truss therefore possesses this peculiarity, that the ties are all in an inclined position, instead of being perpendicular to the chords, as in other modes of construction.

That this inclined position of the ties is injurious, we are not prepared to prove; although several considerations lead us to suppose that it is less efficient than when the ties are perpendicular. But this point is comparatively unimportant, as it is for very different reasons that we propose a change in the mode of construction.

One of the first defects apparent in old lattice bridges is the warped condition of the side trusses. The cause which produces this effect cannot perhaps be more simply explained, than by comparing them to thin and deep boards, placed edgeways on two supports, and loaded with a heavy weight. So long as a proper lateral support is furnished, the strength may be found sufficient; but when the lateral supports are removed, the board twists and falls. A lattice truss is composed of thin plank, and its construction is in every respect such as to render this illustration appropriate.

A second defect may be found in the short ties and braces at the extremities, which, furnishing but an insecure support, render these points, which require the greatest strength, weaker than any others; this defect is generally removed by extending the truss over the edge of the abutment, a distance about equal to its height, thus providing a remedy at the expense of economy by the introduction of from 15 to 30 feet of additional truss.

Other defects can be mentioned, which are not, however, peculiar to lattice bridges. The ties and braces are of the same size throughout, and consequently no stronger at the point of greatest strain than where the strain is least. The same remark applies also to the chords. Some of these evils can be remedied by slight additions. By bolting arches or arch-braces to the truss, the weak points both of the chords and braces can be effectually relieved. But it would be still better to depend for the power of resisting all the weight upon an arch-brace system, using a light lattice truss only as a counter-brace. This would be a great improvement; but one