taking the mean of the results, we have (1,980+3,960)÷2=2,970, which is 248 lbs. less than the weight borne in Expt. 8. But it is also 390 lbs. *greater* than that borne in Expt. 7, by a piece of similar dimensions, but an inferior specimen. It does not seem, therefore, that the rule is much at fault.

From these facts and others of a similar nature which have come under my observation, I give the following as a good practical rule for determining the negative power of resistance for pieces of similar cross sections, after knowing from experiment the power of a piece of given dimensions, and similar cross section. *Make the power of resistance as* $\frac{D^3}{L^2}$ *and as* $\frac{D^3}{L}$ *successively, and take the mean of the results thus obtained, as the true result;* D representing the diameter (or side of the square if the cross section be square,) and L, the length of the piece.

XLIV. This rule will apply to pieces whose lengths are from 15 to 40 times as great as their diameters, and perhaps for greater lengths, although in bridge building, greater lengths will seldom be used.* But as the length is reduced to 8 or 10 times the diameter, or less, it is manifest that the power of resistance increases in a less ratio than that given in the rule, and even less than inversely as the simple length. For we see by the table of experiments that a square piece, length equal to 18 diameters, (Expt. 9,) bore at the rate of 45,000 lbs. to the square inch, which is about one third of the actual crushing weight for the strongest iron. But according to the rule, a piece of half the length, or equal to nine diameters, should sustain 135,000, which is about the maximum for cast iron, whereas experiment shews that the power of resistance increases till the length is reduced to about 2

* It is probable that for greater lengths than 40 diameters, the formula given article 30, would be more nearly sustained than where the length is less.