Each shaft forms a part of its respective trusses. The chords run through, and thus a very effective, and at the same time very simple framing is obtained.

An efficient lateral connection between the shafts is made by the floor-beams, cross-chords, and lattice, as is plainly exhibited on Plate 9.

Figs. 7 and 8, Plate 9, are sections of a tower, at the top and level of upper floor.

The construction of the upper floor for common travel, is made plain by the section, Fig. 2, on Plate 9. The outside posts of the outside trusses are continued above the upper floor-beams, and give lateral strength to the outside railings.

The upper floor-beams are five feet apart, and have a depth of 9 inches. Two intermediate posts of a light section are put up in the railings between each pair of main posts. Six-inch channel-bars form the upper chords of these railings, and the panels are trussed by diagonal rods screwed tight in central rings. The space between the outside railings is 37 feet 6 in., and is divided into three spaces; the middle one of 27 feet 6 in. in the clear, serving as a roadway, and the two outside spaces, each 7 feet 6 in. in the clear, answering for sidewalks. Light iron railings separate the two, and serve as a protection to pedestrians.

On each of the middle piers the roadway is divided by the shafts of the towers, and by the cables, but ample room is left on both sides, the narrowest place being reduced to ten feet for a length of only eight feet. The iron tramways are continued in straight lines from end to end. They serve for the accommodation of street-cars as well as for all kinds of vehicles. The iron tram rests on oak sleepers 71 inches in thickness. (See Fig. 9, Plate 9.)

The spaces between are floored longitudinally with 3-inch plank, for the support of a block-pavement of 6 feet deep. In the central space, tin spouts, at a distance of 15 feet apart, are passed down from the upper to the lower floor as a means of drainage.

Most of the rain-water will run down the tramways, as may be noticed on the Alleghany bridge, in Pittsburgh, and on the Cincinnati bridge. The timber should of course be thoroughly seasoned, and preserved by tarring or otherwise; and the whole floor should be made water-tight.

The sidewalks are constructed of two courses of plank: the lower one is 2 to 3 inches thick, tapering 1 inch, and the upper course 2 inches,—both laid lengthways, and secured by wood-screws and spikes.

On Plate 7 the arrangement of the storm-cables is made plain. On that pier, where the superstructure is permanently fixed and anchored to the masonry, these cables are also fastened to the masonry. On the other pier, however, the storm-cables are only secured to the iron superstructure, and are independent of the masonry, so that they will contract and expand freely, and in unison with the whole structure, which, on that pier, is supported on roller-frames.

There are two sets of storm-cables—one for each floor. The lower set is suspended below the lower floor; the upper set rests upon the upper floor-beams. If these cables are of sufficient strength and well secured, they will insure the lateral stability of the structure better than can be done by diagonal bracing. They are also very convenient when putting up the work: a correct alignment of the trusses and arches, so important a task in large spans, will be much facilitated by their use.

It will be necessary to make the under side of the upper floor fire-proof, because of its exposure to the sparks and heated gases discharged from the stacks of locomotives. To do this, I propose to suspend, and to fasten to the upper beams along their whole length, sheet-iron aprons five feet wide, allowing them to sag about 2 inches. Open spaces of a depth of 9 to 11 inches will thus be formed between the sheeting and the floor, which will offer a perfect protection against fire. The few timber-bridgings under the string-pieces, which support the trusses, may be immersed in a fire-proof solution, or they may be made of iron, or protected by a double thickness of sheet-iron underneath.

The arrangement of this sheeting is indicated in Fig. 2, Plate 8.