THE STRATFORD TROLLEY CAR DISASTER.

The recent deplorable trolley car accident at the upper part of Stratford, Connecticut, in which twenty-nine people were killed and sixteen were more or less seriously injured, is certainly one of the most shocking disasters in the history of the electric railroads. Speculation has been rife as to the predisposing cause which led to this wholesale loss of life, but the facts that have been brought out at the inquest, coupled with a personal inspection of the site by a representative of the SCIENTIFIC AMERICAN, leave but little doubt in our own mind as to the train of causes which precipitated the disaster.

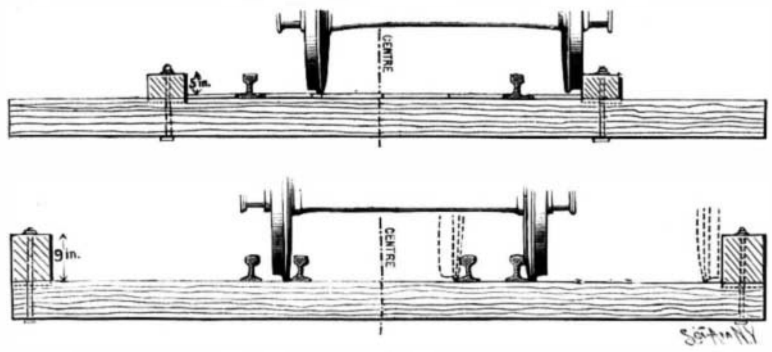
The accident occurred on the afternoon of Sunday, August 6, on the extension of the Bridgeport and Stratford Electric Railway through the north part of Stratford to Shelton, ten miles north, and known as the Shelton Street Railway. The extension runs north from the old road along the highway of the former town for about a mile, and then turns to the left over private property across the site of an old mill-pond, which had been drained during the building of the road. The track crosses the depression in which the pond lies by means of the steel bridge shown in the accompanying illustrations, which was built by the Berlin Iron Bridge Company, and, except in the particulars to which reference is made later in this article, appears to be of the best design and construction. From the point where the track leaves the highway to the bridge is about 700 feet, and the grade descends at the rate of three feet in one hundred until the bridge abutment is reached.

The total length of the bridge is about 400 feet. It is carried on steel piers resting upon masonry foundations. The trusses are of the deck type, and the floor consisted of ties 6 × 8 inches × 14 feet in length, laid on and bolted to the steel trusses and spaced and held in place by two guard-rails of oak measuring 6 × 10 inches, which were notched down over the ties and secured to them by screw bolts. The guard-rails were spaced about 12 inches on the outside of the rails.

The road was entirely new, having been opened for traffic only three days before the accident occurred, and the approach to the bridge appears to have been in a very unfinished condition. This approach for the whole 600 or 700 feet of its length consisted of a sand and gravel fill, upon which the ties had been laid, but no great amount of tamping or surfacing had been done.

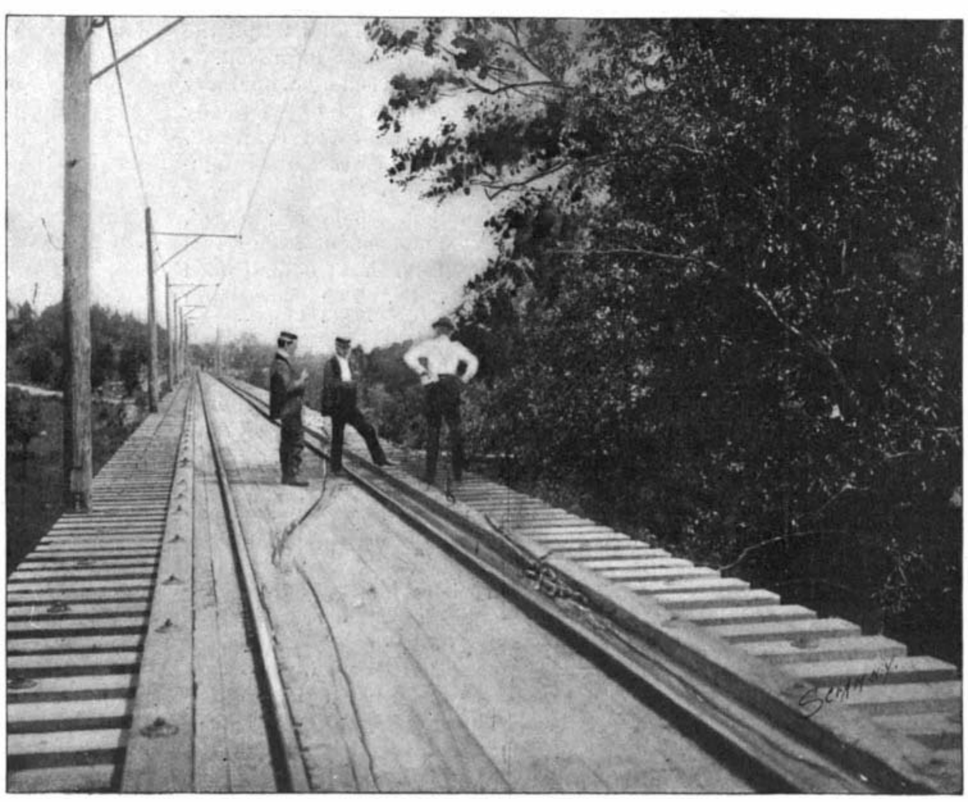
The car was of the four-wheeled, rigid base type, with the axles placed well in toward the center, and long overhangs. It was heavily loaded as it turned out from the highway and started on its fatal trip down the 600 or 700 feet of grade and across the bridge. According to the evidence of the motorman, when he started he turned the controller three notches and did not shut off the current until he was within 100 feet of the bridge. He says that the car was not running fast, or any faster than usual; but it is easy to calculate that the acceleration due to a descent over several hundred feet of a 3 per cent grade, aided by the current due to the controller being one-third open, would result in a speed that was probably between 25 and 30 miles an hour. The rapid movement of the car over a new and practically unballasted track appears to have produced a fore and aft "teetering" of the car—a result which invariably follows when a car of this type with a long body and short wheel-base base passes over an uneven track. This motion was probably greatly aggravated when the forward axle passed from the elastic roadbed to the unyielding abutment, the motorman testifying that it "jolted a little" at this point. It is quite conceivable that the vertical oscillation had reached a point where the load was practically all taken off the forward axle, and under such conditions it would only require a slight sidewise pressure to cause the right-hand wheel to mount the rail.

Now that this was what happened appears probable from the evidence. The motorman stated that he first noticed that something was wrong when he was about 15 feet on the bridge, and the expert engineer who made an examination of the bridge states that the wheel climbed the rail at 10 feet from the abutment. The flange seems to have ridden upon the rail for 30 feet before dropping into the space between the steel rail and the guard-rail. The wheel then ran for 28 feet against the inside of the guard-rail, which it finally mounted, the car continuing to run diagonally upon the ties for another 30 feet until it finally toppled over and fell bottom up a distance of 37 feet to the bed of the mill-pond below. The fearful mortality was largely due to the weight of the heavy motors under the floor with the added weight of the wheels crushing the roof-supporting posts, the victims being thereby imprisoned between the floor of the car and its roof. Our upper illustration shows the car floor intact except the motor opening, while the seats are demolished excepting that in the rear. The car was turned back into the position shown and the dead removed from the spot indicated by the confused mass of debris.



1.—The upper drawing shows bridge floor as built; the lower drawing shows improved floor with both inside and outside guard-rails.

2.—Wrecked car lying beneath the bridge.



3.—Deck view, showing where car left the bridge.
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There are many lessons to be learned from this disaster. In the first place, it is simply courting disaster to allow suburban trolleys to run upon newly laid tracks before they have been properly ballasted, aligned, and surfaced, particularly if the cars are of the long body and short and rigid wheel-base type.

The second lesson is that the style of guard-rail used on this bridge is unable to keep a car on the bridge if it jumps the rails when going at high speed. If wooden ties are used they should be inside and not outside the rails, for we must remember that the tread of the wheel is raised about an inch from the ties by an amount equal to the height of the flange, and if, as in this case, planking is laid on the ties, another inch of height is lost. It is probable that the effective height of the guard-rail was not over 3 inches, for we must subtract one inch for notching down over the ties, one inch for the planking, and one inch for the height of the wheel flange, leaving only 3 of the 6 inches of depth of the guard-rail available.

As a matter of fact, however, good construction demands that a steel rail guard be placed about 5 or 6 inches inside of each main rail. Had such rails been in place on this bridge, when the right-hand wheel dropped over to the right of its rail the left-hand wheel would have had the full height of a 5-inch steel rail to prevent its further movement in a lateral direction across the bridge. If by any chance it had climbed this rail, it would still have had to climb the right-hand steel guard-rail, and with the assistance of an 8 by 10 wooden guard-rail placed on the extreme ends of the ties, as shown in our engraving, the further progress of the car would be arrested.

The tracks of the derailed car are outlined in our lower illustration, which was made from a photograph kindly loaned us by The New York Herald. It will be seen by the track on the right that the face of the right wheel pressed against the edge of the guard-rail with such force that it finally struck a soft or biting spot, which assisted it in mounting the guard-rail.

A floor system constructed on the lines above shown would, in our opinion, be a perfect safeguard against such disasters as that of August 6; but as long as the control of a derailed car is left to a couple of wooden stringers placed on the outside of the rails, the chances of its remaining on the bridge are exceedingly slim.

A School for Motormen.

The Metropolitan Street Railway Company of New York has a regular school for motormen, which is described in a recent number of The Street Railway Review. The men are not given any theoretical instruction, the idea being merely to teach them the practical duties connected with their work. A book of rules is given to each new man, with which he has to acquaint himself, and he is obliged to undergo an oral examination in it. The practical drill, to which considerable time is given, is rendered possible by a room which has fifty controller or brake equipments. The instructor gives bell signals, and the men operate the controllers and brakes according to the signals which they receive. After a thorough practice in controller and brake manipulation, the student is instructed in the clerical work to be required of him and then is placed with a sub instructor on a car for two or three weeks. The company is satisfied that the school gives it better men than they would obtain by immediately handing a raw recruit over to an experienced motorman to be broken in, and considers that it saves them large sums, not only in motor and controller repairs, but also on the accident account. Weekly lectures connected with their employment are also given in the schoolroom, which are free to the employés of the company. They also have the use of a club room, with a library and reading room.

THE Pennsylvania Railroad is now running a train between Washington and Atlantic City, a distance of 206 miles, in four hours and twenty minutes.