

its. If in the first essays at iron bridge building, the iron bridge has competed so successfully with wooden bridges, improved by the experience of ages, may not the most satisfactory results be anticipated from an equal degree of experience in the construction and use of iron bridges?

XXXVII. Presuming the affirmative to be the only rational answer to the above question, I have arranged the details of plans for carrying into practice the preceding principles and suggestions in the construction of rail-road bridges of iron.

I have also made careful detailed estimates of the expense of bridges of different dimensions and in different circumstances, some of the more general results of which I will here state.

In proportioning the parts of a rail-road bridge, I have assumed that it may be exposed to a load of 2000 lbs. per foot run, for the whole or any part of its length, in addition to its own weight, and in case of tension, have allowed one square inch cross section of wrought iron for every 10,000 lbs. of the maximum strain produced upon every part by such weights, acting by dead pressure. In case of thrust, or crushing force, I have allowed one square inch cross section of cast iron for every 12,000 lbs., acting on pieces, (mostly in the form of hollow cylinders,) of a length equal to 18 diameters, and a greater amount of material, where the ratio of the length to the diameter is greater; always having regard to practicability, as well as theoretical proportions, in adjusting the dimensions of the parts.

My estimates made upon these bases have fully satisfied me, that a bridge of 100 feet span, with the track sustained upon the top, will cost about \$2000, or \$20 per foot, assuming the present pieces of iron, (1846) in ordinary circumstances. If the track pass near the bottom of the trusses, the expense will be increased two or three dollars a foot.

For a span of 140 feet, by a liberal detailed estimate, I make, in round numbers, a cost of \$4000. For 70 feet,