

DOUBLE-TRACK RAILWAY VIADUCT OVER THE DES MOINES RIVER.

There is nearing completion across the Des Moines River what will be considerably the longest railway viaduct for its height in existence. While there are other viaducts of considerably greater height, what makes the Boone viaduct, as it is called locally, remarkable is the combination of height and length, and the fact of its being a double-track structure. In point of total weight of metal employed in its construction it is fully three times as heavy as the next largest bridge of the kind in the world.

	Kinzua.	Loa.	Pecos.	Des Moines.
Length	2,050	800	2,180	2,685
Height above water. ...	302	336	321	185
Greatest width at base	103	124	90	70
Width at grade	18	13	16	27
Number of tracks	1	1	1	2
Tons of metal	1,400	1,115	1,820	5,680

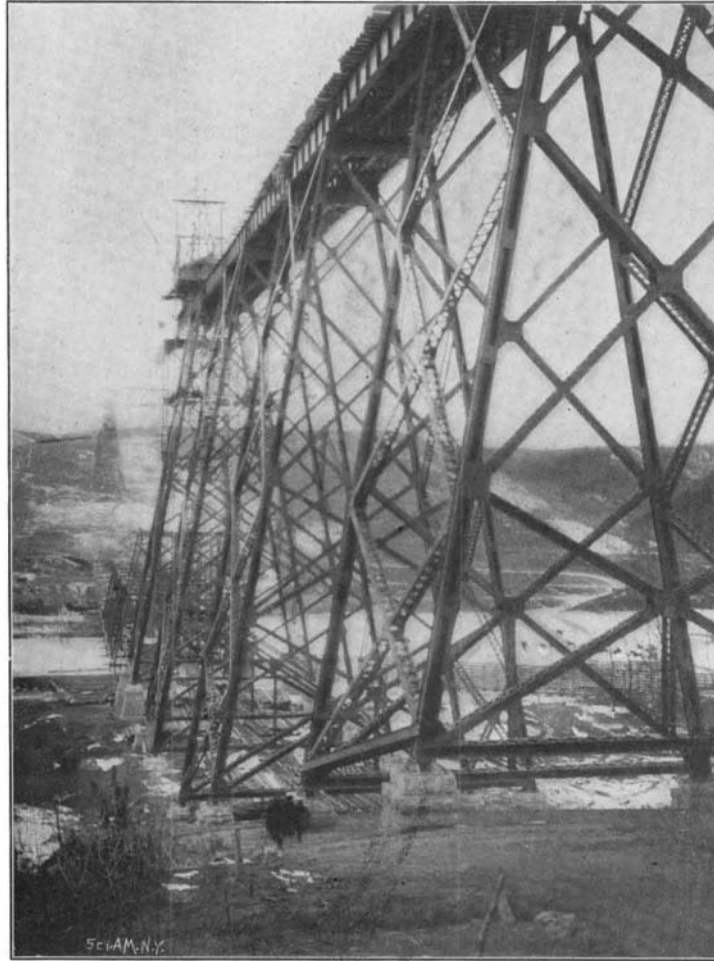
The loftiest of these structures is on the line of the Antofagasta Railway in Bolivia and is known as the Loa viaduct. It was constructed by English engineers in the year 1889. The height of the tracks above the water is 336 feet. As the crossing is over a narrow cañon, the length is only 800 feet; the great depth, however, involves a proportionate width of the towers at the base, the extreme spread of the columns being 124 feet. The next in point of height is the Pecos viaduct, which carries the Southern Pacific Railway over the Pecos River in Texas. This structure, which was built in 1892, is but little lower than the Bolivia viaduct, the height from water to rail being 321 feet, and the total length from abutment to abutment is 2,180 feet. Then comes the Kinzua viaduct, 302 feet above the water and 2,050 feet in length. These three viaducts carry only a single track; and, as we have said, it is the width and consequent weight of the floor system, and the great breadth of the whole structure, which render the Des Moines viaduct so much larger than the other three, the total weight of steel in the structure being 5680 tons, as against 1,820 tons in the Pecos, 1,400 tons in the old Kinzua viaduct, and 1,115 tons for the Loa viaduct.

The Des Moines structure consists of the viaduct proper, built of plate girder spans carried on braced towers, and a 300-foot truss across the channel of the river. The towers consist of four legs of built-up latticed construction, with strong lateral and longitudinal bracing between them. The spans across the towers are 45 feet in length and the spans between the towers are 75 feet. The substructure was built in the ordinary method, by means of derricks, which were carried by the towers, as they were built up, section by section, to the level of the underside of the plate girder superstructure. It should be explained that the much greater weight of the Des Moines viaduct as compared with the others mentioned in our comparison is to be attributed not merely to the fact that it carries two tracks, but also to the extra-

the new structure having been increased forty per cent to meet the heavier rolling stock of the present day.

The Preservation of Stonehenge.

A party of representatives of societies interested in archaeology recently met Sir Edmund Antrobus at



A Near View of One of the Towers.

Stonehenge to discuss the details of the resolution passed at the recent conference in London. The party approved of all the suggestions made at the London conference. The work will be carried out as soon as the weather is favorable, by an architect and a civil engineer. Nothing in the way of restoration will be attempted, the only object the societies have in view being the preservation of this most ancient memorial. The first work will be the raising of the huge monolith which overhangs the altar stone, as it is in a most dangerous condition, into an upright position. It is the largest and finest monolith in England, next to Cleopatra's Needle. At present it rests on a smaller stone, but there are two large flaws, or cracks, in it, and if it were to fall it is feared that it would be broken into three parts. Other stones will be put in position to support the lintel, which will rest upon them. Sir Edmund Antrobus

Present Status of the Telephone Business.

BY ALTON D. ADAMS.

The public is now to have the benefits of free and active competition in the telephone business. Judge Brown, of the United States Circuit Court, by the decision rendered at Boston on February 27, has opened the manufacture and sale of telephones and the operation of exchanges to all who care to enter these lines. The Berliner microphone patent, declared invalid by Judge Brown, was the only one of general application that independent manufacturers and operators have had to fear in the hands of the American Bell Telephone Company.

A direct result of this decision must be a large increase of the flow of capital to the telephone business, for the fear of infringement has greatly retarded investment along this line.

A large number of minor patents on details of construction are held by the Bell Company, but this is none the less true for the independent companies, and there is probably little real advantage to be gained on either side by extensive litigation over details of construction. From now on the success of telephone enterprises must, in the main, depend on the quality of service and the price at which it is rendered.

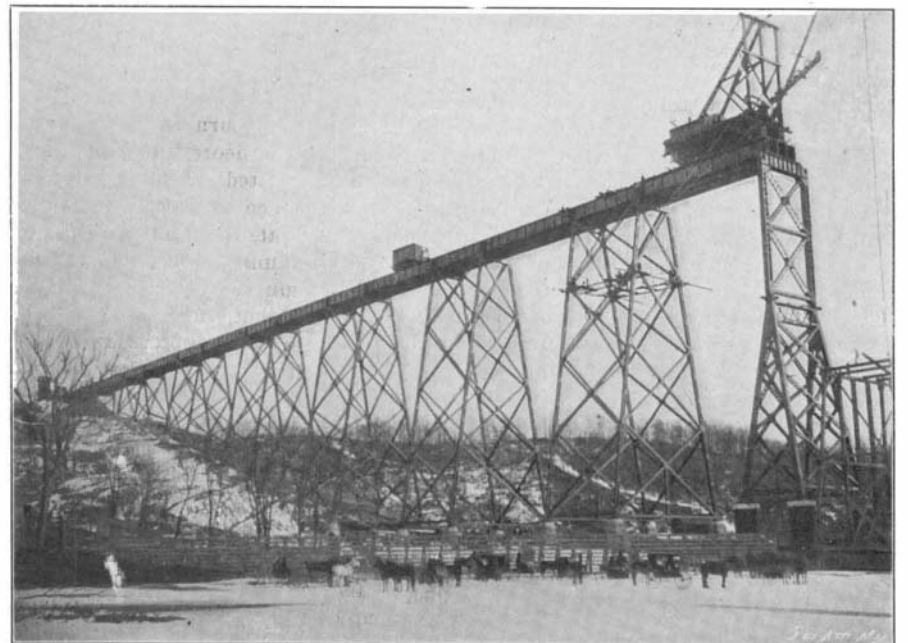
One tendency of the development of telephone service has been to lessen the business done over telegraph lines. This tendency must certainly increase with the future rapid extension of telephone systems, so long as the two kinds of service take place over distinct lines. Both telegraph and telephone systems require enormous plants, mostly in the form of transmission lines. Telegraph lines are comparatively idle during the day, but well employed at night, while the reverse is true for telephone lines. A moderate addition to the equipment of either system, at stations or exchanges, would enable it to compete in the long distance service now performed by the other. These conditions must operate as a spur to improve and cheapen the service of both telephone and telegraph companies, and may eventually lead to a union of these interests.

Whirlwinds Observed in Germany.

According to the Meteorologische Zeitschrift a remarkable series of whirlwinds was observed in Germany on the 26th of last June. The whirlwinds made their appearance at Hine near Seismberg and were seen toward 10 h. 45 m. A. M. on the slope of the Gatscheer Mountain. The first of these whirlwinds looked like a column of cloud or mist twisted in a screw-like form, rising up below a cloud which was moving slowly from east to west, and it afterward joined the cloud. Soon after a second whirlwind was seen to rise a little farther toward the east and this was shortly followed by others. The region is partly covered with oak trees, and at the points where the columns were seen to form, the oaks were uprooted and lay upon the ground. This uprooting



General View of the Viaduct.



At the Channel Crossing, Showing Bridge Pier.

DOUBLE-TRACK RAILWAY VIADUCT ACROSS THE DES MOINES RIVER, NEAR BOONE, IOWA.

ordinary increase which has taken place of late years in the weight both of locomotives and rolling stock. The single-track viaducts were constructed at a time when the maximum load on the axles of rolling stock was very much lighter than it is to-day. A striking instance of the increase in weight of bridges, due to this, is shown in the comparison of the new Kinzua viaduct with the old one, the weight of the metal in

hopes to obtain permission to divert the roadway now passing through the earth circle which surrounds the stones and to proceed with the erection of a wire fence as approved by the conference in London.

The Union Iron Works has decided to use oil for fuel in their plant, and the necessary changes in the furnaces are being made.

of the trees took place only here and there, and thus a number of trees quite distant from one another were felled, while the trees separating them remained intact. It is also remarkable that this great development of force took place without the least agitation of the air being felt in the neighborhood. The series of whirlwinds were found at distances of 500 to 600 feet apart.