AN ENGINEER'S FINANCIAL RETURNS.

There is no good reason, says Mr. Chas. T. Main, president of the Boston Society of Civil Engineers, in a paper read before that body, why an engineer should not be as well paid as a lawyer or doctor. Mr. Main says:

A fellow-engineer said one day: "The hardest thing which I have to do is to make out a bill for services." It is here again that the natural modesty of the man is such that he is unable to appreciate the worth of his own services.

Some of us are called upon to make investigations and reports on enterprises involving the expenditure of millions of dollars, and the conclusion reached and the signature at the end of the report may prevent our clients from losing large amounts, or may cause them to embark in an enterprise which will net them great profits.

The concentrated knowledge and experience of years may be given in a short period, and yet we are apt to measure the value of our services on a per-diem basis, which will amount to a pitiable sum compared with the importance of the service rendered. This condition should be remedied so that the returns will be commensurate with the value of the services rendered. A lawyer of high standing, in making his charges, would consider not only the time required but the importance of the case or value of services rendered.

There is no good reason, aside from custom, why the engineer should not be as well recompensed for his services as is the doctor or the lawyer. The engineer engaged in the industrial development furnishes his services, as a rule, to a clientele that can afford to pay the full value for services rendered. Where a problem has been carefully studied, and the work carried out in accordance with the final conclusions, the result enables a saving in cost of production or an increase in profits. The engineer who works along these lines is carrying on the work of efficiency of which so much has been said and written recently. The industries can well afford to pay the cost of obtaining the benefits derived from good engineering.

In the regular pursuit of design and construction, there seems to be no way of charging more than some definite fixed sum or percentage, the aggregate of which cannot be large unless the undertaking is unusually large.

Many of our profession hold salaried offices, and the salaries are not very large as a rule; but the tendency of later years has been to make a better return for services rendered.

To the younger members the progress seems to be slow, but with ability and willingness to work there is no reason why success should not follow. Some of the greatest engineers have been men who have not had the advantages of technical training and have forged their way to the front by close application and native ability.

The young graduate from a technical school is apt to think he knows it all; and if he is well balancel he will soon find that he has laid a good and substantial foundation during his studies on which to build his education for effective work which will be of value to his employer, and which will develop from day to day in the actual performance of his work. If he is well grounded in the fundamental principles of the profession he will be able to undertake and carry out any work which is assigned to him; but he should have patience, and not expect too rapid advancement in position and salary.

For these reasons the younger men should be modest in their expectations and consider a part of their remuneration the valuable experience which they are acquiring.

After an engineer has had many years of experience and hard work, and his work and judgment are of great value to his clients, he should rise above his modesty and charge a sum commensurate with the value of his services. At the present time, however, it does not seem as if a large percentage of the profession could derive more than a good living from strictly professional work.

Some time ago one of my clients, who is very successful in manufacturing, said that his son thought he would like to be an engineer, and the father desired some advice as to the best thing for a boy to do. I told him that if he wanted the boy to make a lot of money, he should take him into business with him, but if he wanted him to have an honorable profession which would probably procure a living for him, but not much margin, to make an engineer of him.

FLAT SLAB BRIDGES.

By W. H. Finley, Asst. Chief Engineer Chicago and Northwestern Railway.

Since the introduction of concrete for the construction of railroad bridges no type of structure has met with more success than the flat slab bridge. In the days of stone masonry we were confined to the flat top culvert for openings up to four or five foot spans. Beyond that it was necessary to use the arch type. This meant increased expense in construction due to the cost of the cutting of the masonry for the arches. For years after the introduction of concrete it was a common practice to use, for small openings, say up to eight or nine feet, old railroad rails embedded in the concrete to form the top covering. In those days there was more or less second hand rail that could be used economically for this purpose and it was thought that in using the material in this way a cheap and satisfactory structure could be produced. It was soon discovered, however, that second-hand rails were not always available, and if available they could be put to better use than burying them in concrete for culvert construction. In spans greater than nine feet and up to thirty feet it was the practice, for a number of years, to use I Beams embedded in concrete. Among some engineers the idea to use beams of sufficient strength to carry the live load and consider the concrete only as taking the place of lateral bracing. This form of construction required very careful work in the field, inasmuch as it is difficult to make a satisfactory bond between concrete and large areas of metal, as represented by an I Beam, and with the greatest care in the selection of the material and the placing of the concrete it was difficult to prevent the same from cracking or separating from the beams. Although there were a number of satisfactory bridges built of this type, yet it was gradually abandoned. As confidence grew in reinforced concrete these smaller openings were built of the reinforced flat slab type. This type not only took the place of stone arches of corresponding span but also at a much less price. It enabled engineers to satisfactorily solve a great many problems in places where a wide and low opening was particularly desirable. The ideal structure from a railroad standpoint of use is that type that entails the least cost in maintenance. Stone masonry, however carefully constructed, required from time to time repointing to prevent the infiltration of water and consequent disintegration of the structure. With concrete properly constructed this maintenance charge is completely eliminated. Not only is the maintenance charge eliminated but the first cost of construction is considerably reduced. In the building of a flat slab bridge as a monolith it is possible to use less material in the side walls than would be required for an arch of corresponding span.

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