race, and in the Renaissance period were not such artists as Michael Angelo, Leonard da Vinci, and Palladio great both in architecture and engineering? In mediaeval ages, bridges, churches, cathedrals and dwelling houses were designed under the supervision of the priests and clergy, but during the 16th and 17th centuries these supervisors of craftsmen became more interested in doctrinal controversies and so both architectural and engineering problems passed from their control, and the new profession of the civil engineer arose with such pioneers as Brindley, Smeaton, Telford, and Rennie.

With the development of steam and all the discoveries of modern science and engineering, the separation of the two professions became wider, but I think to-day there is a new spirit that is drawing them together again. The question, then, of the aesthetic treatment of engineering structures is to-day more fully appreciated by an enlarging circle, and it is one in which the engineer needs and desires the co-operation of the architect. This co-operation of the engineer and architect will have the effect of stimulating a healthy public interest in the need for great engineering structures being made as beautiful as possible. It has been said by a well-known engineer that if two designs are submitted to a board of directors, the one beautiful and the other ugly, the directors will always choose the ugly one, but this is untrue to-day, and many great corporations are setting a worthy example in encouraging the co-operation of the engineer and the architect.

Why should not even the humblest railway station be a beautiful object? We no longer believe in Ruskin's fierce denunciation of railway stations, and in these days of constant travel the comfort and beauty of well designed railway terminals are a delight to travelling man. Why cannot we have beautiful designs for the buildings and chimneys of steam power plants, for a water tower, for all our bridges, for service reservoirs, and valve houses? We should, though, in every case, let these structures speak for themselves and express by their design their meaning, stating plainly, without pretension, what they represent. We do not want a railway terminal to look like a temple for the worship of Minerva, nor a steam plant chimney to resemble Cleopatra's needle.

Probably most of the discussion upon this subject has arisen in connection with the design of bridges, and the writer has noted with pleasure recently the influential engineering press stimulating thought in this direction. Let us, therefore, examine first the evolutionary changes in bridge design by referring to some old and modern types of bridges. The earliest method of crossing a river was, perhaps, by stepping stones, by logs thrown across the stream or, where the span was wide, by a bridge of boats. It is, though, outside the scope of this paper to discuss the origin of the several types upon which all modern bridges are designed. Many beautiful bridges have been designed in wood. We have records of some of the earliest that combined great ingenuity with beauty, and to-day in Switzerland and Japan are many notable examples.

For two thousand years the engineer has been able to make masonry bridges beautiful, and although his opportunities in Canada for constructing such bridges are few, a study of the older designs is of great assistance in dealing with reinforced concrete structures which are in our country taking the place of the cut stone structures of Europe.

In the Pont du Gard, built by Agrippa, the son-in-law of Augustus, in 19 B.C., there is a grand combination produced by the form and proportion of the arches, and the varied effect of dressed and undressed masonry. In this structure, as well as in the Claudian Aqueduct, and the aqueduct at Tarragona, in Spain, the engineering skill is remarkable, proving that the Romans were highly skilled in mechanics and hydraulics. In these structures we see the harmony of science and art, twin sisters who should never be separated, and the result stands to-day a triumph of fine building.

In the bridge of Augustus, at Rimini, the piers are very massive, equal in thickness to one-half of the arch openings. There still remain traces of decoration on the key stones, and the ruined cornice indicates that the bridge was one of great beauty. Judging from its massive proportions, it is probable that over the piers were elaborate architectural details combined with noble statuary. Structurally it is excellent engineering, and even now, after the lapse of nearly 2,000 years, can be seen the fine workmanship of the old masons.

In the Renaissance period in Italy we could select many types for illustration of beautiful bridges which were erected by architects and engineers. One of the best-known, and one which well repays careful study, is Bartholomew Ammanati's famous bridge, which was rebuilt in 1566-1569, called the Pont della Trinata, over the Arno, at Florence. Ammanati's genius as an architect and sculptor is well known, and in this bridge we find careful study given to the engineering details that go to make up a successful structure. There are three spans, the centre 90 ft. 10 ins., and the two side spans 87 ft. 7 ins. The arches are two parabolic curves meeting at a centre with a slight angle which is obscured by an ornamental escutcheon. The arch ring is very heavily moulded, and the spandril panelled, a method which requires very careful treatment to prevent the scale of the design being lost.

During mediaeval times many beautiful bridges were built in Great Britain which are standing to-day more beautiful than ever with the "golden stain of time" upon them. The Bridge of Dee is an excellent example. Of particular worthiness of note is the treatment of the under side of the arch by ribbing so as to economize material and produce at the same time delightful effects of light and shade. It might be suggested that a similar treatment is possible in an economical design of a reinforced concrete bridge.

[Mr. Conway similarly called attention to the early masonry bridges of France, and to the London, Waterloo, Aberdeen and Grosvenor masonry bridges of Great Britain. Over 40 lantern views of bridges were shown, the selection bringing out in an able manner the aesthetic features of each. As lack of space forbids the presentation here of these illustrations, portions of Mr. Conway's discussion relating specially to certain examples are necessarily omitted.—Editor.]

Iron and Steel Structures.—It is when we come to consider the modern development of bridge building, and the introduction of iron and steel, that the aesthetic problems assume a different character from those of simple masonry structures. The development of the use of iron and steel in bridge building has been, to use Herbert Spencer's line of progress in organic evolution, "from simplicity to complexity of structure, and from obscure complexity to a defined simplicity of function." It is this simplicity of function which is the prevailing note of all well-designed steel structures. Michael Angelo maintained that to an architect a knowledge of anatomy was essential. Can we not also say that to those who examine iron and steel structures from the purely aesthetic viewpoint a knowledge of the anatomy of a bridge is necessary, and an understanding of the relationship and