MODERN EXAMPLES OF ROAD AND RAILWAY BRIDGES.

Span being taken at 175 ft. load as 350 tons.
Rise of arch 17 ft. 6 in.
Compressive strain on rib at centre of loaded span 419 tons.
" " " springing " 460 "

It may be interesting, if we give here the details of testing of the bridge, together with a statement of the quantities of the materials used. When examined by Captain Rich, one of the Inspectors of the Board of Trade, each rib, with the exception of those adjoining the original bridge, was tested by placing on it eight of the heaviest engines and tenders (weighing together about 360 tons) of the London, Chatham, and Dover Railway Company, while subsequently the whole structure was tested by twelve locomotives and tenders, weighing together about 350 tons, the experimental trains being allowed to stand on the bridge and being run over at speed. Under these circumstances the following results were obtained: maximum deflection of loaded ribs of 175 ft. span, 31 in.; simultaneous rise of corresponding ribs of next spans, 1 in.; deflection of adjacent unloaded rib (partly caused by the vertical bracing between the ribs and partly by the stiffness of the platform), 31 in.; deflection of girders of 70 ft. span, forming land opening, 3 in.

The principal materials employed in the widening were:

- Timber in cofferdams and stages ..... 286,000 cubic feet.
- Bolts and spikes in ditto ..... 220 tons.
- Excavation ..... 29,350 cubic yds.
- Concrete in cement ..... 4,950 "
- " in lime ..... 3,300 "
- Brickwork in cement ..... 11,100 "
- Brickwork in lime ..... 2,700 cubic yds.
- Portland and Roach stone ..... 35,900 cubic feet.
- Bramley Fall ..... 22,300 "
- Cast iron in permanent cylinders ..... 461 tons.
- " in skewbacks and piers ..... 386 "
- " in parapets (new) ..... 28 "

Total cast iron ..... 885 "

Wrought iron in ribs, cross girders and bracing girders ..... 3523 tons.
" in bolts and nuts ..... 18 "

Total wrought iron ..... 3541 "

Number of rivets used ..... 800,000

The total cost of the bridge was £245,000, equal to about 38l. per foot run of single line or about 24 l. 13s. per superficial foot of area covered.

As we have already stated, Sir Charles Fox and Sons were the engineers to the work, whilst Mr. Edmund Wragge was the resident engineer, and Messrs. Peto and Betts the contractors, their representative being Mr. Curry. The ironwork was supplied and erected by Messrs. Ormery, Grierson and Co., of Manchester, and the cost of the work, which has rendered the Victoria Bridge the widest railway bridge in the world, was defrayed by the London, Brighton and South Coast, and the London, Chatham and Dover Railway Companies, jointly. The first stone of the bridge was laid on the 22nd of February, 1865, and the first locomotive passed over it on the 1st of August, 1866, seventeen months after the commencement of the work.

THE HOLBORN VALLEY IMPROVEMENTS.

PLATE XLV.

In the summer of 1863 the Corporation of the City of London invited the preparation of competitive designs for the improvement of the gradients in the Holborn Valley. This was the first practical step that had been taken towards the fulfilment of an important City improvement, the necessity of which had been most urgently required ever since Holborn became a great thoroughfare. From time to time during the last hundred and fifty years, schemes, more or less practicable, had been proposed, and in 1840 an attempt was made to establish a public company with the object of purchasing property, and constructing a viaduct and street approaches between Snow-hill on the east, and Fetter-lane on the west. This company, whose anticipated capital was 300,000l., came, however, in common with all the previous and many subsequent schemes, to an abortive ending.

In answer to the application of the Corporation nearly three hundred designs were prepared for approval, the bulk of which were of course entirely unsuited for the purpose in view. Altogether some eighty-five were ultimately selected as fulfilling more or less the require-