from the formulae of Launhardt and Weyrauch, based upon these facts:

If f = working stress per square inch
p = primitive strength; i.e., the resistance to fracture under a given number of repeated stresses of the same kind.
s = statical strength; i.e., the resistance to fracture under a gradually applied load
v = vibration strength; i.e., the resistance to fracture under stresses of equal intensity but of opposite kind.
F = factor of safety

then, for stresses of the same kind, by Launhardt,

$$f=\frac{p}{F}\left\{1+\frac{s-p}{p}\cdot\frac{\text{min. stress}}{\text{max. stress}}\right\}$$

and, for stresses of opposite kinds, by Weyrauch,

$$f=\frac{p}{F}\left\{1-\frac{p-v}{p}\cdot\frac{\text{max. small stress}}{\text{max. large stress}}\right\}$$

These, for structural steel, become

$$f=10{,}000\left(1+\frac{2}{3}\cdot\frac{\text{min. stress}}{\text{max. stress}}\right)$$

and

$$f=10{,}000\left(1-\frac{2}{5}\cdot\frac{\text{max. small stress}}{\text{max. large stress}}\right)$$

On these formulae are based specifications which make use of different units in making allowance for impact.

Theodore Cooper specifies various units for the different members according to their position in the bridge, these members subject to the greatest effect from impact, such as floor beam hangers, having the lowest unit stresses, and for most of the main members, allowing twice as much load per unit for dead load as for live.

The Pennsylvania Railroad increases their maximum calculated stress (M) in a member by a coefficient $(1+K)$, and the resulting stress $M\ (1+K)$ is the stress for which the member is designed using a constant unit stress.

For members with the stress of one kind only, $K = 1 - 2R + R^2$.
For members subject to reversal of stress, $K = 1 + 2R - R^2$.

$$R = \frac{m}{M}$$

m = minimum calculated stress in members subjected to one kind of stress only, or the maximum calculated stress of lesser kind in members subjected to reversal of stress. By minimum stress is meant the absolute minimum, i. e., in a diagonal or post m is the