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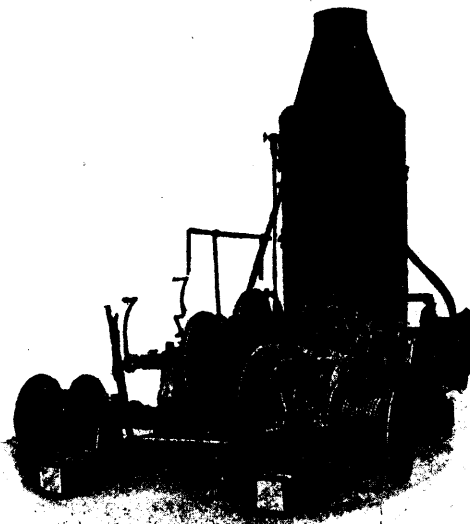
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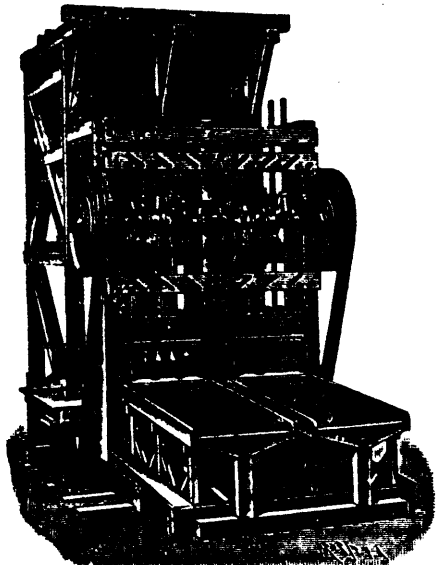
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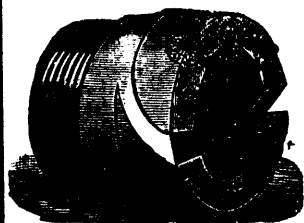
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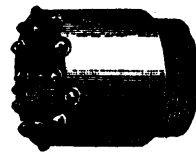
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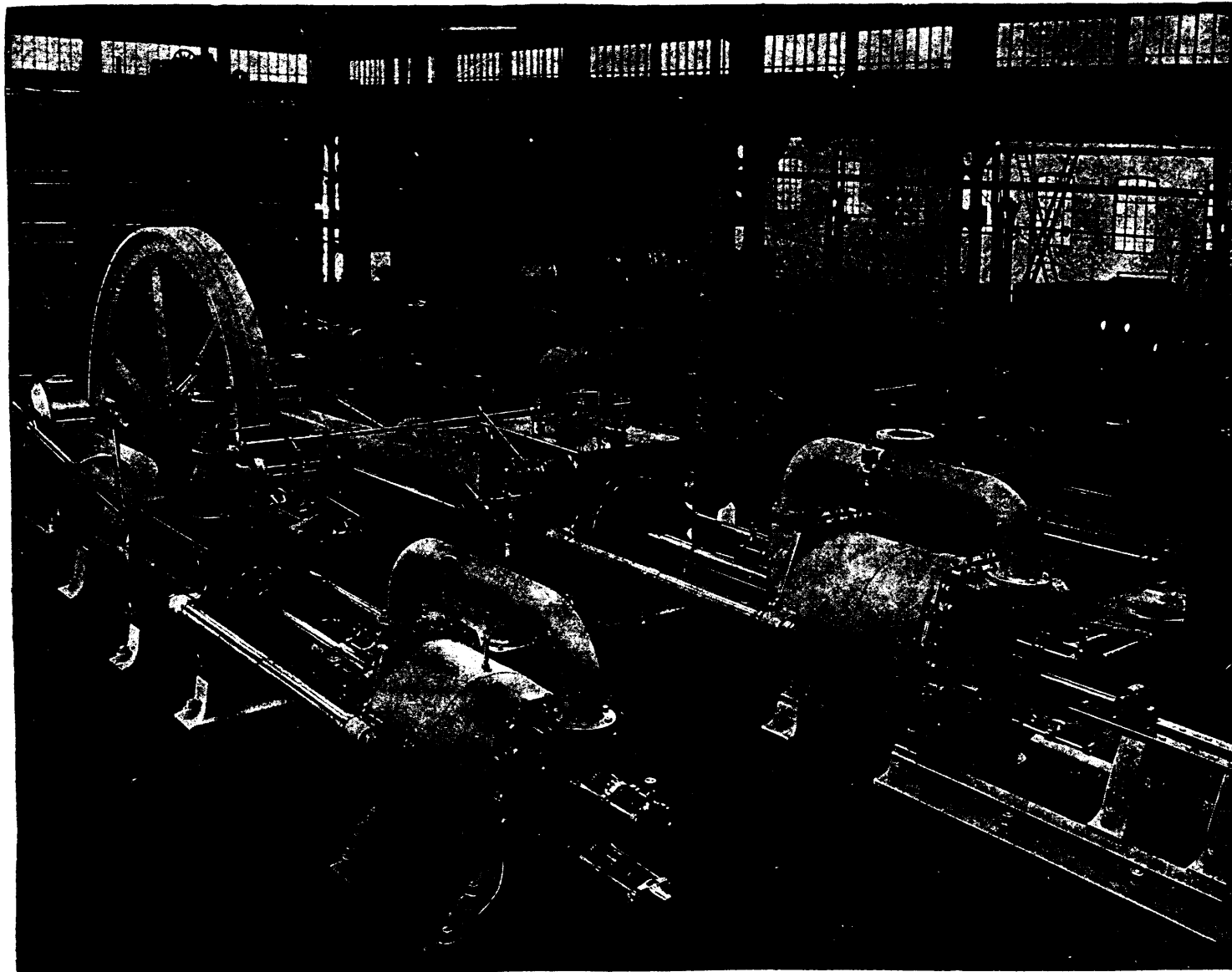
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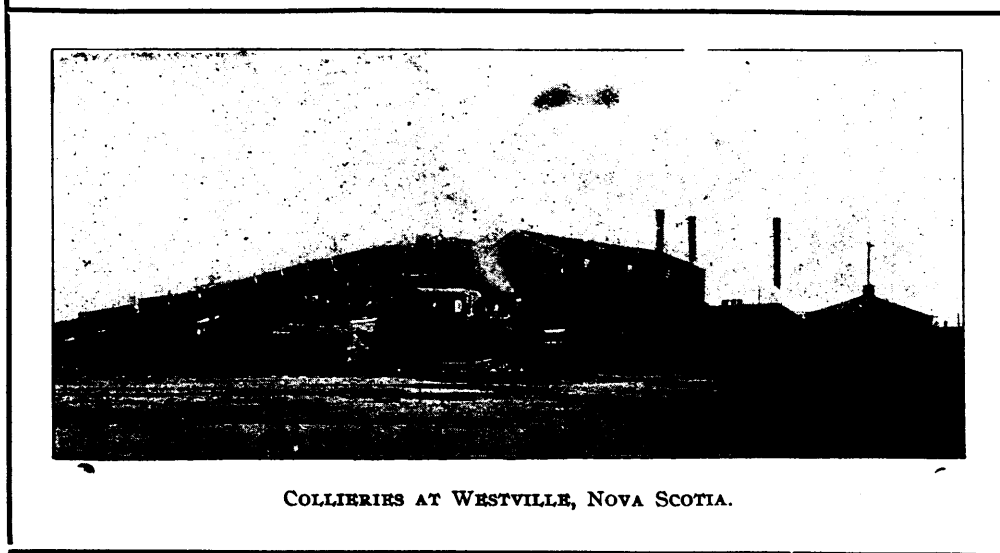
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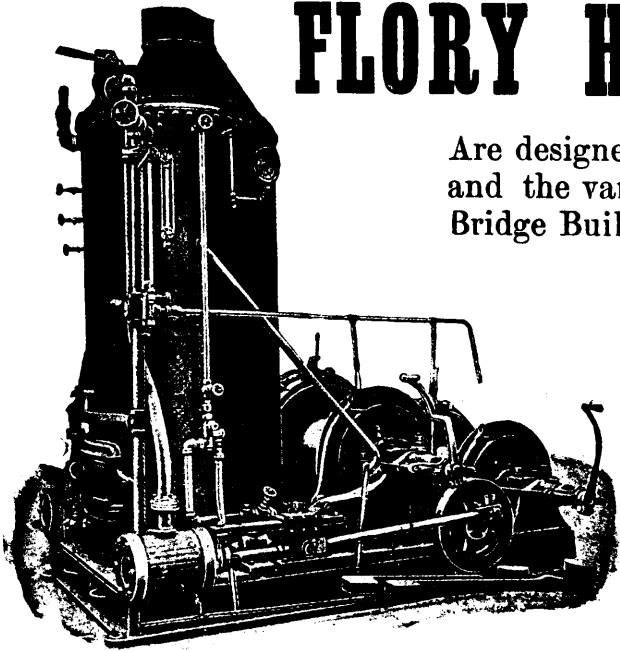
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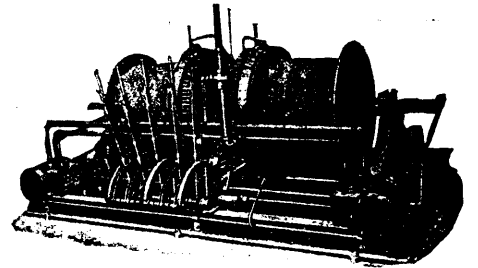
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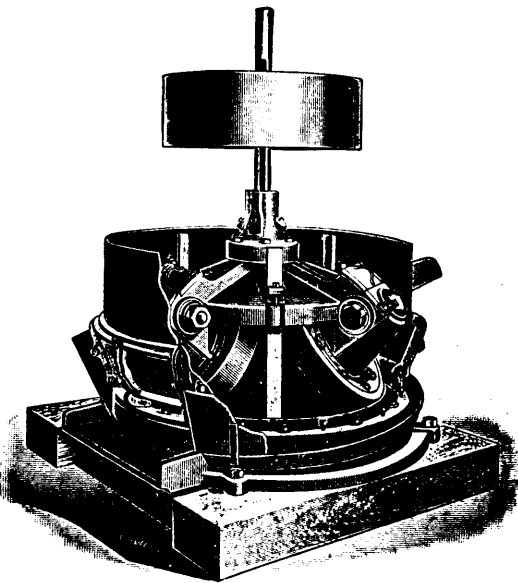
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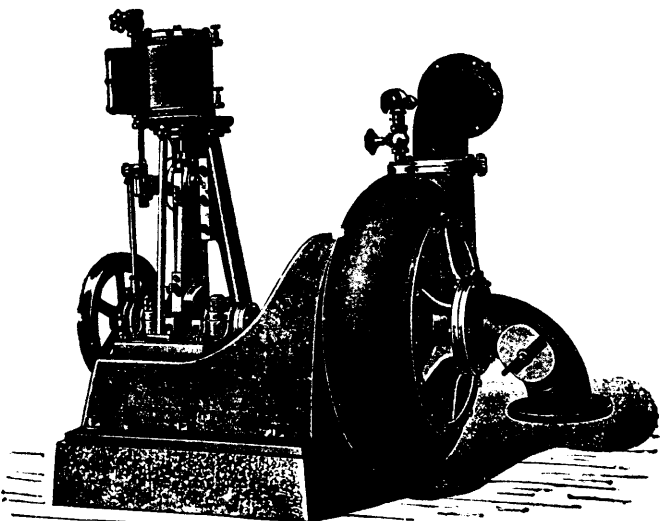


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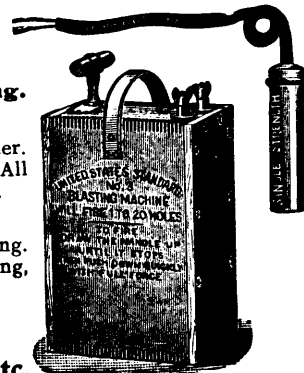
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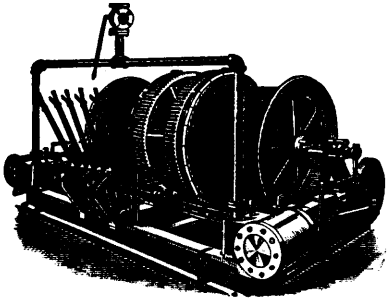
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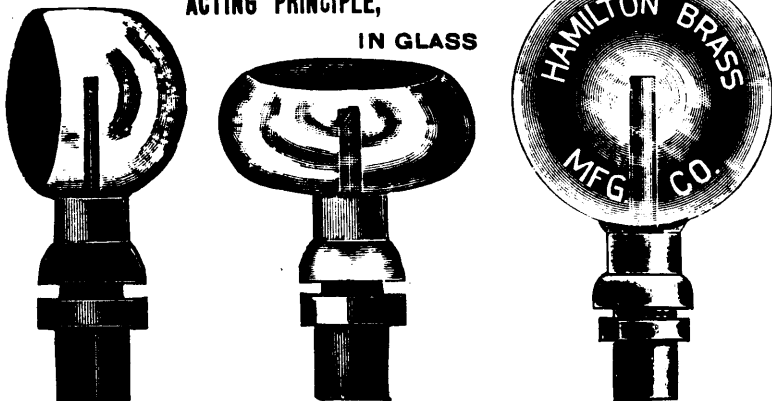
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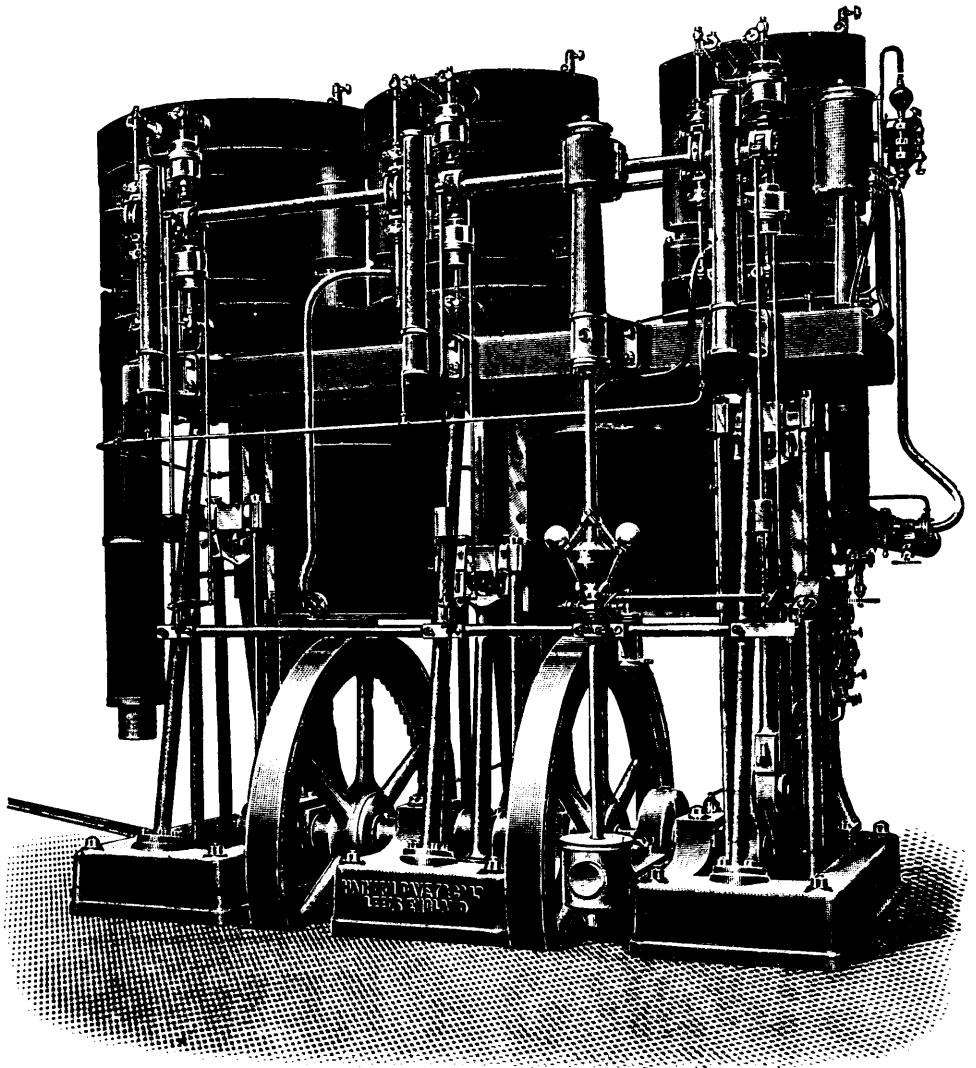
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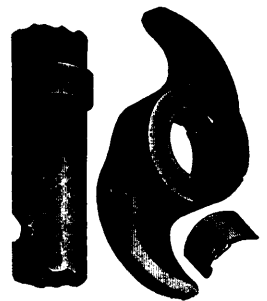
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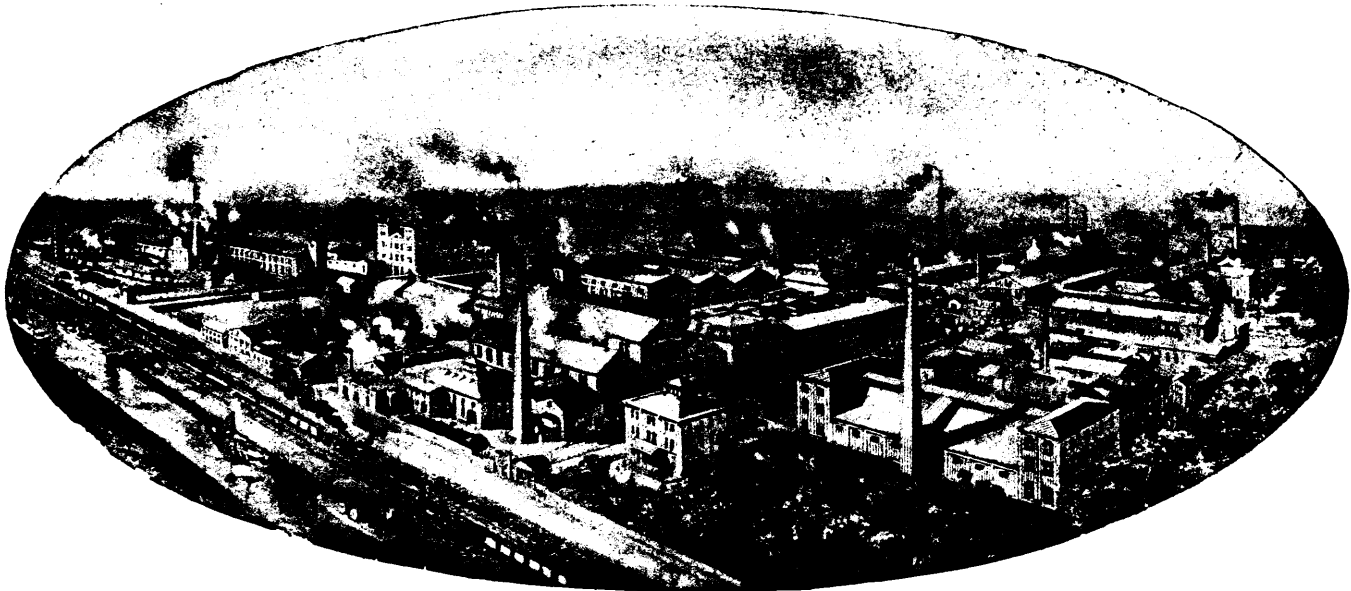
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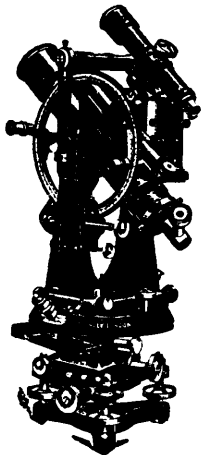
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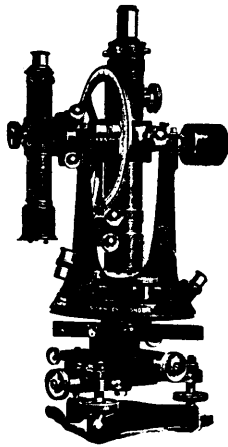
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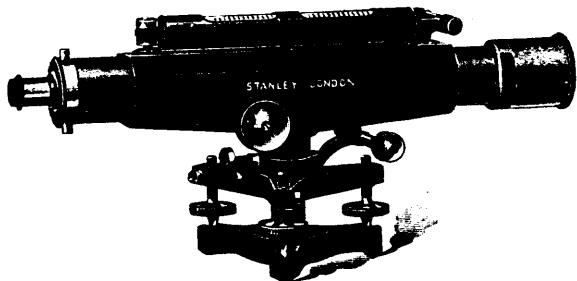
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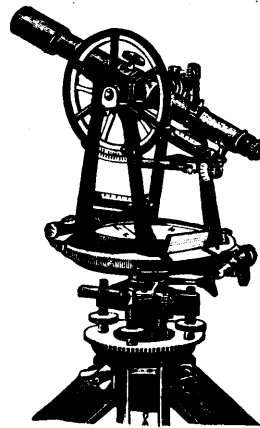
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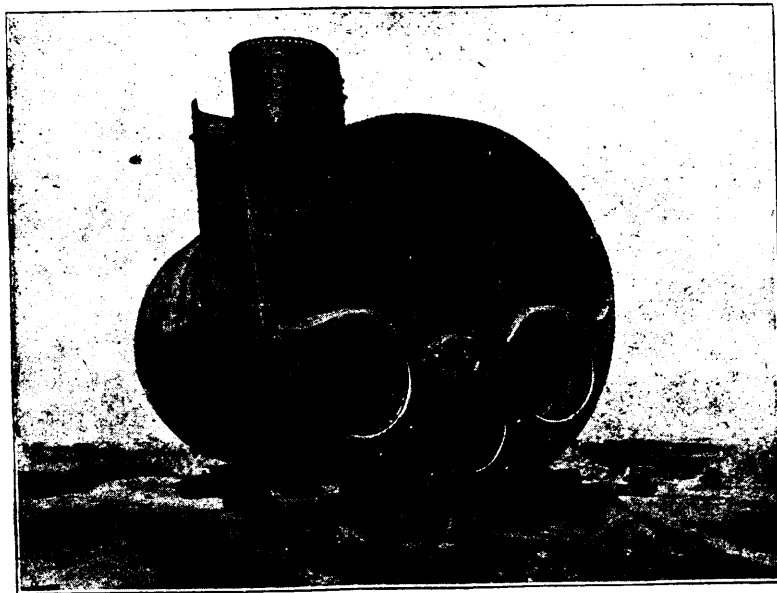
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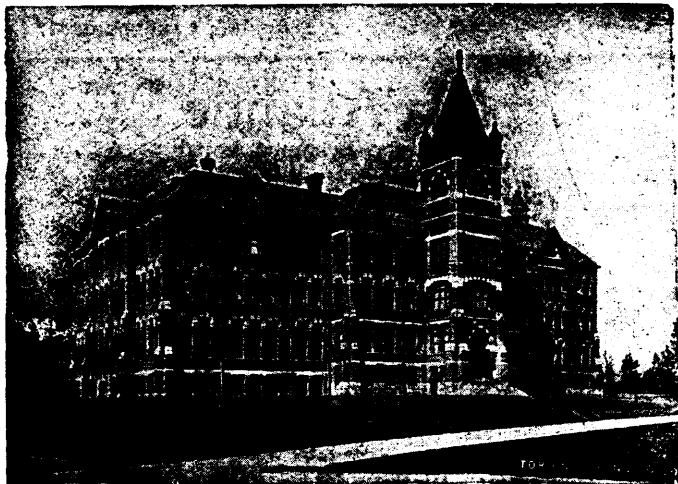
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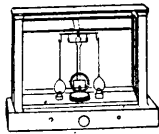
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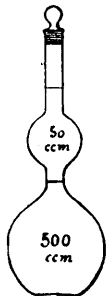
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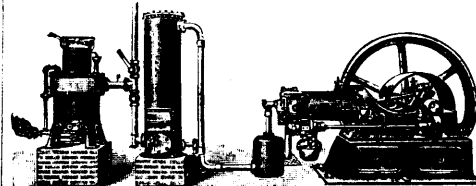
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The Council of the Institute will award a Gold Medal, presented by the President, for the best paper contributed by student members to the Transactions of the Institute during the year 1904.

STUDENTS' PRIZES.

In addition to the President's Gold Medal the Council offers three prizes of a cash value of twenty-five dollars each for the best papers contributed by Canadian mining students on the following subjects:—

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Competitors must advise the titles of their subjects to the Acting Secretary of the Institute not later than the 15th February next and MSS. must be sent to him on or before the opening session of the meeting on the 1st of March.

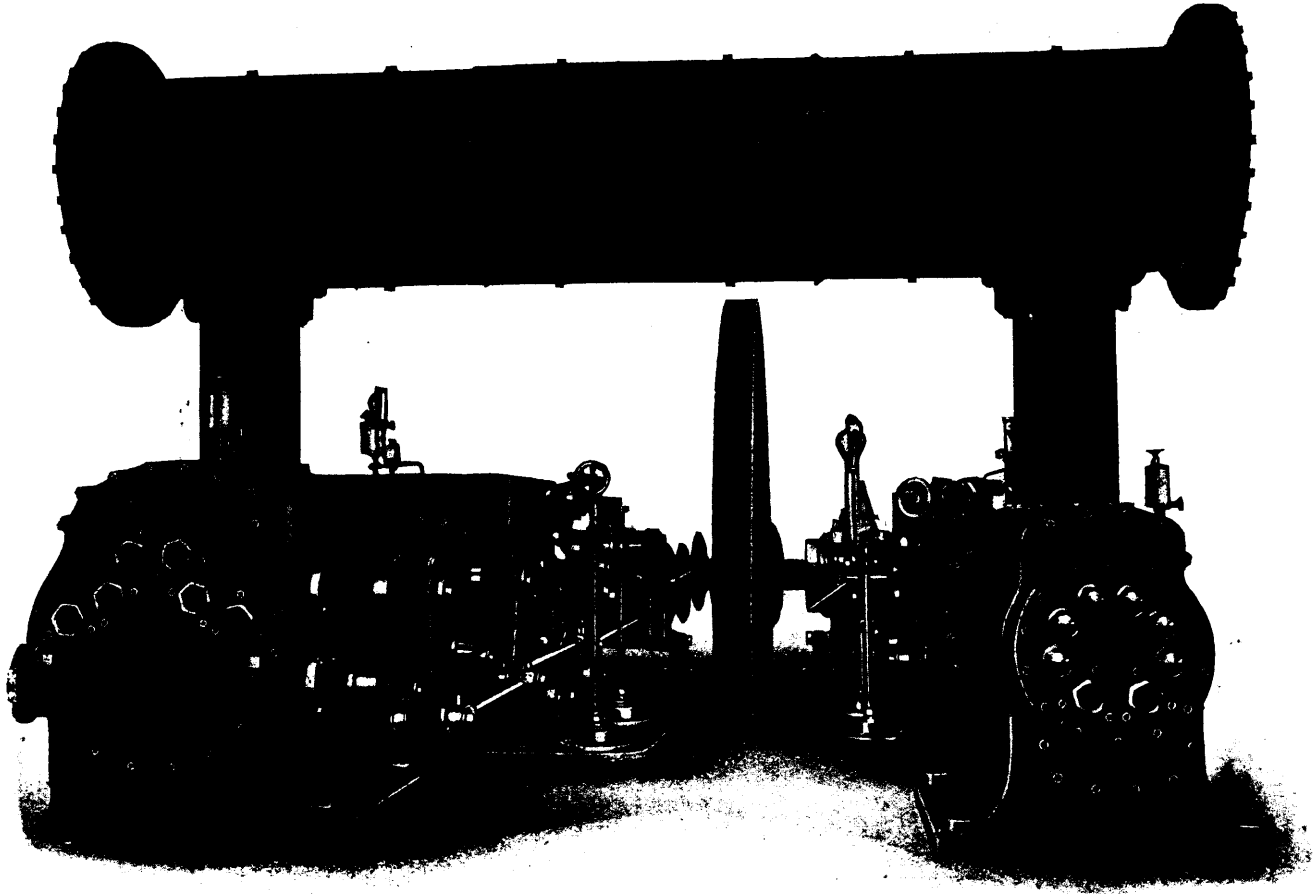
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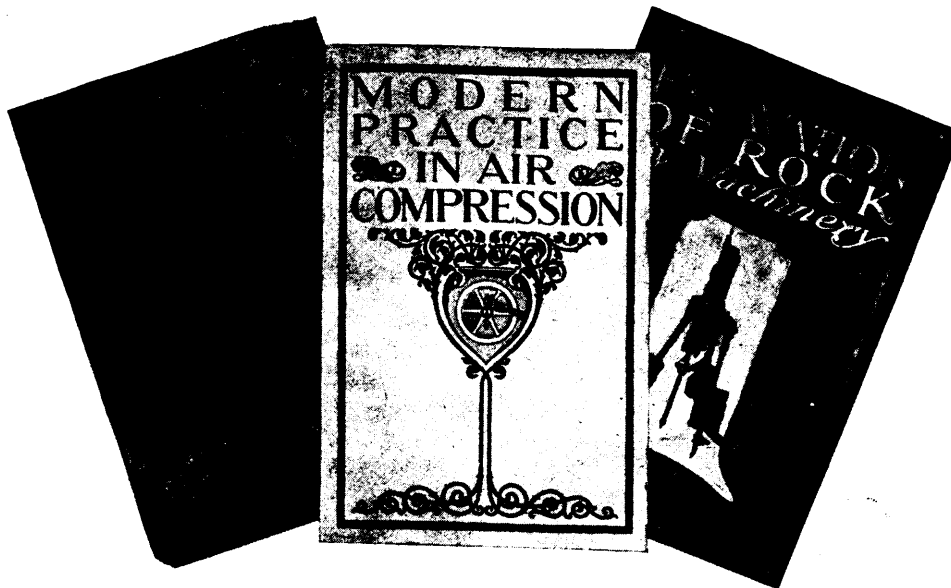
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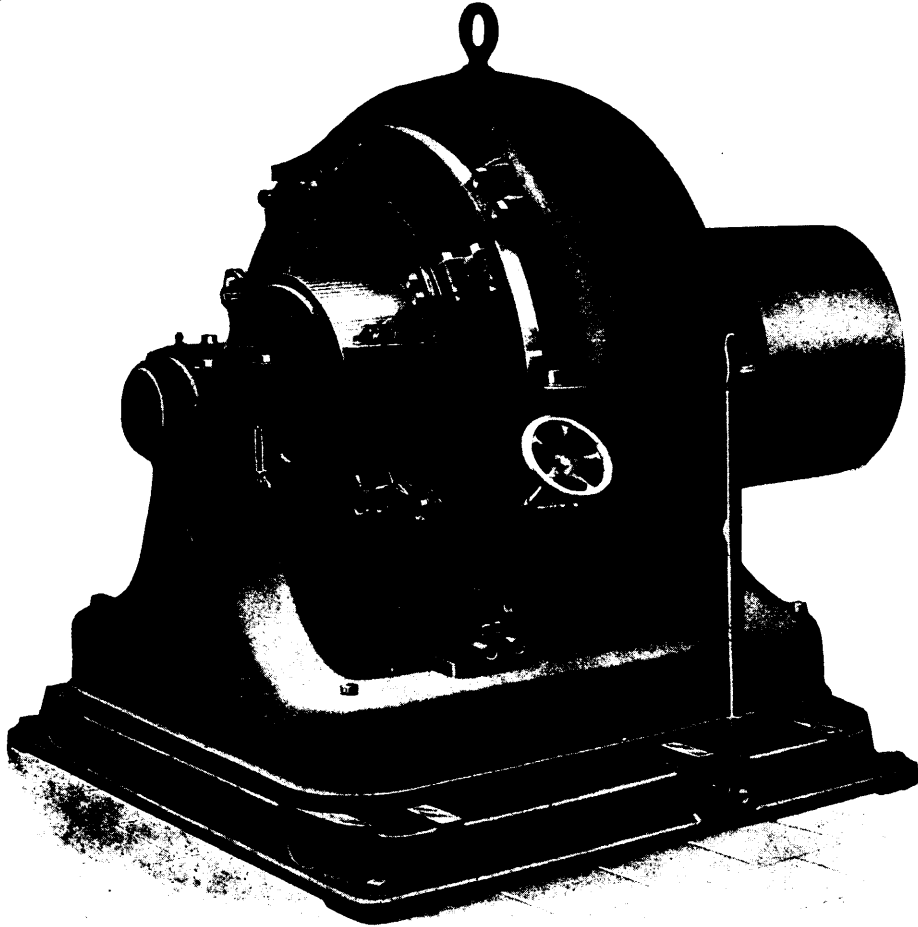
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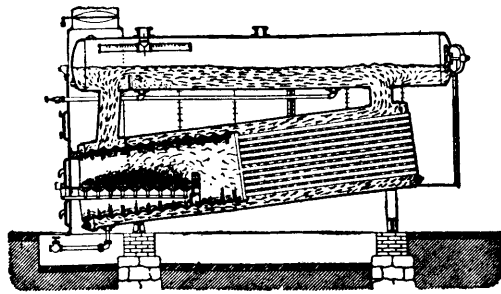
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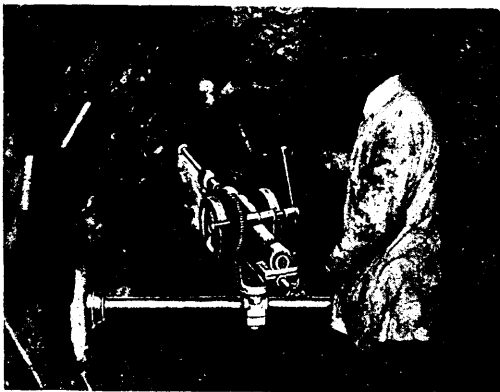
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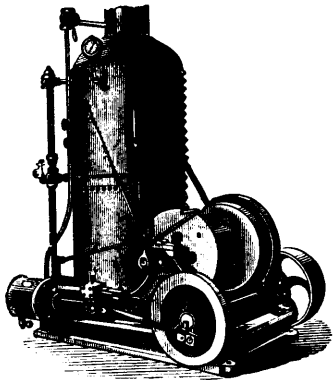
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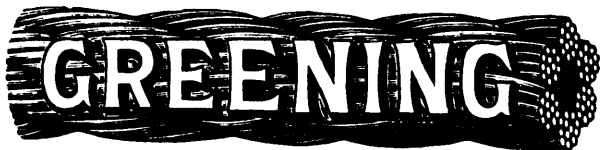
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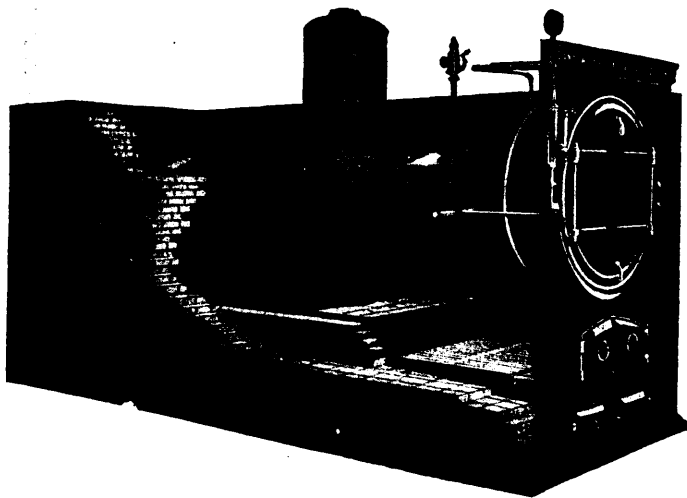
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The REVIEW'S columns are always open for the discussion of questions cognate to the mining industry.

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The official announcement of the seventh annual meeting of the Canadian Mining Institute, to be held in Montreal on the first, second and third days of March appears in our advertising columns this month.

The executive of the Canadian Mining Institute have announced the prize winners for the papers read at the last annual meeting. The President's gold medal has been awarded to Mr. C. W. Knight, Queen's University, for his paper on "Notes on Some Deposits in the Eastern Ontario Clay Belt." The Institute money prizes of \$25 each were awarded to E. J. Carlyle of McGill University, Montreal, for a paper on "The Pioneer Iron Mine, Ely, Minn.;" E. T. Caskill, Queen's University, Kingston, for a paper on "Notes on the Occurrence, Production and Uses of Mica," and Mr. J. F. Hamilton, School of Practical Science, Toronto, for a paper on "The Relative Attraction of Some Common Minerals for Residuum Oil."

A gentleman who has recently travelled through South Africa says that the mining of base metals and of coal is now attracting much attention. Several large deposits of good

grade hematite have been consolidated and London capital received for their development. The discoveries of tin are not yet vouched as being of commercial value, though development may change present views. Copper ores are known to exist, but the market does not warrant their development. Much of an advance has, however, been scored for the coal trade by the opening up of new seams in the Barberton, Middleburg and Petersburg districts, which are reported of unusual thickness and of good quality.

Canadian Mining in 1904.

The year which has just closed did not occasion any material advance in the production of minerals in Canada, but witnessed some reconstructions and changes in methods which have already borne fruit in increased outputs and decreased costs. This was most noticeable in Eastern Canada, but was nevertheless true of British Columbia. We propose to briefly note the most important events, leaving the details to our next issue.

In Nova Scotia the event which will probably outweigh (in financial magnitude) all other, was the beginning of a self-supporting career for the Dominion Iron and Steel Co. Under the able financial supervision of Mr. J. H. Plummer, the President, and the yet more valuable technical direction of Mr. Graham Fraser, as Director of Works, the chimerical and visionary policy of preceding managements was laid aside, and the corporation started in to do the work which lay ready for it. The skilled brain of Mr. Fraser grasped the potent facts that the Canadian market would buy billets, rods and special shapes, but would not take structural material in sufficient quantity to make operation profitable; therefore a remodelling took place. To-day the demand for wire rods is great, and the company is earning profits which take care of all fixed charges and will shortly permit the payment of interest on the preferred shares. The common shares will wait, perhaps for some years, before their value is anything but speculative.

The completion of the single stack of the Nova Scotia Steel and Coal Co. at North Sydney, in August last, and its subsequent successful operation is another noteworthy event.

The N. S. gold fields showed a diminished production, but the year noted the introduction of several plants for the

recovery of the values hitherto lost in metallic sulphides; whether the cyanide method will produce satisfactory extraction of these values is questioned by some chemists, but the effort is in the right direction.

In Quebec there was little to note except the abandonment of attempts to work the iron sands of the Lower St. Lawrence River, and the discovery of a valuable mineral section, carrying ores of iron, copper and gold, as well as asbestos, in the northern region which will be traversed by the Grand Trunk Pacific.

In Ontario the chief event was the resumption of active operations at the Sault by the Lake Superior Corporation, and an adjustment of the financial obligations of the old company. The successful manufacture of steel rails from imported pig was accomplished in the last quarter of the year, and there is hope that the iron manufacturing end of the huge aggregation will be permanently profitable. Several of the subsidiary companies have not yet resumed active operations, and some of them will doubtless be dropped from the chain formed some years ago by Mr. F. H. Clergue.

The exploitation of the new mineral region round Haileybury and Lake Temagami has shown the occurrence in commercial quantities of native silver, ores of cobalt, pyrrhotites carrying nickel, and the promise of iron ores. The new district is bound to become an important factor of the mineral wealth of Ontario.

The gold fields of Western Ontario have not made any material output, but have remained in the obscurity which befell them some three years ago, yet in individual cases substantial improvements and progress are recorded.

For British Columbia it may truthfully be said that the year has witnessed an increase of legitimate work, an increase in production and probably an increase in profits. The bounty on lead stimulated the Slocan and East Kootenay sections and their production has been much increased.

In Rossland Camp there was no increase of output, the year's tonnage being 342,324 tons valued at \$4,400,000, an average of \$12.88 per ton. The camp has been agitated (as ever) by schemes for amalgamation of properties, reconstruction, etc., etc. A short time now will probably witness the announcement of the success of the Waterlow effort to consolidate the chief producers of the Camp, with the addition of two or three small Boundary properties.

The Boundary district has gone steadily ahead, and has greatly increased its shipments, closing the year with a record of 810,000 tons of which the Granby Consolidated Mining and Smelting Company alone treated 570,000 tons. The transfer of the Granby Consolidated to American interests, accomplished during the summer, is the most noteworthy occurrence during the year for British Columbia. The market troubles of the promoters of the Montreal and Boston have not yet (apparently) had any effect upon the mines or furnaces of that corporation, and need not necessarily. Some of the claims aggregated are valuable and some are not, but the valuable ones are apparently sufficient to produce a dividend on the large capital of the aggregation.

The Slocan also experienced a decided revival of interest and production. The shipment of zinc ores (concentrates and lump) began as a regular industry. The introduction of the leasing system is noted in an independent article.

The Lardeau district had its best year in 1904; the Silver Cup, Nettie L. and Triune have all done well; the gold section of Poplar Creek yet requires time and better management before a responsible verdict can be given.

The Yukon has had no special feature beyond the voluntary abandonment of the so-called "Tredgold Concession," which occurred in midsummer; its production was about \$10,000,000.

Taken all in all the year 1904 witnessed a realization of the value of Canadian mining, which had been previously doubted owing to the violent sickness of the mining share market. It is not optimistic to say that 1905 will show still further recuperation from the despair of 1902; and the only deterrent feature in sight is the incompetency of some of the managements in charge of producing properties.

The Leasing System in West Kootenay.

The leasing of mining properties on a royalty basis is rapidly spreading in West Kootenay with satisfactory results. Hitherto the system has prevailed chiefly in the Slocan to which it is especially adapted in consequence of the large number of small properties in that Division and the high grade character of the ore. During the present season leased mines have contributed a considerable tonnage to the output of the district, and next season will see an increase. The lease of the *Enterprise* has been carried on with success, and the *Chapeau*, on which an English company spent \$150,000, and which has been shut down for two years, has just started again by the owners of the adjoining *Kilo*, on a 20 per cent. royalty.

In the Ymir district the *Queen* property has been operated under a lease by Mr. W. H. Waldie, who has done so well (bringing down a brick every month worth from \$3,000 to \$5,000) that he is likely to arrange for the purchase of the property. The *Kootenay Belle* and adjoining claims, belonging to Mr. Thomas Bennett, were leased three months ago to the Bell Bros., who are working vigorously and sharing with Mr. Waldie the use of the Yellowstone Mill. The *Kootenay Belle* is a free milling property of promise, and the outcome of the present lease may be a consolidation of the three properties and the ultimate development of a large mine.

The pioneer of leasing in Kootenay, Mr. M. S. Davys, who ran the Silver King in 1903 and 1904 with such splendid results, has recently returned from London where he met the directors of the Hall Mines and concluded an arrangement to operate the mine as lessee on a half profit basis. This is a satisfactory arrangement for the shareholders who must have cast longing eyes towards the handsome profits which Mr. Davys made during the last financial year.

Altogether there can be no doubt that the system of leasing is working well in the district and keeping many properties in

operation which would otherwise be idle. It is also a gratifying feature that the local men, who have little capital but have stood by the country for years, are thus enabled to reap the benefit of their experience and perseverance.

The Rossland Power Company's New Plant.

Early in December the western mining community were startled, though not greatly surprised, to learn that the extensive new plant of the Rossland Power Co., erected at Trail at a cost of \$300,000, had been closed down indefinitely after a run of a few weeks, and that Mr. Kirby's resignation as general manager of the War Eagle and Centre Star Mining companies had followed.

Whether the former accounts for the latter, or whether, as is firmly believed in well informed circles, Mr. Kirby's resignation results from his determined opposition to the Snow Shoe amalgamation, will be known later, but such a course is the only one which would be expected of a man of Mr. Kirby's integrity.

In this connection the transference of Mr. James Cronin, Mr. T. G. Blackstock's "fidus achates," to Rossland and his active participation in the control there is significant. No doubt later developments will clear up this point. Meanwhile the failure of the large concentrating and cyaniding plant at Trail is a matter of great moment and seriousness to the community.

It was hoped that this plant, the result of five years' study of Rossland ores, would solve the problem of extracting the values which have hitherto been lost, and so convert this camp into one of the most profitable in the West. Laboratory tests promised this result, but experience has again proved how wide is the difference between experiment and practice.

The management has not been slow to state the reason for its drastic action in closing down. Briefly summarized, the explanation is, that the mill has been engaged for several weeks on a trial run; the process comprises the two standard operations of coarse concentration on jigs and tables and cyanide treatment of the tailings. These tailings, below a quarter of an inch in size, were pulverized in Chilean mills to about 50 mesh. The test runs made developed the fact that the coarse concentrates, although otherwise of excellent quality, were surprisingly low in grade, and under the smelter rates prevailing yielded no profit. The reason given for this is that the finely disseminated sulphides remaining with the jig tailings were of very much higher grade than the larger particles and contained the bulk of the values. This unexpected peculiarity of the ore impoverished the coarse concentrates and carried the high grade sulphides, \$100 to \$200 per ton, into the cyanide tanks where successful extraction was impossible.

It has, therefore, become necessary to add a plant of concentrating tables to treat the pulverized product from the Chilean mills before it goes to the cyanide plant, and thus to extract the rich sulphide contents for other treatment. It will

require several months to secure and install these tables and make some additions to the slime-settling facilities which have been found necessary and desirable. It has, therefore, been decided to suspend operations until these improvements have been made.

To this may be added the following facts:—The mill is built on a bench 200 feet above the Columbia River, and not until after construction was it discovered that to bring water from that river, which is the only adequate source of supply, would require the construction of a flume more than 20 miles long from a point above Robson. An attempt was made to obtain a water supply from Rocky Creek, which was found to be inadequate and which retarded the commencement of operations. Finally, a flume was constructed, at great expense, from Murphy Creek which brought an abundance of water to prove that the plant was a failure. During the trial run we are informed that 32 tons of water were used to the ton of ore treated.

In consequence of the internal arrangement of the mill all the ore has to be twice elevated by mechanical appliances, which involve extensive machinery which absorbs a large proportion of the power available. Gravitation is not resorted to except in the actual process of concentration.

Reports show that much remains to be done before this plant will do the work for which it was designed, if, indeed, the fundamental errors of location and construction can be overcome, and if this is the final result of five years' experimenting with, and study of, Rossland ores one may fairly doubt whether that camp is within measurable distance of a solution of the problem of extracting values. One reflection suggests itself, viz.: that Mr. Hopkins, the English expert who directed the company's experiments with the Pellatan-Clerici process for more than two years before it was abandoned for the now discredited Elmore process, advised that water concentration would carry the high grade sulphides into the cyanide vats and so destroy the efficiency of the process. Mr. Hopkins was "let out" and the company proceeded with its plans, and expenditure. To-day the former seems to have been justified in his opinion.

The Payne Mine.

The closing down of the Payne Mine is the most serious set back that the mining industry of the Kootenays has sustained since a similar fate overtook the War Eagle nearly four years ago. Fortunately, the latter soon resumed operations, though on a more limited scale; whether the same course will be followed by the Payne remains to be seen.

For a long time the Payne was the banner mine, not only of the Slocan, but of the Kootenays. It was the pioneer of silver lead production on a large scale, and before the Rossland camp had produced to attract attention, the Payne was already making shipments and paying dividends. This continued until 1900, when the reserves in the upper level were

exhausted, and, as development work had been neglected and all the profits distributed in dividends, there were no reserves on which to fall back. The mine was closed, to the disappointment of the public and the great loss of the shareholders, many of whom were comparatively poor people who had invested because they regarded the mine as a permanent source of income.

In 1901 Montreal capitalists came to the rescue and carried through a scheme of re-organization which provided adequate funds, if wisely expended, to re-habilitate the property and place it on a paying basis. During the last three years some \$500,000 have been expended and now the mine is closed down, with no ore reserves in sight and a general indebtedness of \$100,000, which includes \$42,000 to the Bank of Montreal. This is a lamentable fiasco, and especially disastrous in view of the increased price now offered for lead, the market just opening for zinc, and the assistance given to the industry by the Government bonus, a large portion of which should have gone into the pockets of the Payne shareholders.

In view of the importance of the position of affairs detailed above, our correspondent has investigated the matter on the spot, and, in the light of the information available, concludes that there has been inexcusable neglect on the part of the directors in failing to keep in touch with the actual condition of affairs, either through the medium of a competent and independent consulting engineer, or an experienced and practical managing director. The lack of this precaution has led to a repetition of the series of blunders which have characterized the careers of many mining companies in British Columbia. A large mill and concentrator and a zinc separator have been erected, costing from \$250,000 to \$300,000, only to find that there is no ore ready for treatment. The small tonnage passed through from development work could not be treated economically, costing more to concentrate than the values realized by the process.

One half the above amount, spent on intelligent development work, would have effectually demonstrated whether or not pay ore existed at greater depth; the lowest level driven is at 800 feet and here the values have disappeared.

By way of contrast in methods it may be noted that, at the Rambler Caribou a tunnel is being driven 4,000 feet to cut the vein at nearly 2,000 feet in depth. It will take two years to complete that tunnel and will cost \$75,000. Meanwhile, it is a matter of patience and steady outgo with no income, but it is legitimate mining and in the end will pay the shareholders and the district.

It is impossible to believe that the Payne will not start up again sooner or later, but meanwhile another blow has been struck at mining investment in the Kootenays, and since the worst has happened we, in common with all who have the true interests of the district at heart, hope that its resuscitation may be later rather than sooner, unless its third career is to be conducted on better principles, with a disregard for the stock market, and in pursuance of an enlightened policy based on the development of ore bodies as the first essential of successful mining.

CORRESPONDENCE.

Mining Schools.

To the Editor,—

Sir:—

Some months ago a movement was made in several of the American Mining schools towards buying a mine to be operated and used as a practical training in conjunction with the academic courses. It is understood that they leased a mine in Colorado for this purpose, and time will show how well it has fared with them.

The Mining College of Washington State University has now undertaken to operate an abandoned mine at Index Snohomish County.

Generally speaking, these attempts to increase practical training within the course of study have been commended by the mining journals. THE CANADIAN MINING REVIEW itself has come forward with a suggestion of the kind for the three principal mining schools of Canada. It is rightly recognized that a degree in a mining course may still cover a lamentable ignorance of mining conditions. The usual cure for this is a hard few years in mining camps, after graduation.

An enterprising student, ready to take the mining industry as his vocation need hardly wait until graduation for some practical experience; aside from the University mines he can get employment at some rough work, where he can learn much of men and manners and mining, which will make his feet feel more sure when he leaves the shelter of the academic home. As a student he can do work, which becomes his position at that stage, such work as might set him back at a later stage, also he is usually well received and given a show by mine managers, if he exhibits a proper spirit. At this time he gains a local knowledge and affiliations with mining industry which no university mine in its academic isolation can give him.

If the railways, so generous in their treatment of the public at holiday times, and of the training of engineers in their own branches at McGill, would give science students facilities within their means of reaching outside work for the summer they would greatly benefit the men who are creating industry.

For our own part, the students themselves show a commendable enterprise in going out to far away points for summer work. The experience is invaluable, but transportation leaves little to help them on through the next session. In British Columbia and Alberta last summer there were a large number of Eastern students, working on D.L.S. surveys, irrigation surveys, and in the mines of Rossland, Slocan and Boundary; others, in the mineral districts of Ontario and the Nickel-Colbalt country near Lake Temiskaming.

This is a better condition than ten years ago when the few mining graduates of the eastern colleges went like tenderfeet into the mining districts where no great favor was shown to college men.

The Provincial Government of Ontario has generously assisted the training of engineers and provided mills for their instruction and the benefit of the mining community of the province. The latter is a point sometimes lost sight of because the results of tests made for individuals are not, and cannot, be published abroad.

The mills, however, exist and are running on good work each year for six months; to obtain ores for this purpose, very reasonable rates are given, rates far below the actual value of the work done.

The Canadian Pacific Railway Co. has given a reduced rate upon such shipments for testing purposes, so that it has become quite possible to treat small lots of British Columbia ore. Some of these, especially the dry ores of gold and silver offer a very good field for testing. At the Kingston School of Mining, each year, ores suitable for testing in the matter of free milling, cyanidation, etc., are treated before Christmas; those for concentration after Christmas. The tests are usually on a considerable quantity so that besides affording solid instruction the metals or concentrates saved are a commercial quantity and more than pay for the tests in some cases.

It is right that people should know that such work is being done to the mutual advantage of the students and the miner, and that the country is getting back something of value in trained men, and mill tests, for the support given.

During the past two years these tests have been more in the mill than the laboratory, that is they have been made with conditions of commercial magnitude, not with models.

Free milling and other treatment has been applied to gold ores from Jack Lake in north-western Ontario, and from discoveries north of Sault Ste. Marie. Various leaching processes have been used upon dry gold-silver ores from British Columbia. Magnetic separation has been used on iron ores from Quebec for the elimination of titanium and on the flue dust of the Hamilton Furnace Co. Concentration tests with various classifiers and oil upon ores from British Columbia and on molybdenite and graphite from Eastern Ontario.

Jig and table concentration on considerable lots of zinc and lead ore from Frontenac County.

A considerable amount of work has also been done by the Mineralogy Department on the new Nickel Colbalt ores of Temiskaming.

Yours truly,

J. C. GWILLIM.

Kingston, January 3rd, 1905.

[Prof. Gwillim's letter opens an inviting vista for discussion of the curriculum adopted in our Mining Schools, and of the lines of practical work done or attempted in the summer schools after the close of the regular session. The REVIEW has asked some of the professors in other mining schools to give our readers the benefit of their views, and herewith extends an invitation to engineers, who are not professors, to use the columns for any contribution to the subject they desire to submit.—EDITOR.]

The Centre Star Mine.*

By L. HEBBER COLE.

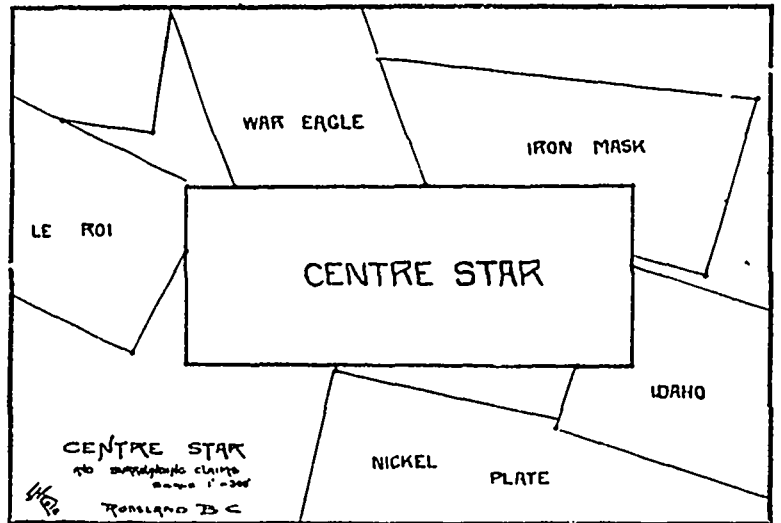
The Centre Star Mine at Rossland, B.C., is located on the slopes of Red Mountain to the north-west of the city. It is bounded on the west by the Le Roi Mineral Claim, on the north-west by the War Eagle and Iron Mask Claims, the north-east by the Idaho and to the south-east by the Nickel Plate Claim.

It is full sized, 1,500 ft. long by 600 ft. wide and was located in 1890.

The ore of this mine consists of iron and copper sulphides (pyrrhotite, chalcopryite, and pyrite, accompanied by arsenopyrite). The principal value is in gold, which is chiefly car-

ried by the chalcopryite, but the copper makes an important addition, and there is always a small amount of silver present.

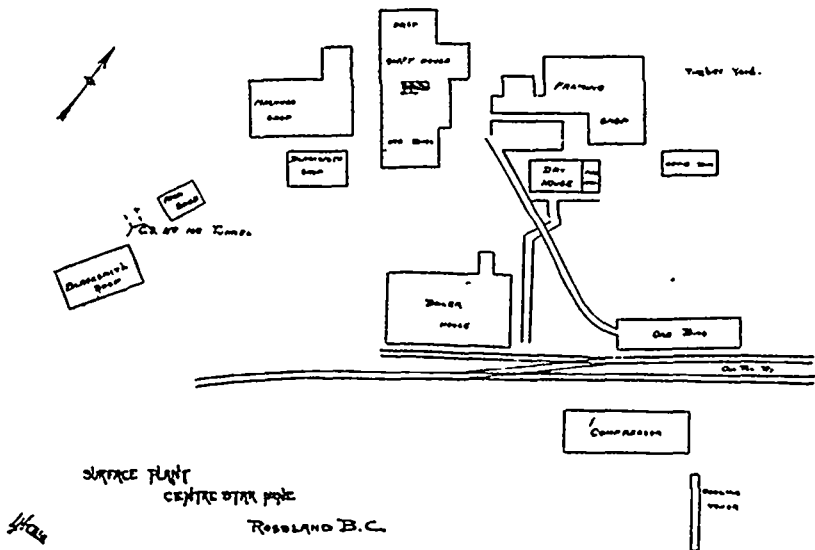
The veins vary in width from a few inches to 40 or 50 feet, and the pay shutes in some cases extend from wall to wall, while in others, only parts of the veins are enriched. Some-



times the walls are very indistinct and the values run into the country and gradually decrease with any sharp line of division between ore and country.

The mine consists of several veins, either extensions from bordering claims or else veins starting in the claim itself. The main Centre Star vein, however, and the one in which most of the work is done, is the large Shear Zone Fissure consisting of parallel platings of the rock produced by shearing under high compression. This vein runs along the southern slope of Red Mountain and appears in the Le Roi Mine; it has a dip varying from 60 degrees to 70 degrees and a strike that is approximately N. 68 E. It varies greatly in width and is cut by a large number of dykes and faults.

As the Centre Star and War Eagle Mines are under the same management, the offices are placed so as to be convenient to both. The office building, besides containing rooms for the general office work, has draughting rooms, blue print



room, photographic dark room, surveyor's instrument room, and the private offices of the general manager and superintendent. The assay office is conveniently near the main office.

The collar of the main shaft is located 500 feet from the west end line and 225 feet from the north side line of the

*Abstract of a paper read before the Mining Section of the Canadian Society of Civil Engineers.

claim. Over this shaft, is erected the shaft house. The hoisting engines are contained in a room on the hanging wall side of this building, while the back part of the shaft is occupied with ore bins.

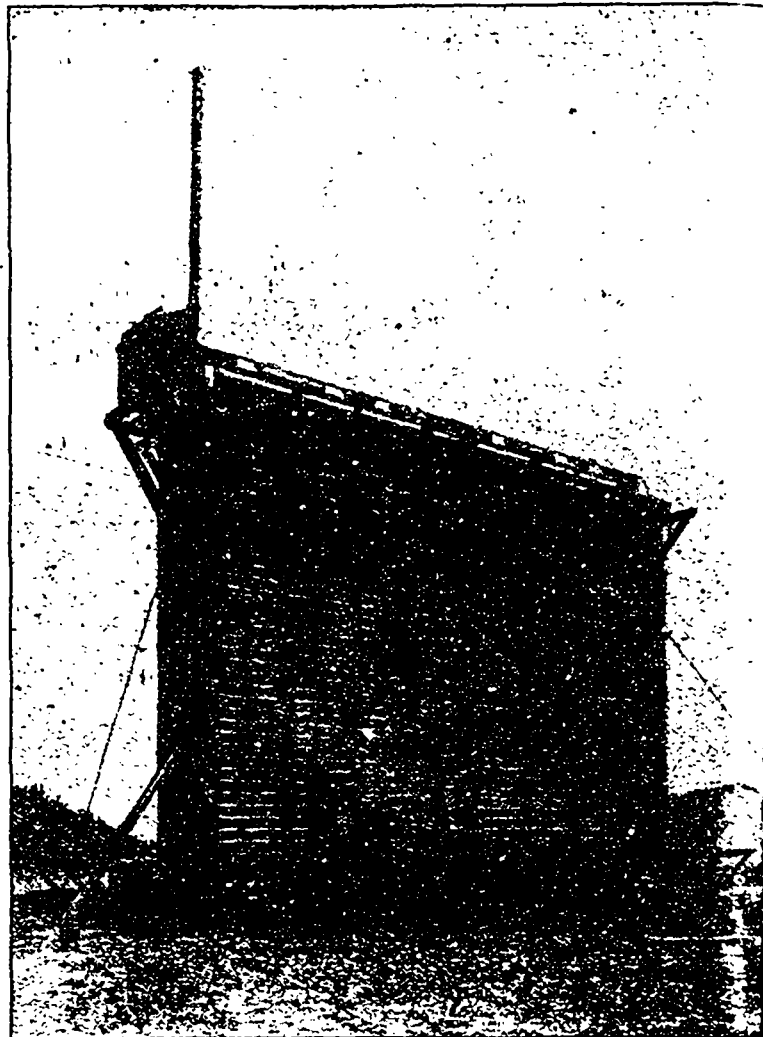
The machinery for the machine and timber framing shops, is driven by a 100 H.P. cross compound automatic cut-off Ball engine. The line shaft is fitted with friction clutches so that each shop can be operated independently. The equipment of the machine shop consists of one 28 inch swing and one 16 inch American Tool Company's lathes; one 26 by 36 inch American Tool Company's planer; one 36 inch Barnes upright drill and one post radial drill. There are also two pipe machines with a capacity to cut from $\frac{1}{4}$ to 8 inch pipe, and a bolt cutter to cut from $\frac{1}{4}$ to 2 inch bolts. The whole is served with a three ton travelling crane. About one-third of the shop is devoted to the repairing of rock drills. The machine shop is fitted with steam, water, compressed air and electricity for testing and repairing. Beyond the machine shop is the blacksmith shop. Here the sharpening of the machine drill steel is accomplished by a machine drill-sharpener. There are three men operating this machine; besides these, two blacksmiths and their helpers are kept employed on general construction and repair work for both mines. The drill steel for both the War Eagle and Centre Star Mines is sharpened by the one machine.

Adjoining the shaft house and connected with it by two tram-car tracks is a 40 by 70 foot mill devoted exclusively to the framing of mine timbers, having the latest appliances for framing square sets and shaft timbers by power. This timber framing machinery was built by the Denver Engineering Works. A 48 inch swinging crosscut and a rip saw complete the equipment, which gives ample facilities for supplying the mine with correctly framed timbers in the least time and most economical manner.

The War Eagle and Centre Star hoists and Centre Star compressor are all supplied with steam from the Centre Star boilerhouse, which contains four horizontal tubular boilers (5 ft. by 15 ft.) of 100 H.P. each, carrying a steam pressure of 100 pounds, and three (88 in. by 16 ft.) Scotch marine high pressure boilers carrying a steam pressure of 130 pounds and having a capacity of 175 H.P. each. The fuel used is Crow's Nest Pass coal.

Compressed air is supplied to the mine by a Canadian Rand Drill Company's cross compound, condensing, two stage, air compressor of 40 drill capacity. When running at its maximum speed of 70 revolutions per minute, it consumes 625 H.P. and delivers 3,960 cubic feet of free air per minute. The steam cylinders are 22 in. by 48 in. and 40 in. by 48 in., and the air cylinders are 22 in. by 48 in. and 30 in. by 48 in. The circulating water for the condenser is cooled after leaving the condenser, by means of a cooling tower, located 100 feet away. This tower is 25 ft. high and 40 ft. long. The circulating water is forced to the top by means of a single acting Worthington, triplex, power pump belted direct from the main shaft of the compressor. The water flows in thin layers over the shutters of the tower, and in so doing, presents a very large superficial area to the direct cooling contact of the air. From the cooling tower, the water returns by gravity to a settling tank, from which it is again handled through the condenser and around the same cycle by means of the pump. The condenser is of the Wheeler Admiralty surface type. All Centre Star and War Eagle compressors discharge into a common system so that any or all compressors can be used in the running of either mine.

PROSPECTING.—Prospecting and development were started in the usual manner on the Centre Star Claim. The veins were exposed by surface stripping in several places and prospecting shafts were sunk on the veins. Two tunnels were run in on the ore, and from these tunnels, prospecting proceeded by



COOLING TOWER.

means of crosscuts, drifts, winzes and raises; when it was considered that the mine was sufficiently proven, the main shaft was sunk. Work on this shaft proceeded at three different points simultaneously, viz.: sinking from the surface, raising from the second level, and sinking from the second level; the mine is now worked entirely through this main shaft. The collar of the shaft is 3,688 feet above sea level. The shaft has a dip of 70 deg. and its direction is N. 38 deg. 49 min. W. There are three compartments, two of which are used for skips, while the third is used for a man-way and for the ventilation and compressed air pipes. Each compartment is five feet square, inside measurement. From this shaft eight levels are worked, varying from 125 feet to 175 feet apart on the slope.

At each level a large station is blasted out so as to handle the ore into the skips through large pockets. These are made so that by opening a gate at the bottom, the ore is allowed to shoot straight into the skips by gravity. From the station, crosscuts and drifts have been run in different directions to locate and work the ore bodies.

DRIFTING.—Where possible, the drifts are driven along the foot wall. Since the rock is extremely hard no timbering is required.

The average advance per round of holes is 4.5 ft., working one machine for two shifts per day. The total advance for a month varies from 70 ft. to 100 ft.; the grade of the drift is $\frac{7}{8}$ of 1 per cent. Drifting is always kept well in advance of ore extraction.

The raises are put in at irregular distances along the drifts, and are usually of two compartments, one a man-way and the other an ore chute.

DIAMOND DRILL WORK.—Two sizes of drills are used, one of $1\frac{3}{8}$ in. core diameter, and the other with 1.5-1.6 in. core diameter. The machines are seldom used for boring over three hundred feet.

In starting the drill, especially for those drifts in which tramming is carried on, a short crosscut is first blasted out to give room for operating the machine without interfering with other work. The rods are square threaded and are in 5 ft. lengths; they are pulled in 5 ft. to 10 ft. lengths, according to the space available behind the drill. The average length of

pump run by compressed air. In an eight hour shift, the average progress made is about 10 ft.

Since the rock in which the drilling is carried on is very hard, the bits require to be reset frequently, each bit drilling about 12 ft. before resetting is necessary.

If the drill hole is not deep, the rods are pulled by hand, but if 200 ft. or so the work is too severe, and a drum is then used on which is coiled the wire rope.

The core, after it has been examined and sampled, is placed in trays and put on shelves in the core-house for future reference.

NARROW STOPES.—A large part of the workings consist of narrow stopes less than 15 ft. wide. Having carried up the raise a sufficient height, stoping begins at the lowest limits of the pay ore and the stope is driven to the boundary of the pay chute. Round stulls are used and a close floor of lagging is spiked on the stulls; stoping above the floor then commences.

The broken ore is kept close up to the face so as to have a good footing for the machine men.

When the pay ore begins just above the drift, a raise is not kept in advance of the stoping, since the whole back is worked as a stope. In this case, there is a permanent tight floor left above the drift.

WIDE STOPES.—For stopes of a width greater than 15 ft. square sets take the place of stulls. The length and breadth of the ore body is first determined and the sill floor laid down. Breaking down the ore from the back is then started. Enough space is always excavated above the last floor to leave room for drilling the back. For a change of width in the ore body, the stope is extended by attacking the hanging or foot wall, or by leaving out as many sets as is necessary, according as the vein widens or narrows.

DRILLS USED.—Most of the drills used are of $3\frac{1}{4}$ inch diameter, and 6 inch stroke—Rand drills of the Little Giant type. They are set up, where possible, on drifting columns, which can be braced to the sides of the drift or to the floor and the back. Where the use of a column is impossible, a tripod is used.

Cross bits are welded to round shanks, which vary in length from 18 inches to 10 feet. One shift of eight hours dulls about thirty bits to each machine.

A round of holes for drifting in this mine generally consists of ten holes arranged as follows:—

Two back holes, three break holes, three cut holes, two lifters.

If the work is heavy a couple more holes may be added, one more lifter and one more back hole. The length of the holes varies from 5 ft. to 7 ft.

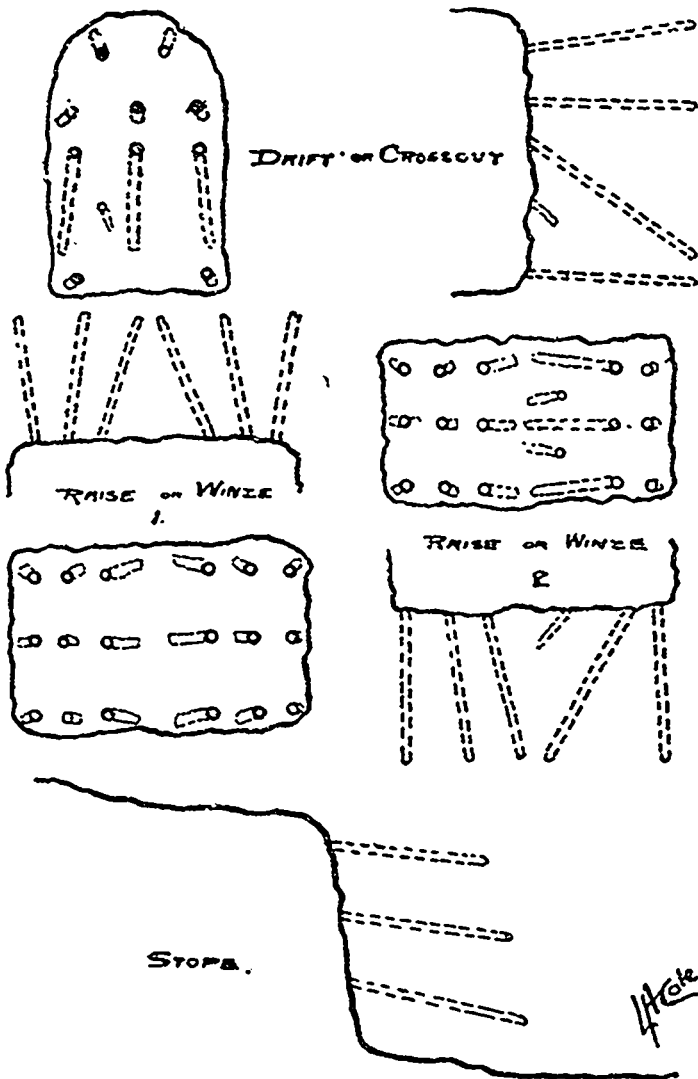
The back holes are inclined at an angle of about thirty degrees to the horizontal.

The next row of holes, called breast holes, is drilled slightly off the horizontal, just enough to hold water. They break down the portion immediately below the rock in which the back holes are placed, so as to relieve these upper holes.

Below the breast holes is another row, called cut holes, placed so as to run down at about an angle of about forty-five degrees; they remove the central portion of the rock so as to allow the other holes to break well.

The two bottom holes or lifters are drilled in at an incline downwards so as to form a wedge with the cut holes. Their object is to keep the floor on a level.

The side holes in each row are inclined either to the left or to the right according to the side they are on, in order to keep the walls at an even distance apart. Where the drift is re-



Sketch showing position of holes drilled for breaking ground
 ROSSLAND B.C. CENTRE STAR MINE.

the core pieces saved is from 5 inches to 8 inches, but often the full length of the core barrel is kept intact.

The drill engines are screw fed, and fitted for 300, 700 and 1,000 revolutions per inch of advance. Their ordinary speed is 300 r. p. m. with a maximum of 1,500 r. p. m. The water is pumped through the drill rods by a small independent force

quired to turn either to left or right, all the holes are inclined in that direction.

For raises or winzes the holes are so placed that when the centre-cut holes are blasted, a free area is left for the other holes to break into. Eighteen holes is the usual number for a round, three in each line.

An exactly similar round is used for sinking, with the exception that the centre holes are inclined more towards each other so as to give more breaking power. The average length of the holes is from 6 ft. to 8 ft. For shaft sinking a great many more holes are used, as the area to be broken is generally larger.

The holes for stoping are placed so that the fullest breaking power of the charge can be utilized, and are placed horizontally in rows, one above the other. The higher holes are a little shorter, all are water holes.

When possible all blasting is done at night; the hours from 1 a.m. to 7 a.m. are set apart for this, and two men do the blasting for the whole mine. By this method the mine is free from gas and smoke for the morning shift.

The dynamite used is manufactured by the Hamilton Powder Company. The sticks are $1\frac{1}{4}$ inch and $\frac{7}{8}$ inch in diameter, the former are of 40 per cent. and 50 per cent. strength, while the $\frac{7}{8}$ inch is of 60 per cent.

The 60 per cent. powder is only used to break boulders, or whenever hand drilling is used for timbering holes.

The average charge for a drift round (10 to 12 holes) is from 90 to 100 sticks, or about 45 pounds.

The shortest fuse is timed to burn six minutes, giving the men time to get into safety.

In drifts, the cut holes are fired first, then the breast holes and lifters and last of all the back holes. In raises, etc., the centre holes are first fired, then the following rows in order.

Stope holes (horizontal) are fired one row at a time. The men then charge the next row above and fire that. They continue this until the whole round is blasted. Similarly in shaft sinking, the centre holes are blasted and the muck is cleaned out before the next row is fired.

MUCKING.—When the working place is clear of smoke the mucking of the ore begins. The muck is loosened and shovelled into small cars which are trammed to the shaft station by men; no horses or mechanical labour are used underground, with the exception of on the second level.

Here a small station hoisting engine is used which pulls out eight cars at a time. It is impossible for this to be done by men as there is a heavy grade in the drift by reason of the drainage being towards the mouth of the tunnel.

The rails are of 16 lbs per yard, these are spiked to ties placed $2\frac{1}{2}$ feet apart. Track laying is kept well up with the work.

The curving of all rails is done underground as required.

The car used stands 2 ft. $11\frac{1}{2}$ inches from top to rails, and holds 16 cubic feet (approx. 1 ton).

HOISTING.—The main hoist in the mine was supplied by Webster, Camp & Lane, of Akron, Ohio. It has two drums, each 6 ft. by 3 ft. with a capacity of 1,700 ft. of round steel rope of $\frac{7}{8}$ in. diameter. The average winding speed is 800 ft. per minute with a maximum of 1,000 ft. per minute.

The engines are 14 inch by 18 inch stroke with a Stevenson reversing gear. A Lane friction clutch is attached, permitting of either drum being run independently, so that hoisting may be carried on at the same time from different levels. The round rope is prevented from cutting the footwall timbers by rollers placed on the wall plates at intervals.

The skip runs on a 30 lb. steel rail spiked to the footwall plates of the shaft. The shaft guides are chiefly for safety purposes so that the safety clutches can grip them in case of accident.

The weight of the skip is 2,400 lbs., and of the ore is 4,000 lbs., so that the 4,000

total weight hoisted, without rope, is 6,400 lbs.

The skips haul with Humble detaching hooks, so that in the case of an overwind the rope is detached, and the skip hung in the head frame.

When a winze is being sunk, a small temporary hoist is generally used and the muck, etc., is hoisted in a bucket running on skids, it is dumped automatically into cars when it reaches the level.

TIMBERING.—On account of the solidity of the rock, timbering is not required in ordinary drifts and crosscuts: in stopes and raises, stulls and lagging are used extensively, but when the stope becomes too wide (15 ft. is about the limit) square sets are adopted; square timbers are also used in the shaft.

The timber is supplied to the mine as:—

SQUARE TIMBER.—10 inch x 10 inch square by 16 ft. long.

PLANKS.—3 inch and 4 inch wide by 16 ft. long.

STULLS.—Logs varying in diameter from 10 inch to 25 inch with the bark removed, and cut into lengths of about 16 ft.

LAGGING.—Small, round timber left in the rough, and in 16 ft. lengths. Tamarac is generally used.

Adjacent to the framing-shop and connected with it by tracks is a commodious timber yard. The timber is hauled along the road on the upper side of this yard, and from the waggons it is rolled down skids and piled, being brought into the framing shop on trucks. A swing-saw is used for cutting the timbers to the required lengths, and the spare timbers are framed by the timber-framing machine. From the framing-shop, the timbers are trammed to the collar of the shaft as needed. For lowering the timber into the mine the ordinary skips are generally replaced by a special timber skip.

In the shaft, the sets run at right angles to the dip, but in the square-set stopes the floors are laid level. On the other hand, in the narrower stopes, the stulls are placed approximately at right angles to the walls.

The timbers are firmly wedged into place by wooden wedges. On top of these is placed the lagging, so as to form a solid floor. The flooring used in the square sets is 3 inch and 4 inch planking.

PUMPING.—The water encountered is comparatively small in amount and is non-corrosive. Three pumps, one on the 4th level, another on the 8th level and the third in the sump of the shaft, are sufficient to cope with all the water.

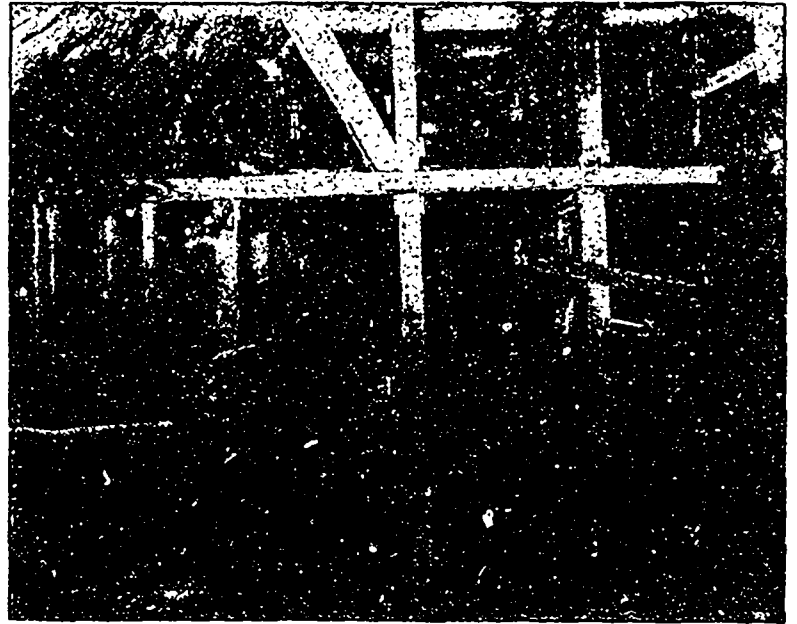
A large new pump, to be run by electricity, is now being installed at the 6th level station. When in place, this pump will do the pumping for the whole mine.

VENTILATION.—The mine is provided with a No. 4 Root's blower, having a 14 inch delivery pipe. It runs about eight hours per day and supplies 150,000 cubic feet of air per hour. It is driven by 10 H.P. induction motor. The blower is reversible and can thus be used either to force fresh air into the mine or to exhaust the foul air.

There is more or less natural ventilation up and down the shaft, due to its connections with the tunnels. When stopes or raises extend from level to level, a certain amount of ventilation is secured, but when these are not completed artificial ventilation is required. Much time is saved by artificial ventilation as the smoke and poisonous gas, generated by the ex-



NARROW STOPE,
in which tripods are usually used at the Centre Star Mine.



SQUARE SET TIMBERING,
as placed in the side stopes of the Centre Star Mine.



THE HOISTING ENGINE
of the Centre Star Mine.



VIEW OF THE COLLAR OF THE MAIN SHAFT
of the Centre Star Mine.

plosion of the powder, are quickly sucked out by the reversed blower, and the working place cleared so that work can be resumed.

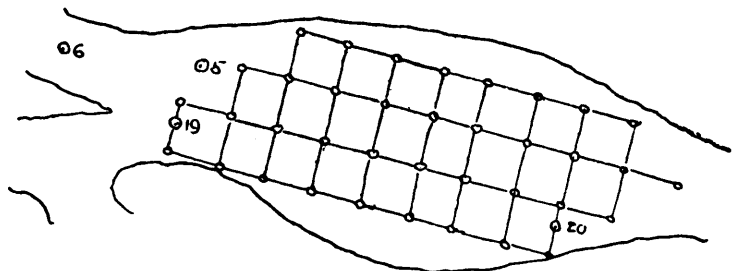
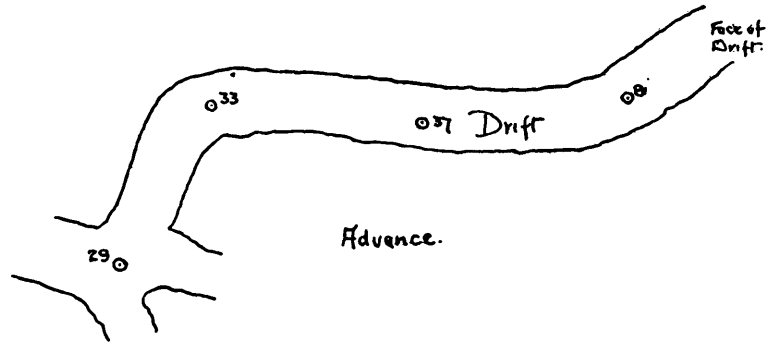
LIGHTING.—The main shaft, stations, and principal tunnels are lighted with electric incandescent 32 C.P. lamps. The wiring for the mine lighting is carried down the shaft in an iron conduit with iron junction boxes at each station. The wiring is so arranged that the lamps can also be used for flash signals if needed.

TELEPHONES.—There is telephonic communication between all the principal mine buildings, and also between the lower mine workings and the shaft house. The system is so arranged that no central exchange is needed. The diagram attached gives the system of wiring for the surface.

Electric gongs are used for station signals but pull bells are used to move the skips.

SURFACE SURVEY WORK.—Except where very accurate work is required, the location of all mine buildings is done by the

stations are set at convenient intervals in the mine, which are accurately located from a line down the shaft. The methods then employed are as follows:—Stations are placed in the back of the drift, etc., by drilling 2 inch holes about 4 inch

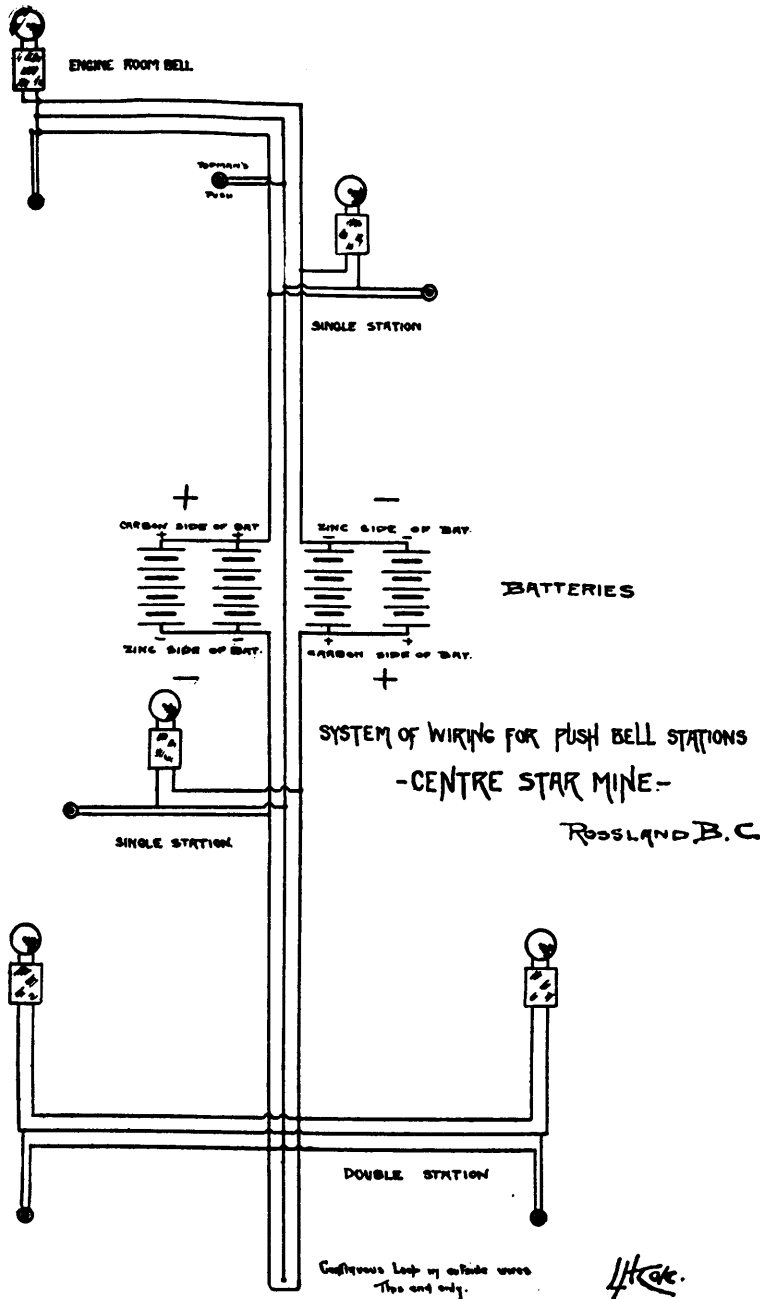


LOCATION OF SQUARE SETS.

H. G. G.

SURVEYING

CENTRE STAR MINE
Rossland B.C.



stadia method. If accurate work is to be done, a transit and band tape are employed; for levelling, an ordinary level is used. All elevations are calculated from the bench mark located on the Bank of Montreal building in Rossland.

UNDERGROUND SURVEYS.—In underground work the transit (reading to minutes) and steel tape are used entirely. Survey

deep. Into each of these holes is driven a wooden plug, level with the back. Horseshoe nails, with a pierced head, are placed in the plugs to allow of plumb bobs being hung from them. A brass tag with the number of the station on it is fastened beside each nail.

The advance is surveyed twice a month. It is taken up as follows:—(See Diagram Transit set up at Station 37); Vernier set 0 degree, B.S. on Station 33; a sight is then taken on Station 31 and angle read. Angles are always read twice, by doubling, as a check. The elevation of Station 81 is located, by means of a button set on plumb bob at 81, on a horizontal line from the transit. The horizontal distance between 37 and 81 is measured to the nearest hundredth of a foot, and contours taken, left and right, from the line. This operation is repeated at 81 and sight is taken to face of drift.

LOCATION OF SQUARE SETS.—Transit set up at Station 5. (See diagram). Vernier at 0 degree B. Sight taken at Station 6, and the angle turned in a clock-like direction to Station 19, is measured. Elevation of transit below Station 5 is measured. Vertical circle set at 0 degree and button set on line of plumb bob at Station 19. Horizontal distance between Stations 5 and 19 measured. Transit is then set up at Station 19 and angle turned to Station 20, with Station 5 as a back-sight. Station 20 is placed in the cap of the square set, the same distance from the post as Station 19. Bearing of line 19-20 is then the bearing of square sets.

Stopes not having square sets are surveyed in exactly the same way as the drifts except that a longer contour rod is used. Where the walls are very irregular, sights are taken on

different points by the transit, and angle turned is read and the distance measured. The transit telescope is never plunged.

For diamond drill holes a sub-station is located on the end of the drill rod in the same way as a station is. The transit is then set up over sub-station and sight taken to collar of hole, with the last station as B.S. The line from sub-station to collar is the bearing.

The survey of stopes for the vertical projection is, in the case of narrow stopes, taken up with the transit. Transit is set up in a position (located from the nearest station) so that the back can all be seen and sights taken to points on the back and vertical angle read and distance measured.

Square sets stopes are taken up with a 14 ft. rod and steel tape, since back can always be reached from last floor.

The bearings of all lines taken underground are worked out from the azimuth of the back sight, the co-ordinates of the stations only are worked out by the traverse tables. All other points are plotted from their bearing and distances.

The working maps on which all underground work is plotted, are drawn to convenient scales.

Geological maps are kept of each level, also assay sheets on which are plotted all assays run. Tracings of all maps are made for blue-printing.

SAMPLING.—When ore is loaded on cars, it is sold right to the smelters so that all sampling of shipments is made at the *smelter sampling mill*.

Chip samples are taken from the face, and all headings, after each blast, except where running through known country, when only occasional samples are taken.

ASSAYING.—The samples to be assayed consist principally of diamond drill cores, daily chip samples and smelter controls. A double check is kept by assaying a floor sample as well as the ordinary control for each shipment lot. This floor sample is obtained as follows:—When the last cut is made on the sampling floor of the smelter sampling mill, half is sent to the smelter assay office and the other half, which is called the floor sample at the mine, is sent directly to the mine and is treated there exactly as the half at the smelter office. The smelter sample is ground and passed through a 120 mesh and divided into three parts. One part is assayed by the smelter, another part is the control that goes to the mine, and the third is kept for umpire. What remains on the sieve in the form of scales, is cupelled separately and the result added to the pulp assay as metallica. The mine control has had these metallica extracted from it, and in order to keep a check on the metallica the above mentioned floor sample is taken.

The control samples are assayed for gold, silver and copper. The six fusions of one half assay ton each, are run for gold and the average taken. The flux used is a litharge flux as follows:—

Litharge 70 grms.
Soda Bi-Carbonate 15 grms.

and enough nitre or argol to give a 20 grms. button. In order to determine the quantity of nitre or argol to be added, it is necessary to run a preliminary assay. The smelter uses a nitre and nails flux, but the mine finds that, by using a different flux it can obtain closer results. The iodide method is used for control coppers, but for all others, the cyanide method is employed.

A very complete water system is now in operation, which supplies both the Centre Star and War Eagle Mines with water for boilers and compressors and also for fire protection. The water comes from Centre Star Gulch and is handled by

two high duty Cameron pumps and a Snow duplex pump. The water is raised 500 ft. through a three inch pipe, 2,000 feet long, and discharged into a 30,000 gallon tank near the War Eagle shaft-house. One hundred feet below this, there is another 30,000 gallon tank, and on the slope of the hill, above the Centre Star shaft-house, there is a third tank of the same capacity. This is provided with a 1,000 gallon per minute Snow duplex underwriters' fire pump, which is always ready for immediate use (using either steam or air) and will give a pressure of 130 lbs. At the level of the company's offices a natural pressure of 100 lbs. at the hydrants is obtained. The system has 28 hydrants placed at convenient points to protect all the buildings of both mines.

Every employee of the company is put through a fire drill and there is a regular fire department in connection with the mine, apart from the city brigade.

Two shifts only of eight hours each are worked. The morning shift goes at 7 a.m. and works, with an hour's intermission, until 4 p.m. The second or afternoon shift starts at 4 p.m., and with an hour for supper at 6 p.m. works till 1 a.m. Two men during the hours from 1 to 7 a.m. blast all the ground drilled and ready for breaking and turn on the blowers, thus leaving the mine free from smoke and ready for the morning shift.

The scale of wages is as follows:—

Shaft men	\$4.00
Machine men	3.50
Timbermen	3.50
Muckers	2.50
Carpenters	3.50
Machinists	4.00
Blacksmiths	4.00
“ Helpers	3.00
Hoisting engineers	\$3.00 and 4.00
Powder and tool boys	2.50
Surface labourers	2.50

The surface men work ten hour shifts with the exception of the carpenters, who only work nine hours, and hoisting engineers, who work eight hours.

The contract system is used largely in both the development work and in the stoping and is found to be very satisfactory. The miners are paid for the amount of advance made in the former and for lengths of holes drilled in stoping. By this means it is found that the drills are used to better advantage during the eight hour shifts.

ASBESTOS NOTES.

The purchase of the asbestos mines and mills belonging to King Bros., at Thetford, by the American Asbestos Co., of Black Lake, of which Mr. H. M. Whitney, of Boston, is the head, is noteworthy. The King Bros., asbestos mines and mills, at Thetford, are the largest in the district, employing upwards of two hundred men and producing daily between forty and fifty tons of asbestos. The main pit, which has been worked now for over twenty-five years, has yielded very large quantities of asbestos, and there is little doubt that there are large masses which have not been touched yet. The large pit has a depth of 165 feet, while the width and length are 200 and 600 feet respectively, and is fitted with cable derricks and hoisting machinery, to handle large quantities of rock. The two mills have a combined capacity of approximately six hundred tons. One of the mills was built five years ago, its capacity is four hundred tons of asbestos rock in twenty-four hours, and it is said to be of higher efficiency than any mill in Thetford.

The purchase comprises, besides the mills and mines in operation, some nine hundred acres of land in Thetford, consisting of town lots and asbestos land and town property in Black Lake. The new management took over the properties on January 2, 1905, Mr. Bennett remaining with the new concern. Plans are now making to increase the capacity of the present mills some fifty per cent.

The new mill of the American Asbestos Co. was started two months ago, and is treating the output of two pits, formerly worked to considerable extent by the late proprietor, Mr. Murphy. The system employed in this mill is entirely different from the other, the motive power is electricity, furnished by the St. Francis Power Co., and the apparatus employed is of different design. This mill will have a capacity of 700 tons of asbestos rock in 24 hours or an output of from 60 to 70 tons of fibered asbestos per day. A new feature of this milling plant is the utilization of fine waste material, which the other mills have been accumulating for future use. This waste material will be manufactured, by means of special apparatus, into asbestic, the output of which will be some 600 tons a day, when the mill is working to its full capacity.

The combined capacity of all the works and mills of the American Asbestos Co., when the Black Lake mill is finished, will be in the neighbourhood of 1,300 tons of asbestos rock per day, or an output of approximately 100 tons of fiber asbestos. These works and mills will be the largest producers in the world.

The Union Asbestos mines, owned by an asbestos manufacturing firm in Hamburg, are working on an extensive scale and 125 men are employed. All the pits are located at the top of the Black Lake Ridge, and at present three pits are in operation. There is a seven drill air compressor and a number of boom and cable derricks on the property; two mills handle the output. The asbestos fibre collected in the pits is cleaned by a crude plant of Chilean mill, rolls and screens. The large mill handles all the asbestos rock and fines transported from the pits. The mines are under the energetic management of Mr. Crabtree with Mr. Rielle as mining engineer.

The Johnson Asbestos Co. is working close to the property of the Montreal and Glasgow Co. The main workings are 90 feet deep, 125 wide and 175 feet long. The asbestos produced contains a larger percentage of No. 1 fibre, than is usually found in Black Lake properties. Most of the fibre is first class, hand cobbing, material and it appears that the short fibre or milling material is not plentiful. The property is prepared for the production of a large output. On account of shortage of men the mill is closed down, but the mine is working with a limited number of men. All milling material is accumulated near the mill and will be run through in next spring.

The Standard Asbestos Company is the most southerly mine on the large Serpentine belt and operates a large tract of asbestos-bearing rock. Operations at present are in the western part of the property; the pit measures 75 feet wide, 100 feet long and about 35 feet deep. A mill for the daily treatment of 150 tons of asbestos rock is erected near the quarries and handles the whole output of the mine. The property is fitted with an air compressor, and modern hoisting and milling machinery. About forty men are steadily employed all the year round but generally there is a shortage of men.

The Manhattan Asbestos Co., which owns a strip of asbestos bearing land next to the Standard Asbestos Co. has let a contract to Mr. Pharo, of Black Lake, to work some of the dumps at the mill. The mill treats about 150 tons of asbestos rock a day and it is reported that both mine and mill will be worked on a large scale in the spring, 1905.

The Syracuse Asbestos Co. has acquired from Dr. Reed lot 28, township of Coleraine, between Black Lake and Thetford. Operations were carried on last summer in a shallow open quarry, where a massive grey green Serpentine exposed a number of seamy partings containing small and large sized asbestos fibre. A small mill has been erected for the production of crude, but plans are now in preparation for the erection of a new fiberizing mill of large capacity.

All the Thetford mines, with the exception of the Beaver, are working vigorously.

The Bells Asbestos Co. is pushing work vigorously; the large output is handled by a mill erected on the eastern side of the Quebec Central R.R. track, at a distance of about 1,000 feet from the quarries. A number of cable derricks and a large hoisting and compressor plant are installed, operations on a large scale go on throughout the year, the main drawback being, sometimes, the shortage of trained miners.

The Johnson Asbestos Co., which is working part of the quarry where the Bells Co. is working, has its two mills in permanent operation. Haulage at both the Bells and Johnson mines is performed by locomotives, and 3-ton box cars of the tilting type.

The Quebec Asbestos Co. and the Broughton Asbestos Co., at East Broughton, are pushing work in their quarries, which are all situated in Serpentine belt, which is entirely different in character from that at Thetford and Black Lake. The mill of the Broughton Asbestos Co. has been rebuilt and is treating about 125 tons of rock per day; about 50 men are employed. Mr. H. H. Williams is the manager. The Quebec Asbestos Co. completed its mill several months ago according to the designs of Mr. John Penhale and is working with a force of about 35 men.

The Tropenas Steel Process.

The agents for the Tropenas Converter Steel Process, Messrs. Powell & Colne, of 11 Broadway, New York City, have issued an attractive pamphlet which explains the process and shows its application. Heretofore the vast majority of small castings have been supplied by makers of semi-steel or crucible steel, at a considerable cost for time for turning out even small orders. By the Tropenas Process it is possible to obtain small steel castings of excellent quality and for quick delivery.

This method was adopted after several years experience with open-hearth and crucible steel plants, and after a careful study of the subject of steel making at home and abroad, where the Process is in successful operation in some forty different plants. The Tropenas Process consists in the use of special converters in which pig iron and selected scrap, previously melted in a cupola, are subjected to an air blast of three to four pounds pressure per square inch, directed horizontally across the top of the molten bath. This action generates intense heat by the combustion of the metalloids in the pig iron, and after a period varying from sixteen to twenty minutes, depending on the quality of the charge used, there remains in the converter a bath of nearly pure iron. Addition is made of ferro-manganese or ferro-silicon, or both, to bring up the silicon, manganese and carbon contents to the specified proportions, when the metal is drawn off into a ladle and poured. The Process is simple and the product very regular.

In the suits between Joshua A. Bell, of Montreal, and the Royal Bank, in which the former had two actions against the Bank for \$415,000 and \$100,000 respectively, and the Bank an action for \$127,997 against Bell, judgment has been given dismissing the two actions of Bell against the Royal Bank, and rendering judgment in favour of the Bank in the last suit. These actions arose out of the locally famous case in which Mr. Thos. J. Chisholm sought to purchase the Stanley Mine at Idaho Springs, Colo. Mr. Chisholm is now an absconding debtor and Mr. Bell has lost all his former estate.

OBITUARY.

The death of Sir I. Lowthian Bell removes one of the foremost world authorities on the manufacture of iron and steel. Born at Newcastle in the year 1816, the deceased was in his 88th year at the time of his death. He was educated in the local schools at Newcastle, and received higher education at Edinburgh University and at the Sorbonne, in Paris. He was also indebted to instruction received in his youth in both Germany and Denmark.

Sir Lowthian had been mayor of his native town before receiving his baronetcy in 1885, and had also been a juror at the Philadelphia Exhibition of 1876. He held large interests in the Clarence Iron Works, and in various collieries in England and Wales. His principal publications were "The Chemistry of the Blast Furnace," and the "Principles of the Manufacture of Iron and Steel."

BOOK NOTICES.

The "International Number" of the Mining Magazine, as the January issue is called, is a record number for the quality and value of its contents. The articles on Gold Dredging by Mr. R. H. Postlethwaite, on the Saving of Gold in Alaska and the Klondike by Mr. Chester W. Purington, and on the Deep Leads of Victoria by Mr. Waldemar Lindgren are alone worth the year's subscription.

Not the least valuable feature of this valuable publication is the monthly Digest of articles on Mining which have appeared in the current press. This feature of the Mining Magazine commends itself to every busy engineer, since he gets the gist of the article in compact compass, and is able to find at a glance whether an article is worth careful reading. We must say that the Mining Magazine fills a want of the mining engineer which no other publication attempts to do.

The new year brings to us the Engineering and Mining Journal in a new form, the size being reduced to a page of nine inches by twelve inches. The change will doubtless be appreciated by many of its subscribers. The issue is made up, as usual, at the beginning of the year by a comprehensive review of operations and markets, both at home and abroad, during the past year. There is a comprehensive review of the gold production and situation throughout the world by the chief editor, Mr. T. A. Rickard; this is followed by special articles on copper and copper market, lead, antimony and zinc markets with special articles by acknowledged authorities on the various mineral and metal products of the United States and foreign countries with some article of value to specialists.

The Engineering Magazine distinguishes its new year's issue by one of those special numbers for which this magazine is noted. The first of these special numbers came out some three years ago as a Works' Management number and has been followed by Labour-Saving numbers, and this issue is also denominated a Labour-Saving number. It is devoted chiefly to the various problems which arise from transportation and includes articles by authorities on mechanical conveying and excavating machinery, the transport of air, labour-saving devices in coal mining, the transportation of water by power pumps, underground haulage, etc., etc. The collection of these special numbers of the Engineering Magazine forms a valuable adjunct to any engineer's library.

We have received two numbers of a new publication, "The Chemical Engineer," which is to issue monthly, from Allentown, Pennsylvania. In his bow to the public the editor avows that the scope of the new journal is "exclusively" practical chemistry, or as the Review knew it in its youth—industrial chemistry. The introduction is so much to our liking that we take the liberty of reproducing it.

"We have called our publication 'The Chemical Engineer,' because the vast majority of the technical chemists of the present day are not only workers in the laboratory but have active supervision of the operation of our great chemical and metallurgical industries and hence are strictly speaking engineers, i. e., those who direct an enterprise. Upon them depends the success of the process. They usually select the raw materials, direct as to the proper proportioning of these, oversee the operations required to complete the chemical change from the crude stuff to the finished product and finally test the latter to see if it conforms to the requirements of the use to which it is to be put. One man may not follow the process throughout all its changes and may merely analyze the raw materials while someone else may test the finished product, just as one mechanical engineer may draw the plans and another supervise the construction of the machine.

"As modern technology becomes more specialized it becomes more and more interdependent. It is hard to tell where mechanical engineering ends and civil engineering begins or where the line of demarcation is drawn between mining and metallurgy, or where lie the boundaries separating metallurgy and chemistry."

The names of the contributors to the November and December issues are a guarantee of the quality of the text afforded to readers. We believe there is a large field of usefulness for this new journal, and we wish it all possible good luck.

Mining Share Market.

There has been nothing doing in mining shares since our last report, prices are nominal and unchanged. No one appears, at present, to take any interest in these securities, and there is an entire absence of buyers or sellers.

Business in industrial stocks is fairly good, but prices are irregular; Nova Scotia Steel, Dominion Iron and Steel and Dominion Coal 5's are lower, while the Dominion Iron and Steel stocks show an advance.

There is no news of importance to account for these changes, the fact of the Nova Scotia Steel Co. requiring more money probably accounts for the check in the advance of that stock, and Dominion Coal has not been a favorite of speculators for some time; but to account for the decline in Dominion Iron and Steel bonds, and an advance in the stocks, is too hard a nut to crack for anyone conversant with the Company's affairs, and is one of the riddles of the "street."

The following list shows the quotations for the week ending Saturday, January 14, as supplied to the Review by Robert Meredith & Co., 57 St. Francois Xavier Street, Montreal:—

Far value of shares.		Asked.	Bid.
.10	Canadian Gold Fields Syndicate.. . . . .	.06	.04
5.00	Cariboo Hydraulic.. . . . .	.75	—
1.00	Centre Star.. . . . .	.21½	.19
1.00	Deer Trail Consolidated.. . . . .	.02	—
1.00	Giant.. . . . .	.03½	.01
10.00	Granby Consolidated..	5.25	5.12
10.00	Montreal and Boston..	1.12½	1.00
1.00	North Star.. . . . .	.02	—
1.00	Payne.. . . . .	.04	.01½
1.00	Rambler Cariboo.. . . . .	.17	.15
1.00	Republic.. . . . .	.03½	—
1.00	St. Eugene.. . . . .	.47½	.45
1.00	War Eagle.. . . . .	.10½	.09
1.00	White Bear.. . . . .	.04¾	.04¼
100.00	Nova Scotia Steel (common).. . . . .	.67½	.67
100.00	Ditto ditto (preferred)..	—	—
100.00	Dominion Coal (common).. . . . .	.63	.61
100.00	Ditto ditto (preferred)..	116	113
100.00	Dominion Iron and Steel (common).. . . . .	.19¼	.19
100.00	Ditto ditto ditto (preferred).. . . . .	.65	.64½
—	Ditto ditto ditto (bonds).. . . . .	.82	.81½

INDUSTRIAL NOTES.

Mr. David Mitchell, manager of the Chignecto Coal and Railway Co., advises that the surveys for the railway from the colliery at Chignecto to North Port on the Straits of Northumberland have been completed and that the railway will be built next season.

The electrical equipments of the Soulanges Canal has drawn an expression of opinion from Mr. S. E. Feddon, of the Sheffield Corporation, England, to the effect that it was one of the best applications of electrical energy Mr. Feddon had ever seen. Mr. Feddon also expressed his satisfaction and admiration of the excellent electrical department of McGill University.

The Canadian Car Company is now known to be primarily organized for the benefit of the new Grand Trunk Pacific Railway. The Canadian directors are practically the dummies selected by Grand Trunk and Grand Trunk Pacific interests. The Pressed Steel Car Co. and American capital represent a majority interest and the Canadian interests are a minority.

"The Iron Age," commenting on the equipment and possible production of Canada, states that although the total tonnage is small compared with that of the United States or Great Britain it is nevertheless sufficient for the present needs of the Dominion, and that American iron and steel masters must reconcile themselves to the eventual loss of the Canadian market.

The contract for the erection of the new lift lock at Kirkfield, on the Trent Canal, has been awarded to the Dominion Bridge Company of Montreal. The lock is to overcome a lift of fifty feet and will differ from the lock at Peterborough in that the towers are to be of steel. Work will begin on the new contract immediately, to be completed in the year 1906. The Dominion Bridge Company also built the steel superstructure of the lift lock at Peterborough.

The Westinghouse Electric and Manufacturing Company has closed a contract with the Ontario Power Company for an alternating current generator with a rated output of 10,000 horse-power at 85 per cent. power factor. This is in addition to three other machines which the Westinghouse Company is furnishing for this plant. The generators are of the revolving-field, two-bearing type, designed for direct connection to water-wheels; they generate three-phase current at 12,000 volts and 25 cycles, and run at a speed of 187½ r.p.m.

The B. Greening Wire Co., of Hamilton, have opened the new year with a new catalogue of their wire rope manufactures. It shows the great variety of ropes which now are made of iron or steel wire, and gives valuable tables of service to the engineer. Their Swedish charcoal rope is made from rods specially imported from Sweden and drawn into wire in the company's mills at Hamilton; for safety and use for passenger elevators this make has a most enviable reputation. The new Acme Brand which has a tensile strength of 120 tons to the square inch of cross-section, is distinguished by having one strand of the six painted a bright green.

The Robb Engineering Company, of Amherst, N.S., have recently completed a new machine shop building which is perhaps the largest shop in the province. It was designed by Mr. A. G. Robb and is 250 feet long by 100 feet wide. The walls are brick and the roof of mill construction, consisting of southern pine trusses spaced eight feet centres. The interior of the building is coated with a special permanent whitewash which does not rub; it is heated by the fan system which utilizes exhaust steam from the mine engine to heat the air before it is distributed through the shop. One-half of the width of the building forms an erecting floor clear from floor to roof and served by an electric crane with a lifting capacity of twenty-five tons. The machinery of the shop is driven by electricity generated from a C. G. E. dynamo driven by a Robb-Armstrong engine; the motors for the separate machines are of both the Westinghouse and Bullock types.

A recent bulletin of the American Iron and Steel Association gives a description of every blast furnace, rolling mill and steel works in Canada, with the character of the product made and the yearly capacity of the works. From this bulletin we summarize that:—

Nova Scotia has three blast furnaces, three rolling mills, and two steel plants.

New Brunswick has one rolling mill.

Quebec has three blast furnaces, five rolling mills, and one steel plant.

Ontario has five furnaces, nine rolling mills and three steel plants.

Nova Scotia and Ontario each have a rolling mill under construction and Manitoba is projecting one. The total number of blast furnaces in Canada is 16, eleven of which use coke and five use charcoal. The completed rolling mills are 18 in number, of which one has a Bessemer steel plant, one a Tropenas, and five have open hearth furnaces. The gross annual capacity of the furnaces is put at 830,000 tons of pig iron; the capacity of the Bessemer and Tropenas steel plants is put at 200,800 tons; the capacity of the open hearth steel plants at 451,000 tons.

MINING NOTES.

NOVA SCOTIA.

The smelter erected at Pictou to smelt copper ores is again reported sold, but this time to Boston men. Last reports were to the effect that Halifax capital had purchased it.

The estimated value of the production of coal in Nova Scotia during the year 1904 was \$13,000,000, of gold \$500,000, of iron ore \$50,000, of pig iron \$3,100,000, of steel \$2,730,000, and other minerals \$605,000.

The Arlington Gold Mining and Milling Co., Ltd., operating at Moose-land, Tangier County, Nova Scotia, is being wound up under the Act of 1889 and the liquidators are advertising the plant to public tender.

The first furnace of the Nova Scotia Steel and Coal Co., which was put in blast at Sydney mines on the 30th of August is now turning out over two hundred tons a day of excellent pig iron. The cost of production from this furnace is less than it was at Ferrona, as, owing to modern appliances used, there are fewer men needed. The company has 100 coke ovens in operation and 150 more nearly ready to be charged.

During the season of 1904 the Dominion Iron and Steel Co. used 232,050 tons from its mine at Wabana, Bell Island, Newfoundland; 25,050 tons from Cartagena, Spain; 24,650 tons from Sweden and 18,936 tons from Lake Superior Mines, U. S. A., a total of 290,686 tons.

The various departments in the steel works of the Dominion Iron and Steel Company were put on double shift on the 2nd of January, and several hundred new men were employed, including a number of skilled workmen, who were brought from the United States.

During the year the Nova Scotia Steel and Coal Company completed and put in successful operation an iron furnace at Sydney Mines which has been running full time and turning out a satisfactory product. The steel furnace of this company is expected to be ready in the spring of 1905.

The year 1904 shows a considerable decrease in the amount of gold produced over 1903, in fact, there has been a steady and marked decline in the production of gold during the last three years. The mine at North Brookfield and another at Caribou, Halifax County, during the year 1904, passed the limit of 1,000 feet in vertical depth, with results which are reported to be in favour of deep sinking.

The mining carried on at Londonderry during the year 1904 was by the open cut method, large amounts of ankerite being mined with the ore. 1904 was also marked by the introduction of cyanide methods at Millipigate and North Brookfield.

A corporation known as the Mabou and Gulf Railway Company have been chartered to build a line of railway from Mabou to Orangedale on the I. C. Railway. The distance is forty miles. The purpose of the railway is to afford an outlet during the winter months for the coal mined at the Mabou collieries; during the summer shipments are made by water from the large pier at the collieries. The company is composed of Boston and Nova Scotia capitalists, and the president is Colonel Boardman Cann, of Boston.

ONTARIO.

Reports from the Paymaster Mine, near Wabigoon are satisfactory.

Reports from the township of Hudson, five miles from New Liskeard, are to the effect that a good deposit of copper pyrites has been found.

The Sault Ste. Marie transfer office has registered the transfer of the North Star Nickel mine from A. C. McCharles to an English concern for a consideration of \$100,000.

The new chemistry and mining building, the new name for the School of Practical Science, Toronto, was opened in the first week of January with appropriate ceremonies. The building cost \$300,000.

The nickel refining process, owned by Detroit people, has been offered to the Lake Superior Co., and has been investigated by President Warren and E. A. Sjostedt, chemist, for the works, whose opinions have not been made public.

Dr. J. E. Wilkinson and Mr. J. McCart have sold the entire interests on 275 acres of oil lands at Petrolea to New York people; the price is not published, but is said to be the largest in recent years.

The Algoma Steel Company have made application to the audit office at Ottawa for bounty on 13,000 tons of pig iron made from Oct. 1st to Dec. 15th. The amount claimed is \$19,540.

Shipments from the Helen mine amounted to 117,135 tons for the year 1904. This mine began to ship in 1899, and for six years the total shipments amounted to 909,106 tons.

The Redeemer Gold Mining Company made a clean-up in December of a two-week's run. The exact return is not made public but is reported at \$25 a ton. This property, it will be remembered, is in the Dryden belt.

The Mond Nickel Company's plant at Victoria mine is now in full operation; the company recently declared a dividend of seven per cent. and with the new arrangements which have been made regarding the refining project on the other side, is hopeful of keeping its smelter and bessemerising plant in continuous operation.

A despatch from Port William states that the mill to be erected by J. C. Hunter and associates will be located in West Port William, and that the plans for the contemplated plant will involve an expenditure of close to one million dollars. The smelter will be located between the railways and the river, thus affording both water and rail transportation.

Progress is reported to be steady at the Paymaster Mine and the Laurentian and Volcanic Reef mines in the Manitou section. The Laurentian shaft has now reached a depth of 250 feet, and the shaft on the Volcanic Reef is down to 230 feet.

Reports from Sturgeon Lake say that the mill of the Jack Bay Gold Mining Company has been dredging its stamps steadily for a month; the same reports state that the ore is running much higher than they expected, \$10 per ton.

A correspondent from Temagami writes that the Arsenical Ore Production Company (of New York), is to build a concentrating plant at Net Lake, three miles from Temagami. The concentrates from this plant will be sent to Niagara Falls for final treatment.

Mr. T. W. Gibson, director of the Bureau of Mines, is authority for the statement that four carloads of ore shipped to New York from the silver mines near Haileybury gave satisfactory returns. One carload of twenty tons realizing \$37,500.

A Seamington despatch states that about the 10th of December a drill which penetrated to a depth of 1,032 feet was stopped by heavy oil pressure, but when boring was resumed with a heavier drill a six-inch stream of oil gushed to a height of seventy feet in the air and is now bearing a flow of seventy-five barrels a day.

The Golden Star Company, in the Sturgeon Lake District, reports considerable development work during the past season. The east cross-cut from No. 2 shaft has driven 105 feet, the west cross-cut 55 feet, and the drive from the latter, 20 feet. From the bottom of No. 3 shaft the cross-cut was driven easterly for 16 feet, cutting an eight foot vein, reports for which are not given. The west cross-cut was driven 15 feet.

Mr. N. W. Rowell states that of the \$2,700,000 worth of claims filed against the Lake Superior Corporation all but \$500,000 has been paid off. The proceedings which were stayed in June last have been brought before Judge Falconbridge, and the Court has given the company a short time in which to settle some proceedings against other Soo companies. The companies implicated are the Algoma Commercial Co., the Algoma Steel Company and the Sault Ste. Marie Pulp and Paper Company. The aggregate amount of the claims is not large.

Some seven gentlemen from St. Paul, Minn., and North Dakota, have secured from the Ontario Government mining licenses for three years on some lands on Hunter's Island, near the International boundary, which they propose to explore for mineral. Their agreement with the Government undertakes the expenditure of \$120,000 in this time. It may be said in this connection, that exploration work previously done on Hunter's Island did not show any great value for the ore obtained; a large corporation who have looked into the deposits do not have any great confidence in the deposits.

The new corporation, The Corundum Refiners, Ltd., referred to in a recent issue of the Review, is exploiting its property (which amounts to 650 acres), in the township of Raglan. The construction of a 100-ton cleaning and concentrating plant has been commenced and completion is promised by the first of June. The site for the mill and town of the company is at Jewelville on the Mattawaska River about one mile distant from the deposits; the Mattawaska River is navigable to this point by a small steamer, and the Canada Atlantic Railway is only eleven miles distant. It is understood that the principal shareholders are Buffalo capitalists.

In an official communication to the Ontario Government the Lake Superior Corporation, through Mr. N. W. Rowell, a director, states that the reorganized corporation is flourishing financially; that it has met all interested payments on its bonds, both those guaranteed by the Province of Ontario and those issued on the credit of the company alone; that it is now disbursing monthly for wages from \$125,000 to \$130,000. One coke blast furnace, with a capacity of 250 tons per day is at

work, and a charcoal furnace of 150 tons daily capacity will be blast this month. This joint daily output of 400 tons of pig will enable the corporation to discontinue the importation of iron from the United States, which has been necessary in order to keep the rail mill at work. The rails which have been supplied to purchasers thus far have been made from American pig iron.

The new Minister of Crown Lands for Ontario, the Hon. Mr. Mackay, promises changes in the administration of his department in the interests of the practical miner; at the recent party convention in Toronto the Minister moved the following resolution: "That the most liberal terms should be offered to prospectors for minerals, providing that the minerals are developed within a reasonable time and not held merely for speculative purposes." Whether this resolution is a piece of political bounce or whether it is to become a part of the policy of the new administration only time can tell us, but, in speaking of it Mr. Mackay said that it was the intention of his Department to establish local offices with local agents in different mining centres, at which offices records could be obtained as to ground taken up and decisions given, and that the object of this local office would be to correct the trouble, delay and expense incident to coming, or writing, to the head office in Toronto. We wish the Minister luck with his new project.

BRITISH COLUMBIA.

Two cars of ore, recently shipped from the Skylark mine, yielded \$107 per ton.

The total production from the mines of the Boundary district is reported to be about 810,000 tons for the year.

In the month of November the product of the Canadian Smelting Works at Trail was 947,168 pounds of lead.

The Venus mill, serving the Athabasca-Venus mines, has been compelled to close owing to lack of water.

The Foghorn in Ymir District, reports a strike of good ore on No. 2 ledge at a depth of 600 feet.

The deposit of iron ore near Crawford Bay, owned by Messrs. McMillan and Robinson, is to be incorporated into a joint stock company.

A. J. McMillan went to England to spend the Christmas holidays with his family in Warwickshire.

The gold production of the Atlin District for 1904 amounted to \$600,000 against \$420,000 for 1903.

The Silver-lead mines of British Columbia have paid dividends amounting to \$3,500,000 since 1892.

The Marysville smelter is to use the Huntington-Heberlein process for treatment of its ores. This process was described in our issue for December.

Mr. G. S. C. Lindsay, general manager of the Crow's Nest Pass Coal Co., has returned to Fernie after spending the Christmas season in Toronto.

The Boundary country now has ten furnaces in blast—six of the Granby furnaces, two of the B. C. copper and two of the Montreal and Boston.

The Rawhide mine belonging to the Consolidated Montreal and Boston Company began regular shipments of ore to the smelter at Boundary Falls on Dec. 21.

The Provincial Mining Association of British Columbia expects to hold its annual meeting in the latter part of January or the first week of February.

Coal from the mine on Coal Hill operated by the Kamloops Coal and Development Company, is now being used as fuel at the Iron Mask. At present two teams are engaged hauling the coal.

The Slocan Star, owned by the Byron N. White Company, has paid total dividends amounting to \$517,600; the dividend for 1904 was \$50,000, or ten per cent. on the capital stock.

The mines in the Slocan division have not yet enough snow to permit of rawhiding or sleighing the ore to rail connection, and in consequence a number of men were laid off last month.

The Kootenay Belle Group, near Salmo, has been bonded by Patsey Clark, of Spokane, for \$100,000 for the period of one year. Mr. Clark intends to push development during the period of his option.

The Tyee Smelter, at Ladysmith, received in December 200 tons of ore by steamer Asnur from the far north, 150 tons came from Alaska and 50 tons from the copper mines at White Horse, Yukon Territory.

From good authority we learn that there are some 13,000 tons of zinc concentrates awaiting purchase in the Slocan country. Of this amount there are about 8,000 tons at Sandon, and 5,000 tons at Kaslo.

The city of Victoria in experimenting with a mixture of granulated slag and clay for a road surface. It is believed that this material, when properly rolled, will make a surface comparable to macadam.

The Northport Smelter will hereafter be able to purchase its coke for \$2.00 a ton instead of \$2.50, in consequence of the Great Northern Railway's completion to Fernie.

The Alice mine, at Creston, has been compelled to close down owing to lack of water. The flume which supplies the water is frozen solid, and no other water is available.

The C. P. R. claim on Welsher Mountain, in Franklin Camp, near Grand Forks, has had some remarkably good results from the ore recently uncovered. The values run: copper, \$8.64; silver, \$11 and gold, \$8.25 per ton.

Reports from the Lillooet gold dredge show that it continues to do satisfactory work; the dredge is running continuously and making returns of between \$300 and \$400 for each full day's work. The financial difficulty with the late secretary is being adjusted.

The work at the Princess Royal mine, on Princess Royal Island, will be continued during the winter. Some twenty to thirty men are employed, and the climate will permit of traffic over the lakes during the winter with the exception of about two months.

The owners of the Crofton smelter are still working upon the possibility of making arrangements to handle the output of ore from the Britannia mines; upon the solution of this matter depends the question of re-opening the plant at an early date.

Late advices from the Boundary Creek state that, Mr. S. F. Parrish and Mr. R. H. Anderson are negotiating for the lease or purchase of the B. C. mine in Summit Camp. Mr. Parrish was formerly the manager of the B. C. mine and probably knows its value and possibilities better than most men.

The Iron Mask is steadily producing ore, and every day about two car loads of ore and concentrates are shipped to the smelter. Part of the ore which needs no concentrating is shipped as mined. The big traction engine and a four-horse team are kept busily employed every day hauling stuff to the siding to load on the cars.

Another rich outcrop of quartz has been found in the Granite-Poorman section between Eagle and 49 creeks, below Nelson. This time it occurred in the claim known as the "Green Horn." Fine specimens with visible free gold are characteristic of this gold section, but the trouble has been that such specimens disappeared with depth.

The Imperial Coal and Coke Co., which owns an extensive area of coal lands at Fording River, B.C., has found that certain of its seams carry a good grade of gas coal. Tests show a production of about ten thousand cubic feet per ton, which should qualify this coal for gas production when the western country needs gas.

The Crow's Nest Pass Coal Co. paid out in December a total of \$126,842 for pay rolls on their three collieries at Coal Creek, Michel and Carbonado. This represents the wages for something over 1,800 men. The present output of the Coal Company is about one million tons a year.

The Lucky Jim mine, near Bear Lake, sold, during December, 2,000 tons of zinc ore to Batchelor Bros., of Spokane. Of this tonnage 1,200 tons will be delivered as crude ore, and 800 tons will be in the form of concentrates. The lump ore averages 54 per cent. of zinc, and the concentrates 48 per cent.

Owing to lack of ores the Hall Mines, Ltd., have only been running one furnace for quite a period. In view of accumulations during the past month, and having promises of a larger supply from East Kootenay mines, the management planned to blow in a second furnace about the first of the year.

The values reported for the ore chute which has been cut on the 1,450 level on the Le Roi mine are put at \$20 per ton in gold, and in consequence the management is encouraged to believe that the Le Roi may duplicate in depth the rich values it yielded near the surface.

The Five Metals Mining Co., located at Crawford Bay, are pushing work upon the cross cut tunnel, and expect to have a sufficient amount of ore developed to supply a 50-ton lead furnace by the first of next June. The company proposes to erect such a furnace if development is satisfactory.

The Van Anda mine, at Texada Island, suspended work in December, and did not give any information to the public as to its intention to resume operations. This mine has been operated for some time by an English concern, and its shut down is ascribed to an inspection which was made by a representative of that company.

The discovery of fire clay on Sumas Mountain, noted in these columns a month or two ago, has been tested by mixing and burning tests which were conducted by the firm of assayers, Messrs. Pellew-Harvey, Bryant and Gilman. We are informed that the tests which were made showed the satisfactory character of the clay.

Advices from Rossland again report the finding of the ore chute on the Jumbo claim. The tunnel driven to cut this ore chute has been in progress for more than a year, but about the middle of December the ore chute was cut and driven on. The width is reported as being between fifteen and thirty feet, but values are not given.

The output of the Boundary country for the month of November was the largest ever recorded and amounted to 72,306 tons. The largest shipper for the month was the Granby with a total of 45,089. The Brooklyn-Stemwinder shipped 7,650 tons, and the iron mine, the Emma, shipped 2,650 tons.

The Slocan Star mine declared a dividend of \$25,000 payable on December 14th. This dividend was the second one for the current year 1904. The directors of the Slocan Star contemplate the erection next spring of a Custom zinc concentrating plant on the Slocan Star ground. Over two thousand tons of rough concentrates are piled up at the Star mill awaiting further concentration.

Mr. M. K. Rodgers, manager of the Nickel Plate mine in the Similkameen country has taken an eighteen months' bond on the "Maggie," a group of claims on Bonaparte River, fourteen miles from Ashcroft. The price is \$160,000, and a forfeit of \$2,500 was paid when the bond was signed. In addition, Mr. Rodgers has purchased thirty acres of land near the tunnel entrance for \$350 in order to secure a dump.

The Yale Hydraulic Mining Company, working placer ground near Yale, B.C., has completed the construction of its pipe line, which is over 6,000 feet in length, and, in the early part of November turned on the water. One monitor is in use having a capacity of 1,000 cubic yards of gravel a day. The gravel works easily and tests have shown it to run from 5 to 25 cts to the yard.

In the month of November there was shipped to the Trail smelter 639,384 pounds of ore, which yielded 383,862 pounds of metallic lead from the St. Eugene mine, and 593,052 lbs. of ore, yielding 124,172 lbs. of lead from the North Star mine. These two mines produced sixty per cent. of the total amount of lead ore obtained in the Kootenay District for the month of November.

The Granby Company commenced work on the first of December on three new furnaces for the smelter which are to be completed, if possible, by the end of February. The company's officials are reticent, but it is understood that three additional furnaces will be built when the present three are completed, making in all a total of nine new furnaces with a combined capacity of 5,000 tons a day.

The verdict which was obtained by the Centre Star Mining Company against the Rossland Union has been appealed from by the Executive Committee of the Western Federation of Miners. Notice of appeal has been given to the Supreme Court of British Columbia and counsel for the Federation has advised that if necessary the appeal should be taken to the Privy Council.

The first train over the new branch of the Great Northern Railway reached Fernie on the 17th of December. The running of this train marks the practical completion of the new branch line. The station buildings are nearly finished and the operation of this branch, as well as those leading to Morissey, Michel and Coal Creek, has been taken over by the Crow's Nest Pass Coal Co. as operating lessee.

The litigation respecting the title to the Lucky Jack and Swede claims in the Lardeau District has been settled and the title vested in the Great Northern Mines Co. This corporation now holds title to twenty-one claims, including the Oyster Criterion and the Nettle L. The basis of the settlement was a transfer of 75,000 shares of the Great Northern Mines Co.'s stock to J. C. Rutherford and L. Hanna.

A fatal accident occurred at the Silver Cup mine in the Lardeau country the first week in December, by which Mr. Alexander Laing lost his life. Mr. Laing was picking in an old stope when a fall of rock jammed his head between the rock and the footwall; he was dead when he was found. Mr. Laing was a native of Aberdeen, Scotland, and was thirty-three years old. He had lived in the Lardeau for five years, and was an experienced miner.

The Hastings (B.C.) syndicate operating the Arlington mine has, it is reported, shown a year of profitable work. Ore sales to the smelter realized \$47,300, after deducting freight and treatment charges. One thousand one hundred and seventy feet of development work was done at an average cost of \$7.66 per foot. The ore shipped averaged \$52 a ton in gold, and nearly \$4.00 a ton in silver. The net profits for the year amounted to \$14,600.

The coal trade of the Coast was very slack during the early part of December but is reviving, and it is believed that the tonnage for export will be largely increased as soon as the Australian contracts, given to the Southern Pacific Railway during the strike period, are completed. On one day in December there were no less than eleven vessels taking on coal. The shipments now average 10,000 tons each.

The Boundary Creek "Times" is authority for the statement that a big strike has been made on the La France group, five miles east of Kootenay Lake. The ledge is reported to have been found three feet in width, having an 100 foot ore chute giving values of 200 ounces in silver, \$35 in gold, and three per cent. of copper. One tunnel has been driven on the vein for 100 feet, and some hundred feet below another tunnel has been driven in for 250 feet, but there is no evidence that the lead is continuous between these adits.

Reports from the Ymir mine, under date of Dec. 20, are to the effect that pay ore has been found on the 1,000 foot level, and that five feet of milling ore is now being mined from the east drift on that level. The report confirms the correctness of the theory that the ore chute took a sharp trend towards the east, just below the 600 foot level. The grade, however, remains lower than in the upper levels, and cautious management will be required in order to resume the payment of dividends. The total amount paid in dividends to date amounts to \$192,000.

B.C. papers contain reports that efforts are being made to re-open the B. C. mine in Summit Camp. The B. C. mine, in former days, shipped out about 100,000 tons of excellent ore, and reports say that something like \$750,000 was received from ore sales before the mine closed. The corporation owns a large number of crown granted claims which have not been systematically prospected, and there would appear to be a possible future for the B. C. provided fresh capital and good management can be obtained.

The Master in the Court of Revision for Assessment has decided that the Le Roi Company must pay \$15,425.47 according to the provision of the two per cent. clause in the Act providing for the assessment of mining companies. This sum is, in addition to amounts paid by the Le Roi Company for the years 1902 and 1903. Inspection discovered that the returns made for these years were incorrect, and an examination of the company's books substantiated the claim. The company appealed to the Court of Revision and the matter was heard in September last. The company's solicitor intimates that the corporation will appeal to the Supreme Court from the Master's decision.

The ore shipments from different Rossland mines for the year 1904 up to Dec. 28th, are reported as follows:—

Le Roi.. . . .	141,406
Centre Star.. . . .	71,899
Centre Star (milled).. . . .	4,460
War Eagle.. . . .	55,966
War Eagle (milled).. . . .	3,960
Le Roi No. 2.. . . .	23,481
Le Roi No. 2 (milled).. . . .	10,900
Spitzee.. . . .	960
Kootenay.. . . .	5,084
Jumbo.. . . .	13,303
Cliff.. . . .	1,340
Velvet-Portland (milled).. . . .	2,622
L. X. L.	986
White Bear (milled)	2,030
White Bear.. . . .	189
Iron Mask.. . . .	70
Rossland View.. . . .	80
Golden Rule.. . . .	5
Total.. . . .	338,844

The Sandon Standard prints the following list of dividends paid by Slocan mines as authentic. The amounts are from discovery to December 1, 1904.

Payne.. . . .	\$1,420,000
Slocan Star.. . . .	575,000
Idaho.. . . .	400,000
Reco.. . . .	287,500
Rambler Cariboo.. . . .	220,000
Last Chance.. . . .	213,000
Whitewater.. . . .	209,000
Ruth.. . . .	125,000
Sunset.. . . .	66,000
Noble Five.. . . .	50,000
Goodenough.. . . .	45,188
Washington.. . . .	38,000
Monitor.. . . .	27,000
Queen Bess.. . . .	25,000
Jackson.. . . .	20,000
Surprise.. . . .	20,000
Bosun.. . . .	12,000
Antoine.. . . .	10,000
Grand total.. . . .	\$4,763,297.

A somewhat unique experience for a chief justice was that given to Mr. Justice Hunter of British Columbia in December, when His Lordship took an expert from each side of the case before him and went

underground in the Slocan in order to get the personal evidence of his own eyes. The suit was one of trespass between the Slocan Star and the Rabbit Paw mining companies and the point at issue was as to the nature of a wall, which was described as a porphyry dike, the plaintiff claimed the dike to be faulted by a fissure and that the defendants were therefore trespassers.

NORTH-WEST TERRITORIES.

The International Coal and Coke Co., at Coleman, are shipping daily over 400 tons of screened coal. The culm is used at the coke ovens.

The Canadian-American Coal and Coke Co. is putting out 650 tons of coal a day. The endless-rope-haulage machinery will be installed and in commission by February 1st. Something over 200 men are on the payroll.

The compressed air haulage system, installed in the mines of the International Coal and Coke Co., at Coleman, is working satisfactorily. The locomotive hauls from 25 to 30 loaded cars out to the tipples with ease, the load is about 50 tons. The company have some 86 coke ovens in operation.

The site selected for the zinc smelter at Frank, Alberta, is west of the town on ground lying between the No. 2 Tunnel of the Canadian-American Coal and Coke Co. and the river. This site permits of building smoke flues up the side of the hill to the stack which will be erected on top of the hill. The water supply will be taken from Gold Creek.

YUKON.

Three hundred men are wintering in the Klouane Lake country; the bulk of them being on Burwash creek.

The original discoveries on Ledge Creek will be idle during the winter and will have to wait for development until next summer.

Since the building of the Government road from Whitehorse to Klouane Lake was finished freights have fallen from 35 cents per lb. to 8½ cents.

In the trial of McKeen vs. White Channel Gold Hill Hydraulic Co. judgment was reserved. The suit is brought to determine rights to the water from Irish and Big Skookum creeks.

The Lewes River Dredge and Mining Company, operating a dredge on Discovery Claim and Bonanza Creek, had during last summer to thaw all the ground work artificially. The ground thawed too slowly under the summer heat to keep the big dredge at work.

In the suit of Johnson versus Berggren the Sheriff sold the mining claim and machinery belonging thereto on Quartz Creek at public auction. The claim was on the right limit of the Creek, and has not been prospected to any considerable extent.

The Anglo-Klondike Company, Ltd., whose fiscal year closed on Sept. 30, showed a profit account of £7,447 out of which the directors have declared a five per cent. dividend. The company has obtained an extension of its grant of water from Boulder Creek for a further period of ten years, or until July 9, 1920.

The Yukon "World" says that Tanana diggings are full of old machinery that has been shipped there from Dawson, chiefly boilers, and that not over one-half of them are serviceable. A surplus of boilers is reported. The same paper is authority for the statement that the town and district are "distressingly healthy," and that physicians have nothing to do in their profession.

The copper ore sent out from Whitehorse to the smelter at Ladysmith, B.C., was hauled 4½ miles to Whitehorse, then shipped by rail to Skagway, and then transhipped by steamer to Ladysmith. Something over 200 tons have been sent out from the Copper King mine this season. The values on the shipment are not made public, but the gold contents were considerable, and the shipment has more than paid expenses.

Additional reports, under date of November the 18th from the Duncan Creek country on the Upper Stewart River, confirm last month's reports of the shortness of provisions. It transpires that the steamer Prospector was wrecked about opposite the concession of the N. A. T. & T. Co., two miles below McQuesten Creek. The nearest point from which provisions can be obtained is Dominion Creek, the freight for which over the Range will be too exorbitant for most of the miners to pay.

Reports from Fairbanks under date of the 30th of October, state that there was no snow at that date in Fairbanks; the upper end of Chateneka Creek was frozen, but the lower end of the creek was free. It is also reported that few people are left at Circle City this winter. Provisions are said to be low in the camp at Fairbanks, and the probabilities are that many will have to leave that camp before winter is over owing to the scarcity of food. There are double the men in the camp that are needed.

The most costly litigation which has yet occurred in the Yukon Territory was terminated the last week in November by filing the judgment in the Clerk's Office of the Territorial Court of the decision of the Privy Council in the case of Belchers versus McDonald. This case has been on the docket for nearly four years and a half, and is the only Yukon case which has been carried to the Privy Council. The case had no particular relation to the mines, but is notable as the most bitterly contested suit yet fought in the courts of the Yukon.

This fall has seen preparations made for the opening of mining operations in the Alsek country on a scale which is much larger than is customary in the Yukon country. A New York syndicate has grouped all the claims on Bullion Creek from Discovery to 84 below, and is giving a lay on the entire block to receive 75 per cent. of the gross output, the remaining 25 per cent. of the profits to go to the owners. This syndicate is known as the Bullion Creek Hydraulic Company. It will freight from Whitehorse over the new government road some 250 tons of machinery and supplies during the winter. The company proposes building a saw mill at the mouth of Silver Creek, which is directly opposite Bullion Creek, across Lake Klouane. The claims which have been grouped together will be hydraulic, as Bullion Creek is well adapted for such a method of work, as it has a heavy ground and abundance of water, few large boulders, and gravel that is free from frost. Between Discovery Claim and 84 below there is a drop altitude of about 500 feet. As the creek is about 20 miles long, and the heads in glaciers of the Coast Range, no scarcity of water during the summer season is apprehended.

COAL NOTES

After modification the contract offered by the Dominion Coal Co. to its workmen has been accepted for a period of three years.

At Glace Bay nearly 2,000,000 tons of coal were raised in 1904 from the collieries of the Dominion Coal Co. at that place.

The output of the three collieries belonging to the Nova Scotia Steel and Coal Co., which are at Sydney mines, total 478,022 tons or 30,347 tons in excess of the figures for 1904.

The importations of anthracite coal from the United States in 1904 were 1,936,000 tons, against 1,430,000 tons for 1903. The importations of bituminous coal from the United States fell off some 233,000 tons.

The stoppage of the Sydney steel plant (due to the strike) was one of the causes why coal shipments for 1904 did not come up to expectations. Owing to the unusually late spring the shipment season was late in beginning and the summer was unusually irregular.

The Inverness Railway and Coal Co. made an innovation last season by sending a quantity of coal through the Lakes to Ontario ports. The business was probably not profitable, although the boats that took up the coal took down iron ore.

In some cases the average pay of the workers about the collieries in 1904 was increased. The Hon. R. Drummond figures that the average pay per day during the year 1904 for the Spring Hill miners was \$2.99, whereas the average wage for the year 1903 was \$2.88. The prophets put the production of Cape Breton County of 1905 at probably 4,000,000 tons, Inverness 350,000 tons, Pictou 750,000 tons, Cumberland 750,000 or a total of 1,200,000 tons more than 1904. It is not probable that this sum will be reached, but it shows what the collieries can do with their increased facilities for output; they do not attempt to say whether a market for all this increased product can be obtained.

One estimate of the shipments from the various Nova Scotia collieries for the year is as follows:—

Dominion Coal Company..	2,800,000
Nova Scotia Steel and Coal Co..	480,000
Cumberland Railway and Coal Co..	420,000
Acadia Coal Company..	250,000
Inverness Coal Company..	240,000
Inverness Railway and Coal Co..	172,000
	<u>4,362,000</u>

In the month of November the output of the Crow's Nest Pass Coal Co. was as follows:—

Coal Creek Colliery..	44,867 tons.
Michel Colliery..	22,253 "
Carbonada Colliery..	7,449 "
Total..	<u>74,569 "</u>

The coke made was as follows:—

At Fernie, with 390 ovens..	11,950 tons.
At Michel, with 345 ovens..	9,157 "
Total..	<u>21,107 "</u>

The Crow's Nest Pass Coal Co. has a total of 1,123 ovens.

The output of coal of the Nova Scotia mines for the past year is estimated at 4,450,000 tons made up as follows:—

Cape Breton County	3,050,000 tons.
Inverness County	250,000 "
Cumberland County	600,000 "
Pictou County	550,000 "

The shipments show a slight falling off as compared with the year 1903, the main increase being the product of the Nova Scotia Steel and Coal Company, whose output is about 50,000 tons ahead of 1903; the largest decrease is shown by the Acadia Co., which is over 8,000 tons behind last year. There is nothing which leads to any expectation of an increase for 1905 nor is there anything pointing to a decrease. Probably sales will be increased while output remains practically the same.

The official statement of the output of the Dominion Coal Co. for the month of December is as follows:—

Dominion No. 1	42,748
" No. 2	23,918
" No. 3	17,314
" No. 4 (Caledonia)	39,942
" No. 5 (Reserve)	43,678
" No. 6 . . . . .	.....
" No. 7 (Hub)	2,813
" No. 8 (International)	10,405
" No. 9	13,648
Total for December	194,486

The total for November was 232,720 tons. December shipments aggregated 172,752 tons.

The year's output of the Dominion Coal Co. amounted to 3,023,522 tons, and the shipments to 2,780,037 tons. The output was distributed as follows:—

Year 1904.	
Dominion No. 1	415,192 tons.
" No. 2	403,561 "
" No. 3	347,264 "
" No. 4 (Caledonia)	519,457 "
" No. 5 (Reserve)	268,256 "
" No. 6	1,555 "
" No. 7 (Hub)	143,922 "
" No. 8 (International)	193,152 "
" No. 9	226,163 "
	3,023,522 "

Digest of Recent Patents; Mining and Metallurgical.

CANADIAN.

Nov. 22, 1904.

775,414.—Apparatus for Extracting Precious Metal from Ores. John J. Berrigan, East Orange, N.J., assignor to Francis J. Arend, New York, N.Y., and John Bernstrom, Stockholm, Sweden. An apparatus for extracting precious metal from ore by a solution chemically active to dissolve said metal, means for mixing said ore in comminuted form with said solution, means for agitating said mixture, means for centrifugally separating the enriched solution from said ore, and means for conducting said ore and solution from said mixing device to said agitating device and from said agitating device to said separator.

775,405.—Process of Extracting Metals from their Ores. Frederic H. Long, Chicago, Ill. An improvement in the cyanid process of extracting precious metals from their ores that consists in effecting the passage of the entire charge of mixed ore and cyanid solution in successive portions through a contracted channel by injecting into said channel an air-blast of sufficient force and volume to maintain the flow of the charge and to revivify the cyanid and clear the ore.

775,778.—Miner's Car. William J. Neilson, Wilson, Pa. The combination with a mining-car having a hinged gate, of a locking rod, said locking-rod having bent ends, angular clips carried by the sides of said cars and adapted to engage the ends of said rod, and means for automatically releasing said rod at predetermined locations.

775,359.—Apparatus for the Extraction of Zinc. Chas. S. Brand, Knowle, England. The combination with means for the extraction of zinc, of the condensing-chamber, the passage connecting the means for extraction of zinc with the condensing-chamber and a mass of chemically inert and refractory or non-combustible material in said passage.

775,597.—Process of Extracting Gold from Ores. Henry R. Cassel, London, England. A process which consists in gradually and continuously generating by electrolysis at a high current density exceeding ten amperes per square foot of anode-surface, nascent cyanogen in the pulp containing a cyanid and a halogen salt, simultaneously agitating the pulp, dissolving and converting the precious metals into soluble cyanids, and retaining them in solution.

775,548.—Process of Separating Copper or like Metals from their Ores. Paul Weiller, Vienna, and Arthur Weiller, Trieste, Austria-Hungary. A process for separating from their ores copper, silver, lead and all other metals adapted to be precipitated from an acid solution by means of sulfureted hydrogen, consisting in mixing the crushed ore with iron-fillings and saltpetre, placing the mixture in a suitable small furnace and igniting the said mixture, whereby the metal is reduced and fused down.

Nov. 29, 1904.

775,424.—Process of Treating Gold and Silver Ores. Charles H. Rider, St. Louis, Mo. A process which consists in placing a charge of approximately five hundred pounds of crushed ore in each of the four receptacles, adding in each receptacle a solution composed of one hundred gallons of water, three to five gallons of commercial sulfuric acid, and fifteen to twenty gallons of commercial nitric acid, and after the silver is dissolved removing the resultant solution to new receptacles, adding the fresh solution to the undissolved ore in the first receptacle, said solution comprising forty gallons of water, five gallons of nitric acid, and ten gallons of hydro-chloric acid, thus dissolving the gold in the first receptacle, then combining the two solutions and precipitating the silver.

775,944.—Ore-Concentrator. Albert H. Stebbins, Little Rock, Ark. The combination of a series of cylindrical chambers varying in size from end to end of the series and each having at one end a reduced connecting portion joined to the larger end of the next preceding chamber, means for introducing spiral or gyratory air-currents into the first of said series of chambers, a discharge-opening in the wall of each of said chambers and a separate tangential inlet for each of said cylindrical chambers.

775,946.—Concentrating-Machine. Albert H. Stebbins, Little Rock, Ark. The combination of a box-like frame, a concentrating-surface arranged above the bottom of said frame to provide a fluid-chamber, means for introducing a blast of fluid into said chamber beneath the concentrating-surface to stratify the material thereon, said concentrating-surface being provided with perforations, said perforations being disposed in groups at an angle to each other in different portions of the concentrating-surface to direct the fluid currents in different directions over said concentrating-surface.

776,145.—Process of Separating Metals from Sulfid Ores.—Charles V. Potter, Balaclava, Victoria, Australia. A process which consists in adding to same an acid solution which is a non-solvent of the previous metals, then applying heat to the same, and removing the sulfids from the surface of the solution.

776,156.—Calining Furnace. William A. Koneman, Chicago, Ill. An apparatus for calcining gypsum, or the like, the combination of a furnace, a calcining-chamber, a plurality of heat-radiating flues communicating at one end with said furnace, to conduct the hot products of combustion therefrom, and crossing said chamber, a series of vapor-abstracting conduits crossing and open to said chamber, and means for feeding the material to be calcined against and past the sides of said flues and conduits, the said flues being all closed to said calcining-chamber whereby the said material is kept from physical contact with the hot products of combustion from the furnace during the entire calcining operation.

Dec. 6, 1904.

777,020.—Dumping-Car. Joseph D. Hampton, Hazleton, Pa. A dumping-car having a fixedly-held sides and ends and a gate at one end, a movable bottom, means for automatically moving said bottom and wise to release said gate and carry the load there through to dump the same for the purposes specified.

776,647.—Concentrator. Frederick M. Dillon and Wylie G. Wilson, Denver, Colo. A transversely-inclined concentrating-table having a longitudinal vibration whose tendency is to cause the material to travel thereon from the head toward the tail of the table, the said table having longitudinal riffles arranged in groups of varying height, the highest groups being located upon the upper portion of the transversely-inclined surface, the lowest group being centrally located on said surface, and a third group on the lowest portion of the table.

776,531.—Mine-Car Coupling. Marshall G. Moore, Johnstown, Pa. A car-coupling comprising links and clevises or their equivalent, one or more of said members being twisted about the longitudinal axis thereof, whereby said coupling works freely into its slack position, thus forming a short hanging loop.

Dec. 13, 1904.

777,159.—Apparatus for Recovering Precious Metals. Virginia Tunbridge, Newark, N. J., administratrix of John Tunbridge, deceased. An apparatus comprising a supply-channel having a backwardly-inclined screen at its discharge end, a separator arranged to receive the material from said supply-channel, and provided with a series of sediment-collecting hoppers having sediment-discharges and separated by ridges which are progressively higher toward the outlet, a forwardly-inclined screen located at the outlet of the separator and provided with means for holding soap, a filtering tank connected with the outlet of the separator and provided with upright and depending partitions forming a series of upward and downward passages, filtering material located in the said downward passages, and a channel adapted to receive the overflow from the filter and to direct the said overflow against the sediment withdrawn from the separator.

777,379.—Ore-Leaching Apparatus. William S. Jones. Greensburg, Pa. A leaching-tank having its bottom divided into a series of independent compartments combined with pipes discharging independently to and leading independently from each of the said compartments, the pipes connected to each compartment being each connected with a common supply and each provided with its own independent valve.

777,472.—Dumping Coke-Car. Frank S. Ingoldsby and Joseph R. Bowling, St. Louis, Mo., assignors to The Ingoldsby Automatic Car Company, St. Louis, Mo., a corporation of West Virginia. A coke-car, sides having trusses comprising upper and lower chords, a metal sheathing secured to the lower portion of said trusses, and slats completing the sides above the sheathing.

777,223.—Amalgamator. Elizabeth P. Wilkins, Baltimore, Md. The combination with a receptacle of a cylinder adapted to rotate therein, a stand-pipe rigidly engaged in and projecting below the bottom of said cylinder, a worm conveyor in said stand-pipe projecting below the bottom thereof, inwardly-directed beaters on the bottom and sides of said receptacle and outwardly-directed beaters on the bottom and sides of the cylinder arranged staggering therewith.

Dec. 20, 1904.

778,149.—Apparatus for Treating Pyrites. William B. Simons, Charleston, S.C. An apparatus for treating pyrites for the recovery of sulfur fumes, the combination with a furnace, of two or more series of bars, the bars of each series spaced apart, and said series of bars disposed, one series above and spaced from another, and means for stirring pyrites on one series of bars and causing the same while burning, to descend to the next lower series of bars.

778,100.—Art of reducing Aluminum or other Metals. Henry S. Blackmore, Mount Vernon, N.Y. A process which consists in exposing a compound of the metal to be reduced to the action of a substance having such superior affinity for the electro-negative constituent of the compound that heat is evolved in the said reduction and simultaneously employing the said heat to elevate other ingredients capable of reducing the metal by endothermic reaction to a temperature at which reduction is accomplished, and carrying on the reduction by the action of such ingredients.

777,803.—Gold Separator. Thomas Pollock, Santa Barbara, Cal., assignor of one-third to Charles O. Rios, Santa Barbara, Cal. The combination of a U-shaped pipe having its arms of different lengths, and disposed vertically, a sand-hopper carried by the longer arm, a valve on the bottom of the hopper, a water-inlet tube beneath and adjacent to the valve and disposed obliquely to the pipe, a normally sealed discharged-outlet arranged in the lower part of the bend of the pipe, a mercury-chamber carried by the shorter arm of the pipe, a valve in the pipe beneath the chamber, and an outlet-pipe at the top of chamber.

777,936.—Kiln. Robert Booth, London, and Frederick Crosland, Egrement, England. A kiln for calcining lime or other material having a vertical shaft or passage, the top of which is in cross-section longer in one direction than in the opposite direction, said shaft having a bottom portion which is of similar shape to the top but with the longer axis of the elongated section extending crosswise to that of the upper section, and said shaft having an intermediate portion substantially circular in section at one point and gradually conforming above and below said circular zone to the shape of the top and bottom portions.

778,096.—Process of making coal briquets. John W. Barnes, Philadelphia, Pa., assignor of one-half to Clara G. Hobson, Philadelphia, Pa. A process consisting in intimately mixing in the proportions substantially recited, granulated coal, molasses, and paraffin, and hot water, then forming the mass into briquets, then subjecting the same to a temperature of from 280 to 300 Fahrenheit, and then sprinkling said briquets with a mixture of paraffin and hot water, and finally drying the briquets.

Dec. 27, 1904.

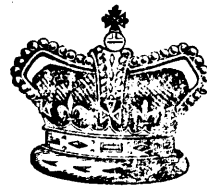
778,345.—Process of Reducing Metallic Oxids with Metallic Aluminum. Frederick C. Weber, Chicago, Ill. A method which consists in subjecting the to-be-treated charge, comprising aluminum in admixture with a metallic oxid reducible by aluminum, to an initial drying for removal of hygroscopic or ordinarily-present moisture thereby completely and absolutely dehydrating the material and then briqueting the dehydrated dry hot charge in a treatment preparatory to reduction of the charge.

778,458.—Centrifugal Machine. John C. Morrison, Chicago, Ill., assignor to United States Peat Fuel Company, a corporation of Illinois. The combination with a basket open at top and normally closed at bottom, and such basket being adapted for continuous rotation, of means for feeding separate charges of wet material through the open top into such basket, means for automatically discharging the moisture-relieved material through a temporarily-opened bottom of same, and instrumentalities connecting such feeding and discharging means whereby their action is made intermittent while the basket continues to revolve.

778,614.—Gas-Producer. Samuel T. Wellman, Charles H. Wellman, and John W. Seaver, Cleveland, Ohio, assignors to The Wellman-Seaver Engineering Company, Cleveland, Ohio, a corporation of Ohio. The combination is a gas-producer, of hollow stirring or agitating arms, a rotating elements of the producer carrying the same and having a partition whereby it is divided into two chambers, one of which communicates with said hollow arms, pipes projecting into the hollow arms and communicating with the other of said chambers, and means for supplying water to one of the said chambers and conveying it from the other.

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PROVINCE OF NOVA SCOTIA.

Leases for Mines of Gold, Silver, Coal, Iron, Copper, Lead, Tin

—AND—

PRECIOUS STONES.

TITLES GIVEN DIRECT FROM THE CROWN, ROYALTIES AND RENTALS MODERATE.

GOLD AND SILVER.

Under the provisions of Chap. 1, Acts of 1892, of Mines and Minerals, Licenses are issued for prospecting Gold and Silver for a term of twelve months. Mines of Gold and Silver are laid off in areas of 150 by 250 feet, any number of which up to one hundred can be included in one License, provided that the length of the block does not exceed twice its width. The cost is 50 cents per area. Leases of any number of areas are granted for a term of 40 years at \$2.00 per area. These leases are forfeitable if not worked, but advantage can be taken of a recent Act by which on payment of 50 cents annually for each area contained in the lease it becomes non-forfeitable if the labor be not performed.

Licenses are issued to owners of quartz crushing mills, who are required

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

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

MINES OTHER THAN GOLD AND SILVER.

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

All rentals are refunded if afterwards the areas are worked and pay royalties. All titles, transfers, etc., of minerals are registered by the Mines Department for a nominal fee, and provision is made for lessees and licensees whereby they can acquire promptly, either by arrangement with the owner or by arbitration, all land required for their mining works.

The Government as a security for the payment of royalties, makes the royalties first lien on the plant and fixtures of the mine.

The unusually generous conditions under which the Government of Nova Scotia grants its minerals have introduced many outside capitalists, who have always stated that the Mining laws of the Province were the best they had had experience of.

The royalties on the remaining minerals are : Copper, four cents on every unit ; Lead, two cents upon every unit ; Iron, five cents on every ton ; Tin and Precious Stones, five per cent. ; Coal, 10 cents on every ton sold.

The Gold district of the Province extends along its entire Atlantic coast, and varies in width from 10 to 40 miles, and embraces an area of over three thousand miles, and is traversed by good roads and accessible at all points by water. Coal is known in the Counties of Cumberland, Colchester, Pictou and Antigonish, and at numerous points in the Island of Cape Breton. The ores of Iron, Copper, etc., are met at numerous points, and are being rapidly secured by miners and investors.

Copies of the Mining Law and any information can be had on application to

THE HON. A. DRYSDALE,

Commissioner Public Works and Mines,

HALIFAX, NOVA SCOTIA.

PROVINCE OF QUEBEC

The attention of Miners and Capitalists in the United States
and in Europe is invited to the

GREAT MINERAL TERRITORY

Open for investment in the Province of Quebec.

Gold, Silver, Copper, Iron, Asbestos, Mica, Plumbago, Phosphate,
Chromic Iron, Galena, Etc.

ORNAMENTAL AND STRUCTURAL MATERIALS IN ABUNDANT VARIETY.

**The Mining Law gives absolute security to Title, and has been
specially framed for the encouragement of Mining.**

Mining concessions are divided into three classes :—

1. In unsurveyed territory (a) the first class contains 400 acres, (b) the second, 200 acres, and (c) the third, 100 acres.
2. In surveyed townships the three classes respectively comprise one, two and four lots.

All lands supposed to contain mines or ores belonging to the Crown may be acquired from the Commissioner of Colonization and Mines (a) as a mining concession by purchase, or (b) be occupied and worked under a mining license.

No sale of mining concessions containing more than 400 acres in superficies can be made by the Commissioner to the same person. The Governor-in-Council may, however, grant a larger extent of territory up to 1,000 acres under special circumstances.

The rates charged and to be paid in full at the time of the purchase are \$5 and \$10 per acre for mining lands containing the superior metals* ; the first named price being for lands situated more than 12 miles and the last named for lands situated less than 12 miles from the railway.

If containing the inferior metal, \$2 and \$4 according to distance from railway.

Unless stipulated to the contrary in the letters patent in concessions for the mining of superior metals, the purchaser has the right to mine for all metals found therein ; in concessions for the mining of the inferior metals, those only may be mined for.

*The superior metals include the ores of gold, silver, lead, copper, nickel, graphite, asbestos, mica, and phosphate of lime. The words inferior metals include all other minerals, and ores.

Mining lands are sold on the express condition that the purchaser shall commence *bona fide* to mine within two years from the date of purchase, and shall not spend less than \$500 if mining for the superior metals ; and not less than \$200 if for inferior metals. In default, cancellation of sale of mining lands

(b) Licenses may be obtained from the Commissioner on the following terms :—Application for an exploration and prospecting license, if the mine is on private land, \$2 for every 100 acres or fraction of 100 ; if the mine is on Crown lands (1) in surveyed territory, \$5 for every 100 acres, and (2) in unsurveyed territory, \$5 for each square mile, the license to be valid for three months and renewable. The holder of such license may afterwards purchase the mine, paying the prices mentioned.

Licenses for mining are of two kinds: Private lands licenses where the mining rights belong to the Crown, and public lands licenses. These licenses are granted on payment of a fee of \$5 and an annual rental of \$1 per acre. Each license is granted for 200 acres or less, but not for more ; is valid for one year, and is renewable on the same terms as those on which it was originally granted. The Governor-in-Council may at any time require the payment of the royalty in lieu of fees for a mining license and the annual rental—such royalties, unless otherwise determined by letters patent or other title from the Crown, being fixed at a rate not to exceed three per cent. of the value at the mine of the mineral extracted after deducting the cost of mining it.

The fullest information will be cheerfully given on application to

THE MINISTER OF LANDS, MINES AND FISHERIES,
PARLIAMENT BUILDINGS. QUEBEC.

Ontario's Mining Lands..

THE Crown domain of the Province of Ontario contains an area of over 100,000,000 acres, a large part of which is comprised in geological formations known to carry valuable minerals and extending northward from the great lakes and westward from the Ottawa river to the Manitoba boundary.

Iron in large bodies of magnetite and hematite; copper in sulphide and native form; gold, mostly in free milling quartz; silver, native and sulphides; zincblende, galena, pyrites, mica, graphite, talc, marl, brick clay, building stones of all kinds and other useful minerals have been found in many places, and are being worked at the present time.

In the famous Sudbury region Ontario possesses one of the two sources of the world's supply of nickel, and the known deposits of this metal are very large. Recent discoveries of corundum in Eastern Ontario are believed to be the most extensive in existence.

The output of iron, copper and nickel in 1903 was much beyond that of any previous year, and large developments in these industries are now going on.

In the older parts of the Province salt, petroleum and natural gas are important products.

The mining laws of Ontario are liberal, and the prices of mineral lands low. Title by freehold or lease, on working conditions for seven years. There are no royalties.

The climate is unsurpassed, wood and water are plentiful, and in the summer season the prospector can go almost anywhere in a canoe.

The Canadian Pacific Railway runs through the entire mineral belt.

For reports of the Bureau of Mines, maps, mining laws, etc., apply to

HONORABLE E. J. DAVIS,

Commissioner of Crown Lands,

or

THOS. W. GIBSON,

Director Bureau of Mines,

Toronto, Ontario.



Dominion of Canada

SYNOPSIS OF REGULATIONS

For disposal of Minerals on Dominion Lands in Manitoba, the North-west Territories and the Yukon Territory.

COAL.

Coal lands may be purchased at \$10 per acre for soft coal and \$20 for anthracite. Not more than 320 acres can be acquired by one individual or company. Royalty at the rate of ten cents per ton of 2,000 pounds shall be collected on the gross output.

QUARTZ.

Persons of eighteen years and over and joint stock companies holding free miner's certificates may obtain entry for a mining location.

A free miner's certificate is granted for one or more years, not exceeding five, upon payment in advance of \$7.50 per annum for an individual, and from \$50 to \$100 per annum for a company, according to capital.

A free miner, having discovered mineral in place, may locate a claim 1500 x 1500 feet by marking out the same with two legal posts, bearing location notices, one at each end on the line of the lode or vein.

The claim shall be recorded within 15 days if located within ten miles of a mining recorder's office, one additional day allowed for every additional ten miles or fraction. The fee for recording a claim is \$5.

At least \$100 must be expended on the claim each year or paid to the mining recorder in lieu thereof. When \$500 has been expended or paid, the locator may, upon having a survey made, and upon complying with other requirements, purchase the land at \$1.00 an acre.

Permission may be granted by the Minister of the Interior to locate claims containing iron and mica, also copper, in the Yukon Territory of an area not extending 160 acres.

The patent for a mining location shall provide for the payment of a Royalty of 2½ per cent. of the sales of the products of the location.

PLACER MINING.

Manitoba and the N. W. T., excepting the Yukon Territory.—Placer mining claims generally are 100 feet square; entry fee \$5, renewable yearly. On the North Saskatchewan River claims are either bar or bench, the former being 100 feet long and extending between high and low water mark. The latter includes bar diggings, but extends back to the base of the hill or bank, but not exceeding 1,000 feet. Where steam power is used, claims 200 feet wide may be obtained.

Dredging in the rivers of Manitoba and the N. W. T., excepting the Yukon Territory.—A free miner may obtain only two leases of five miles each for a term of twenty years, renewable in the discretion of the Minister of the Interior.

The lessee's right is confined to the submerged bed or bars of the river below low water mark, and subject to the rights of all persons who have, or who may receive entries for bar diggings or bench claims, except on the Saskatchewan River, where the lessee may dredge to high water mark on each alternate leasehold.

The lessee shall have a dredge in operation within one season from the date of the lease for each five miles, but where a person or company has obtained more than one lease one dredge for each fifteen miles or fraction is sufficient. Rental, \$10 per annum for each mile of river leased. Royalty at the rate of two and a half per cent. collected on the output after it exceeds \$10,000.

DREDGING IN THE YUKON TERRITORY.

Six leases of five miles each may be granted to a free miner for a term of twenty years, also renewable.

The lessee's right is confined to the submerged bed or bars in the river below low water mark, that boundary to be fixed by its position on the 1st day of August in the year of the date of the lease.

The lessee shall have one dredge in operation within two years from the date of the lease, and one dredge for each five miles within six years from such date. Rental, \$100 per mile for first year and \$10 per mile for each subsequent year. Royalty, same as placer mining.

PLACER MINING IN THE YUKON TERRITORY.

Creek, gulch, river and hill claims shall not exceed 250 feet in length, measured on the base line or general direction of the creek or gulch, the width being from 1,000 to 2,000 feet. All other placer claims shall be 250 feet square.

Claims are marked by two legal posts, one at each end, bearing notices. Entry must be made within ten days, if the claim is within ten miles of mining recorder's office. One extra day allowed for each additional ten miles or fraction.

The person or company staking a claim must hold a free miner's certificate.

The discoverer of a new mine is entitled to a claim of 1,000 feet in length, and if the party consists of two, 1,500 feet altogether, on the output of which no royalty shall be charged, the rest of the party ordinary claims only.

Entry fee, \$10. Royalty at the rate of two and one-half per cent. on the value of the gold shipped from the Yukon Territory to be paid to the Comptroller.

No free miner shall receive a grant of more than one mining claim on each separate river, creek or gulch, but the same miner may hold any number of claims by purchase, and free miners may work their claims in partnership by filing notice and paying fee of \$2. A claim may be abandoned, and another obtained on the same creek, gulch or river, by giving notice and paying a fee.

Work must be done on a claim each year to the value of at least \$200. A certificate that work has been done must be obtained each year; if not, the claim shall be deemed to be abandoned, and open to occupation and entry by a free miner.

The boundaries of a claim may be defined absolutely by having a survey made and publishing notices in the Yukon Official Gazette.

PETROLEUM.

All unappropriated Dominion Lands in Manitoba, the North-West Territories and within the Yukon Territory are open to prospecting for petroleum, and the Minister may reserve for an individual or company having machinery on the land to be prospected, an area of 640 acres. Should the prospector discover oil in paying quantities, and satisfactorily establish such discovery, an area not exceeding 640 acres, including the oil well and such other land as may be determined, will be sold to the discoverer at the rate of \$1.00 an acre subject to royalty at such rate as may be specified by order-in-council.

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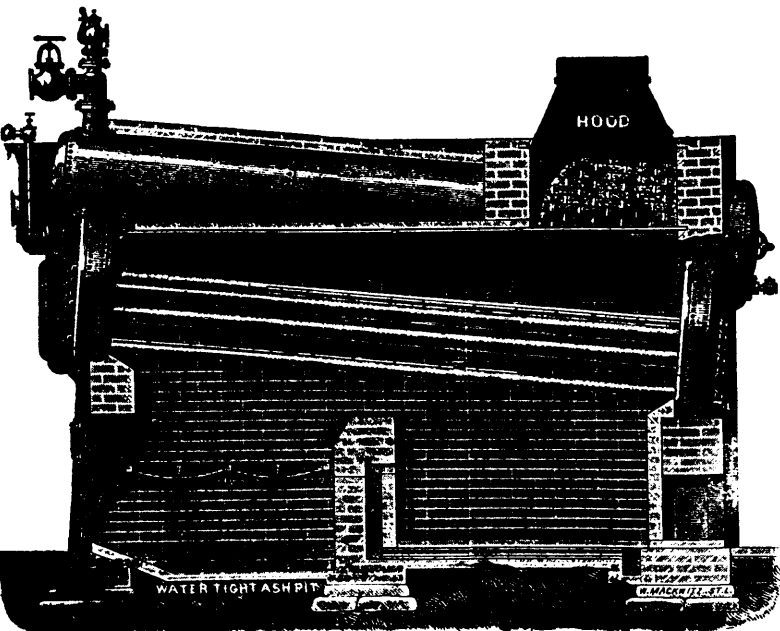
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