

FALL OF THE B. & O. SUSQUEHANNA BRIDGE.

BY WILLIAM ALLEN.

In the SCIENTIFIC AMERICAN of September 19 appeared an illustrated description of the new Baltimore & Ohio Railroad bridge across the Susquehanna River. Just four days later a portion of the structure fell, carrying with it several cars of a freight train crossing the bridge at the time. As a consequence of the accident, one of the most important sections of the structure must be entirely replaced, and traffic over it suspended until the work is completed.

From the statements of the crew of the freight train on the bridge and witnesses of the disaster, it appears that all heard a series of loud reports following each other in quick succession. Then came what they call a crashing sound apparently caused by the superstructure tearing away from its anchorages. The section which fell was 377 feet in length. Upon it were the frame traveler used in erection and twelve coal cars, each carrying fifty tons. The total weight this span was sustaining at the time of the collapse was about 700 tons, as nearly as can be estimated, in addition to the weight of the bridge material proper. In the fall to the river bed of nearly 100 feet, the metal and woodwork were twisted and wrenched into a tangled, shapeless mass of girders, posts, and other structural material. Most of the wreckage fell into the east channel of the river, between the island over which the bridge passes and the main shore, and was nearly submerged. The accompanying illustrations show its position before any of the debris was cleared away.

The portion of the bridge that fell was over what is termed the eastern channel of the river. As already described in the SCIENTIFIC AMERICAN, it was a deck truss with the tracks laid upon the upper floor. Each end rested upon the masonry piers of the original structure, which were being enlarged in proportion to the dimensions of the new superstructure. A platform or shoring of steel had been placed upon the tops of the piers to support it until the enlargement was completed. These piers and falsework in the river upheld the span. When the accident occurred, the superstructure "broke away," so to speak, from the piers, pulling the nearest rails from the track left on either side. The piers were uninjured, the damage being entirely confined to the superstructure. It might be added that an examination of the bridge remaining shows it to be intact and ready for train service when repairs are completed. The center of the coal train was carried away, leaving the locomotive and four cars on the east and six cars on the west side. The train was thus wrenched apart in two places, the center cars going down with the bridge.

At the time of writing two theories have been advanced as to the cause of the trouble. One is that the wreck was due to charges of explosives arranged in such a position that they wrenched apart or loosened the main supports of the span which gave way. Another theory is that the heavy coal train proved too much for the falsework. The bridge, however, has been in course of erection for over a year; and during this time train service has been maintained continuously. As this division of the Baltimore & Ohio connects New York, Philadelphia, Baltimore, and Washington, passenger and freight traffic is very extensive, and about seventy trains of the largest type of passenger and freight cars have passed over the structure daily, without its giving any indication of weakness. It may be added that the falsework was designed especially to sustain a weight largely in excess of any which might pass over the bridge. While the original piers were left to aid in supporting the new superstructure until replaced by the larger piers, the temporary falsework by which the piers were reinforced had been carefully designed, and none of the timber was subjected to stresses above those usually allowed

in work of this character. The loading per pile was ten tons.

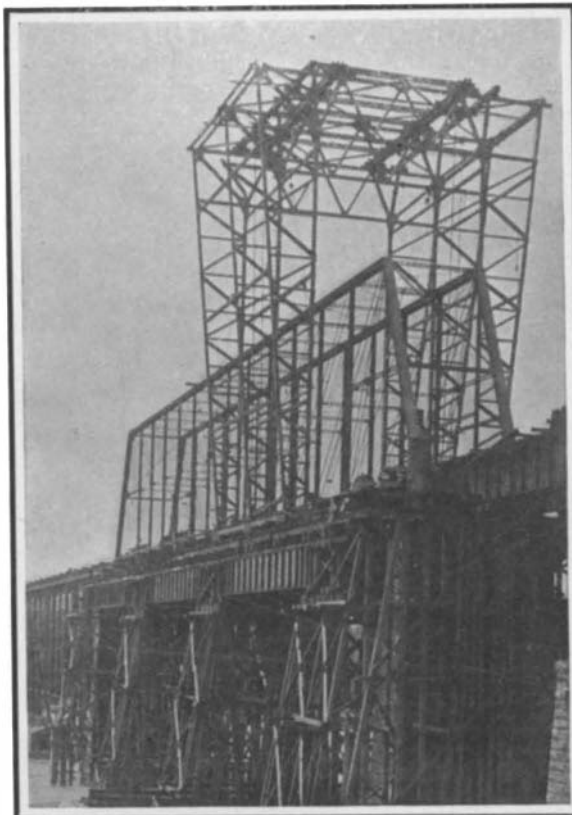
It is needless to say that immediately after the disaster engineers of the American Bridge Company, contractors for the work, and of the Baltimore & Ohio

structure tore away from its fastenings. As already stated, these reports or explosions came immediately before the bridge fell. The engineer of the train on the bridge said they sounded like short thunder claps. They were so loud that they were heard distinctly in



In This Wreck Are the Temporary 377-Foot Span, the Falsework, and 12 Loaded Coal Cars.

Railroad Company were on the spot, and made an examination of the portions standing and of the fallen mass. The SCIENTIFIC AMERICAN can say on the authority of Chief Engineer Carothers of the railroad com-



Traveler for Removing and Erecting Trusses.

pany, who made a personal investigation, that thus far nothing whatever has been found in the falsework or permanent construction to indicate that the trouble was due to any weakness or defective workmanship.

As to the theory that explosives were used, the peculiar sounds have not been accounted for. These were entirely distinct from the noise made when the super-

the towns on either side of the river, and after them came the crashing noise as the structure gave way. It might be added that guards have been placed on and in the vicinity of the structure for some time past, as the construction company, which employs non-union men, claims it feared that damage might be done by persons opposing its policy.

The work is one of the most extensive being undertaken in the United States, the length of the bridge being 7,000 feet. It is to sustain two tracks, and the metal construction alone comprises 20,000 tons of steel, some of the girders in the section which collapsed weighing 85 tons. Consequently this part represented less than five per cent of the total length of the bridge and about the same proportion of the total weight, or 1,000 tons, excluding the coal cars and traveler, which, if added, would make a total of 1,700 tons.

The Current Supplement.

The current SUPPLEMENT, No. 1710, is opened by B. S. Bowdish with an instructive and entertaining article on our fly-catchers, copiously illustrated. In three papers during the past two years Prof. T. J. J. See of the United States Naval Observatory has dealt with the cause of earthquakes and mountain formation, and has developed a new theory, according to which mountains are due to the secular leakage of the ocean through its bed. His further researches on the subject are briefly summarized in the current SUPPLEMENT. Thomas Oxley writes on some seventeenth and eighteenth century bottles. Aeroplane building has become an industry in France. A brief illustrated article gives one a glimpse of an aeroplane factory. Dr. Francis Darwin's striking paper on the movements of plants, in which he proposes the theory that the growth of the individual and the evolution of the race are processes of what may be called unconscious memory, is concluded. The part played by industrial dust in disease is briefly described. A thorough explanation of pneumatic caissons is given by Mr. T. Kennard Thomson, the well-known New York engineer. He shows clearly how they are used in the construction of tall buildings. The article will be published in two or three numbers of the SUPPLEMENT. Alfred A. Wohlauer contributes an excellent discussion on the present status of the flaming arc lamp. Among the minor articles may be mentioned those on the Tantalum Detector for Wireless Signaling; Power Measurement of Engines; The Carnot Cycle; The Development of Invention. The usual Science Notes, Engineering Notes, and Trade Notes and Formulæ, will be found in their accustomed places.

Aeronautics at Home and Abroad.

On September 28 Wilbur Wright made a flight of 1 hour, 7 minutes, and 11 4/5 seconds, and covered a distance variously placed at 32 to 36 miles. The next day he made two flights with a passenger, the first lasting 11 minutes and 36 2/5 seconds, and the second lasting 6 minutes and 15 seconds. The large gold medal of the Aero Club of France has been given to the Wrights.

Orville Wright's time for delivering a military aeroplane to the United States government has been extended to June 28, 1909.

Henry Farman on October 2 flew 40 kilometers or about 24 miles, at the rate of almost 54 miles an hour. This is said to be the world's record for speed.

The Aeronautic Society has decided to hold a contest on November 3 (Election Day). Octave Chanute has offered first and second prizes of respectively \$50 and \$20 for the best gliding performances.



View of Wreck from Opposite Side to That Shown Above.
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