

18.03 square inches. From p. 15 we find that the minimum size of top plate for nine-inch channels is  $\frac{5}{16}'' \times 11\frac{1}{2}''$ , corresponding to an area of 3.59 square inches. Subtracting this from 18.03, and dividing the remainder by 2, gives 7.22 square inches for the area of one channel, which corresponds to a weight per foot of 24.07 pounds.\* Referring to Carnegie's "Pocket-Companion," p. 65, we find that nine-inch channels vary in weight from eighteen to thirty pounds per foot; so the nine-inch channels required will be procurable. This calculation is not final, for it is not improbable that ten-inch channels will be found more economical.

The best way to settle the point is to ascertain the average weight per foot of chord for both cases. Dividing, then, 46.482 and 61.976 by 3.222, subtracting 3.59 from each quotient, multiplying the remainders by 10, and dividing by 6, gives 18.07 and 26.08 as the weights of the channel bars for the second and fourth panels; which weights are both procurable. The average of the three sections will therefore be 17.23 square inches, corresponding to a weight per foot of 57.43 pounds.

If we employ ten-inch channels, the ratio of length to least diameter will be 24, for which Table X. gives 3.369 as the intensity of working-stress. Dividing this into each of the three stresses gives 18.40, 17.25, and 13.80 as the sections required. The minimum size of top plate (see p. 15) is  $\frac{5}{16}'' \times 12\frac{1}{2}''$ , corresponding to an area of 3.91 square inches. Subtracting this from 13.80, and multiplying the remainder by  $\frac{1}{6}$ , gives 16.48 pounds per foot as the weight of the channels in the end panels of the top chord; but the lightest ten-inch channel procurable (see Carnegie, p. 64) weighs seventeen and a half pounds per foot: therefore the area of the section will have to be 14.41 square inches.

The average of the three sections will be 16.69 square inches, corresponding to a weight of 55.63 pounds per lineal foot. The difference between 57.43 and 55.63 is 1.8, which, multiplied by

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\* The reader may have forgotten that a bar of iron one square inch in cross-section and three feet long weighs exactly ten pounds: consequently, when the area of a section is given in square inches, multiply by ten, and divide by three, to find the weight per foot; and when the weight per foot is given, multiply by three, and divide by ten, in order to find the area.