manner, with a less lap than what is required in the lock splice. In this case the fastenings should pass through at right angles with the plane of the joint, that they may not be slackened by a slight yielding of the timber to pressure, in the holes. This, however, is a device which will probably, seldom be resorted to in bridge construction.

Timbers may also be shackled together end to end by iron bolts and straps, as shewn in Fig. 59. The aggregate cross-section of straps should be about 1 square inch to each 10 to 15 thousand pounds of strain which the splice is intended to bear; and the diameter of bolts fastening the straps, about one-fifth of the thickness of timber, to secure the greatest effect for the amount of section destroyed in cutting the bolt hole.

To connect two timbers 10×12 inches, so as make half of the fibres available for tension, we may take 6 straps 2 feet long from hole to hole, and containing a cross-section of about 1 square inch, each. Also 6 bolts of 2" in diameter, and arrange the straps and bolts as shown in the figure, the straps being placed upon the 12" sides. This will cost, say for 170 lbs. of iron at 7cts., $11.90.