each triangle equal to the difference between the expansions of the tie and brace, and causing a deflection at the centre equal to

$$140 \times [.000837 - .000272] = .079 = \tfrac{15}{16} \text{ inches.}$$

The total deflection caused by an increase of temperature of 120° will therefore be .229 feet, or $2\tfrac{3}{4}$ inches.[*]

The extreme vertical variation of the centre of the span, from its position when unloaded at the lowest temperature, and when fully loaded at the highest temperature, will not exceed .373 feet, or $4\tfrac{15}{32}$ inches.

The deflections of the other spans may be calculated in the same manner, but will be less than the above. The calculations for the 176 and 130 ft. spans are much simplified by the absence of curvature in the upper chords.

STRAINS IN THE DRAW.

The weight of the iron and timber in the draw is 735,000 pounds; the turn-table, entirely of iron, weighs 52,000 pounds, leaving for the weight of the trusses and floor 683,000 pounds. The length of each truss between the centres of the end posts is 359.3 ft., making the dead load 1,901 pounds to the foot; a small allowance should be added to this for paint, wire railing, dust, ice, etc., increasing the dead load to 1,920 pounds per foot, which leaves a simple ratio to the assumed moving load of 2,240 pounds to the foot. The framing of the truss is such that the weight should be transferred to the turn-table only through the centre posts and cross-girders, the adjoining posts standing outside of the turn-table; the length of each arm should therefore be measured from the centre of the truss. The skew of the bridge makes the two arms of each truss of unequal length; the greater length, 182 feet, will be considered in these calculations, giving results which will be slightly excessive for the shorter arm. The total load per running foot on each truss is 2,080 pounds, of which $\tfrac{6}{13}$, or 960 pounds, is dead, and 1,120 is variable.

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[*] The noted expansion of bottom chords from the coldest day in January, 1870, say 10° below zero, to the warmest day in June, 1870, say 104° above in the shade, was as follows :

133 ft. span	$\tfrac{9}{16}$ inches.	250 ft. span	$1\tfrac{5}{8}$ inches.
200 " "	$1\tfrac{3}{8}$ "	177 " "	$1\tfrac{5}{16}$ "