A still further reduction of the depth of shoulder, or width of pin, will make a still larger portion of the fibres available, but not so much length, and experience and judgment, with a little calculation, will dictate the proper medium in this respect. The limit in theory, is, when the shoulders are infinitely small, in which case the whole amount of fibres becomes available. But in practice, I would only estimate from one-half to two-thirds as available for tension. This reduces the safe load for pieces acting by tension, to from 500 to 700 lbs., (I usually take the former,) to the square inch, for the whole cross section.

I shall not, perhaps, find a more suitable place to make a few general remarks upon the merits and use of pins for connecting pieces of timber. I am much in favor of the use of iron pins and bolts for this purpose, especially for connecting pieces that cross, or meet one another at an angle. Wooden pins in such cases, do not possess sufficient strength in proportion to the surface, unless made so large as to cut the timber too much. Moreover, the action on the pin tends to crush it laterally, in which direction the hardest timbers do no offer so much resistance as the ends of the fibres to which they are opposed.

Where pieces are connected with their fibres parallel, wooden pins or keys with the cross sections elongated in the direction of the grain, to give them the necessary strength, may be employed without too much cutting of the timber; but as just remarked, the key is liable to yield before the ends of the fibres cut, are taxed to their full capacity, and consequently is poorly adapted to the purpose in any case where the utmost strength is required.—But when the grain runs in different directions, the hole can not be elongated without too much cutting of at least one of the pieces. Suppose a piece to be connected by a pin between two others. The pin should be strong enough to bear as much strain as the opposed surface can sustain. Now, this can scarcely be accomplished by wooden pins, as has just been remarked. But, if suffi-