being carried by the abutments directly, and does not affect the truss at all.

Call the span \( l \); the height, \( h \); load per foot, \( w \), whence total load \( = lw = W \). For equilibrium the moment of the external forces must be equal to the moment of the internal forces. The external force is the reaction of the abutment, or \( \frac{1}{4}wl \); the internal force is the strain on the material. Taking moments around the foot of the kingbolt, we have for the thrust in either rafter: Reaction multiplied by its lever = thrust multiplied by its lever, or \( \frac{w}{4}l \times \frac{l}{2} = T \times h' \) and \( T = \frac{wl^2}{8h'} \).

For the pull on the tie-beam, moments must be taken around the apex of the rafters. Reaction multiplied by lever = pull multiplied by lever, or \( \frac{w}{4}l \times \frac{l}{2} = P \times h \) and \( P = \frac{wl}{8h} \).

The strain on the kingbolt is simply the load upheld by it, or \( \frac{1}{2}wl \). If instead of carrying the load on horizontal stringers supported midway by a cross-beam, in turn held up by the kingbolt, as in the example, it is distributed over the tie by numerous transverse beams, then the tie, in addition to the pull on it from the thrust of the rafters, must be proportioned as an ordinary beam exposed to a uniformly distributed load of \( \frac{1}{2}wl \) for each half of the tie. If this truss is turned upside down, the value of the strains will remain as it was before, only being reversed in kind; that is, the kingbolt will become a post, suffering compression, as does the horizon-