To obtain the actual deflection, that due to the strains in the braces and panel ties must be added to the deflection thus obtained. The heaviest strain caused by the moving load alone upon the braces is 240 pounds per square inch, and upon the ties 5,000 pounds per square inch, shortening each brace .000165 of its length, and lengthening each tie .000172 of its length; making the deflection due to each triangle .000337 of the height of that triangle; but as the central ties and braces, which are the longest, are but slightly strained by a full load, the average deflection due to all the triangles will not exceed .00025 of their height. The aggregate height of the five triangles on each side of the centre, in the system whose tie-rods meet at the centre, is 140 feet, making the deflection due to the strains in the web .035 feet, or $\frac{1}{3}\frac{3}{2}$ of an inch; this, added to the deflection due to the chord strains, gives for the total deflection .144 feet, or $1\frac{2}{3}\frac{3}{2}$ inches.*

The unequal expansion of the wood and iron in the structure, under a change in temperature, causes the centre of the truss to rise and fall in a manner similar to the action produced by a passing train. The range of temperature at Kansas City may be assumed at 120° Fahrenheit; in exceptional seasons it may exceed this, but only rarely. The coefficient of expansion of pine wood, for one degree of Fahrenheit, is .00000227, and that of wrought-iron is .00000698; then give for the values of i and i' the equation given above:—

$$i = .00000698 \times 120 = .000837$$
$$i' = .00000227 \times 120 - \frac{e}{243} = .000272 + \frac{e}{243}$$

The values of the other known quantities will be the same as in the preceding calculation. Solving the equations as before, we have for the effects of an increase of temperature of 120° Fahrenheit:—

$e = .0317$ $\qquad$ $i' = .000401$
$r = 50459$ $\qquad$ $d = .150 = 1\frac{1}{1}\frac{3}{6}$ inches.

The same increase of temperature acting upon the web causes a deflection in

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* To secure strictly accurate results, the deflection caused in the top chord by the web strains should be calculated separately, and the general deflections corrected to correspond with the spreading of the arch due to them; this difference, however, is but slight, and need not ordinarily be considered.