tubular principle? Certainly not, because these deflections are far within the safe limits of the elasticity of the iron plates composing them. But tubular bridges are designed to be rigid, while Suspension Railway Bridges are designed to be flexible.

Next to weight as a means of preserving equilibrium, the most important feature in the Niagara Bridge are the Girders which support the track. They are made of timber, and in connection with 4 lines of rails serve to distribute the pressure of concentrated loads. The efficiency of these girders became evident at the first trial. On the 8th of March, I made the first trial trip with an American built engine of 23 tons weight, with 4 drivers, placed but a short distance apart. The general depression in the center was 0.3 ft. But its passage was also accompanied by a local depression or slight flattening effect, which amounted to about 1 inch, extending over a length of 100 feet. Another American Engine of 22 tons weight produced nearly the same effect. I then made a trip with an English built Freight Engine of 34 tons weight, with six drivers, placed at a considerable distance apart, which owing to its weight being less concentrated, did not cause more of a local deflection than half an inch, but together with a loaded passenger car produced a general reduction of the camber in the center of 5½ inches. Without girders the trusses would not long resist the action of trains.

The Niagara Bridge of a span of 821 feet 4 inches, from center to center of towers, forms a slightly curved hollow beam or box of a depth of 18 ft., width of bottom of 24 ft., and of top 25 ft. The lower floor is used for common travel, while the upper is appropriated to Rail-