WOODEN BRIDGES.

is not only admissible, but very desirable. This strain is the greatest that can be thrown upon a counter-brace; the passage of a load relieves instead of increasing it, and it will be safe to calculate the size by the condition that it shall produce the required compression on the brace.

Let $A B C D$ be a rectangle, and suppose a force to act in the direction of the diagonal $A C$, $C$ being a fixed point.

**Fig. 54.**

If the intensity of the force be represented by $A C$, the components in the direction of the sides will be $A D$ and $A B$, and those which result from the resistance of the fixed point $C$ will be $C D$ and $C B$. These four components produce a force of extension on the diagonal $D B$, the magnitude of which is represented by $D B$. This is the measure of the force which must be produced by wedging the counter-brace; and as this diagonal is equal to $A C$, it follows, that the strain upon the counter-brace which produces a given pressure upon the brace, is equal to that pressure itself.

If $w$ represent the greatest weight that can ever press upon any point of a bridge, $W \times \text{Sec. } B A C$ will be a little greater than the strain, and in practice may be taken to represent it.

As the greatest accidental weight that can ever act at a single point is very small when compared with the uniform load, it follows, that counter-braces may be very small when compared with other timbers.

To determine the strain upon the braces and ties.

To estimate the strain upon the brace $D F$, we may suppose the whole of the bridge between $A$ and $D$ to be suspended at the point $D$, and the measure of the force would be that which