diameters. I would therefore apply the rule to square pieces above 15, and to solid cylindrical, above 12 diameters. From 15 to 10 diameters for square pieces, and from 12 to 8 for cylinders. I would call the strength as \( \frac{D^3}{L} \), and from those lengths down to 2 diameters, I would add pro rata, according to the differences between the weights, or resistances determined as above for square and pieces of 10, cylinders of 8 diameters in length, and the absolute crushing weight of the iron; i.e., if a square piece whose length equals 10 diameters bear \( m \) pounds, and the crushing weight for pieces of 2 diameters or less be \( n \) pounds, to obtain the resistance for a piece of 9 diameters, I would call it equal to \( m + (n - m) \div 8 \), and for 8 diameters, I would take \( m + 2 (n - m) \div 8 \), and so on.

XLV. I have already observed that in practice, materials should be exposed to much less strain than their absolute strength is capable of sustaining for a short time.

This is a fact well known to every body who has had experience in building, or has reflected upon the subject, and the reasons for it are, perhaps, sufficiently obvious, still, I will mention some of them.

Firstly, there is a great want of uniformity in the quality and strength of materials of the same kind, and no degree of precaution can always guard against the employment of those containing defective portions, possessing less than the average strength.

Again, when materials are exposed to a strain, although it be but a small part of what they can bear, a change is produced in the arrangement of their particles, whereby they frequently, if not generally, become weakened, especially if they be frequently exposed to such process. Hence, it often happens that a piece will break with a less strain than it has previously borne without apparent injury.

Now, there are no means of estimating exactly the