is proper to examine them, as bridges are frequently built on similar plans without arches, and on roads over which very heavy trains are carried.

The result of the calculation proves that, in the first case, where the counter-brace forms an intermediate support, and reduces the length of the unsupported portions of the braces to $9\frac{1}{2}$ feet, flexure cannot take place in the plane of the truss.

In the second place, where there is no intermediate support, and the three braces are supposed to yield laterally in a direction perpendicular to the plane of the truss, the resistance is not sufficient, and flexure might take place under the hypotheses assumed, unless, by the addition of keys and bolts, the three braces are made to act as one piece, in which case the formula will give

$$W = \frac{9000 \times 6 \times 21^3}{19^2} = 1{,}386{,}000 \text{ nearly,}$$

which is more than double the stiffness in the first case, and 9 times as great as the maximum strain.

The conclusion, therefore, is, that in a truss constructed upon these principles, but without arches, it is highly important that the braces at the ends of the spans should be stiffened laterally by bolts and keys.

Strain upon the floor beams.

The floor beams are 7×14, placed 3 feet 8 inches from centre to centre; the interval between chords is $15\frac{1}{2}$ feet; the greatest weight upon any floor beam would be equivalent to $4\frac{1}{2}$ tons applied at the centre.

On the supposition that the deflection is $\frac{1}{40}$ inch to 1 foot,

$$W = \frac{B\,D^3}{\cdot 0125\,l^2} = \frac{7 \times 14^3}{\cdot 0125 \times (15\cdot 5)^2} = 6402.$$

The actual weight is 9000.

The deflection produced by this weight would be

$$6402 : 9000 :: \frac{1}{40} : \frac{1\cdot 4}{40} \text{ or } \frac{14}{400} \text{ of an inch per foot in length.}$$

The actual deflection caused by the passage of a locomo-