America to quite generally employ girders with parallel top and bottom members, vertical posts (except at the ends, where they are made inclined toward the centre of the span), and tie-rods inclined at nearly forty-five degrees. This form takes the least material for the required strength.

The safety of a bridge depends quite as much upon the design and proportions of its details and connections as upon its general shape. The strain which will compress or extend the ties, chords, and other parts can be calculated with mathematical exactness. But the strains coming upon the connections are very often indeterminate, and no mathematical formula has yet been found for them. They are like the strains which come upon the wheels, axles, and moving parts of carriages, cars and machinery. Yet experience and judgment have led the best builders to a singular uniformity in their treatment of these parts. Each bridge has been an experiment, the lessons of which have been studied and turned to the best effect.

There is no doubt that iron bridges can be made perfectly safe. Their margin is greater than that of the boiler, the axles, or the rail. To make them safe, European governments depend upon rigid rules, and careful inspection to see that they are carried out. In this country government inspection is not relied on with such certainty, and the spirit of our institutions leads us to depend more upon the action of self-interest and the inherent trustworthiness of mankind when indulged with freedom of action. Though at times this confidence may seem vain, and "rings" in industrial pursuits, as in politics, appear to corrupt the honesty which forms the very foundation of freedom, yet their influence is but temporary, and as soon as the best