lower, and compress the upper part. This is called a lateral, or transverse strain.

Iron may likewise be acted upon by forces tending to force it asunder laterally, in the manner of the action of a pair of shears. This is called a shear strain; and though less important than either of the preceding cases, it will frequently have place in bridge work, partially at least, in the action of rivets, and connecting pins.

With regard to the simple positive and negative strength of iron it is only necessary for me to state in this place, as the result of a multitude of experiments, that a bar of good wrought iron one inch square, will sustain a positive strain of about 60,000 lbs. on the average; and a negative strain, in pieces not exceeding about twice the least diameter, of 70 or 80 thousand pounds. But in both cases, the metal yields permanently with much less stress than the amounts here indicated; and hence, as well as for other considerations, it can never be safely exposed in practice, to more than a small proportion of these stresses, say from $\frac{1}{4}$ to $\frac{1}{2}$.

Cast iron resists a positive strain of 15,000 to 30,000 lbs. to the square inch, but usually, not over 18,000. But it is seldom relied on to sustain this kind of action especially in bridge work, wrought iron being much better adapted to the purpose. On rare occasions, it may perhaps safely be exposed to a strain of 8,000 to 4,000 lbs. to the square inch, but should not be used under tension strain, when wrought iron can be conveniently substituted.

Cast iron, however, is capable of resisting a much greater negative strain than wrought iron; its power of resistance in this respect, being from 80,000 to