GENERAL DESCRIPTION.

METHOD OF RAISING THE SUPERSTRUCTURE.

A most important question is the practicability, safety, and cost of erecting the superstructure of such large spans as are here proposed. Short spans may be raised on temporary scaffolding, one span at a time, with great facility and little risk. But the task of putting in place spans of great dimensions in a river which is subject to great and sudden rises, full of floating debris, and with an unstable and treacherous bed, is very formidable, and may in certain stages and at certain seasons become totally impracticable.

The history of the erection of the 500 ft. span of the Kullenburg bridge in Holland has furnished a practical demonstration of the difficulties and dangers involved in such an enterprise. Before the entire completion of the large span of that great work, a very heavy gale sprung up and demolished all the scaffolding, but left the trusses unaffected, their bearing parts having been previously all safely connected. Had this high wind occurred a few days sooner, the whole superstructure would have been thrown down a total wreck. The contractor who put up this work is one of the most competent and most experienced men in Europe, and nothing had been neglected on his part to insure success. I mention this accident at the Kullenburg bridge, so that it may serve as a warning to hasty and inexperienced men; also as a comment upon estimates which recently have been made for large spans, in which the items of the cost of erection have been set down at very low figures indeed; showing that those who make out the estimates did not fully realize the difficulties before them.

I may also mention that the difficulties encountered in the erection of the large span of the Steubenville bridge over the Ohio river, would appear to be a sufficient warning against the undertaking of much larger works of a similar construction.

Having fully committed myself in favor of long-span bridges over our Western rivers, and now presenting plans which are not only perfectly practicable and safe, but also more economical than shorter spans, I would consider the task before me only half completed if I did not speak frankly and plainly of the method of raising such structures.

Fortunately, my own experience in matters of this kind enables me, and indeed obliges me to speak positively and without quoting other examples and precedents upon this subject. What I propose to do here, has already been done by myself more than once quite successfully, and on a much larger scale.

It may be of interest to notice here the method pursued by the contractor of the Coblenz bridge (the same who put up the Kullenburg bridge) in raising the three arches of that work. The two halves of the arched ribs were completed on shore, then launched and floated on boats to their destination, whence they were raised to their permanent position and connected. The raising was done by a hydraulic press supported on a temporary scaffolding put up in the centre of the span. Arches of a little over 300 feet may be managed in that way quite successfully, and also economically. But when the span is doubled, all the drawbacks attending this process are also doubled, and it will be wise to consider other methods.

In comparing different plans of raising, the questions of relative economy and of speed of execution are of much less importance than is the question of safety. That method should be adopted which insures absolute safety under all circumstances. Fortunately, the plans of superstructure here proposed, while exhibiting the greatest practicable economy and strength, also admit of the easiest, most economical, and safest mode of erection. No one will question the fact that the suspension principle, when applied to the raising of bridge superstructures, offers the safest and also the most economical method. The Parabolic Truss as here devised and modified, is a combination of the suspension cable and of the arch. If, therefore, we suspend the cable first, we may afterward suspend the arch to it, independent of scaffolding, flood, or ice. The whole work may be put up in this manner, without the use of any scaffolding whatever. Should the season and stage of water, however, be unfavorable to scaffolding, then I would advise, by all means, to make use of a few light bends, supported on piles and connected with the suspended platform by simple hemp-roe lashings, in such a manner that in the emergency of a sudden rise and other threatening dangers, the lashings may be all cut in a few minutes and the bends be allowed to float off without doing any further harm. A few such light scaffold-frames put up, say every 50 or 100 feet, will much assist in preserving the proper level of the suspended platform, and will therefore facilitate the joining of the various members of the structure. Those, particularly, who are without experience in suspended structures will find the assistance of bends very useful. But I repeat, that they are not a necessity, only a convenient auxiliary.