ORDINARY IRON HIGHWAY-BRIDGES.

Taking the centre of moments at $E$, the moment of the pressure is

$$2Pd + 2P'(d - f),$$

which can be resisted only by the moment of a released weight $V$ upon the foot at $F$; thus,

$$2Pd + 2P'(d - f) = Vb,$$

and

$$V = \frac{2d(P + P') - 2P'f}{b}.$$

This release of weight $V$ must pass up the vibration rod $KG$, causing a tension therein equal to

$$V \sec \theta = \frac{2d(P + P') - 2P'f}{b} \sec \theta.$$

To find the stress on the strut $JK$, pass a plane through the sway bracing, cutting $GH$, $GK$, and $JK$ ($HG$ not being strained); take the centre of moments at $G$, and consider the forces acting on the left side of the truss; then the moment of the stress in $JK$ will balance the moments of $P'$ and $\frac{1}{2}H$, thus,

$$(JK) = \frac{\frac{1}{2}Hd - P'f}{f} = \frac{d}{f}(P + P') - P',$$

to which must be added the horizontal component of the initial tension in $JH$. $(JK)$ represents the stress in $JK$.

The stress in the upper lateral strut $GH$ is that due to the wind pressure, considering it as a portion of the upper lateral system plus the sum of the horizontal components of the initial tensions in the three rods meeting at one of its ends.

If $GH$ be considered as a portion of the vertical sway bracing, its stress may be found by passing a plane, as in the last case, and taking the centre of moments at $K$, considering the external forces acting on the left-hand half of the truss; then the moment of the stress in $GH$ will balance the moments of the horizontal re-action at $E$ and the pressure at $G$, the moment of the increased weight at $E$ balancing the moment of the increased re-action; thus,

$$(GH) = \frac{\frac{1}{2}H(d - f) + Pf}{f} = \frac{d}{f}(P + P') - P',$$

or equal to the stress in $JK$. 