APPENDIX II.

DEMONSTRATION OF FORMULA FOR FLOOR BEAMS.

LET the notation be the same as given on p. 19, viz. :—

A = area of bottom flange in square inches,
A' = area of web in square inches,
A'' = area lost by a rivet hole in square inches,
W = the uniformly distributed load in tons,
L = length of beam in feet between centres of supports,
D = depth in feet between centres of gravity of flanges,

and

T = intensity of working tensile stress in tons.

The moment at the centre of the beam is $\frac{WL}{8}$. Let us take the centre of moments at the middle of the web, which will correspond with the neutral surface, if we assume, which is nearly true, that the upper and lower flanges are of the same area, and are subjected to numerically equal stresses.

The moment of the load is resisted by the sum of the moments of the flange stresses and those of the web stresses. The sum of the moments of the flange stresses is

$$2(A - A'')T \times \frac{D}{2} = (A - A'')TD.$$

The resisting-moment of the web stresses is found as follows :—

The resisting-intensity of stress on the fibre most remote from the neutral surface may be taken equal to T; then that for any fibre at the distance x will be, by the common theory of flexure, $\frac{2Tx}{D}$. The stress on an elementary area at this