ADDITIONAL PLANS FOR THE ST. LOUIS BRIDGE.

The longest stays, in each span, heavy slip-joints or telescopic-joints are introduced into each truss, the construction of which will be easily understood by the details, Figs. 3, 4, 5, 6, and 7, on Plate 12.

Fig. 5 is an elevation of one truss, with five upright posts in close proximity. Fig. 4 shows the upper ends of these posts, one closed and one slip-bar; and Fig. 3 is a section of the same. There is one slip-bar for each channel-bar 8' 10" long, as wide as the channel, and of the same average area of section, greatest at the joint, and lesser at the ends. The one end of this slip-bar, for a length of three feet, is firmly riveted to its respective channel, and further secured by one strap, which embraces two slip-bars and two channels, with the posts between. The other end of the slip-bar, for a length of 5' 6", is not permanently fixed in the channel by any means, but laterally secured in it by five screw-bolts or straps, in such manner that the bar can slip lengthways without any lateral play. The channels are made extra heavy and planed off inside; the slip-bars are also planed off so that the slipping will proceed easily, and at the same time make a tight fit. An open joint is left between the second and third post, which in the warmest weather may be allowed to close up within, say 1/4 in. Calculating upon an extreme range of temperature of 150°, the contraction would amount to one foot in 1,000 feet, or 8 ft. for 400 feet. In the coldest weather, therefore, the open gap would have widened 0.4 ft. more, or would be a little over six inches wide.

It will be noticed that the stiffness and strength of the trusses will not be impaired by this arrangement. The posts being well braced by diagonal zigzag bars, and the slip-bolts being of ample section, there will be no lack of rigidity.

Figs. 6 and 7 explain the slipping arrangement of the railway tracks. While the slip-joints of the rails and the girders underneath are all opposite and above each other, the timber stringers are made continuous at this point and are spliced at some distance from it, on either side. The bolts which secure the timbers will readily permit the slipping of the rails and girders.

The central part of the truss in the main span is to be considered as fixed in the centre of the span, so that its contraction and expansion will take place at both ends at the slip-joints where the suspenders are long enough to admit of this motion. The trusses on the pier form one connected whole with the towers, and are anchored upon the masonry. Their contraction and expansion in the direction of the bridge, will also take place at the slip-joints, and in perfect accord with the stays as well as the towers.

On the abutments the trusses are also fixed by anchoring, so that contraction and expansion must take place at the slip-joints.

The cables being fixed upon the top of the towers, their contraction and expansion, due to changes of temperature, will of course influence the camber of the floor, which will be more or less according to temperature, but without affecting the efficiency of the trusses.

No special provision has been made for the contraction and expansion of the storm-cables, nor is any needed. By suspending them underneath the lower floor about every fifty feet, allowing them to sag a little between those points, this sag will in practice prove sufficient to admit of contraction and expansion without being overstrained in winter or getting too slack in summer. On this point I speak from actual experience, and I know that the arrangement here proposed is a safe one. The same may be done with the upper storm-cables, allowing them to sag a little between the upper connecting-beams and ties.

Fig. 12, Plate 13, exhibits a section through the abutment and anchorage, and explains itself. The cables are connected with anchor-chains inside of the anchor-masonry. The chains are composed of 7 links; each link is composed of the requisite number of bars of adequate sections, so as to correspond to the strength of the cables. The last link is in a vertical position, its tension, therefore, has to be met by the weight of masonry which rests upon the anchor-plates.

RAILROAD BRIDGE OVER THE OHIO.

As an elevation of a railroad bridge over the Ohio river is presented by Fig. 1, on Plate 13. A central span of 530 feet is connected with two lesser spans of 580 feet, the three reaches forming one connected Parabolic Truss, fixed stationary upon one of the middle piers, and supported by rollers on the other piers, so as to allow of free contraction and expansion. The water-way afforded by the three openings is therefore more than 1,200 feet, which is the normal width of the river in a good boating stage at and below Cincinnati. Two additional smaller spans on each shore add 660 feet, thus affording a total opening of 1,860 feet, which is ample for the highest flood. The details of this design do not materially vary from those of former plans, and need not therefore be repeated.