THE German invasion of France, as is well known, brought with it great destruction of property, and especially of railways. The Orléans Railway Company's system was successively occupied by the Prussians in the Departments of the Seine, the Seine-et-Oise, of the Loiret, Eure-et-Loir, of Loir-et-Cher, of the Sarthe, and of Indre-et-Loire. It was in these departments, and especially in the plains of Beauce, that the most vigorous efforts were made during the siege of Paris to resist the flood of invasion which sometimes advanced, sometimes receded, until the capitulation of Paris put an end to the struggle. It had fallen especially to the lot of the Orléans Railway Company, during more than five months, to follow the movements of the French armies, to act in concert with them, and to establish the most rapid and complete communications. The most important services required were of course to convey supplies and ammunition, and to bring up reinforcements. These reinforcements consisted at times of such considerable masses, that they absorbed all the available means of transport. Thus, on the eve of the battle of Coulmiers, an army of 70,000 men was conveyed in a few days from Sallens, in Sologne, to the forest of Marchenoir, in Beauce, by using the lines from Vierron to Tours, from Tours to Beaugency, and from Tours to Vendôme.

The maintenance of communication was, besides, of vital importance to the population, reduced by requisitions, and deprived of all news during the German occupation. When the company took re-possession of the lines, they found themselves confronted by the most disastrous damages of all kinds. If the permanent way was simply overthrown, its restoration was easy. If the broken bridges had only about 30 ft. span, there were still simple means for rapidly restoring the road, either by throwing timber or iron girders over the openings, or by filling them up with earthwork.

When, however, the broken bridges had an opening greater than 50 ft., it became necessary to execute more important works, of which the drawings on Plate LVII. form one illustration. It applies exclusively to bridges or viaducts in stone, for the repairs of which three systems were adopted:

1. Girders in timber.
2. Girders in iron, cast or wrought.
3. Earthwork.

We may describe in detail the proceedings employed on this temporary work, which are the more interesting, considering the circumstances under which they were executed.

The permanent works of reconstructing arches were undertaken soon after the temporary repairs, and were actively prosecuted. With regard to them it is sufficient to say, that generally the arches were rebuilt upon temporary staging without interrupting the traffic, and according to one of two methods:

1. A certain number of arches were executed, for the whole span and full thickness, leaving only the spaces necessary for the passage of wooden supporting girders. After the completion and decentering of the arches, the timber girders were removed piecemeal, and the spaces they occupied were filled up with masonry in the ordinary way.

2. Other arches were constructed without spaces, strong iron bracing being employed.

The bridge of Montulis, which we illustrate (in Plate LVII.), offers an example of reconstruction with timber staging. This bridge carries the line from Orléans to Tours over the Loire, between the stations of Vouvray and Montulis. It consists of 12 arches of 81 ft. 2 in. span. Figs. 1 and 2 show enough of the structure to indicate the damage it sustained during the war. The French blew up the filling over the second and third piers between the arches on the left bank on the 13th December, 1870, and the Germans destroyed the first arch, and the abutment on the right side, on the 28th January, 1871.

The temporary repairs over the piers by means of timber staging, and the re-establishment of girders in cast iron on the Montulis side, were made four different times by the Orléans Company, the three first times during the war, and the last time directly after the signing of the armistice. These works, shown in Figs. 3 to 7, were rapidly completed, on account of their small importance.

Figs. 8 to 11, Plate LVII., show the more important works which had to be executed for the repairs of the first arch and the abutment. They consist of a timber staging, intended to carry the permanent way, and much precaution was taken to prevent movement in the second arch. It was necessary to relieve the second arch of the ballast and the permanent way, and on