THE YOUNG CERAMIC ENGINEER

By R. E. BIRCH, '27

EDITOR'S NOTE.—Mr. Birch, a former editor of *The Ohio State Engineer*, is a Research Engineer with The Ohio State University Engineering Experiment Station.

To take its place along with the mother-in-law and flivver jokes, there has arisen in recent years a worthy successor. The subject of many variations, it concerns the responsibility which children feel for the behavior of their parents. Although mindful that an analogy exists, I do not hesitate to state that the employer of engineering graduates should consider himself answerable to his subordinates for the degree to which he respects certain responsibilities. It is generally believed that the methods used in handling technically trained men by their first employers are of major importance in determining their ultimate success.

In general the man who is preparing to take his first position should scrutinize his prospective employers as closely as they will investigate him. Information is probably not equally available, but certain facts can be determined and others can be surmised from personal interview. He should be interested in the financial soundness of the company and the opportunity given to young men who are giving their talents but have no capital to invest. Something can usually be determined concerning the experience of former and present employees. Reports from the first group in many cases are to be discounted however. It would be possible to list a great many such considerations which are important when taking one's first position. The great number of changes in employment made by engineering graduates in their first few years out of school is evidence of the failure to solve this problem.

One of my acquaintances, a ceramic engineer who graduated from an eastern school some 15 years ago, and is now successfully established in the brick industry, says there is only one way to give embryonic engineers a proper beginning. He tells of one of the largest tile firms in the country which, upon hiring a college graduate, gives him a shovel and assigns him a regular turn shoveling coal with a kiln-firing crew. They realize that the burning of clay ware and many other processes in this industry and all others demand first-hand knowledge from the men who may sometime direct those processes.

This point reminds one of the prayer which Skippy, the child prodigy of the comic strips, offered recently. Kneeling at his bed with hands folded he said: "Oh God, make me a good boy, but not goody-goody." And then after some hesitation he amended himself: "After all who am I to tell you what to do with me. So you do just what you want. Give me the works if you feel like it." Many of the ceramic firms which employ college trained men have found that giving them the works must always come before turning over the works.

Ceramic engineering is the science of clay working, of making bricks and tile and pottery and dozens of other products that come from Mother Earth. Pottery and brick manufacture antedate the earliest written historical records. However, ceramics as a branch of engineering is still a baby. Clay working found its way into the college curriculum, with the Ohio State University pioneering in this country in 1895. At the present time, scarcely thirty-five years later, some of the leaders in every branch of the clay-working industry hold college degrees in ceramic engineering. Probably a great many more do not, for a college education in ceramics is like a college education in everything else. There will always be a great many men who because of circumstances or preferences will plunge directly into the industry which is to receive their talents.

It is equally certain that there will always be a place for the man who is so strongly resolved to cast his lot with a chosen industrial group that he spends four of his best years and a small fortune in preparing for that affiliation. The enthusiasm and eagerness which marks the attitude of the men engaged in the manufacture of clay wares is usually characteristic of only the younger industrial divisions. Those who elect a college training in ceramics usually do so for well-defined reasons, since that training is rigid enough to exclude those who attend college as sightseers. The mortality rate is high. Consequently those who register in departments of that nature usually do so because of a genuine attraction to the problems of the industry. Undoubtedly this affinity of certain men for clay is akin to the force which holds the chemist to his test tubes with their cloudy precipitates and to that sense which dictates the occupation of every man.

We have read a great amount in recent years of the disillusionment which in some cases has followed graduation from college. It would no doubt be incorrect to assume that such occurrences are unknown to ceramic graduates. It is essential to realize that a college education marks the completion of nothing more than the scheduled curriculum. In other words the man has received a technical training which is valuable but which must be supplemented by practical experience and more hard work. His selection of any definite college course was a major problem of primary importance, but the decision is only a general one. The most important problem arises in making one's industrial connection. The personality of the engineer, his willingness to make sacrifices, and his aptitude for certain phases of manufacturing are some of the factors having bearing on this subject.

The clay-working industries are many times more varied than the average person would imagine. For this reason the college training must be broad and the graduate must make further selection. When ceramics is mentioned we think of bricks and pottery. Even then we are apt to overlook the many kinds of bricks that are manufactured. There are pavers and building bricks and bricks that are filling rather more specific requirements, such as those made to resist acids and the extreme heats found in industrial furnaces. The ware in this latter group is called refractories,

or more commonly fire brick. In our homes we have an example in those bricks which line our fireplaces. There the requirements are mild compared to such industrial applications as refractories for open-hearth steel furnaces where temperatures may often reach 3000°F. The severity of this treatment is apparent when it is known that a dazzling white heat is about 2600°.

Even when the extensive development of such common products as brick is realized there still remains a good score of other products usually not thought of as clay products. Spark plugs are a ceramic product, as are most of our electric insulators. Many ceramists find a place in the manufacture of glass which is a kindred industry.

Not all ceramic graduates immediately take their place in industrial organizations. There is an increasing demand for men who have had additional training in the methods of research. Such training is supplied chiefly at the universities where fellowships, which assist in the support of the worker, are provided to permit him to engage in the investigation of one or more definite problems of value to the industry. The stipends necessary for their maintenance are usually provided by commercial firms or organizations.

As mentioned before, a college education marks the end of four years of a rather limited mental diet. The young man who considers even his technical education complete, makes a serious mistake. Having seen the rise of radio, television, and aeronautics within a few brief years, we do not have to be told that the scientist must always be reintrenching himself to keep abreast. The presentation of these inventions is only the outward display of the revolution in scientific affairs. The change in scientific organization and methods has been even more revolutionary. Though the advance of clay working has not been so spectacular, its strides have surely been as certain as those in such progressive fields as electricity.

This is an age of specialization, and ceramic engineering is said to be a specialized profession. However, it is true that specialization is never a fact, and that its accomplishment is becoming more and more impossible. Advance in science is leveling the walls which have in the past existed between the various industrial divisions. The photographer has been forced to study sound-recording and to familiarize himself with electrical control methods. The specialists who were formerly carriage-makers are now concerning themselves with precise means of controlling the quality of the raw materials which go into the manufacture of bearings for the machines which propel their carriages.

And in turn, the potter has abandoned his potter's wheel for more modern equipment, and concerns himself with problems of power consumption and material handling. Research in clays is being accomplished with the aid of formerly neglected knowledge. The microscope is being used more intelligently and even the X-Ray is finding a place in the solution of fundamental problems. The trend of these developments is chiefly toward enlightened manufacturing conditions that will produce clay wares of better quality. The young Ceramic Engineer is contributing to this progress and is earning a place for himself in the ceramic industry of the future.