cases. Mr. Wasell only makes it 7¾ inches, the difference being due to the unfavorable supposition we have made, that the saddles move to the full amount that the land spans elongate.*

Now allowing Mr. Wasell's argument full weight, let us see what it amounts to. At the time of greatest cold, we have found that the distance between the cables is $\frac{39}{100}$ feet more than the normal distance; and it is manifest that more load will be thrown on the upper cables in consequence of this increase. The question, then, to consider is, how much will it be necessary to *take off* of the lower and place upon the upper cables, to bring them again into equal bearing?

Experiments show that iron wire extends $\frac{1}{1000}$ of its length per square inch of section, for each gross ton of weight added. If, then, we add 18 tons of weight to each of the upper cables, the strain in each will be increased $35\frac{46}{100}$ tons. This increased load will cause the curves of the land spans to each increase in length $\frac{127}{10000}$ feet, and the curve of the centre span to increase $\frac{49}{1000}$ feet; and the final effect will be to increase the deflection of the centre span by $\frac{222}{1000}$ feet, making it $52\frac{302}{1000}$ feet. But when we place 18 tons more load on each *upper* cable, we by so doing diminish the weight on the *lower* cables; thus causing a diminution of tension of $30\frac{42}{100}$ tons in each. This diminished strain will cause the curve of each land span of the lower cables to shorten 0.00908 feet, the

* On the unallowable supposition that the saddles are *fixed* on top of the towers, the difference in distances between the cables for the extreme range of temperatures taken, would be but 4½ inches.