MINING ENGINEERING

By PROF. CHARLES E. LOCKE.

First of all, let us consider the various openings for a young man in the profession of mining engineering. He may have to deal strictly with mines, their investigation and working; he may have to do with the ore dressing side, which covers the separation of the valuable minerals from the waste; or he may go into metallurgical lines where he extracts the metal or useful material in such form that it is ready for the market.

In small mines a young man usually starts in as an assayer or surveyor, and works up to the position of superintendent or general manager. Such mines are often in remote places, in many cases their life is short, and, although progress is rapid, the frequency of change of location may become a serious drawback.

In large mines the whole operation is generally on a more permanent basis, so that progress, although it is along the same path as in small mines, is apt to be slower and surer. Such mines often have the advantage of attracting larger communities.

Coal mining is in a class by itself. These mines are generally large and work here partakes of the nature of manufacturing industries where a young man can start at the bottom and work up.

Metallurgical works are, as a rule, large and permanent and located near centers. A young engineer starts in a subordinate position, often as chemist. Iron and steel metallurgy requires enormous plants and involves considerable mechanical as well as metallurgical work. It approaches the nearest of anything in the mining line to a permanent manufacturing industry.

The foregoing are the main lines that are open. Others are government work, especially on the geological survey, mining expert work which should be attempted only after years of practical experience, the manufacturing of mining machinery, and so the list can go on indefinitely. A study of a list of graduates of a mining engineering school will show that the men receive such a broad training that their pursuits become many and varied.

In preparing to enter this field,—and this applies to all engineering professions,—honesty, courage, perseverance, firmness, self control, a knowledge of, and an ability to handle men, are absolutely necessary. Honesty is placed first because the peculiar nature of mining has made it such a field for dishonest schemes in the past. The cupidity and gullibility of man, coupled with the uncertainty of the extent and richness of the earth's treasures, are the chief causes of this. Happily, conditions are improving and it is to be hoped that the day when all mining enterprises will be legitimate, is not far distant.

The technical training for this profession is broad rather than highly specialized. The mining engineer must not only be a master of his subject, but he must combine with it a knowledge of other engineering professions. It may be well to consider the individual subjects and their relation to the work.

Mathematics, physics, and chemistry are the fundamental studies. Mathematics and physics are necessary in all engineering work. The former is required for all sorts of calculations and also gives the training which leads to exactness. The latter involves a knowledge of all natural laws without which an engineer would be hopelessly at sea. Chemistry, including fire chemistry or assaying, is necessary for the determination of the values in an ore or in the products of a metallurgical operation. In fact it may be said that metallurgy is dependent upon chemistry.

Mineralogy, or the knowledge of minerals, is essential in prospecting for valuable deposits and also in solving the problem of the proper treatment of an ore to recover the values from it.

Geology, or the knowledge of the earth's structure, is likewise of import-

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ance in prospecting. It comes into use also in actual mining work in deciding how to remove the ore to the best advantage.

Civil, mechanical, electrical, and hydraulic engineering are useful because the mining engineer in the majority of cases is located in a remote place where he cannot call in a specialist in these subjects without great expense and loss of time. He must understand mechanical engineering in order to superintend his construction work; civil engineering for his surface surveying and also for the surveying and mapping of underground workings; electrical engineering for the installation of modern power transmission and for the operation of electro-metallurgical processes; and hydraulic engineering for the best utilization of natural water power.

The consideration of academic studies—languages, history, and English—has been left until the last. Undoubtedly some very successful engineers have been able to get along without them, but their lack is a serious handicap to a man. One can readily understand that a manager writing reports or dealing with his superiors will be greatly aided by a good command of the English language. Similarly a commercial training would be very valuable in the keeping of accounts, buying and selling, etc.

It is claimed by some that four years at a college giving good scientific trainings, supplemented by two years at a technical school, furnishes the best preparation for a mining engineer. The former not only imparts a general education and broadness of view, but also in the majority of cases provides contcat with his fellows, which is apt to be missed in the highly specialized work of the latter.

One may ask how it is possible to turn out a mining engineer who shall know all about civil, electrical, mechanical, and hydraulic engineering in the same time that is takes to train a civil, electrical, or mechanical engineer. The answer is that the student is given the broad principles and not the specialized work of all these lines.

The school education is only part of the training of a mining engineer. It must be supplemented by a course in practical work, an apprenticeship, so to speak, where he will gain a knowledge of details and of men and learn to adapt his theory to practical work. This practical work may either precede or follow the theoretical study, but the balance of opinion seems to be towards the latter sequence. Sometimes the two may be sandwiched together, and this course is to be commended. The question of how long or how varied this practical experience shall be will depend upon the individual case, and it is impossible to make any definite statement here.

The question as to which line offers the best chances of success is not capable of answer. It is the opinion of the writer that opportunities are good in all lines and it is not the training that a man receives, nor the line of work which he chooses which guarantees success, but rather the man himself. The best man comes to the front everywhere.

The salary which a technical graduate may expect to receive, is by no means fixed and, viewed in the light of what has been said previously regarding the necessity of practical experience, it will be seen that salary should not cut too much figure in choosing the line that one expects to follow. In a general way the salary varies in inverse ratio to the probable life of the position. At the present time metallurgical works offer beginners from $40 to $60 per month, while mining jobs will pay from $50 to $75 per month at the start. A good man, however, will soon get a raise from these figures and will continue up the ladder until he finds himself at the top among the mining and metallurgical experts, and the presidents, general managers, and superintendents, whose yearly salaries run into the tens of thousands.

MIN. ENG. SOCIETY

By ROBT. S. BREYER 1910.

The objects of this society as set forth in its constitution are to awaken and maintain an active interest in the study of Mining Engineering among its members and to aid generally in their intellectual advancement and improvement.

With these objects in view and with the realization that there existed an urgent need of such a society, a committee of three was appointed in the fall of 1897 by the classes of '98, '99 and '00 to look into the formation of a society and to draw up a constitution. This they did and the constitution was finally ratified. The officers elected, who had previously composed the committee, were: President, Arthur L. Hamilton '00, at present a mining engineer at Fairbanks, Alaska; vice president and treasurer, Stanley Motch of the Motch & Merryweather Machinery Co., Cleveland, O.; secretary, Edward E. Bugbee, at present assistant professor of mining and metallurgy in the department.

At this time the society was an entirely new venture, but from the start it was shown that a long felt necessity had been met, namely the furnishing of means whereby the undergraduates were put in closer touch with one another and with men engaged in actual practice.

It is worthy of note that the first speaker was the prominent mining engineer, Bradford H. Locke, III., '72, who was more than well qualified from actual experience to "warn the future mining engineers from the Institute of the many pitfalls that meet the mining engineer in the way of mismanagement, temptations to dishonesty, mine salting, etc., when he goes out into the world to begin the battle of life"; and that the absolute essential and therefore axiomatic qualities of a mining engineer are that he must be both honest and competent, points which have been brought out from time to time by engineers who have addressed the undergraduates.

The present society has a total membership of ninety-three (93) active members, drawn from the three upper classes. It will be noticed that the society has departed from the usual custom of admitting only juniors and seniors to membership in a student professional society. However, this step of admitting sophomores was not taken with the idea of increasing the membership, but with the idea that the advantages of the society should be extended to all those intimately connected with the department. And, furthermore, it has been found of advantage to admit the sophomores, since by doing so a closer relation between them and the department is set up, and again the knowledge gained in the meetings, of the practical side of mining and metallurgy proves of great value in the first summer position for a certain amount of practical experience is now urged and may become made a requirement of the department in the near future.

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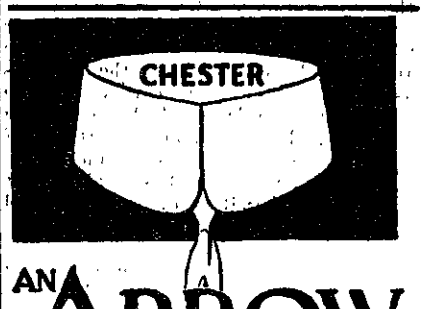

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