

in order to become thoroughly familiar with all details and connections, so that one may know how to arrange, to the best advantage, the details of his design. The work of these years is, of course, very hard and tedious, and one becomes eager to get into the higher positions of designing, estimating, inspecting, and testing. During this interval, however, he becomes a good draughtsman, and at the same time has no inconsiderable experience in the other lines.

In view of the fact that each engineer has his own methods and each company its own apparatus and equipments, I think it is advisable for the younger engineer to change employers at intervals in order to have the advantage of the methods and equipage of each. This may be slightly detrimental from a financial point of view at first, but the first cost is made up for in the end.

CIVIL ENGINEERING (INCLUDING MINING ENGINEERING).

BY H. E. T. HAULTAIN.

* * * * *

All the subjects included in the departments of "Civil Engineering (including Mining Engineering)" and "Mechanical and Electrical Engineering" *ought* to be studied by the mining engineer, and much of the departments of "Architecture" and "Analytical" and applied "Chemistry," and of course all of "Assaying and Mining Geology," besides the subjects ore-winning and ore-treating, the latter of which is an especially large and heavy subject.

Let us consider what is expected of the mining engineer, considering the term "mining engineer" to mean the man employed for the designing of the whole plant, and not the one individual man in charge.

Let us commence at the end, when all the work has been done. Consider a fairly large mine in one of the new countries, where a few years ago it was all a wilderness. What have we? A mine containing several miles of shafts, adits, winzes, galleries, rises, drives, etc., etc., out of which is being blasted and raised to the surface 500 or more tons of rock-matter daily. This 500 tons of rock-matter has to be brought into the condition