TOWERS.

The towers are 62 feet high above the roller-plates. Each tower is composed of 2 shafts, which form parts of the trusses, and are firmly connected with the chords and arches. Each of the shafts is composed of three columns, and each column again may be constructed either of 4, 6, or 8 sections. Plate 5 exhibits a section of a column composed of 6 segments. In Plate 4, the columns are drawn with 4 segments only. The interior circle of the column is assumed at 16 inches. The shafts being 50' 2" high from the roller-plate to the saddle, the sections may be rolled about 20 or 30 feet long, so as to break joints. Every joint must be covered by a splicing-plate inside. The intermediate plates which connect the segments, also breaking joints with them, will likewise add to the firmness of the columns. Both ends of the columns are to be planed off true, and so must be the end of every intermediate piece, so that every joint will make a tight fit. The respective columns of the opposite shafts are connected horizontally by a system of channel-bars and diagonals, which will fully insure their lateral security. This is further increased by 2 lattice-beams, which connect the cast-iron saddles, as is plainly exhibited on Plate 4. The top roller-plate being planed off on both sides, the lower ends of the columns will have a fair level seat upon them. The shafts are thus enclosed between the foot of the arches and the lower chords, and firmly connected with them laterally by flat bars, angle-irons, and stay-bolts. When the flanges of the inner channel-bars and those of the columns meet and interfere with each other, they are cut away for a few inches. The trans-plates at the towers are also firmly connected with the shafts, and so are the upper chords, and these connections will add much to the strength of the structure. In the direction of the trusses each tower is further secured by 4 lattice-braces which run between the chords and arches. The stability of the towers in this direction is also very much increased by the stays, and in a lateral direction two powerful wire-rope guys greatly add to their security. These guys also serve as anchors, and being hinged at the lower ends, will not interfere with the free contraction and expansion of the structure. To guard against lateral vibration of the lattice-braces, their outer chords are strengthened by plates 12 inches wide and 4 inch thick, riveted to a heavy T bar which connects with the lattice-bars. It will be noticed that the towers, forming one connected whole with the trusses and arches, will move freely on the roller-plates along with the rest when affected by contraction and expansion on that pier which is provided with rollers. On the other pier the towers are of course stationary.

By reference to the table of weights, we find the greatest vertical pressure upon one tower (two shafts) equal to 950 tons. Allowing 4 tons maximum compression for one square inch section of iron, we should require \( \frac{950}{4} = 237.5 \) c. in., or 118.1 c. in. in each shaft. In place of this, we have allowed in our estimate a section of 150 c. in., which reduces the pressure upon each superfluous inch to 3.15 tons at the top of the tower. As we descend the strength increases considerably by aid of the lattice, and when the upper chords are reached the strength is nearly doubled. We are therefore quite sure that ample allowance is made for the supporting power of the towers. When great economy must be practiced, this part of the work will admit of a reduction without endangering its safety.

SADDLES.

The saddles on top of the towers are of cast-iron, 8 feet long by 3' 6 in. wide at the bottom plate. Its construction will become plain by an inspection of Plate 6. The lower face is planed off so that when the top of the column is brought to a level, the two surfaces will have a fair and equal bearing. In order now to secure the saddle horizontally, 6 small segmental plates are fitted around each column, and secured to the bottom of the saddle by set-screws. To do