An examination of the table shows the close correspondence between the actual breaking load of the beam and that calculated by means of Neely's Formula and also between the compression-endwise strength and the extreme fibre stress at elastic limit.

Comparing Neely's formula (equation 13) with the one in common use, we have for the value of the modulus of rupture—

$$f = \frac{3}{2} \, n \, f_c \qquad (14)$$

It follows from this equation that if the numerical coefficient n were constant, the modulus of rupture would be a constant multiple of the compression-endwise strength and consequently a satisfactory measure of quality. One objection to the use of the modulus of rupture is that it is a fictitious quantity, representing a stress which never does exist. A more serious practical objection is that it is not constant, varying not only with the content of moisture and other properties which exert an influence on the crushing and bending strength, but also with the ratio of length to depth of beam (even in "long" beams).

In the expression for the modulus of rupture (equation 14), the value of f_c should include all those variations which depend upon moisture, specific gravity, etc., and the numerical coefficient n should include those dependent on the proportions of the beam.

This is borne out by the values given in the above table which indicate that n varies with the proportions of the beam, decreasing as the ratio of length to depth is increased. The average value of n is 1.26 for the 4 short-leaf pine beams in which the ratio of length to depth is 16 and the average value of n is 1.20 for the 4 in which the ratio is 18. A similar decrease may be observed in the values of n for all the beams irrespective of species, but the number of tests is altogether too few to deduce any general law.

In order to derive the full benefit from Neely's theory as applied to the ultimate strength of beams, it will be necessary to establish the values of the numerical coefficient n for different materials and varying proportions.

It is not necessary, however, to establish these values in order to use Neely's formula for the load on a beam at the elastic limit —the load with which the practitioner is chiefly concerned—it being obtained at once from the equation

$$W_e = \frac{2bh^2}{3l} f_c$$

when the compression-endwise strength of the timber is known.