mistakes, but he always needs a precedent, and, if he departs from the beaten track, must do so tentatively. It is true that the enormous tubular bridge across the Menai Straits was constructed by the successful practical engineer, Robert Stephenson, but it was the result of many experiments, and, till completed, its builder was uncertain whether it would carry the necessary load or not, a proof of which remains to this day in the grooves left in the masonry for supporting chains if they should have been needed. And this bridge and its successors, the Conway and Victoria tubular bridges, though worthy monuments of Stephenson's skill and success as an early engineer, would be looked on as faulty and wasteful practice if executed now. And this is due entirely to the fact that at that time theory and practice were kept apart. The celebrated Navier had some time before lectured on the methods of determining stresses in such structures, but the practical men at that time in England had not the opportunities to learn the principles which would have enabled them to proportion the various parts of their bridges to the stresses which they had to bear. But theory and practice were soon to be firmly joined together, and we find that a small girder only seventy feet span, on the Great Northern Railway of Ireland over the River Cusher, was the first iron lattice girder in which all the parts were properly proportioned to bear the stresses which came on them. This bridge, designed by Barton, was immediately followed by the magnificent Boyne viaduct, whose central span is 267 feet, and which "must ever rank as a signal illustration of the successful application of abstract principles to a great work by men who were capable, not only of appreciating them, but of following their guidance in a practical manner."

It might at first sight seem that, owing to the many branches of engineering, it would be well to have special schools for each branch, and that a student having determined which branch he intended to follow should devote all his energies to that alone. Such, however, is not found expedient. Over specialization is bad. A man thoroughly equipped as a railroad engineer might find himself hopelessly crippled at some time for want of some knowledge of electrical engineering; and, in fact, we find in many cases successful engineers have attained their success in other branches of the profession than that in which they had started.

A man in these days to attain even ordinary success must be well equipped when he enters on the practice of his profession, otherwise he will have many years of hard work, and he will always look with regret on the time wasted in his earlier years. The successful engineer is one who combines the highest scientific knowledge with wide experience. This scientific knowledge can only be obtained in special schools, and it is the duty of the State to see that such schools are maintained in an efficient condition. It is true that such men as Smeaton, Watt, Brindley and the Stephensons were successful, and yet had not opportunities of attending Technical colleges, but the average student might well hesitate to compare his natural ability to theirs, and they were all hard students, and made use of all the opportunities of study they met.

(To be continued)