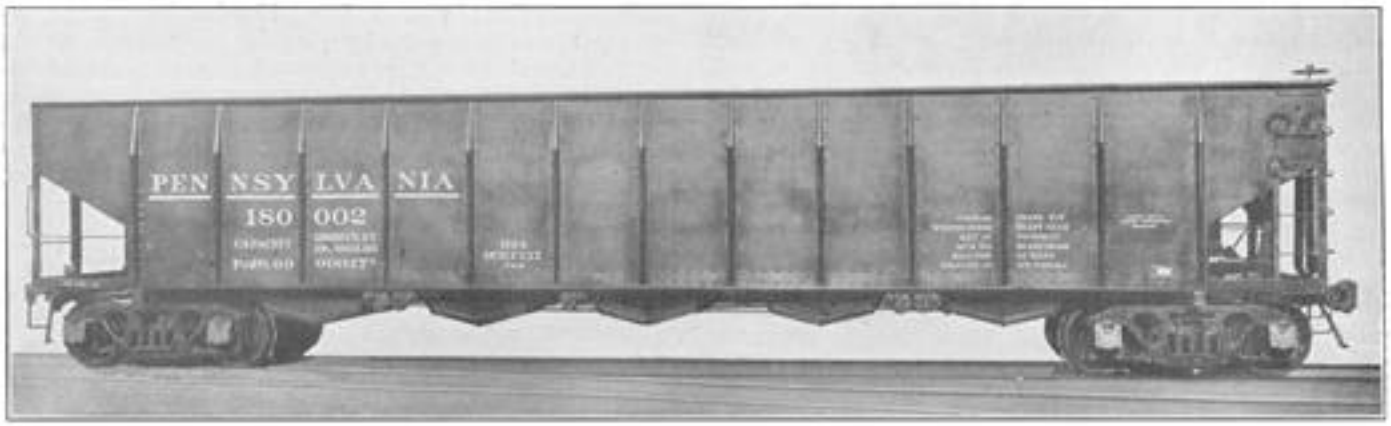


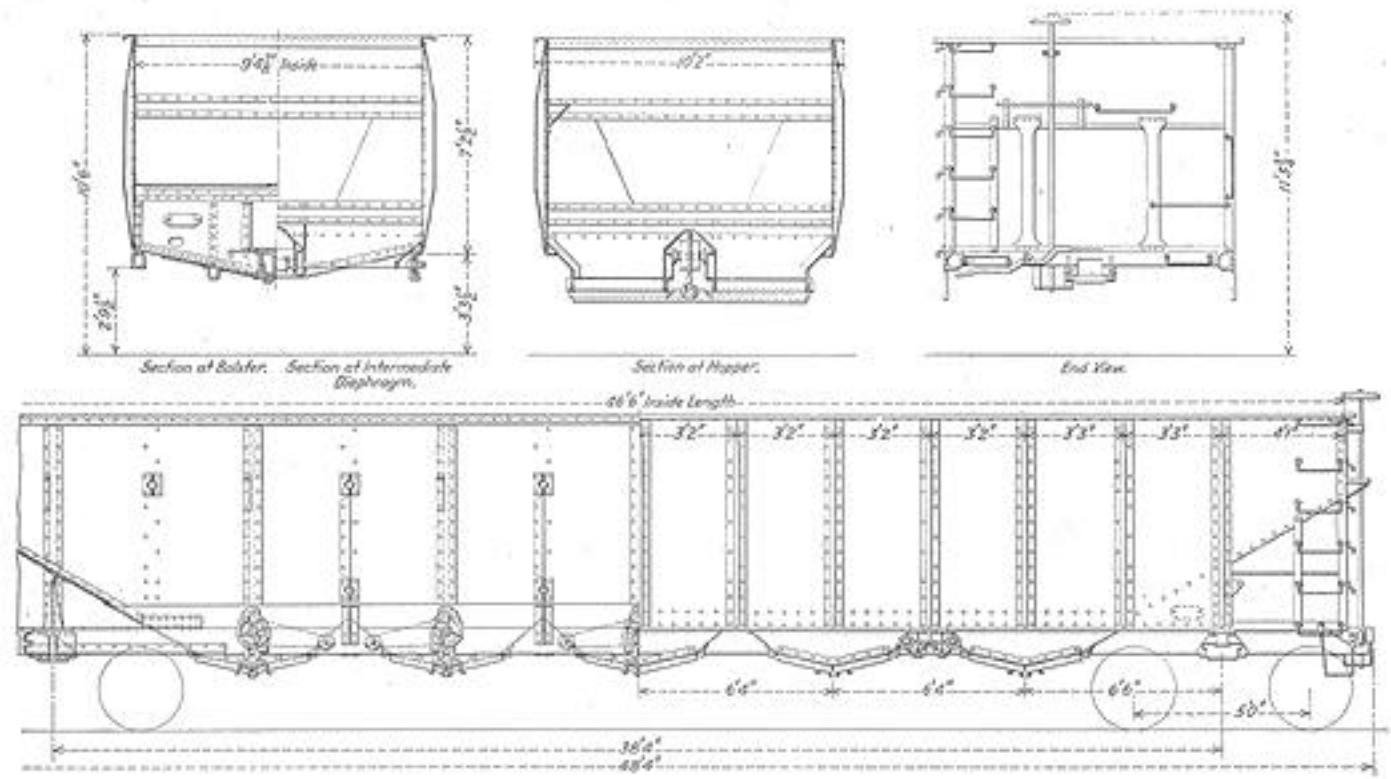
PENNSYLVANIA 85-TON HOPPER CARS

An All-Steel Coal Car Having a Light Weight of 60,000 Lb. and 3,228 Cu. Ft. Gross Cubical Capacity

THE Pennsylvania Railroad has gone one step further in the construction of its all-steel hopper cars and is building, at its Altoona shops, a car which has a capacity of 170,000 lb. and a light weight of 60,000 lb. The new design is known as the Class H-24 car and is patterned after the Pennsylvania Class H-21a hopper car, the details of which are interchangeable. In the new car the cubical capacity has been increased to 3,228 cu. ft. This large amount has been obtained by the addition of a bay 6 ft. 4 in. long thus requiring five hoppers instead of four, which is the number now being used in the Class H-21a equipment.

The general dimensions of the car are as follows:

Light weight	60,000 lb.
Length over end sills	48 ft. 4 in.
Length inside	46 ft. 6 in.
Distance, from center to center of truck	38 ft. 4 in.
Width, extreme	10 ft. 2 in.
Width, inside	9 ft. 4⅜ in.
Extreme height from rail	10 ft. 6 in.



Elevation and Sections of 85-Ton Hopper Car for the Pennsylvania

Truck wheel base	5 ft. 10 in.
Truck weight	15,050 lb.
Capacity	170,000 lb.
Cubical capacity:	
Level with the top	2,900 cu. ft.
Contents heaped	328 cu. ft.
Total	3,228 cu. ft.

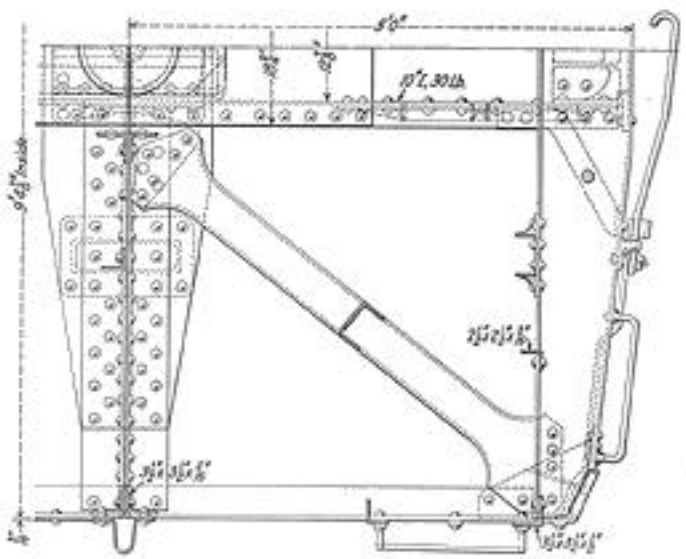
Underframe.—The underframe is characteristic of former Pennsylvania designs, having a well-balanced central member to absorb the buffing stresses, while the major portion

of the load is carried by the side construction. The center sills are two 10-in., 30-lb. channels, 48 ft. ¾ in. long, strengthened latterly by spacers at the diaphragms, as well as by cover plates at either end. Cast steel striking plates join the end and center sills. The center sills are further reinforced by two other steel castings, which extend forward and backward a sufficient distance from the center line of the bolster to form a draft gear stop and act as a spacer for the center sills at the point where the body bolster is joined thereto. The center sill cover plate and bottom reinforcing angles are not continuous on account of the clearance required by the drop door operating device. A U-shape ridge sheet, the four sections of which form a continuous member extending between the end slope sheets, is substituted for a continuous cover plate, and is so attached to the center sill that there is at least 24 sq. in. of metal to resist buffing. The bottom member of the side construction is a 4-in. by 4-in. by ⅝-in. angle. The end sills are pressed Z-shape members.

The body bolster is composed of a ¼-in. vertical web plate, cut out over the center sills to permit them to pass through. It is secured at the top to the end slope sheets by two 5-in. by 3½-in. by ⅜-in. angles, 8 ft. 10 in. and 6 ft. 8½ in. long. It is strengthened at the bottom by two 5-in. by 3½-in. by ⅜-in. reinforcing angles, which extend from the center to the side sills. A tie plate passes under the center sills and is riveted to the web plate reinforcing angles on either side, as well as to the center sills, the center sill reinforcing angles and the center sill casting. The center plate is a drop forging.

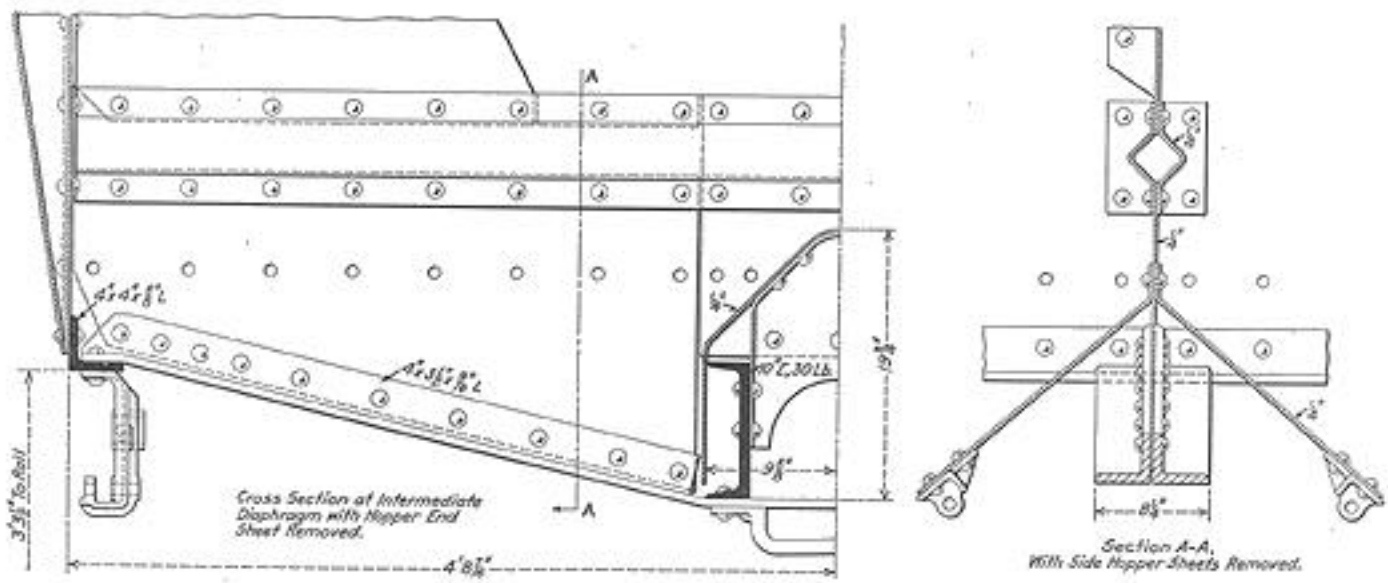
Four intermediate diaphragms located between the five hoppers transfer the major portion of the load from the center to the side construction. The diaphragms, like the bolster, are of the single plate type, which gives the maximum amount of space for the hoppers. The ¼-in. diaphragm sheet is divided into three parts, one on either side of the center sills and the central portion immediately above, all of which are joined together by the cross ridge sheets and lower cross ties. The bottom of the web plate is reinforced by two

distinct members; viz., a 5-in. 19.3-lb. bulb angle, as the top member; a 4-in. by 4-in. by ⅝-in. angle as the bottom member, previously mentioned as part of the underframe; twenty-six vertical U-shape posts spaced 3 ft. 2 in. and 3 ft. 3 in. apart, as the details demand, and 3/16-in. side sheets which connect the other three parts. Alternate posts in conjunction with inside butt strips join adjacent



Half Plan of Bolster and End Sill of Pennsylvania Hopper Car

side sheets. The end consists of a 4½-in. by 5-in., 19.3 lb. bulb angle at the top, and a 3/16-in. end sheet connected to the sides by the steel corner casting and an angle corner post. The end sheet extends downward 2 ft. 9¾ in. from the top of the bulb angle and is flanged inward at the bottom to support the floor slope sheet. The end floor sheets, ridge sheet and side hopper sheets all slope into the drop



Section Through Intermediate Diaphragm of Hopper Car

4-in. by 3½-in. by 9/16-in. angles, the vertical leg of which is cut off at the center sills, allowing the horizontal leg to extend under the sills, thus forming a continuous member from side to side of the car. The top of the intermediate diaphragm web plate terminates between the flanges of a diamond-shaped pressed steel cross brace. Immediately below it are secured the ¼-in. hopper slope sheets, to the lower edge of which the drop door hinge castings are riveted.

Superstructure.—The side construction is composed of four

bottoms at an angle considered sufficient to discharge the load when the doors are open.

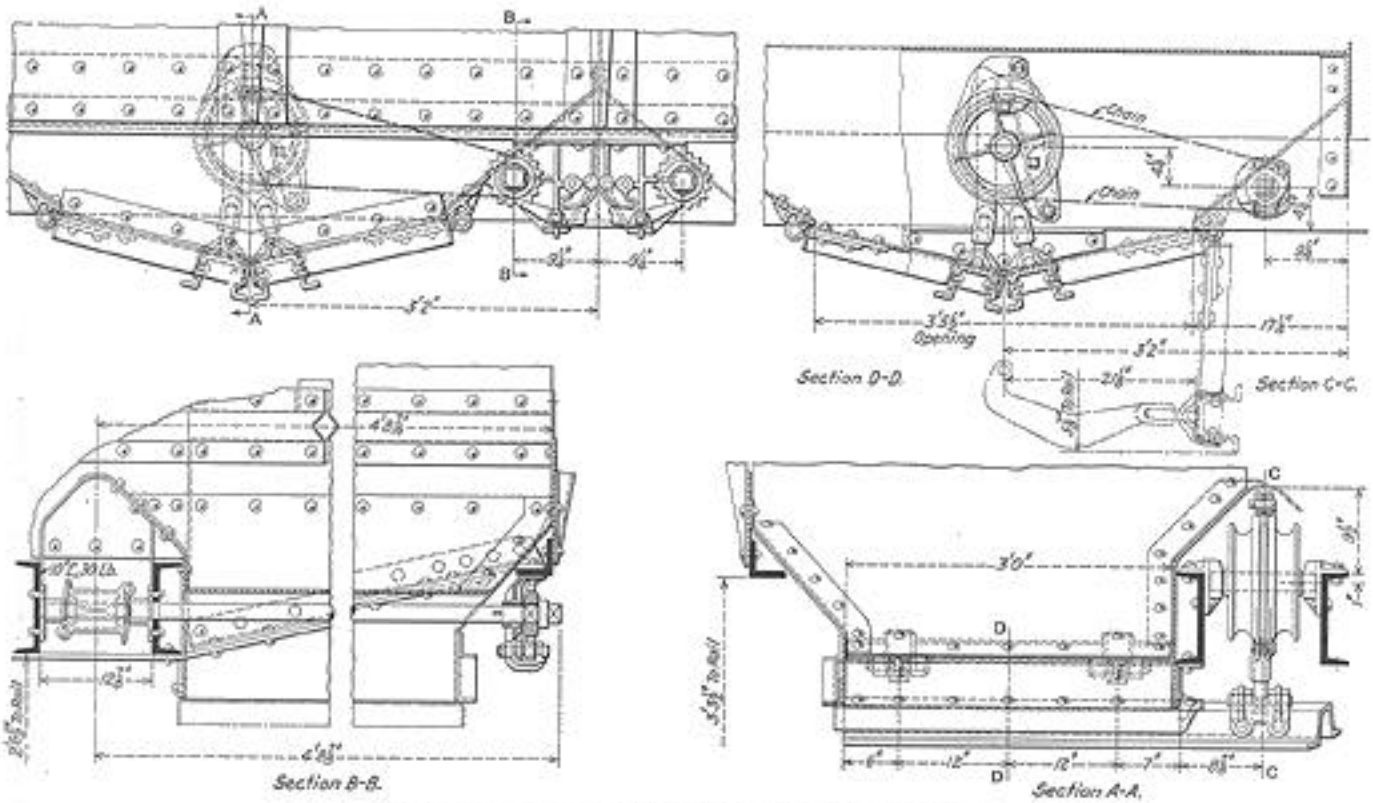
Eight diamond-shaped cross braces, two above each intermediate diaphragm, tie the sides of the car together. These cross braces are located one above the other at a distance of 42 in., the center line of the top one being 27 in. below the top of car. A vertical ¼-in. gusset plate, 18 7/16 in. wide at the top and 34 in. wide at the bottom, is riveted between the lower flange of the upper and the upper flange of

the lower cross brace, as well as to the side sheets, thus adding materially to the stiffness of the superstructure. The car has five hoppers which are divided by the ridge sheet which spans the center sills into two units each. Each unit has a pair of drop doors which are operated by a mechanism controlled from the side of the car. When in the release position they have a maximum opening of 3 ft. 5½ in. by 2 ft. 11 3/16 in. per pair of doors.

Door Operating Mechanism.—The arrangement of the drop doors and the mechanism for operating them is shown in one of the illustrations. Each door is connected to chain sheaves by two links as shown in section *AA*. The door link is attached to the door channel by an adjustable T-bolt which permits the door being adjusted so it will close tightly. The sheave is located directly above the center line of the door opening, between the center sill channels. These sheaves are operated by a chain which passes over the drum shown in section *BB*, which is operated by the crank from the side of the car. Ratchet wheels and pawls hold the door in any position desired. In the design of the entire arrangement, effort has been made to have it as simple as possible and easily adjusted.

Trucks.—The car is carried on two cast steel side frame trucks, having a 5-ft. 10-in. wheelbase, 6½-in. by 12-in. journals, and wrought steel wheels. The side frames are of the box section type in which the brake beam hanger supports and bolster guides are cast integral. The cast steel journal boxes, secured at either end of the side frame with 1½-in. box bolts, are also tied at the bottom by ⅝-in. by 6-in. journal box tie bars, upon which rest two ½-in. shims which may be transferred to the top of the box, thus providing for 1-in. adjustment in the height of the center plate.

The spring plank is a pressed section ½ in. thick and 16 in. wide at the center, being spread at the ends to 20 in. The spring plank supports the third point suspension spring which is located at the center and extends in either direction along the center line of the car a sufficient distance to support the end of the brake beam strut. The bathtub type bolster is composed of a 15/16-in. plate with a ⅝-in. cover plate riveted to the top flanges, supporting the drop forged center plate and side bearings. The bolster is 7 ft. 8 in. long, 17½ in. wide and 14¼ in. deep at the center, tapering to 7¼ in. at either end.



Arrangement of Drop Doors for Pennsylvania Hopper Car

"ONE COAT" PAINT FOR FREIGHT CARS

BY J. H. PITARD

In response to a popular demand for methods of expediting the repairs of freight equipment in the shops, so-called "one coat" paints have appeared in the field and apparently are meeting with favor. Before adopting these paints for general use on freight equipment it is advisable to consider well the degree of protection which they afford and the cost as compared with the usual method.

Some of the "one coat" paints that have come under the writer's observation have proved to be of good quality and make a very creditable showing, but there is still some doubt as to their value as a protective coating. The thickness of the paint film has much to do with the protection afforded either on wood or metal cars, but more especially on metal, for the reason that linseed oil which is the binder vehicle in all freight car paints, is hydroscopic to some extent; that is to say, it will absorb a certain amount of moisture even when mixed with the pigments. Unless the paint film is of sufficient thickness to prevent the penetration of moisture through to the under surface, the paint will not prevent damage to the car. Effective protection from moisture can only be secured by a thick coating, and it is not possible to obtain the proper degree of thickness with one coat of paint.

In the painting of freight equipment, proper discrimination should be shown in the treatment of metal and wooden cars. Regardless of how naked a wooden car has become, if decay has not set in, it can be effectively protected with paint. The surface of a steel car, however, should not be allowed to become exposed, as rusting when once begun is very difficult to check. It may be stopped temporarily with