and some other varieties, are preferred for certain purposes, as being harder, stiffer, and especially better calculated to sustain a transverse action, whether tending to bend or crush it. But in what follows, reference will principally be had to the ordinary white pine of this country; and the deductions here made, may readily be modified so as to apply to other materials of known strength, when so required.

The absolute positive, or tensile strength of pine, may be stated at about 10,000 lbs. to the square inch of cross-section. It might therefore seem to be safely reliable in practice, at 15 or 16 hundred pounds to the inch, upon that part of the section of which the fibres are not separated in forming connections with other parts of the structure. And so it probably would be, when new, sound, and straight grained. But timber in bridges, is usually more or less exposed to wetting and drying, and deterioration in strength,—especially as it regards tension. Moreover, in forming connections of parts and pieces in a structure, it is difficult to secure a uniform strain upon all the uncut fibres;—one side of the piece being often exposed to much greater stress than the other. In view of such facts, it is deemed advisable to seldom allow less than one square inch section of unbroken fibre to each 1,000 lbs. of tensile strain.

**Negative Strength of Timber.**

CXLI. The ability of pine to resist compression in the direction of the length of piece, is from 4 to 5 thousand pounds to the square inch of section, and this varies but little, whether the pieces be of length equal to once, or five or six times the diameter. It moreover