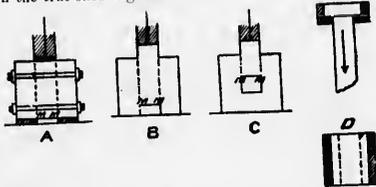


SHEARING STRENGTH.

In the experiments, to determine the shearing strength of timbers, considerable difficulty was found in preparing suitable test-pieces which would not at the same time be liable to a large bending action. Blocks were prepared as shown by sketches A, B and C; but unless the sides were sufficiently strongly clamped, as in Fig. A, the specimens almost invariably opened at M, under an effect chiefly due to bending. The clamping, again, introduced a compression, which rendered it impossible to obtain the true shearing stress.



After a number of experiments, more satisfactory and reliable results were obtained by preparing test-pieces as shown by Figs. E and D. The bending action is by no means eliminated, and, generally speaking, it is practically impossible to frame timber joints subjected to a pure shear only. The shearing strengths, which are of importance, are the resistances along planes tangential and radial to the annular rings. An examination of the test-pieces shows that the shears are invariably along these planes.

Thus it will be observed that in the tangential shears, the fibre, both hard and soft, is sheared radially, in the radial shears tangentially, and invariably through the soft fibre.

With test-pieces of the form shown by Fig. D, the shearing strengths along the tangential and radial planes are obtained, while the compound shearing strength, which may be considered as the resultant of the tangential and radial shears, is obtained with the test-pieces of the form shown by Fig. E.

The following Tables give the results of experiments carried out with test-pieces and holders of the form described:—

TABLE OF THE TANGENTIAL, RADIAL AND COMPOUND SHEARING STRENGTHS OF DOUGLAS FIR SPECIMENS CUT OUT OF THE SAME BEAM.

Specimen.	Shearing stress per sq. in. in a direction tangential to the annular rings.	Specimen.	Shearing stress per sq. in. in a direction at right angles to the annular rings.	Specimen.	Compound shears.
No. 1	553	No. 3	560	*No. 13	471
No. 2	568	No. 5	484	*No. 14	536
No. 4	441	No. 7	544	No. 16	629
No. 6	555	No. 8	480	No. 16	657
No. 10	454	No. 9	436		
No. 11	415	No. 12	480		

TABLE OF THE COMPOUND SHEARING STRENGTHS OF DOUGLAS FIR AND RED PINE SPECIMENS.

Douglas Fir.		Red Pine.	
Specimen.	Shearing strength per square inch.	Specimen.	Shearing strength per square inch.
No. 1	802 lbs.	No. 1	648 lbs.
No. 2	727 "	No. 2	553 "
No. 3	886 "	No. 3	572 "
No. 4	795 "	No. 4	570 "
No. 5	706 "	No. 5	731 "
No. 6	649 "	No. 6	534 "
No. 7	746 "	No. 7	671 "
No. 8		No. 8	698 "
		No. 9	740 "
		No. 10	757 "