

Table I. gives the weight of iron per lineal foot of bridge as 479 pounds, which multiplied by 160 gives 76,640: adding 600 pounds for the spikes, makes the total weight of iron 77,240 pounds. This indicates an error in the table of only eight-tenths of one per cent, — a very satisfactory result.

If we deduct the weight of the end lower lateral struts, rollers, roller plates, anchor bolts, etc., which really do not come upon the bridge, in all about 1,400 pounds, the dead load per lineal foot will be  $\frac{76,640}{160} + 269 = 747$ ; which agrees within seven pounds with that assumed.

It may appear to the reader who has carefully followed out all the calculations in this chapter, that the designing of iron bridges, and estimating weights thereof, involve a great deal of work, and demand considerable time: but such is not necessarily the case; for an expert could have made this design in from two to three hours, because his experience would have told him the sizes of many of the details and the number of rivets to employ. In this chapter everything has been figured out carefully enough for making working-drawings, instead of merely an estimate of weight; for the author considers that it is better to teach the beginner exact methods in the first place, and leave him to develop approximate ones as his practical experience increases.

A useful deduction which can be made from the "Bill of Iron" in this chapter is the proportion which the weight of the rivet heads bears to the weight of the rest of the iron, excluding that of the floor beams, spikes, and washers. In this case the ratio is about  $\frac{2000}{83800} = 2.91$  per cent. The average for a number of estimates made by the author is 2.85 per cent, the greatest being 3, and the least 2.4 per cent. The knowledge of this fact will save considerable time for any one who has many estimates of weight to make.

The author at one time, when in haste, used to figure out the total weight of main portions, and divide by a certain quantity less than unity, in order to determine the total weight of iron, but has now abandoned the method as giving too loose an approximation, finding that the correct divisor varies considerably with the length of span and the class of bridge. Tables I., II., and III. give the weights of iron for all cases far more accurately than will any such approximation.