told that this diagram applies to-day. Steel underframes are overhauled when about 15 years old, very little work being required in intervals of 15 years after that. As far as I can learn no metal frames of the heavier sections in ordinary service have ever worn out or corroded to the point requiring them to be discarded. It is apparent that the cost of repairs of the wooden boxes is far greater than that of the metal frames of the same cars.

These people cannot understand our general use of wooden cars for either passenger or freight service. Passenger car construction over here is tending in a marked way toward universal use of steel underframes and increasing use of steel in upperframes. An excellent example of metal work is the metallic window sash of European cars.

My notes cover many other interesting details, but these letters must soon be brought to a close.

G. M. B.

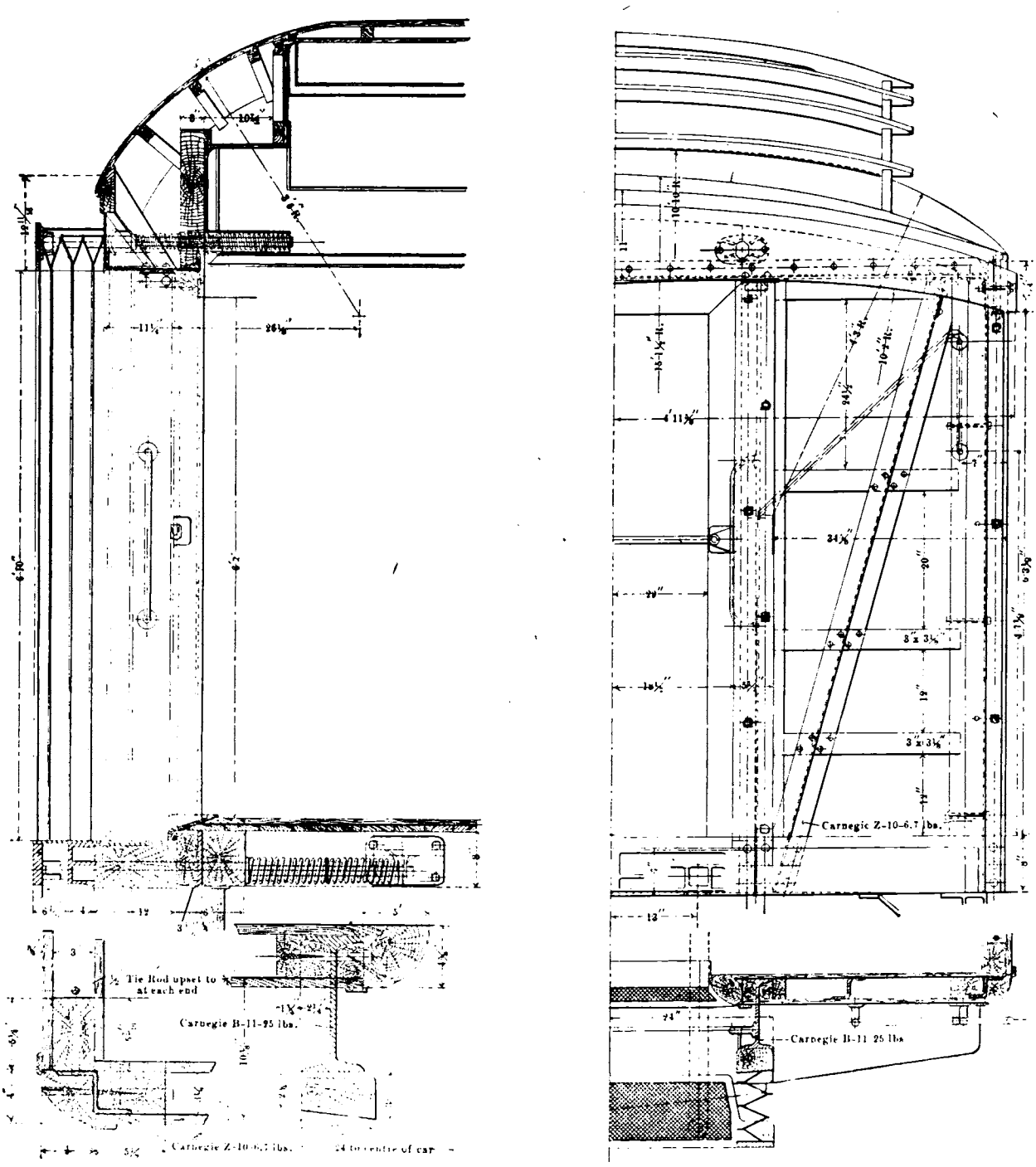
(To be continued.)

REINFORCEMENT OF POSTAL CARS.

PENNSYLVANIA RAILROAD.

In accordance with suggestions from the United States mail service officials, the end construction of postal cars on the Pennsylvania Railroad has been reinforced, as shown in these engravings. The reinforcement provided is even more effective than that suggested. Its purpose is to increase collision resistance.

In addition to the plates applied to the outside faces of the center sills and the inside faces of the side sills and the outside faces of the end sills, large rectangular castings are applied at the corners of the underframe; the end framing is reinforced in an entirely new way. The ¾ x 8-in. plate reinforcing the end sills receives the attachment of 10-in. 25-lb. I beams, forming posts for the vestibule opening. Across these I beams at the top is a horizontal plate with flanges of

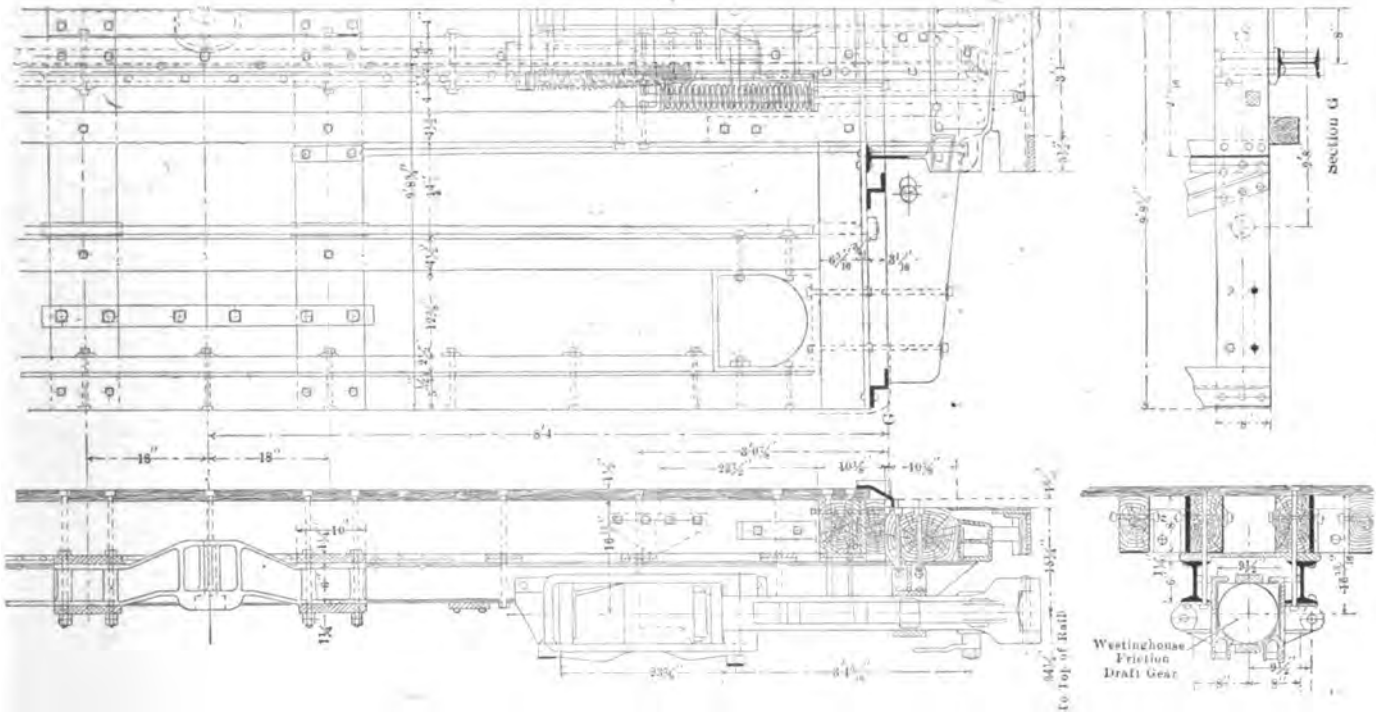


REINFORCEMENT OF END CONSTRUCTION OF POSTAL CARS.
PENNSYLVANIA RAILROAD.

angles, to which is connected a vertical plate across the end of the car for a finish. The horizontal plate referred to increases the collision strength of the upper portion of the vestibule. In addition to the I beams, Z bars pass diagonally across the end panels of the car, as indicated in the drawing, these being riveted to the end sill reinforcing plate at the bottom, and secured by angles to the horizontal plate at the top. Other Z bars are built in the corner posts of the car and are riveted to the end sill reinforcing plate at the bottom and the same horizontal plate at the top.

The draft sills of this car are 6-in. I beams extending 13 ins. beyond the inner bolsters. These members receive plates on their upper faces, at each side of both bolsters, and another fits between the two bolsters these plates being riveted to the upper flanges of the I beams. The drawing of the complete framing at the end of the car illustrates the application of the Westinghouse draft gear and the Standard Coupler Company's steel platform, which has been applied to some of these cars which are now in service.

The car itself is similar in its general features to previous construction on this road. Its interior arrangements, however, have been modified to suit recent requirements of the department to produce a combination car, which may be used



REINFORCEMENT OF END CONSTRUCTION OF POSTAL CARS—PENNSYLVANIA RAILROAD.

either entirely for newspaper mail or first-class matter. The floor plan illustrates the large number of cases at one end of the car which are arranged as permanent fittings, but installed in such a way as not to interfere with the use of the car for paper mail when the racks are folded down from the wall.

The end reinforcement is built in accordance with patents issued to Mr. W. F. Kiesel, assistant mechanical engineer of the Pennsylvania Railroad.

Inasmuch as the Interstate Commerce Commission inspectors are very closely watching automatic couplers for the breakage of devices and coupler pin chains, which necessitate going between the cars to make couplings, it seems advisable to direct attention to the importance of one of the primary elements of draft rigging. That is the construction of the rigging so that the coupler cannot travel beyond the standard allowance of motion of 1¾ ins., or 2 ins. at most. If the construction is such that it cannot possibly allow more than that amount of motion to the coupler, it will be impossible for the chains to break under legitimate usage. Perhaps this feature of draft rigging has been overlooked. It should not be longer neglected.

A statement was printed last month giving credit to the shops of the Chicago & Northwestern Railway for the general repairs of 50 locomotives per month in a shop with but 21 pits. Attention has been called to the fact that record had already been made in this journal of general repairs at the rate of more than three engines per pit per month in other shops. In this connection it should be stated that at Altoona 3¼ engines per pit per month are turned out of the erecting shop. This, however, is a shop well equipped with crane service. The performance of the Chicago & Northwestern does not suffer in comparison, because the Chicago shops are not fitted with cranes, the only large crane at those works being in the boiler shop.

AIR OPENINGS UNDER LOCOMOTIVE GRATES.—There seems to be no doubt that there is a direct loss of heat when the air supply is inadequate and that a considerable saving may be accomplished by properly designing the damper openings. In an extract from the report of a committee before the Northwest Railway Club, which appeared on page 102 of our March number, the statement was made that the loss of heat when the air supply is not adequate sometimes reaches 25 per cent., and attention was drawn to the fact that damper openings on some of the newer types of locomotives were entirely too small.

For perfect combustion 8 lbs. of oxygen are required for every pound of hydrogen and 2 2-3 lbs. of oxygen for every pound of carbon. It has been suggested that by staying the firebox with hollow stay bolts with an inside diameter of ⅛ in., perfect combustion may be obtained. It is impossible to get sufficient air through the grates, and air in excessive volumes must not be admitted above the fire bed. The air which it would be possible to get through 1,000 or more hollow stay bolts with ¼-in. holes might not be sufficient for perfect combustion, but it would furnish enough oxygen to pay for the hollow stay bolts several times over. As the air passes through these stay bolts the risk of burning them is decreased and the expansion of the bolt is reduced, and thus the liability of cracking the sheets is lessened. In addition the exhaust of the locomotive drawing the current of air through the hollow bolts keeps the holes open and affords a means for detecting breakage inside as well as outside of the firebox. The bolts are rolled hollow and the strength is thus increased and the bolt is more flexible.