creosote, carbolinium, zinc chloride, or sodium fluoride is advisable. If earlier defects in construction are then corrected, such as insufficient ventilation, contact between timber and ground, leaky roofs, poor plumbing, and any other factors which permit the timber to become wet, there need be little fear of further infection.

"Every step in the eradication must be thoroughly and carefully taken, however, for traces of the fungus left in any portion of the building, where the timbers are moist, will continue to develop and spread to new timber and eventually cause further trouble. This precaution is particularly important, for the dry rot fungi during their development will have carried many gallons of water upward into the building and wetted many of the timber so they are soaked and dripping and hence susceptible to further infection."

Improved Design of A. R. A. Class IV Tank Car

Special Attention Given to Construction to Effect Low Cost of Maintenance and Safety in Operation

The following is a description of a tank car built in accordance with the American Railway Association standard requirements for a class IV car. Many features of interest have been brought out in this design. The following is an account of the principal items embodied in the construction of the car.

The General American Tank Car Corporation has recently completed the construction of 100 tank cars, built for the Phillips Petroleum Co., Bartlesville, Okla. While the cars are constructed in accordance with the American Railway Association's standard requirements for class IV cars, the design shows many features of interest which can be regarded as outstanding advancements in the construction of tank cars. The jacket has received special attention. It furnishes an excellent protection for the insulation. It can readily be removed, allowing access to the tank and to the insulation for necessary repairs. The anchor, the manhole frame and cover, the cast steel body bolsters and the flashing at the outlet nozzle which will permit an inspection of the outlet flange rivets, are among the principal features brought out in the design of the new cars.

Underframe

The center sill consists of two 13-in. rolled channels. They are placed back to back at a distance of 12⅞ in. and extend from striking casting to striking casting. The channels are reinforced by a ⅜-in. open hearth steel top cover plate which extends in one length between the end platform plates. Bottom reinforcement consists of two ¼-in. tie plates located at the intermediate running board supports.

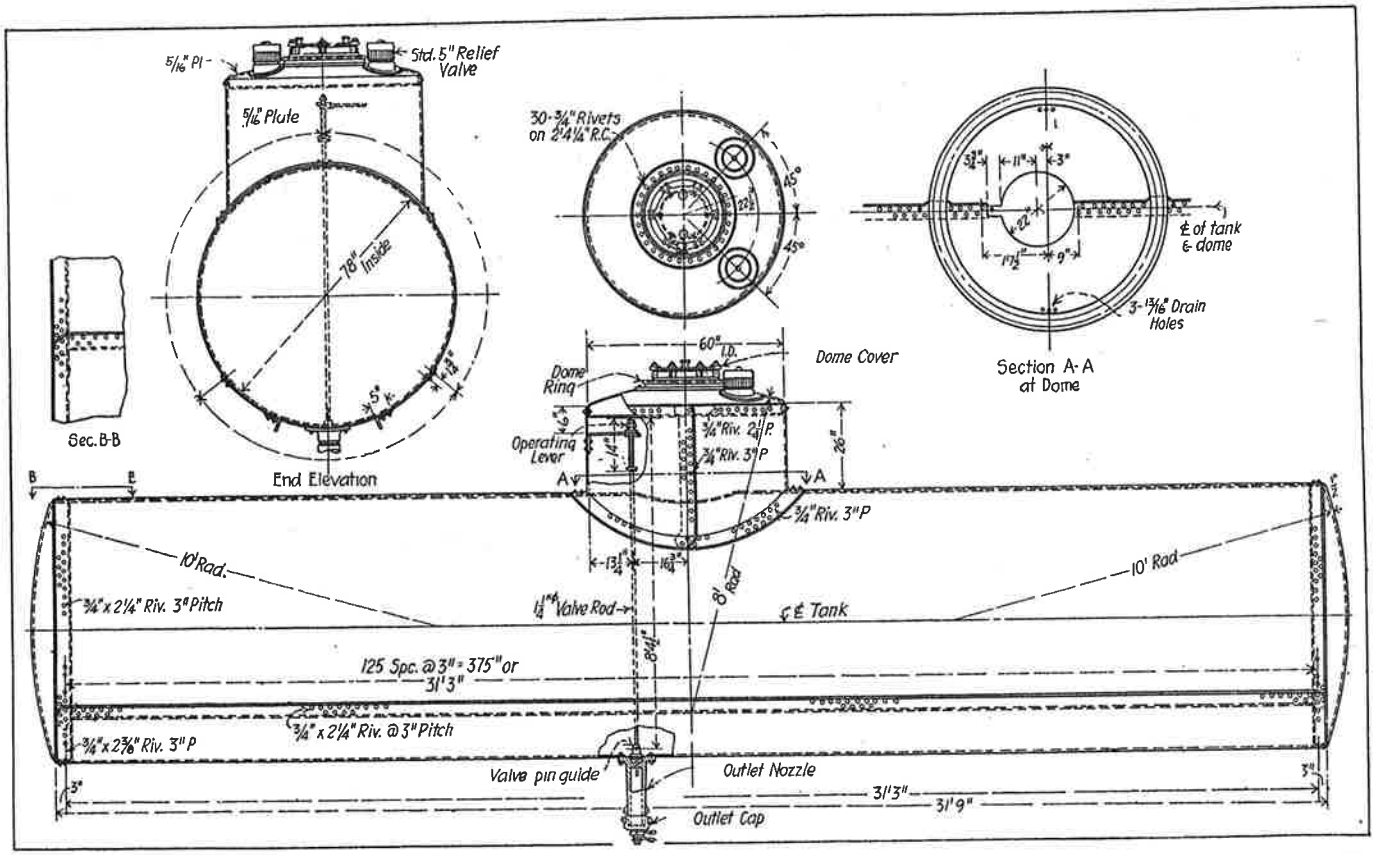
The total area of the center sill section is well within the A. R. A. standard minimum requirement of 30 sq. in. The channels have a combined area of 30.90 sq. in., which, including the area of the top cover plate, amounts to 39.40 sq. in., for the sill section. The center line of the draft is located near the center of gravity of the center sill section, which insures the ratio of unit stress to end load well within the A. R. A. requirements of .05.

Cast steel combined bolster center filler and back stops are used. Each body bolster consists of two steel castings placed on each side of the center sill, securely riveted to the channels and the center fillers. Push pole pockets and tank band lugs are cast integral with these bolster castings. They are also provided with brackets for the running boards. The body bolster castings, designed to provide support for the tank, have the top flange equipped with slots for the bolts for the tank support blocks. The application insures a self-adjusting feature and keeps the blocks always in contact with the tank.

The tank blocks are made of a good grade of car oak. Their application to the body bolster and the center sill is shown in the accompanying drawing. The blocks are cut to conform to the radius of the tank in order to insure full bearing on all bearing surfaces. They are fastened by means of ⅝-in. lag screws.

The end platform plate is pressed from a ⅜-in. open hearth steel plate. It extends the full width of the car

A. R. A. Class IV Tank Car Built by the General American Tank Car Corporation for the Phillips Petroleum Co., Bartlesville, Okla.



General Drawing of the Tank, A. R. A. Class IV Tank Car Built for the Phillips Petroleum Co. by the General American Tank Car Corporation.

and is securely riveted to the center sill channel flanges. Each plate provides substantial support for end and side running boards, and the flange of the plate provides protection for the end running board.

Additional running board supports are located at a distance of 4 ft. 3½ in. from the center line of the car. These supports consist of 4-in. open hearth steel channels, bent to pass under the center sill. The ends of the supports are connected by means of a 4-in. open hearth steel tie plate which passed over the top of the center sill and forms a tension member. The channels are securely riveted to the bottom flanges of the center sill channels.

The general dimensions of the car are as follows:

Length over striking plates	36 ft. 0 in.
Length over center sill channels	35 ft. 9½ in.
Length over end running boards	35 ft. 9½ in.
Truck centers	25 ft. 10 in.
Width over running boards	9 ft. 3½ in.
Width over all	9 ft. 9⅞ in.
Height from top of rail to bottom of center sill	2 ft. 4½ in.
Height from top of rail to top of center sill cover plate	3 ft. 5⅞ in.
Height from top of rail to top of truck center plate bearing surface	2 ft. 1 11/16
Height from top of rail to top of running board	3 ft. 7⅞ in.
Height from top of rail to top of dome cover	13 ft. 5⅞ in.
Height from top of rail to center line of tank	6 ft. 11 9/16 in.
Height from top of rail to bottom of discharge valve	2 ft. 0 3/16 in.
Length of tank over calking edges	31 ft. 9 in.
Length of jacket exclusive of heads	32 ft. 11¾ in.
Heigh of dome exclusive of head	2 ft. 2 in.
Height of dome jacket exclusive of head	2 ft. 3¼ in.
Inside of diameter of tank	6 ft. 6 in.
Inside diameter of dome	5 ft. 0 in.
Nominal inside diameter of jacket	6 ft. 11 in.
Nominal inside diameter of dome jacket	5 ft. 6 in.
Tank heads disked to a radius of	10 ft. 0 in.
Dome head disked to a radius of	8 ft. 0 in.
Nominal capacity of tank	8000 gallons
Actual capacity of tank	8070 gallons
Dome capacity (based on combined capacity of tank and dome)	4 per cent
Capacity of car	80,000 lbs.
Light weight of car	47,700 lbs.

The Tank

The tank is built in accordance with the A. R. A. standard specification for class IV tank car. All plates entering into the construction of the tank and the dome comply with the American Society for Testing Materials specifications for boiler plate steel, flange quality. The tank is composed of three longitudinal sheets and calculated for a bursting pressure based on the lowest tensile strength of the plate or the seam of not less than 300 lbs. per sq. in. Plates of the following thicknesses are used:

Sheel sheet	5/16 in.
Bottom sheet	7/16 in.
Dome sheet	5/16 in.
Tank head	½ in.
Dome head	5/16 in.

All plates are bevel sheared for inside and outside calking. Great precaution is taken in calking to prevent undercutting of the edges. The tanks are tested in accordance with standard requirements with water of a temperature of from 60 to 70 deg. F. to a pressure of 75 lbs. per sq. in.

All seams are double riveted with the exception of the dome head seam, which is single riveted. The seams are riveted metal to metal without the interposition of other material. The rivets comply with the A. R. A. specifications for boiler rivet steel, and rivets for passenger and freight equipment cars. The efficiency of the seams is calculated to be not less than 70 per cent of the strength of the thinnest plate.

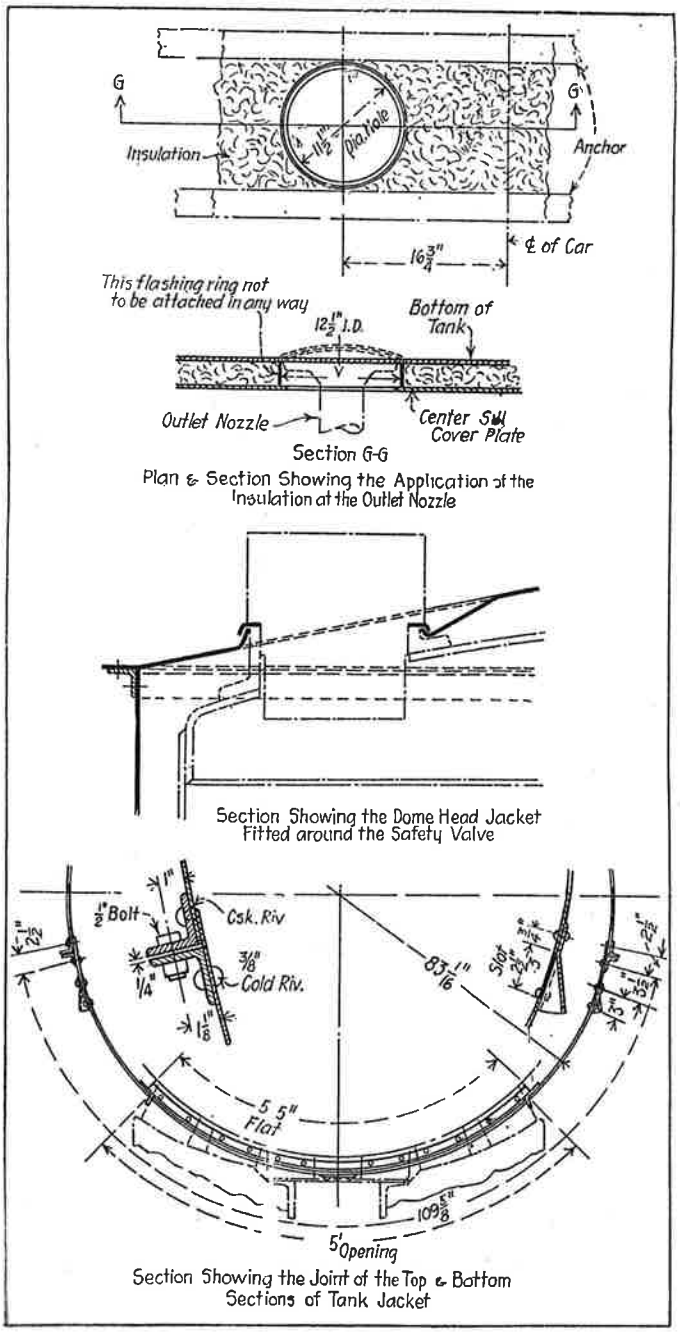
The Manhole Frame and Cover

For cars used for the transportation of inflammable liquids a mechanical arrangement for applying the dome cover necessarily must be such as to make it practically

impossible to remove it while the interior of the tank is subjected to pressure. Provision for suitable vents must therefore be made which will open automatically when the operation of removing the dome cover starts. The necessity of these safety features has been recognized, and it is interesting to note the construction of the dome frame and cover developed for this particular type of car.

The manhole is surmounted by a malleable iron frame with smooth and true bearing surface. The frame is riveted to the dome head by thirty ¾-in. rivets. The cover is made of malleable iron and secured to the frame by six ⅞-in. hinged bolts, two of which are provided with slots for sealing. The bolts are fitted with hexagon malleable shoulder nuts and flattened at the ends to prevent the nuts from coming off.

The dome cover is so constructed that in the event there is internal pressure within the tank, it cannot be removed from the frame until that internal pressure has been released.



Sections Showing Construction of the Tank Jacket, A. R. A. Class IV Tank Car, Built by the General American Tank Car Corporation.

The manhole frame is grooved for water and gasoline proof gasket rings, inserted to furnish a protection for the dome insulation. The application of a cast steel ring on the dome jacket is clearly shown in the accompanying illustrations. The ring is fastened by means of cap screws in such a manner as to compress the gasket rings and thus produce a watertight joint.

Discharge Outlet and Safety Valves

The outlet valve casting has an inside diameter of 4 in. and is designed in accordance with the A. R. A. standard. It is securely riveted to the bottom sheet of the tank and is provided with a bevel seated valve of the pin guide type. The valve is operated from the dome by a 1¼-in. diameter open hearth steel rod which is fitted with an eccentric cam handle and spring to keep the valve in a closed position. The outlet cap plug is 2 in. in diameter.

The tank is equipped with two A. R. A. standard 5-in. safety valves placed on top of the dome. They are set to open at a pressure of 25 lb. per sq. in.

Tank Anchorage

The tank is anchored rigidly to the underframe on the center sill at the center of the car. The anchor consists of two pressed steel plates riveted to the top flange of each center sill channel. The plates are formed to the contour of the tank and bent to connect the supporting angles of the tank. The anchor plates are 6 ft. 0 in. long. This arrangement allows the tank to be removed from the underframe without disturbing the rivets through the tank sheets.

The tank is also secured to the underframe by means of 2½-in. by ½-in. open hearth steel tank bands located at the bolsters. The ends of the bands are upset to 1⅜ in. diameter, each one fitted with one nut and lock nut.

Tank Insulation

The entire tank and dome with the exception of the tank anchorage, including the tank supports on the bolsters, is covered with hairfelt insulation. The hairfelt is applied in sections, with closely fitted joints and properly formed around all projections. The joints of the second layer must lap the joints of the first layer so that no opening will be left exposing the tank.

Two separate layers of insulation are applied. The first layer consists of one course of insulating paper followed by one course of 1-in. Keystone hairfelt and an additional course of insulating paper. This composite first layer is securely wired in place with No. 14 soft iron wire. The second layer consists of one course of 1-in. Keystone hairfelt followed by a layer of insulating paper. This course, like the first layer, is wired in place with soft iron wire. Before the first layer of insulating paper is applied the tank receives a coat of standard brown primer paint after it has been thoroughly cleaned and all scale and dirt removed.

The jacket heads are insulated with paper and hairfelt applied in the same manner as on the tank.

The Jacket

The jacket is built up of ⅛-in. open hearth steel plates. It consists of three principal sections: a top section including the dome jacket, a bottom section and the jacket heads. The various sections are built up of sheets properly lapped and riveted together by ⅜-in. rivets with approximately 2½-in. pitch.

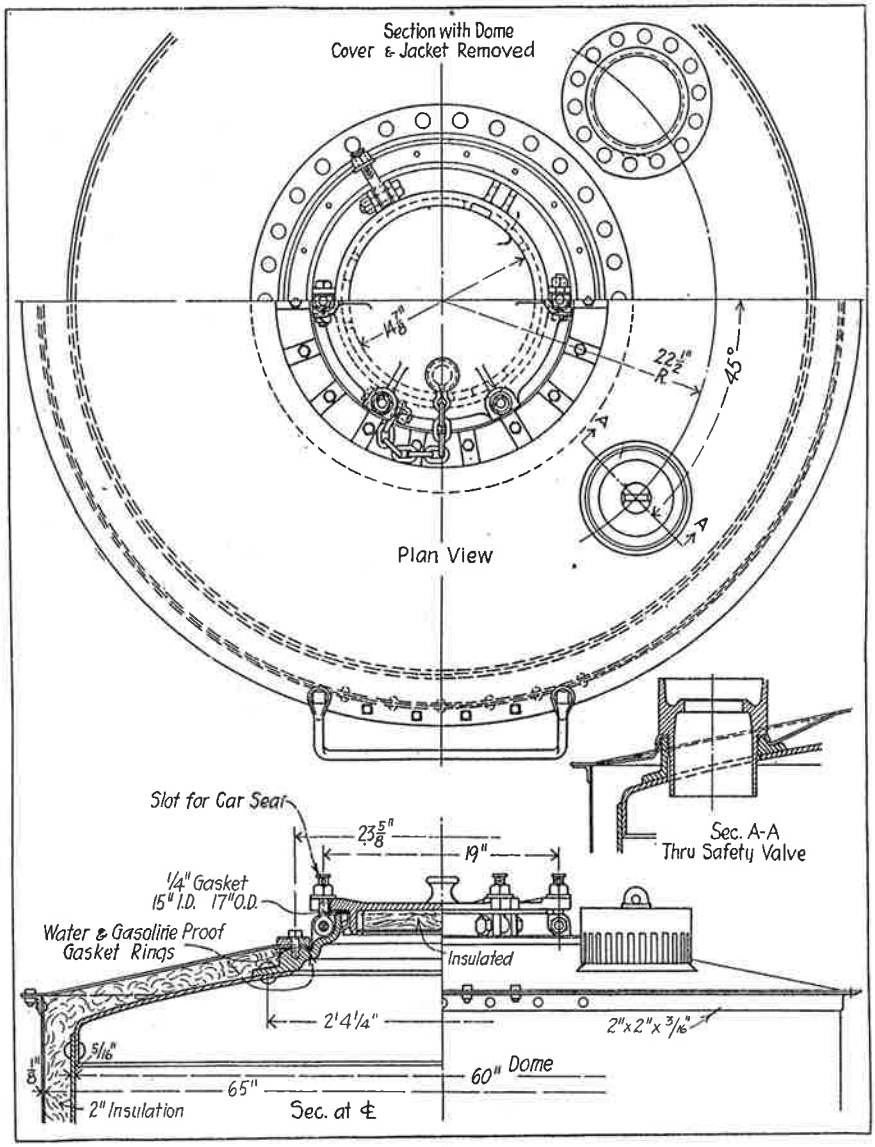
The top section covers the insulation on the upper portion of the tank and extends down below the horizontal center line, where it joins the bottom section on both sides

of the tank. It is built of eight sheets. The two center sheets are connected to the dome shell. The dome jacket head is reinforced around the edge by a 1½-in. by 1½-in. by 3/16-in. rolled angle which serves as connection for the dome shell.

The jacket head is fitted closely around the manhole frame and is secured to the frame by a cast steel ring, the application of which has been previously described. The fitting of the jacket around the safety valves is commendable. The jacket sheet is fitted around the valve with the edge flanged up. A pressed collar which fits tight around the valve body forms the joint and acts as a watershed, as shown in the accompanying illustrations.

The bottom section is built up of 12 sheets. The two sections are drawn together by ½-in. bolts which pass through 2-in. by 2-in. by 3/16-in. rolled angles riveted to the sheets at the joints. Referring to the accompanying illustration showing the section of the joint, it will be found that the sheets in the bottom section lap under the sheets in the top section in order to exclude water which otherwise might work itself through the joint.

The opening in the jacket for the body bolster tank blocks is well protected by angles formed to the contour of the tank and riveted to jacket bottom. The tank bands pass through openings in the bottom section of the jacket. The openings are covered with pressed steel hoods to exclude water. As shown in the illustrations, the arrangement used for protecting the insulation at the outlet nozzle will permit the inspection of all rivets used in its application.



Section Showing the Construction of the Dome Cover, A. R. A. Class IV Tank Car Built by the General American Tank Car Corp. The Cover Cannot Be Removed from the Frame Until Internal Pressure Within the Tank Has Been Released.

The jacket head is built in the shape of a cone, with edge reinforced by a 1½-in. by 1½-in. by 3/16-in. angle, by means of which connection is made to the tank jacket.

The Trucks

The trucks are designed for a capacity of 40 tons. Andrews type annealed cast steel truck side frames are used. They have the brake hanger arms cast integral and are equipped with bosses for the spring plank. The bolsters are made of cast steel of a design and strength to meet A. R. A. requirements for 40-ton capacity cars.

Chilled 33-in. cast iron wheels are used. The general dimensions of the trucks are as follows:

Wheel base	5 ft. 6 in.
Height from rail to bearing surface of center plate, free height	2 ft. 1⅞ in.
Height from rail to bearing surface of center plate with frame and tank mounted	2 ft. 1 11/16 in.
Height from rail to top of spring plank	0 ft. 10⅞ in.
Height from rail to top of side frame	2 ft. 6⅞ in.
Center to center of side bearings	4 ft. 2 in.
Height from top of rail to top of side bearing, light car	2 ft. 3 11/16 in.

During the summer of 1924, 125 cars of this type were built for the Phillips Petroleum Co. at the Warren plant of the General American Tank Car Corporation. The illustrations accompanying this desciption represent the construction of these cars. On the 100 cars recently completed a few improvements were made, these pertaining particularly to the jacket and the dome cover.

Interpretations of Per Diem Rules

The secretary of the American Railway Association announces in circular No. 2526, dated March 26, 1925. that the per diem rules arbitration committee has authorized the following interpretations to per diem rules, 4, 13 and 14:

Interpretation No. 4 (d)

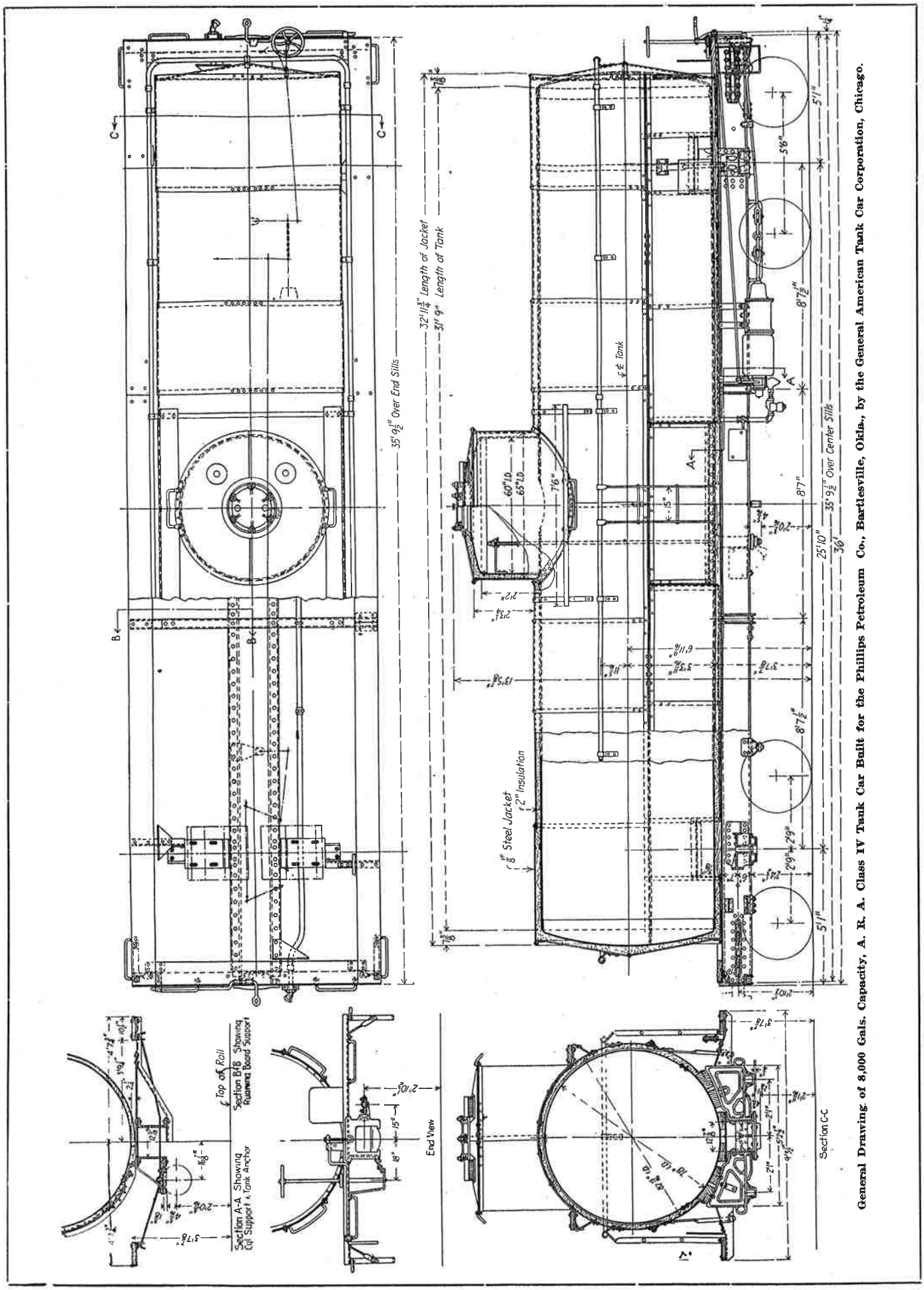
Question:—When foreign railroad owned freight cars are used in the service of circus or carnival companies, should the roads over which they moved make settlement with car owners in accordance with per diem rules? Answer:—Yes.

Interpretation No. 13 (a)

Question:—Does a blank or "nil" reclaim statement filed by a road with its connection constitute an original switching reclaim? Answer:—No.

Interpretation No. 14 (d)

Question:—May a reclaim on a car held at junction point where received be passed on from the delivery road to another road,



General Drawing of 8,000 Gals. Capacity, A. R. A. Class IV Tank Car Built for the Phillips Petroleum Co., Bartlesville, Okla., by the General American Tank Car Corporation, Chicago.