that the greatest unit fibre stress shall not exceed the allowable unit stress for the timber.

**Counters.**—Wherever the live and dead load stresses are opposite in character, only two-thirds of the deadload stress shall be considered effective in counteracting the live-load stress.

For class A bridges counters shall be so provided and proportioned that an increase of 25 per cent. in the specified live load would not increase the unit stress in any member more than 25 per cent.

Net Section at Rivets.—In proportioning tension members the diameter of the rivet holes shall be taken ½ inch larger than the nominal diameter of the rivets.

**Proportioning Plate Girders.**—The flanges of plate girders shall be assumed to take all the bending moment, and the web shall be assumed to take all the shear. The compression and tension flanges shall have the same gross section.

The Floor System.—All floor beams shall be rolled or riveted steel girders and shall be rigidly connected to the trusses or side girders. They shall, when practicable, be placed at right angles to the direction of traffic.

All joists shall be rolled or riveted steel girders and shall be rigidly fastened to the floor beams. When wood floors are used, the joists shall be riveted to the webs of floor beams by means of connection angles. The spacing of joists centre to centre shall be not greater than 3 feet.

Wood floors shall be constructed of first-quality timber of the kind specified by the engineer in writing or indicated on his drawings. For oak floors the minimum thickness of plank used shall be  $2\frac{1}{2}$  inches, and for pine the minimum thickness shall be 3 inches. In no case shall the thickness of the floor plank be less than onetwelfth of the distance, centre to centre, between joists. All plank shall be laid with the heart side down at right angles to the direction of traffic. Spaces approximately  $\frac{1}{2}$  inch shall be left between adjacent planks.

Wood floors shall be provided with a wheel guard on each side of the roadway. Wheel guards shall be constructed of timbers having a cross section of not less than 6 inches by 4 inches, spliced with 6-inch lap joints, and shall be securely bolted to the joists at intervals not to exceed 5 feet.

Adequate provision shall be made for draining all parts of the floor, and the water drained off shall go clear of all metal work.

Details of Design and Construction.—The minimum thickness of metal used in any part of the structure, except that used for fillers and other minor parts, shall be 5/16 inch. For class B bridges, however, this specification may be modified by the engineer in writing to permit the use of standard channels and I-beams having web thicknesses of less than 5/16 inch, provided that the modification is made as a supplementary clause to these specifications before the contract is awarded or is indicated on the engineer's general drawings.

Truss spans shall be given a camber by making the horizontal projection of the top chord longer than the bottom chord by 3/16 inch for each 10 feet of span.

All connections shall be designed to develop the full strength of the connecting members and shall be of the character indicated on the engineer's drawings or by the engineer in writing. Angles subject to tensile stress shall be connected by both legs, otherwise only the section of the leg actually connected will be considered effective.

The neutral axes of connecting members shall meet in a point.

Rivets and Rivet Spacing.—Rivets shall be either  $\frac{7}{8}$  inch,  $\frac{3}{4}$  inch, or  $\frac{5}{8}$  inch in diameter, except when used in minor parts.

The maximum pitch in the line of stress shall not exceed 6 inches or 16 times the thickness of the thinnest outside plate. The minimum pitch shall not be less than 3 inches for  $\frac{1}{2}$  inches for  $\frac{3}{4}$ -inch rivets, and 2 inches for  $\frac{5}{8}$ -inch rivets. For plate girders the rivet spacing in the vertical legs of the flange angles

shall be determined from the formula, p=-, where p is

the pitch in inches, r the permissible stress in one rivet in pounds, h the distance between lines of rivets in inches, and s the maximum shear in pounds at the section under consideration. In no case, however, shall the pitch exceed 4 inches.

The minimum distances from centre or rivet holes to the nearest edge shall be not less than  $1\frac{1}{2}$  inches,  $1\frac{1}{4}$  inches, and 1 inch for  $\frac{7}{8}$ -inch rivets,  $\frac{3}{4}$ -inch rivets, and  $\frac{5}{8}$ -inch rivets, respectively. The maximum distance from any edge to the centre of rivet holes shall not exceed 8 times the thickness of the thinnest outside plate or 6 inches.

Unless otherwise specified in the engineer's drawings or by the engineer in writing,  $\frac{5}{8}$ -inch rivets shall be used for all flanges less than  $\frac{21}{2}$  inches wide,  $\frac{3}{4}$ -inch rivets for flanges between  $\frac{21}{2}$  and  $\frac{31}{2}$  inches, and  $\frac{7}{8}$ inch rivets for all flanges over  $\frac{31}{2}$  inches wide.

At the ends of built compression members the pitch of rivets in the line of stress shall not exceed 4 diameters for a distance equal to twice the maximum width of the member.

The grip of rivets shall, in general, be not greater than 4 diameters. When it is necessary to make the grip greater than 4 diameters, the allowable unit shearing strength shall be decreased 1 per cent. for each 1/16 inch of additional grip.

Pin Connections.—All pins shall be sufficiently long to furnish full bearing upon the turned body of the pin for all connecting parts. All pins shall be secured by chambered nuts and the screw ends shall be sufficiently long to admit of burring the threads after the nuts are set.

No pin shall have a diameter less than three-fourths the width of the widest eyebar attached to it.

The several members attaching to a pin shall be so placed as to produce as little bending movement as practicable upon the pin; and they shall be held in place by means of filling rings.

All pin holes shall be so bored that when the pin is in place it shall be perpendicular to the axial plane of the truss, and each connecting member shall bear uniformly upon the pin. The diameter of the hole shall not be more than 1/32 inch greater than that of the pin.

Pin holes shall be sufficiently reinforced to distribute the stresses properly over the full cross section of the members. Where "pin plates" are used, they shall contain a sufficient number of rivets to transmit their proportion of the bearing pressure, and at least one plate on