CANADIAN MINING JOURNAL

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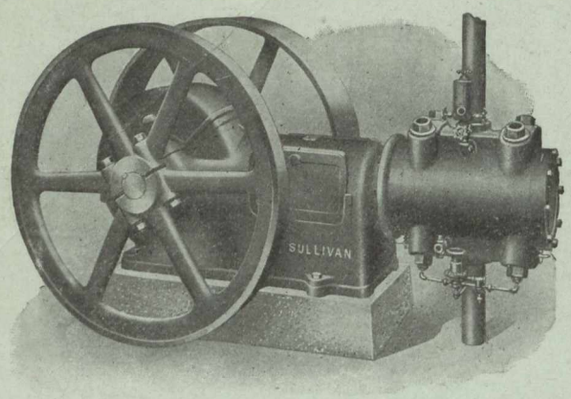
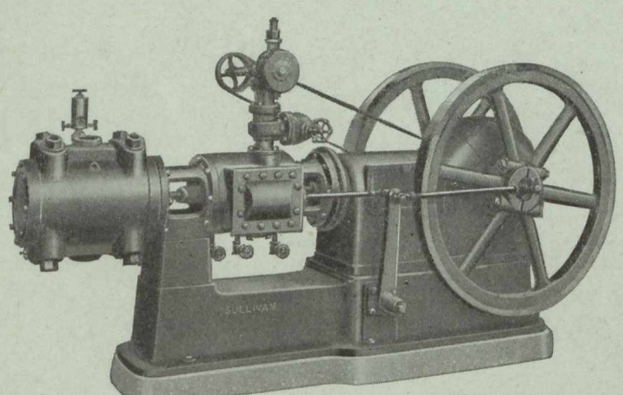
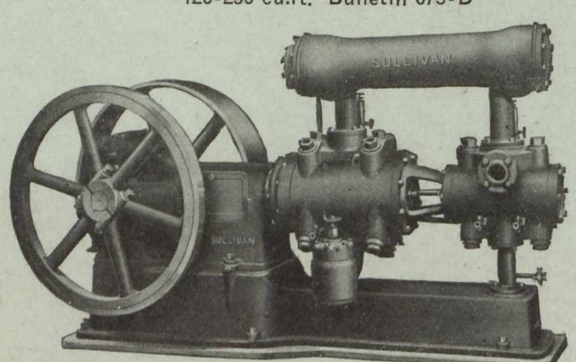
AIR COMPRESSOR RELIABILITY



Sullivan "WG3," Belted Compressor, 50-300 cu.ft.
Bulletin 675-G



Sullivan "WA5," Steam-driven Compressor,
120-250 cu.ft. Bulletin 675-D



Sullivan "WH3," Two-Stage Belted Compressor,
Bulletin 675-G

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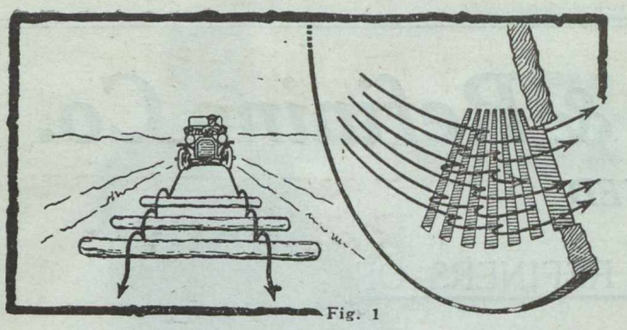
Fig. 1

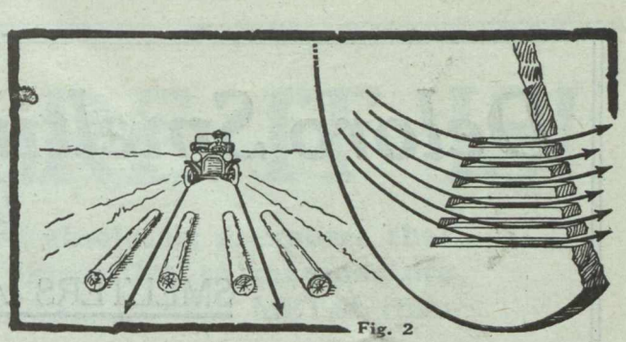
Fig. 2

Discharge "with the movement of the mill" is *unimpeded* discharge

In the Marcy Mill there is a quick discharge of mineral and gangue as soon as it is sufficiently fine. That means a rapid change of mill content which results in large tonnage and high crushing efficiency. All this is accomplished by a properly designed grate and lifting compartment.

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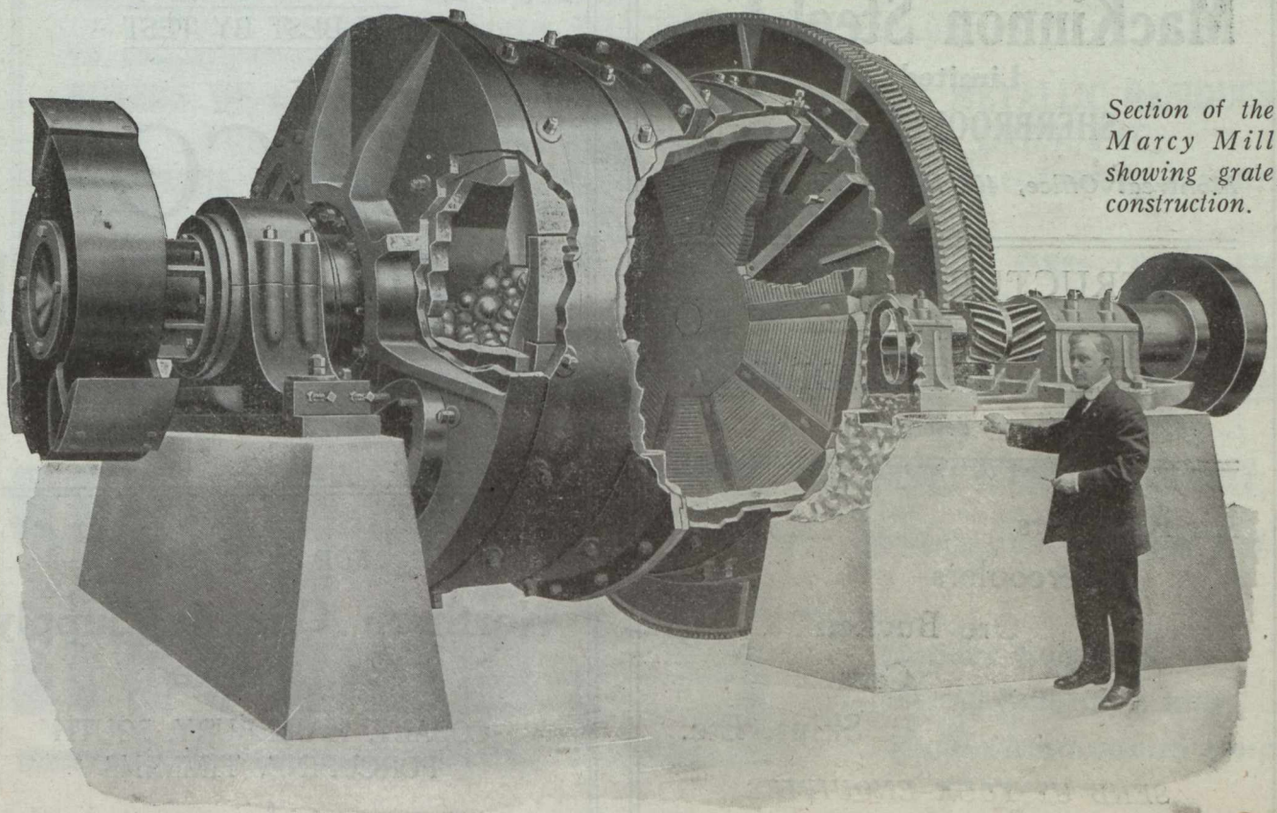

Section of the Marcy Mill showing grate construction.

Canadian Mining Journal

A Weekly Journal devoted to the Science and Practice of the Mining, Metallurgical and Allied Industries, with an Up-to-date Review of Conditions maintaining therein.

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EDITORIAL

WILDCATS SHOULD BE MUZZLED.

Contrary to outward appearances, and despite the silence of public comment, conservative mining interests are not altogether pleased with the outcome of recent attempt of the Ontario Government to devise ways and means of combating the prostitution of the mining industry of this province by a few modern pirates. Obviously, according to unanimous opinion throughout the mining districts, the "Sale of Shares Act, 1919," was most decidedly not the remedy, having the affect, as it probably would have had, of interfering with the earnest efforts of all mine operators no matter how sincere. However, in spite of this one failure to find the proper solution, the opinion is being quietly expressed among mining men that the matter should not be permitted to drop, and that the opposition raised in Northern Ontario should not be misinterpreted as signifying opposition to the principle of the measure.

When, early in the present year it became known that legislation was being considered, aiming at the protection of the public, the captains of industry as well as all the decent thinking people of the whole of Northern Ontario believed the Government had at last decided to no longer disregard the flagrant abuse of one of the basic industries of the country. Heads which had been bowed almost in shame at the Governments previous inaction in this respect raised their eyes to greet this flicker of hope. Then came the full text of the bill, which was followed by one of the greatest waves of resentment of its kind ever experienced in the North. The bill would confer power upon a commissioner to judge whether or not any particular proposition promised a "fair return on shares to be offered for sale," a power which no man has yet been able to develop and which is the fundamental fact in placing unusual value upon the precious metals.

The contention has been put forward that laws already in the statutes are adequate to protect the public, but that these laws have been frequently disregarded by wildcat promoters, and the powers with which the authorities have been possessed have not been exercised, and that the abuse of the mining industry has been due partly to the unscrupulous promoter and partly to the failure of the authorities to fulfil its obligations to the public.

The suggestion has been offered that mining promotions should be placed under the jurisdiction of the Bureau of Mines. The suggestion appears to have been met with a good deal of favor. Through the Minister of Mines, the Mining Commissioner, the various mining recorders in all parts of the province, the staff of geologists, and through constant touch with sincere mining men it would not be difficult to arrange the necessary machinery to successfully cope with wildcat promotions. After all a so-called wildcat (except in oil drilling parlence) is but a piece of territory upon which there may or may not be possibilities of success, but which is promoted in such a manner as to permit its promoters to pocket a large portion of the money subscribed by shareholders, and leave only a portion to go toward development work as a means of covering their tracks.

For any one individual to attempt to find a remedy, would appear to be very unreasonable, very unfair to the industry and an injury to the country as a whole. There should first be a report expressive of expert opinion from all angles and compiled by some such an organization as the Bureau of Mines.

In a word, legitimate operators do not wish to be placed at the mercy of any politically appointed commission, or, as a matter of fact, at the mercy of any commission. At the same time, genuine operators express the sincere wish that misrepresentation should be made punishable by law. By this route lies at once, protection for genuine effort and punishment for the wildcatters.—J. A. McR.

TUBE MILL LININGS.

A new tube mill lining has been brought to our attention, which promises to remove a great deal of trouble and annoyance from the operation of this mill. Up to the first year of the war the Silex lining had been almost universally employed and when properly installed this lining gave fair satisfaction. The war, however, shut off the supply of Silex and there does not appear to be any prospect of this material being available for some years yet, and recourse has been had to chilled iron lining plates, but these are far from satisfactory.

The problem was attacked by Mr. F. B. Kilbourn, of Montreal, and he evolved an entirely new idea in linings, which he has successfully patented. This lining consists of a series of special chilled iron T-bars set on edge round the tube mill and spaced from ¾" to 1" apart. The spaces between the bars are filled with a rich cement grout and when this is set the tube mill is ready for operation. After a few hours running the concrete between the bars is worn out somewhat, leaving the bars protruding. The appearance of the mill can be seen from the illustration which shows the corrugated affect of the bars protruding beyond the concrete filling; this corrugation has the effect of positively driving the contents of the mill. Users of tube mills are quite aware of the fact that with the Silver or chilled iron plate lining there is a great deal of slipping of the contents, which not only wastes power, but reduces the efficiency of grinding very greatly.

We understand that many tube mills have now been equipped with this new lining and the results attending their use exceeded expectations. The first mill so equipped was shut down after 5,000 hours of operation and the wear checked up. A careful record has been kept of the original internal diameter and measurements after the mill was taken out of commission showed a wear of only ⅛". The illustration shows this particular mill after having run for 5,000 hours. As the wearing depth is two inches the life of this lining would be 80,000 hours, or over nine years con-

tinuous operation. The small amount of wear shows that there can be very little slipping of the contents and that the claim of positive drive is fully justified.

Another feature that should be noticed is the uniformity of the wear. As is well known a chilled iron plate wears in grooves and holes and a plate has to be discarded on that account and not on account of uniform reduction in thickness. Another feature is that no bolts are required and the trouble and annoyance from this cause are removed.

We understand that Messrs. Burnett & Crampton, at Rigaud, Quebec, have been appointed sole manufacturers and selling agents for Canada for this lining. This is a comparatively young concern and they appear to be in the field to turn out the highest grade of castings. They inform us that they have had considerable success with chilled iron and also with high grade machinery castings. Both partners in this firm are engineers and, therefore, appreciate an engineer's requirements in grey iron.

GOVERNMENT EXPLORATION FOR MINERALS.

The secretary of the Canadian Mining Institute, Mr. H. Mortimer-Lamb, has recommended that an endeavor be made to interest Federal and Provincial authorities in his scheme for governmental exploration for minerals. It is to be hoped that some way will be found to speed up prospecting and Mr. Lamb's scheme has the advantage at this time of affording employment to returned men.

Under this scheme, officers of the Department of Mines would be in charge of prospecting areas. The prospecting parties would be under the leadership of mining engineers. The men would be paid by the Government. Discoveries would be examined by officers of the Department of Mines and there disposed of to operating companies. Of the monies realized from the sale of properties 75 per cent. would be retained by the Government, and the remaining 25 per cent. would be divided among the members of the party responsible for making the original discovery.

In our opinion some such scheme should be given a fair trial. There are obvious difficulties to be encountered, and unexpected ones will doubtless crop up; but one important discovery would possibly make the experiment quite worth while.

To assist technical, professional and business men returning from overseas to secure suitable employment a special section has been established by Department of Soldiers' Civil Re-establishment. Major George C. Riley, of Montreal, a member of the Canadian Mining Institute, will be in charge of the work. Major Riley will doubtless be pleased to hear from any operator who needs technical men.

The decision to engage an assistant secretary is another sign that the Canadian Mining Institute is growing and that it intends to do something this year. One of the advantages will be that the secretary will be able to visit branches more frequently without causing accumulation of work at headquarters.

H. W. Appleton, formerly with Robert W. Hunt & Company, and recently Works Manager, Toronto Plate Glass Importing Co., has joined the staff of Burns & Roberts, Ltd., railway and contractors' equipment, Toronto.

THE FREEHOLD SYSTEM.

To the Editor of the Canadian Mining Journal:

Sir,—In connection with the discussion regarding the holding of mineral areas by freehold as against leasehold, there is one phase of the subject that I do not think has been sufficiently emphasized, that is the opinion of those most directly interested: the prospector and the purchaser. A canvas of these interested parties would show that about 101 per cent are in favour of tenure by freehold. This opinion is easily understood. Ownership is necessary to any exchange. If all the prospector has to sell is ownership of a lease of a property, every day that he retains the ownership of this lease, lessens its value. The purchaser, on the other hand, feels that he is not purchasing the full possibilities of the property—he is only purchasing the right to make a profit out of the property for a limited time. This will lessen the valuation placed on prospects and lessen the expected profits from operation, tending to discourage both prospector and purchaser. Even a long-term lease with the promise of a renewal of lease will not overcome this, because ownership of a lease of a property can never be as valuable as actual ownership of the property, unless the lease be in perpetuity, when it is the same as freehold. Again, it must not be forgotten that many mining men do not consider that the promises of even Governments are inviolate.

The stock argument in favor of leasing is that the mineral resources of the country belong to all the people and should not be alienated; that the people should control their natural resources. This argument may be correct for agricultural lands, for timber lands, for water powers and for fisheries, for these natural resources, if intelligently handled and wisely conserved, will continue to produce food, timber, power and fish forever. But the mineral resources of a country cannot be used without becoming exhausted. A mineral will not reproduce itself, and the first pound of ore hoisted from a mine marks the beginning of the end.

The leasing system would be more wasteful and tend to more rapidly exhaust the mineral resources of a country than the tenure by freehold. If a company had only ten or twenty years in which to operate a mineral deposit they would make every effort to get all the profit possible in that time. The result would be that during the closing period of the lease, if it appeared that all the ore could not be extracted, the most profitable would be taken and no attempt would be made to keep the mine in repair. At the expiration of the lease the country would be the proud possessor of a hole in the ground, probably containing a greater or less amount of what was at one time payable ore, but which, under existing conditions, would cost far more to extract than the ore would be worth; nor could this be prevented except by having a reliable and capable Government mining engineer at every mine in the country with a staff of surveyors, samplers and assayers.

If the people wish to retain their mineral resources then let the Government take over the whole business of prospecting, developing and mining.

Further more, what is the necessity of the Government retaining ownership of mineral lands? It can, at any time considered necessary for the welfare of the state, commandeer the output, or take over the operation, or even stop the production of any mineral. It seems to me that the tenure of mineral lands by leasehold instead of freehold would tend to discourage the prospector and frighten away the investor, to rapidly exhaust the high-grade ores, and to encourage wasteful methods of ore extraction.—X. Y. Z.

Nova Scotia's Mines and Minerals Production, in Relation to the War

By HARRY PIERS, Provincial Museum, Halifax, N.S.

The Mines of Nova Scotia and the various local industries affiliated therewith, took their full share in contributing to the winning of the late war; and the record on the field of honor of the thousands of sturdy enlisted men from our colliery districts has been one to be truly proud of, and while many a fine Nova Scotian lad lies beneath the poppies in Flanders, others now stand triumphant along Rhine.

Despite very adverse conditions as regards labor supply, resultant from the heavy enlistment of skilled miners, and a great shortage of shipping and to some extent of rolling-stock; the mining industry put forth noble and united efforts to thoroughly do its bit as an auxiliary factor in the great world-struggle; the result may be viewed with pride by the people of the Atlantic provinces in general, and by the mining population in particular.

The chief mineral industry of Nova Scotia is at present that connected with the extraction annually of several millions of tons of bituminous coal of remarkably good quality, from its immense coalfields which cover a large part of the province, and which in costal regions extend for unknown distances under the sea. This vast industry claims our first attention.

Coal Production.

Of late years the production of bituminous coal in Nova Scotia has been regularly increasing from about 2,000,000 tons in 1890*, 2,089,245 in 1895, 3,238,245 in 1900, 5,050,420 in 1905, and 5,477,146 in 1910, until it finally reached the highest point in its history in 1913, when an output of 7,203,913 tons was attained, with the certain prospect of a still higher production under the normal peace conditions which were then existing, and which no one then thought would be so suddenly broken. The value of Nova Scotian coal was becoming yearly better known and more fully appreciated in more distant markets, every effort was being made to take full advantage of new openings for extending the trade, and to thereby increase the profits and the welfare of the province, and the whole prospect looked very bright indeed.

In the very midst of all this prosperity, war broke out in August, 1914, the whole country was suddenly put on a pre-arranged war footing, the voluntary enlistment of men for military service began, transportation problems became increasingly more difficult, and the result was soon seen in a slight drop to an output of 7,005,464 tons of coal for the year, and a still greater decrease to 6,379,463 tons in 1915. Great efforts were made to successfully cope with the adverse conditions which had thus arisen. Even with a great decrease in skilled workmen, the output, owing to an increased production per man, actually advanced in a gratifying manner to 6,496,472 tons in 1916, which was greater than the peace-time output of 1911.

*It is to be kept in mind that the fiscal year of the Nova Scotian Government ends on 30th September, and mineral returns conform thereto.

Coal was now being urgently needed for large munition factories which had sprung up in various places late in 1915, and noble efforts were made by the operators and the miners themselves, to keep up the source of power required by these war industries which worked for twenty-four hours every day in the year. The miners were being further reduced in numbers through enlistment, and new men had to be secured, often with much difficulty, by agents in the west, and these new hands had to be broken into colliery work, and rapidly turned into capable employees. In the year 1916, the output per man at the working-face, per year, reached the very high figure o fabout 590 tons—the highest on record in the province. This production per man will stand as an evidence of what can be accomplished under stress, and will no doubt furnish a datum point as to full efficiency in the future.

Still the number of employees continued to decrease, as large numbers patriotically passed to join the colors. Others came under the Military Service Act of 1917, and still others were attracted by the higher remuneration of the munition works where they felt they were also taking part in the war activities of the country. Transportation was becoming increasingly difficult both by sea and land, the former through the destruction of shipping and the latter through the inadequate amount of rolling-stock available to handle the vast amount of war supplies, food, and men which were pouring ceaselessly toward Europe. Despite those deterring factors, the output of coal in 1917 was 5,803,660 tons, and the production per man was about 560 tons.

In 1918, the year just closed, the total production was about 5,266,000 tons, which about equals that of the pre-war year 1909. It may be observed that the production of coal is in ratio to the number of men employed; and when workmen cannot be obtained for any reason, the output falls off and this holds good relatively no matter what degree of efficiency labor has attained to.

Coal in Cape Breton is probably worth about $6.00 a ton at the mine, and in Pictou County about $6.25 to $6.40; so that the output for 1918 had a value of about thirty-two and a quarter million dollars.

Men Employed, Output per Man, and Enlistment.

The war, as has been noted, had a very bad effect numerically upon the personnel of all the collieries. When hostilities broke out and voluntary recruits were called for, no class responded more readily and in greater numbers than the hardy coal miners, who were of muscular physique, and enured to fatigue and ever-present danger, and special Highland battalions were raised in Cape Breton Island, and others were largely recruited there and among other mining communities throughout the province, the most enlistments probably taking place in 1916. Large numbers joined the well-known 85th Nova Scotia Highlanders, the famous 25th Battalion, the 185th Cape Breton Highlanders, one of the Seige Batteries and some enlisted in the 64th Battalion, as well as in other corps.

The deeds of these noble men on the field of battle

show of what magnificent stuff these hardy and courageous Nova Scotian miners are composed. In one section of the Highland battalions—the 85th—over three-fourths came from Glace Bay, Inverness, Sydney Mines and the Dominion Collieries. The great fighting done by these and other berserks of the coal-pits, has been heralded by war correspondents and brought justifiable pride in the hearts of all. The same holds true of every battalion and battery in which the Nova Scotian miners are represented; they form a large proportion of the rank and file, and are among the very best of the nation's fighting men.

The mines had been pretty well stripped of able-bodied men under voluntary-enlistment system, and when the compulsory Military Service Act of 1917 came into force, a still further drain was made upon the mines. Agents of the coal companies had to sent afield in an effort to secure labor. As the production of coal is a very vital factor in prosecuting a successful war in modern times, particularly when munition works are dependant upon coal to turn their wheels, when maritime carriers and war vessels consume immense quantities of fuel, and the people of the country have to be kept warm in winter; the serious nature of this drain upon the personnel of a very essential industry was brought to the notice of the authorities, and it was felt that some remedy should be forthcoming.

The new munition works, as we have seen, were also offering large wages which attracted many men from the collieries to the workshops, and this was an extra menace to the coal industry, although the mechanics were still employed in urgent war-work. The opening of several small new collieries in various sections of the province, while it helped somewhat to lessen the acuteness of the transportation problem, by supplying near-by markets, lowered the available number of colliers for the older mines.

Some particulars will now be given of the number of men, above and below ground, employed at our collieries, and of the output per year per man at the working-face, as this data has, of course, a direct bearing upon the production. The reasons for the decrease in the personnel has been just referred to, and was a direct consequence of war conditions.

Men Employed in Nova Scotia Collieries.

In 1913, the year of our greatest coal production, 13,664 persons were employed above and below ground in the various Nova Scotian collieries, and the output per man "at the face" per annum was about 530 tons; the latter being the highest man's output hitherto, although the year 1902 nearly equalled it. The average output per man had been about 489 tons for the sixteen years since 1898, in which latter year the man output had suddenly gone markedly upward by about 123 tons from the average of 366 tons, which existed for the decade between 1888 and 1897. In one year, 1893, it had even dropped slightly below the 300-ton mark.

In 1914, the year of the war's outbreak, the number of persons employed had risen to 14,638; but the output per man dropped by 40 tons to about 490 tons. In 1915 the number of employees had further increased to 16,326 which was the largest number ever employed in the history of our coal mines, as the effects of enlistment were not then marked, and new men could be obtained to replace those who had joined the colours; but the output per man remained at about 490, as in the previous year, probably owing to the introduction of new men to take the place of skilled hands who had gone overseas.

In 1916, owing to increased enlistments in the military forces, etc., the number of employees suddenly dropped to 13,124, this being a decrease of no less than 3,202 men, which placed the working force back to where it was in the pre-war year, 1912. This was a very serious handicap to an essential industry which was striving hard to do its part in the economic phase of the war. The situation so created was, however, manfully met by increasing the efficiency of all the departments, and we are surprised and much gratified by seeing the output per man "at the face" per year suddenly leap upwards, by one hundred tons, to the splendid figure of about 590 tons which represents the very highest state of efficiency our colliers have ever attained to. This is a record to which our miners may very well point with pride. Thereby the total output of coal, even with a decrease of considerably over three thousand employees, was increased over that of the previous year by 117,009 tons. There were then about fourteen companies operating, which had been the average number during the preceding seevral years.

In 1917 the number of men employed still further decreased to 12,483 and the output per man was about 560 tons. Several new collieries, of small size and each employing about ten men, had opened this year, particularly in Cumberland County, and the number of operating companies had thus increased to twenty-one; so that the decreased total number of employees showed a still heavier decrease of labour at each of the older collieries. Some men left the old deep mines, preferring to work in the shallow new ones, where they would have shorter distances to go underground to their work, and where the conditions were considered safer. To counteract the shortage of labour, patent mechanical loaders were introduced that year into some of the collieries of the Dominion Coal Company, and this was found to affect a saving of about one man to a room.

It may be said to the credit of the workmen, that labor agitations were pretty generally put in the background during the war, and all united as far as possible in speeding-up the general output and efficiency.

Distribution of Coal.

During the war the St. Lawrence trade was necessarily discontinued. The following tabulation shows that the shipments to Quebec have been very small, as compared with normal years. The distribution of Nova Scotia coal by Provinces for the fiscal years ending 30th September, was as follows:

	1913.	1917.	1918. approx.
Nova Scotia	2,599,053	2,880,787	2,758,970
Quebec	2,193,228	303,012	134,440
New Brunswick	646,642	888,162	882,600
United States	468,091	342,100	296,000
Bunkers	234,177	382,973	285,360
Newfoundland	210,544	236,530	219,190
P. E. Island	96,082	103,168	78,070
Ste. Pierre	6,650	6,043	5,400
Other countries	2,830	299	.....
Total	6,457,297	5,143,074	4,660,030

The springing into being of large thoroughly-equipped munition factories in Nova Scotia, working at top-notch pressure, day and night, and calling imperatively for power with which to drive their machinery, created a new and sudden demand upon the resources of our collieries which had to be promptly met. These collieries, besides producing a source of power for railway locomotion and various industries as heretofore, as

well as fuel for warming the people and for other household uses as in normal times, immediately came in with a direct contribution to the forces which were behind the guns. More coal, and still more coal, was required for smelting purposes and for the production of unusual quantities of steel, and finally for manufacturing this material into shells of all calibres and other warlike supplies which were rushed to the European front in large and continuous shipments.

We have some indication of this new, warlike use of our coal on glancing at the total coal consumption in Nova Scotia during recent years, having in mind that the average local consumption for a few years prior to the war was about 2,179,510 tons. The excess might at first sight be roughly put down as the amount used in the production of munitions, although actually the quantity used for the latter purpose was very considerably in excess of that, as the manufacture of structural steel, rails and ordinary commercial iron and steel was much cut down during the period of war, so that more of our coal was used in munition work than a direct comparison of the figures might otherwise suggest.

It is worthy of notice, that the high price of anthracite coal and the difficulty of obtaining it, caused many people in our towns to use bituminous coal in their heating furnaces; and once having tried this with success, without doubt many will continue the use of this fuel in the future, as being satisfactory and much less costly than anthracite.

Another direct contribution towards the war made by our coal mines, was the large amount of bunker coal disposed to many transports, munitions steamers, food-carrying vessels and ships of the navy. These vessels were bunkered at Louisbourg, Sydney and Halifax. The exact amount of such coal is not known, as much bunkering was done by private firms who had purchased from our collieries and it does not appear in our returns as separate from the local consumption.

The General Conditions at the Collieries for the various years may finally be thus set forth:—

In 1914 the working conditions at all the collieries were good; development work had been kept well in advance; power installations had been maintained at their usual high efficiency; and generally the collieries were developed and equipped for an output largely in excess of any that had hitherto been reached.

In 1915 the shortage of men and difficulty in obtaining sufficient means of water transportation, both caused by the war, had had the effect of decreasing seriously the output of coal; but the collieries in respect to equipment, working conditions, and development toward a much greater production, were in as satisfactory a condition as at the close of the previous year.

In 1916 although the shortage of men and the means for water transportation continued throughout the year, the output and sales were greater than in the preceding year, and it is to be particularly noted that the consumption of coal within the province increased by 710,869 tons as compared with that of 1915, this being largely due to the establishment of munition works and the consumption of coal therein.

In the next year, 1917, the lack of men and of adequate transportation were acutely felt. Compared with the previous year the output decreased by 692,811 tons and the sales by 790,636. This decrease in sales was about balanced by the reduced shipments to Quebec and the United States. The quantity of coal, however, sold in Nova Scotia was 2,880,787 tons, or a gratifying increase of 54,487 tons over the preceding year which itself had been a most noteworthy one in this respect.

In the year just closed, 1918, the operators were still confronted with the labor supply and transportation problems, and the total production fell, by about 537,660 tons, to approximately 5,266,000 tons, while in Nova Scotia the consumption decreased to about 2,758,970 tons, being a little more than half the entire output.

Iron and Steel Industry.

In the progress of the iron and steel industries of the province we observe further evidence of what was being done to help in the war-time activities of the country. As the war preceded, trade fell off considerably in the ordinary peace-time iron and steel products, owing to the temporary suspension of curtailment of much constructional work which was not very necessary; but the establishment late in 1915 and in 1916 of munition plants, operating at fever speed, day and night, called for coal, metallurgical coke, and limestone for flux, as well as the essential iron ore, pig-iron, and steel of special grades. We have seen how the local consumption of coal was strongly affected by this, particularly from 1916 onward. The following table shows clearly the effect of this, concurrently, upon the iron and steel industry of Nova Scotia, and how that province exerted itself to supply the demand for the local munition works, despite the hampering shortage of labor and transportation. The item of steel ingots shows the general trend. In 1913, the production was 483,600 tons, which decreased to 341,818 in 1914, but recovered to 369,310 in 1915 despite the decreased trade in ordinary commercial products, and a marked improvement is noticeable in 1916. Thence it mounted rapidly to 515,538 tons in 1917 under the stimulus of shell production, which is the high mark in the industry. A very large proportion of the iron and steel output after 1915 represents projectiles furnished the British guns to carry on the terrific daily bombardment at the front, and it was the ultimate preponderance of gun-fire which was such a very vital factor in the winning of the great war. The production of iron and steel in this province centres at the Dominion Iron and Steel Company's blast furnaces and steel works at Sydney, and those of the Nova Scotia Steel and Coal Company at Sydney Mines and Trenton.

The detail figures representing the iron and steel production are as follows, those for 1918 being approximate ones, as the exact amounts have not yet been made public:—

	Iron Ore, imported, Long Tons.	Pig Iron produced Short Tons.	Steel Ingots Short Tons.	Coke Short Tons.	Limestone, Short Tons.
1913	991,168	486,962	483,600	728,037	547,004
1914	562,103	281,428	341,818	467,730	335,515
1915	665,541	295,868	369,310	452,099	353,412
1916	795,066	429,615	502,106	669,478	514,474
1917	991,084	437,354	515,538	645,327	411,575
1918*	637,000	380,700	470,900	584,900	407,000

Munition Works.

The large, well-equipped shell factories to which reference has so often been made in this article, were first established here, under governmental inspection, early in summer of 1915, and were located at Trenton, Amherst, New Glasgow and Sydney, while others were at Dartmouth, Yarmouth, etc. By June, 1915, ninety per cent of the Nova Scotia Steel and Coal Co.'s open-

* Approximate.

hearth steel furnaces was being used in the production of shells. Among the important companies thus engaged in the production of such munitions, may be mentioned:—

The Nova Scotia Steel and Coal Company, Ltd., Trenton;

The International Engineering Works, Ltd., Amherst;

The Dominion Iron & Steel Works, Ltd., Sydney;

J. W. Cumming and Son, Ltd., New Glasgow;

The Starr Manufacturing Co., Ltd., Dartmouth;

The Burrill-Johnson Iron Co., Ltd., Yarmouth.

The supply of steel was obtained from the Dominion Iron and Steel Co., and the Nova Scotia Steel and Coal Co. Equipped with all necessary forging apparatus, presses, lathes, etc., and a large staff of men who soon became thoroughly proficient in the precision work requisite in this branch of mechanical engineering, the operating companies worked continually for twenty-four hours each day in the week, and produced vast quantities of shell-blanks, disks and other accessories, and assembled and finished them as forged-steel shrapnel and high-explosive (common lyddite) shells for the use of the British Army as well as for the Navy. These were inspected by government officials, boxed and shipped, and only required the addition of the bursting-charge to be ready to go to the guns. The shrapnel was also charged here with the requisite weight lead-alloy bullets.

Among the classes of forged steel projectiles turned out by the Nova Scotian munition workers were:

12 and 14-pounder (3-inch) shrapnel shells for quick-fire guns used by the British Navy in auxillary batteries for defense against torpedo-boat attack.

18-pounder (3.3-inch) shrapnel and also common lyddite (high explosive) shells for quick-fire guns of the light batteries of the British Field Artillery.

4.5-inch common lyddite (high explosive) shells for quick-fire field howitzers of the howitzer batteries of the British Field Artillery.

60-pounder (5-inch) common lyddite (high explosive) shells for breech-loading guns of the heavy batteries of the British Field Artillery.

9.2 inch common lyddite (high explosive) shells for siege howitzers of the British Siege Batteries.

Some firms, such as the Brandam-Henderson, Ltd., of Halifax, took up the work of casting shrapnel bullets from lead-antimony alloy, and prosecuted their work both night and day, their product after inspection being barrelled and shipped to the shell factories.

It is impossible at the present time to give figures to show to just what magnitude all this war-time industry attained, as the secrecy which surrounded all such works at the time has caused quantitative returns to be, as yet, kept in the background. It was, however, an industry of great proportions, and the output was a direct contribution to the cause for which the Allies were fighting.

It is satisfactory to note that about April, 1918, arrangements were made with the Dominion Iron and Steel Corporation, under which that company will erect a plant at the cost of three to five million dollars for the construction of ship's plates, and will be in a position to turn out 150,000 tons of ship-steel annually, beginning in July or August, 1919. This will have a very important bearing upon the programme of Dominion-wide shipbuilding which is now being carried out to replace losses caused by the war.

Railways:—In 1915 the Eastern Car Company, New Glasgow, N.S., constructed many cars for the Russian government as well as for France. In filling these orders, our iron-workers were required to produce large numbers of axles, wheels, and other metal fittings.

Toluene.

The urgent demand for a continuous and ample supply of material for the production of modern high-explosives for military purposes, and the knowledge that great quantities of coal-tar could be readily produced in Nova Scotia, soon led to the distillation at Sydney of large amounts of toluene, toluol, or methylbenzine, a liquid chemical product akin to benzine, and obtained from coal-tar by rectification of the fractional boiling between 100 and 120 degrees. It derived its name from having been first obtained by the dry distillation of tolu-balsam; whereas now the most abundant source is coal-tar, from which it is derived by a process of fractional distillation. The toluene produced in Nova Scotia was subsequently nitrated at Quebec, and thereupon became the crystalline substance, with excessively violent explosive properties, when properly detonated, to which the now well-known name trinitrotoluene (TNT) has been applied, a high-explosive which has proved a large factor in the war, both on land and sea. It was 204,000 kilograms of this explosive from the United States, with 2,114,000 kilograms of picric acid and 56,000 kilograms of gun-cotton which destroyed part of Halifax when the steamship "Mont Blanc" blew up on December 6th, 1917.

Little has been known about the production of toluene in Nova Scotia, as the usual secrecy surrounded all that related to it as in the case of other munitions. The first issue of it here was in April, 1915, and from then until the end of November, 1918, over 705,000 gallons were produced. After the war, a proportion of the toluene output might possibly be utilized in dye production.

Stibnite.

Some activity was shown in the production of stibnite from the well-known mine at West Gore, Hants Cp., N.S. This mine was re-opened in 1915 and in that year 10,872 long tons of ore was raised, which increased to 14,149 tons in 1916, and dropped to 10,660 tons in 1917, in the summer of which year the mine ceased operations owing, it is reported, to a pinching of the deposit. This mineral is a valuable ore of antimony, and also here carries gold values, and it is largely utilized in preparing the lead-antimony alloy from which shrapnel bullets are cast.

Scheelite.

The scheelite mine at Sheelite, Halifax Co., N.S., was closed subsequent to 1913, after a certain amount of tungsten ore had been extracted. It was re-opened in 1917 and some 50½ long tons of scheelite were raised, but the mine was subsequently again closed.

Manganese.

Nova Scotia has the well-known reputation of having produced some of the highest grade manganese ore that has been on the market in the past. No returns, however, were made in 1915, but in 1916 there were produced 544 long tons of ore, while in the next year, 1917, the returns gave 180 tons. In 1918 some ore was produced at Loch Lomond, C.B., by C. V. Wetmore of Sydney, and the Rossville Manganese Co., operating near New Ross, Lun. Co., had a shaft and were engaged in exploratory work, but unfortunately had their headgear destroyed by fire.

Molybdenum.

A little molybdenum ore was produced in 1917 near

New Ross, Lun. Co., from a property recently opened at New Russell, but it has not yet had time to be sufficiently developed to become an extensive producer, although such work is in progress. Some of the development work in the mineral deposit referred to above, was carried out under superintendence of the Munitions Commission.

Gold.

The gold production has fallen off, one of the causes being the dry seasons which interfered with the operations of the hydro-electric plants as in 1916, and another being that mines which had been operated at a profit in normal years have been unable to do so in wartime in consequence of the great scarcity and advance in cost of labor resulting from the drafting of men into the army and the high pay offered by munition and other works, as well as the greatly advanced price of materials.

The gold production of the province during the period of the war has been but a few thousand ounces. The total gold production of Nova Scotia from 1862 to 1917, was 956,497 ounces from 2,187,493 tons of ore crushed, which shows the high average yield of 2.28 ounces per ton.

Gypsum.

There are inexhaustible deposits of good gypsum on tidewater in Nova Scotia, and the trade in it is a large and rapidly growing one. The output of recent years has been,—in 1914, 283,340 short tons; in 1915, 230,216 tons; in 1916, 279,400 tons; and in 1917, 298,108 tons and 10,000 tons of calcined plaster.

Barytes.

Excellent barytes for use in paint manufacture occurs at Lake Ainslie, C.B., and 1,400 tons were mined in 1914, 750 tons in 1915, 1,262 tons in 1916, and 2,400 tons in 1917. Deposits are also located in various other parts of the province.

Moulding Sand.

Moulding sand has been produced to some extent for use in foundries, the amounts being 430 tons in 1914, 800 tons in 1915, 500 tons in 1916, and 250 in 1917.

Other Produce of Nova Scotia mines and quarries are tabulated below and in some instances amount to large quantities. The feestones of the province are well-known for their excellent quality and pleasing variety of tints.

	1914.	1915.	1916.	1917.
Building stone, short tons	15,468	39,654	32,399	24,711
Cement blocks, number	.....	.....	15,000	25,000
Bricks, number	14,543,608	1,922,100	19,504,987	13,598,075
Drain-pipes & tile, feet	1,592,875	1,022,470	959,933	1,355,297
Sewer blocks, feet	....	....	76,470	....
Grindstone, tons	202	235	260	360
Coal briquettes, short tons	24,170	13,890	635	....
Ammonium sulphate, long tons	4,139	4,303	5,121	5,068

Salt.

In the autumn of 1918 a bed of salt was discovered near Malagash, N.S., and is now being prospected with a shaft and bore-holes. Fishery salt was greatly in demand at one period of the war, and the discovery of a workable deposit in this province would be a great benefit.

Prospecting.

There has been a considerable revival of prospecting for minerals which had gained an increased demand and a higher value during the war; and numerous enquiries were made by firms looking for workable deposits of various minerals and ores which had come into prominence through the shutting-off of the supplies which had formerly come from Germany.

To assist prospectors and those developing known mineral deposits, the government of Nova Scotia possesses core-drills of various sizes and kinds, which may readily be obtained on paying running expenses and for wear to the cutting material. These drills have done a large amount of excellent exploratory work in past years, and have saved much labor and money which would otherwise have been expended in sinking trial shafts. They have also contributed, through their published logs, to our knowledge of the geology of the province.

MINISTER OF MINES OF BRITISH COLUMBIA VISITS OTTAWA IN INTERESTS OF MINING INDUSTRY.

While in Ottawa, Hon. Wm. Sloan, Minister of Mines, will take up with the Dominion Government a number of matters of first importance to the advancement of the mining industry of this Province, one of which will be the matter of effecting an arrangement to throw open Indian Reserves of this Province to miners. As far as the Province is concerned, its policy already has ben defined by certain amendments to the "Placer Mining Act," and the "Mineral Act," and it remains for the Dominion to declare itself in agreement with the principle thus laid down for the areas to be thrown open to development by the Lieut.-Governor's proclamation.

Another matter which the Minister will discuss is the advisability of placing under Provincial control the minerals within what is known as the Railway Belt in this Province. Under the terms whereby the Canadian Pacific Railway was built through British Columbia to the Pacific Coast the base metals for forty miles on either side of the railroad were handed over to the Dominion Government. Mr. Sloan has a proposal to make to the Ottawa Government, having in view the assumption by the Province of this authority to the end that a policy of developing the minerals within the area, particularly the coal and iron, may be proceeded with. He maintains that the dual system of mineral administration from the Coast to the Rocky Mountains along the line of the C. P. R. has had and continues to have the effect of retarding the progress of the mining industry and thinks it would be beneficial to the Western country to have the minerals within this forty mile strip solely under the Provincial Department of Mines. His position in this respect is exactly the same as it is with regard to the E. & N. Railway Belt on Vancouver Island, which has been referred to heretofore.

There are other questions, however, to be laid before Ottawa which also are of the utmost moment. One is that the Federal Administration should give practical evidence of its interest in the development of the iron ore resources of Western Canada by supplementing the British Columbia Bounty on the manufacture of pig iron from locally produced ore. He would have the Dominion offer such an additional bounty as would make the initiation of the industry in the Pacific Northwest irresistibly attractive to capital.

The Federal Government will be asked, also, to grant financial aid for the establishment in British Columbia of an experimental station for comprehensive mineral research, which would include flotation processes, treatment of complex and refractory ores, utilization of coal by-products and other chmical determinations.

Mr. Sloan estimates that an adequate experimental station would cost between $150,000 and $200,000, and states that the logical site for it would be at Point Grey, Vancouver, in connection with the British Columbia University, on the buildings of which the Provincial Government will spend this year some $500,000. He thinks, therefore, that it is the proper time to make an effort to secure such a University adjunct, asserting that it would very materially and most profitably enlarge the scope of the present mining school. "In this Province," he says, "the miners are confronted with many difficulties in the treatment of complex ores. With an Experimental Station, equipped for scientific research and skilled laboratory work, many of their problems would be solved, and they would be enabled to obtain much fuller returns on the various minerals found in our ores."

Mr. Sloan also proposes to bring before Ottawa the question of the Dominion Government making a grant to aid the Province in carrying out its policy of assisting miners in the construction of roads and trails to promising prospects and mines.

Finally the Minister will talk over with Hon. Mr. Burrell, Minister of Mines, the plans of the Dominion with respect to geological survey work in the West this summer. He is very appreciative of what has and is being done by the central government along this line, and hopes that the activity of the past will be continued.

BRITISH COLUMBIA COAL AND COKE PRODUCTION.

Statement of Coal and Coke Tonnage Returns for the Month of February, 1919.

	Tonnage. Coal	Tonnage. Coke
Canadian Collieries, Ltd., Comox	50,691	1,938
Canadian Collieries, Ltd., Extension-Wellington	19,535	Nil
Canadian Collieries, Ltd., South Wellington	5,566	Nil
Western Fuel Co., Nanaimo	59,105	Nil
Pacific Coast Coal Mines, Ltd., South Wellington	4,719	Nil
British Columbia Coal Mining Co. (Leased), East Wellington	2,748	Nil
Nanoose Collieries, Ltd., Nanoose Bay	500	Nil
Crows Nest Pass Coal Co., Michel	14,195	4,970
Crows Nest Pass Coal Co., Coal Creek	21,684	3,805
Corbin Coal & Coke Co., Corbin	3,172	Nil
Middlesboro Collieries, Middlesboro	3,935	Nil
Princeton Coal & Land Co., Princeton	2.051	Nil
Fleming Coal Company, Merritt	3 729	Nil
Granby Company, Cassidy's Landing	3,891	Nil
Coalmont Collieries, Coalmont	800	Nil
Telkwa Collieries, Telkwa	236	Nil
Total tonnage	195,557	10,713

THE NIPISSING REPORT.

In his report for the year 1918 President E. P. Earle, of The Nipissing Mines Co., says:

"It is a pleasure to again report to stockholders the results of a very succesful year's operation of The Nipissing Mining Company, Limited. Conditions have been most unusual. Materials of all kinds used in our mining operations advanced greatly. The wages of our employees have been materially increased, and an unusually large sum had to be set aside for war taxes. Fortunately the rise in the price of silver offset the large increase in the cost of operation, with the result that the net profit was as much as in the previous year. The production of the mine was 3,701,416 fine ounces which was sold at an average price of 99.14 cents per ounce at Cobalt. The net operating receipts were almost $2,600,000. Dividends paid were $1,800,000, which brings the total sum distributed to the stockholders up to $19,140,000. As has been previously stated, stockholders should bear in mind that the large dividends paid by the company should be considered as in part a return of capital. The surplus has increased from $2,731,000 to 3,441,000. Development of new ore did not fully make up for the large production, so there is some decrease in ore reserves, which now stand at about 6,000,000 ounces. The mines and mills are fully equipped to handle our production in a most economical way. It is especially gratifying to your directors to be able to state that the properties of the company have been operated at full capacity throughout the war, without any trouble with its employees."

Kirkland Lake's New Mill.

Milling operations were commenced on a large scale at the Kirkland Lake Gold property, in the Kirkland Lake camp recently. Certain portions of the milling equipment have already been tried out and found to give highly satisfactory results. The workings of the mine have been carried to a depth of 700 feet, and the orebody showed every indication at this point of continuing to still greater depths. This is the deepest working in the Kirkland Lake camp to date. A large quantity of milling ore is on the surface dumps ready for treatment in the new mill, and the new central shaft is being connected up with the various workings of the mine to the 700-foot level, which will greatly facilitate the handling of the ore in the future. The Kirkland Lake Gold Mines is owned by the Beaver Consolidated Silver Mines of Cobalt, and has been brought to its present state of development by the latter company. The mill is conceded to be one of the most modern in the north country.

Mr. M. J. Carrigan, of Seattle, certainly deserves that new addition to his name "Pig-Iron" Carrigan. He earned it.

Eli Carpenter, Discoverer of the Slocan

By J. C. GWILLIM.

Eli Carpenter, who discovered the Slocan, B. C., silver-lead camp in 1891, died near Salmon Arm, B. C., in January, 1917. Many old-timers of the Kootenay country will be interested to have some account of him since he left that district in 1898 to find his way, by the Edmonton route, to the Klondyke.

He was then about 60 years of age and some of us did not expect to hear of him again. Rumors came that he was trapping on the Athabasca; and then that he was dead. Two years later he turned up in Dawson.

By chance I met a Mr. C. H. Ivens, of Salmon Arm this winter. He said he had helped carry Eli Carpenter to his grave, and this inclined me to make some enquiries of his later history, so that there might be some record of a brave old man whose life, as one of his friends, a pioneer of Slocan, says brings to my mind the words of the poet: "Many towns claim Great Homer dead, through which the living Homer begged his bread."

No one seems to know where Eli Carpenter was born. He was a French Canadian, small, dark and wiry, rather reticent and modest about himself. According to his own allusions, he ran away from his home in Quebec, and was, in his youth, an acrobat and tight-rope walker, during which period he crossed various canyons on a rope. Bruce White, who died at Nelson last winter, and was companion to Eli on some of his trips in early Slocan days "always contended that Eli was the original Blondin who walked across Niagara Falls on a tight rope, but (says Mr. Neil MBething), I do not know what led Bruce to believe this." Certain, it is that one Dominion Day about 1897 he crossed the main street of Slocan city on a rope thirty feet from the ground repeatedly and threw in a few fancy tricks while up there. He was about 60 years old and hard up then, and an honorarium of $50 was collected on the spot.

In 1890 southern Kootenay was the mecca of western prospectors. The Hall Mines "Silver King," had been found by Colville half-breeds, and Rossland Red Mountain by Bourgeois and Moriss. Colville Joe" and Indians told of rich mineral deposits in the Slocan Lake district. So Neil Gething and Bill Springer crossed the mountain ranges from Kootenay Lake to the head of Lemon Creek and thence down Springer Creek to Slocan Lake in 1890. They were probably the first prospectors who reached Slocan. Some of their assay samples carried good values; but on their return to Nelson, Joe Moriss and Joe Bourgeois turned up from Trail Creek with news of the Rossland discovery, and this diverted attention away from Slocan until the next year, 1891.

Prospectors were now working up the creeks on the western side of Kootenay Lake, and amongst them was Eli Carpenter who is said to have been "grubstaked," by Scott McDonald of Hot Springs (Ainsworth). Eli made his way up Kalso Creek for some twenty odd miles through thick brush and down logs following the valley to the divide and over to Carpenter Creek, which flows the other way, into Slocan Lake. Getting short of grub he decided to return to Kootenay Lake by way of the mountain ridges so climbed up Payne Mountain, which rises above the three forks of Carpenter Creek and has a grand view down the creek to Slocan Lake, and the glaciers on the other side of it. Here he found float galena, and after some search, the outcrop of the Payne Mine near the summit of the ridge. His location was made. The ore, assayed at Ainsworth, ran over two hundred ounces of silver to the ton. Mr. Angus McInnes, mining recorder of New Denver has made an "abstract" of the original record, it is:

Mineral claim—Payne.
Located by—Eli Carpenter 34566, John Seyton 39686.
Situate—About twenty-five miles west of Kootenay Lake in the head waters of Slocan Creek.
Direction of centre line—North-east and south-west.
Length—1,500 feet.
Located on 9th day of September, 1891.
Recorded this 22nd day of September, 1891.
Recorder—T. H. Griffin.

Eli Carpenter's discovery caused a stampede, and there was a wild scramble to get locations before snow fell. He seems to have returned himself, for that same fall. Mr. Neil Gething says; Bruce White and Eli were returning by way of Slocan river, when some one's dog robbed their outfit. Coming across an old trapper's cabin they found an ancient wild swan suspended. " Bruce was afraid to eat it on account of it being so old, and also of the possibility that it might be poisoned for bait, but Eli, who was very hungry, could not agree with Bruce, and said, 'Bruce, if we have got to die, we might as well died with our belly full.' "

In that same fall or winter Eli Carpenter sold the Payne prospect to Eteve Bailey for five hundred dollars (at a later period this mine paid over a million in dividends). Bailey opened up the mine in the following summer. Quoting Mr. Gething: "Eli was a mildly disposed man and bore but little animosity to anyone, but I remember one incident in which he seemed to be completely upset. It was late in the fall and prospecting was all over, and of course Eli's money was all gone by this time, so he rolled up his blankets and packed them on his back started up the hill, from the hotel, to where he was sure of a job from his friend Bailey, in the mine he had sold for five hundred dollars. When he arrived at the mine he found everything going fine, but was informed: full handed.' So old Elie had to take up his bed again and look for a job in another place."

In 1895 prospecting shifted to the "dry ore" district at the southern end of Slocan Lake. Eli cruised round these hills for awhile without finding much. He was an occasional contributor to our assay office in Slocan City, and on one occasion said he would like me to teach him how to assay, but he never turned up for instruction. He referred to experiences in Colorado, and I think must have come from there to the Kootenay. It was during this period that he astonished us with the tight rope performance.

In 1898, like thousands of others, Eli started for Klondike; but he chose a bad route. He left Edmonton with others, and after two years wandering arrived alone in Dawson, "nearly starving and almost

naked." Some accounts say that he and his companions went by way of the Peace and Mackenzie rivers, thence up the Laird and across the portage to the Pelly, a branch of the Yukon. At any rate he finished alone, and is said to have considered this "breaking trail from Edmonton to Alaska as his greatest achievement." His old associates used to say that "given matches and a small sack of salt he could stay in the mountains for months, for he could make meals out of everything in sight."

Before leaving on this trip he gave to Wm. Thomlinson of New Denver, who first met him in 1892—"the carbine which he carried on all his explorations for many years previously; and he also gave me the historic pole pick with which he broke the first float found from the Payne mine, the first mineral claim to be recorded in this camp. I still have these mementos of that brave little pioneer."

Arrived in Klondyke, he is said to have got some hydraulic ground which he worked out in one year by putting on a night shift but made little out of it account of the large amount of waste. Others say he made some money, and he is credited with having made two fair fortunes in his time which were easily squandered on the less fortunate.

About 1911 he reappeared on the prairie east of Calgary, and gathered some stock together; but was found to be squatting on a school section, from which he had to move. At this time he was thrown from his cayuse and broke his leg. After a period in a Calgary hospital he decided to go prospecting again in British Columbia and took a ticket for Kamloops. On his way to the train he slipped and broke the newly set bone, but in spite of that boarded the train and arrived at Kamloops where he went to hospital again. He was now about 75 years old.

Here he fell in with a man from Celesta, near Salmon Arm, and went there with him. Quoting Mrs. Jackson of Sicamons, who came to know him well, "This plan was carried out but did not work well. E. C. found his money getting less and apparently 'nothing doing.' So, although the lake (Shusways Lake) was frozen, our friend decided to pull out for Sicamons. He left Celesta early one morning on a small handsleigh, with a couple of blankets. As he was obliged to use crutches in moving about, he fixed a bent nail in the end of each, and, sitting on the sleigh propelled himself along. He made 24 miles that day, and when dusk came he made camp in Hungary Cove, a few miles north of Murdoch Point, which is opposite Sicamons. Next morning he found that had he proceeded, it would have proved disastrous, for a little further on the lake had opened up."

From Sicamons he made his way to Australia, and stayed in that country two weeks. He is said to have found gold there, but no water to wash it. In 1913 he returned to Shuswap Lake.

"He seems to have been attracted by Shuswap Lake and neighborhood, so arranged to take up a homestead, where, as he put it, he could make a place to die in. He seems, at this time to have felt that his luck had given out and he did not want to go to the Old Man's Home (at Kamloops), though for years he seems to have been a regular subscriber."

His homestead at Anesly Arm was well timbered; he made his improvements, put in a flume, waterwheel and rough saw-mill; made and graded a wide road for three-quarters of a mile and cut 50,000 feet of lumber. This mill had in its framing 30 foot tie timbers and was erected by Eli entirely without assistance. "When one recalls that, at this time he was nearly 80 years old, his extraordinary will-power is better understood." Another mill which was to have taken his logs, all ready for booming, shut down, and he had to face the winter with little money and great disappointment.

A young man, Albert Brock, lived near by. "Many's the time," to quote our friend, "did this young man Albert Brock give him half his fish," otherwise the old man would have gone hungry."

"It was at this time," Mrs. Jackson says, "that we were able to fill quite a blank in helping him out." . . . . In 1916 his hand became badly mangled between the belt and the wheel of the mill, forcing him to seek medical advice; so he came to Sicamons and on to Salmon Arm. Here the local constable found him the position of night watchman at McConnel's closed mill so that he felt independent while having his hand attended to."

Mrs. Jackson continues, "All through that winter he was a regular visitor in our home, being just over the lake from Annis. The week prior to his death he spent here, preparing things for his return to his own mill, so soon as the lake opened up. He left us on Friday, we visited him on the following Sunday, sat with him and left him full of hope and good spirits. He was like a boy in his enthusiasm to get back to his mill again.

"On Wednesday, January 23rd, he was found dead in his bunk, with his head on his arm, apparently just dozed off. So, as he seemed to have no one but ourselves, we took him to Salmon Arm, where Mr. West, the Church of England clergyman, buried him on January 26th, 1917."

Mrs. Jackson adds, "He was so shy with strangers and had so little vanity, that I should doubt if a portrait o fhim is to be had. I wish there was some way of getting together enough money to put a stone over him; just to let people know that that brave spirit is in some way connected with it. Do you suppose it would be any use appealing to the readers of The Canadian Mining Journal?"

If any old acquaintance who reads this account cares to perpetuate his memory and the early days of Kootenay, the writer, or the "Canadian Mining Journal" will accept subscriptions for a simple monument.

TO MAKE ENGINEERING A CLOSE CORPORATION.

Mr. Walter J. Francis, Mr. Surveyor and Mr. Brown of Montreal, were entertained to dinner at the Engineer's Club, by the Toronto branch of the Engineering Institute of Canada. They afterwards addressed a well attended meeting on the affairs of the institute. The meeting was presided over by Mr. A. H. Harkness, M.E.I.C. Mr. Francis spoke on the activities of the Engineering Institute. Mr. Surveyor spoke on the question of securing legislation to make the engineering profession a closed corporation, similar to doctors, lawyers, surveyors, dentists and others. Mr. Brown advocated one great national institution of engineers for Canada, and that engineers should loyally support the same.

The University of Washington was well represented with Dean Roberts and his sister, Professor Landes and Professor J. H. Daniels.

Special Correspondence

Will Test B. C. Iron Ores.

Action has been taken to commence at the earliest possible moment proposed experiments with a view to determining the practicability of producing from British Columbia iron ores, and within the Province, pig iron of such quality and at such a cost as to permit it to take its place successfully in a competitive market.

Authority was given Hon. Wm. Sloan, Minister of Mines, to take the necessary iron ore practically from wherever it may be found by the terms of an Act passed at the recent session of the Provincial Legislature and entitled the "Iron-ore Supply Act." Mr. Sloan since has left for Eastern Canada but, prior to his departure, instructions were given Mr. Wm. M. Brewer, District Mining Engineer, to take the necessary steps to obtain quantities of iron ore for shipment to those plants which have asked for it. Two smelters, situated near Vancouver, B.C., have undertaken to make the changes required for the treatment of the magnetite ores and it is thought likely that there will be others ready before long to undertake the production on a smal scale of pig iron should the experiments decided upon prove satisfactory. Naturally, however, the firms which have sought the Government's assistance will be first taken care of in the distribution of ore.

The terms of the Act, which are sweeping and are generally approved in the Province, permit the Department of Mines to expend up to $50,000 in this work. The key clause of the legislation reads as follows:

"Where, in the opinion of the Minister of Mines, it is necessary or expedient to procure a supply of iron ore for treatment for experimental purposes in aid of the development of the iron and steel industry in the Province, he may, by himself, or by any person authorized by him, enter upon, take possession of, and occupy for such time as he may see fit any mining property in the province and mine and take therefrom any iron ore from thereon or thereunder; and may cause the mining and the removal of the iron to be carried out, and the ore to be supplied and delivered free to any smelting plant in the province for treatment therein for the purpose of experiment in the production from crude ore of pig-iron of a merchantable quality."

Other provisions are that no unnecessary damage shall be done or caused to any mining property so entered upon and that compensation shall be paid to the owners "computed at the maximum rate of 25 cents per ton of ore removed, or at such lesser rate as may be agreed upon. The usual tax on iron ore shall not apply in respect of iron ore so mined and removed.

Would Prevent Dumping of Metals.

At a recent meeting of the Trail (B. C.) Reconstruction Board objection was taken to the marketing in Canada of foreign metals and representations were made to the Dominion Government as indicated by the terms of the appended resolution:

"Whereas the whole interior of the Province of British Columbia is largely dependent upon the mining and smelting industry and these industries are most seriously affected at the present time owing to the demand for copper and lead being almost negligible; and

"Whereas such markets as may exist are flooded with metals dumped into Canada from other countries; and

"Whereas tremendous stocks of these metals exist in Canada at the present time and, if relief is not quickly forthcoming, the entire industry will collapse and throw approximately 15,000 men out of employment; therefore be it

"Resolved by the Trail (B. C.) Reconstruction Board on this 24th day of March, 1919, that the importation of these metals into Canada be allowed only by special permit of the Dominion Government until the stocks of metals now on hand are disposed of and money tied up in these stocks is released to carry on the industry again."

To Explore Coal and Oil Fields of B. C.

"The Coal and Petroleum Appropriation Act, 1919," is the title of a measure introduced by Hon. T. D. Patullo, Minister of Lands for British Columbia, during the last session of the Legislature and which has become law. It provides authority for the expenditure of $50,000 in the investigation and exploration of potential oil fields in this province. The exploratory work also will have in view the location and the obtainig of all possible information as to the possibility of developing on Crown lands new coal producing areas. While the field researches for which the Department of Lands is preparing may be taken to be directly primarily to ascertaining whether the province is possessed of oil in any quantity, the possibility of finding petroleum and natural gas will not be lost sight of. It is understood that attention first will be directed to the lands of the Peace River District, in the neighborhood of the Alberta boundary, where more or less perfunctory examination has given rise to the hope that oil in considerable quantity exists. This country is sparsely settled, is without transportation of any but the most crude character, and, if general but somewhat indefinite reports which have been received from occasional prospectors at rare intervals are to be given credence, it is rich in natural mineral and kindred resources. The advisability of the Provincial Government undertaking systematic exploratory work in this area was emphasized by discussion and resolution at the recent International Mining Convention held at Vancouver, B.C.

Advocates More Geological Survey Work.

With reference to the generally admitted need of more detailed knowledge of the resources of British Columbia it is interesting to note comments made by Charles Price-Green, Industrial Commissioner for the Canadian National Railway, who visited the Pacific Coast recently with a party of officials of the Canadian Northern Ry. At present he is making a general survey of the country with a view to the establishment of new industries based on natural resources and, having an intimate and practical knowledge of mining, he has been giving special attention to the mineral possibilities of this Province. In this connection he recommends very complete geological surveys of the mineral lands and a personal canvass of the money-

ed interests of Great Britain with a view to further investments in mineral development. He says that there never was so much money for investment in Great Britain as to-day. As a resutl of the war, money is not held in as few hands as formerly and Mr. Green avers that trust companies are "fairly bulging with funds for investment." Other portions of the Empire have been able to draw large sums from British investors and he believes that proper representation will bring much to the Dominion. Heavy English investors have pointed out to him the necessity for extensive geological survey work in Canada. While having a general knowledge of the mineral possibilities of the country they insist that it is essential that more and accurate information should be available. He recalls that it was extensive geological survey work that opened up the Cobalt area. Mr. Green's investigations have convinced him of the enormous mineral wealth of Canada and he states that British Columbia especially has much of the economic ore that is so largely used in many kinds of English manufacturies. These, he is confident, will receive recognition shortly and that this province is due for general development in respect of its mining industry, As to the iron industry he is not so hopeful at present, as there does not appear to be an assured market, but says that it will come in time.

Prospecting Rights on Indian Reservation.

Two measures passed at the last session of the British Columbia Legislature affect the mining industry in an important manner. One of these provides for the amendment of the "Placer Mining Act," to permit every free miner, during the continuance of his certificate, to "enter, locate, prospect, and mine for gold and other precious metals and stones" upon Indian reservations. The other amends the "Mineral Act" to permit holders of Free Miners' Certificates to "enter, locate, prospect and mine" upon Indian reservations. In extending the right of access to Indian reservations to miners Hon. Wm. Sloan is following out the policy which he enunciated at the time of coming into office, namely, that there should be as little restriction to the finding and the development of the mineral riches of the province as possible. His passage of an Act throwing open the Strathcona Park, a large area on Vancouver Island, to mining operations was directed along this line and the steps now being taken to reach an understanding with the Esquimault & Nanaimo Ry. Co. to abolish the present dual control of the minerals of the Island Railway Belt is another move towards the same end. The existing arrangement with regard to the latter area is that mining regulations promulgated both by the province and by the Railway Company govern the acquiring of title to minerals and their commercial development. Mr. Sloan would have the province placed in full control. As to Indian reservations it is the contention of the Minister of Mines that the province never relinquished its right to the minerals in these lands and he quoted from a document fifty odd years old to prove that this principle always has been maintained by the province. The result is that large new areas are thrown open to the prospector and it is felt that the mining industry will receive a material fillip in consequence of this action.

These amendments to the "Placr Mining Act," and the "Mineral Act" of the Province of British Columbia do not come into effect until proclaimed law by the Lieut.-Governor of British Columbia. The Dominion Government, it should be explained, is the legally constituted guardian of the Indians and it may take the position that the Province has no authority to permit miners and prospectors upon Indian Reservations for purposes of engaging in mining. It will be necessary, therefore, before the said Proclamation is issued for the province to come to some understanding with the Federal authorities on the point and this matter already is being taken up by the British Columbia Administration with Ottawa in the hope and belief that it will be possible to arrive at an amicable settlement. That prospectors should be barred from operating on Indian Reserves is held to be unreasonable on more than one premise, but one of the most forcible advanced is that the ordinary holder of private property, under the mining laws of the country, cannot withhold the privilege to the miner of entering upon his land for the purpose of mining providing he puts up bonds assuring the land proprietor of indemnity should the work undertaken result in damage to the said property. It, therefore, very properly is asked: Why should the Indians be singled out for very special treatment in this respect?

Reopening Anyox Plant.

Little difficulty apparently is being experienced by the Granby Consolidated Mining & Smelting Company in obtaining the 1,200 men necessary for the re-opening of its plant at Anyox, B. C. Very shortly after the announcement in Vancouver that the men were needed upwards of 300 were signed on, many of them being returned soldiers. As many of those being taken on are mechanics, which it may be stated was not expected, it may be presumed that the company's requirements soon will have been satisfied, the Anyox plant completely manned and in full operation.

Operating at Copper Mountain.

Operations have been commenced at Copper Mountain by the Canada Copper Corporation. Many employees who have been residing at Allenby, B.C., have moved with their families to the mountain for the season's work.

French Complex Ore Reduction Co.

The French Complex Ore Reduction Company, which has a plant near Nelson, B. C., designed to experiment in the treatment of the complex ores of this province, was granted $25,000 by the Provincial Government in 1918, the same to be a charge on its assets. Of this amount the Government held back a sum to meet back interest payments on bonds previously guaranteed by the province on behalf of the company. Thomas French, manager for the company, claimed that this seriously handicapped him in the work he has in hand and made representations along this line to the mining committee of the British Columbia legislature during the late session, As a result it is announced that the Government will release to him $7,906, which represents the total of the aforesaid interest. Mr. French states that, providing this financial relief is forthcoming without delay, thus obviating unnecessary overhead expense, it would be sufficient to enable him to demonstrate the commercial feasibility of the French method in the treatment of complex zinc ores. Owing to past delays he states that his expenses have been excessive.

Initial Dividend Paid by Belmont Surf Inlet Co.

Considerable interest has been created in Provivncial Mining Circles by the recent declaration of an initial dividend of a 5 per cent, by the Belmont Surf Inlet Mining Company. The company has a capital of $2,500,000, and has spent about $1,500,000 in the installation of a plant. The ore, which runs from $12 to $15 a ton in gold values, is concentrated at the mine and then shipped to the Tacoma Smelter. Considerable of the stock is held in Vancouver, Victoria and other British Columbia cities.

Title to Coal Lands Still in Doubt.

When the British Columbia Legislature prorogued a few days ago the Lieut-Governor withheld his assent to one of the measures passed, namely, the Settlers' Rights Act of 1919. This is the Bill which would have given the old settlers or their dependents, with homes in the Esquimalt and Nanaimo Railway Belt on Vancouver Island a further opportunity to make application for the coal rights in connection with their property. It is not necessary to go into the history of this matter again, it being sufficient to say that the issue now is straight cut betweent the jurisdiction of the Dominion and the Province and that the stake to those directly interested is title to a large section of coal-bearing lands of the Island. On the question of jurisdiction the province maintains that it has absolute power with respect to the administration of matters pertaining to civil and property rights, within which classification comes the proprietorship of the coal referred to. Just what position the Dominion Government takes it is not so easy to define, but that it is responsible for the Lieut.-Governor's action in refusing to give his assent to the enactment of the Legislature there is no doubt. It may be that its argument is that title to surface and under-surface rights in these Island lands passed from the Province to the Dominion, and from the latter to the E. & N. Co. in 1884; that the E. & N Co. since has sold the under surface rights to the Canadian Collieries (D) Ltd., and that the latter, having raised a considerable sum on this security, should be protected, if only in justice to the bondholders. In other words the Federal authorities possibly take the view that there was a legal and valid bargain between Province and Dominion and the Railway Company and that, bad bargain as it may now be considered from the standpoint of the Province, and inadequate as may have been the conservation of the rights of settlers or squatters, "a bargain is a bargain," and should be maintained inviolate. It is to be noted that, because of the action taken by the Dominion Government, the Province finds itself in the position of being forced to defend its right to the sole administration of "property and civil rights" within its domain. These rights are part and parcel of the "Terms of Union" and it is considered most serious, apart altogether from the rights of the Canadian Collieries or of the settlers affected, that the Federal Government should so interfere with Provincial legislation of this character. It is very probable, therefore, that both because it believes the settlers have a good case and have been unjustly treated and because the powers granted the provinces under Confederation must be upheld that British Columbia will not allow the matter to drop where it now stands.

Arising out of the Settlers' Rights Act of 1917, an action was heard recently before the British Columbia Court of Appeal. This measure has force and effect for about a year before it was disallowed by the Dominion Government and in that period Provincial Licenses were issued to a number of settlers. A few of the latter sold to the Granby Consolidated Mining & Smelting Company, which, as a result, commenced development work, the fruit of which is the new and flourishing colliery at Cassidy's, Vancouver Island. To maintain what it considers to be its rights the E. & N. Railway Co. entered suits against a number of those who thus acquired Provincial Title, among the latter being those who had disposed of their holdings to the Granby Company. A *lis pendens* was filed against the lands and the Registrar-General refused to register the grants to the Granby Company until this had been removed or dealt with. It was argued for the Granby Company that the Registrar-General had no right to attempt to exercise judicial discretion, but should have accepted the documents and allowed the courts to decide the questions of law. This view was taken by the judge. While the 1917 Act was disalloyed subsequent to the Registrar's refusal, it is not thought that that will affect the decision, but that the grants must now be registered pending the final decision of the courts.

There has been argument before the Provincial Appellate Court on two other actions over these coal lands, the E. & N. Ry. Company seeking to have the licenses granted to Mrs. Dunlop, an aged settler, and to Messrs. Wilson and Mackenzie, as executors of the Ganner Estate, set aside as being null and void. In this connection it was sought to have the Attorney-General of the Province declared a co-defendant under a practice founded on an Act which dates back to the time of Henry VIII., which provides that a subject in fear of an act of injustice by the Crown may bring the Crown before the Court. The Supreme Court held with this opinion, but the Appeal Court dissolved the Supreme Court's order, the cases will proceed without the Crown being made a co-defendant.

It will be seen, therefore, that, with considerable litigation pending and with the Provincial Government much concerned over what it takes to be the unwarranted interference of Ottawa, the question of title to a not inconsiderable part of the coal lands of Vancouver Island is likely to remain unsettled for some time.

The Eight Hour Day.

Approximately 1,600 surface workers employed by the collieries of British Columbia are affected by the Eight-Hour Working Day law which came into force on the 1st of April. This legislation was passed at the 1918 session of the Provincial House, being introduced by Hon. Wm. Sloan, Minister of Mines. On the last day of the 1919 session, which has just closed, J. H. Hawthornthwaite, the member for Newcastle District, a coal mining centre, asked Mr. Sloan what action was proposed to be taken in view of a request received from the Coal Operators, particularly those of District 18, which includes Eastern British Columbia and the Province of Alberta, that the application of this law be deferred. In reply Mr. Sloan stated that the amendment to the Coal Mines Regulation Act to which Mr. Hawthornthwaite referred had been introduced and passed in the year 1918 by the terms of which an eight hour working day was granted the surface workers in and around coal mines. The House was reminded that it was proposed at that time that this legislation should become effective as from October 1 of last year. Owing, however, to representations made as to the existing working agreement between the operators and the

miners in Eastern British Columbia and Alberta, which agreement did not expire until April 1 of this year, it was decided to suspend the Act until that time. Under the circumstances and notwithstanding the representations referred to, the Minister could see no valid reason why the law should be further suspended. Accordingly he had directed that it should be enforced and the District Mining Inspector had been instucted to see that the Act was carried out without qualification. The argument of those who asked for further postponement was based on the fact that the working agreement mentioned has been continued between the operators and miners temporarily and also, it is understood, on the possibility of conditions being disturbed to the detriment of the industry in the face of a general Eight-Hour Day in this Province and no such regulation in the adjacent Province of Alberta.

A policy of selecting labor appears to be the general practice at the mines of Cobalt. Men who formerly held jobs for the reason that no others could be secured to replace them are being gradually let out and returned men and others willing to do justice to their work are being given the preference. As a consequence a higher efficiency is noticeable.

The Nipissing Report.

The annual report of the Nipissing Mining Company just issued, covering the twelve-month period ended December 31st shows the gross value of production for the year amounted to $4,040,446, as against $3,756,889 during the preceding year. Total costs of production increased, however, the cost for 1918 amounting to $1,444,350, as compared with $1,057,987 in 1917. Ore reserves are estimated at 6,005,135 ounces of silver as compared with reserves of 8,076,540 a year previous. Working profits during the year amounted to $2,506,-096, as against $2,700,000. The decline in profits as compared with production is due to the fact that during the year the cost of production averaged 39 cents per ounces of silver produced as compared with a cost of 25 cents per ounce during the previous year. In the annual report the fact is pointed out that no great success was met during the year in the search for new orebodies. In this respect it is interesting to note that during the opening months of the current year just the reverse is the case. This fact is supported by the statement in the report for the month of March where it is pointed out. "Favorable underground developments were met with at several shafts and general operations everywhere continued to be satisfactory."

Ontario-Kirkland.

The shaft of the Ontario-Kirkland, formerly the Hurd property in the Kirkland Lake field, has reached a depth of 320 feet. It is now proposed to drive a cross-cut for the purpose of tapping the main vein which left the shaft at a depth of 195 feet, as well a cross-cutting for the No. 2 and No. 3 veins, all of which parallel in comparatively close proximity. At the point where the slightly dipping vein left the perpendicular shaft it is officially stated values were of a high commercial grade. It is also stated one of the best sinking records so far attained in the Kirkland Lake camp was established by driving the shaft 120 feet in 30 working days.

Temiskaming.

The reported discovery of high grade ore earlier in the week at the Temiskaming mine has been officially denied. Also, it is learned, the completion of the deal for control of the Dolly Varden mine in British Columbia is being held up due to the settlement of various contentious matters relative to the affairs of the Dolly Varden Company.

Contrary to reports the Mining Corporation of Canada is not negotiating for the Silver Cliff mine.

Green Meehan.

Arrangements are being made to resume work at the Edwards & Wright property, formerly the Green Meehan. Plans provide for a comparatively extensive program of exploration work, as well as the mining of considerable low grade ore already developed.

ELECTRIC SPECIFICATIONS AND CONTRACTS.

Mundy, Rowland & Company, of Vancouver and Winnipeg, will undertake the building of power plants, the making of specifications covering installation of motors, pumps and waterwheels.

They have to their credit the building of large power plants, and on the Pacific Coast are completing one of the largest power plants recently installed.

Dolly Varden.

With respect to the controversy between the Dolly Varden Mining Company, owner of valuable mining property in the Alice Arm District, and the Taylor Engineering Company, which went into liquidation because of the financial burden involved in the construction of a railway from tidewater to the first mentioned company's mine, it has been stated previously that an investigation was undertaken by a special committee of the British Columbia Legislature; that a report was submitted to the Provincial Legislature; and that the report was referred back because the Temiskaming Mining Company, of Toronto, which held an option of purchase on the Dolly Varden Mine and other holdings wishes to present evidence as to its position. Since then the latter company's testimony has been taken, but it failed to affect the committee's report which was again presented without change and adopted unanimously. A. M. Whiteside, chairman of the committee, in explanation made the following statement:

"Every effort has been put forth by the committee to do justice by all parties. The committee came to the conclusion that the only manner in which to treat the matter fairly was to consider the two parties according to their investments and claims. The mining company had an investment of $640,000, while the Taylor Engineering company had a total investment of $462,000. We have said that the mining company should make the claim of the appellant company a charge on the assets, with the privilege of paying off the claim, and if this was not desirable they could have their claim taken over by the Taylor Engineering Company and have it paid off by that company. We contend there was no hardship contained in this conclusion and also that if the Taylor Engineering Company could not prove itself in a position to complete the work to the satisfaction of the Minister of Railways they should lose all they had put into the undertaking."

Smelter Smoke at Trail.

In the vicinity of the Trail (B. C.) Smeltery, Consolidated Mining & Smelting Co. of Canada, there is a considerable agricultural area the inhabitants of which have been complaining of the injury to their crops caused by the smoke from the company's plant. The same condition, possibly, occurs elsewhere in the province, but it is understood that the specific case mentioned and the petitions received as a result from the farmers affected, led to enactment at the last session of the Provincial Legislature designed to give the cultivators of the soil some relief. It is entitled the "Industrial Operations Damage Compensation Act" and, it is almost needless to say, is not popular among those identified with the control and management of smelters and other industrial concerns. The chief clause of this measure sets out that any company, owning or operating any reduction works or industrial plant, or proposing to acquire or operate any ore-reduction works or industrial plant, "make an agreement with the owner of any land for payment to the owner of compensation for any damage or injury resulting or likely to result to the land, or in respect of its present or future use, from the operation of the ore reduction works or industrial plant." If the company and the land owner cannot come to an agreement it is provided that application may be made to the Public Utilities Commission for the fixing of the amount of compensation rightfully due the latter. This, of course, constitutes a recognition of the claims of the farmer and there is no doubt that it will result in a settlement of the issue between industrial companies and those agriculturists in the province who have felt themselves aggrieved, but with no means of obtaining redress.

MacKinnon Steel Co., Ltd., Sherbrooke, Que.

We have just taken a contract for the supply of all necessary steelwork in connection with eight-story apartment house being erected on Drummond Street, Montreal, by R. R. DuTremblay. The name of the general contractor is Alex. MacKay, Montreal. The valuation of the complete structure is five hundred thousand dollars, and the steel work will amount to approximately sixty thousand dollars.

Huff Electrostatic Separator Co. Move to Their New Plant.

The Huff Electrostatic Separator Co., which has been located for the last fourteen years at 60 India Street, Boston, Mass., has recently acquired and fitted up a large plant at Arlington, Mass., a suburb of Boston, to which it has moved its offices, ore testing and chemical laboratories and works. It maintains a well equipped laboratory for the purpose of making either preliminary or complete tests showing the results that can be obtained commercially in the separation or concentration of minerals, abrasive materials, and reclaiming valuable content of many waste materials by the Huff Electrostatic Process. Mr. H. B. Johnson, an expert on graphite refining, is General Manager of the company.

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R. T. Gilman & Co.

Carbide:
Canada Carbide Company, Ltd.

Cars:
Canadian Ingersoll Rand Co., Sherbrooke, Que.
MacKinnon Steel Co., Ltd.
Northern Canada Supply Co.
Marsh Engineering Works.
Mine & Smelter Supply Co.
Fraser & Chalmers of Canada, Ltd.

Car Wheels and Axles:
Marsh Engineering Works, Ltd.

Cement Machinery:
Northern Canada Supply Co.
Hadfields Ltd.
Fraser & Chalmers of Canada, Ltd.

Chains:
Jones & Glasco.
Northern Canada Supply Co.

Chemical Apparatus:
Mine & Smelter Supply Co.

Chemists:
Canadian Laboratories.
Campbell & Deyell.
Thos. Heyes & Sons.
Milton Hersey Co.
Ledoux & Co.

Classifiers:
niMe & Smelter Supply Co.

Coal:
Dominion Coal Co.
Nova Scotia Steel & Coal Co.

Coal Cutters:
Sullivan Machinery Co.
Can. Ingersoll-Rand Co., Ltd., Montreal, Que.

Coal Mining Explosives:
Canadian Explosives, Ltd.

Coal Mining Machinery:
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que.
Sullivan Machinery Co.
Marsh Engineering Works.
Hadfields, Ltd.
Fraser & Chalmers of Canada, Ltd.

Coal Pick Machines:
Sullivan Machinery Co.

Compressors—Air:
Smart-Turner Machine Co.
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que.
Northern Canada Supply Co.
MacGovern & Co., Inc.
R. T. Gilman & Co.
Fraser & Chalmers of Canada, Ltd.

Concrete Mixers:
Northern Canada Supply Co.
Gould, Shapley & Muir Co., Ltd.
MacGovern & Co., Inc.

Condensers:
Smart -Turner Machine Co.
Northern Canada Supply Co.
MacGovern & Co., Inc.
Fraser & Chalmers of Canada, Ltd.

Concentrating Tables:
Mine & Smelter Co.

Converters:
Northern Canada Supply Co.
MacGovern & Co., Inc.

Conveyor—Trough—Belt:
Hendrick Mfg. Co.

Cranes:
Smart-Turner Machine Co.
M. Beatty & Sons, Ltd.

Crane Ropes:
Allan, Whyte & Co.

Crucibles:
Mine & Smelter Supply Co.

Crushers:
Lymans, Ltd.
Mussens, Limited.
Mine & Smelter Supply Co.
Hadfields Ltd.
Fraser & Chalmers of Canada, Ltd.

Derricks:
Smart-Turner Machine Co.
M. Beatty & Sons, Ltd.
Marsh Engineering Works.
R. T. Gilman & Co.

Diamond Drill Contractors:
Diamond Drill Contracting Co.
E. J. Longyear Company.
Smith & Travers.
Sullivan Machinery Co.

Dredger Pins:
Hadfields Ltd.

Dredging Machinery:
M. Beatty & Sons.
Hadfields Ltd.

Dredging Ropes:
Allan, Whyte & Co.
R. T. Gilman & Co.

Drills, Air and Hammer: ... ...
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que.
Sullivan Machinery Co.
Northern Canada Supply Co.
Canadian Rock Drill Co.

Drills—Core:
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que.
E. J. Longyear Company.
Standard Diamond Drill Co.
Sullivan Machinery Co.

Drills—Diamond:
Sullivan Machinery Co.
Northern Canada Supply Co.
E. J. Longyear Company.

Drill Steel—Mining:
Hadfields Ltd.

Drill Steel Sharpeners:
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que.
Northern Canada Supply Co.
Sullivan Machinery Co.
Canadian Rock Drill Co.

Drills—Electric:
Sullivan Machinery Co.
Northern Electric Co., Ltd.,

Drills—High Speed and Carbon:
Hadfields Ltd.

Dynamite:
Canadian Explosives.
Northern Canada Supply Co.

Ejectors:
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que.
Northern Canada Supply Co.

Elevators:
M. Beatty & Sons.
Sullivan Machinery Co.
Northern Canada Supply Co.
Hadfields Ltd.
Fraser & Chalmers of Canada, Ltd.

Engineering Instruments:
C. L. Berger & Sons.

Engines—Automatic:
Smart-Turner Machine Co.
Fraser & Chalmers of Canada, Ltd.

Engines—Gas and Gasoline:
Alex. Fleck.
Sullivan Machinery Co.
Smart-Turner Machine Co.
Gould, Shapley & Muir Co., Ltd.
MacGovern & Co., Inc.

Engines—Haulage:
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que.
Marsh Engineering Works.
Fraser & Chalmers of Canada, Ltd.

Engines—Marine:
Smart-Turner Machine Co.
MacGovern & Co., Inc.

Engines—Steam:
Smart-Turner Machine Co.
M. Beatty & Sons.
R. T. Gilman & Co.
MacGovern & Co., Inc.
Fraser & Chalmers of Canada, Ltd.

Flood Lamps:
Northern Electric Co., Ltd.,

Forges:
Northern Canada Supply Co., Ltd.

Forging:
M. Beatty & Sons.
Smart-Turner Machine Co.
Hadfields Ltd.
Fraser & Chalmers of Canada, Ltd.

Furnaces—Assay:
Lymans, Ltd.
Mine & Smelter Supply Co.

Fuse:
Canadian Explosives.
Northern Canada Supply Co.

Gears, Machine Cut:
The Hamilton Gear & Machine Co.
Fraser & Chalmers of Canada, Ltd.

Canadian Miners' Buying Directory.—(Continued from page 29.)

Gears:
Smart-Turner Machine Co.
Northern Canada Supply Co.
The Hamilton Gear & Machine Co.
Fraser & Chalmers of Canada, Ltd.

Hammer Rock Drills:
Mussens, Limited.

Hangers&Cable:
Standard Undeground Cable Co. of Canada, Ltd.

High Speed Steel:
Hadfields Ltd.

High Speed Steel Twist Drills:
Northern Canada Supply Co.

Hoists—Air, Electric and Steam:
Can. Ingersoll-Rand Co., Ltd., Montreal, Que.
Jones & Glassco.
M. Beatty & Sons.
Marsh Engineering Works.
Northern Canada Supply Co.
Mine and Smelter Supply Co.
Fraser & Chalmers of Canada, Ltd.

Hoisting Engines:
Mussens, Limited.
Sullivan Machinery Co.
Can. Ingersoll-Rand Co., Ltd.
M. Beatty & Sons.
Marsh Engineering Works.
Fraser & Chalmers Engineering Works.
Fraser & Chalmers of Canada, Ltd.

Hose:
Northern Canada Supply Co.

Hydraulic Machinery:
Hadfields Ltd.
MacGovern & Co., Inc.
Fraser & Chalmers of Canada, Ltd.

Ingot Copper:
Canada Metal Co., Ltd.
Hoyt Metal Co.

Insulating Compounds:
Standard Underground Cable Co. of Canada, Ltd.

Jacks:
Can. Brakeshoe Co., Ltd.
Northern Canada Supply Co.

Laboratory Machinery:
Mine & Smelter Supply Co.

Lamps, Miners:
Canada Carbide Company, Ltd.
Dewar Mfg. Co., Inc.
Northern Electric Co., Ltd.,

Locomotives (Steam, Compressed Air and Storage Steam:
H. K. Porter Company.
R. T. Gilman & Co.
Fraser & Chalmers of Canada, Ltd.

Link Belt:
Northern Canada Supply Co.
Jones & Glassco.

Manganese Steel:
Hadfields Ltd.
Fraser & Chalmers of Canada, Ltd.

Metal Merchants:
Henry Bath & Son.
Geo. G. Blackwell, Sons, & Co.
Consolidated Mining and Smelting Co. of Canada.
Canada Metal Co.
C. L. Constant Co.
Everitt & Co.

Mining Requisites:
Hadfields Ltd.
Fraser & Chalmers of Canada, Ltd.

Monel Metal:
International Nickel Co.

Motors:
R. T. Gilman & Co.

Nickel:
International Nickel Co.

Ore Sacks:
Northern Canada Supply Co.

Ore Testing Works:
Ledoux & Co.
Can. Laboratories.
Milton Hersey Co., Ltd.
Campbell & Deyell.
Hoyt Metal Co.

Ores and Metals—Buyers and Sellers of:
C. L. Constant Co.
Geo. G. Blackwell.
Consolidated Mining and Smelting Co. of Canada.
Orford Copper Co.
Canada Metal Co.
Hoyt Metal Co.
Everitt & Co.

Perforated Metals:
Northern Canada Supply Co.
Hendrick Mfg. Co.

Pig Tin:
Canada Metal Co., Ltd.
Hoyt Metal Co.

Pig Lead:
Canada Metal Co., Ltd.
Hoyt Metal Co.

Pipes:
Canada Metal Co., Ltd.
Consolidated M. & S. Co.
Northern Canada Supply Co.
Smart-Turner Machine Co.

Pipe—Wood Stave:
Pacific Coast Pipe Co., Ltd.
Mine and Smelter Supply Co.

Piston Rock Drills:
Mussens, Limited.

Plate Work:
John Inglis Co., Ltd.

Pneumatic Tools:
Can. Ingersoll-Rand Co., Ltd.
Jones & Glassco.

Prospecting Mills and Machinery:
E. J. Longyear Company.
Standard Diamond Drill Co.
Mine & Smelter Supply Co.
Fraser & Chalmers of Canada, Ltd.

Pulleys, Shafting and Hangings:
Northern Canada Supply Co.

Pulverizers—Laboratory:
Mine & Smelter Supply Co.

Pumps—Boiler Feed:
Smart-Turner Machine Co.
Northern Canada Supply Co.
Canadian Ingersoll-Rand Co., Ltd.
Fraser & Chalmers of Canada, Ltd.

Pumps—Centrifugal:
Mussens, Limited.
Smart-Turner Machine Co.
M. Beatty & Sons.
Canadian Ingersoll-Rand Co., Ltd.
Mine & Smelter Supply Co.
Fraser & Chalmers of Canada, Ltd.

Pumps—Electric:

Pumps—Sand and Slime:
Mine & Smelter Supply Co.

Pumps—Pneumatic:
Smart-Turner Machine Co.
Sullivan Machinery Co.

Pumps—Steam:
Canadian Ingersoll-Rand Co., Ltd.
Mussens, Limited.
Northern Canada Supply Co.
Smart-Turner Machine Co.
R. T. Gilman & Co.
Fraser & Chalmers of Canada, Ltd.

Pumps—Turbine:
Smart-Turner Machine Co.
Canadian Ingersoll-Rand Co., Ltd.
Fraser & Chalmers Engineering Works.
Fraser & Chalmers of Canada, Ltd.

Pumps—Vacuum:
Smart-Turner Machine Co.

Quarrying Machinery:
Sullivan Machinery Co.
Canadian Ingersoll-Rand Co., Ltd.
Hadfields Ltd.

Rails:
Hadfields, Ltd.
R. T. Gilman & Co.

Roofing:
Northern Canada Supply Co.

Rope—Manilla and Jute:
Jones & Glassco.
Northern Canada Supply Co.
Allan, Whyte & Co.

Rope—Wire:
Allan, Whyte & Co.
Northern Canada Supply Co.

Rolls—Crushing:
Hadfields Ltd.

Samplers:
Fraser & Chalmers of Canada, Ltd.
C. L. Constant Co.
Ledoux & Co.
Milton Hersey Co.
Thos. Heyes & Son.
Mine & Smelter Supply Co.
Fraser & Chalmers of Canada, Ltd.

Screens:
Northern Canada Supply Co.
Hendrick Mfg. Co.
Hadfields Ltd.

Screens—Cross Pateent Flanged Lip:
Hendrick Mfg. Co.

Separators:
Smart-Turner Machine Co.

Sheet Lead:
Canada Metal Co., Ltd.

Sheets—Genuine Manganese Bronze:
Hendrick Mfg. Co.

Shovels—Steam:
M. Beatty & Sons.
R. T. Gilman & Co.

Smoke Stacks:
Hendrick Mfg. Co.
MacKinnon Steel Co., Ltd.
Marsh Engineering Works.

Special Machinery:
John Inglis Co., Ltd.

Steel Barrels:
Smart-Turner Machine Co.
Fraser & Chalmers of Canada, Ltd.

Steel Castings:
Canadian Brakeshoe Co., Ltd.
Hadfields Ltd.

Steel Drills:
Sullivan Machinery Co.
Northern Canada Supply Co.
Can. Ingersoll-Rand Co., Ltd.

Steel Drums:
Smart-Turner Machine Co.

Steel—Tool:
N. S. Steel & Coal Co.
Hadfields Ltd.

Stone Breakers:
Hadfields Ltd.
Fraser & Chalmers of Canada, Ltd.

Surveying Instruments:
C. L. Berger.

Tables—Concentrating:
Mine & Smelter Supply Co.
Fraser & Chalmers of Canada, Ltd.

Tanks (Wooden):
Gould, Shapley & Muir Co., Ltd.
Pacific Coast Pipe Co., Ltd.

Tanks—Steel:
Canadian Ingersoll Rand Co., Sherbrooke, Que.
Marsh Engineering Works.
MacKinnon Steel Co.
Fraser & Chalmers of Canada, Ltd.

Tanks—Cyanide, Etc.:
Hendrick Mfg. Co.
Pacific Coast Pipe Co., Ltd.
MacKinnon Steel Co.
Fraser & Chalmers of Canada, Ltd.

Tanks (water) and Steel Towers:
Gould, Shapley & Muir Co., Ltd.
MacKinnon Steel Co.

Tramway Points and Crossings:
Hadfields Ltd.

Transits:
C. L. Berger & Sons.

Transformers:
R. T. Gilman & Co.
Northern Electric Co., Ltd.,

Tubs:
Hadfields Ltd.

Welding Rod and Flux:
Prest-O-Lite Co. of Canada, Ltd.
Imperial Brass Mfg. Co.

Welding and Cutting, Oxy-Acetylene:
Prest-O-Lite Co. of Canada, Ltd.
Imperial Brass Mfg. Co.

Wheels and Axles:
Hadfields Ltd.

Winding Engines—Steam and Electric:
Can. Ingersoll-Rand Co., Ltd.
Marsh Engineering Works.
Fraser & Chalmers of Canada, Ltd.

Wire:
Canada Wire & Cable Co., Ltd.

Wire Cloth:
Northern Canada Supply Co.
Greening, B., Wire Co.

Wire (Bare and Insulated):
Standard Underground Cable Co., of Canada, Ltd.
Northern Electric Co., Ltd.,

Zinc Spelter:
Canada Metal Co., Ltd.
Hoyt Metal Co.

ALPHABETICAL INDEX TO ADVERTISERS

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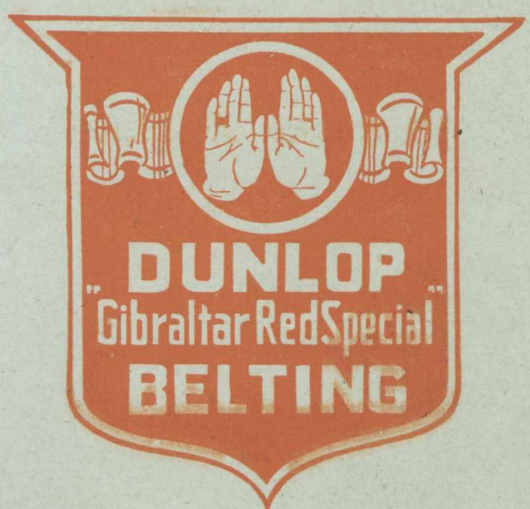

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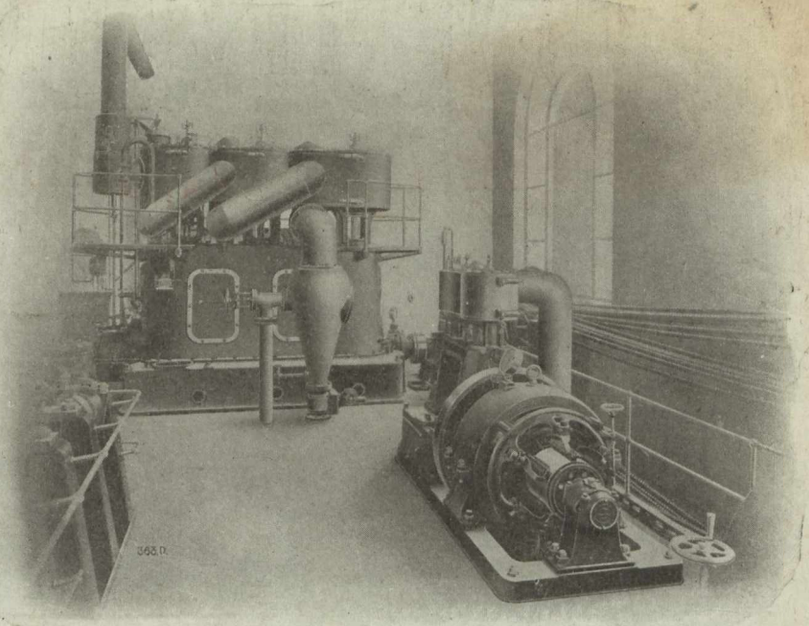

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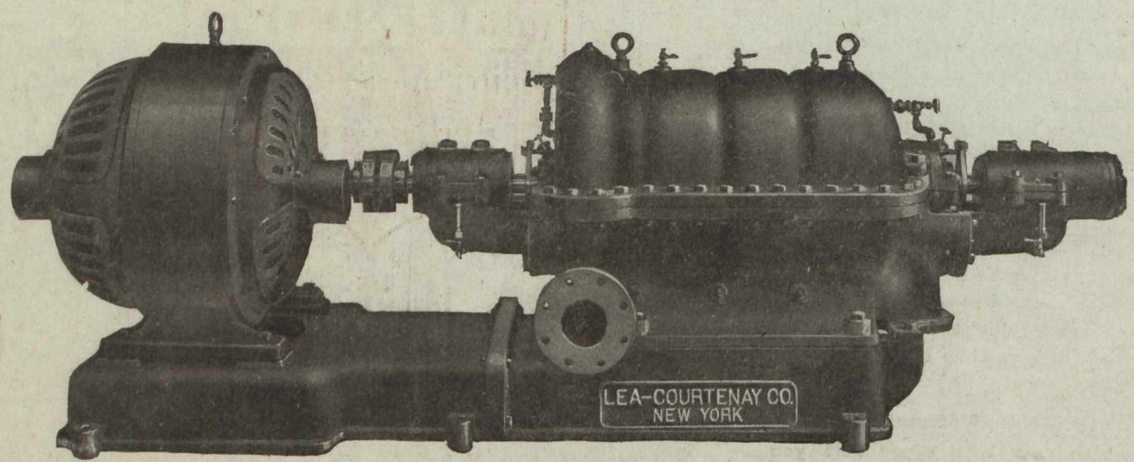

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