lines back. It is the opinion of most American engineers that to design a bridge a man requires plenty of good, sound common sense rather than a profound knowledge of mathematics. It is true that without a thorough, practical knowledge of this subject no man can be an engineer; but on the other hand, a great ability to understand and use profound and complicated mathematics will not constitute a man an engineer; in fact it nearly always indicates an incapacity to deal with the practical parts of the profession.

The three dangers to which the present Japanese bridges are subject are washout, destruction by wind, and derailment. In respect to the first, my prediction has already been fulfilled.

To the second the bridges are liable at any time, although it may be years before a sufficiently great pressure will strike one of them; but when it does, being utterly unprovided with either sway or side bracing of any kind, the structure must succumb. In respect to the third, the danger is ever on the increase, because the life of the best of rails is limited; and, when a broken one on or near the approach of one of the bridges derails a locomotive travelling at the usual speed, there will be a wreck that is liable to cause the loss of many lives.

In addition to these, there are the following faults in the construction that indicate very clearly a want of practical and theoretical knowledge in designing.

1°. The web struts are weak even if their sectional areas be excessive, owing to the fact that they are formed of two flat bars with trussing between. Trussed bars as struts were long ago tested in America and condemned.

2°. The thickening of the eyebars at the eyes by rivetting a plate on each side weakens the bars, indicating a want of either strength or economy.

3°. The stay plates of the top chord might as well have been omitted for all the good they can do. They are placed three feet apart and have one rivet through each end.

The object of stay plates latticeing or lacing is to make the two sides of the member so connected act together instead of separately.

Supposing the top plate to be omitted (as it sometimes is) and to be replaced by stay plates similar to those described, would the two valves of the chord act together or separately?

The answer to this may be that the top plate is not omitted. True, but if it were, the injurious effect of using such stay plating would only be doubled.

4°. The trough shape of the bottom chords tends to collect rain water and to rust away the iron. I saw water standing in the bottom chords of a bridge on the Kobe and Otsu Railway long after it had ceased raining.

5°. The connecting plates at the joints in the top chords are so small that there are not enough rivets to transfer the stress past the joints. This is not a point of vital importance, provided that the abutting ends are in contact throughout, which I stated in a previous paper they are not.

6°. There is a want of economy in using so many panels in the trusses and so many floor beams. A smaller number of larger floor beams would weigh much less and be more rigid.

7°. By resting the floor beams on the bottom chords, the inner sides of