be from $\frac{1}{8}$ to $\frac{1}{4}$ the thickness of the timber, to secure the greatest effect according to the fibres cut by the bolt hole.

To connect two sticks twelve inches square, so as to make half the fibres available, take 6 straps, two feet long from hole to hole, (three straps on a side,) and six 2 inch bolts, as shewn in the figure 32, Pl. 6. The straps should contain each, 1 square inch cross section, or a little more, in all parts.

This will take, say 150 lbs. of iron at 8 cents, ...$12.00.

To form a splice with 2 lockings, 10 ft. lap will cost, for 10c.ft. timber at 30 cts., .......$3.00

40 lbs. iron at 8 cents, ................... 3.20

Extra labor, ......................... 1.00

\[ \text{Difference,} \quad \begin{array}{c} \text{7,20} \end{array} \]

$4.80

The splice with iron straps will cost near $5.00, or 68 per cent more, for a 12 inch timber, than the lap and lock splice. The same proportion may not hold for all sizes of timber, but there can be little doubt that the lap and lock plan is the better and more economical mode of splicing.

I will now proceed to the application of the preceding general facts and deductions to the construction of bridges.

It is not necessary to allude to bridges of less than 12 or 15 feet, simple beams being sufficient for such cases.

**Plan of a 20 ft. Bridge for Rail Roads,**

Applicable for Stretches from 15 to 25 ft.—[See Fig. 33, Pl. 7.]

In this plan, A represents a side, and B, an end view of one truss; and C, a top view of the bridge. The scale is distorted, in order to shew the details more distinctly, without making the figure of an inconvenient size. The lengths of pieces are on a scale of 1 to 100, and the widths or diameters, 1 to 30. The angles are in their true proportions.