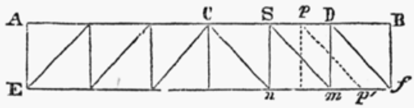
would hold it in equilibrium; but in estimating the weight, it is not sufficient to take simply the weight of the structure itself, to this must be added the greatest load that could ever come upon it.

FIG. 55.



In a railroad bridge, the greatest load is probably when a train of loaded cars occupies the entire space between A and D, and the driving wheels of the locomotive are directly over D. The weight of the cars may be regarded as a uniform load distributed over $A\ D$, and its centre of gravity would be at a distance of one-half $A\ D$ from the point of rotation E. The weight on the driving wheels of the locomotive may be considered as acting with a leverage equal to the whole distance $A\ D$. Let the weight of the bridge between A and D be represented by W, the uniform load on $A\ D$ by w', and the weight on D by w''; then taking the sum of the moments, we have $w\ (\frac{1}{2}\ A\ D) + w'\ (\frac{1}{2}\ A\ D) + w''\ (A\ D) = f\ A\ D$ or $\frac{w + w' + 2\ w''}{2} = f =$ the vertical force which applied at D will sustain the load.

The strain upon the brace will be very nearly f *sec.* $m\ D\ f$ or $f \times \frac{D\ f}{D\ m}$.

When there are intermediate braces and ties, as $p\ p'$, it will not vary much from the truth to suppose the strain which was thrown upon a single brace in former case by the uniform load to be divided equally amongst all that the interval contains. If one intermediate tie be introduced, it will bear one-half, if two, each one-third, if n, $\frac{1}{n + 1}$ part of the uniform load, and this is expressed by $\frac{w + w'}{2\ (n + 1)}$.