clear, having regard to the context, and the all important fact that the year 1886 was the time for the first renewal. It is further the most reasonable construction with reference to the contract, and the rights with which it deals. It follows that the Government has not, as a matter of contract, the right to have at the present time a legislative revision of the royalty.

Yours truly,

(Signed) DRYSDALE, NEWCOMBE & MCINNES."

H. S. POOLE, ESQ.,
Agent Acadia Coal Co., Stellarton, N.S.

"I approve of and concur in the above opinion,
H. McD. HENRY."

Also concurred in by B. G. GRAY.

Finally the Hon. Dr. Parker drew attention to the section which required the extra royalty to be paid, as for February 23rd, to which Mr. Poole replied :—

That the lessees unhesitatingly regarded this section as retroactive ; they had sent in their quarterly returns at the end of March as required by previous legislation, and the section in question did not show how a correction was to be made.

Iron Smelting in Toronto—The Petition of the Ontario Iron and Steel Company.

The petition of the Ontario Iron and Steel Co., by their board of provisional directors, humbly sheweth :—

1. That a petition to your Government for the incorporation of a company to be called "The Ontario Iron and Steel Company, limited," under the Ontario Joint Stock Companies Patent Act, has been signed by the following gentlemen, viz.: Elias Rogers, H. S. Howland Robert Jaffray, A. S. Irving, S. H. Janes, H. N. Baird, J. K. Kerr, W. D. Matthews, John I. Davidson, H. L. Hime, T. D. Ledyard, provisional directors, and J. Kerr Fisken, W. I. Mackenzie, J. W. Langmuir, Wm. Ince, Samuel Beatty, A. M. Walton, E. W. Brown, John McArce, C.E., Clarence J. McCuaig, Joseph Blakely, W. M. Stark, Harton Walker, Lewis Lukes, Fred J. Stewart, W. Hope. Alex. Rankin, W. H. Howland, S. Shaw, J. Enoch Thompson, S. Frank Wilson, H. Wyatt, Robert Hodman, John T. Moore, James Baird, P. Lang James, C.E., A. C. Macdonell, Edward Moore, L. O. P. Genereaux, James McGee, J. L. Scarth, Scott & Walmsley, C. J. Smith, R. H. Bowes, P. G. Close, Robert Beatty, O. A Howland, C. S. Gzowski, jun., C. McMichael, C. Gordon Richardson ; W. A. Allan, Ottawa, Ont.; Geo. A. Cox, John Leys, Herbert A. E. Kent, James Hedley, Horace Thorne.

2. That although it is believed that promising deposits of iron ore suitable to make pig iron and steel exist in the Province of Ontario, there is at present no mine producing iron ore in Ontario, and the extent or value of such deposits is as yet unknown, nor is there any blast furnace in operation in the Province.

3. That ores, apparently of excellent quality, have been found in Ontario, some of which, being exceptionally free from phosphorus and other impurities, are suited to make the finest steel, but further practical tests require to be made to prove their quality, quantity and extent.

4. Your petitioners humbly present that, in order to obtain sufficient capital to erect and operate a furnace, it is necessary to demonstrate beyond a doubt that iron ores suitable to make pig iron and steel can be mined at accessible points in Ontario in sufficient quantities to supply such furnace.

5. That capitalists are unwilling to assume the whole risk of pioneering this enterprise, which, like all experiments, is attended with a considerable degree of uncertainty ; therefore it will be necessary to obtain some financial aid from your Government to assist in the erection of such a furnace, and also a bonus upon the output thereof.

6. That foreign capitalists will not invest until it can be demonstrated that iron can be smelted profitably.

7. That a furnace erected in Ontario which will produce pig iron from our ores will be the most practical method of developing and utilising the mineral resources of our Province and of determining the value of the mineral lands still held by the Government, which will benefit in a greater degree from the success of the enterprise than any private individual.

8. That a company, intending to erect and operate a modern furnace capable of producing one hundred (100) tons of pig iron daily, will require a paid up capital of at least five hundred thousand dollars.

9. That the establishing of such a furnace will lead to other industries incident to the multifarious applications of iron, steel and nickel-steel, thus retaining in our Province an immense amount of money which is now expended in importing the products of iron from foreign countries, and furnishing employment for hundreds of thousands of artizans.

The extraordinary growth of the population of the United States, which is largely due to the development of mining industries, furnishes an illustration of the benefits which will accrue to Canada from the same source.

Your petitioners therefore pray :—

1 That the Government of Ontario should make a suitable appropriation through the Bureau of Mines to test and prove by diamond drill borings, or such other means as the Government may deem necessary, some of the most accessible deposits of iron ore in Ontario, showing their extent and value ; and such tests shall be made under such regulations and restrictions as the Government may deem expedient.

2 That an Act should be passed by the Legislative Assembly authorising the Government to give a bonus of two dollars ($2) per ton on the output of a modern furnace, which shall be of not less capacity than one hundred (100) tons per day, erected at such place in Ontario and under such conditions by such company as shall be approved of by the Government, such bonus to be given for ten years from the time such furnace shall commence to produce pig iron, and also to aid, in such other manner as your Government may deem expedient, any company which will undertake forthwith the erection and operation of a modern furnace to smelt Ontario ores.

In the event of such prayers being granted to the satisfaction of your petitioners, your petitioners propose immediately to complete the organization of said company and to proceed with the erection of a furnace capable of smelting 100 to 150 tons of pig iron daily.

It is claimed by the promoters of the project set forth above that the requisite ores can be found in great plenty within about 115 miles of Toronto ; and in a pamphlet recently issued on the subject, in which the undeveloped mineral centres in Ontario are discussed in detail, it is shown by the analysis of experts that the ores in almost every case are of unusually high grade, being particularly free from phosphorus and sulphur. The promoters have strong hopes that the time is not remote when a blast furnace will be established in Toronto and a vastly increased product of Ontario ores smelted right here. The Belmont Bessemer Ore Co., of New York, which last year leased the Belmont iron mine, about 110 miles east of Toronto, are building a railway nine miles long from the mine to the Central Ontario Railway, and state that as soon as this piece of road is completed, which will be during the summer, they intend to put on a force of 500 men at the mine and make large shipments of ore. A deputation will shortly wait on the Government and present fully the views of the promoters.

Nickel-Steel.

This alloy was first described in a paper read by Mr. J. Riley before the Iron and Steel Institute. Since then the alloy has assumed great importance, owing to the results obtained in the armour-plate tests at Annapolis. In these tests nickel-steel was shown to be superior to ordinary steel for armour-plates, and also to compound armour. Mr. Garrison observes that the United States authorities appear to have considered these results as conclusive and final, and adopted at once nickel-steel as the sole material for the armour-plates of the new United States navy. This, the author adds, appears a questionable and short-sighted policy, in view of some of the remarkable results which have been obtained with other and cheaper steel alloys.

The author next refers to the method of manufacture patented by the Creusot Works in 1889, which consisted in the fusion of nickel scrap and pig iron in a reverberatory furnace under a layer of anthracite, for the purpose of avoiding oxidation. The resulting metal is used as an addition to metal poor in nickel.

What is known as "Marbeau's nickelo-spiegel" is made by a process which consists in the simultaneous reduction of the ores of nickel, iron and manganese. According to Riley, nickel-steel can be made in any good open-hearth furnace working at a fairly good heat, and no special arrangements are required for casting. If the charge is properly worked, scarcely any of the nickel will pass into the slag. No particular care either is required when reheating the ingots for hammering or rolling. If the steel has been well made, and it is of proper composition, it will hammer or roll well whether it contains little or much nickel.

Steels rich in nickel are practically non-corrodible, and those poor in nickel are much better than other steels in this respect, the whole series of steels, up to 50 per cent. of nickel, taking, according to Riley, a good polish and finish. The alloys up to 5 per cent. of nickel may be machined with moderate ease ; beyond that percentage they are more difficult to work. Mr. J. F. Hall has stated that he has made nickel-steel with a tensile strength of 97 tons per square inch, and with an elongation of 7 per cent., and Mr. G. J. Snelus has pointed out that some samples of nickel-steel appear to extend uniformly over their whole length, in the manner, that is, of the manganese steel, to which reference has already been made. Some of the nickel steel recently made by Messrs. Carnegie, Phipps & Co. for the United States Navy department gave the following results :—

	I.	II.
Elastic limit, lbs. per square inch	59,000	60,000
Ultimate tensile strength, lbs. per square inch	100,000	102,000
Elongation, per cent	15 5	15 5
Reduction of area, per cent	29 5	26 5

The test-pieces were cut from ¾ inch plate, and the metal contained 0·2 per cent of nickel.

Howe states that the hardness of nickel-steel depends on the proportion of nickel and carbon jointly, nickel increasing the hardness up to a certain percentage, and the hardness again diminishing as this percentage of nickel is exceeded. Steel containing 0·9 per cent. of carbon and 2 per cent. of nickel cannot be machined. The metal forges easily whether it contains little or much manganese. The presence of manganese in nickel-steel is most important if the conditions of treatment are to be successful. Salt water does not corrode nickel-steel as readily as ordinary steel. At very low temperatures nickel-steel shows considerable expansion.

The electro-conductivity of nickel-steel is very low, the resistence being very high. Hopkinson has shown that nickel-steel containing less than 5 per cent. of nickel is decidedly more magnetisable than wrought iron, particularly for high inductions. On the other hand, when containing 25 per cent. of nickel, it is non-magnetic at ordinary temperatures; but if cooled to 20° C., it becomes strongly magnetic, and remains so, when it again returns to normal temperature. If, finally, it is heated until it reaches its critical temperature, 580° C., it becomes again non-magnetic, and remains so until cooled once again to the temperature above mentioned,—20° C.

Mr. Garrison next proceeds to a consideration of the results obtained with the trials of armour-plates both at Annapolis, United States, and at Ochta, near St Petersburgh. A reproduction is given of a photograph of the plates used at Annapolis, and taken after the trial. The great advantage of the nickel-steel plate over the ordinary steel plate, lay in its absolute freedom from cracks, though it showed slightly less resistance to penetration.

Canadian Platinum.

BY J. T. DONALD, M.A.

Under this title the writer read a paper before the meeting of the General Mining Association of the Province of Quebec, in January last. This paper was published in the REVIEW and reproduced in *The Engineering and Mining Journal*. Owing to the wide publicity thus given to it the writer has received further information on the subject, the most interesting portion of which refers to sperrylite, the platinum mineral of the Sudbury district.

In the paper above referred to it was stated that "So far as can be learned no effort has yet been made to utilize sperrylite as a source of platinum." It now appears that this mineral has been used as a source of commercial platinum. Mr. Charles F. Croselmere, of Newark, N.J., writes me that last year Messrs. Eimer & Amend, of New York, furnished him with a quantity of sperrylite, and that he extracted the platinum from it and returned it to them in the form of wire.

It would thus appear that should sperrylite be found in sufficient quantity its contained arsenic will not be a barrier to its use as a source of platinum.

The Practical Working of Coal Cutting Machines.

At the last meeting of the Manchester Geological Society, Mr. Richard Sutcliffe read a paper on the "Practical Working of Coal Cutting Machines," in the course of which he said that he quite agreed with Mr. Walker, of the Wharncliffe Silkstone Colliery, who was the largest user of coal cutting machines in England, when he said that actual experience points to 100 yards per 8 hours shift as being a satisfactory performance with coal cutting machines when the ordinary conditions of work in a coal face were in force. The writer had found that the most convenient machine, and a better one for all round work than any, was one having a cylinder at each end, with the cutting wheel in or near the middle. By this arrangement a comparatively light machine would keep the rails without extra fittings in working, and was capable of cutting either coal or fire clay, and the power could be varied to suit the material to be cut, by making it to run from 3 to 1, to 12 to 1 between the crank shaft and cutting disc, and its total length need not exceed 7 feet. To get anything like good results from the best machines, when cutting 3 feet deep or more, the debris should be kept removed, as the fore or cutting portion of the wheel brought it from the groove or cut, otherwise it would be taken back in part by the back portion of the wheel, until it becomes jammed. As the attendant might have many things to look after, as well as the removal of this debris, it was often neglected, and therefore much of the power wasted. This fact must suggest to the contemplative mind the desirability of making a coal cutting machine capable of dealing with its refuse automatically so as to prevent its return into the groove. The fixing of the chisels or cutters in the periphery of the rotating disc had a great influence on the working of a machine in cutting hard material. The proper way was to fix the cutters radial in the disc and hook them near their edges sufficiently forward to cut, and then as a cutter shank wore loose it got less instead of more work to do. Even the sharpening of the cutters had an important effect on the working of a machine, and a set of 20 was sometimes blunted in as low as 10 yards, and sometimes would cut as much as 1000 yards, even when properly edged and tempered, according to the material to be cut. If the holing was fairly free foom iron pyrites, or such like impurities, the set of cutters should do from 50 to 100 when each cutter was doing its share in either coal or fireclay. A good coal cutting machine should be strong and simple in construction, with few working parts, it should have sufficient base and weight to keep on the rails when working it without extra fittings, it should be able to cut either way, and be easily reversed, and should automatically remove the debris so as to prevent it getting into the groove, and it should not exceed 3 feet in width nor 7 feet in length. Where coal had to be blown down after being cut it was best to make a deep holing, but when it fell from gravitation, it was sometimes advisable to take a lighter or shallow cut which enabled the machine to cut a greater distance, and the fillers to fill out a greater length, each in the shaft, allowing the gates to be farther apart, but whether the cuts where deep or shallow it was undesirable to dress