

It will be noticed that the Dominion Government Specification 1901, Canadian Pacific Railway, and Pennsylvania Railway Specifications give almost identical weights, while the maximum difference between all six is about 10%.

Some curious literature may be found on the subject of impact, as in *Engineering News*, May 9, 1895. In a paper giving the results of measured bridge stresses, it is stated that "the actual strains agree very closely with the theoretical statically computed strains, even in the hip verticals, under a speed of train of 55 miles per hour."

Also an article on "The measurement of live load strains in bridges," by J. J. Hankenson and H. Ledger, it is stated that "Longitudinal vibration or rapid vibration of stress is much more excessive in the lower chord near the centre than in any other tension member; while the hip vertical shows a stress far less variable than that in the lower chord. The main diagonal is subjected to a less amount of longitudinal vibration than any other of the tension members. The reason for the great amount of longitudinal vibration in the lower chord is that it receives the stresses of all the members on their way to the abutments, consequently every variation of the stresses in the web members caused by a moving train, and shocks from its concentrated truck loads, must cause a variation in stress of the lower chord. This shows that the metal of the lower chord is subjected to a much more fatiguing stress than that of any other member of the truss."

In building, the effect of impact is felt to the greatest extent in the floor joists, to a less extent in the main girders, and still less in the columns. Allowance for it may be made by adding various percentages to the live load stresses, according to the position of the member under consideration.

From all this it appears that we have various methods and formulae for determining impact stress, all of which, however, are empirical and lack confirmation by actual experiment, so that it would seem that here lies a comparatively unexplored field for the research man; with time, instruments, and "the sinews of war," a first-class series of experiments might be carried out, and a formula derived which could be used with the knowledge that its results would be very close to the truth.