LITTLE JUNIATA BRIDGE. 213

\[ w = \frac{BD^3}{0.0125 \times 12} = \frac{6 \times 12}{0.0125 \times 16^3} = 3240 \text{ pounds weight,} \]

that will cause a deflection of \( \frac{1}{30} \) inch to 1 foot, or \( \frac{1}{48} = \frac{3}{8} \) of an inch in 16 feet.

The actual weight being 5282 pounds, the deflection will be in proportion, or

\[ \frac{5282}{2240} = \frac{3}{8} \times \text{inch deflection caused by the passage of a locomotive.} \]

**Counter-Braces.**

The greatest possible strain upon the counter-braces, being equal to the strain upon the braces of the middle panels due to the variable load, will be 1200 pounds.

The cross-section of the 4 rods \( \frac{5}{8} \) diameter is \( 1\frac{1}{4} \) square inches. The greatest possible strain per square inch, 9600 pounds.

**SECOND HYPOTHESIS.**

Calculation of the strength, on the supposition that the arch supports the whole weight.

The span of the arch is 60 feet, and rise 8 feet 9 inches.

The weight on the half arch being 96,443 pounds.

Distance of centre of gravity from support, 15 feet.

Cross-section of two arches in middle, 35.6 square inches.

Cross-section of two arches at ends, 40.6 do.

\[ w = P = \text{pressure per square inch, we will have} \]

\[ P \times 35.6 \times 8.75 = 96443 \times 15, \]

whence \( P = 4644 \) pounds = strain per square inch — middle of arch.

The pressure at the skew-back is to the pressure at the crown as the hypotenuse is to the perpendicular, or as 7.50: 6.82.

But the cross-section at the skew-back is also increased in