THE EDUCATION OF MINING ENGINEERS IN THE UNITED STATES AND NEW ZEALAND.

Prof. Howard Eckseldt, of Lehigh University, South Bethlehem, Pa., recently contributed an interesting paper on the subject of "Mining Education in the United States." In the course of his remarks he stated that forty, and even a less number of years ago, the general public opinion was against engineering education, and even to-day one occasionally meets a manager or superintendent who boasts that no college men are to be found in his employ; but, happily, this state of affairs is now passing away. The length of the course of study in most of the mining schools is about four years, though, in some cases, a five years' course is still maintained. There is, however, a strong tendency towards shortening the length of the college year, at many schools at present the terms being limited to thirty-two weeks. The present average age at which mining students enter colleges is about 18½ years.

In respect to instruction in mathematics, the present tendency is to do away in a large measure with the old method of teaching from text books, with their series of rules and abstract problems, and to substitute practical problems in everyday engineering. The importance of physics has not been realized by some engineers, but the recent advances in electrical research have brought this subject into greater prominence. The study of physics involves a considerable amount of laboratory work, but there exists a tendency to carry such work too far when the student begins to do it mechanically, or does it simply with a view of completing the work required. A course in specifications, estimates and contracts is included in the courses of construction, although some engineering schools omit the study of the English language from their curriculum. Prof. Eckseldt very sensibly remarks that one of the first requirements of an engineer is his ability to express himself well and grammatically, and he therefore deplores the fact that this subject is ignored in the way it is. The courses, of course, include a thorough instruction in chemistry, surveying in all its branches, geology, crystallography, mineralogy and metallurgy.

Prof. Jas. Park, director of the Otago University School of Mines, New Zealand, remarks that the course of study prescribed in a mining school, while in every case based on first principles, commonly reflects the dominant mining industry in the place or district. In New Zealand, technical education in connection with mining is provided as follows:—(1) By schools of mines situated in the chief mining centres; and (2) by a University Mining School, carried on as a faculty of Otago University, one of the affiliated colleges of the University of New Zealand. The goldfield mining schools provide for the instruction of underground mine managers, battery managers, and assayers, the university mining school for the training of mining engineers, mining geologists, mine and battery managers, mine surveyors, and metallurgical chemists.

There are six primary mining schools. Four are situated in the Auckland goldfields, at Thames, Waihi, Karanjahake, and Coromandel; and two on the west coast of South Island, at Reefton and Westport, councils elected by the local subscribers. The classes for the convenience of the students (chiefly miners and battery workmen) are mostly conducted during the evening.

The Otago University Mining School occupies a position in relation to mining almost identical with that of the mining academies of Germany. It grants associate diplomas in mining, metallurgy, and geology, and prepares students for the B.Sc. degrees in mining and metallurgy. All the subjects of instruction for the associate diploma are taught up to the B.Sc. standard. The associate course nominally covers three years, but in fact never takes less than four. The session consists of two terms of three months each, with a recess of three weeks between the terms. The long summer vacation of five months is occupied by students in practical mining, metallurgical, geological, or engineering work.

The dominant industry in New Zealand and the Commonwealth of Australia is gold-mining, and as nine-tenths of our graduates engage in that pursuit, the course of study is drawn up so as to encourage specialization in that direction. In all the associate courses, the first two years are devoted to pure mathematics, applied mathematics, physics, mechanics, general geology, mineralogy, petrography, and geometrical drawing. The third and fourth years are spent in advanced laboratory work and lectures, field practice in land, mine and engineering surveying, mechanical drawing, with special reference to mining plant and appliances, etc. The metallurgical course deals prominently with the mechanical recovery of gold from gravels by hydraulicing, elevating and dredging; the crushing, pulverizing, and concentration of ores; the treatment of gold ores and silver ores by amalgamation, chlorination, cyaniding, etc.; and with the construction, erection and working of the machines, plant and appliances used in these processes. Colonial experience has shown that an exact knowledge of land, mine and engineering surveying is one of the most necessary and most valuable qualifications of a mining graduate; and for this reason candidates for the associate diploma in each division of the mining school are required to take a two years' course in surveying.

Students who have passed the class examinations in all the branches of study prescribed for any division are entitled, without further examination, to the diploma of that division.

THE USE OF COAL FOR METALLURGICAL PURPOSES.

Mr. J. Stevens Jeans, who for twenty-seven years was Secretary of the British Iron Trade Association, and for seventeen years Secretary of the Iron and Steel Institute, recently gave evidence before the Royal Commission on Coal Supplies in Great Britain, on the use of coal for metallurgical purposes. The evidence, in many respects makes interesting reading. He said:

The economy in the consumption of fuel was one of the greatest importance to the iron industry, which was vitally affected by the supply and cost of suitable fuel. The iron trade in its collective capacity had for many years past been the largest individual source of coal consumption in Great Britain. At the time when the report of the Argyll Coal Commission was made, in 1871, the total annual output of British coal was computed at 117,000,000 tons. Of that output, not less than 32,000,000 tons were consumed in the iron and steel industries, being 30 per cent. of the total output. Since then the relative consumption of coal in the iron trade had fallen off, partly in consequence of the vast increase of the relative importance of coal exports, and partly because steel had very largely taken the place of wrought iron, with a much reduced consumption of coal per unit of output. The average consumption of coal per ton of finished iron in the palmy days of the finished iron industry was about 3 tons (it was taken by the Argyll Commission at 3 tons 7 cwt.), whereas the average consumption of coal in the steel industry per ton of ingots was not more than, say, 12 cwt., with some addition to the consumption for finished materials. Probably an average of 15 cwt. would represent the coal consumption per ton of plates or rails throughout.

The best record for any single year had been two tons of coal per ton of pig iron produced for the country as a whole. Since 1873, which was memorable as the year of the great coal famine (when the cost of fuel reached a level not attained before or since), the average consumption of coal in the pig iron industry per ton of pig had been reduced by just about half a ton, which meant about 4,000,000 tons a year on our total iron output. Theoretically, this consumption should be still materially reduced, not only by bringing to a lower level the absolute quantity of coal used to smelt a ton of pig iron, but also by getting a greater useful effect out of the coal used through the blast-furnace gases, in raising heat for other purposes, and thus displacing fuel that would otherwise be needed for power requirements. Much has been done in the iron trade of late years to bring about economy of fuel, and there were very few iron or steel works that had not made experiments of their own, designed to reduce the fuel bill. There were those who did not think that in daily practice much increase of economy was possible in either pig iron or steelmaking, but this was a problem to which no one could provide a reliable solution in the light of past experience, except upon the ground that the possible margin of economy had been greatly reduced.

THE ONTARIO SCHOOL OF PRACTICAL SCIENCE.

A new building has recently been erected for these schools, where, in future, instruction in chemistry and mining will be given. On the lower floor are situated the electro-chemical laboratories, which are thoroughly well equipped with electric furnaces and other appliances, in addition to general laboratories. Space is also set aside here for a museum, while there is also an excellent lecture room. In the upper floors are the Mineralogical and Geological Departments. The Mining Department is now being equipped with machinery for experimental work, including a 15 h.p. motor, a 5 stamp battery Challenge ore feeder, amalgamating plates, and a Wilfley concentrator. There is also a Hadfield gyrating crusher and a set of Hamilton rolls 16 x 12 inches.

THE MARKET FOR PORTLAND CEMENT.

An increase of twenty-eight per cent. is shown in the sale of Portland Cement in Canada, as compared with last year's returns. On the other hand, a decided decrease in the use of natural cement is reported. In 1904, Canada imported three-quarters of a million barrels of Portland cement, and these imports are certain to steadily grow less with the development of the local industry. The Dominion has large resources of raw material for the manufacture of cement well accessible to the markets, and within the last year two important works at least have been established.

THE HUNTINGTON-HEBERLEIN PROCESS.

Experiments are now being made with the Heberlein process in connection with the smelting of galena ores, at the Sullivan smelter, Marysville, B.C. The following note, therefore, on the process, which was published in the Engineering and Mining Journal, of June 15th, will be of local interest:—

In the Huntington-Heberlein process, galena is mixed with quicklime, the whole raised to a temperature of 700 deg. C. (1,300 deg. F.) and air is blown in, whereby the lead sulphide is changed to the oxide and is fused by the heat of the reaction. In the similar Carmichael-Bradford process, the lead sulphide is mixed with calcined gypsum, and the blowing-in of air is performed at a somewhat lower temperature (900 deg. C.), the result being practically identical with that of the Huntington-Heberlein process, though the intermediate reactions, of course, may be slightly different.

ELECTRIC FURNACE CONSTRUCTION.

An interesting example of the introduction of electro-chemical methods into old industries is offered in the manufacture of pure artificial corundum. The Norton Emery Wheel Co., an old-established firm, with its main works at Worcester, Mass., purchased, several years ago, the patent of C. B. Jacobs for fusing bauxite in an electric furnace, thereby producing a pure artificial corundum. The fused charge is allowed to cool slowly, when it acquires the hardness of corundum and the toughness of emery, and is suitable for wheels, stones, and all the various uses of an abrasive. The process is worked in a plant of the Norton Emery Wheel Co., at Niagara Falls. A rather extended and interesting exhibit at the St. Louis Exposition showed that the process is in a state of very healthy development.

A patent granted on November 22nd, to A. C. Higgins, general manager of the Norton Emery Wheel Co., is evidently intended for the special purpose of making artificial corundum, or, "alundum"; but is of more general interest since it shows how, by judicious furnace design, any special refractory lining with its troubles may be avoided. His furnace consists essentially of an iron shell forming the outside of the crucible with suitable means for applying water on the outside of the shell to all its parts in a continuously flowing stream or blanket, and conducting it away at the base. The portion of the charge in immediate contact with the cool shell solidifies and thus forms a lining for the rest of the molten mass. The lining consists, therefore, of solid alundum. Similar linings have been used with success in other electric furnace industries.—Elec. World.