The pressure upon the points \( A \) and \( C \) will be each one-half of the weight sustained by the upper beam, and on the points \( D \) and \( E' \) one-half of the weight on the lower beam.

**Strength of a long beam laid over several supports.**

This subject properly belongs to the resistance of timber; but as it expresses so nearly the condition of a continuous bridge supported by a number of piers, it has been considered preferable to introduce it in this place.

**Fig. 43.**

Let \( A B C D \) represent a beam laid over several supports, and loaded with a uniform weight. If we examine the central interval, we perceive that the weight upon it is sustained by the resistance of the sections at \( m, p, \) and \( n, \) and the whole weight would be equal to the sum of the weights that each section separately would be capable of sustaining.

The resistance of each section being \( R \, d^2. \) If \( w \) represent the uniform weight upon the whole beam, we will have for the weight that the section \( m \) alone could sustain

\[
R \, d^2 = \frac{1}{2} \times \frac{1}{2} l = \text{or} \quad w = \frac{4 \, R \, d^2}{l}
\]

For the section at \( n \)

\[
w = \frac{4 \, R \, d^2}{l}
\]

For the middle section

\[
w = \frac{8 \, R \, d^2}{l}
\]

And for the whole weight

\[
16 \, \frac{R \, d^2}{l}
\]

which is twice the weight that the middle section alone is capable of sustaining, or in other words: The strength of a beam fixed at the ends is to the strength of a beam free at the ends as 2 is to 1.

For the end section \((n o)\) we have weight which the sec-