

ation as exhibited by the "Report of the Zinc Commission" above quoted from; narrated briefly what had been done by the Canada Zinc Co., at Nelson B. C., in experimenting in the electric smelting of zinc ores; stated that monetary assistance was required to the extent of \$20,000 to \$25,000 to make certain changes in the company's plant, and to operate it. . . . "to complete the experiments and demonstrate the commercial practicability of smelting the zinc ores with electricity." A proposal was made "to divert \$50,000 of the unearned portion of the lead bounty fund to be used to complete the experiments in smelting zinc ores by the electrothermic process," and eventually there was adopted the recommendation of Dr. Haanel, Director of Mines, that such an amount be placed at the disposal of the Mines Branch of the Department of Mines, to be employed:

"1st. For the investigation on a commercial scale of the processes above enumerated, namely, (1) the De Laval process, in operation at Trollhatten, Sweden; (2) the improved process of De Laval, plant for the demonstration of which was then being erected in England; (3) the Cote-Pierron process, recently invented in France; (4) the bisulphite process, plant for the demonstration of which on a commercial scale was then nearly completed in Wales—or of any other process.

"2nd. For the setting up and operating of an experimental plant at Nelson, B.C., to test that one of the processes reported upon, which promises commercial success in treating the zinc ores of British Columbia."

In June, 1910, Mr. W. R. Ingalls was authorized "to inaugurate and carry through an investigation for the discovery or development of a method for the economic treatment of the mixed zinc sulphide ores of Canada in the production of metallic zinc of a marketable zinc product." Dr. Haanel wrote to Mr. Ingalls:

"The following recommendations made by you regarding the conduct of the investigation are approved, and are to be adhered to:

"1st. That you devote personal attention to all schemes that may be presented to the office in the interest of the problem to be solved.

"2nd. That it is specially agreed, that no invention that may result from this investigation be patented in the Dominion of Canada, but that rights may be reserved as to other countries.

"3rd. That all possible work in connection with this investigation be done in Canada.

"4th. That such small-scale experiments as would be most conveniently done by you outside of Canada be permitted to be done in such place as you may direct."

Progress reports of Mr. Ingalls were printed in the "Summary Report" of the Mines Branch for 1911 (pp. 14-15) and 1912 (pp. 8-10), and references were made to the work done at McGill University laboratory in connection with this investigation in a paper presented by Mr. Ingalls at the 1912 annual meeting of the Canadian Mining Institute (see Transactions of C.M.I., Vol. XV., 1912, pp. 101-114). The Mines Branch "Summary Report" for 1913 has not yet been published, but the position to-day in connection with the investigations that have been going on since 1910 is indicated in the following account of an address given on April 18, last, at Nelson, British Columbia, by Mr. Ingalls, before the members of the local Board of Trade and others interested. As reported in the Nelson "Daily News," Mr. Ingalls said:

The problem of treating mixed ores containing more or less zinc has been one of the most baffling of metallurgical problems of the last 60 years or more, and it is one that has remained without general solution. Much progress has been made in mechanical separation and in simple zinc smelting, which have rendered profitable ores that only 10 years ago were not so. There remain many kinds of zinc ores which are still unprofitable, because of their remoteness from market, adverse conditions of production, or complex character and low grade, and, unfortunately, they are the kinds possessed by many mine owners, including some of those in Kootenay district. With regard to these, the problem is not simply how can they be treated, but how can they be rated profitably, which means the discovery of some process cheaper than any known to metallurgists to-day.

When the Canada Department of Mines commenced an investigation with the object of finding such a process, it was not with the idea that in electric smelting alone would a solution be found. First there was reviewed all recent work in the general metallurgical field that we learned of. Besides making our own studies we considered the processes that were offered by many inventors, but were unable to find anything that gave even reasonable promise. Without abandoning consideration of other matters, we turned our attention to electric smelting, which is a subject of unknown possibilities, attractive because unknown, and the surface indications of which looked good. We were of course aware that electric smelting had for a number of years actually been done in Sweden and Norway; but we were also aware that it had not been successful, neither metallurgically nor commercially. If reference be made to the "Report of the Commission on the Investigation of the Zinc Resources of British Columbia," published by the Department of Mines, in 1906, with which report I had much to do, it will be found that information relative to electrothermic smelting of zinc ore was included. We were aware also that many persons other than those mentioned in the report, in America as well as in Europe had experimented in electric smelting, but up to that time none had been successful. It was therefore a fair field for study.

About two years ago a summary of a report upon electric smelting in Sweden and Norway was published in some of the technical journals, and I was asked through the Department of Mines why the Scandinavian process could not be transplanted to British Columbia. Having in possession the full text of the report, including all the figures given, I stated that costs in British Columbia for electric power, labor and other things were from two and one-half to three times higher than corresponding costs in Sweden and Norway. Under these conditions electric smelting in British Columbia would be out of the question.

Since that time the production of electric spelter in Scandinavia has attained considerable proportions, amounting to some thousands of tons per annum. While this spelter is obtained partly from smelting zinc dross and zinc junk generally, some of it is the product of ore smelting. However, I may mention as a recent substantiation of my opinion relative to the suggested introduction of this process into British Columbia that the directors of the principal Scandinavian company engaged in electric zinc smelting reported officially last November that up to August, 1913, they had not been able to smelt at a profit; they were hopeful,