messrs. FitzGerald & Bennie's report:—

"In a general consideration of the electric furnace experiments there is reason to be satisfied. So far as the power consumption is concerned, the results obtained show that no difficulty in reaching a power consumption of one-quarter horsepower year per ton of steel produced need be expected. The only serious problem which we have been faced with in the experiments is that of electrode consumption. However, if the conditions of the experiments are considered, there

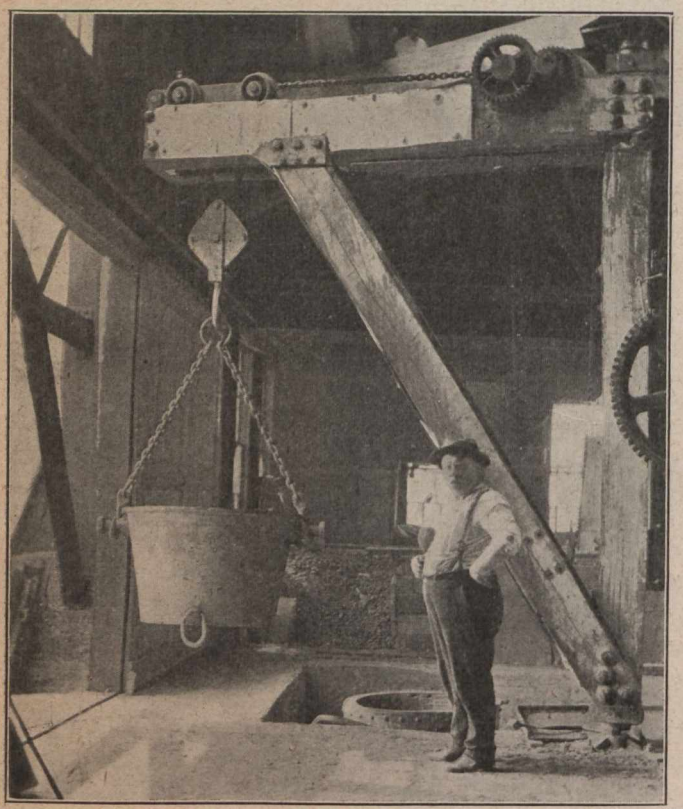


FIG. 6—CASTING CRANE

is reason to believe that this difficulty may be met successfully. There is one other point to be noted in this connection. The Lash process so far has been tried only in the Heroult furnace, where carbon electrodes are used, and this difficulty would not have to be faced in the induction furnace of the Rochling-Rodenhauser design."

Over $30,000 was spent by The Canadian Lash Steel Process Co., Ltd., in building this plant, and conducting these tests, and the results have brought forth conclusively the following:—

First—That cheaper steel can be made by this process than by the regular open hearth practice owing to the reduction in the amount of pig iron required, and the fact that the rest of the metallic content is in the form of ore, which is iron in its cheapest state. To anyone familiar with the steel trade, this cost can be easily figured when the cost of ore, pig iron, carbon in any form, and water power is known. On $3 ore, $18 pig iron, and $15 power, ingots can be made for less than the cost of the pig iron.

Second—The quality of the steel is very much better, owing to the material in the charge coming direct from its native condition.

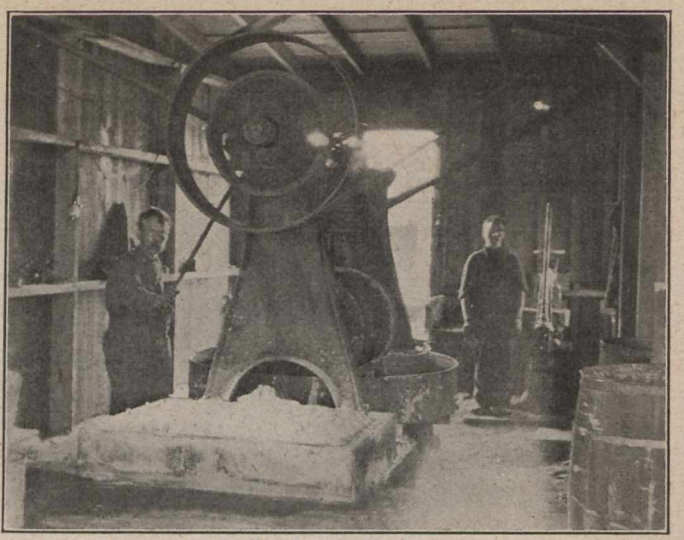


FIG 7—MIXING PLANT.

Third—The control of the heats and temperatures is absolute, and the trouble due to impurities in fuel is eliminated.

Fourth—The carbon content of the bath can be brought under absolute control, as it is only necessary to slightly vary the mixture to bring out any carbon content desired.

Fifth—The cost of building a plant of a given capacity is much less than a plant for regular open hearth practice on account of the elimination of all producers, checker work, underground flues, etc., the electric furnace being nothing more than a large-sized lined ladle.

Sixth—The attendance required should be less, as the material is simply charged into the furnace, the

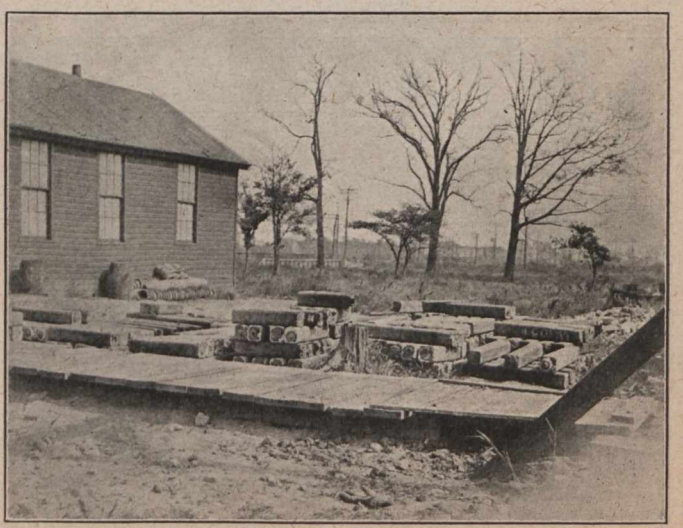


FIG. 8- BILLET YARD.

furnace is closed up tight, and the power applied. Owing to the character of the material that is charged, and the electrical control of the operation, no attendance is required until the melt is made. It therefore becomes a mechanical proposition throughout, in which the materials are all handled by machinery, and the furnace is self-regulating. It is possible to charge a

large size furnace in less than two minutes. These facts, when compared with the pig and scrap proposition, which takes considerable labor to handle, are apparent to those familiar with the steel business.

Seventh—The cost of refractories, repairs, etc., will be very much less, and there should be no interruption to continuous operation of a plant, because a complete furnace fully lined, ready to go into operation, can be kept as a spare, and with the proper crane arrangements can be set in the place of the furnace needing repairs, which furnace can be taken to another building for this purpose. Therefore, it is apparent that the cost, and care of checker work, producers, flues, etc., are entirely eliminated. Owing to the construction of the electric furnace the roof is very much stronger and better maintained.

Finally—The control of the heat for the elimination of impurities, and the handling of the steel, and the fact that the amount of impurities charged into the furnace is always known, gives a condition for the making of high-grade material that cannot be obtained by any other known process.

BATTERY AND CYANIDE GOLD SMELTING.

By A. Thomas (Member).

(Paper read before the C. M. and M. Society of South Africa.)

As it is some time since the subject of gold smelting has been discussed by this Society, the following notes are written with the object of giving a brief outline of some present practices, and of providing an opportunity during discussion, for members to bring forward other methods at present in vogue.

The separation of the mercury from the gold is done in cylindrical retorts, made of cast steel, measuring 53 in. long, 12 in. in diameter, and 1½ in. thick. The retorts rest on two water cooled bearers, with the usual water jacketed condenser for the mercury fumes. The flue of a retort furnace has three openings, measuring 11 in. x 8 in, arranged above the retort one over each end, and the other over the centre, thereby insuring a uniform temperature over the whole body of the retorts. This arrangement of the flue is necessary, as with the single flue retort furnace one part of the retort is generally heated too strongly, whilst other parts are insufficiently heated to volatilize the mercury completely. The capacity of this retort is 5,000 oz. of amalgam, and in charging, semi-circular trays are used. These are white-washed inside before receiving the amalgam, and care is taken not to fill the trays too full. The doors of the retort are sealed with a joint made of asbestos cord soaked in water. As soon as the mercury begins to come through the condenser the fire is checked and a uniform temperature maintained for about two hours, or until the mercury ceases to come off. The temperature is then raised to expel the remainder of the mercury.

If the temperature is too high in the early stages of retorting, the distillation will be too violent, and sputtering of amalgam in the retort is likely to ensue. The time required for retorting is from 4 to 4½ hours.

After removal from the trays, the gold is weighed into 1,000 oz. lots and smelted in No. 40 plumbago crucibles; a little borax is added as the gold melts down, but this is removed by skimming, after being thickened by the addition of a little fine sand. The bullion is afterwards cast into bars, which show a loss in weight of about .72 per cent. on the retorted gold. The mercury is afterwards weighed and returned to the mill. The difference between the weight of the amalgam charged into the retort and the weight of gold and mercury recovered is about .14 per cent. on weight of amalgam. Several assays of the retorted mercury have been made, and in each case only a trace of gold found. The coal consumption for retorting 5,000 oz. of amalgam is about 350 lb.

The fire boxes used for calcining the zinc gold slimes are rectangular in shape, measuring 44 in. x 22 in. A tray made of 2 in. cast-iron with three sides turned up 1½ in. is placed over the fire box. The trays in which the slimes are calcined are placed over these furnaces and are made of ⅛ in. mild steel, 48 in. long, 26 in. wide and 8 in. deep. Before receiving the slimes these trays are white-washed, as this prolongs their life and prevents the slimes from adhering to the bottoms, especially if the temperature has been too high during the calcination process. Great care must be taken in carrying out the calcination, as upon this the success of the smelting operation depends. The temperature is kept low at first and gradually raised as the operation proceeds. As a rule, about three hours is required for a successful calcination. The usual loss on this operation is about 42.4 per cent. of the original weight. Tests seem, however, to show that the bulk of the loss is due to moisture, which may run up to as much as 38 per cent., the remaining 4 per cent. may be due to the removal of carbonaceous matter, and other changes, which may cause a loss of weight. A curious feature of the calcined slimes is the presence of a purple color, which would seem, though I am not positive on the point, to vary in intensity in proportion to the richness of the slimes. Acording to Muller (see Metallurgy of Gold, by T. K. Rose, p. 35), gold in a very finely divided state gives a purple color i nthe presence of alkalies and alkaline earths, and it may be that this purple color is the same as mentioned by Muller. On completion of the calcination the tray is removed from the furnace, and when cool, taken to an enclosed room, where the calcined slimes are weighed and fluxed. Every precaution should be taken at this stage to avoid unnecessary handling and consequent dusting of the slimes.

The fluxing is carried out as follows:—The calcined slimes, which are more or less caked, are weighed direct from the trays without any grinding whatever. Plumbago crucibles No. 100 with clay liners are used for smelting. The slimes are weighed and placed in the pots with the required amount of manganese dioxide The pots are only filled to within 4 1-2 to 5 inches from the top, the rest of the space being used for the other fluxes, composed of borax and silica, old crushed liners being used as a source of silica. The following may be taken as a representative charge: Calcined slimes, 100 parts; manganese dioxide, 7.5 to 10 parts; crushed liners, 25 parts; fused borax, 20 to 25 parts.

Naturally, the flux is used within certain limits, according to the quality and physical features of the slimes after calcination. All new plumbago crucibles are subjected to a preliminary treatment before use, thus increasing their life to a considerable extent. The treatment is as follows:—They are placed in the furnace and heated for 30 minutes, to remove the glaze, after cooling they are placed for 45 minutes in a saturated solution of borax, and are afterwards dusted over with powdered borax and placed over the calcining furnace to dry, and when dry, reheated in the reverberatory furnace until the borax fuses. New clay liners, whenever possible, are used in the first charge of the smelt. This obviates the necessity of suddenly subjecting them to the high temperature of the furnace prevailing with subsequent charges.

A type of furnace which, with a few slight alterations, would be quite suitable for this work, is the old reverberatory pan furnace, known locally as the Tavener furnace; one point I may mention in connection with furnaces used for smelting rich gold bearing materials, is the lack of proper condensing chambers in the flues. I am convinced that some kind of condensing chamber is necessary and should be attached to all furnaces smelting finely divided and rich product, such as cyanide gold slimes. Even with all the precautions that can be taken in fluxing, such as using a borax cover, or placing covers on the pots, I have every reason to believe that gold is carried off to the flue, both mechanically and by volatilization.

The buttons of gold obtained from the fusion are usually of high grade, and ready for casting into bars. Occasionally, a thin skin of matte may appear on a few of the buttons, and when this occurs they are arranged so that those with the matte are placed in the same crucible as the highest grade button of the smelt, thus averaging up the fineness in the bars. No attempt is made to desulphurize the matte in smelting, but this is skimmed off and kept for future treatment with the bye-products in the pan furnace, where it will be desulphurized with battery screens. This matte generally occurs in case of cracked liners when the slag comes in contact with the graphite crucibles. My experience goes to show that to a very large extent the fineness of the bullion produced on these fields depends mainly on good calcination. Perfect calcination has two other great advantages, firstly, by reducing the bulk of the material; secondly, by perfect oxidation of the base metals, doing away with the necessity of using a large quantity of oxidizer in fluxing, thus reducing the value driven into the slag—particularly of the silver.

For very base bullion, owing to the presence of metallic lead and copper, I find that cupellation with clean lead is the only satisfactory method of bringing up the grade. This, however, should not be necessary on these fields, as low grade bullion is rare and unnecessary.

In casting cyanide bars it is usual to keep their weight in the neighborhood of 700 oz. A point that has often been raised on these fields, is to what degree of fineness should bullion be brought. At present we have all kinds of pains and penalties to avoid at the hands of the refiners in London. This seems rather extraordinary when we consider the tonnage, for that is what it amounts to, of the gold we turn out. A mine that refines its gold up to over 900 parts per 1,000 fine receives no better terms than one which just reaches the mark of 900 gold and silver. There is no doubt that every penny we spend on refining our bullion beyond the point necessary to escape the penalties, is to my mind, unnecessary. The present system is certainly not satisfactory, and would bear thorough investigation at the hands of those who have the disposing of the gold on behalf of the mines.

Another point also suggests itself, why should we ship all our bullion home for refining? I can see no reason why a refinery should not be established on these fields. The technical part of the work can be successfully carried out here, but I will leave the discussion of the financial side of this question to members who may have more data at their disposal.

For the treatment of bye-product many mines are equipped with the usual kind of reverberatory pan furnace. As the construction of the furnace is the main factor which governs efficiency and working costs, I give the following dimensions of a furnace of this kind, hoping they may be of use to some of the members.

The pan in which the furnace hearth is built is made of ½ in. iron, measuring 9 ft. x 6 ft. with a depth of 24 in.:—

Size of grate in fire box, 3 ft. 6 in. x 3 ft.; from fire box of grate to top of roof, 2 ft. 4 in.; top of bridge wall to roof, 11½ in.; size of furnace hearth, 7 ft. 6 in. x 3 ft. 6 in:; bridge end of hearth to roof, 2 ft. 5¾ in.; centre of hearth to roof, 2 ft. 6 in.; lowest point of roof to hearth, 1 ft. 7 in.; the hearth of the furnace has a fall from all points to tap hole of 3½ in. to 1½ in.; uptake flue from furnace, 2 ft 6 in. x 9 in.; capacity of furnace for lead bullion 4,200 lb.=61,268 oz. troy.

The bye-products consist of the slag from the smelting of gold zinc slimes in the reverberatory pan furnace, ground up crucibles, liners, etc. In treating these bye-products, the aim is to produce a liquid slag of low specific gravity, and thus reduce as much lead as possible from the materials treated. This is done by the addition of metallic iron in the form of battery screens. As a precaution against any residual high values of the precious metal in slag, the charge, prior to withdrawing the slag, is given a wash down with litharge and coal dust.

All variations in the charges smelted are regulated by experience. It would be very interesting to know by analysis the exact composition of the slag and other materials to be treated and so be able to flux from a theoretical standpoint. However, as these parcels of slag and other bye-products are not very large, and the composition of them varies from time to time, an analysis would not furnish any definite information for the treatment of future bye-products.

The present method is crude, but the value of the residual slags shows that the results are satisfactory. Naturally, this method is only applicable in a case similar to the one we are dealing with, because fully 90 per cent. of the material treated has already been fluxed, and merely requires re-smelting and reduction of the metals. The principal material to be smelted being the slag from the zinc slimes smelt, this is always taken as a base from which to work. When there is a large quantity of refractory materials to be smelted, it is worked off in small lots. Should these present any difficulty, the amount of assay slag usually added to the charge is slightly increased, ground up liners, or any other gold bearing silicious material is added in small lots to each charge, as the slag from the cyanide smelt is nearly always basic, and some protection is need for the furnace lining.

In commencing a smelt, a few bars of lead are

placed in the furnace, so as to form a bath, and prevent the slag from corroding the bottom of the furnace. The first charge is made up and its behavior in the furnace carefully noted, so that any defects may be remedied in the succeeding charges. It is sometimes found necessary to return the slag to the furnace for re-treatment on account of the high values contained therein. The following is a brief account of a bye-product smelt.

Amongst the materials treated were, reverberatory pan furnace slag, bullion furnace ashes, extractor house sweepings, old cupels, brick from furnace bottoms, calcining trays, battery screens, elephant cord from battery, assay slag, etc.

The mixture was made up into 14 charges of about 900 lb. each, and contained 9 per cent. lithage and 5.5 per cent. iron, in the form of battery screen and old calcining trays.

The average value of the slag drawn off, assayed as follows:—

Gold, 3.99 dwt. per ton; silver, 337.59 dwt. per ton; lead, 6.5 per cent.

The weight of lead bullion recovered = 19,143 oz. troy. The total litharge added only accounts for 12,-711 oz,. thus showing a gain of 6,432 oz. After deducting 797 oz., the weight of the gold and silver recovered by cupellation, there remains a surplus of 5,635 oz. of lead, which has been recovered from the material treated.

In this smelt the last few pots of slag drawn off are put aside for treatment in the next smelt, since fine shots of lead may be skimmed off. Before tapping the lead bullion off, the metallic lead is concentrated and purified by oxidation and the dross afterwards taken off. In this particular smelt the dross carried 28 per cent. metallic copper, the remainder being oxide of lead and finer shots of metallic lead. The cupel used in this smelt was made of bone ash, manufactured on the mine. The bones were collected from the kitchen at the native compound, and burnt in the cupel furnace, an iron plate being inserted on the cupel so as to form a bottom for the furnace. The burning presented no difficulty, and the calcination was complete in four hours. It is most important that the bones should be completely burned, so as to expel all animal and carbonaceous matter. The loss in weight during calcination is about 54 per cent. The bone ash obtained was equally as good, if not better than than the imported article, at less than half the cost. In preparing the bone ash for making the test, I used 14 lb. caustic potash in solution to 400 lb. bone ash with satisfactory results.

In presenting these brief notes I do so with the hope that the members engaged in this class of work will raise a discussion which will serve to bring forward a few of the newer innovations in smelting on these fields, and so bring our published information up to date.

Coal Washing as Practised by the Nova Scotia Steel and Coal Company, at Sydney Mines, Cape Breton, N.S.

From Transactions of the Canadian Society of Civil Engineers.

By C. L. Cantley, Stud. Can. Soc., C.E.

The cleansing of coal to fit it for metallurgical purposes is a branch of the art and science of ore dressing which has become prominent only at a comparatively recent date in America. The reasons for this are quickly brought to mind when we remember the growing scarcity of pure fuel and the refinements of metallurgical methods which now make fuel treatment necessary, except where Nature has been especially kind to the metallurgist.

In Canada, the greater part of our fuel is not sufficiently pure for the economical smelting of iron, and hence it was that one of the first coal washers to be built and operated in America was laid down in 1892 at Ferrona, Nova Scotia, by the New Glasgow Iron, Coal & Railway Company, at that date a constituent of a company which afterwards became the title company.

The success obtained on the product of the neighboring mines induced Mr. Graham Fraser, at that time managing director of the Nova Scotia Steel & Forge Company, to carry out a series of experiments in and about the year 1894 on other Nova Scotia coals, and especially to test the coals of Eastern Cape Breton with a view of seeing whether a good enough coke could be made to warrant the establishment of an iron and steel industry on that island.

The experiments proved conclusively that by this method of treatment coals containing a high percentage of ash and sulphur could be so prepared as to make a coke of good quality, at atreatment cost not exceeding ten cents per ton, and it is largely to these successful tests we owe the establishment of the iron and steel industry of Cape Breton.

Thus we see, from the outset, the fundamental importance of this branch of ore dressing which has made possible one of the greatest industries in Eastern Canada; this is further emphasized by the recent troubles in Canadian steel-coal circles brought about by coal being supplied which, it was claimed, could not be sufficiently purified by washing to make good metallurgical coke.

The Nova Scotia Steel & Coal Company in 1896 purchased the entire property of the General Mining Association of London, which operated the well-known "Old Sydney" main seam in Sydney Mines, Cape Breton. The intention then was to utilize part of the coal mined for the manufacture of coke to be used in iron blast furnaces, and in 1899 the plant described in this paper was laid down at the colliery, the general scheme being similar to that of the plant previously erected at Ferrona. As originally designed, by Stein & Boericke, metallurgical engineers of Philadelphia, and erected, the plant was expected to handle 300 tons of coal per day of ten hours. It has, however, been much altered in details, chiefly of elevators and waste disposal, so as to have a uniform washing capacity throughout, and, as a consequence, the output is now over 500 tons per day.

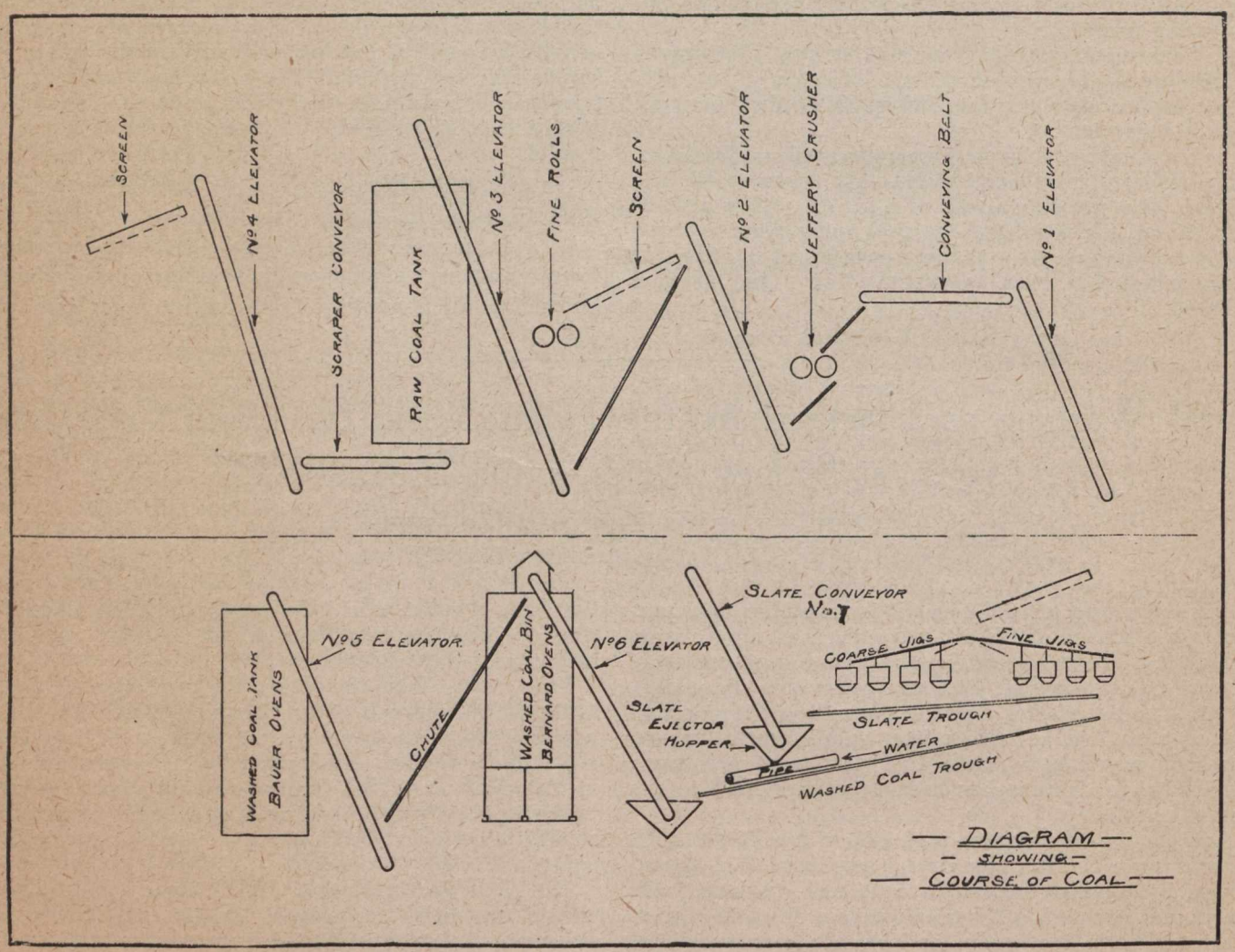
The plant is situated in the immediate vicinity of the

colliery, from which it formerly drew all its coals. Now, however, the coals treated are screenings collected in cars from several collieries, and are what is locally known as culm or duff, that is to say, the screenings removed from the run of mine coal as prepared for the market. These screenings include practically all the fire-clay contained in the clay parting between the coal seam and the roof and the foot wall. The undercutting being in the clay-band next the foot wall, the proportion of ash in these screenings is from two to three times as great as in the seam coal proper.

An outline of the whole process is shown in the appended sketch.

The cars of screenings are emptied, as required, into No. 1 elevator pit, and the coal is lifted by bucket elevator to a Robins belt conveyor, which carries it 135 feet, over sidings, to the breaker house, where it is lowered by chute to a modified type of Jeffery rolls. These rolls are 24 inches in diameter, and turn at 180 and 270 revolutions, respectively, per minute in opposite directions. The original rolls (the frame being of cast iron) were designed with one roll stationary and the other adjustable, the adjustable roll being held within a half inch of the other by means of a counter weight acting through a toggle joint applied to each bearing of the moveable roll, it being necessary to have one adjustable on account of foreign material, such as bolts, spikes, etc., finding their way into them with the coal.

While the toggle joints gave very good results for small pieces of iron and rock, they would not allow the rolls to open up quickly enough to pass a two-inch machine pick, and this caused frequent breakages of the roll frame. To overcome this trouble the cast iron frame was discarded and the original rolls, bearings, and toggle joints were mounted in a frame consisting of two steel channel irons on each side, with a top and bottom cover plate, forming a box girder; to this girder is fastened, on each end, cast steel pedestals to receive the bearings, these last being held to the girder by means of four three quarter-inch machine bolts. The effect of this construction is that when a machine pick passes through the rolls, and the toggle joint does not act quickly enough, the four three-quarter-inch bolts, holding the pedestals to the girder frame, are sheared off, allowing the rolls to separate and causing no other damage than the loss of the four bolts, which are easily replaced, and the machine put in running order again.



The product is elevated by No. 2 elevator and deposited on a shaking screen with half-inch perforations. The screenings fall directly to No. 3 elevator pit; all portions larger than half-inch going over the screen into plain rolls, 16 inches in diameter, and running at 80 revolutions per minute, and thence to No. 3 elevator pit. From here all the coal of half-inch diameter and under is elevated by No. 3 elevator to the raw coal storage tank, which is built of steel, brick lined. This storage tank is self-trimming, and holds 1,000 tons, a fea-

ture which permits a supply of crushed coal to be kept one day ahead. Thus the washer proper is enabled to run on a day when the collieries are idle. The bottom of the tank is designed with two rows of parallel openings, fitted with sliding covers, each in line with a horizontal scraper conveyor delivering the crushed coal to the foot of No. 4 elevator, which delivers it in turn upon the shaking screen. This last has three-eighth-inch perforations, and being set at an angle of about 15 degrees, is supported upon rocker arms, and has an eccentric motion closely resembling that of hand screening. Owing, however, to the fine coal being more or less damp, it is impossible to separate the two sizes on a dry screen, so that, as the coal is delivered to the screen, it is met with a number of jets of water, which flush the coal through the screen plates. When the screen was flushed with the ordinary coal washing water the perforations in the jet pipes became plugged up, consequently clear water has to be used, and a cheap and convenient supply is found in the circulating water from a surface condenser, connected to the main centrifugal pump engine; this water being warm, is less trying for the jig tenders, who have their hands immersed continually. The combined effect then of the incline and the supply of water is to rapidly flush away by flume those screenings under three-eighth-inch to the fine jigs. The remainder, under half-inch and greater than three-eighth-inch, being sluiced to the coarse jigs.

There are four coarse jigs on one side of the building, and as many fine ones on the other, all of them being essentially modifications of the Luhrig jig, and designed especially for coal washing work by Mr. Stein, the engineer whose firm had charge of the erection of the plant. The fine jigs, styled "Standard two-compartment fine-corn jig" by the designer, are built of wood, and wash 7½ tons of coal per hour.

Thus about 65 per cent. of the coal is washed by the fine jigs, since only three of the coarse jigs, with a capacity of six tons per hour each, are used at a time. The fine jigs, which have one compartment fitted with quarter-inch perforated plates, and the other with three-eighth-inch perforated plates, are run at 135 pulsations per minute. The feldspar used in the bed is of five-eighth-inch cubes. The coarse jigs are run at 72 pulsations per minute, and have a bed of seven-eighth-inch feldspar varying from 2 to 4 inches in thickness, depending on the amount of slate flowing. The purified product from the jigs is sluiced to the washed coal bin, while the slate runs to a waste bin, from which it is removed by No. 7 elevator to the slate bin in a storage tower, or flushed away by the slate ejector.

The water from both these bins, carrying in suspension certain fine coal and extremely fine particles of slate, returns to the sludge tank, directly under the jigs. There this fine material settles, and at proper intervals is drawn off. This tank, being the reservoir to which all leakages drain, also acts as a sump for the washer, and the centrifugal circulating pump drawing from it uses the water over and over again. Thus the only loss of water is that caried away by the products as moisture, a small amount as leakage, and that used for flushing purposes. This amounts, in all, to about 25 per cent. by weight of the coal washed.

The washed coal is all elevated to a drainage and storage tower by No. 6 elevator, which is equipped with perforated buckets, as also are the elevators Nos. 5 and 7, and the amount required for the coke ovens located nearby is lowered by chute and re-elevated by No. 5 elevator to another tower. This additional handling is found to pay, owing to the reduction of moisture by drainage.

The amount of water required in circulation is about 2,000 gallons per minute, and is supplied by a 12-inch centrifugal pump direct connected to a 12x10 vertical engine, running at 250 revolutions per minute. This engine exhausts into a surface condenser, the circulating water of the condenser being used as mentioned above to flush down the coal over the shaking screen.

As originally laid down, a 100 horsepower engine supplied all the power necessary, but now electricity is used for motive power as follows: Crushing house complete, including elevators; one Westinghouse 75-H.P., 60-cycle, 3-phase, 200-volt, 650 revolutions per minute, induction motor; washer house proper, jigs, etc.; 50-H.P. induction motor; Bernard tower; 30-H.P. 220-volt induction motor. All the motors are of the same type.

The following analyses are in each case averages of many determinations, and represent as close an approximation to the actual composition of the products as can possibly be obtained. The raw coals from the three separate collieries have been analysed at regular intervals over a period of several consecutive months, and give the following results:—

Coll.	Moist.	Vol. and Comb. Mat.	Fix. Carb.	Ash.	Sulphur.
A	4.86	29.11	56.73	14.87	2.14
B	5.96	28.38	57.38	14.23	2.09
C	6.51	23.11	54.27	22.61	2.45
Aver.	5.77	26.87	56.12	17.23	2.23

As the weight of coal received from each colliery for each month was known, the following analyses of the mixture received at the wash plant for each month were calculated, and are as follows:—

Month.	Moist.	Vol. and Comb. Mat.	Fix. Carb.	Ash.	Sulphur.
1	5.62	27.71	56.48	15.93	2.17
2	5.61	27.82	56.50	15.98	2.18
3	5.67	27.75	56.54	15.83	2.16
4	5.69	27.40	56.31	16.53	2.19
5	5.68	27.25	56.28	16.72	2.20
Aver.	5.65	27.56	56.43	16.19	2.18

The average analyses of the washed coal resulting from the washing of the above coal, and covering the same period, are as follows:—

Month.	Moist.	Vol. and Comb. Mat.	Fix. Carb.	Ash.	Sulphur.
1	16.25	34.86	60.58	4.52	1.27
2	13.87	35.01	61.00	3.96	1.25
3	11.95	38.20	58.14	3.66	1.45
4	14.01	35.70	58.56	5.80	1.74
5	11.00	35.92	59.36	4.72	1.75
Aver.	13.42	35.94	59.53	4.53	1.50

Thus it is seen that the average reduction for the five months has been from 16.19 per cent. to 4.53 per cent. in ash, or 72 per cent., and in sulphur from 2.18 per cent. to 1.50 per cent., over 30 per cent. reduction. It might be said in regard to the above figures that the greater quantity of ash in the coal in the last two months was due to the increased percentage of "C." coal used. This coal was not run over a picking belt since that colliery was newly opened, and was not as well equipped as the other collieries.

The most prominent feature of the coal treated, a soft bituminous variety, is the high percentage of volatile and combustible matter which is typical of the Cape Breton coal measures. The coal mixture also has a high percentage of sulphur and more ash than is consistent with economy. Most of the impurity is present in the form of slate, there being only a small percentage of bone coal. The following analysis is that of the impurity which sinks in a calcium chloride solution of 1.35 specific gravity.

$Fe S_2$	13.64	
$Si O_2$	28.50	combined
Al_2O_3	17.59	as slate.
Ca O	6.74	
$Mn Co_3$	2.91	
Mg O	0.44	
Chem. Comb. H_2O	15.10	
Carbonaceous matter	14.80	partly bone coal.
	99.72	

About one-half of the sulphur contained exists as iron pyrites ($Fe S_2$), which seems to occur evenly and uniformly distributed through the coal and bone in the form of small nodules, leafy formations between the layers, and as a series of particles in size between 80 and 100 mesh; the remainder of the sulphur is present as organic sulphur. It is impossible to get rid of this latter portion by any specific gravity method of separation, and it is called the fixed sulphur.

The following are the specific gravities of the coal constituents:—

Slate	3.83
Coal	1.27
Splint or bone	1.50
Pyrite	4.80

In order to determine the best possible separation that can be effected with the coal in question by means of a specific gravity method, the following experiment has been made: A calcium chloride solution of slightly higher specific gravity than that of coal, and less than that of the other constituents, was put into a glass jar of about three-quarter-gallon capacity; to this solution was added a weighed quantity of coal of the same size as supplied to the jigs. The contents were stirred briskly and allowed to settle. The sample was now found to be divided into two portions. All particles of a specific gravity less than that of the solution had floated while all the particles heavier than that had gone to the bottom. Between these two layers there remained suspended in solution a small proportion of the particles whose specific gravity was about that of the solution. The floating and sinking portions were separately removed, washed free from the solution, weighed, and analyzed. From the data thus obtained we calculate the purity and yield of the floating portion of the washed coal obtainable. This is the simplest and most effective coal washing operation that can be performed, and the results of this experiment determine absolutely for any coal the maximum purity of the washed coal obtainable from it by any washing process. The calcium chloride solution used was of 1.35 specific gravity, which was found best suited for this coal.

The results of a series of such experiments conducted at the same time as the analysis already given, are as follows:—

Average composition of float on $Ca Cl_2$ solution 1.35 sp. gr.:

Vol. and Com. Mat.	Fix. Carb.	Ash.	Sulphur.
36.67	59.92	3.41	121

From these figures we learn that the coal treated had a fixed ash of 3.41 per cent., and 1.21 per cent. of fixed sulphur. Consequently the plant washed the large tonnage of coal treated in the five months to within one and one-quarter per cent. of the best possible reduction in ash, and to within a third of one per cent. (0.3) of the best possible reduction in sulphur.

The loss in washing for the large amount of coal treated has been 13 per cent. plus 8 per cent., which is the difference in moisture, a total of some 21 per cent., and of this the impurity removed as ash and sulphur is 12 per cent., which leaves an actual coal loss of about 9 per cent. in the process.

The slate resulting from the washing process from the coarse jigs contains about 25 per cent. of good coal, and is therefore lifted by bucket elevator to the top of the jigs and re-washed in No. 4 coarse jig with the following results:—

	Original slate.	Washed coal from slate.	Slate produced contans about 13% impure coal.
Vol. and Com. Mat.	21.80	30.59	19.10
Fix. Carb.	37.10	51.61	24.40
Ash	41.10	17.18	50.50
Sulphur	4.06	2.79	9.07

This re-washed product is used about the plant under such boilers as are worked below their rated capacity.

A point of interest about the washer is the ingenious method of disposing of the slate, which was introduced last spring by Mr. John Preston, the engineer who had supervision of this department. Hitherto the slate had been elevated to a bin in the storage tower, from whence, at proper intervals, it was removed on cars to a convenient dumping place. The present scheme is quite simple, and consists in flushing the slate from the jigs directly to the sea.

The following description of the equipment will explain the method in detail: An 8-inch pipe has been laid from the shore to the central condensing plant at the colliery where the washer is situated, and through it a 7-inch Gwynne centrifugal pump supplies salt water for condensing purposes. This pump has a rated capacity of 1,200 imperial gallons per minute at 900 revolutions per minute, and is directly connected to a 50 horsepower, 3-phase, 60-cycle, 220-volt induction motor located at the seashore. The condenser is a 12 and 17x19x15 Worthington jet condenser, arranged to take steam from a Walker double compound compressor, a tandem compound fan engine, a tandem compound haulage engine, and a simple cylinder haulage engine; the four engines totalling up about 1,500 horsepower. The discharge pipe of the 7-inch centrifugal pump, which has a lift of 50 feet, is directly connected to the suction pipe of the air pump of the condenser. The air pump discharge delivers the salt water, after condensing the steam from the engines, to a 6-inch cast iron pipe, which passes through the wash plant, and is used for conveying the slate from the wash plant to the cliff, a distance of about 700 feet.

A valve controlling the amount of water supplied to this pipe is placed between the air pump discharge and the square hopper through which the slate enters the

pipe, with an overflow ahead of it which carries away the difference between the amount of water delivered and the amount required. The supply valve is kept sufficiently open to allow the water to half fill the hopper. The pipe is laid on a downward grade, varying from one to four per cent., towards the cliff. At the cliff, which it overhangs, there is a vertical leg about 26 feet long, the effect of the latter is to give an hydraulic gradient to the entire line sufficient to cause a flow of about 600 or 700 gallons per minute, when the pipe runs full bore; the resultant velocity causes all slaty material to be easily carried through the pipe.

In order to keep foreign material, such as bolts and spikes, from getting into the pipe and plugging it up, it has been found necessary to fit the hopper with a special grating, which consists of a cast iron plate, about six inches thick, perforated with 2½-inch diamond-shaped holes, the holes being V-shaped or zigzag in vertical section; this construction allows any round or square material up to about 1½ inches in diameter to pass through it, but will not allow any material having a length of over 2½ inches to pass. Further precautions are taken to cope with clogging in the line by having special oblong openings cast in the pipe every few hundred feet apart. These openings have covers screwed on, which can be removed at will. Should the pipe become clogged, lengths of small pipe, such as are commonly kept in stock, are coupled together and inserted into the opening immediately below the clog, and forced against the obstruction, the water pressure being kept in the meantime on the remainder of the pipe. Once started, the rush of water quickly clears the pipe.

Since the amount of water used for flushing purposes is already required by the colliery for condensing, the colliery and wash plant divide the pumping charges equally, and the cost of disposing of the slate by this method is very low.

The figures of a typical analysis of the coke from the washed coal may prove interesting. Such an analysis would be as follows:—

Moist.	Vol. and Com. Mat.	Fix. Carb.	Ash.	Sulphur.
12.5	2.25	90.50	7.25	1.22

Thus it will be seen that this plant renders possible the manufacture of a coke which is eminently suitable for use in the iron blast furnace from a coal which unwashed would be unsuitable, and in addition utilizes for this purpose the less desirable, from the fuel point of view, portion of the coal, that is, the screenings.

The writer wishes to acknowledge his indebtedness to the management of the Nova Scotia Steel and Coal Company for permission to use the information given and for access to the records of their chemist. The author is, however, responsible for the preparation of the average analyses and for the conclusions drawn.

INAUGURAL ADDRESS.

By the President of the C. M. and M. Society of South Africa.

(*Continued from last issue.*)

Apprenticeship to Mining.—For those who would take up the work of actual underground mining as a means of livelihood, the system of apprenticeship, as started by the Association of Mine Managers, would seem to be an excellent scheme, and it was with great regret that I learnt from some remarks made by Mr. Laen Carter at one of our recent meetings, that "so far it had not been a success, and that at the present time there are very few apprentices underground." This is not as it should be. Means must be found to induce young men to submit themselves to a regular and thorough apprenticeship below ground, as is done by mechanics above ground, so that when a youth having duly served his term, applies for work as a full-fledged miner, the employer will have a guarantee that the applicant does possess a knowledge of the work he wishes to undertake, and to such as take a serious view of mining work and wish to learn thoroughly what is most necessarily, namely, the theory as well as the practice of the work, I would commend the evening classes in mining, which are held at the Transvaal University College, where the miner is taught how to work intelligently, and thus benefit himself, the mine, and also his fellow workmen. Under the new scheme of the Mine Managers' Association an inducement is held out to apprentices to attend these clsasses, which I find, on enquiry, have a large membership, and which are attended by men coming from far distant parts of the Rand, showing at the same time the attraction of the classes and the keenness of the students. The youth of this country has to learn to appreciate the fact that if it wishes to take a proper part in the development of the resources of this land it must take measures to submit to a course of study, not alone in one particular subject, but in a general knowledge of science, and to the youth I would say, the means are at hand, make use of them.

I look to the Metallurgical Trials' Committee, which has lately been formed under the aegis of the various mining houses, for much assistance to the mining and metallurgical world. Co-operation of this nature will permit of far fuller and more practical investigation of the merits of any invention or improvement than would otherwise be the case, and I am sure that all those who have thought out improvements, which they are individually unable to have tested or experimented upon, will note the constitution of this Committee with pleasure, and will not be afraid to lay their ideas before the representatives, as I am confident that all trials made will be carried out in the most thorough manner.

Agriculture and Agricultural Chemistry.—There is little question that, apart from the mining industry, which is, undoubtedly, at the present time the staple industry of the country, there are enormous possibilities in the direction of agriculture, and owing to the many varied natures and constituents of the soils to be dealt with, the problems of properly dressing and manuring the land will provide much work for the chemist, without whose aid I fear those who engage in the farming industry will be but floundering in the dark. Those who read that most interesting production, the Transvaal Agricultural Journal (which I may state is free to every citizen of the Transvaal for the asking), will appreciate the great amount of work which has been done in every branch of agriculture by those employed on the Government farms, and I trust that our Government will always realize the great value of the various researches which have been made in the past, and the value of which will perhaps be more apparent in the future, to those engaged in agricultural pursuits. We know that there is a prevalence of a great number of various description of pests, the occurrence of which dishearten the farmer and often indeed stultify his efforts, but I am sure that by perseverance and careful study the difficulties and dan-

gers from this cause will eventually disappear, and in the attainment of this end the chemist will figure largely. I again venture to hope that our Government will recognize the great work which has already been done, and which still has to be done, and will give every encouragement to foster scientific investigations, and the work of the chemist in its application to the benefit of what must become one of the great industries of this vast country with its many and varied conditions of climate and soils.

South Africa should, undoubtedly, be in a position to become a country absolutely self-supporting in every respect. The question of irrigation and the proper conservation of water is one which may rightly and safely be left in the hands of our brother scientists, the engineers.

We have as a lesson in possibilities our marvellous gold industry, and in this respect I cannot do better than refer to the words of that eminent financier, Herr Dernburg, who recently visited us. In the course of a most instructive and eloquent speech he stated that there was a time when the standard of currency was greatly exercising the minds of financial men in the great centres of the world, the question being whether the standard should be gold or silver. At that time arose the Goldsmiths of the Transvaal, the output from which settled the question once and for all; it was to be gold. I doubt if this important fact had ever before been made patent to the world (outside the world of financial men), and I take it to be a happy augury that if South Africa has been able to settle this important question she will be able to settle many others of as great importance to the welfare of human-kind.

Our Society continues to be on terms of the greatest amity with the kindred societies; this is much evidenced by the fact that some of our members have been invited by the Transvaal Institute of Mechanical Engineers to assist upon a committee, which that institution has formed for the purpose of establishing South African standards for strengths of materials, etc.

Our Society is now widely represented by members in all parts of the world, but there is still much further scope for its usefulness, and I trust that those who have been and will be appointed (under the new scheme, which you have approved of and which strikes me as such an excellent one) "as Corresponding Members of Council" will do their utmost to further our interests by bringing in new members, and by obtaining for our information and instruction, papers upon the many and varied subjects which come under the scope of our work, and also help us by contributing to our discussions. While on the matter of discussions, I cannot too strongly urge upon members the value of the fullest possible discussion upon a paper, as by this means we learn the views of individuals, and obtain the results of the experience of many hard and practical workers who may not feel able to write original papers, but whose attention and interest is awakened by statements made in papers written by others, which statements they may be able to confirm or otherwise from their own experiences, and thus the discussion becomes as valuable as the original paper. I would also urge our members to come forward with descriptions and records of processes and methods which they may have tried and not found to be successes. The information contained in a record of trials which have proved failures is of the greatest value to the metallurgical world.

The reduction in working costs, improvements in plants, and higher efficiency in the mining and metallurgical departments, as well as better extraction, have brought large bodies of ore, which were in former times classed as "unpayable," either within, or very nearly within the "payable" class, and it must be the aim of all the members of our Society, both the mining and the metallurgical members, to take advantage of all existing improvements and to endeavor to devise new ones in order to assist in bringing down the general costs of production to such a point that aided, we may hope, by still better extraction of the gold, it shall be possible to see a profit where but loss existed before. In this endeavor we must work hand in hand with our good friends the kindred societies of engineers, whose aims run on lines parallel to our own. Thus can we do our portion towards making it commercially possible to open up new lines and to reopen many old ones, to the end that the industry may be able to sustain a larger white population, and that by such means the burden of those who are now suffering so severely from want of employment may be lightened, and prosperity may again reign in this country.

COAL BRIQUETTING IN 1907.

By EDWARD W. PARKER.

From Advance Chapter Mineral Resources of the United States.

That considerable progress was made in the development of a briquetting industry in the United States in 1907 is shown by the reports of operations made to the Geological Survey for that year. There were eleven plants in actual operation during 1907, although one of these, that of the Pittsburg Coal Mining Company, at Pittsburg Landing, Cal., was burned in July and had not been rebuilt up to the close of the year. The total production of briquets, as reported to the Survey, amounted to 66,524 short tons, having a value at the plants of $258,426. When compared with the development of this industry in Germany (in which country the production of briquets in 1906 amounted to about 16,000,000 short tons), the production in the United States appears insignificant, but it is of importance as indicating that a beginning has been made, and with the success of the established plants demonstrated and the gradual education of consumers in the advantages of briquets for efficiency, ease of handling, and clealiness, rapid progress should be made in this industry during the next few years.

As constant dropping of water wears away the stone, so the constant agitation of this subject has begun to show its effect, and the rock of opposition, or at least of inaction, is being worn away. There can be little doubt that the interest aroused through calling attention to the waste of that part of the country's natural resources, represented by the nonuse of the slack and culm pro-

duced in our coal-mining operations, and the aggressive policy of President Roosevelt in seeking to throw light upon it and to correct the abuses into which we have largely unconsciously fallen, are to a great extent responsible for the present prospect of a development of coal briquetting, as an important industry in the United States. It may not be long before the governments of the States, under whose jurisdiction the matter comes, will enact legislation against the accumulation of slack and culm heaps or their useless destruction by burning, and prohibit this waste, as they have in some cases interdicted the waste of natural gas.

Legislation which would prohibit "shooting from the solid" at mines, when the slack coal is not a marketable product, and which would provide penalties for excessive use of powder, would have, as one result, a larger percentage of lump coal, and thus, in part at least, enable operators to assume the additional expense involved in the briquetting of such slack coal as is unavoidably produced.

There were eleven coal briquetting plants in the United States, each manufacturing briquets, during 1907. The location of these plants and the character of the fuel and binder used in the operations are as follows:

Arizona Copper Company, Clifton, Ariz.—This company uses bituminous coal, mined in New Mexico, with an asphaltic pitch made from California crude petroleum. The briquets weigh aproximately 4 pounds each and are used under the boilers of the company's plant. The briquetting machine is of English design and is described in the United States Geological Survey Bulletin 316, published in 1907. The capacity of the machine is 24 tons in a day of ten hours.

Western Fuel Company, Oakland, Cal.—This plant, which is also described in Bulletin 316, operates on bituminous coal slack or screenigs with asphaltic pitch, with proportions of 90 per cent. of coal and 10 per cent. of binder. The capacity of the machine is 60 tons in a day of ten hours. The operations of the company were begun in June, 1905. The briquets are cubical in shape, with rounded edges, and weigh approximately 10 ounces each. They are used principally for domestic purposes.

Pittsburg Coal Mining Company, Pittsburg Landing, Cal.—This plant was put into operation during the first six months of 1907, but was burned in July. It was operated upon screenings from the coal yards of San Francisco, using asphaltic pitch as a binder in the proportions of 92 per cent. of coal and 8 per cent. of pitch. The briquets are of semicylindrical pattern, weighing about 8 ounces each and are used principally for domestic purposes.

Indianapolis, Briquetting Company, Indianapolis, Ind.—This company began installing briquetting machinery in 1906 and commenced operations in November, 1907, using 92 per cent. bituminous coal slack and 8 per cent. of coal-tar pitch. The briquets are of cylindrical shape, weighing 5 ounces when intended for domestic purposes. Larger sized briquets can be made, if desired, the capacity of the machine depending upon the size of the briquets.

Semet-Solvay Company, Detroit, Mich.—The Briquetting plant of the Semet-Solvay Company, located at Delray, Mich., is operated in connection with the plant of the Semet-Solvay by-product coke ovens at that place and is intended primarily to make available for use the coke "breeze" produced at the ovens. As originally designed (early in 1905) this plant contained a Johnson (English) briquetting press, but the product, on account of the large size of the briquets, was not found adapted to the market and a Mashek type of press was substituted. The new machine was started in August, 1907. Another machine, producing the eggette or ovoid-shaped briquet, has been purchased but has not been delivered. When the new machine is installed the plant will have a capacity of nearly 20 tons an hour. The present practice consists in using a mixture of 50 to 75 per cent. of bituminous coal slack and 50 to 25 per cent. of coke breeze. From 91 to 95 per cent. of this mixture is used with 9 to 5 per cent. of coal tar pitch. The briquets weigh about 2 ounces each.

Western Coalette Fuel Company, Kansas City, Mo.—This company is operating a Renfrow machine, the type of which, described in Bulletin 316, formed a part of the equipment of the Geological Survey coal-testing plant at St. Louis, Mo., subsequent to the exposition period and later at the Jamestown Exposition. The machine was installed in Kansis City in April, 1907, and is operating upon semi-anthracite slack from Arkansas and Oklahoma and bituminous coal slack from Kansas and Missouri, using coal-tar pitch as a binder in proportions of 94 per cent. of coal and 6 per cent. of binder. The briquets are cylindrical in shape with convex ends, weighing approximately 14 ounces. They are intended for household, locomotive, and stationary boiler use. The capacity of the machine, of which there was only one installed at the close of 1907, is 8 tons per hour. The operations during the year were largely of an experimental character and considerable construction work was caried on at the same time.

D. Grieme Coal Company, foot of West Forty-seventh Street, New York, N.Y.—This plant, among those described in Bulletin 316, was put into operation in October, 1907. The press is of Mashek design and makes a small, rectangular, convex briquet which is intended entirely for domestic purposes. They weigh aproximately 2 ounces each. The coal used is anthracite No. 3 buckwheat and culm with coal-tar pitch as a binder, the proportions being 93 to 94 per cent. of coal and 6 to 7 per cent. of binder. The capacity of the machine is rated at 13 tons of briquets per hour.

The National Fuel Briquette Machinery Company, foot of Court Street, Brooklyn, N.Y.—This plant is also described in Bulletin 316, and consists of a Belgian type press manufacturing small eggettes which weigh less than 2 ounces each. It is operated on anthracite culm and coal-tar pitch with proportions of 95 per cent. of coal to 5 per cent. of pitch. The eggettes are intended primarily for household use, and the principal market is in the domestic trade of Brooklyn. They are also used to some extent for stationary boilers. The capacity of the machine is rated at 6 tons per hour.

The Scranton Anthracite Briquette Company, Dickson City, Pa.—This plant was the largest producer of briquets in the United States during 1907, although it was operated only seven months during the year. The plant is located adjacent to one of the Delaware, Lackawanna and Western mines, near Dickson City, and the briquets are used on the locomotives of that railroad. Anthracite culm is used exclusively with a patented binder of which coal-tar pitch is a principal ingredient. The company prefers not to publish the proportions of coal and pitch used. The briquets are of eggette pattern, weighing about 8 ounces each. During the year the company was engaged in enlarging its plant, and for this reason operations were carried on during only seven months of the year. When the extension work is com-

pleted the company expects to have a capacity of 10,000 or 12,000 tons of briquets per month.

The Briquette Coal Company, Staten Island, N.Y.—This plant, which was completed in July, 1906, and which was briefly described in Bulletin 316, consists of two presses, one of German type and one of Belgian type, the briquets made in the former weighing approximately 1 pound each and those in the Belgian about 4 ounces each. The machines have a capacity of respectively 4½ to 7½ tons per hour. The plant is operated on a mixture of anthracite culm and bituminous slack coal and also on anthracite alone with a binder, of which coal-tar pitch is the basis. The company does not care to give details as to binder or the percentages used.

The United Gas Improvement Company, Point Breeze, Philadelphia, Pa.—As stated in the report on the Coal Briquetting Industry in 1906, published in Bulletin 316, this plant is operated primarily for the purpose of utilizing the breeze produced at the gas works of the company. It is found advantageous to mix the coke breeze with anthracite culm and bituminous slack in addition to the binding material. The average mixture is 42 per cent. anthracite culm, 13 per cent. bituminous slack, 35 per cent. coke breeze, and 10 per cent. water-gas pitch. The briquets weigh approximately 5 ounces each, are of eggette pattern, and are charged into retorts and used in the manufacture of water gas. There are two machines in the plant, both of Belgian type, which have a capacity of 50 tons per day.

In addition to the preceding list of plants, all of which were in operation in 1907, the following companies have been organized for the purpose of establishing coal-briquetting plants. This list does not include any of the names published in Bulletin 316 which have passed out of existence or from which no replies were received from inquiries sent asking for information regarding the operations of the plants during 1907:

The Standard Fuel Company, Birmingham, Ala.—A new company, incorporated in 1907; it did not produce any commercial briquets during the year.

The United States Briquetting Company, San Francisco, Cal.—This company was organized for the purpose of exploiting a process for briquetting peat with California petroleum. All of the work so far has been of an experimental character.

North American Coal Briquetting Company, 81 New Street, New York, N.Y.—This company was organized for exploiting the Forst briquetting process, the main feature of which consists in the material to be used as binder. It consists principally of coal-tar pitch, but the other ingredients of the binding material are kept secret and the process is a patented one. The company has not yet begun operation on a commercial scale.

Zwoyer Fuel Company, 60 Wall Street, New York, N.Y.—The plant of this company, which is described in Bulletin 316, was removed from Brooklyn, N.Y., to Perth Amboy, N.J., during 1907, and was not operated during the year.

American Briquetting and Manufacturing Company, Williston, N. Dak.—This company was organized for the purpose of briquetting North Dakota lignite, using 94 per cent. of lignite and 6 per cent. of binder composed of flax-fiber sirup and rosin. The briquets are to be made in large sizes, weighing 2 pounds 8 ounces each. It is estimated that the machine would have a capacity of 9 tons per hour. It is anticipated that the plant will be in operation during 1908, manufacturing briquets intended for household purposes and for stationary boilers.

Washington Coal Briquetting Company, Seattle, Wash.—This company was incorporated in 1907 for the briquetting of slack coals from the coal mines of the State. The plant had not been completed at the close of 1907.

The Coal-Briquette Machine Company, Oshkosh, Wis.—This company organized in 1907 and expected to be in operation during 1908. It is manufacturing some briquets out of anthracite and bituminous coal and lignite in an experimental way. The briquets are cylindrical in shape and weigh, approximately, 12 ounces each. The capacity of the machine is rated at 48 tons a day.

American Lignite Briquette Company, Rockdale, Tex.—This company, of which Mr. J. J. Olsen, of San Antonio, is president, was organized in 1907 for the purpose of briquetting lignite mined at Rockdale. The company expected to be in operation during the summer of 1908.

United States Coal Manufacturing Company, 1339 Arch Street, Philadelphia, Pa.—This company has manufactured some briquets in an experimental manner, but at the close of 1907 had not produced any on a commercial scale. The briquets are of triangular shape, of small size, and intended for domestic use. The character of the binder and the proportion of binder and coal used are kept secret by the company. High calorific value, easy ignition, complete combustion, and absence of clinkering are merits claimed for these briquets.

R. B. Metcalf, Portsmouth, R.I.—Mr. Metcalf, who has done considerable experimental work in the briquetting of Rhode Island anthracite, had not begun the manufacturing of briquets on a commercial scale at the close of 1907, although he expected to have a plant in operation before the close of 1908.

When a few years ago, the alloy of aluminum with 6 per cent. of copper for use for various naval purposes did not give the complete satisfaction that was expected of it, the aluminum then available had not the degree of purity which now obtains. Aluminum manufacturers then set to work to improve their methods of manufacture; they now produce aluminum of a high degree of purity, and they are quite as eager in recommending the use of this pure aluminum in alloys as its ing of a French aluminum manufacturer to the effect use alone for different engineering purposes. The say-that "the future of aluminum lies upon the water," is more true now than it ever has been. Seeing also the very great efforts which are being made at the present time in the construction of dirigible balloons and aeroplanes, its future is likely to be further extended still, while in the numerous branches of the electric industry the use of aluminum is steadily developing day by day."

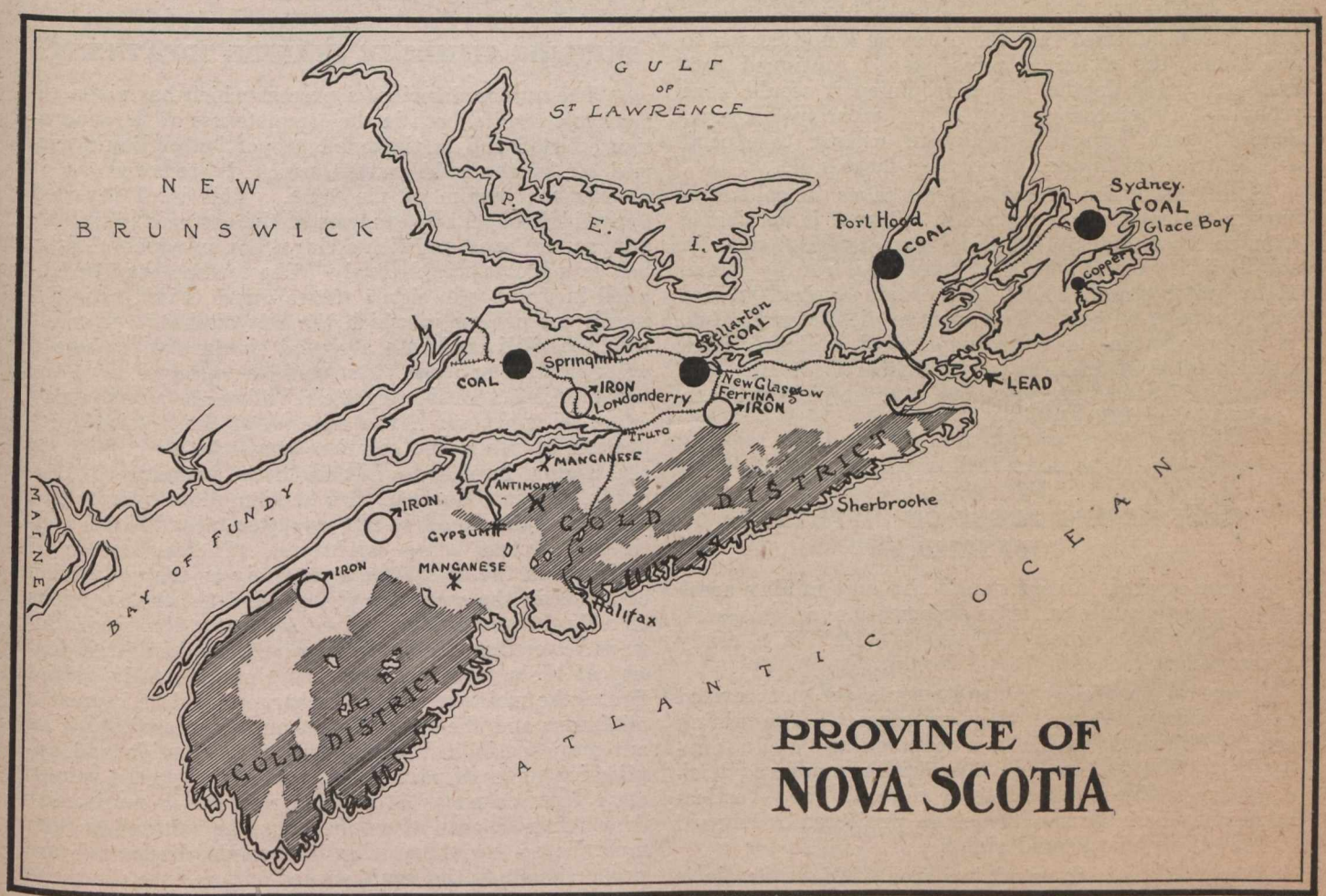
The marble output of the United States in 1907 was valued at $7,837,685. Vermont marble is used for outside building and for monumental work, also for interior decorations, for electric work, mosaic work, etc., and is sold principally as dressed stone. Vermont produced about 1,450,000 cubit feet, 58.65 per cent. of the entire output.

GOLD MINING AT WAVERLEY, N.S., FIFTY-TWO YEARS AGO.

The late Sir J. W. Dawson visited the Waverley gold mines in 1866, six or seven years after the first discovery of the metal in Nova Scotia. Sir William, then plain Mr. Dawson, incorporated a note this visit in his book, "Acadian Geology."

The Waverley veins were at that time the most extensively worked in Nova Scotia. The ore was extracted in large open cuts along the strike of the vein, and was hoisted by horse "gins." The deepest pit was 225 feet. Dawson noted in this pit that the vein consisted of compact grayish-white quartz, varying in thickness from four feet to six inches, but having an ordinary width of about two feet. The footwall, he states, consists of coarse gray slate, with small cross veins of quartz, the hanging wall of hard gray quartzite presenting a waved and crumpled surface. "The quartz," he remarks, "has a laminated or banded appearance, and the gold seems to be most abundant near the walls; though visible gold is rare in this vein at present, the greater part being in a minutely disseminated and invisible state. The superintendent of one of the mines informed me that the thicker portions of the vein afforded scarcely more gold than the thinner portions, and that the gold is most abundant near the hanging wall." This particular vein was known then, as it is now, by the name of "Tudor."

Mr. Dawson expresses admiration for the equipment of the "German" mine at Waverly. The quartz from this vein, he tells us, "is crushed in an admirable stamping mill, worked by steam, and at present having sixteen stamps, though capable of being increased to twice that number." The completeness of the apparatus "for the *subsequent* amalgamation and distillation necessary to obtain the gold," is commented upon. The problem of recovering the gold from the "metallic sulphurets" was even at that early date a subject of practical interest. Dawson does not, much to our regret, go into details on this point. Battery amalgation was not in vogue. Only the gold caught on the plates was recovered.



WAVERLEY LIES ABOUT TWELVE MILES FROM HALIFAX ON THE I. C. RY.

The yield in those days was heavy. Waverly ore averaged more than one ounce of gold to the ton, despite crude and wasteful methods. Five mills, four worked by steam, and one by water power, were in operation. In 1865 the Waverly district yielded 13,102 ounces. The

rate of return per man employed was $895 per annum.

In view of the later history of gold mining in Nova Scotia, Dawson's recommendations as to mining methods and government assistance have something of a prophetic air. Summing up the situation (1866) he points out that the veins then opened were not worked up to their highest point of profit. Even in the larger mines, like those of Waverly, no vertical shafts had been sunk on the veins.

"The desire to make the work [immediately] remunerative as it proceeds has induced all the companies to sink on the slope of the veins,and to conduct the works on the cheapest possible plan." Dawson then expresses a strong conviction that, considering the regularity and extent of the veins, were vertical shafts sunk to a great depth and regular mining in the Cornish plan pursued, the initial outlay would be more than repaid by increased production. Some of the veins then worked had improved with depth; others showed impoverishment. But Dawson affirmed that there was no sound reason to doubt that the principal veins opened continued profitable to great depths. In his opinion it would have repaid the Provincial Government to grant special privileges to such companies as were willing to expend sufficient capital to open mines on a large scale.

Some conception of the interest taken in gold mining five years after the first rush occurred is obtainable from the fact that in 1865 there were 38 stamp-mills in commission. Twenty-seven of these were run by steam, 11 by water power, 30,963 tons of ore crushed yielded 24,162 ounces of gold. The average yield was 15 dwt. 14 grains per ton. The maximum yield, evidently from a small parcel of ore, was reported from Wine Harbour. This was 87 ounces per ton. The average yield per man employed was $669.41.

UNIT MINING AREAS OF DIFFERENT COUNTRIES.

There is great divergence in the unit mining areas of different countries. For information of this sort, Hatch and Valentine's "Mining Tables" is a ready source of reference.

Some of the following statements are not revised to date, but in the main they are correct. The mining area of British Columbia is a rectangular claim not exceeding 1,500 feet in length or width, measured horizontally, with no extralateral right. The vertical planes in which the boundaries lie, projected downward define the underground rights.

The gold and silver mining area of Nova Scotia is a rectangle measuring 250 feet by 150 feet, laid off with the shorter sides running east and west. 100 is the maximum that can be taken up by one person. For the mining of other minerals an area of five square miles, not exceeding 2 1-2 miles in length, may be granted.

400 acres is the amount of mining territory that one person may acquire in Quebec, although by special Order-in-Council 1,000 acres may be taken.

For gold and silver the New Brunswick area is practically the same as in Nova Scotia.

The unit area for vein mining in the United States is the claim of 1,500 feet along the strike of the vein by 600 feet in width. By virtue of the "law of the apex" extra-lateral right allows the vein to be followed beyond the vertical plane in which the surface boundaries lie.

In Mexico the unit area for the mining of all metals, precious stones, rock-salt, and sulphur, is the pertenencia, which is a solid block of unlimited depth, defined above ground by that part of the surface which in horizontal projection gives a square, each side of which measures 100 metres; and bounded underground by the four vertical planes corresponding to the sides of the said square.

The Transvaal claim, for vein and reef mining, has an area of 60,000 square Cape feet. (One Cape foot equals 1.033 British). Where practicable the claim is a rectangle in form, measuring 150 Cape feet along the strike by 400 Cape feet in a direction at right angles to the strike.

SETTLING SLIMES IN CYANIDE TREATMENT.

"The author describes a process which has given remarkable results, both in the completeness of the separation effected and in the small proportion of liquid carried off by the solid matter, which is removed as it reaches the bottom of the tank. This is of inverted pyramidal shape, and connects at the bottom through an 8-in. square aperture with a closed box in which a 10-in. belt is made to travel slowly. The method may be applied in practice in either of two ways. First, as in intermittent process in which the belt discharge of solids would be delivered into a second similar tank where a weak solution or wash water could be sprayed on to the belt to loosen and disintegrate the slime; or a mixer may effect this purpose. After removal of the required proportion of solids the solution would be withdrawn to the original level and a second charge introduced. Secondly, the introduction of a suction filter near to the surface of the liquid in the separator, permits of a continuous process being carried on. The percentage of moisture in the discharge is inversely as the proportion of solids in the separator charge, and the first portions of a discharge from any given separator charge are always better than the succeeding portions, hence the density of the separator charge is maintained as its initial figure, the moisture in the discharge would be kept at a minimum and the rate of discharge increased. By an automatic periodical cutting off of the suction and application of small back pressure the filter screen is kept clear from caked slime and clear liquid is continually drawn from a pulp of sp. gr. 1.4. The belt and suction must be so correlated that the solids discharged are proportionate to the liquid sucked out, and the discharge from a pulp of the density stated will uniformly contain about only 22.5 per cent. of moisture. If there be two suction pipes with screens they are kept clear by back pressure being applied alternately to each. The continued use of screen suction would not be possible unless the solids were being extracted by the conveyor belt. The procedure in the wash settlers is practically the same. The solids are washed off the belt by precipitated solution and water, and the suctions withdraw an equal amount of liquid, which is passed through the extractor boxes and returned from the sump. In other processes completeness of washing is dependent on time and capacity of plant, as each instalment of slime is taken separately and washed solution passed through it as long as economically possible, when it must be removed, whether well washed or not, to make room for the next

instalment; but in this method continuity is unimpeded and slimes may be washed out with any reasonable quantity of weak solution without affecting the time of treatment—the only factor affected being the capacity of the extractor boxes.

The advantages of this method are: (1) Absence of pumps, carrying machinery and complicated appliances; (2) the separation of sands from slime is not called for, and thus disadvantages attendant on dealing with such classes of material as depend on close classification are obviated; (3) it is possible to wash to the best advantage and thus reduce the loss by residual moisture; (4) the degree of fineness or uniformity is immaterial; (5) the initial cost is very low, and niceties of adjustment are not requisite; (6) the only limit to the thickness of a charge is the point at which it will not run, and best results are obtained from charges with high percentages of solids; (7) the process may be continuous. The paper is accompanied by diagrams and tables showing the arrangement and the results of working."—Electrochemical and Metallurgical Journal.

ELECTROLYTIC SEPARATION OF NICKEL AND COPPER.

Nickel can be accurately determined by electrolysis of the nitrate, provided (1) no nitrite be present, (2) a sufficient excess of ammonia be added, and (3) a straight wire of passive iron be used as anode. Iron is necessary since platinum anodes are more or less irregularly attacked, and the dissolved platinum is deposited with the nickel. The metals (0.4 to 0.5 gram in all), or compounds containing them, are dissolved in nitric acid, with an excess of 5 c.c. of strong acid. Nitrous acid is expelled by boiling. The volume is made up to 100 c.c., and the copper precipitated by a current of 1 ampere at ordinary temperature. Towards the end of the operation the solution is warmed up to 50 degrees or 60 degrees C. To the bath is now added 80 c.c. of ammonia (s.g. 0.91), the iron wire anode, cleaned in hydrochloric acir and rendered passive in strong nitric, is substituted for the platinum one, the coppered cathode replaced, and the nickel deposited on it by a current of 5 amperes. The current heats the solution to 70 degrees C. When the liquid is decolorized and gas evolution occurs at the cathode, the latter is withdrawn without stoppage of current, and washed, dried, and weighed. After retesting, the deposition of nickel is complete in 55 minutes. The ammonium sulphide test is useless in solutions containing so much free ammonia. Hence the need of retesting.

NEW USE FOR PLASTER OF PARIS.

"Not only is plaster of Paris an excellent flux for melting such materials as washings, grindings, or chips, but it has also the property of removing iron, a fact not generally appreciated. Plaster of Paris when melted fuses to a clear liquid, which has the property of dissolving oxides. Being a heated flux it does not attack the crucible. To use plaster of Paris for melting washings, grindings, or other scrap which contains iron, about 5 lb. are mixed with 100 lb. of the scrap and the whole is melted down. The plaster melts and clears the scrap of the iron. When the whole is thoroughly melted and the metal well stirred the plaster need not be skimmed off. The whole is poured into an ingot mould. When cold, the plaster is easily removed by a blow from a hammer. Frequently it comes away of its own accord. Small quantities of iron may in this way be removed from scrap metals, a good melt being at the same time obtained. Not only is plaster of Paris an excellent flux for melting such materials as washings or grindings, but it has the great advantage of not attacking the crucible. This is not possessed by any other flux."—Indian Engineering.

MINERAL LAWS OF NEWFOUNDLAND.

In the ancient colony it is lawful for any person to search and prospect for minerals, and to prove the existence, value, and extent of minerals therein or thereunder, without first obtaining a license. This liberty, however, is qualified by the provision that such search and prospecting shall be bona fide with a view to obtaining a mining location and lease thereof under the provisions of the Crown Lands Act. No person so searching or prospecting is permitted to remove from the land any greater quantity of ore, mineral, or metal than shall be necessary to be used as samples. The above does not apply to land appropriated or reserved by the Crown.

CANADIAN PLACE NAMES.

Confusion has resulted from the careless naming of localities in Canada. This is felt as much by the mining fraternity as by any other class. To illustrate some of the needless sources of confusion one has but to look through the pages of the Geological Survey Index. Everywhere, in every province, there is duplication of names of towns,, villages, districts, rivers, etc. There are 22 streams known by the name of "Little River." There are five "Eel" rivers and 20 "Black" rivers. And so on. Names of this sort are entirely lacking in charm and meaning.

MINERALS AND WATER SOLUTIONS.

Metals are precipitated from solutions of their salts by natural silicates. Almost equivalent quantities of the bases of the silicates are dissolved at the same time. In these reactions the most common replacing bases are sodium, potassium, magnesium, and calcium. The metals are precipitated as hydroxides or basic salts.

The principal changes in matters pertaining to ore dressing during 1907 were in the direction of modifications of existing processes. Steam stamps are used extensively only in the Lake Superior copper districts. The Harz jig is still acceptable. The Wilfley, Deister, and other such concentrating tables are most used for fine concentration. Suspended Frue vanners have been tried successfully. There is a marked tendency to introduce flotation processes of various types for the concentration of mixed sulphides. Magnetic concentration has advanced rapidly, bot hin efficiency and in scope of application. In Norway and Sweden the concentration of lean magnetites, along with briquetting of the products, has been most successfully carried on. In America the field for this work is opening up rapidly.

BOOK REVIEWS.

Who's Who in Mining and Metallurgy, containing the Records of Mining Engineers and Metallurgists at Home and Abroad, 1908. Founded by George Safford. The Mining Jounral, London.

We have often suffered inconvenience from the fact that until now there has been no published list of British mining engineers and metallurgists. Even in Canada, although in point of numbers our professional mining men are relatively few, it is not always easy to keep track of every member of the fraternity. Both here and in the United States dependence msut be placed upon the membership lists of technical societies and upon personal items in the periodicals. But, it may be because of the superior modesty of our English brethren, as we have long ago given up the attempt to place any but the most prominent engineers of the motherland.

We extend a hearty welcome to "Who's Who." In its pages we may ascertain the present address, the professional qualifications and other pertinent facts concerning Great Britain's mining men.

Naturally there are omissions. These are due, however,fi not to oversight on the part of the editor, but to the indifference of those whose names are not included.

Canadian mining engineers, investors and others will find "Who's Who" a most serviceable volume.

The Mineral Industry: Its Statistics, Technology and Trade during 1907. Edited by Walter Renton Ingalls. Volume XVI. Supplementing volumes I. to XV. 1100pages. Price, $10. Hill Publishing Co., 505 Pearl St., New York, 1908.

The annual volume of "The Mineral Industry" is too well known to need introduction to our readers. This sixteenth annual edition is in many respects an improvement upon its predecessors.

While the mineral industries of the United States are given first place, those of the rest of the world are not neglected. The correlation of data gathered from all over the globe adds largely to the interest of the volume.

Under title of the minerals in question the volume is devided into chapters each of which is a complete treaties on one branch of the industry. Geological technological and commercial conditions are outlined. Export and import trade is not overlooked.

Statistical tables accmpany each chapter, and figures on the world's mineral output are collected in the last section.

The chapters of most general interest and those describing the advances made during the past year in the study of ore deposits in sampling and assaying and in ore dressing and coal washing.

The list of contributors includes the names of the most brilliant technical writers in America.

In conclusion we must call attention, not for the first time, to the misinformation that vitiates Mr. J. P. Hutchins' description of dredging in the Yukon. It is out of place to reiterate here our criticisms of Mr. Hutchins' attitude. It is also impossible that Mr. Hutchins can have obtained his information at first hand.

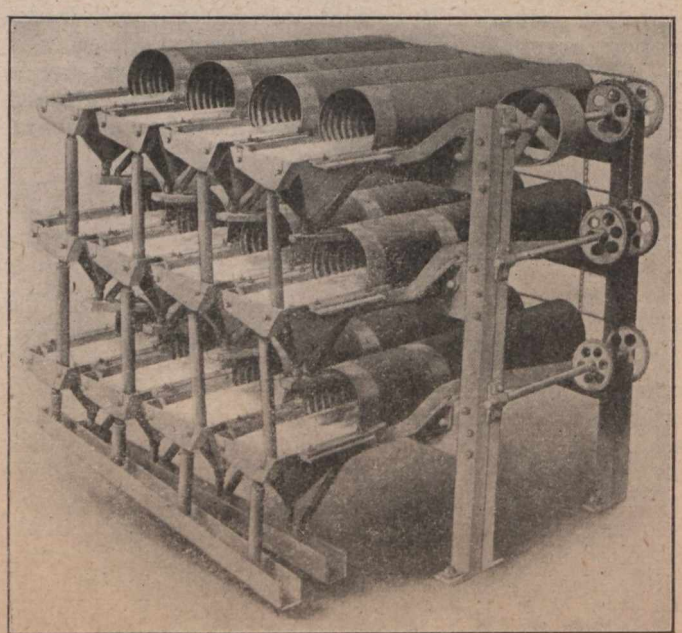
For an accurate account of dredging in the Yukon we must refer the reader to two articles by Mr. T. A. Rickard appearing in the Mining and Scientific Press of August 29, and September 12. These articles were written after personal inspection of the dredging territory of the Yukon.

EXCHANGES.

The Engineering Magazine, September, 1908.

Mr. A. Selwyn-Brown's short review of modern development on the metallurgy of lead and zinc is most timely. After disposing briefly of the Huntington and Herberlein, the Carmichael-Bradford, and the Savelsberg processes of wasting and agglomeration, Mr. Selwyn-Brown touches on briquetting concentrates and fine sulphides, sintering, and so on.

But the most important section of the paper is that descriptive of the Macquisten process of flotation, the recent invention of a Glasgow investigator. The Macquisten process differs from the Potter, Delprat, De Bavay, and Elmore processes in employing no chemicals. The sulphide particles are separated from the gangue by utilizing the surface tension of water by means of a simple mechanical device. The operation is based upon the fact that sulphide minerals are positively affected by the surface tension of water while the rock constituents are not so affected. "The surface tension of the water spreads around each sulphide particle like an envelope leaving, probably, between the surfaces of the water and the mineral a bubble of air



large enough to float the sulphide. No envelope is formed around silicates. The water appears to penetrate them and causes them to sink."

The process is conducted in a concentrator composed of a simple cast iron tube, six feet in length and one foot in diameter. Near each end are two tires resting on supporting rollers to enable the tubes to be revolved with little friction. Inside the tubes is a helical groove with an inch and a half pitch running from end to end, as in a bultnut.

"The tube is revolved at the rate of about 30 revolutions per minute. The pulp is screwed through the tube and is so guided by the helical screw groove as to gain the mineral particles repeated opportunities to glide upon the surface of the water. Good concentration can be made in one tube. The inventor's experiments showed, however, that when four tubes were joined in series so that one fed into the next one following, some of the finest particles did not get properly started on the water's surface until they had nearly reached the discharging end of the fourth tube.

"This process has been tried on a larger scale at the Adelaide Mill, Nevada. It was run with an ore composed of chalcopyrite, pyrrhotite, and pyrite with a little blende and galena which previous plants had failed to handle profitably. Each tube successfully treated from 5 to 6 tons of ore per twenty-four hours, concentrating in the ratio of 11 to 1."

Engineering and Mining Journal, October 3, 1908.—The cyanidation of silver ores at Pachuca, Mexico, is written of by Claude T. Rice. The Pachuca ore carries only five grams of gold per kilogram of silver. The ore milled averages about 700 grams silver and 3.5 grams gold per metric ton. The gangue is silicions. The silver occurs as chloride or bromide in the oxidized ore, and mainly as argentite in the unoxidized ore. Some of the ore shows a considerable amount of manganese and a little copper. The ore is completely slimed and air agitation of the cyanide solutions is being introduced.

PERSONAL AND GENERAL.

Mr. H. E. T. Haultain, whose appointment to the chair of mining, Toronto University, is noted on another page, has taken up his new duties.

Mr. Reginald E. Hore has resigned his position as lecturer in the University of Michigan to become lecturer on geology at the School of Mining, Kingston, Ont.

Mr. Aldridge, general manager of the Consolidated Mining and Smelting Co., was in Cobalt recently adranging for the shipment of low-grade ore to the smelter at Trail, B.C.

Mr. Douglas B. Langford, M.I.M.E., who was one of the guests of the Canadian Mining Institute's summer excursion, is at present in Toronto. Mr. Langford will probably spend the winter in Canada.

Prof. A. P. Coleman, of Toronto University, was returned from a two-months' exploration of portions of the Rocky Mountains west of Edmonton hitherto unexplored. An ascent of Mount Robson was undertaken by his party, but after reaching the 11,000-foot level they were forced to abandon the attempt to reach the summit on account of heavy snowfalls.

Mr. E. E. Stockton, of the Auditor-General's Dept., Ottawa, has returned from a visit to the Yukon, where he was engaged for four months on official business. He reports that the gold production of the territory this season will be larger than for many years past, owing to the operations of the Guggenheims, and for the first time the dredges will be busy until the ice forms late in October.

The following is a list of gentlemen elected to membership at a meeting of council held at Victoria, B.C., on September 21st: Members—Alexander Grant, Van Anda, Texada Island, B.C.; J. Edgar McAllister, M.E., Greenwood, B.C.; W. F. McNeill, Canmore, Alta; J. A. Miller, Rossland, B.C.; Geo. Wilkinson, manager South Wellington Coal Mines, Box 286, Nanaimo, B.C.; Mrs. Rosalind Young, 617 Michigan St., Victoria, B.C. Associates—W. Anderson, C.E., Box 666, Rossland, B.C.; H. P. Dickinson, general agent The Giant Powder Co., Box 95, Rossland, B.C.; Chas. F. Law, Vancouver, B.C.; A. B. Mackenzie, Box 222, Rossland, B.C.; Geo. Sheldon-Williams, Box 806, Vancouver, B.C.

Elected to membership at council meeting held at Temagami, Ont., Sept. 6: Members, A. C. Bailey, M.E., box 405, Cobalt, Ont.; Benjamin Browitt, Merritt, B.C.; Freeman I. Daniels, Cobalt, Ont.; Alexander Faulds, Middlesboro', Nicola Valley, B.C.; Ralph W. Foster, M.E., Cobalt, Ont.; Thos. Graham, M.E., Supt. of Mines, Western Fuel Co., Nanaimo, B.C.; H. W. Hardinge, M.E., 43 Exchange Place, New York, N.Y.; J. D. Hurd, M.E., Fernie, B.C.; Jas. Hylands, M.E., Box 18, Cobalt, Ont.; Herbert E. Jackman, M.E., care of Mr. L. A. Hoyt, East Jordan, Mich., U.S.A.; George Johnson, Cobalt, Ont.; M. C. H. Little, M.E., Cobalt, Ont.; J. L. Parker, M.E., care of Tyee Copper Co., Victoria, B.C.; John W. Russell, manager eKrry Mining Co., Cobalt, Ont.; Francis H. Shepherd, M.E., Box 353, Nanaimo, B.C.; R. J. Smith, 403, 1st Street, Manistee, Mich., U.S.A. Associates—Milton Carr, director City of Cobalt Mining Co., Cobalt, Ont.; Shirley R. Gragg, M.E., Haileybury, Ont.; Arthur W. McCurdy, president Nootka Marble Quarries, Limited, Victoria, B.C.; Frank B. Mosure, Cobalt, Ont.; T. J. Smith, president Diamond Vale Colleries, Limited, Box 439, Vancouver, B.C.

YUKON COAL.

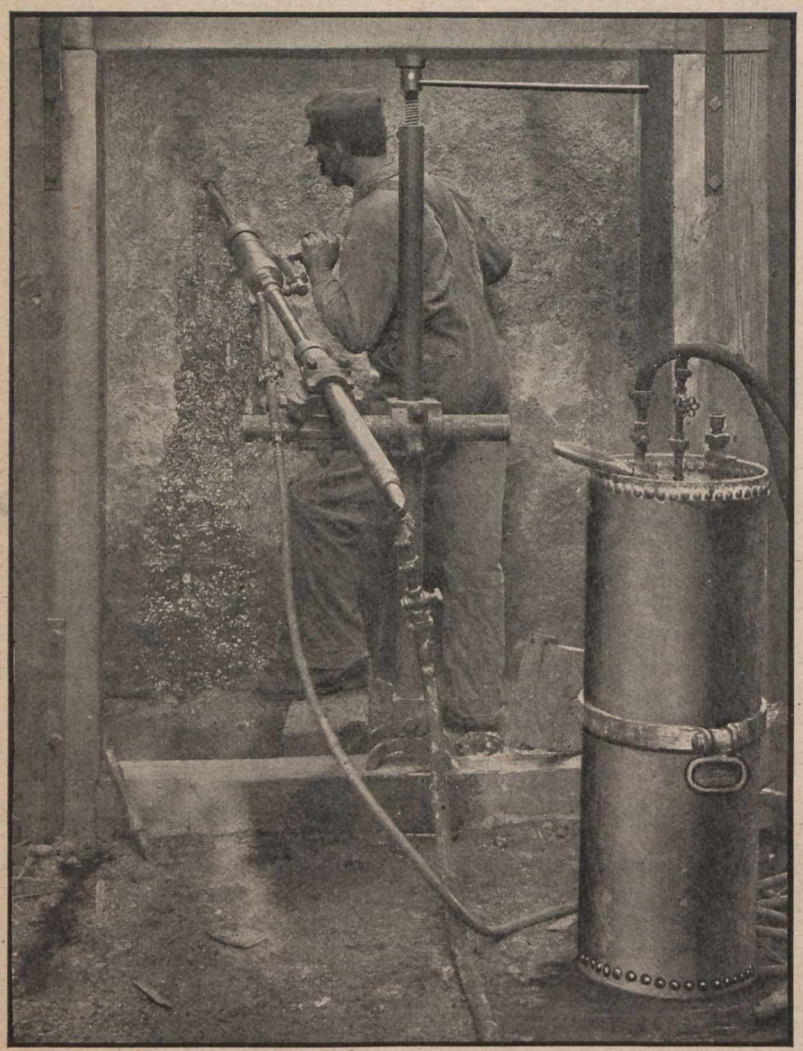
Coal is coming to the front rapidly in Yukon Territory. Last year royalty was paid on 15,433 tons, three times the amount received during the previous year. The price of domestic coal in Dawson is $16 per ton. Tantalus and Coal Creek are the two sources of supply. Coal from the former place is used on the White Pass boats. The coal Creek fuel is used by the electric light plant in Dawson, which is under the same ownership. The Tantalus coal is the better of the two products.

The actual output of the Rand mines last month, as officially announced by the Transvaal Chamber of Mines in London was 587,634 ounces fine. This was 12,366 ounces below the estimates of a week ago as cabled to the Post, and just falls short of the August production, which established high record, having been 587,813 fine ounces.

INDUSTRIAL PAGE.

THE CARNAHAN SYSTEM OF BREAKING ROCK WITH MURPHY DRILL.

In hard rock one man can easily drill 45 feet a shift with our No. 1 Murphy Drill; 65 feet with a No. 2 and 90 feet with a No. 3, and he can put his holes in to take advantage of the ground the same as if he was doing the work by hand. The extreme simplicity and durability of the Murphy is embodied in the fact that there is but one moving part, and when one of our drills go under ground it goes there to stay. The miner does not lose time bringing them to the top for repairs.



After a little thought all miners will admit the advantages herein claimed for a hand-operated, unmounted drill. It is well established theoretically and practically that rock can be broken more economically by means of shallow holes put in, to take advantage of the ground and shot often, than by filling a heading with deep holes and shooting once a shift.

The reason why a heading is filled with deep holes where either old-fashioned machines are used, is because it takes so much time to set the machine up and take it down. The loss in time being enormous.

It is not practical to set up and take down a mounted drill twice or oftener a shift, as one cannot spend all his time in this way; a little time must be allowed for drilling, else progress would be very slow.

With any machine that takes no time to set up or take down and permits the holes to be put in just as they would by hand, there can be a great saving effected in power and in the number of feet of holes necessary to be drilled, over any of the old style mounted machines.

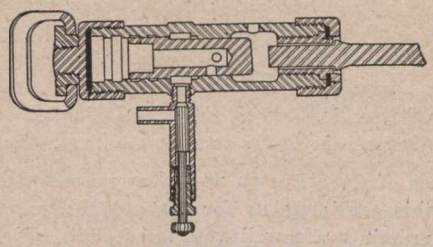
In order to get the good out of hand machines, the hole should not be put in deep, most of them not more than 48 inches. They should be put in to take advantage of the ground, and should be shot twice a shift or oftener, or, if this is impossible, the drill must have plenty of space to work in, as much as at least two headings or a long stope.

A small streak of ore can be kept just as clean when our machines are used, as if it was broken by hand. All miners will admit that in ordinary ground rock can be broken cheaper by hand than with the old style mounted drill if we leave out the question of time. Now, if this is admitted, the proposition becomes simple, for with a Murphy drill a man can drill with ease four times as much as he can by hand. He can put in the holes to take advantage of the ground the same as in hand work and use no more powder per ton of rock broken, than in hand work.

Now, we have only to figure on the cost of operating the machine. The wear and tear of the machine is very slight. We have had them running for six months without a single thing breaking or wearing out, and on an average they will not cost more than $3.00 per month to keep in repair.

The Murphy drill takes about one-third as much air as the two and one-half so called one-man baby machines.

These two items will cost less than one-half the wages of a man, therefore we can break in a day with one man,



using our hand drill, as much as four men could break by hand, with the expense of one and a half times the wage of one man.

From the foregoing description and cut it will be seen the Murphy air hammer drills are adapted to all kinds of practical mining, such as sinking, stoping, tunneling and block-holing; they are adapted to be used with solid or hollow steel, wet or dry.

A hand drill may be changed to a stoping drill, or a stoping drill to a hand drill, and that either may be changed to a water machine, or may be mounted on a column for tunneling. It is therefore possible to equip a mine with Murphy drills and use no other kind, as one line of repair parts will suffice for all machines. The repair parts for a Murphy drill are made strictly interchangeable and are suitable for all styles of our machines. We are the only manufacturers who can equip a mine with air hammer drills for all kinds of mine work. Some manufacturers can supply a hand drill for drilling dry only and a stoping drill for dry work only that cannot be mounted on column, but these are entirely different machines and require a different line of repair parts. Other manufacturers furnish water machine for tunnel work, but this must always be used on a column or cross bar, and its parts are not interchangeable with either the stoping drills or hand drills. You can readily see the advantage of having a line of drills with parts strictly interchangeable and at the same time a drill that is capable of handling all lines of mine work. The advantage of our system will be manifest to any miner. It is not necessary to carry so many repair parts, as the machines are all alike. When a miner has learned to run and understand one of our machines, he understands them all. When the mechanic understands one, he understands all. That these machines are unequal for speed for drilling, durability and minimum consumption of air for work prformed, will be testified to by the hundreds of miners who have recently adopted them.

The Murphy Drill is provided with what is claimed to be the only practical, automatic, lubricating device ever put on a drill. It is as excellent as it is simple. To reach the cylinder, the oil in the reservoir must pass through a leather gaskit, which is made of heavy sole leather, unperforated. The oil must soak through it. This it does just fast enough to keep the cylinder properly lubricated. This advice is more important than may appear at first sight, for miners are so notoriously careless about oiling their drills, and if a drill is not properly oiled it will not do nearly the work and will wear out earlier.

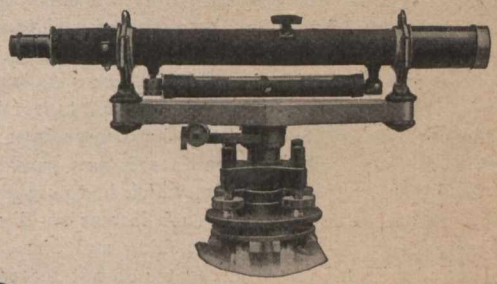
Examination of the cross cut will show the simplicity of the machine there being but one moving part. Every part can be readily removed and replaced if they should become worn as all repairs and parts are made strictly interchangeable. Anyone can understand it, anyone can run it.

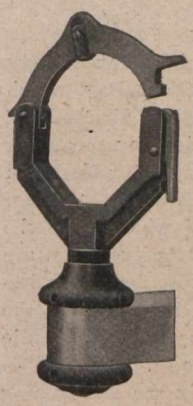
A NEW WYE LEVEL.

We show herewith a new Wye Level having several improvements, which has just been placed on the market by Wm. Ainsworth & Sons, the well known instrument makers of Denver, Colorado, U.S.A.

The principal parts of the instrument are made of the hardest bronze alloys to gauges, and, with the exception of the centres, strictly interchangeable. It has an 18 inch 35 power erecting (or inverting) telescope with 1⅜ inch objective, 8 inch 10 seconds level with graduations on glass, 11 inch bar, clamp and tangent, long steel centres of large diameter and four screw leveling head of improved construction.

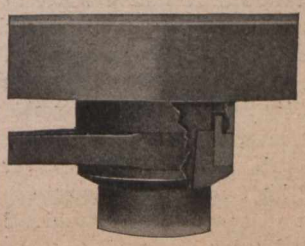
Especial attention has been given to the construction of the telescope, where owing to improved methods and by working to within limits of .00005 inch it has been possible to construct a telescope that will remain in collimation throughout its entire travel without making use of the objectionable object slide adjustment, which until now has been the only solution of this difficulty.





The Wyes are of light but rigid construction with improved spring latches for locking, that are quickly operated and very solid. The clips carry fibre tipped spring plungers that hold the telescope firmly in the wyes.

The leveling head is of the same construction as that used for their transits but without shifting center; and owing to especially accurate construction cannot be cramped in any position.



The spindle and clamp are protected against the entrance of dust by a light ring threaded onto the spindle which carries on its inner diameter a felt ring that is in constant contact with a projecting ring on the clamp.

The instrument is packed with the usual accessories in a mahogany carrying case, the telescope being removed from the Wyes to prevent damage to the collars when carrying and while in transit.

This instrument and an improved Railroad Wye Level are fully described in bulletin BX-16, which will be sent on request.

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

Glace Bay, Oct. 2, 1908.—The pall of smoke which during the latter half of September covered the River St. Lawrence and extended far into the Gulf forbade all navigation for a space of seven or eight days, and caused a great deal of enforced idleness at the mines. The output of the Dominion Coal Company's collieries, for example, would under ordinary circumstances have reached 330,000 tons, but in consequence of the numerous shutdowns that were found necessary, it has amounted to only 260,000 tons.

It has been a striking object lesson on our dependence in Cape Breton on the St. Lawrence market as an outlet for our coal production. At the very least one-half of the saleable output of the Cape Breton collieries is market up the St. Lawrence. It is a peculiar trade. The season is rendered very short by the climatic conditions, so short indeed that it is beyond the capacity of the mines to produce the shipments required during the six or seven months of open navigation. In order, therefore, to equalize production and distribution as much as possible, large banks or stores of coal must be accumulated at the mines during the winter, and equally large stores must be accumulated at the discharging points in order to carry the requirements of the trade over the season of closed navigation. Such a trade requires a large amount of capital, first for transportation, and secondly for wages in order to carry the workmen over the winter and provide the stores of coal required for the summer. This trade is also subject to strenuous American competition, and is altogether beset by so many difficulties and so nicely balanced that very little is needed to render it an unprofitable one. It is, therefore, of the utmost importance to Cape Breton that no legislation be passed that would tend to increase the difficulties of this trade, which has no parallel anywhere, that we are aware of. Any such law as an Eight Hours Act, for instance, might have far-reaching and disastrous consequences that its light-hearted advocates do not foresee.

Mr. Kier Hardie, the leader of the Independent Labor party in England, recently addressed a meeting in Glace Bay, which was held in the interests of the United Mine Workers of America. Mr. Hardie recently achieved notoriety by preaching sedition to the natives of our Indian Empire, and we understand his mission in Canada is to help in the formation of a Labor party in the Federal House similar to that of which he is the leader in England. We hope Mr. Hardie's extensive tours are improving his knowledge of geography, because he needs lessons in that particular science, especially as it applies to the British Empire. It is just about a year ago that Mr. Hardie received a letter from Woolongong, New South Wales, Australia, complaining of the bad state of trade in the coal mining region of New South Wales. Mr. Hardie immediately wrote to leading newspapers in England warning miners not to accept invitations to go to "certain unspecified mines near Sydney, Nova Scotia," and finished his letter by saying that he hoped his warning "would not be in vain." Perhaps it may by this time have penetrated Mr. Hardie's consciousness that Sydney, Nova Scotia, is in Canada, and not in Australia. We never heard that Mr. Hardie acknowledged his error or tried to remove the effects of his letter, although it was promptly contradicted by the Agent-General for Canada in London.

Another gentleman who spoke at this same meeting conveyed some remarkable information to his hearers, from which it appears that we have been living in blissful ignorance of our woeful state. Mr. Sherman, the gentleman in question, and a vice-president of the U. M. W. A., told his audience that they compared very unfavorably with the miners of the West, and that their faces showed that they worked in "ill-ventilated mines." Anyone who knows the Cape Breton miner will smile at this statement, and take it just for what is is worth. When one speaks of the native miner of Cape Breton it must be remembered that he comes of an ancestry of miners, and that he is one of a very distinct race. Out in the West they have no indigenous race like the Highlander of Cape Breton. The miners of the West are gathered from all parts of the world, and it is more than possible that the fine specimens Mr. Sherman has seen there were born down here. It is rather more than likely. But it would be a work of superfluity to attempt to prove the superiority of the Cape Breton miner's physique. Everybody knows it. As to the ventilation of our mines, we think Mr. Sherman is as far astray as he is on the other matter.

The mines of Cape Breton need fear no comparison with any mines on this continent, or for that matter on any other continent. Our mines are well ventilated, well laid out, superbly equipped, and safety is a prime consideration in their management. Mr. Sherman can bring ordinary mortality statistics, ordinary and fatal accident rates, ventilation figures and anything he likes from the West, and we will go one better in Cape Breton, every time. We would remind Mr. Sherman that it is always well to speak a modicum of the truth, and to suppose some spark of intelligence in the audience, even in the benighted East.

ONTARIO.

Cobalt.—The Kerr Lake Mining Company.—The Annual Report of the Kerr Lake Mining Company for the year ending August 31st has been issued. Great credit is due to the management of this company for the complete information furnished and the general excellence of the report.

During the fiscal year a total of 1,473,712 ounces of silver were produced at an estimated value of $787,554. The cost of producing this ore, including all development costs in the mine, shows a total of $139,530.97, leaving a gross profit of $643,023.76. The average value per ton is over $1,500.

Accompanying this report are maps showing the underground development and the surface plants, etc. On vein No. 7 a shaft 180 feet deep has been sunk. On vein No. 3 a depth of 325 feet has been reached. Considerably over a mile of underground work has been done. Five veins on this property have already been located in which ore has been blocked out. Vein No. 3 has produced 168 tons, and vein No. 7 363 tons. Less than 25 per cent. of the property has been developed, but from the valuable veins uncovered in the development work so far done there is every reason to believe that other veins of equal richness will be encountered with further development work. The showing of the property for the yast year is a remarkable one.

The following is the statement of the Secretary-Treasurer of the assets and liabilities:—

"To the Shareholders and Directors of the Kerr Lake Mining Company:

"I herewith submit my report of the Assets and Liabilities, together with Profit and Loss account, for the fiscal year ending August 31st, 1908.

"It is most gratifying to be able to report to you that I received the sum of $740,435.80 from the sale of ore during the year. There is still outstanding and due to us by the smelters $116,772.76, making a total of $857,208.56.

"The entire plant, including machinery and buildings, has been charged off to Profit and Loss.

"In previous years amounts received from the sale of ore have been as follows:—

In 1906	$176,717 00
In 1907	347,855 38
In 1908	857,208 56

showing a steady increase.

"Dividends paid were as follows:—

In 1906	$190,000 00
In 1907	210,000 00
In 1908	360,000 00

"The whole is respectfully submitted.

"By order of the Board,

"JACOB A. JACOBS,

"Secretary-Treasurer.

"New York, City, N.Y., Sept. 23rd, 1908."

La Rose.—The net earnings of the La Rose Mine for September were $101,000, as compared to $108,000 for August, $127,329 for July, and $82,807.55 for June.

KERR LAKE MINERS WINNING DRILL CONTEST, LABOR DAY.

City of Cobalt.—The City of Cobalt Mine is rapidly coming to the front as a producer of high-grade ore. In the week ending October 2nd 191,600 pounds of ore was shipped, placing the City of Cobalt fifth in the list of shipping mines. Up to and including October 1st practically 500,000 ounces of silver have been taken out of the property, netting approximately $250,000. On July 3rd a dividend of 3 per cent. with a bonus of 2 per cent. was distributed. On October 15th a dividend of 3 per cent. with a 2 per cent. bonus will be distributed. It is estimated that the ore in sight guarantees a quarterly dividend of 5 per cent. for four years. A new plant is being installed, consisting of a 12-drill Sullivan compressor, enlarged boiler capacity, etc. The main shaft is down 137 feet. Approximately 1,000 feet of drilling has been done at the 65-foot level. Three hundred and fifty-six feet of drifting and cross-cutting has been done at the 137-foot level. In a cross-cut from the lower level a vein known as No. 2 was encountered, and a winze sunk on this vein 60 feet, and at 200 feet a new vein was struck, which is about six inches wide and carries very high values of native silver.

Silver Cross.—Mr. Lewis Jennings, who controls the Silver Cross Mine, has just completed arrangements to resume work on the property. The No. 1 shaft was sunk to 100 feet, and No. 2 shaft to 46 feet when work was discontinued. The No. 2 shaft is on a very wide true vein of calcite and cobalt. This vein will be cut at the depth of 200 feet with a diamond drill. A force of men will be put to work at once trenching, and a diamond drill started. The property is well located, and the formation is very favorable.

Cochrane Cobalt.—Arrangements have been made for the sale of sufficient treasury stock of the Cochrane Cobalt Company to provide funds for thorough development of the property. This should add a new shipper to the S. E. Coleman district, as the indications are exceedingly favorable, and the property is undoubtedly a valuable one. Mr. Floyd Harmon, who developed the Temiskaming Mine, will have charge of the Cochrane. Mr. Harmon has had a very extended experience in the Cobalt field, and under his management the property will be developed to the best advantage.

The Beaver Mine.—At the 200-foot level from the main shaft a drift is being driven in to cut a number of veins which were located at the 75-foot level. Seven veins in all have been cut at this level, and all of these showed every indication of values at depth. The experience of Temiskaming and Shamrock, which adjoin the Beaver on the south and north, has shown that the silver values are not located at or near the surface. Developments at 200 feet should prove up some important vlaues.

The Silver Cliff.—The Silver Cliff Mine, which is operated by a syndicate of Toronto capitalists, is rapidly taking its place as one of the important shipping mines of the camp. Since the present management took possession on July 1st over $125,000 worth of ore has been taken out. Several new veins have been opened up, and the No. 1 vein proved to carry high-grade ore from the surface to the 170-foot level. The main workings of the mine are from a drift into the face of a high bluff, making mining very inexpensive.

Temiskaming and Hudson Bay Company.—At the annual meeting of the shareholders of the Temiskaming and Hudson Bay Company the directors were authorized to issue 23,238 additional shares of stock at the par value of $1 per share to stockholders, at a ratio of two shares for each one share held. The capital stock issued is 7,246 shares of the 25,000 shares of authorized stock. The shares are quoted in the market around $220 each.

It is understood that the new issue is made at the request of brokers, in order to facilitate trading in the stock.

The President reported that the patent to the lot in dispute would be issued by the Government on agreement of the company to pay a royalty of 15 per cent. of net proceeds received from the smelters.

The Red Rock Mine.—The Red Rock Mining Company has gone into liquidation, owing to a debt of $10,000. The directors of the company are as follows: F. P. Chapin, President; A. E. Dyment, Vice-President; R. M. Green, Secretary-Treasurer; R. R. Gamey, A. E. Osler, and N. S. Thompson.

The capitalization of the company is $1,000,000; the stock was all issued. At one period there was every indication that the territory around the Red Rock and Green-Meehan would prove to be very valuable, but the history of both these properties has been unfortunate.

The Otisse Claim.—The Otisse property at Silver Lake, in the Montreal River district, has just been sold to a Toronto syndicate organized by Mr. E. D. Warren. This property has undoubtedly the best surface showing of any of the claims in the Montreal River district, and the development of it under proper

management will do more to promote the interests of the district than anything so far in the history of the outlying camp. A large sum of money was paid out for the property after reports by first-class engineers, and sufficient capital has been provided to thoroughly develop the property. Mr. Frank C. Loring, who has been for some years prominent in the Cobalt District, is to have general supervision of the development work. Mr. Loring is interested also in the promotion. Although no sinking has been done and practically no trenching, twenty-two veins have been located on the property, six of which show native silver. If development with depth shows a persistence in the silver content, the Otisse property will undoubtedly be an important factor in the silver production of the district.

BRITISH COLUMBIA.

Rossland.

The Rossland mines are working along more steadily than the mines of any of the surrounding districts. During the whole of this year they have maintained their regular shipments from week to week, making no runs to high record marks nor falling below their general average. The Boundary mines have been affected by difficulties arising from lack of coke, money and cars, but none of these conditions have affected the Rossland mines to a noticeable extent this year.

The Centre Star, Le Roi, Josie, Giant-California, St. Elmo and Evening Star have appeared on the active shipping list during the past two weeks, and the situation throughout the camp generally is one of persevering activity.

While much might be said of the every-day work at the Centre Star and Le Roi mines, nothing out of the ordinary has occurred. Ore is being opened up in a satisfactory way and the usual development and mining operations have been carried on. On the Surprise property of the Le Roi 2, Ltd., a tunnel has been started towards the ledge. At the Giant-California, having failed to cut the sought for ore body with the long cross-cut, the operators are now doing considerable diamond drill development, by means of which it is hoped to locate the continuation of the lode known to exist in the Annie claim of the Le Roi Two, adjoining, which ore has been followed up to the side lines of the California. The location of ore in the Giant-California means much to Rossland camp in an economical way, and it is hoped that this concern will be repaid in a rich manner for the great amount of developement work they have done on the Giant-California during the past eighteen months.

At the Le Roi mine during the month of August they expended $9,000 on development work, in the course of which a good body of ore was encountered on the 1,650-ft. level. The quantity of ore shipped to the Northport smelter was 6,191 tons, which carried 2,837 ounces of gold, 3,350 oz. silver, and 147,000 lbs. copper. The estimated value of the gross output is $77,000, and the profits $15,000 for the month. The Le Roi has been making good progress during all of the present calendar year, and a good report from the directors for the past fiscal year should be the result.

It is reported that they have exposed a five-foot ledge of good-looking ore on the Inland Empire. No assays are yet to hand.

From time to time the Consolidated Co. has been disposing of the machinery contained in the huge structure erected several years ago for the reduction of Rossland pyritic ore, and which is situated at Trail, B.C. Most of this machinery has been shipped to the various mines of the Consolidated Co., where it has been put to use advantageously. Most of the concentrating machinery proper has been shipped to the St. Eugene concentrator, and the concentrator at Trail is fast being dismantled. The Rossland Power Co., the organization that launched this enterprise, after several months of apparently successful experimental work at Rossland, met with a heavy loss and much disappointment when it was found that the idea was not practicable. The concentrator was too far from the mines, and freight rates, loss in the tailings and general recalcitrant character of Rossland ore led to its failure. The capitalization of the Rossland Power Co. was originally $600,000; when it was absorbed by the Consolidated the assets of this company were taken in at $60,000, and even at that it is safe to say the Consolidated Co. will incur some loss after the transaction is cleared up.

There has been a lot of work done towards the concentration of Rossland low-grade ore. A cyanide works on Sheep Creek, below the camp, started off to revolutionize mining in this section some years ago, but was a dismal failure. The Le Roi Co. has an experimental concentrator on the Black Bear claim consisting of crushers, Chilian mills, settlers, Wilfley tables, etc., which is standing idle at present.

The White Bear stamp mill, Wilfley tables and oil plant are idle, but it is said that this concern made a small profit on their concentrating, while working. Several inventors have brought in their tables for catching the gold and other values in tailings, have been seen working at the foot of the ore dumps for a time and have eventually boxed up their tables and moved to other fields. The Le Roi Two, Ltd., have been working their concentrator steadily for the past couple of years. During the month of August they shipped 69 tons of concentrates, which netted them $950, or $13.76 per ton. This figure, after deducting cost of mining and treatment in the concentrator, leaves them a good profit. It may be said, however, that the "second-class ore" of the Le Roi Two is of a higher grade than that of either the Le Roi or Centre Star mines.

Boundary.

Having survived the coke shortage in good form, and having run the weekly shipments once more up to the high tonnage mark, the big producers of this district are now threatened with a setback in the shape of a car shortage, there being a lack of cars to haul fuel, owing to the demand for cars to take the big wheat crop of the North-West to the Eastern shipping points. The shipments from the district for the week ending Oct. 3 were but 34,959 tons, as compared with the week ending September 19, which totalled 41,230 tons. The Granby, Snowshoe, Mother Lode and Oro Denoro were the only shippers during the week ending October 3.

The mines of the Dominion Copper Co. have been shut down for the present, only a pumping crew being retained at the mines. The company has drifted into such a position, in consequence of the very low price of copper, that it is believed that nothing short of reorganization will place it where they will be able to make their mining and smelting operations pay; that is, considerable capital is required to get the enterprise into good working form, and it is likely that a receiver will be appointed and the company reorganized. The mines of this concern never looked better, and they were working along in good shape until the coke shortage, which followed the Fernie fire, gave them just enough of a setback to precipitate matters. In order to finance the 10 per cent. sinking fund requirements of the $800,000 outstanding bonds, in June last, it is stated that many of the large bondholders took notes for their interest, and now that other heavy payments are about due it is felt that the most expedient thing to do is to get the business organized on a good basis before doing any more work. It is safe to say that when this reorganization has taken place and the company has sufficient funds to make a good start, and equip the mines and smelter with up-to-date ore handling machinery in every respect, then this company will be able to forge ahead to the ranks of profit payers, for their mines are certainly as good

as other Boundary properties that are being made to pay and, in some respects, the ore found in them carries higher values.

The big find of chalcopyrite in the Emma mine of the B. C. Copper Co. has done much to stimulate development in the Greenwood district, and has, to some extent, been an aid to the formation of a company to develop the valuable Greyhound group of mines that adjoin the property of the B. C. Copper Co. The B. C. Copper Co. is now working, in addition to the Mother Lode and Oro Denoro mines, and the properties recently acquired in Wellington camp, the Napoleon and Acme mines, and other properties in the State of Washington just across the Boundary line. At the Napoleon they are extracting 200 tons of ore per day that will average $13.35 per ton. This output can, and will, be considerably augmented when copper advances. The Athelstan Fraction and Molly Pritchard claims which the B. C. Copper Co. recently bonded for a figure around $100,000, will prove valuable to them, inasmuch as the ore is useful as a flux, and in addition carries paying quantities of gold and silver.

A car of ore has been sent by the Consolidated Co. from the War Eagle, Phoenix, to the Trail smelter. The Granby Co., after much experimenting, are now fitting their powder thaw house with an apparatus whereby air-warmed by electric coils will be driven into the thawing room, and they will do away with the steam. It is thought that the air will thaw the powder in a more uniform away and will be less liable to cause accidents than any other form of heat.

Nelson.

The Silver King mine at Nelson has resumed ore shipments, the product now being treated at the Trail smelter. A series of test runs have been made at the Granite-Poorman mine by the lessees. The highest returns were $2,300 for the nine-day run; other runs netted $1,200 and $1,100. The gold obtained from Granite ore is quite coarse, and is mostly caught in the batteries. Twenty tons of concentrates were also obtained in addition to the gold for the three test runs. Experts have been examining the May and Jennie claims of the Reliance Mining Company for American capitalists. The Fisher Maiden mine has made a shipment of 22 tons of sacked ore to the Trail smelter.

A body of $100 ore has been opened up on the Second Relief mine, Salmo district. This ore will not be put through the mill, but is rich enough to ship direct to the smelter. Fifteen men are at work on the Yankee Girl property. The Arlington is shipping 100 tons of $75 ore per month. The control of this company is largely held by English capital.

A body of good shipping ore has been encountered in the workings of the Aurora, across the lake from the St. Eugene. The concentrating ore found in the lower tunnel carries 11 oz. silver and 24 per cent. lead. The operators are confident that they will find a continuation of the St. Eugene lead, and development work is being continued. Several carloads of ore on the Society Girl will be shipped over snow roads to the reduction works this winter. A new boiler-house is being erected at the St. Eugene. The mine is working and shipping steadily, and is looking good all through.

GENERAL MINING NEWS.

NOVA SCOTIA.

North Sydney.—A continuation of the Collins coal seam has been discovered underlying the seam operated by the Mackay Mining Company.

Halifax.—On the property of the McCallum syndicate fourteen veins of scheelite have been cut. Production on a small scale will soon be commenced.

West Gore.—It is rumored that the legal difficulties in which the Dominion Antimony Company was involved are now cleared away, and that work is to be resumed.

ONTARIO.

Cobalt.—Several properties have been added recently to the list of those being worked under lease. Among these are some of the Davis Silver Cobalt Mines Company's claims. The custom of working on lease is widespread in metalliferous districts in the United States.

Bancroft.—The sodalite property near this place has changed hands. Mr. T. Ludyard, the former owner, has sold it to an English syndicate. It will be operated continuously.

BRITISH COLUMBIA.

Ashcroft, Sept. 26.—Mr. J. C. Gwillim, Professor of Mining at the School of Mining, Kingston, Ontario, has spent part of this summer inspecting the Telkwa, Bulkley and Babine districts of Northern British Columbia, on behalf of the Consolidated Mining and Smelting Company.

"Concerning mineral resources," writes Mr. Gwillim, "ores of lead, silver and copper have been found over a very large territory, but little has been done in the way of development. The distances are great, and at present the transportation is all by pack animals. A wagon road is being built from Hazelton to Aldermore, a point sixty miles south from this trails of twenty and thirty miles branch off into the mountains on either side. The country is a favorable one to prospect, but development and cheap transportation must come about before there will be any production of large tonnage.

"Anyone entering the district at this stage should receive easy terms and plenty of time to develop mineral properties, because the cost of development will be great, and also experimental, and the time of realizing from ore production cannot come until the Grand Trunk Pacific is on a shipping basis.

"The Telkwa Mines, the Telkwa Mining, Milling and Development Company, and James Cronin, deserve much credit in opening up the properties which they have under such disadvantages in the matter of long pack trails and insufficient skilled mine labor and equipment.

"Rumors and reports from Ingenika and McConnell Creek are not optimistic."

Nelson.—The Kootenay exhibit of ores at the Spokane Fair is expected to win the cup offered for the best exhibit. Messrs. T. G. Proctor and A. H. Gracey have been active in the movement. Mr. T. Brown is in charge of the exhibit.

Nelson, Oct. 3.—The shut-down of the Boundary smelters in the earlier months of the year has not affected the ore outputs of Boundary and Kootenay to as large an extent as was expected. The total output to date is 1,332,854, as compared with

1,364,271. Both the Boundary and Rossland districts show increases—70,061 and 5,937 tons respectively. The falling off of Slocan outputs is the present drawback.

Nelson.—On September 21st a delegation, consisting of Messrs. R. Irving, F. T. Snyder, L. Pratt, and J. Whittier, representing the Canada Zinc Company, waited upon the City Council of Nelson for the purpose of requesting that the refusal of the city to turn on their electric power over the company's lines be reconsidered. The decision has been left to Engineer Cecil B. Smith.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

Messrs. Bolckow, Vaughan & Co. have acquired the Belmont iron ore mines near Guisborough-in-Cleveland, and will shortly reopen them.

The annual report of the Labor Department of the Board of Trade shows an increase of miners' wages during 1907 in every coal field, ranging from 15 per cent. in Lancashire, Yorkshire and the Midlands, to 43¾ per cent. in Scotland. The total number of workpeople affected was 806,339, and the net amount of increase in weekly wages was £173,613.

The question of the afforestation of mountain lands in South Wales is being prominently discussed in its relations to the mining industry. It is urged that the unemployed could be furnished work in planting spruce and fir trees near the collieries to furnish a home growth of pitwood, which would compete with the foreign-grown wood now imported, and keep down prices.

BELGIUM.

Out of 42 blast furnaces in Belgium, only 30 are in operation. The output of pig iron for the first eight months of the year was 782,700 tons, as compared with 950,640 tons for the corresponding period of 1907.

RUSSIA.

Coal has been discovered near Tschernowskoje, on the Transbaikal Railway, the deposit being estimated at not less than 600,000,000 poods. A syndicate is being formed to take over all the collieries in the district.

A geological survey undertaken this year in the Simbursk government has disclosed rich deposits of bituminous schist, a large quantity of which is fit for fuel, also sulphur and phosphorites, including a considerable quantity of phosphoric acid.

AUSTRIA.

Two Heroult electric furnaces for steel manufacture, one of 2½ and the other 3 tonnes, were recently installed at the works of Messrs. Bohler, at Kapfenburg, Styria.

AUSTRALASIA.

At the South Blocks, Broken Hill, New South Wales, the cost of copper production has been reduced to a minimum of 15s 0¾d per ton.

The Victoria Minister of Mines, in a recent speech, stated that the latest information from the State geological surveys showed that there were 350 miles of auriferous reefs in Victoria, of which it was estimated that 250 miles were not payable at present, although they might be some time.

The Anchor Company, which has spent £100,000 in tin mining operations in Tasmania without being able to pay dividends, is asking a loan of £5,000 from the State Government.

The main shaft in the North Lyell copper mine, Tasmania, is down 90 feet below the 1,000-foot level, and the next level will be run at 1,100 or 1,150 feet.

The State coal mines of New Zealand during the year ending June 30th shipped 237,309 tons of coal, valued at £109,259, of which 115,172 tons were supplied to the Railway Department and the remainder to shipping companies and private consumers.

JAPAN.

In the Province of Satsuma there are now nearly 200 gold mines, the annual output of which is estimated at three million yen. One of the most important is owned by Prince Shimazu, and embraces 2,360 acres, worked by modern methods.

UNITED STATES.

A deal is reported between the Hubbard-Elliott Mining Company, owning extensive copper properties in Alaska, and L. Hirsch & Co., of London, England, involving the formation of a new corporation capitalized at $30,500,000.

A $1,500,000 concentrating plant is to be erected by the Oliver Iron Mining Company on their property at the west end of the Mesabi range.

Advance figures published by the United States Geological Survey give the gold production of California for 1907 at $16,727,928, a decrease of $2,004,525. Silver was produced in the State to the value of $751,646, a decrease of $66,182.

The Westmoreland Coal Company, of Pennsylvania, has completed plans and appropriated $1,000,000 for the development of a tract of 20,000,000 acres in Westmoreland County. Two mines are to be opened and a new mining town founded, which will be named "Yukon."

The H. C. Frick Company is about to erect three new coke plants in the Connellsville district, Pennsylvania, at a cost of about $4,000,000.

SOUTH AFRICA.

Owing to an increase in the demand for diamonds in the United States and Britain, the De Beers mines, which had been working short time, have resumed full operations.

The Natal Government will appoint a commission to enquire into the best means of developing the mining industry and to revise the mining laws.

MEXICO.

Coal has been discovered on the Laguna de Palos Blancos land in the Mocorita district of Sinaloa. It is reported that there are indications of a large deposit of good commercial quality.

A contract has been made by Manuel Cuesta Gallardo, of Guadalajara, with Siemens-Schuckertwerke, of Berlin, Germany, for electrical machinery worth over $7,500,000 for power and irrigation enterprises, including the supplying of electric energy to the Amparo Mining Company in the Etgatlan district.

COMPANY NOTES.

AUGUST REPORT OF LE ROI.

Shipped from mine to Northport during the past month, 6,191 tons of ore, containing 2,837 ounces of gold, 3,350 ounces of silver, and 147,000 pounds of copper. The expenditure on development work during the month was $9,000. Have discovered a good body of ore at the bottom of the mine, 1,650-foot level, south vein; grade of ore varies, but is considerably above the average value of other parts of the mine. According to the above, the gross value of the output was $77,000, which value means that a profit of about $15,000 had been made for the month of August.

FINANCIAL STATEMENT OF THE CONSOLIDATED MINING AND SMELTING COMPANY OF CANADA, LIMITED, FOR YEAR ENDING JUNE, 30TH, 1908.

LIABILITIES.

(*Continued from last issue.*)

FINANCIAL STATEMENT.

After writing off $132,843.20 depreciation upon plant and equipment (as compared to $91,705.50 depreciation marked off during the previous year), $27,127.55 on account of depreciation of stores and doubtful accounts, and charging to profit and loss account $564,226.06 expended upon development, the operating profit shown is $43,415.93. Having provided for the above, and the payment of dividend No. 7, amounting to $66,940.00, the balance at the cherdit of Profit and Loss Account is $32,061.93.

As mentioned in the Annual Report of the previous year, due to circumstances beyond the control of the Company, the stock of ores and metals on hand June 30th, 1907, was very large. Before it was possible to market these metals, their values commenced declining rapidly. The fall in prices during the year is shown by the following quotations:—

	London. Lead.	New York. Silver.	New York. Copper.
June 30th, 1907.....	£20 0 0	67¼ Cents	22⅛ Cents
June 30th, 1908.....	12 5 0	53⅝ Cents	12½ Cents
Difference	£7 15 0	13⅝ Cents	9⅝ Cents

Had it been possible to market the metals on hand June 30th, 1907, at quotations of that date, and to market the metals contained in the ores received during the year at the same quotations as those allowed the mines, then the Consolidated Company's profits would have been increased by over $430,000.

During the year additions to the various plants have amounted to $315,562.22, and the cost of new properties and their development to $621,894.73, or a total of $937,456.95. This amount has been provided by the payment of $416,056.95 cash from working capital. The balance of $521,400 is represented by capital stock issued in payment for new properties.

The Snowshoe overdraft guaranteed by the Consolidated Company has been reduced from $46,196.07 to $29,707.92.

The advance to the Canadian Metal Company of $125,000 (secured by a first mortgage upon the Bluebell Mine and Concentrator, and Frank Zinc Smelter), will be repaid October 31st, 1908. A portion of the above advance was used in the construction of a concentrator at the Bluebille Mine, which is now in operation. The product is being regularly shipped to Trail for treatment.

DEVELOPMENT.

There are 19 miles of underground development or narrow work in the Centre Star Group, 12½ mlies in the St. Eugene, and 3,300 feet in the Richmond Eureka. The Consolidated Company has done 1,366 feet of narrow work and 1,348 feet of diamond drilling on the Snowshoe Mine. The Phoenix Amalgamated has a total of 800 feet of narrow work, a number of open cuts, and 1,749 feet of diamond drilling.

Following is the development or narrow work (given in feet) which has been driven during the year:—

	Drifting.	Cross Cutting.	Raising.	Sinking.	Total.	Diamond Drilling.
Centre Star and Idaho	7.218.0	3,152.0	481.5	518.5	11,370	10,032.9
War Eagle and Iron Mask....	2,568.5	661.0	418.5	100.5	3,748.5	4,160.1
St. Eugene	7,934	1,843	2,596	266	12,639	4,569
Richmond Eureka	1,125	266.0	313	0	1,704	0
Snowshoe	358	205.5	351.5	0	915	1,126
Phoenix Amalgamated .	0	246	75.0	30	351	1,749

The ore reserves in the Centre Star Group, Rossland, have been increased. Shipments from these properties for the year have been 175,799 tons, containing a gross assay-value of $1,915,953.79 as compared to 81,788 tons containing a gross assay-value of $893,249 during the previous year.

The lower workings of the War Eagle and Iron Mask Mines have been producing high-grade ore during the year. For example, during the month of June, 2,133 tons were shipped, containing a total gross value of $50,700, or nearly $24.00 per ton. The occurrence and development of this higher grade product in depth are encouraging features of the year's operations.

The 12th level Centre Star has yielded a large tonnage. The 13th and 14th levels have only, as yet, added slightly to the ore resrves, but prospecting is still incomplete upon these levels.

The Centre Star Shaft is now 20 feet below the 16th level, which makes a total vertical depth below the collar of the shaft of 2,050 feet, and measured along the slope 2,183 feet. Within another month sinking will be stopped and the prospecting and developing of the 15 and 16 foot levels commenced.

Large bodies of heavy sulphide ore have been found in the Idaho, but the gold contents have been disappointing.

The probable ore reserves of the St. Eugene Group, Moyie, are nearly 50 per cent. greater than a year ago. Ore 50 per cent. better in grade than last year's average has been found between the 1,900 foot and 2,000 foot levels. Between the 1,700 foot and 1,800 foot levels a new avenue, called No. 2½, has been located, and this avenue has also been found and partly developed upon the 1,900 foot level. Another new avenue (which will be designated as Fifth Avenue) located approximately 120 feet farther in the hill than Fourth Avenue, is being developed on the 1,900 foot and 2,000 foot levels.

In the report of last year it was mentioned that the 2,000 foot level did not promise to yield as much tonnage as the 1,900 foot level, but present indications are that the 2,000 foot level will produce more than the 1,900 foot level, or any other level in the mine. The grade of the ore is, however, lower than that produced from the upper workings. Some bodies of low-grade matrial have been found on the 2,100 foot level, and a raise from this level shows ore of workable grade. Prospecting upon this level is still incomplete. Drifting and cross-cutting upon the 2,200 foot level are progressing, and one or two low-grade ore bodies have been found. It will require six months or a year to determine the amount of ore upon this level.

The main St. Eugene shaft is 24 feet below the 2,400 foot level or 749 feet vertically below the collar of the shaft.

The Richmond Eureka, at Sandon, is developing very satisfactorily. An aerial tramway was completed last January, and regular monthly shipments of 250 tons of ore are being made,

containing approximately lead 18.5 per cent, silver 55 ounces per ton. The probable stoping area is seven or eight times greater than was estimated a year ago.

Prospecting upon the Phoenix Amalgamated Group was started last summer, but was discontinued at the time the Snowshoe Mine was closed. It was decided to postpone further prospecting until the latter resumed operations. A large amount of low-grade ore, containing a sufficient excess of iron to make it profitable to mine. The extent and commercial value of this body is not yet known.

The tonnage developed in the Snowshoe Mine (leased by the Consolidated Company) is the same as last year. No ore has been found below the faults which cut off the ore bodies in depth, but the chances are favorable for finding additional ore bodies near the surface.

The Snowshoe Mine was shipping 25,000 tons per month when the general demoralization of the copper market occurred. For this reason the mine was closed in November, 1907. The prices for copper having improved, and the general situation being better, it has been decided to commence shipments within the next few weeks. The average assay of 135,500 tons shipped by the Consolidated Company has been: Gold, 0.59 oz.; silver, 0.32 oz.; copper, 1.3 per cent.

CONSTRUCTION AND IMPROVEMENTS.

The amount expended upon new construction and improvements during the year amounted to $315,562.22. A portion of this amount was used in completing work started during the previous year, and most of the remainder upon the following:—

Equipment of the Richmond Eureka Mine, including an aerial tramway; buildings and equipment at the Phoenix Amalgamated; sorting plant and extensions to the St. Eugene Mill for increasing its capacity and efficiency; additional Huntington and Heberlein Plant at Trail; new anode plant at Trail; electric locomotives, and other electric installations.

RESULTS AND MANAGEMENT.

While the financial results have not been satisfactory, the operating profits having been absorbed by the heavy losses experienced in handling metals on a rapidly declining market, yet from an operating and metallurgical standpoint, the year was a decided improvement upon the one preceding; that is, the tonnage handled was much greater, the values (excepting in the St Eugene) higher, and the recovery of metals and costs at the Trail Smelter and regnery better. Eliminating losses in quotations, the operating profits were larger.

These satisfactory operating resuls are due to the excellent work of the many employees at the various properties, and to the following gentlemen:—

R. H. Stewart, Manager of the Company's Mines; Jules Labarhe, Manager of the Trail Smelter and Refinery; T. W. Bingay, Comptroller; William Chambers, Superintendent of the Smelter; John F. Miller, Superintendent of the Refinery; A. J. McNab and James Buchanan, Metallurgists; R. Purcell, Superintendent of Rossland Mines; S. G. Blaylock, Superintendent of St. Eugene Mines; Charles Biesel, Superintendent of Phoenix Mines; A. W. Davis, Superintendent of Richmond Eureka, and John M. Turnbull, Mining Engineer.

Respectfully submitted,

W. H. ALDRIDGE,
Managing Director.

NOVA SCOTIA STEEL AND COAL CO., LTD.

A dividend of two per cent. on the preferred shares of this company, for the quarter ending September 30th, 1908, has been declared payable on October 15, 1908, to shareholders of record of September 30, 1908.

The transfer books will be closed from the 1st to the 5th of October, both days inclusive.

Granby, for the year ending June 30th, shows a deficit of $320,576, compared with a surplus of $228,019 in 1907, and a surplus of $1,013,617 in 1906. The comparative statement follows:—

	1908.	1907.
Copper, lbs.	21,126,926	16,410,576
Silver, oz.	300,593	257,378
Gold, oz.	40,139	35,083
Gross earnings	$3,790,184	$4,521,548
Charges, etc.	3,435,760	2,673,529
Net profit	$354,424	$1,848,014
Dividends	675,000	1,620,000
Deficit	$320,576	*$228,019
Previous surplus	2,775,757	2,547,738
Profit and Loss surplus	$2,455,181	$2,775,757

*Surplus.

Crediting surplus after charges, etc., $354,424 with the $228,999 charged out for depreciation, the amount earned on the stock for the year would be $583,423, or 4.32 per cent. on the $13,500,000 oustanding.

The price realized on fine copper per pound averaged 13 1-3 cents, and gold $20 per ounce.

The net cost per pound of copper, after deducting values of gold and silver, was 10.31 cents, the cost per ton of ore, including all expenses, was $3,486.

The enormous decline in the price of copper and the marked influence on the cost by reason of the difficulties with which the smelter had to contend, permitted the declaring of only two dividends, viz., one of 3 per cent. on September 30, 1907, and one of 2 per cent. on June 30, 1908.

The Kerr Lake Mining Company's output for the year was 1,473,712 ounces of silver with a gross value of $787,554. To date the company has produced silver to the value of $1,310,000.

The next 5 per cent. dividend on Silver Queen will be paid on November 15. This is the regular quarterly 3 per cent., plus a 2 per cent. bonus, which is now becoming regular.

We reprint here a statement issued by the Crown Reserve Mining Company:—

1. That we have since made another 30-ton shipment, which will net us at least $50,000.

2. That our ore on hand has increased to at least $150,000, a letter from the superintendent received this morning stating that the ore-house is literally blocked up with it.

3. That we will ship two cars of high-grade ore monthly after this month.

4. That all our buildings will be fully completed by the 1st of October next, and that the only accounts now unpaid are current monthly ones for this month.

5. This company is in no way interested in any law suit or litigation of any sort, our property being purchased direct from the Government of the Porvince of Ontario, and title guaranteed by special act of the Ontario Legislature.

6. Our property is easy of access to any shareholder, and is always open for their inspection. We have worked our property from the first day on a strictly business basis, ask no favors of anyone except to be allowed to mind our own business, and to be allowed the privilege of working our own property in the best interests of our shareholders.

JOHN CARSON, President.

Statement of Assets and Liabilities at August 31st, 1908.

Assets.

Mining property, mineral rights, buildings, plant and equipment	$2,030,495 69
Cash in banks and on hand	37,609 79
Ore on hand	100,000 00
Ore in transit	40,000 00
Due from smelters	39,551 84
Accounts receivable	500 00
	$2,248,157 32

Liabilities.

*Capital stock	$1,999,957 09
Accounts payable	19,319 31
Royalties due and accruing	27,968 11
Profits and Loss:	
Nine months to August 31, 1908.... $271,665 45	
Less Dividend paid 2nd July, 1908... 70,752 56	
	200,912 90
	$2,248,157 32

*231,143 fully paid up shares of $1 each of the above amount are held by trustees for the benefit of the company.

Audited and verified,

P. S. ROSS & SONS,
Chartered Accountants.

Montreal, Sept. 8, 1908.

Dominion Coal Company, Ltd.

A quarterly dividend of one per cent. has been declared on the common stock of Dominion Coal Company, Limited, payable October 1st, 1908, to shareholders of record at the closing of the books on September 18th, 1908.

Transfer books of the common stock will be closed from September 18th, at 3 p.m., until Actober 1st, at 10 a.m.

STATISTICS AND RETURNS.

The output of the Crow's Nest Pass Coal Company's collieries for the week ending October 2nd was 9,286 tons, a daily average of 3,214 tons. For the week last year the output was 20,692 tons, a daily average of 3,448 tons.

The output of the Crow's Nest Collieries for the week ending October 9th was 17,463 tons, or a daily average of 2,910 tons.

DOMINION STEEL OUTPUT.

Dominion Steel's output for the month of September was below the August level. The figures:—

Pig iron	18,000
Ingots	16,000
Blooms	17,900
Rails	12,000
Rods	3,200

Shipments of ore and concentrates from the Cobalt camp in the month of September broke all records, totalling 3,120 tons. Shipments in the nine months of 1908 are nearly double those of the same period last year, totalling 16,337 tons against 9,766 in the first nine months of 1907. Shipments by months (in tons) were:—

	1907.	1908.	Inc.
January	980	1,325	345
February	903	1,173	270
March	1,027	1,832	805
April	533	1,317	784
May	1,158	1,601	443
June.	1,939	1,581	*357
July	1,327	2,022	695
August	1,139	2,366	1,227
September	760	3,120	2,360
Totals	9,766	16,337	6,571

*Decrease.

NOVA SCOTIA STEEL FOR PAST EIGHT MONTHS.

The coal shipments of the Nova Scotia Steel and Coal Company for the eight months show an increase of 19,767 tons.

August, 1908	64,406
August, 1907	81,590
Decrease, 1908	17,184
August, 1907	81,590
Eight months, 1908	424,644
Eight months, 1907	404,877
Increase, 1908	19,767

COBALT ORE SHIPMENTS.

Following are the weekly shipments from Cobalt, and those from January 1st to date:—

	Week end. Sept. 26. Ore in lbs.	Since Jan. 1. Ore in lbs.
Buffalo	62,000	912,950
*Cobalt Central	60,000	402,975
Drummond	60,000	1,697,790
La Rose	146,410	6,117,252
McKinley	52,530	2,258,570
Nipissing	231,590	4,363,597
O'Brien	122,480	5,144,687
Right of Way	61,660	1,033,780
Silver Queen	249,000	1,372,990
Temiskaming	60,000	808,620
Temiskaming & Hudson Bay	60,000	1,220,500

*Concentrates.

The total shipments for the week were 1,155,670 pounds, or 578 tons. Total shipments from January 1st to date are 33,130,483 pounds, or 16,565 tons.

Following are the weekly shipments from Cobalt, and those from January 1st to date:—

	Week end. Oct. 3. Ore in lbs.	Since Jan. 1. Ore in lbs.
Buffalo	.....	912,950
**Coniagas	63,400	969,360
Cobalt Lake	.....	341,683
Crown Reserve	.....	242,000
*Cobalt Central	.....	402,975
Chambers-Ferland	61,800	183,450
City of Cobalt	191,600	1,197,220
Drummond	60,000	1,065,620
Foster	.....	297,300
Kerr Lake	.....	756,174
King Edward	.....	127,240
La Rose	253,390	6,370,642
McKinley	121,200	2,379,770
Nipissing	176,900	4,540,497
Nova Scotia	.....	392,275
Little Nipissing	.....	40,110
Nancy Helen	.....	367,427
O'Brien	127,700	5,272,387
Peterson Lake	.....	41,237
Right of Way	.....	1,033,780
Provincial	.....	143,210
Silver Leaf	.....	258,030
Silver Cliff	.....	52,000
Silver Queen	63,000	1,435,990
Townsite	40,000	251,700
Temiskaming	.....	808,620
Temiskaming & Hudson Bay	240,000	1,460,500
Trethewey	.....	1,910,476
Watts	.....	561,680

*Concentrates. **Concentrates and high-grade ore.

The total shipments for the week were 1,398,990 pounds, or 699 tons. Total shipments from Jan. 1 to date are 34,429,473 pounds, or 17,215 tons.

BRITISH COLUMBIA ORE SHIPMENTS.

Nelson, Sept. 26.—The following are the ore shipments from the mines of the various districts of Southeastern British Columbia for the past week and year to date:—

	Week.	Year.
Bundary	38,239	1,008,100
Rossland	5,478	203,699
East of Columbia River	1,845	73,135
Total	45,562	1,284,943

Following are the shipments from the various mines and receipts at smelters of the districts of Southeastern British Columbia for the week ending October 3, and the year to date:—

Boundary shipments—	Week.	Year.
Granby	21,681	786,852
Mother Lode	10,578	171,777
Oro Denoro	217	49,886
Snowshoe	2,249	9,124
Other mines	Nil	22,248
Total	34,778	1,039,877
Rossland shipments—		
Centre Star	4,051	127,258
Le Roi	2,049	59,631
Le Roi No. 2	344	22,225
Evening Star	58	865
Mayflower	16	31
Giant	5	5
Other mines	Nil	177
Total	6,523	210,015
East of Columbia River—		
St. Eugene	699	18,781
Whitewater	68	1,379
Whitewater milled	280	7,208
Queen milled	185	7,205
Poor Mal milled	250	8,300
North Star	47	3,135
Richmond	26	1,724
Bluebell	22	1,163
Arlington Erie	23	1,120
Rambler-Cariboo	21	930
Silver King	51	550
Idaho	57	419
Reco	21	314
Sunset	21	249
Keystone	20	70
Golden Giant	2	58
St. Eugene No. 2	24	24
Other mines	Nil	74,952
Total	1,817	74,952
Grand total	43,118	1,324,854
Smelter Receipts.		
Grand Forks	21,681	786,852
Greenwood	10,848	224,203
Boundary Falls	Nil	21,872
Trail	8,838	211,154
North Port (Le Roi)	2,272	65,114
Marysville	Nil	5,730
Total	43,639	1,314,925

MARKET REPORTS.

Oct. 8.—Connellsville coke, f.o.b., ovens—
Furnace coke, prompt, $1.50 to $1.60.
Foundry coke, prompt, $1.90 to $2.00.

Metals.

Oct. 8.—Tin, Straits, 29.6 cents.
Copper, prime Lake, 13.5 to 13.625 cents.
Lake arsenical brands, 13.5 to 13.625 cents.
Electrolytic copper, 13.45 to 13.55 cents.
Copper wire, 14.75 cents.
Lead, 4.475 cents.
Spelter, 4.775 cents.
Sheet zinc, 7.50 cents.
Antimony, Cookson's, 8 to 8.125 cents.
Aluminium, 32 cents.
Nickel, 45 to 47 cents.
Platinum, $23.50 per ounce.
Bismuth, $1.75 per lb.
Quicksilver, $46 per 75 lb. flask.

SILVER PRICES.

	New York. Cents.	London. Pence.
September 26	51 1-2	23 3-4
" 28	51 5-8	23 13-16
" 29	51 3-4	23 7-8
" 30	51 3-4	23 7-8
October 1	51 5-8	23 13-16
" 2	51 1-2	23 3-4
" 3	51 3-8	23 13-16
" 5	51 7-8	23 15-16
" 6	51 3-4	23 7-8
" 7	51 7-8	23 15-16
" 8	51 5-8	23 13-16
" 9	51 3-8	23 11-16