The most economic depth for the beam can be found by trial, or by consulting Table XIX., which gives \( \frac{1}{2}'' \times 27'' \) for the section of the web.

Let us assume these dimensions, and take the effective depth \( D \) equal to 26'' ; then substituting in the formula given on p. 19, omitting \( A'' \), and remembering that \( T = 4 \) tons for bridges of this class, gives

\[
A = \frac{17.046 \times 15 \times 12}{8 \times 26 \times 4} - \frac{1}{6} \times \frac{1}{4} \times 27 = 2.56 \text{ } \square'' ,
\]

the half of which is 1.28 \( \square'' \), corresponding to a weight per foot of 4.27 pounds, because a bar of wrought-iron one inch square and three feet long weighs just ten pounds. Referring to Carnegie’s "Pocket-Companion," p. 68, we find that a 24\( \frac{1}{2}'\times 3'' \) 4.4# angle will be required. Let us see if a 2'' \( \times 3'' \) 5# angle will do for the bottom flange. Assuming that the rivets are \( \frac{5}{8}'\), and the holes \( \frac{13}{16}'\), in diameter, the area lost by a rivet hole will be \( 2 \times \frac{5}{16}'\times \frac{11}{16}' = 0.43 \text{ } \square'' \), which, added to 2.56, gives 2.99 \( \square'' \), corresponding to two angles, each weighing five pounds per foot. The assumed angles will therefore be exactly what are required. For stiffeners, let us use 2'' \( \times 2'' \) 3.1# angles. Four of them at each end of the beam will be needed to take up the compression produced by the stress in the beam hangers, leaving a space between the inner angles equal to about fourteen feet.

The ratio of thickness of web to depth of same is \( \frac{1}{4} \times 27 = \frac{1}{108} \).

Referring to p. 19, we find, by interpolating, that the distance between stiffeners should be 1.65 times the depth, or about 44\( \frac{1}{2}'\). The number of spaces between stiffeners in the fourteen feet will be \( \frac{14 \times 12}{44.5} = 4 \), requiring six stiffeners, three on each side of the web. The filling plates will have to be \( \frac{5}{16}'\times 2'' \times 22\frac{1}{2}'\).

The method of finding the number and distribution of the rivets in the flanges will be treated in Chapter XIII.: for the present, it will be sufficiently accurate to assume that the average spacing is two inches and a half.