DESIGN OF LEAF SPRING

If leaves has full length and graduated leaves, then

$$\sigma_f = \frac{18WL}{bt^2(2n_g + 3n_f)}$$

$$\sigma_g = \frac{12WL}{bt^2(2n_g + 3n_f)}$$

$$\sigma_f = \frac{3}{2}\sigma_g$$

$$\delta = \frac{12WL^3}{Ebt^3(2n_g + 3n_f)}$$

Length of leaf spring leaves

Let $2L_1$ = length of span (or) overall length of the spring

l = width of band (or) distance between the centers of U bolts [It is ineffective length of spring]

n_f = number of full length leaves

n_g = number of graduated leaves

n = Total number of leaves

$$n = n_f + n_g$$

Effective length of Spring

$$2L = 2L_1 - l \text{ [when band is used]}$$

$$2L = 2L_1 - \frac{2}{3} l \text{ [when 'U' bolt is used]}$$

Length of smallest leaf :

$$= \frac{\text{Effective length}}{n-1} + \text{Ineffective length}$$

Length of next leaf

$$= \left[\frac{\text{Effective length}}{n-1} \times 2\right] + \text{Ineffective length}$$

Length of master leaf $= 2L_1 + \pi(d+t) \times 2$

$d \rightarrow$ Inside diameter of eye

$t \rightarrow$ thickness of master leaf

Radius of curvature

The approximate relation between the radius of curvature and the camber of the spring is given by $R = \frac{L_1^2}{2y}$

The exact relation is given by

$$y\,(2R - y) = (L_1)^2$$

$L_1 \rightarrow$ half span of the spring

$y \rightarrow$ camber of the spring