particularly in the centre, must be stiffened sideways to a large extent. All the material expended for stiffening is so much dead weight, without adding to the supporting power, but it must be expended in order to render the bearing members efficient.

Lattice bridges, like Tubular Girders, have seen their best days. The greatest defect in Lattice trusses is, that no two members bear alike. It is practically impossible to make the lattice-bars bear alike in proportion to their sections, under uniformly distributed loads. Attempts have been made in Germany and elsewhere to overcome this difficulty by stretching the bars, but with little success. Another great waste of material in these structures arises from the great multitude of rivets and laps. European engineers are beginning to see these defects, and hence of late an increasing partiality is manifested toward panel-trusses.

The American system of iron bridge construction has very materially grown out of the prevailing timber practice. The latter being correct in principle, although frequently badly abused and applied, correct ideas have been followed out from the very commencement, when iron was first substituted in place of timber. A correct leading feature of the American system of iron trussing was the great depth of girders, the same proportion as observed in timber bridges. Herein was found at once the principle of strength and economy.

Much has been said and written on the "uniform stress in girder work," and a great deal of very useless theory has been wasted upon this theme. This uniformity of strains, I hold, can only be obtained in a Warren Girder or in a well-proportioned panel-truss, where all tension members in the web are adjusted by screws. Experience in this country proves that no disadvantage is attached to screws, provided their section is sufficiently enlarged over the section of the bar, and they are made without welds.

By the addition of auxiliary cables, a greater uniformity of strains will be practically obtained. Any load imposed upon the cable will make itself felt throughout its length. This tension is of course greatest at all the points of suspension, and least at the centre, but otherwise it is uniform. The compression thrown upon the upper chords by the cables will be uniform throughout their length.

Plate 13 exhibits some of the most important details of the trusses, represented in the elevations, Figs. 2 and 7.

Fig. 4 is a section of a cast-iron anchor-plate, in which the ends of the wire-rope are fastened, which compose a cable, and which plate is fitted against one end of the upper chord, Fig. 2. A front view of the same plate is shown in Fig. 5, and a horizontal section in Fig. 6.

Figs. 9, 10, and 11 are similar details, referring to the truss which is represented in elevation by Fig. 7. In this truss there is only one single set of posts (see section, Fig. 8), while in the large truss of 300 ft. span, the posts are arranged in couples, with 20 inches space between to admit of the suspension of the cables. The short truss (Fig. 7) has the cables suspended on each side. This is done by securing one end of the wire-rope in the cast-iron block (Figs. 9 and 11), which rests against the end post and upper chord. The web of this post is pierced with two holes, to pass the ends of the ropes through into the casting. One end being secured, the wire-rope is suspended outside of the truss-posts, passed around the casting at the other extremity of the chord, and returned on the opposite side of the truss to the first casting laid around it, and thus the circuit may be repeated once or twice more, according to the strength of the cable wanted as an auxiliary support. The last end is secured in the same manner as the first end.

Fig. 10 shows a front view of the anchor-block, and Fig. 11 a horizontal section.