From Railway Mechanical Engineer, Vol 91 #3, March 1917, pages 133-135

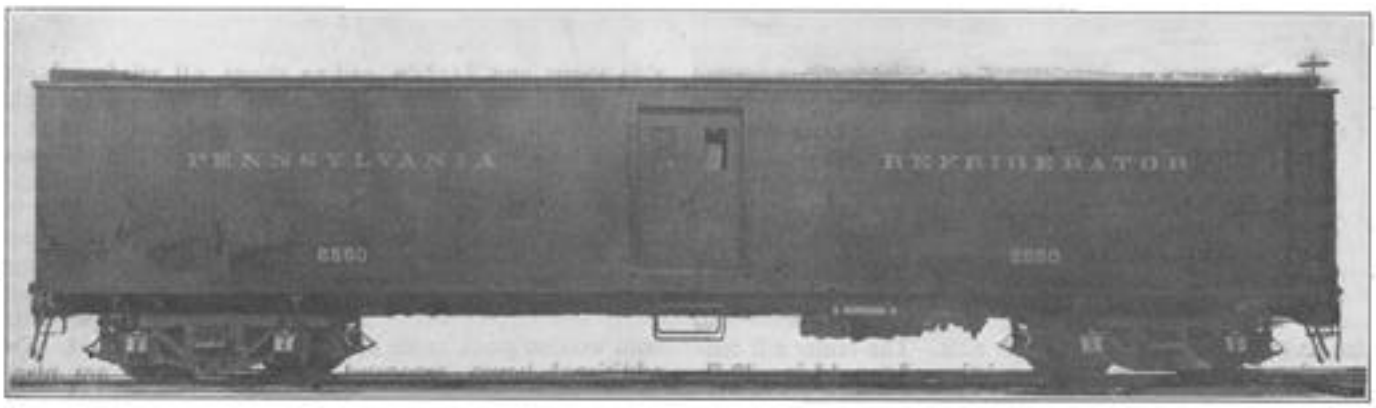
Car Department

PENNSYLVANIA RAILROAD REFRIGERATOR CARS

With a view to utilizing every means available to provide a car which will furnish and maintain adequate refrigeration for milk and cream, the Pennsylvania Railroad has recently designed and built two refrigerator cars which, in many respects, represent a distinct departure from past practices. The cars are designed to use ice either on top of the cans or in the bunkers and are also adapted to the shipment of other commodities than milk and cream.

Past experience and experiments made some years ago indicated the following basic requirements:

1. An inside lining that is watertight and keeps moisture away from the insulation.
2. Adequate continuous insulation fully surrounding the inside lining. The amount of insulation under the roof, which is liable to be heated excessively by the direct rays of the sun, should be greater than that in the sides and bottom.
3. The outside sheathing and roof should be weathertight.
4. The vertical air space around the ice baskets and through the ice should be adequate.
5. The bulkhead, in front of the ice chamber, should be solid, with an air inlet into the ice chamber, close to the ceiling, and an outlet into the car, close to the floor. The bulkhead should be made of non-conducting material, or should be insulated to promote dry refrigeration.
6. The floor should be smooth, to permit sliding the milk cans into place, and to provide a flat base for racks when the car is used for other shipments for which an air space under the lading is of advantage.

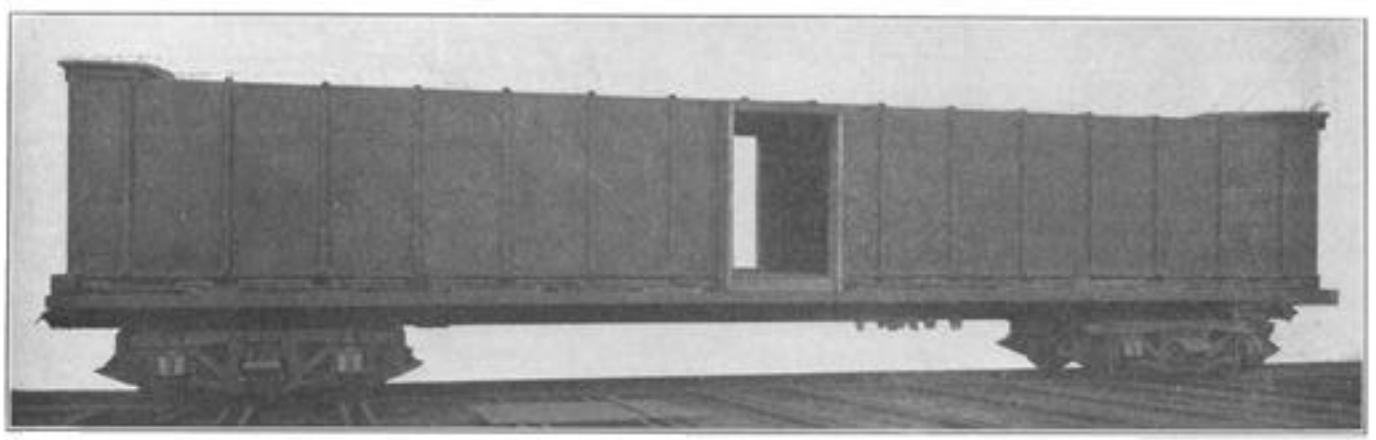


Refrigerator Car With Three Compartments for Rapid Loading

Two cars, differing from each other slightly, for experimental purposes, have just been completed and turned out of the Altoona Car Shops.

Car No. 2500, class R/50, is not partitioned; all of the space between ice baskets is in one compartment. The side doors are of the usual refrigerator type, and open outward.

Car No. 2550, class R/50a, has the space between the ice baskets divided into three compartments, by means of two insulated wooden bulkheads. The middle compartment is 6 ft. 2½-in. long, and is used for quick loading and unloading of cans and boxes from and to station platforms. The cans and boxes can be transferred to or from the other two compartments, which contain the refrigerating means,



Inside Box on Underframe; Insulation Under Floor

while the train is in motion. In this car the side doors are of light construction, and the insulated refrigerator doors are in the two partitions. With the exception of the differences just mentioned, these two cars are exactly alike.

The trucks are of special construction. The side frames are of cast steel. The side frame center opening, the spring plank, and the 5-ft. 6-in. wheelbase are the same as in freight trucks. The elliptic springs and bolster are the same as used on tenders; the bolster has no side motion. The ends of the frame are arranged for helical springs over the journal boxes and clasp brakes. The axles are of the passenger type, with 5½-in. x 11-in. journals, and the wheels are rolled steel, 33 in. in diameter. The journal boxes are pedestal type passenger car boxes. From this it will be seen that the

Side of Truck, Showing Spring Arrangement and Clasp Brakes

truck represents a combination of passenger and freight truck features.

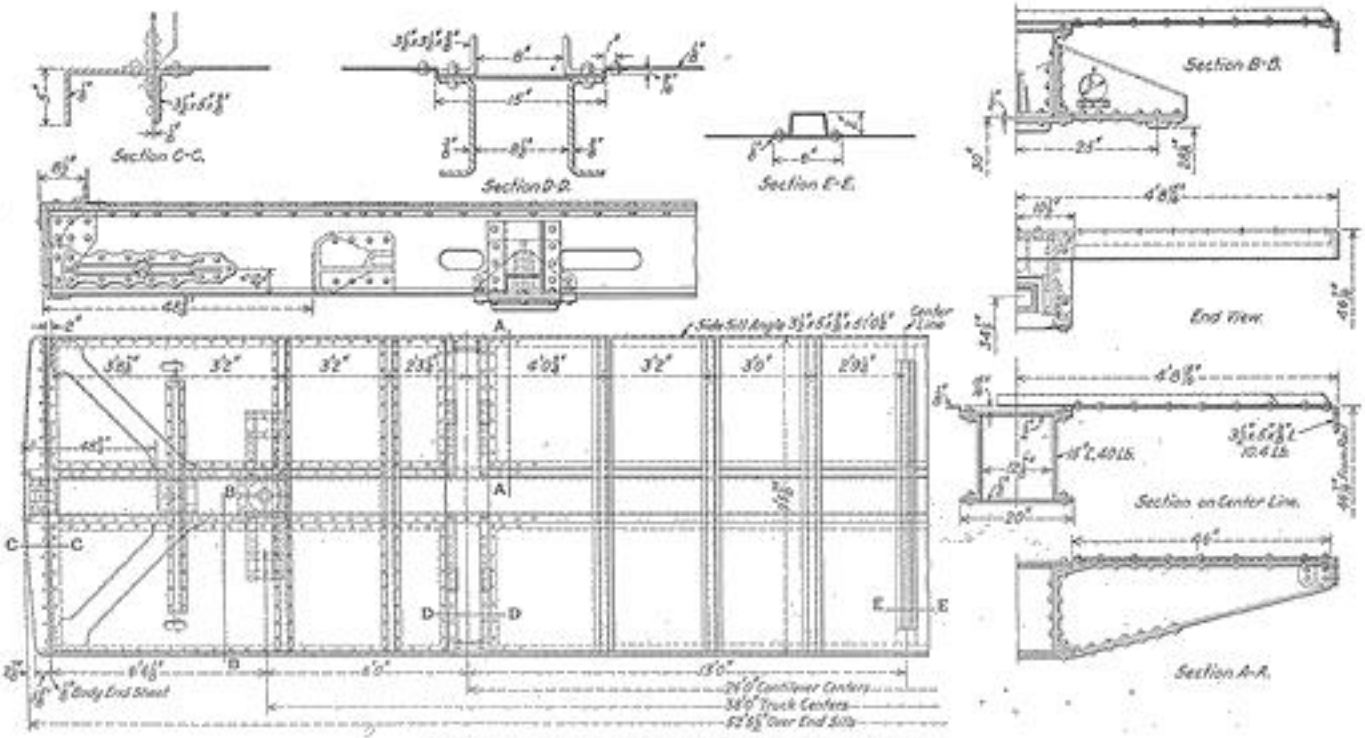
The underframe also combines passenger and freight principles. Bolsters have been omitted, and cantilevers to support the side bearings have been substituted. The load is carried on the end sills and crossbearers, whence it is transferred to the center plate through the center sills. The center sill construction is of the box type, consisting of two 15-in., 40-lb. channels, spaced 12⅜-in. apart, and two ½-in. by 20-in. coverplates. The side sills are 3½-in. by 5-in. by ⅜-in. angles. The spaces between the center sill coverplate and the side angles are covered with ⅛-in. steel plate, reinforced with U-shaped stiffeners, riveted on top. The back follower stop and front bumper castings are of the integral type used in freight cars. The center plates are drop-forged steel.

Oak blocks are placed on the end sills and crossbearers to support the steel box forming the inside lining. The spaces between these blocks are filled with insulation, consisting of four layers of ¾-in. Keystone hair felt, separated by wooden grids to form air spaces.

The inside lining consists of 3/16-in. floor plates, ⅛-in.

Truck Which Combines Passenger and Freight Features

side sheets and 3/32-in. ceiling sheets, all reinforced with U-shaped braces riveted to the outside. It forms a box which can be built up complete on the floor and then lifted to its proper location on the oak supports. The ¾-in. Keystone hair felt, of as great width as can conveniently be manufactured and cut to the proper length, is then lifted to the top of the lining box and unrolled to drop down the sides to meet and join the insulation under the floor. A continuous blanket is thus formed all around the inside box. There are four such blankets running transversely, separated with wooden grids, made of ½-in. strips of soft wood. Two additional layers, separated with wood grids, are placed



Underframe of the Pennsylvania Refrigerator Cars

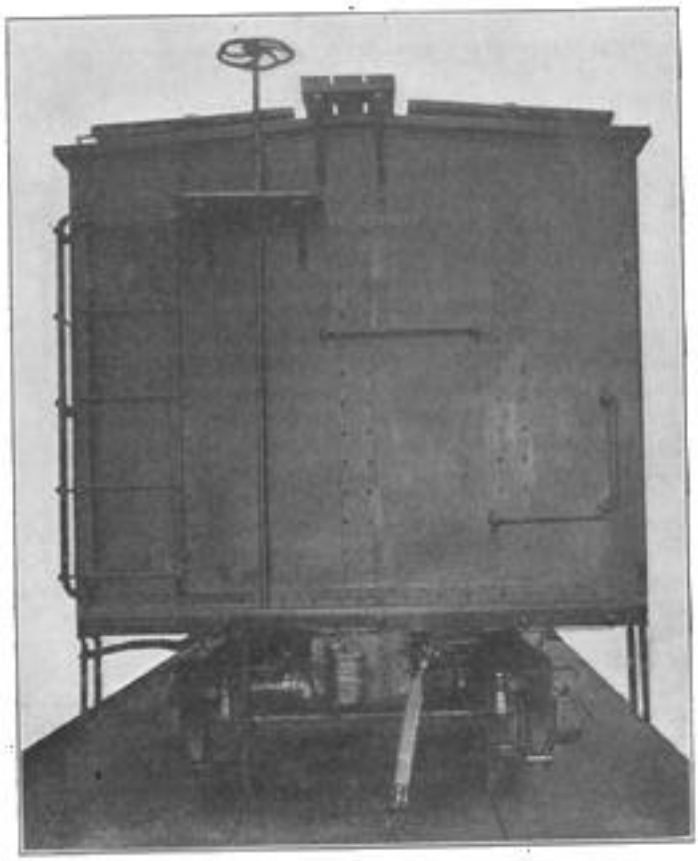
longitudinally on the top of the box, and four layers are placed at the car ends to correspond with the sides.

The Keystone hair felt referred to consists of ¾-in. hair felt placed between two sheets of 90-pound specification paper, and securely sewed together.

After the insulation has been applied, the sides, ends and roof are attached. These parts are also reinforced with

U-shaped braces, and are so designed that the riveting can all be done from the outside. This also permits removing a side, end or roof, for repairs, without disturbing any other part of the car. The connections between inside and outside steel shells are wood. The drains are made of indurated fibre. Hence there are no metal connections between the inside and outside steel shells.

The ice baskets are of the same construction as now standard on other Pennsylvania Railroad refrigerator cars, the



Hand-Brake End of Refrigerator Car

bulkhead in front of each ice basket being made of two courses of wood with an air space between them.

The general dimensions follow:

Length over inside sills	52 ft. 5⅛ in.
Length between ice chamber bulkheads	42 ft. 8¼ in.
Width over sheathing	9 ft. 6¼ in.
Width over roof	10 ft. 0⅜ in.
Width inside	8 ft. 5⅛ in.
Height inside (average)	6 ft. 9¼ in.
Weight of car, empty (lb.)	78,000
Ice capacity of baskets (lb.)	10,000
Loading capacity (lb.)	80,000
Loading capacity (cu. ft.)	2,450
Distance between centers of trucks	33 ft. 0 in.
Total wheelbase	43 ft. 6 in.

DESIRABLE FEATURES FOR GOGGLES.—In Technical Paper 102, published by the Department of the Interior, J. A. Watkins, of the United States Public Health Service, enumerates the following features as desirable in goggles intended to protect the eyes from the injurious effects of intense light: 1—Should shut out harmful rays. 2—Reduce the retinal image to a safe brightness. 3—Not unduly hinder vision of other objects besides those on which the employee is working. 4—Be light in weight, well fitted and as comfortable to wear as possible. 5—Have no metal parts that touch the skin. 6—Be fitted with a flange back of each lens so as to prevent glass from entering the eye in case the lens is broken by flying objects. 7—Be of such coloring that color perception is not unduly disturbed.

THE HOT BOX—ITS CAUSE AND CURE*

BY J. P. LEAKE
Chief Joint Inspector, Chattanooga, Tenn.

The principal causes of hot boxes, in my opinion, may be classified under the following heads: (1) Lack of lubrication. (2) Rough journals. (3) Bad journal bearings. (4) Overloaded cars. (5) Trucks out of alinement. (6) Lading improperly distributed.

(1) Improper lubrication is due largely to the packing getting hard and clammy and falling away from the journal, thus cutting off contact between the oily waste and the journal; the result is inevitably a hot box. To eliminate this cause for hot boxes, good material should be furnished. Wool waste is the best because of its elasticity. Capable and honest men should be used. Most roads depend on the oiler solely to do the inspecting of oil boxes, journals and journal bearings, and the necessity of good men is obvious. I have known instances where old men were used simply because they were not able to do other work. The disposition to keep old men at work so they can earn something in their declining years is commendable; however, I am of the opinion that the men who watch and keep the packing in a box so it will come in contact with the journal, should be honest, capable and in possession of all their faculties. Especially would I emphasize eyesight.

(2) Rough journals may result from seams in journals, due to flaws in the metal, which will develop after the journal has been in service for a time; also cut journals usually caused by hard spots in bearings. When journals become thus defective no amount of brassing or lubrication will overcome the trouble. Hot boxes are the result and the wheels must be removed or the journals dressed before the trouble is overcome. To prevent defects of this nature, the service of an expert oiler will be required—one who can determine when a journal requires attention before it reaches the point of causing a hot box.

(3) There are two reasons why a journal bearing will cause a hot box. One is the fact that it has been allowed to run too long before removal. The other is because of bad alloys in the metal which result in hard and soft spots causing uneven wear. A journal bearing in this condition, or one that has been allowed to wear thin and become distorted or broken, will cause journals to run hot. Here again the expert oiler is required, as he should be able to say when a bearing should be removed, or report on a lot of bearings that are giving trouble, so the test department can locate the exact cause.

(4) Overloaded cars cause a great many journals to run hot. The remedy is living strictly up to rules and instructions with regard to weighing and properly handling overloaded cars.

(5) Trucks out of alinement will cause journals to run hot, and may be eliminated by insisting that the inspectors see that the trucks are kept squared up and are running properly.

(6) Improper distribution of lading should be watched by inspectors. Cars found with lading unevenly distributed should be held for correction. This trouble is more often experienced with baggage cars.

The chief inspectors and the train crews especially should keep in touch with each other so that each may keep posted as to the cause and handling of hot boxes on the road. Generally the last man hired on train crews is the one who handles the hot boxes. He furnishes information on which reports are made to the superintendent. These reports go to the master mechanic and finally find their way to the oiler, sometimes with awful force. I have known good and loyal men to be relieved of their jobs because of persistent reports

*Entered in the Hot Box competition, which closed on October 1, 1916.