

198 NEELY'S FORMULA FOR THE STRENGTH OF WOODEN BEAMS.

The influence of moisture and specific gravity on strength had been previously observed by Bauschinger, but the U. S. Forestry investigations established the laws by the authority of a very much larger number of tests.

NEELY'S FORMULA.

Finally, and most important of all, the relation worked out by Mr. S. T. Neely, which may be stated as follows:—

*9. The extreme fibre stress of beams at elastic limit is equal to the compression-endwise strength of the material, and the strength of beams at rupture can be directly calculated from the compression-endwise strength; the relation of the compression-endwise strength to the breaking load of a beam may be expressed by a simple formula.*

This relation is fully worked out in *Circular No. 18, 1898*, and is referred to by Mr. Fernow in the following terms:—

“When the writer, in 1891, organized the comprehensive work of timber physics in the Division of Forestry, planned several years before, he realized that the large series of data resulting from the many different kinds of tests, while necessary, would be difficult to handle and correlate; but he also foreshadowed the possibility of finding such a relation between the same as to reduce the number of tests necessary. This hope was expressed in the following sentence, in *Bulletin 6*, page 30, 1892, when discussing this line of work:

“‘By and by it is expected that the number of tests necessary may be reduced considerably, when for each species the relation of the different exhibitions of strength can be sufficiently established, and perhaps a test for compression alone furnish sufficient data to compute the strength in other directions.’

“It is therefore with great gratification that the writer may now announce that the expectation then expressed is now realized.

“A careful study of the accumulated data by Mr. S. T. Neely, disclosed such a constant proportionality between the compression and cross-bending strength, that he was led to investigate the same more closely.

“His studies have enabled him to elucidate, not only the true position of the neutral plane in beams, which had hitherto been in