

CAR BUILDERS' CYCLOPEDIA

1946

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1946 Car Builders' Cyclopedia Of American Practice

Definitions and Typical Illustrations of Railroad and Industrial
Cars, Their Parts and Equipment; Cars Built in America
for Export to Foreign Countries; Descriptions and
Illustrations of Shops and Equipment Employed
in Car Construction and Repair

Seventeenth Edition—1946

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LIST OF EDITIONS

<i>Car Builders' Dictionary</i>		<i>Car Builders' Cyclopedia</i>	
First	1879	Tenth	1922
Second	1884	Eleventh	1925
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Seventh	1912	Sixteenth	1943
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Foreword

In the tenth edition, 1922, of this work it was transformed from what might be termed an illustrated Dictionary to a Cyclopedia and the data were compiled in a manner differing radically from that of previous editions; all information relating to a specific subject was combined within a single section instead of being placed in several separate groups. In former editions each of these groups—Association of American Railroads (formerly American Railway Association, Mechanical Division, and originally Master Car Builders' Association) specifications and drawings, general illustrations, and manufacturers' descriptive pages—were in different sections of the book, necessitating considerable cross reference and inconvenience in obtaining complete information on any subject. In the tenth edition, the material was so arranged and indexed that reference to the general index, or the table of contents gave the location of each class of cars or appliances.

Other indexes—General Index to Car Parts and Products—Trade Name Index and Index to Advertisers—were given in the last pages of the book. The Association of American Railroads "Rules of Interchange" and diagrams of the "Loading Rules" were omitted as these are now obtainable in convenient booklet forms.

In this volume, the Seventeenth Edition, the same general arrangement has been followed, with the division into sections clearly defined. In a few cases the arrangement has been changed somewhat in order to make the material more readily accessible. As a further aid, the Table of Contents by sections and subdivisions on page six and the General Index to Car Parts and Products at the end of the book have been amplified and improved and in addition a summary of the contents of each section is given on the first page of the several sections.

Many new designs of cars and appliances in the field of railway car construction have been made since the publication of the previous edition. These have been included as far as possible in order that this Edition might contain the latest practices in American Car Construction and Equipment.

The work of compiling data and rearranging the book has entailed a vast amount of research and revision, in connection with which valuable assistance has been given by an Advisory Committee appointed by the Mechanical Division of the Association of American Railroads, by many other railway mechanical officers, by the railway car builders and by the manufacturers of railway supplies.

Car Builders' Cyclopedia

FORMERLY
CAR BUILDERS' DICTIONARY
FIRST EDITION—1879

Historical

At the Fifth Annual Convention of the Master Car Builders' Association, held in Richmond, Virginia, in 1872, it was

"Resolved, That a committee be appointed with power to publish an illustrated book, defining the proper terms or names of each and every part used in the construction of railway cars, and a description of the use of the same."

This committee consisted of F. D. Adams, M. C. Andrews, Leander Garey, A. Steinbach, C. A. Smith, Joseph Jones and I. W. Van Houten, the actual compilation of the dictionary being done by Matthias N. Forney, assisted by Messrs. Garey and Smith of the committee.

At the Fourteenth Annual Convention, held in Detroit in 1880,

"The committee to which was assigned the duty of preparing a dictionary of terms used in the construction of cars submitted a copy of the book and reported that it had finished its work, and it was discharged."

Revised editions were compiled in 1884 and reprinted in 1888 by A. M. Wellington, assisted by members of the executive committee of the Master Car Builders' Association.

Revised in 1895 and reprinted in 1898 by Professor John C. Wait, assisted by R. H. Soule, N. & W.; A. E. Mitchell, N. Y., L. E. & W., and C. A. Smith, Union Tank Line.

Revised in 1903 by Rodney Hitt, assisted by A. M. Waitt, N. Y. C. & H. R.; J. S. Lentz, L. V.; and W. P. Appleyard, N. Y., N. H. & H.

Revised in 1906 by Rodney Hitt, and in 1909 by Francis E. Lister, under the supervision of C. A. Seley, C., R. I. & P.; H. F. Ball, L. S. & M. S.; and J. E. Muhlfeld, B. & O.

Revised in 1912 by Roy V. Wright, managing editor Railway Age Gazette and editor the American Engineer, assisted by Andrew C. Loudon, under the supervision of R. B. Kendig, N. Y. C. & H. R.; C. B. Young, C., B. & O., and Robert L. Ettenger, So. Ry.

Revised in 1916 by Roy V. Wright, managing editor Railway Age Gazette and editor Railway

Mechanical Engineer, and Andrew C. Loudon, associate editor, assisted by George Mitchell, under the supervision of H. C. Manchester, D., L. & W.; William Schlafge, Erie, and G. W. Wildin, N. Y., N. H. & H.

Revised in 1919 by Roy V. Wright, managing editor Railway Age and editor Railway Mechanical Engineer and Charles N. Winter, associate editor, under the supervision of F. W. Brazier, N. Y. C. Lines, G. W. Rink, C. R. R. of N. J., and H. C. Manchester, D., L. & W.

The General Committee, in session in Chicago, in 1921, adopted a resolution as follows:

"WHEREAS: It is deemed desirable to change the arrangement of data in the book formerly known as the CAR BUILDERS' DICTIONARY.

"BE IT RESOLVED: That the General Committee formally approve the report of the Advisory Committee on Revision of the Car Builders' Dictionary and endorse the proposed sectionalizing plan which provides that the editorial and manufacturers' data be grouped in major sections, these sections to be subdivided into chapters treating the various phases of railway car construction.

"BE IT FURTHER RESOLVED: That the title of the book be changed to CAR BUILDERS' CYCLOPEDIA of American Practice."

In conformity with the above resolution a revised edition was compiled in 1922 by Roy V. Wright, managing editor Railway Age and editor Railway Mechanical Engineer, and Charles N. Winter, associate editor, under the supervision of W. F. Kiesel, Jr., Penna., R. L. Ettenger, Southern Railway, L. K. Sillcox, C., M. & St. P., and G. E. Smart, Can. Nat. Rys.

Revised in 1925, 1928 and again in 1931 by Roy V. Wright, managing editor Railway Age and editor Railway Mechanical Engineer, and Robert C. Augur, managing editor, under the same supervision as the 1922 edition.

Revised in 1937 by the same editors under the supervision of J. A. Pilcher, N. & W., T. P. Irving, C. & O. and F. M. Waring, Penna. R. R.

Revised in 1940 and again in 1943 by the same editors under the supervision of W. I. Cantley, Engineer A. A. R. Mech. Div.; T. P. Irving, C. & O., and E. P. Moses, N. Y. C.

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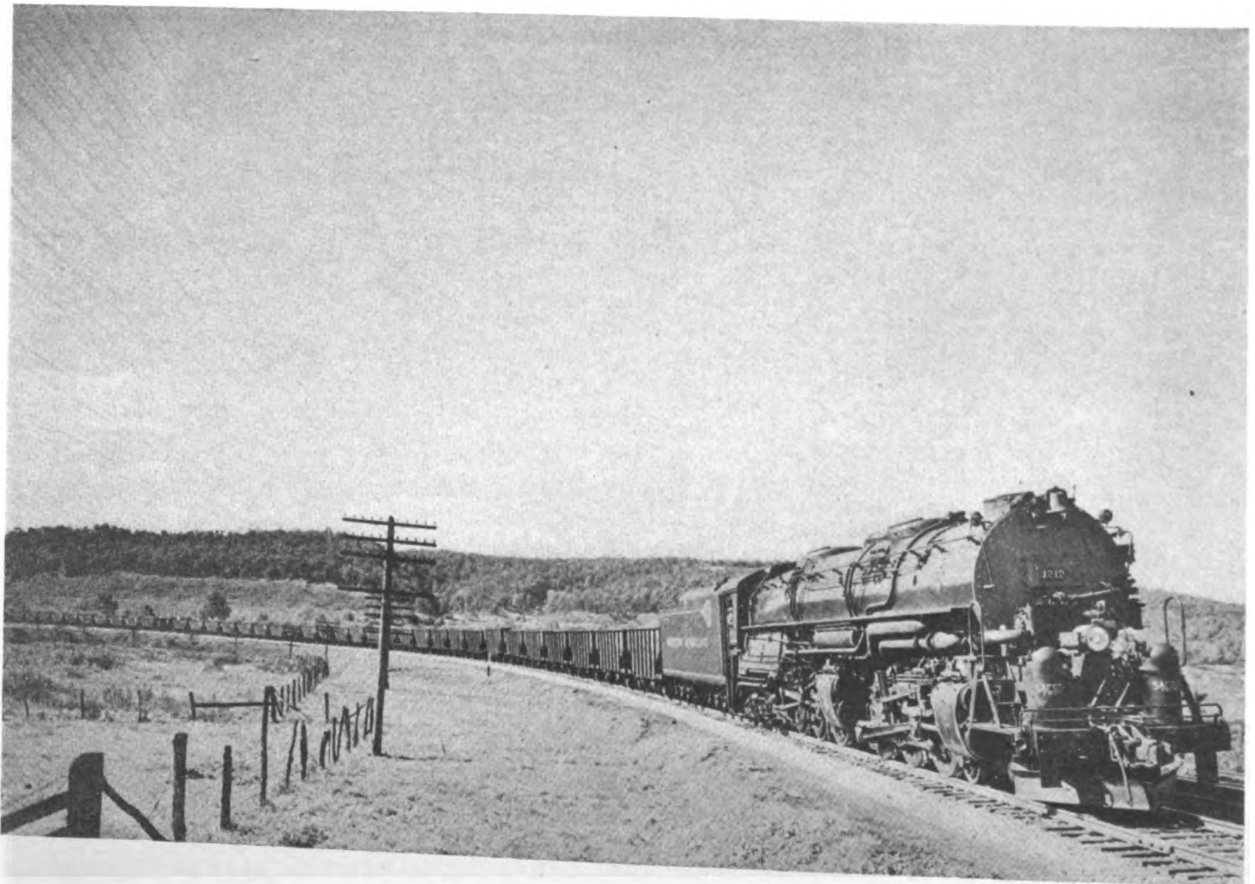
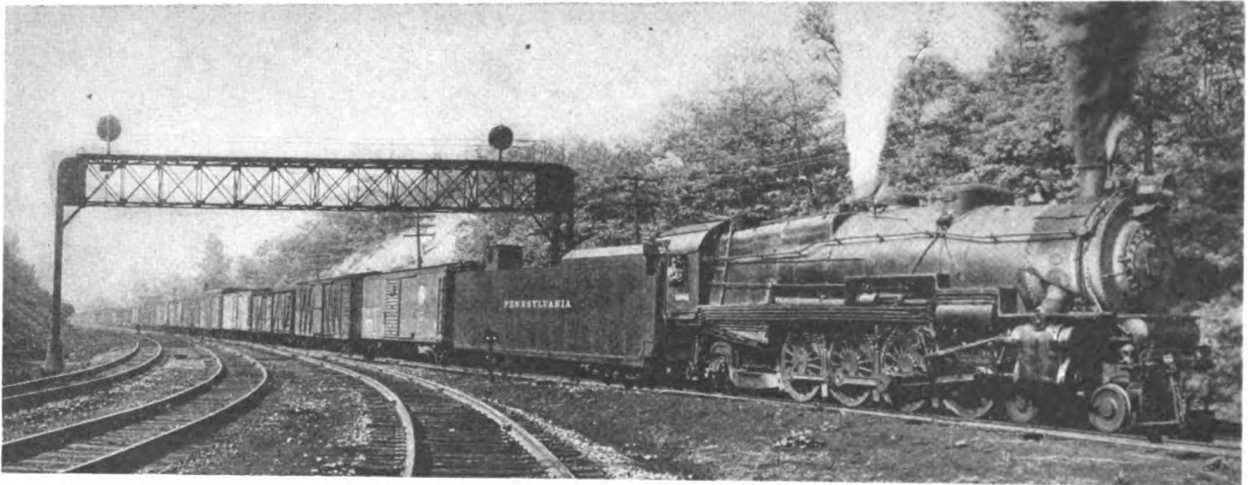
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Section I

Dictionary of Car Terms

Used in Railway Practice

SEE THE LEAD PAGES OF SECTIONS 2, 4, 5 AND 6 FOR THE CLASSIFICATION AND DESCRIPTION OF EACH TYPE OF CAR.

A

"A" End of Car. The opposite end to that on which the brake shaft is located, this end being called the "B" end. In the event of there being two brake shafts, the ends are designated by stencilling the letters "A" and "B", respectively, on both sides, near the ends.

Accelerator, Hot Water. A special fitting used to quicken circulation, with a hot-water heating system, for individual heating of cars before the advent of train steam heat and air conditioning.

Accordion Hood. A term sometimes applied to the top transverse portion of a vestibule diaphragm. See DIAPHRAGM.

Air Brake. In its widest sense, the term "Air Brake" may include any system of braking in which the mechanism is actuated by the manipulation of air pressures exerted on different parts of the apparatus. A more restricted meaning of term is general in the United States and covers only brakes which employ air under pressures above atmospheric as distinguished from "Vacuum Brakes" which employ pressures below atmospheric. With train speeds of the order of 90 m. p. h. and above in passenger service, and 50 to 60 m. p. h. in freight service, the conditions under which the air brakes must function have become more exacting and the equipment correspondingly intricate. See Section 11 for details covering the latest American practices. Definitions of many of the principal units will be found under the headings:—"AB" Brake, etc.

"AB" Brake Equipment. The name by which is designated the type of brake equipment made standard for new freight cars built after September 1, 1933, rebuilt cars after August 1, 1937, and compulsory in interchange after January 1, 1945, by the Board of Directors of the A. A. R. upon recommendations of the General Committee of the Mechanical Division. Replaces Type "K." See Section 11 for parts.

Air Brake Hose. Laminated rubber and canvas tubing which is attached to a nipple that screws into the angle cock at the end of the brake pipe. The other end of the hose is fitted with a coupling which engages with a similar coupling on the adjoining car. The complete arrangement forms a flexible air connection between the brake pipes of the two cars. Manual, A-601.

Air Brake Hose Clamp. See HOSE CLAMP.

Air Brake Hose Coupling. A special type of standardized fitting which is attached to one end of an air brake hose in order to provide means for connection and disconnection, quickly and securely, of the hoses by which the air brake pipe and also signal pipe are carried from car to car. Manual E-17 and E-30.

Air Brake Hose Coupling Gasket. A rubber-composition gasket which fits into the air brake hose coupling to seal the connection against air leakage. This gasket is of standard A. A. R. design and must meet standard specifications of the Association. Manual A-602 and E-17.

Air Brake Hose Label. A label of red or white rubber vulcanized to the air-brake hose near one end. On the label is branded the initials or name of the railroad or other purchaser; the name of the manufacturer; the date of manufacture; the hose serial number; and the monogram of the mechanical association. See Section 12 for illustration. Manual, E-17.

Air Brake Hose Nipple. A short metal tube, of standard A. A. R. design, and formed on one end for forcing into the end of standard air brake hose where it is held by a suitable clamp. The other end of the nipple is threaded and screws into the angle cock. See Section 11 for drawing and Manual E-29 for specifications.

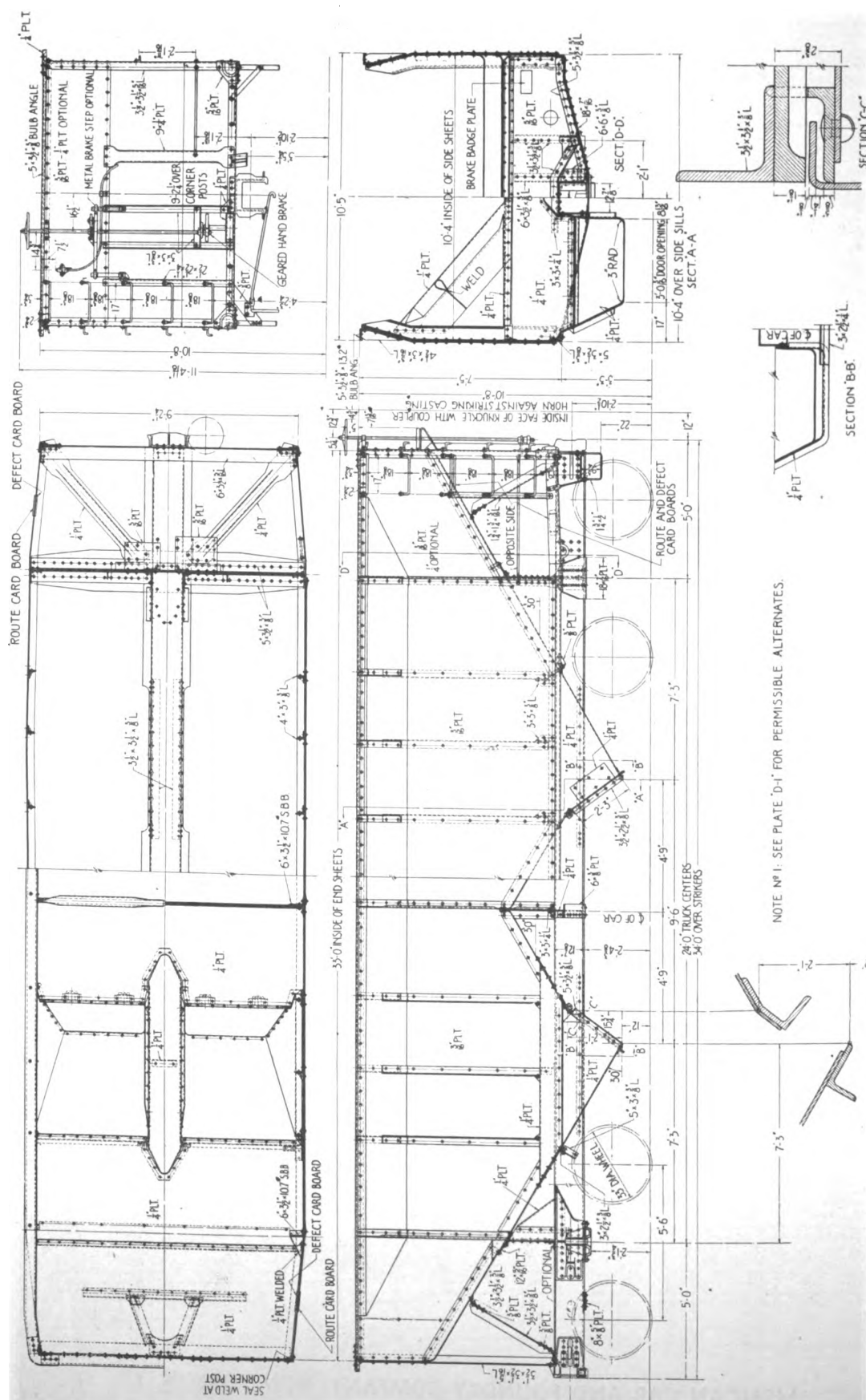
Air Brake Instruction Car. A railway service car, usually a passenger train car, in which is installed the apparatus necessary to illustrate and explain the construction and operation of the air brake system and its parts. It is used for the instruction of train crews and other employees whose duties require knowledge of air brake operation and maintenance. The car is stationed at different points along the line for a week or two at a time. Regular classes are conducted and lectures given by the instructor in charge, who is usually provided with living quarters in the car.

Air Compressor. In car service, a motor- or power-driven pump which supplies compressed air for operating the air brakes on rail motor and electrically operated cars. Also see FANS AND BLOWERS.

Air Compressor Governor. An adjunct to the electrically-driven air compressor, designed to open or close automatically the motor circuit when the air pressure in the reservoir exceeds or falls below certain predetermined limits.

Air Compressor Governor, Synchronizing System. An arrangement for insuring an equal division of work of furnishing compressed air for braking and other purposes among all the motor-driven air compressors in a train. The current supply to the motor of the motor-driven air compressor is controlled by

- called the brake step, is also sometimes used. A bracket called a tank step is attached to the tanks of tank cars.
- Step Box.** A portable box-shaped step, for use between the bottom passenger car step and a low station platform.
- Step Hanger.** A vertical board or metal plate by which the steps are supported from the corner of a car and from the platform end sill.
- Step Nosing.** A metallic facing or molding for the tread of stair steps.
- Step Riser.** The vertical portion of a step in stairs.
- Step Treads.** See SAFETY TREAD and TREAD.
- Steps, Folding.** On many streamlined passenger cars the vestibule steps are hinged to fold up when closed, forming a smooth outline.
- Stile.** The upright pieces on the outer edge of a door or sash, as door stile, sash stile, window stile, etc.
- Stirrup.** A kind of ring or bent bar of iron resembling somewhat the stirrup of a saddle. A coupler carry iron is sometimes called a stirrup.
- Stock Car.** A car for the transportation of live stock, equipped with roof, slatted sides and side doors, single or double deck and frequently with feed and water troughs.
- Stop Bar (Sleeping Car).** A bar to connect the two seats on which the seat bottoms may rest when drawn down to make up a lower berth. It rests upon a stop bar plate.
- Stop Bar Guide.** An attachment to hold a stop bar in place laterally.
- Stop Cock.** A simple form of cock having a body and tapered plug which has an opening through it. When the plug is turned so that the holes in it correspond to the ports in the body the liquid flowing in the pipe can pass through the cock. When the plug is turned so that the openings do not correspond, the flow is stopped.
- Stop-Key Journal Bearing.** A key or wedge with a lug or projection which bears against the end of the axle to restrain lateral motion and thus dispense with a collar on the axle. Not in general use.
- Storage Battery.** A storage battery consists of a number of metallic plates, separated by suitable insulators, immersed in an electrolyte within a proper container. Its function is to convert electrical energy into chemical energy during the operation known as charging and the reverse when discharging. When charging, the terminals are properly connected to a source of electrical supply, usually a direct-current generator driven from the car axle or by an independent engine. Storage batteries are used to supply current for car lighting and air conditioning in passenger train cars and are carried in battery boxes suspended from the underframe.
- Storage Battery Car.** A motor car driven from storage batteries.
- Stove Pipe Jack.** A covering or bonnet for the aperture of a stove pipe on the outside of a car. Practically obsolete except on cabooses and work cars.
- Strap Bolt or Lug Bolt.** A round bolt with a flat bar of iron or steel welded to it, and usually with a hook on the end which serves the purpose of a head. The flat bar has holes in it, by which it can be fastened in place with rivets, bolts, or screws.
- Strap Washer.** An iron or steel strap which takes the heads of several bolts. Also called washer plate.
- Streamline.** The general term given to the type of construction which provides a smooth continuous outer surface on passenger cars. By rounding both ends of a train equipped with such cars, head-on air resistance and air drag are reduced.
- Street Ell.** An elbow pipe fitting with male thread on one end and female thread on other end.
- Striker.** See STRIKING PLATE.
- Striker Arm.** A seat arm. The terms striker arm, seat back arm and seat arm are commonly used.
- Striking Horn.** The stop shoulder, or horn of a coupler, arranged to touch the striking plate before the draft gear goes solid.
- Striking Plate.** A member placed on the ends of the center sills of freight cars against which the horn of the coupler strikes, preventing damage to the draft gear and center sills.
- String Board (Passenger Car Steps).** A vertical plate which supports the ends of the steps. A step hanger.
- Stringer.** A term sometimes applied to a floor nailing strip or a steel member which acts as a support for a nailing strip. A longitudinal floor stringer sometimes occupies a position similar to that of an intermediate sill but is not designed to perform its duties. See NAILING STRIP.
- Stringer Pocket.** A casting for supporting the end of a beam or stringer. In automobile and similar cars, for facilitating the use of a second or upper deck for increasing the loading capacity for small freight.
- Strut (Truss).** A member subjected to a strain of compression. A vertical strut is usually called a post. See also BRAKE BEAM STRUT.
- Stud.** A headless bolt, threaded on both ends. A standing bolt, pin, boss or protuberance designed to hold an attached object in place. Especially a headless bolt permanently screwed into a tapped hole in a casting or forging.
- Sub-Carline (Refrigerator Car).** A strip of wood under the main carline, supporting the sub-roof. See CARLINE.
- Sub-Floor (Refrigerator Car).** A layer of flooring boards under the main floor, and usually separated from it by an air space and hair felt or some other form of special insulation.
- Sub-Roof (Refrigerator Car).** The inside layer of boards of the roof proper, supported on sub-carlines.
- Sub-Sill.** A sill attached under another sill to reinforce it.
- Subway Car.** An electric motor car for use in subways in large cities.
- Sugar Cane Car.** See CANE CAR.
- Supply Pipe (Air Compressor).** A pipe sometimes connected to the air inlet of an air compressor by means of which the air supply is drawn from a point some distance away from the compressor. (Lavatory Fittings.) Pipes which carry hot or cold water to the basin faucets.
- Supply Valve (Steam Heating).** A valve for regulating the supply of steam in the radiator pipes of a car.
- Suspension (Motor Car).** The method of supporting a railway motor. Except in the case of gearless motors, the suspension is designed to put as little dead weight as possible on the axle. (Electric Lighting.) The iron work and fittings which are attached to the body or truck for supporting or suspending the axle generator and which include the belt tightening and aligning devices. The



FREIGHT CARS: 55-Ton Twin Hopper, Class HM

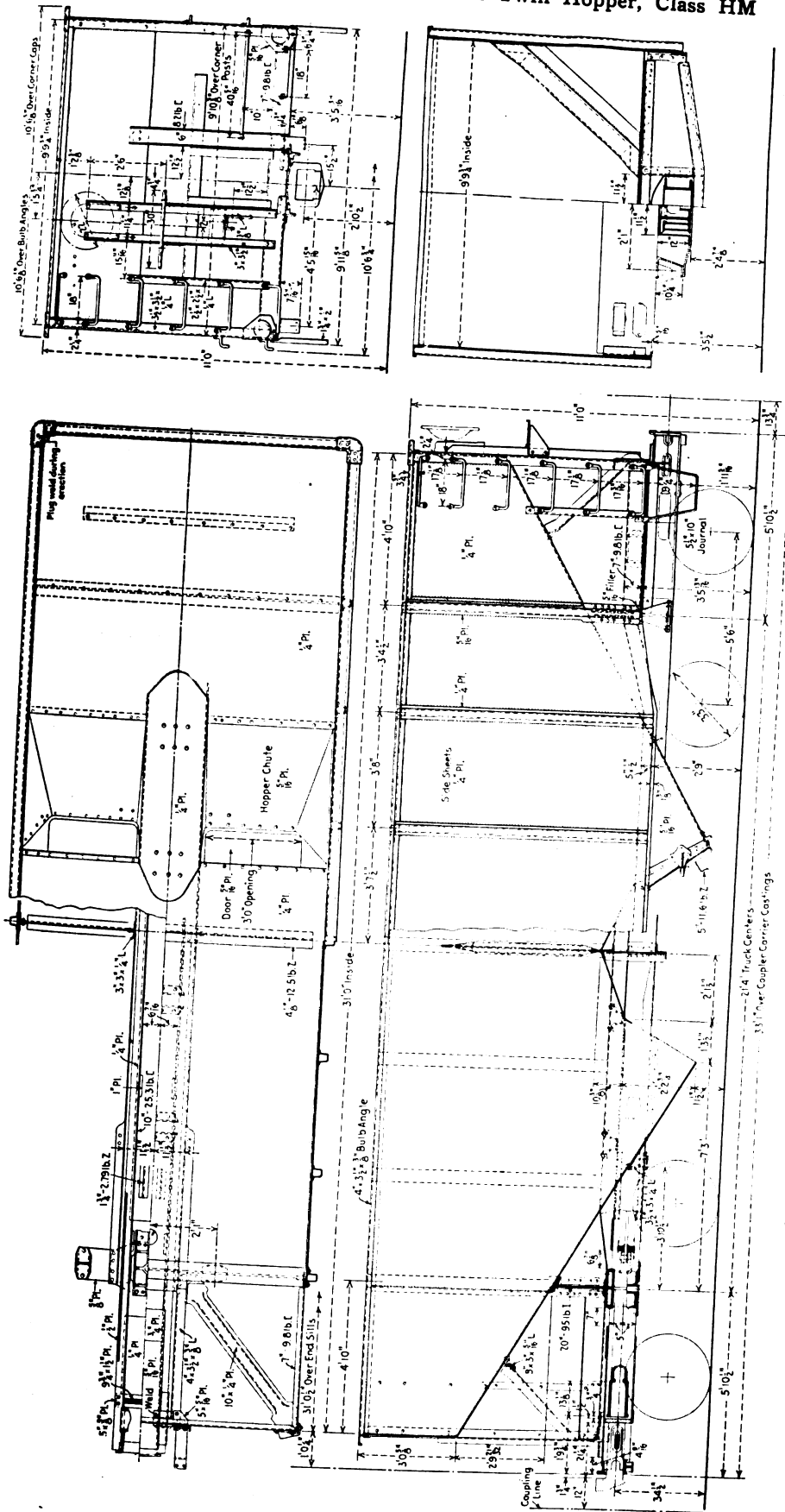


Fig. 2.602—Reading 55-ton welded hopper coal car (2 hoppers). A.A.R. Class HM. Built at Reading Shops.
Description: *Railway Mechanical Engineer*, March 1942, page 116

Note: In addition to 1,000 cars built for the Reading, 500 cars were built for the Central of New Jersey.
Capacity, level, 2,028 cu. ft.; light weight 42,700 lb.
(See also Page 270, Fig. 2.623)

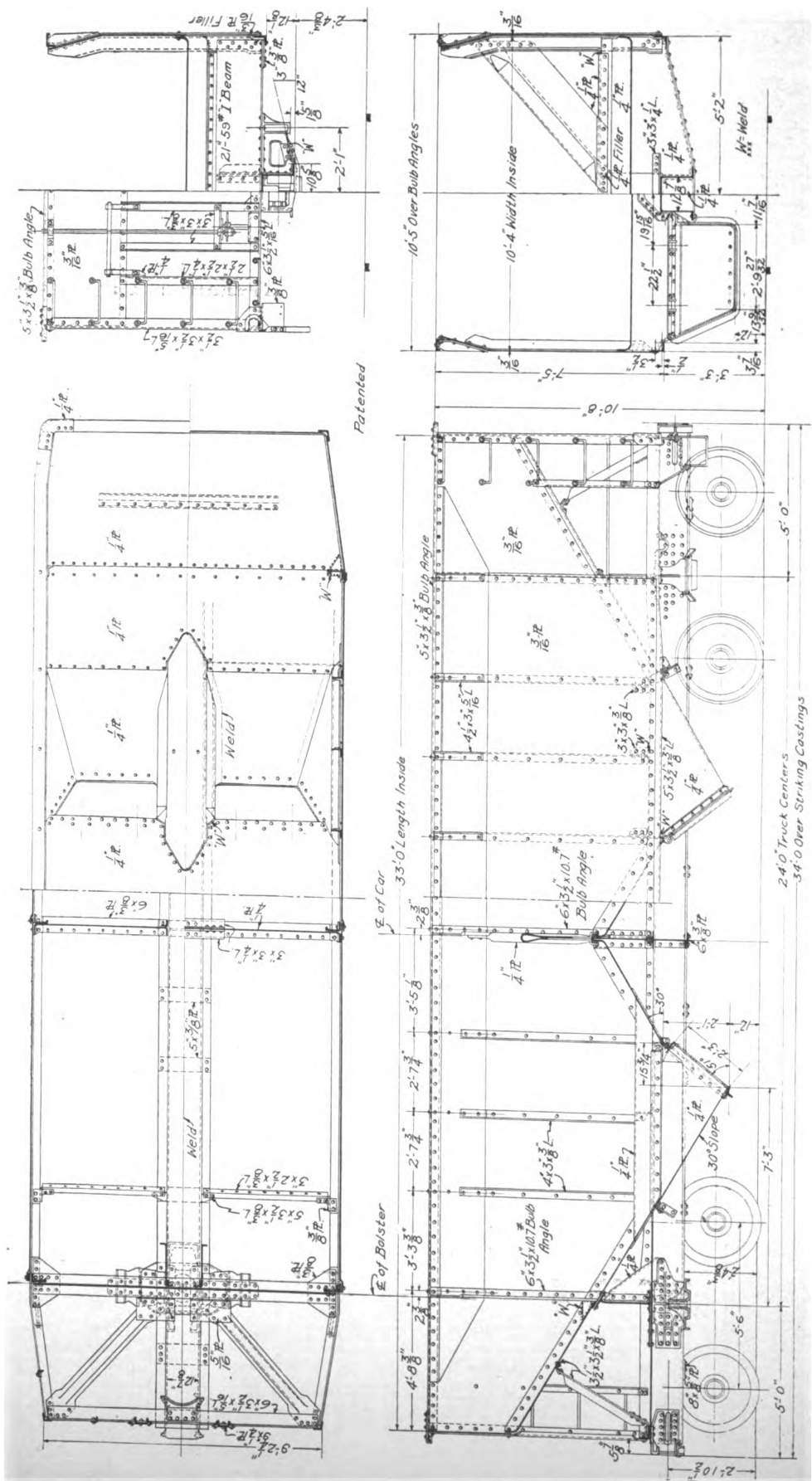
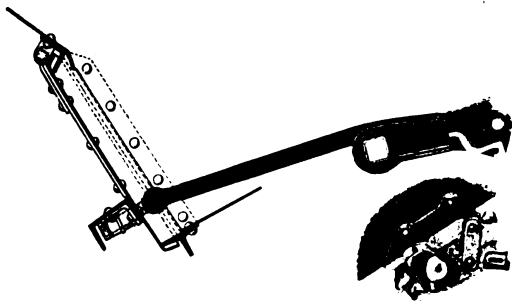


Fig. 2.603—55-Ton all-steel 5½ in. by 10 in. axle load 50-ton Twin Hopper Car with Enterprise hoppers and bolster construction. A. A. R. Class HM. Cubic capacity, 2,133 cu. ft. level or 2,449 cu. ft. with 12 in. average heap.
Enterprise Railway Equipment Company
(See also page 257)

Enterprise Equipment for Hopper Coal Cars

Enterprise Type D Door Operating Mechanism

The Enterprise Type D Door Operating Mechanism illustrated herewith provides an efficient door locking means and insures a close fitting door free from leakage even when car is loaded with coal dust or other fine materials. The mechanism forms a positive lock, is adjustable and a pair of doors are safely and conveniently operated from one side of

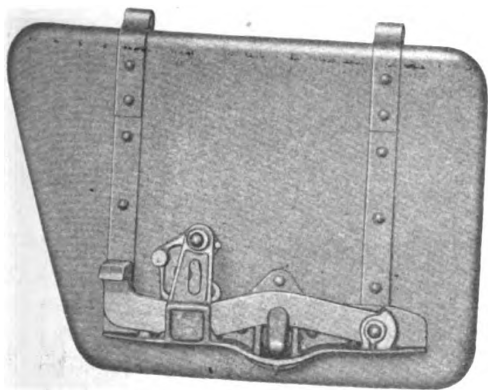


Enterprise Type D Door Operating Mechanism

the car. For application see Fig. 3.217, page 496. There is also a special type D mechanism operative from either side of car.

Enterprise Unit Door Latch

The Enterprise Unit Door Latch illustrated below has met with much favor by coal dealers and others who find it expedient to open only one door



Enterprise Unit Door Latch

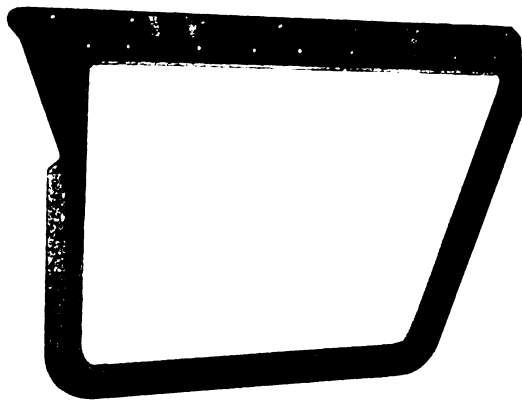
at a time rather than a pair of doors as they can thereby better control the discharge of the load upon the conveying machine. Each door is separately locked by a latch of strong and efficient design which holds it in very close relationship to the hopper frame and the finest of materials may be hauled without leakage. Each door is operated as a separate unit from its respective side of car.

Enterprise Hoppers and Frames

The Enterprise hopper included in General car drawings, page 256 and 275 are a slightly modified form of the A.A.R. hopper. The hopper frames are made from Copper Bearing Steel Tee Sections and Angles which provide smooth and true surfaces for the fit of the door and an enduring quality for wear.

For Hopper and Frame applications see Fig. 3.216, page 496.

For Enterprise Tee Section Copper Bearing Steel Frame for A.A.R. Hopper see Fig. 3.224, page 498.

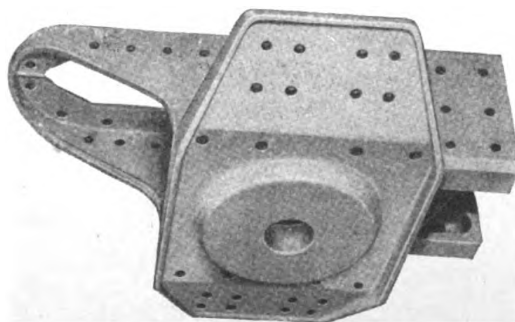


Enterprise "T" Section Hopper Frame

Enterprise Cast Steel Body Foundations

The Enterprise Cast Steel Body Foundations illustrated herewith save weight and reduce car parts; combining in a single unit a real foundation for withstanding shocks received from draft impact, dead weight of load and the upward pounding of the trucks. For applications see pages 490 and 495.

For other products see pages 235 and 299.



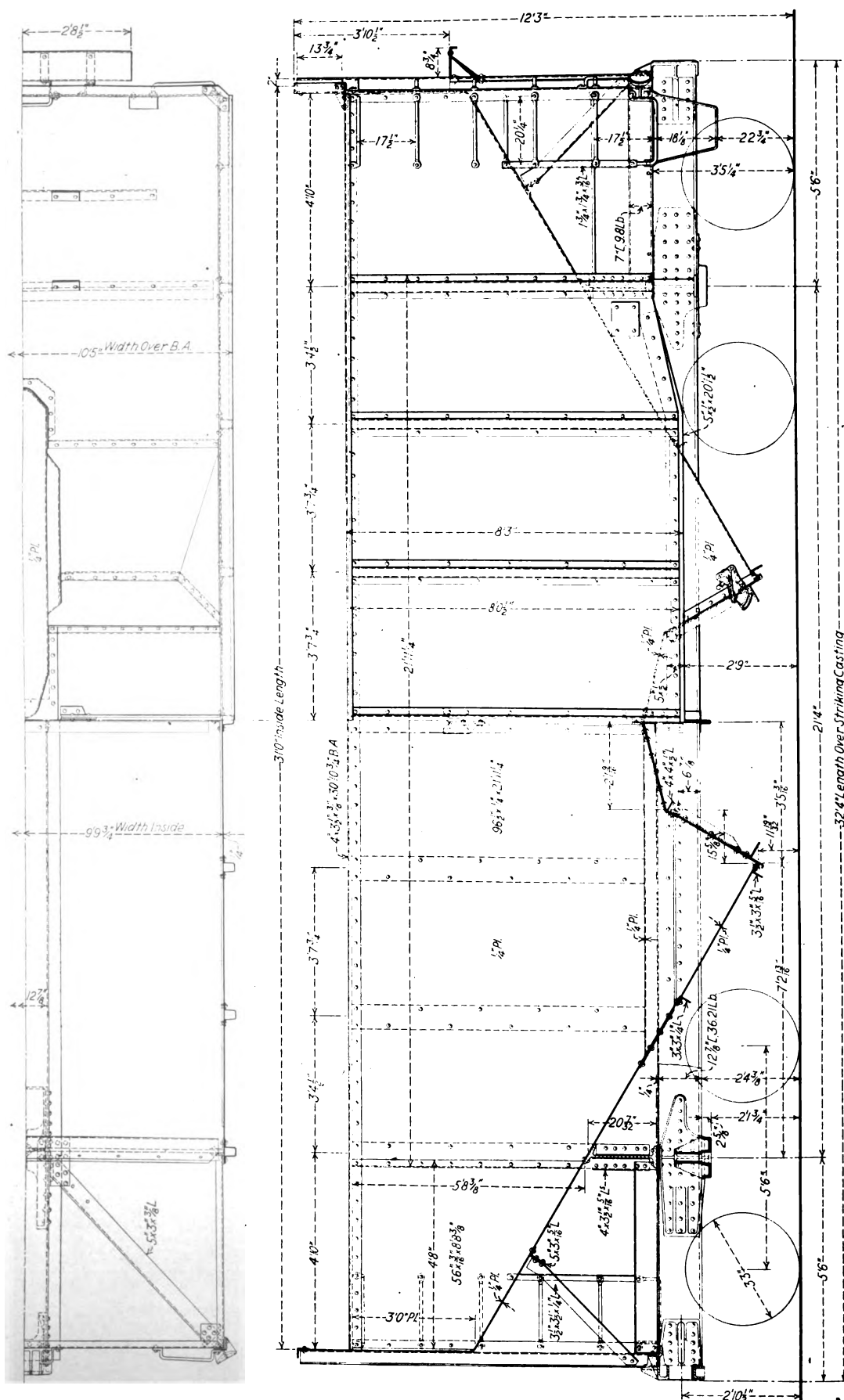
Enterprise cast steel body foundation

ENTERPRISE RAILWAY EQUIPMENT COMPANY, 59 E. Van Buren St., CHICAGO 5, ILL.

Products and Branch Offices Are Listed in the Classified Indexes

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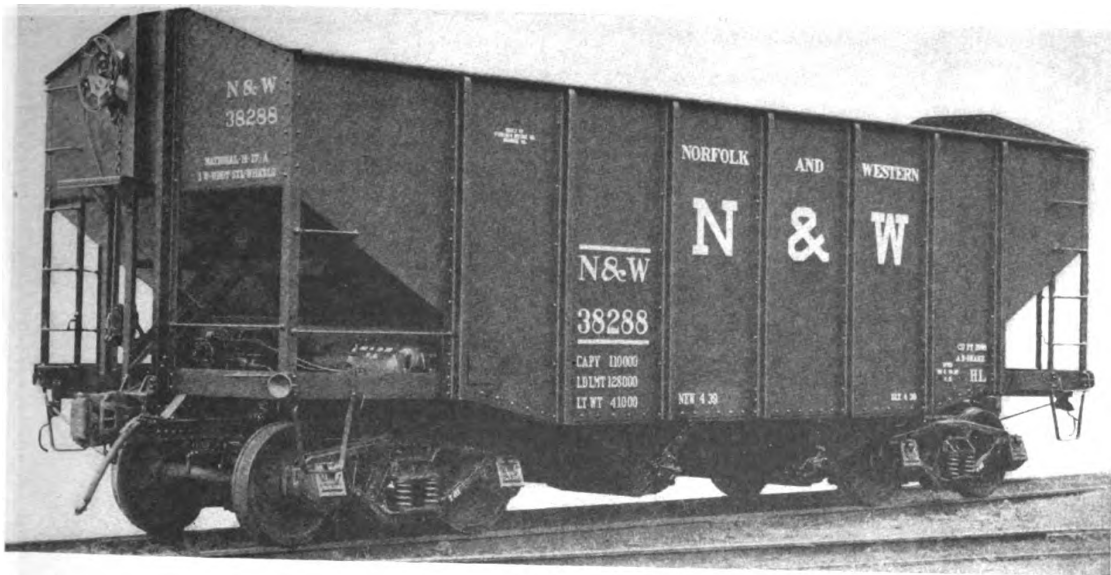


Fig. 2.605—Norfolk & Western 55-ton hopper car, Road Class HL, A. A. R. Class HM. Road Numbers: 22,000-25,999; 38,000-39,999; 56,500-59,999; 67,000-69,999
(See also Figs. 2.604-2.607)

DIMENSIONS AND WEIGHTS—N. & W. CLASS HL HOPPER CAR

Length over striking plates.....	32 ft. 4 in.	Inside width	9 ft. 9 3/4 in.
Coupled length	34 ft. 10 in.	Cubical capacity, level full.....	1,998 cu. ft.
Truck centers	21 ft. 4 in.	Cubical cap., with 30 deg. heap.....	2,429 cu. ft.
Truck wheel base.....	5 ft. 6 in.	Weight of empty car (average).....	41,200 lb.
Axle journals	5 1/2 in. x 10 in.	Load limit (average).....	127,800 lb.
Inside length	31 ft. 0 in.	Weight of one truck.....	7,200 lb.
		Height from rail to top car side.....	11 ft. 0 in.

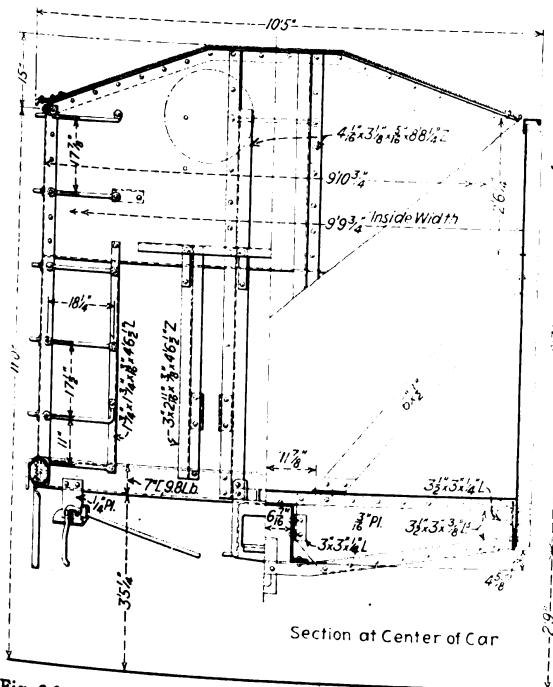


Fig. 2.606—End view and cross section of Norfolk & Western Class HL hopper car shown on Page 258.



Fig. 2.607—Norfolk & Western 55-ton hopper car, Road Class HL.

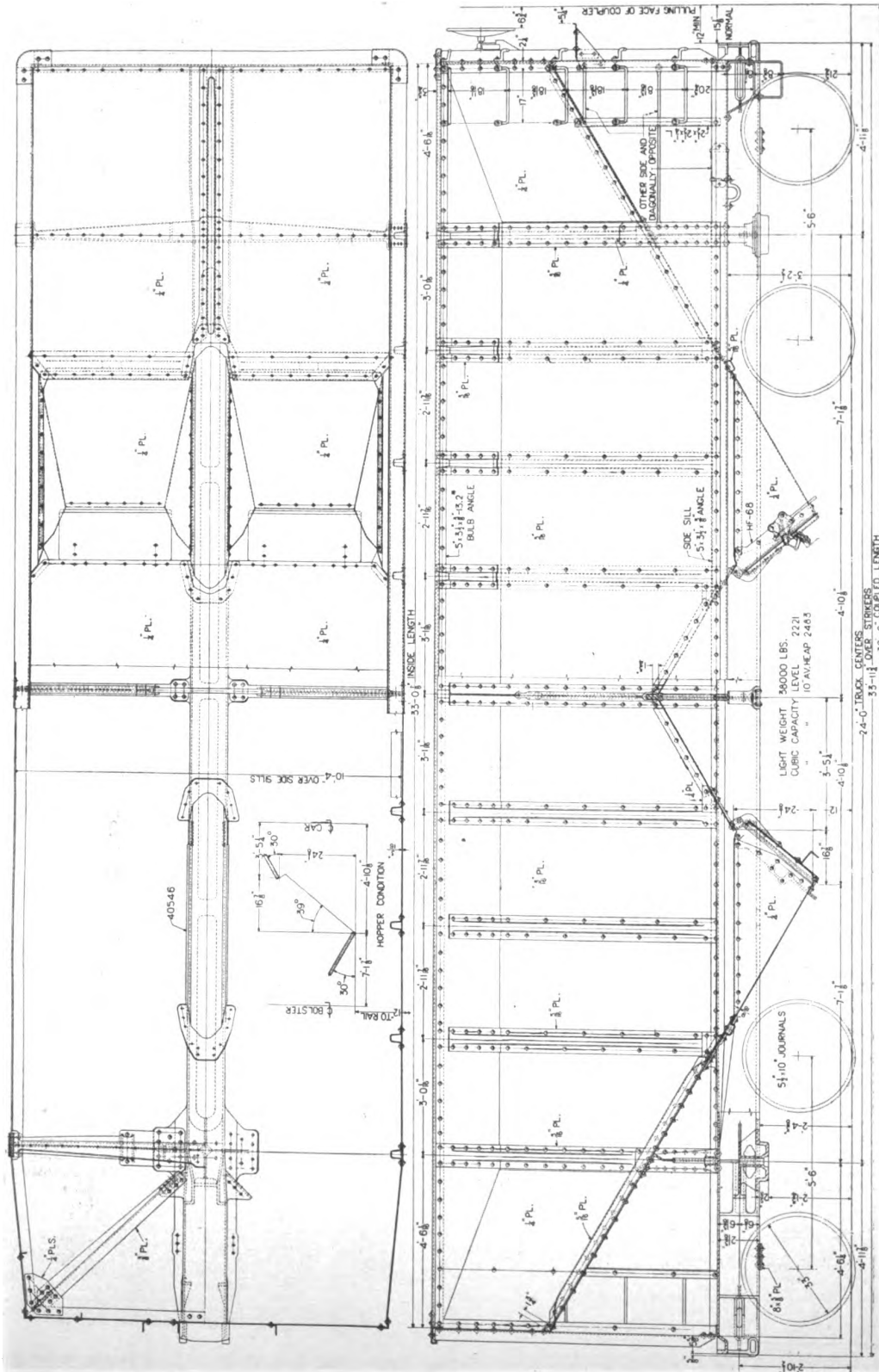


Fig. 2.608—Plan and elevation of Unitcast design, high-capacity, 60-ton twin hopper car with cast steel center sill, body bolsters, crossbearer, crossbearer arms and hopper frames

Unitcast Corporation.

(See also Pages 261, 262, 263)

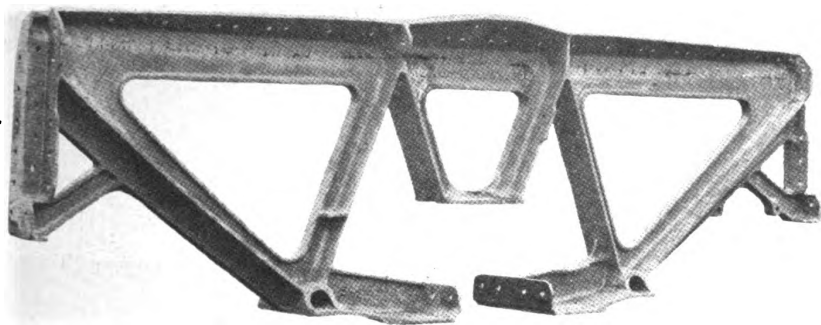
Unitcast—Cast Steel Sections

Recommended in place of complicated fabrication

UNITCAST SECTIONS, for hopper and bulk commodity cars, are recommended in place of rolled steel, built-up construction for the following purposes: (1) Where weakness develops due to corrosion, (2) where complicated fabrication can be elim-

Body Bolster Center Casting

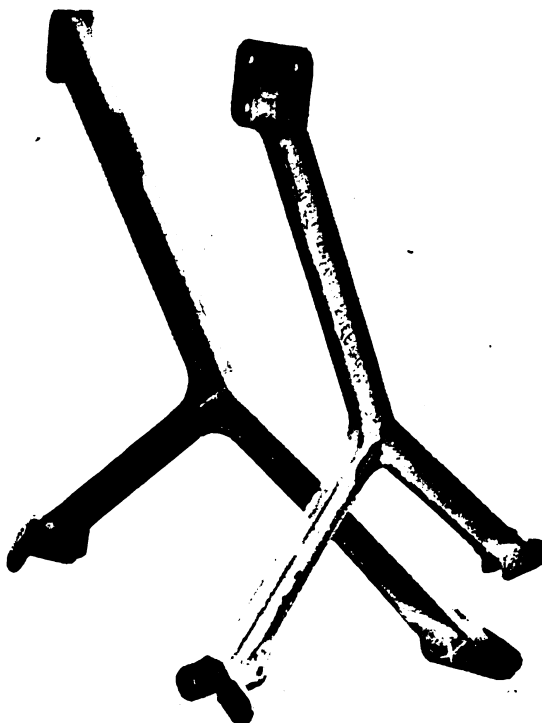
The Body Bolster Center Casting is used with a part structural type bolster. It absorbs the maximum stresses and eliminates the complicated construction immediately above the center sill.



Unitcast Body Bolster

Crossbearer Arms

The Crossbearer Arm, riveted or welded to the apex of the crossridge sheet, extends sufficiently high on the side stake to prevent any tendency of the sides to bulge. It replaces the rolled steel wing plate and will resist corrosion many times longer. Like the Body Bolster, the cast steel is placed only where necessary for the stresses involved.



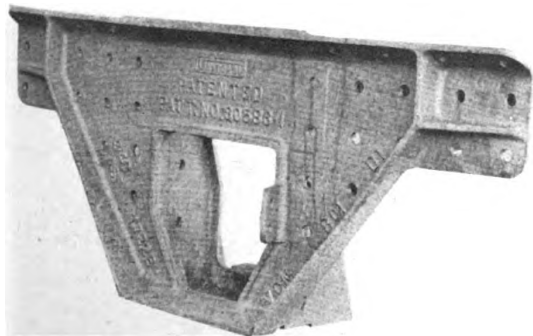
Unitcast Crossbearer Arms

inated and (3) where the use of cast steel can be justified by a decided saving in weight.

Unitcast Body Bolsters, Body Bolster Center Castings, and Crossbearer Arms are designed for the specific purposes mentioned above and deserve serious consideration when strong, light weight cars are being built.

Body Bolster Unit

The Cast Steel Body Bolster is a single unit truss extending the full width of the car. The design allows a considerable saving in weight as the cast steel is placed only where necessary for the stresses involved. On each end of the car the Unitcast Body Bolsters are similar with the exception of brackets and other surfaces that are cast integral for brake equipment and the like. It is not necessary to rivet separate plates or other shapes to the Body Bolster.



Unitcast Body Bolster Center Casting

Unitcast Sections are made of the finest cast steel and will resist corrosion for many times the life of the car. They provide a permanent, non-distorting structure and make ideal light weight construction possible.

UNITCAST CORPORATION, TOLEDO 9, OHIO

Products and Branch Offices Are Listed in the Classified Indexes

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FREIGHT CARS: Hopper, Classes HM and HT

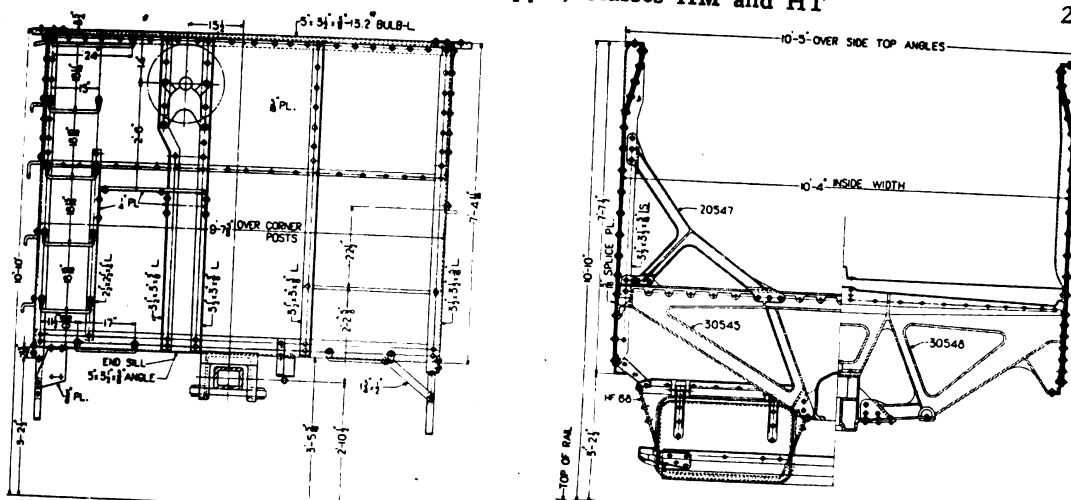


Fig. 2.610—End elevation and half cross-sections at bolster and crossbearer of Unitcast design 60-ton twin hopper car.
(See also Page 260)

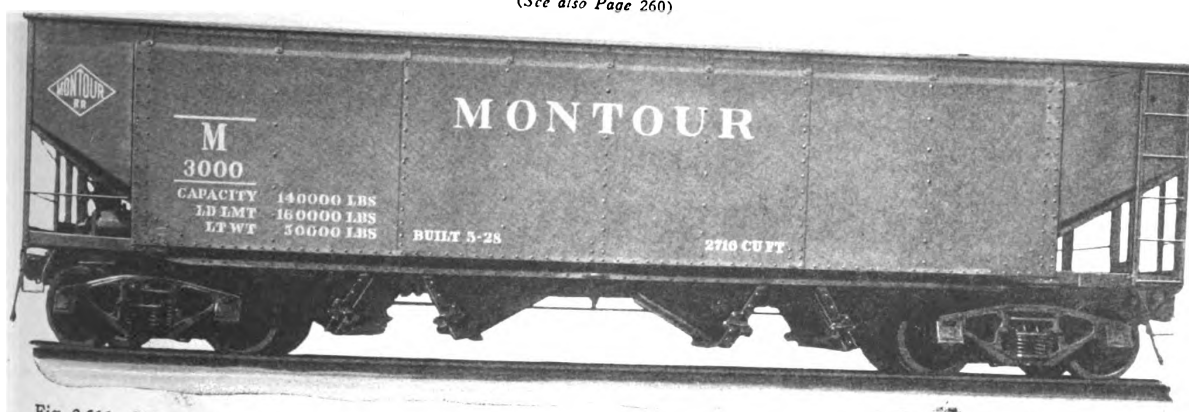


Fig. 2.611—Side view of 70-ton hopper car using Unitcast design cast steel body bolsters, crossbearers and hopper frames.

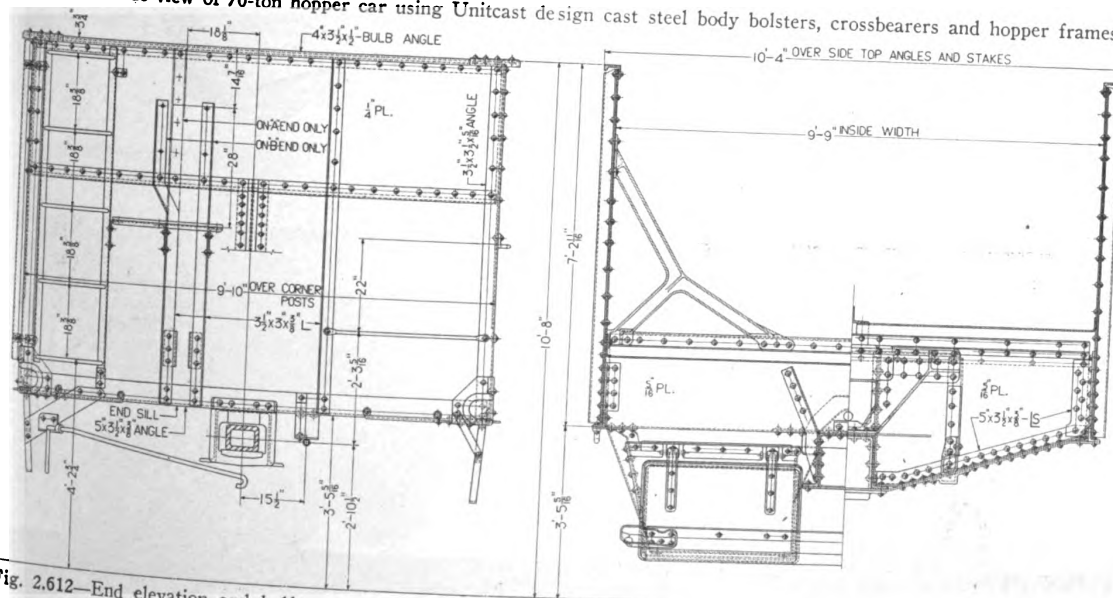


Fig. 2.612—End elevation and half cross-sections of Unitcast design. 55-ton twin hopper car incorporating cast steel crossbearer arms, body bolster center, center sill hood ends and hopper frames.
(See also Page 262)

Unitcast Corporation
(See also Pages 260, 261, 262)

Wine Cast Steel Hopper Frames

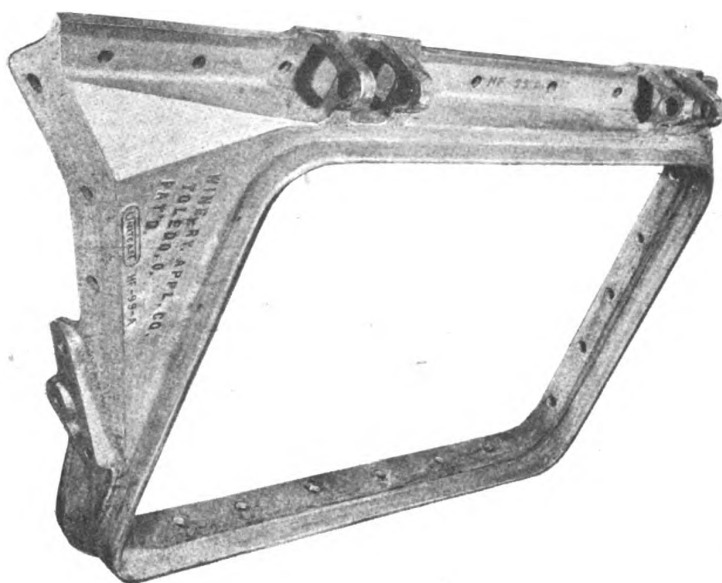
Provide absolute security
against loss of finest lading

THE WINE CAST STEEL HOPPER FRAME provides a positive, non-distorting door fit of rigid construction—entirely surrounding the hopper

Frame also stiffens and supports the lower edge of the crossridge sheet by carrying it on the top section of the unit. It thus prevents binding in the hinge lugs as the crossridge sheet cannot bend down between the side and center sills when subject to abuse or maximum loads. The Wine Cast Steel Construction replaces those portions of the hopper that are known to rust out quickly and it incorporates all the working parts of the door into one casting. It thereby eliminates the possibility of any change in door fit through weakness due to corrosion or faulty construction.

(Continued on next page)

Below: Inside view of Wine Cast Steel Hopper Frame. Sufficient strength is designed into each section.



Above: Outside view of latest design of Wine Cast Steel Hopper Frame. Note integral hinge lugs and continuous rim around hopper opening.

opening. The Wine Hopper Frame ties into both the side and center sills, strengthens the hopper unit, and increases the rigidity of the entire understructure of the car. It carries the hinge lugs and all other door fittings—permanently holding all related parts in their proper location. The Wine Hopper



Hopper car built new with Wine Cast Steel Hopper Frames

THE WINE RAILWAY APPLIANCE COMPANY, TOLEDO 9, OHIO

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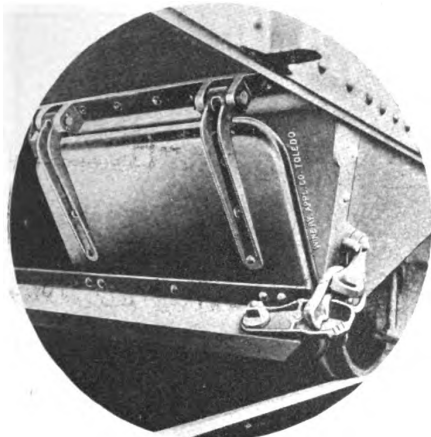
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WINE CAST STEEL HOPPER FRAMES

Simple Construction Saves Time and Labor

Time and labor can be substantially reduced by this simple construction, either in re-building old cars or constructing new ones. This type of construction has fewer parts and rivets than the conventional type of hopper and can be assembled as a unit to be applied to the car body.



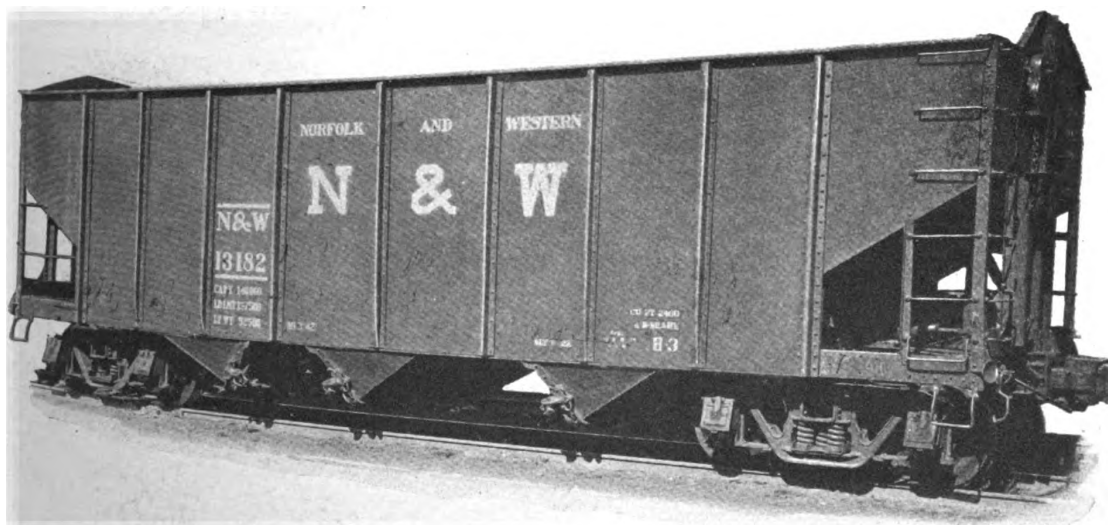
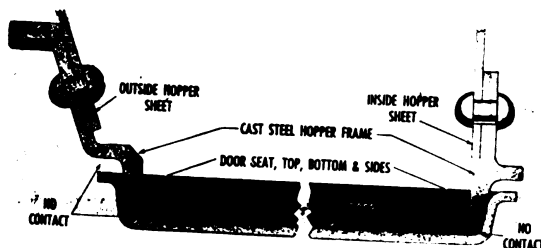
Wine Cast Steel Hopper Frame as applied to hopper car.

Rectangular Openings Reduce Door Cost

The Wine Cast Steel Hopper Frame is designed to use a rectangular, pan-shaped door with out-turned reinforcing edges. The use of this rectangular door eliminates the necessity of carrying right and left hand parts in stock. Furthermore, another saving in the original cost is due to the fact that only one die is necessary in the manufacture of the door. Rectangular doors of this design also give double service; when the lower edge of the door shows weakness, due to corrosion, the door can be inverted to place the bottom of the door at the top where strength is not so important. The design also provides for the hinge holes to be punched in such a manner that when the door is reversed, the end hinge holes are in exact position to properly spot the hinges in the new position. Other types of suitably designed doors are also recommended.

Summing up: Wine Cast Steel Hopper Frames are a necessary feature of modern hopper car construction. Close tolerances, maintained in the manufacture of hopper frames and doors, give this unit an interlocking, "self-sealed" door fit. Wine Hopper Frames resist corrosion and abrasion, cannot warp or distort and provide a permanent, accurate door seat to handle the finest lading without loss. Suitable patterns are available for A.A.R. hopper car designs as well as all other new and modernized cars.

Sectional view of interlocking door fit with Wine Cast Steel Hopper Frame



Hopper car rebuilt with Wine Cast Steel Hopper Frames

THE WINE RAILWAY APPLIANCE COMPANY, TOLEDO 9, OHIO

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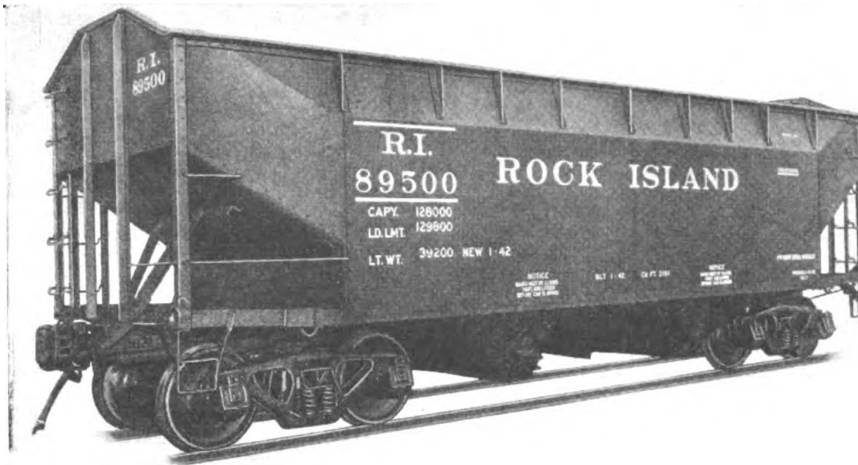


Fig. 2.613—Chicago, Rock Island & Pacific 128,000-lb. capacity twin hopper coal car. Builder, American Car and Foundry Co.

Light weight, 39,200 lb.; load limit, 129,800 lb.; capacity, 2,191 cu. ft.; inside, length 33 ft. 0 in.; width 10 ft. 4 in.; height of sides 10 ft. 8 in.

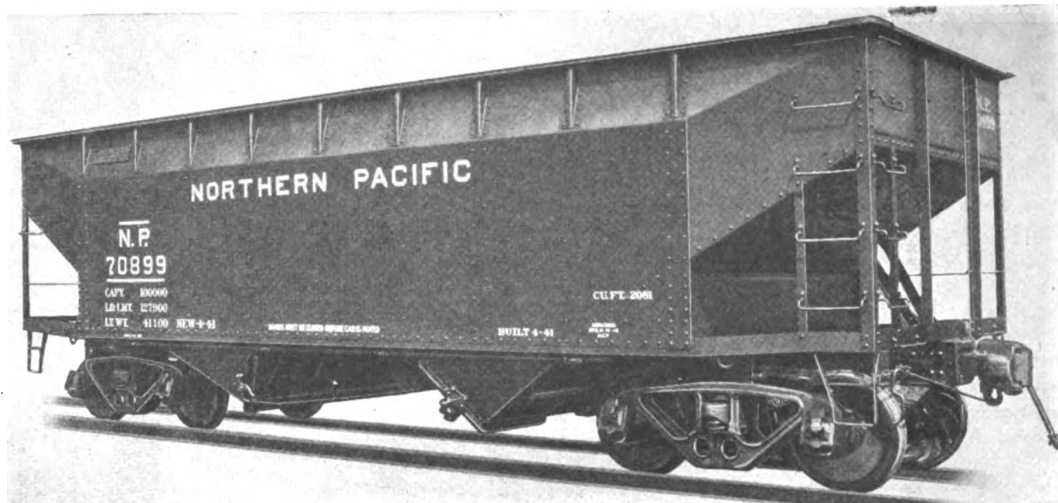


Fig. 2.614—Northern Pacific 50-ton twin hopper coal car. Builder, American Car and Foundry Co.

Light weight, 41,100 lb.; load limit, 127,900 lb.; capacity, 2,081 cu. ft.; inside, length 33 ft. 0 in.; width 10 ft. 4 in.; height of sides 10 ft. 5 in.



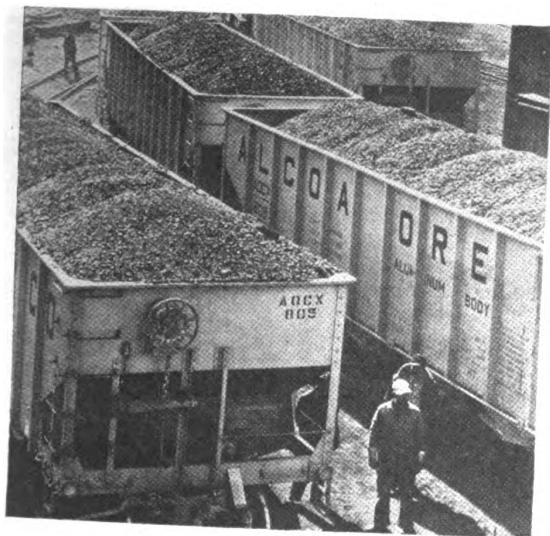
Fig. 2.615—C. B. & Q. 55-ton aluminum twin hopper coal car. Rebuilt on old steel frame. Built at Havelock shops.

Light weight, 36,800 lb.; load limit, 132,200 lb.; capacity, 2,075 cu. ft.; inside, length 34 ft. 3 in.; width 9 ft. 6 in.; height of sides 10 ft. 9 in. Descriptions: *Railway Mechanical Engineer*, Sept. 1944; *Railway Age*, Sept. 9, 1944. (See also Page 267).

Alcoa Aluminum Alloys for Hopper and Gondola Cars

Light Weight, Corrosion Resistance

Rock Island
Capacity 1200
America
Co.
Load 1200
Capacity 1200
Load 1200

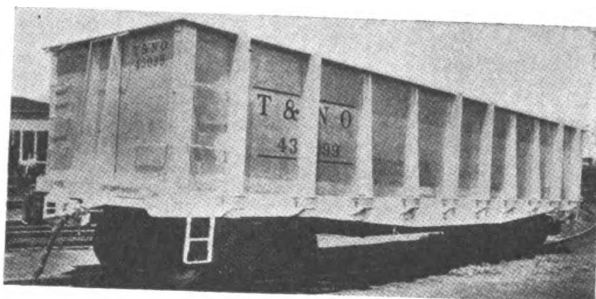


Fourteen Years' Service of Alcoa Alloys in Coal, Ore and Sulphur Transport—Built by Canton Car Company.

Resistance to Corrosion

Coal has always presented a big problem to railroad maintenance men. Short life—frequent replacement of side, floor and hopper sheets was a necessary evil. Alcoa alloys can stop this needless expense. The corrosion resistance of Alcoa alloys, against sulphur and its by-products present in coal, has been proven time and again.

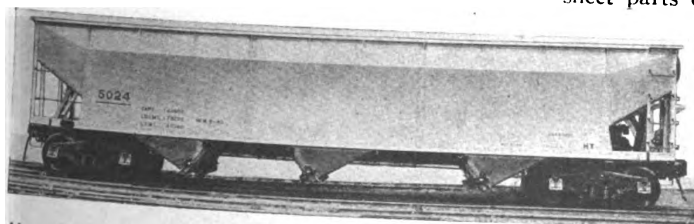
Painting is not required—this means less shopping.



Alcoa Alloys for Sulphur Service—Built by American Car & Foundry Co.

Record of Alcoa Alloys in Hopper and Gondola Cars

Handle them rough, beat them, build a fire under them, put them through the car dumper, Alcoa experience can give you the answers.



Alcoa Alloys for Coal and Sulphur Service—Built by American Car & Foundry Co.

1. In bauxite ore, sulphur, and coal service for 13 years, no repairs from corrosion problems.
2. Two major railroads have had cars in regular service for twelve years, no repairs due to corrosion.

3. Car in sulphur service on Gulf Coast for 9 years—no repairs from action of sulphur. Alcoa experience can give you the same service for your cars.

Reduce Weight—Increase Payload

Complete application of Alcoa alloys can save approximately 12,000 lb. in a standard A.A.R. 50-ton hopper car. This means less dead weight, increased payload, less maintenance on roadways and equipment, longer trains.

Construction of Illustrated Car 5024

The entire body is built of Alcoa aluminum alloys except steel used for center sill, bolsters, and trucks. Specialties are of steel, except the hopper door frames which are 356-T6 aluminum alloy castings, furnished by The Wine Railway Appliance Company and the Dreadnaught pan doors which are 61S-O aluminum alloy pressings made by Standard

Railway Equipment Mfg. Company heat treated to 61S-O after forming.

All formed parts are made of 61S-W, all other sheet parts of 61S-T aluminum alloys. Structural and extruded shapes are of 61S-T and 61S-W aluminum alloys.

Rivets are 53S-T61 alloy, the squeeze driven rivets being upset cold; the hand driven, hot.

The basic design is the A.A.R. triple hopper standard. Weight saving with aluminum permitted increasing the payload, by adding 40½ in. to the length as designed for steel. Thus, the cubic capacity was upped 230 cu. ft.,

for an additional 6.2 tons of coal. Cars are equipped with Westinghouse Air Brake Company AB-8 empty-and-load brakes.

The car bodies are left a natural aluminum finish the underframe and trucks being painted black.

RAILROAD DIVISION

ALUMINUM COMPANY OF AMERICA, Gulf Building, PITTSBURGH 19, PA.

Products and Branch Offices Are Listed in the Classified Indexes

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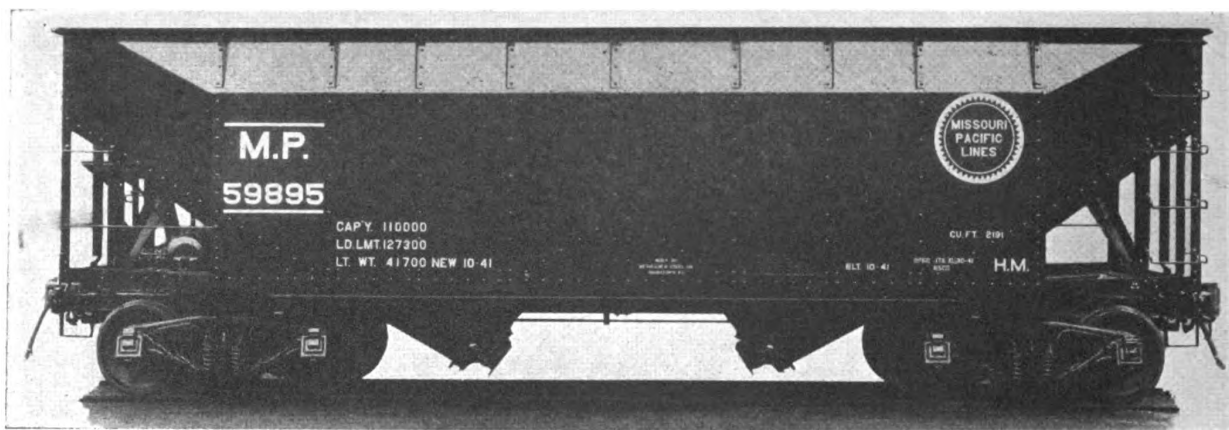


Fig. 2.616—Missouri Pacific 55-ton all-steel twin hopper coal car. Builder, Bethlehem Steel Company. Light weight, 41,700 lb.; load limit, 127,300 lb.; capacity, 2,191 cu. ft.; length inside, 33 ft. 0 in.; width, 10 ft. 4 in.; height of sides, 10 ft. 8 in.

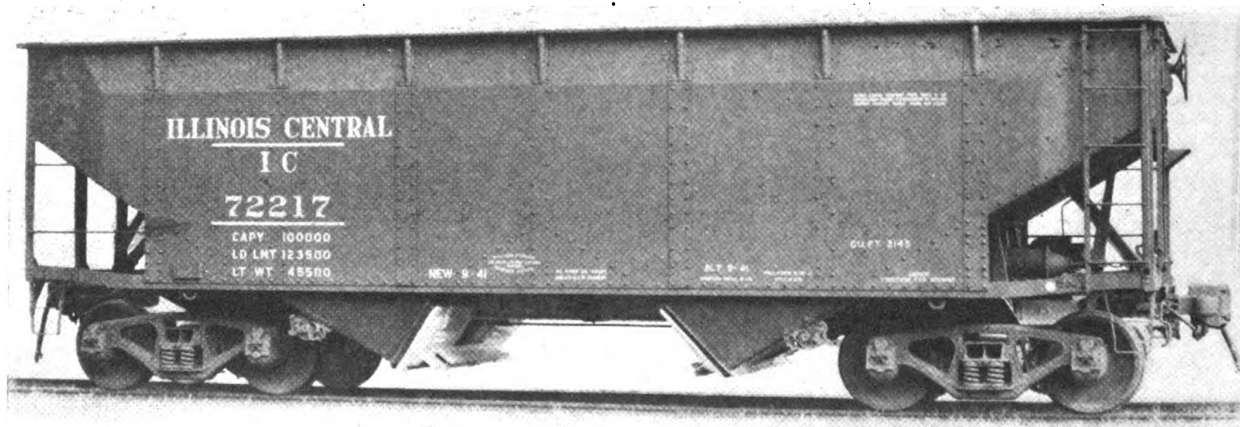


Fig. 2.617—Lehigh Valley 50-ton all-steel twin hopper coal car. Builder, Pullman-Standard Car Manufacturing Co. Light weight, 45,500 lb.; load limit, 123,500 lb.; capacity, 2,145 cu. ft.; length inside, 33 ft. 0 in.; width, 10 ft. 4 in.; height of sides, 10 ft. 8 in. Description: *Railway Age*, Aug. 28, 1943



Fig. 2.618—Southern Ry. 50-ton composite twin hopper coal car. Builder, Pullman-Standard Car Manufacturing Co. Light weight, 41,900 lb.; load limit, 127,100 lb.; capacity, 1,970 cu. ft.; length inside, 33 ft. 0 in.; width, 9 ft. 6 in.; height of sides, 10 ft. 8 in. (A. A. R. Emergency 1942 Design—For drawing see 1943 *Car Builders' Cyclopedia*, Page 249) Description: *Railway Age*, Aug. 28, 1943

FREIGHT CARS: 50-Ton Twin Hopper, Class HM

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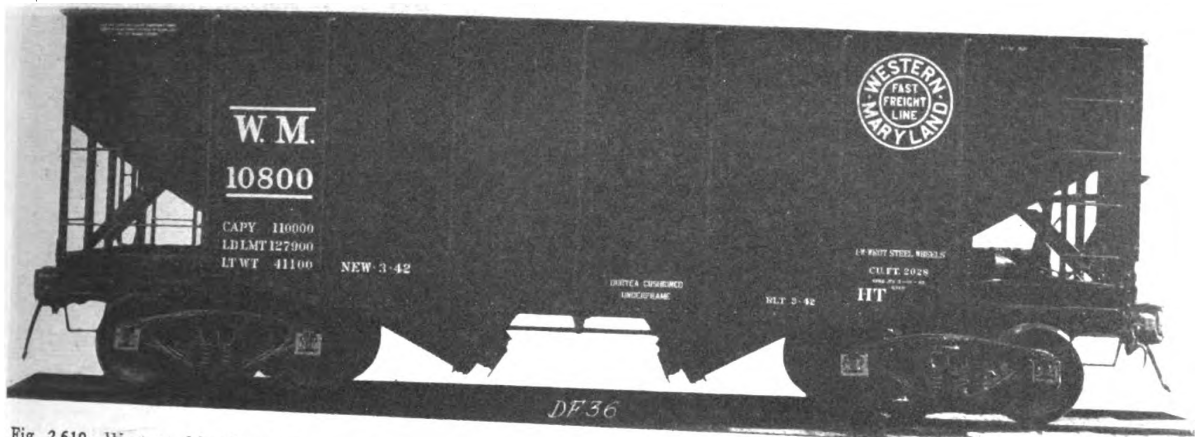


Fig. 2,619—Western Maryland 55-ton twin hopper car with Duryea cushioned underframe. Builder, Bethlehem Steel Company.
 Light weight, 41,100 lb.; load limit, 127,900 lb.; capacity, 2,028 cu. ft.; inside, length 31 ft. 0 in.; width 9 ft. 9 in.; height of sides 10 ft. 5 in.



Fig. 2,620—Baltimore & Ohio 50-ton twin hopper coal car with Duryea cushioned underframe. Builder, General American Transportation Corp.
 Light weight, 44,100 lb.; load limit, 124,900 lb.; capacity, 2,183 cu. ft.; inside, length 33 ft. 0 in.; width 10 ft. 4 in.; height of sides 10 ft. 5 in.

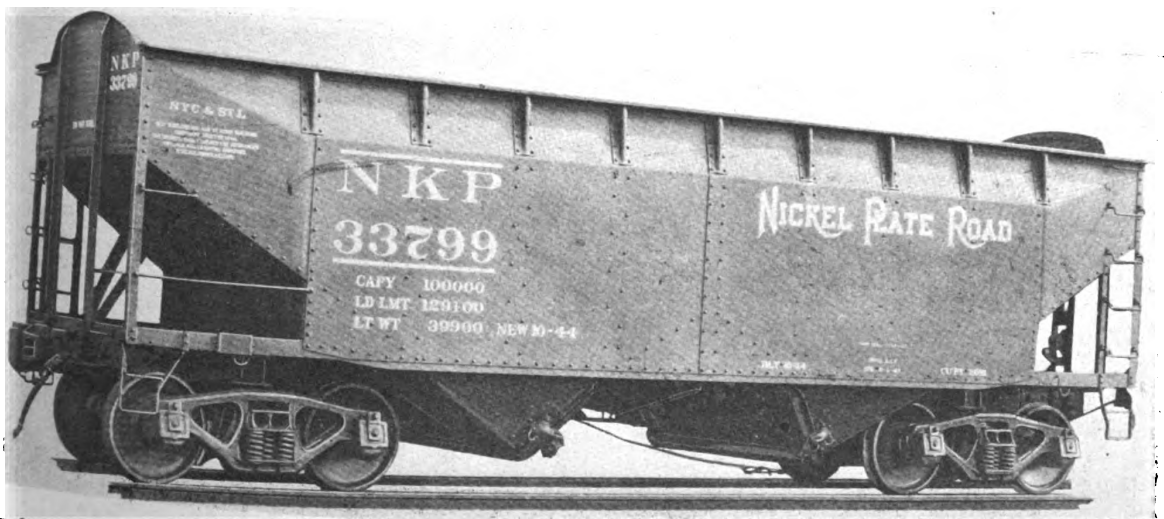


Fig. 2,621—New York, Chicago & St. Louis (Nickel Plate) 50-ton twin hopper coal car. Builder, American Car and Foundry Co.
 Light weight, 39,900 lb.; load limit, 129,100 lb.; capacity, 2,081 cu. ft.; inside, length 33 ft. 0 in.; width 10 ft. 4 in.; height of sides 10 ft. 6 in.



Fig. 2.622—Canadian Pacific 125,000 lb. capacity twin hopper car. Built for National Steel Car Corporation. Capacity, 2,190 cu. ft.; light weight, 42,000 lb.; load limit, 127,000 lb.; length inside, 33 ft. 0 in.; width inside, 10 ft. 4 in.; height overall, 10 ft. 10 in.

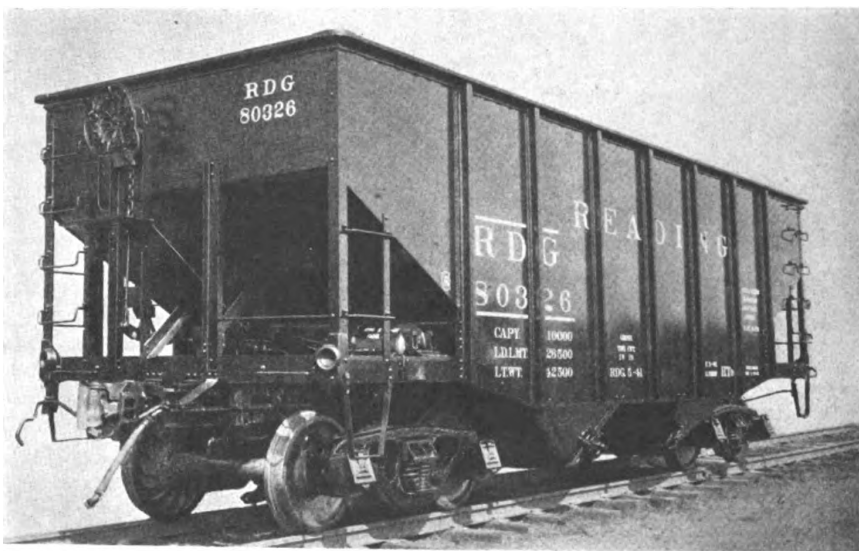


Fig. 2.623 — Reading 50-ton twin-hopper coal car with Dur-yea cushion gear. Road Class HTO; built at railroad shops.

Capacity, 2,028 cu. ft.; light weight, 42,500 lb.; load limit, 126,500 lb.; length inside, 31 ft. 0 in.; width inside, 9 ft. 9 3/4 in.

Description: *Railway Mechanical Engineer, March, 1942*

(For drawing see page 255)



Fig. 2.624—Birmingham Southern 70-ton light-weight twin-hopper car for coal or ore service, A. A. R. Class HM. Builder, Pullman-Standard Car Manufacturing Company.

Capacity, 1,850 cu. ft.; light weight, 36,000 lb.; load limit, 174,000 lb. Inside, length 30 ft. 3 in.; width 9 ft. 7 in.; height of sides, 10 ft. 8 in.

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FREIGHT CARS: 50-Ton Twin Hopper, Class HM

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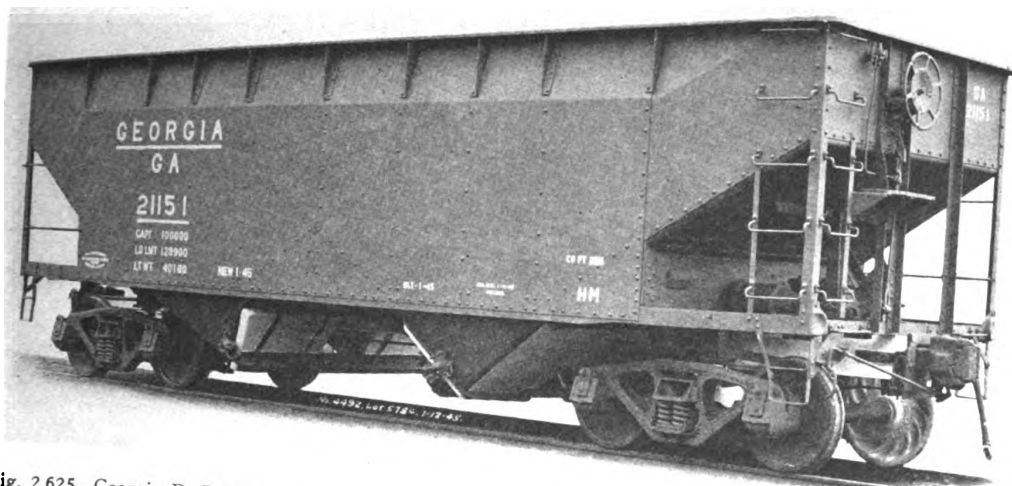


Fig. 2.625—Georgia R. R. 50-ton twin-hopper coal car, A. A. R. Type. Builder, Pullman-Standard Car Manufacturing Co.
Light weight, 40,100 lb.; load limit, 128,900 lb.; capacity, 2,191 cu. ft.; inside, length 33 ft. 0 in.; with 10 ft. 4 in.; height of sides 10 ft. 5 in.

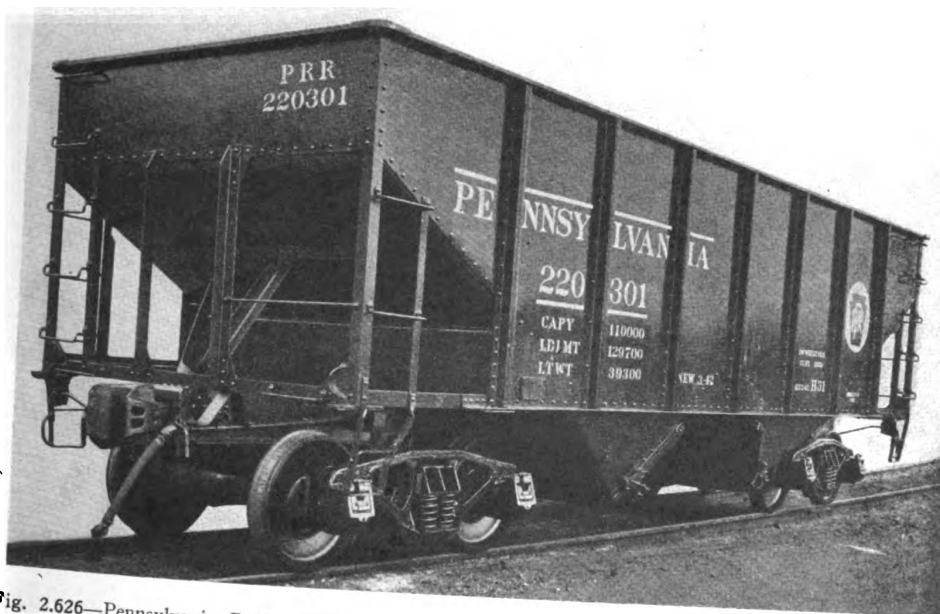


Fig. 2.626—Pennsylvania Railroad 55-ton twin-hopper coal car. Road Class H-31. Built at Altoona shops.
Light weight, 39,300 lb.; load limit, 129,700 lb.; capacity, 1,859 cu. ft.; inside, length 31 ft. 6 in., width 9 ft. 9 in.; height of sides 10 ft. 3 in.

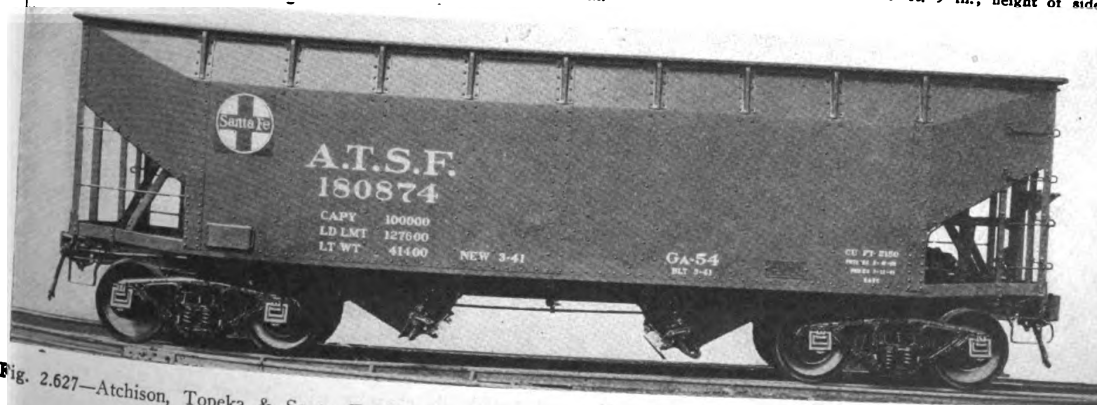


Fig. 2.627—Atchison, Topeka & Santa Fe 50-ton twin hopper coal car. Road Class GA-54. Builder, General American Transportation Corp.
Light weight, 41,400 lb.; load limit, 127,600 lb.; capacity, 2,150 cu. ft.; inside, length 33 ft. 0 in.; width 10 ft. 4 in.; height of sides 10 ft. 7½ in.



Fig. 2.628—Seaboard Air Line 70-ton triple hopper car. Road Class H-7. Builder, Pullman-Standard Car Manufacturing Co. Light weight, 46,200 lb.; load limit, 163,800 lb.; capacity, 2,773 cu. ft.; inside length, 40 ft. 8 in.; width, 10 ft. 4 in.; height of sides, 10 ft. 8 in.

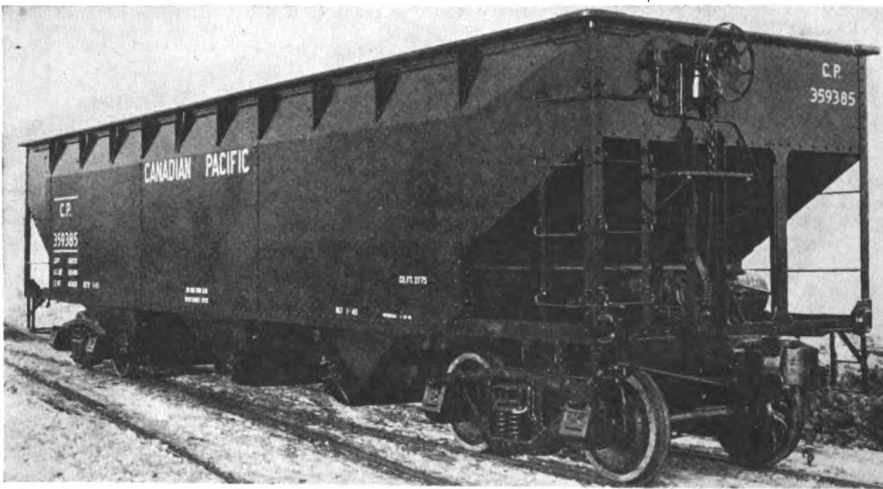


Fig. 2.629—Canadian Pacific 160,000 lb. capacity triple hopper car. Builder, National Steel Car Corp., Ltd.

Light weight, 48,400 lb.; load limit, 161,600 lb.; capacity, 2,775 cu. ft.; inside, length 40 ft. 8 in.; width, 10 ft. 4 in.; height of sides, 10 ft. 8 in.

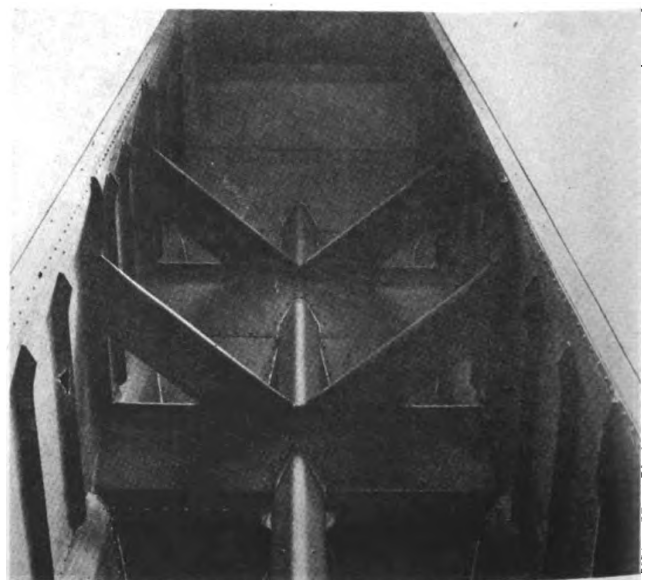
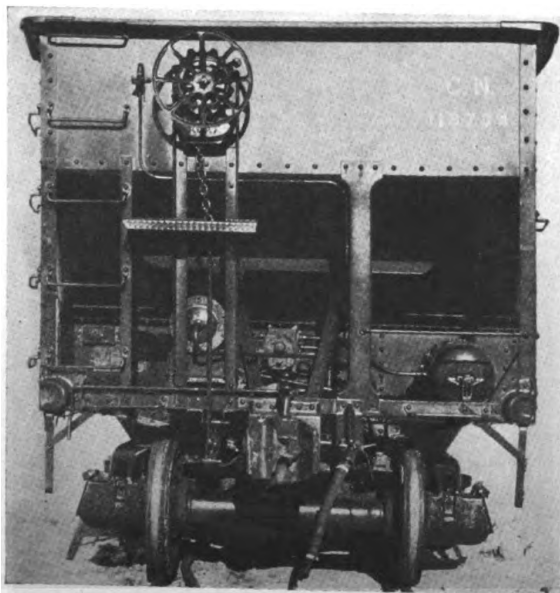


Fig. 2.630, 2.631—End and interior views of Canadian National 160,000 lb. capacity triple hopper car. Series 118,500-118,999. Builder, Eastern Car Co.

FREIGHT CARS: 70-Ton Triple Hopper, Class HT

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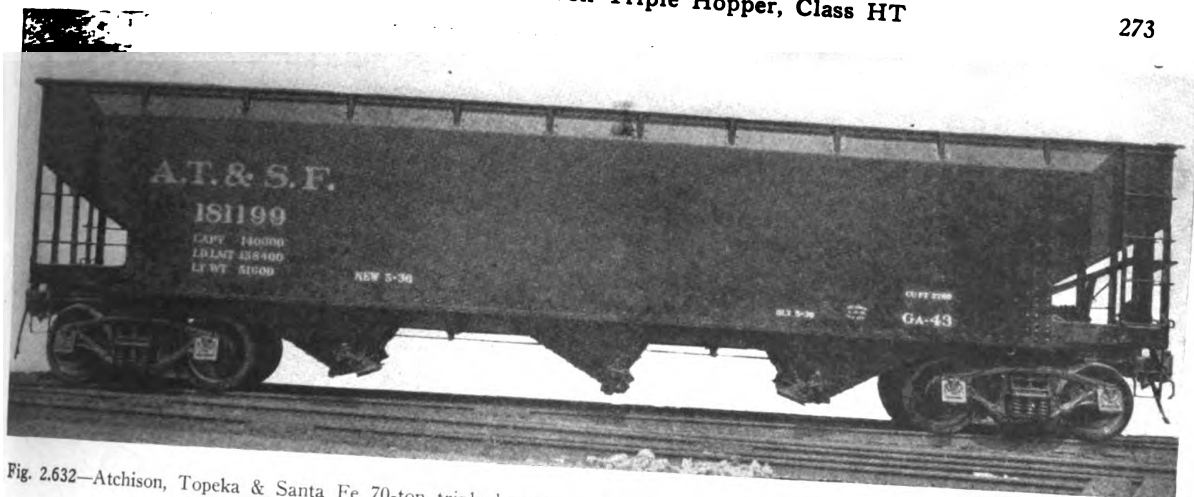


Fig. 2.632—Atchison, Topeka & Santa Fe 70-ton triple hopper car, Road Class GA-43, A. A. R. Class HT. Builder, American Car and Foundry Company.
 Light weight, 51,600 lb.; load limit, 158,400 lb.; capacity, 2,769 cu. ft.; inside, length 41 ft. 3 in.; width 10 ft. 1 in.; height of sides 9 ft. 9 in.

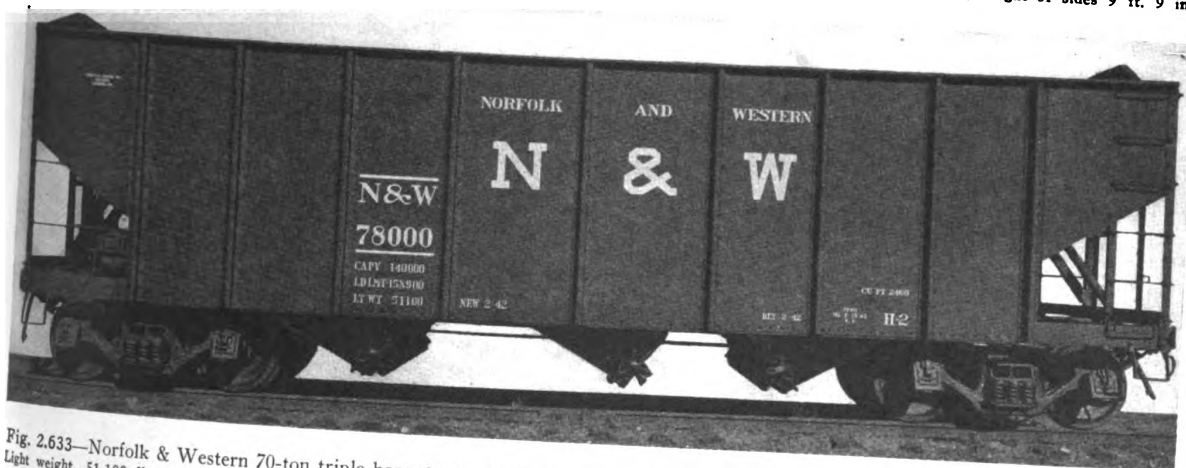


Fig. 2.633—Norfolk & Western 70-ton triple hopper car, A. A. R. Class HT. Built by Virginia Bridge Co. and Bethlehem Steel Co.
 Light weight, 51,100 lb.; load limit, 158,900 lb.; capacity, 2,460 cu. ft.; inside, length 36 ft. 9 in.; width 9 ft. 6 in.; height of sides 10 ft. 2 in.

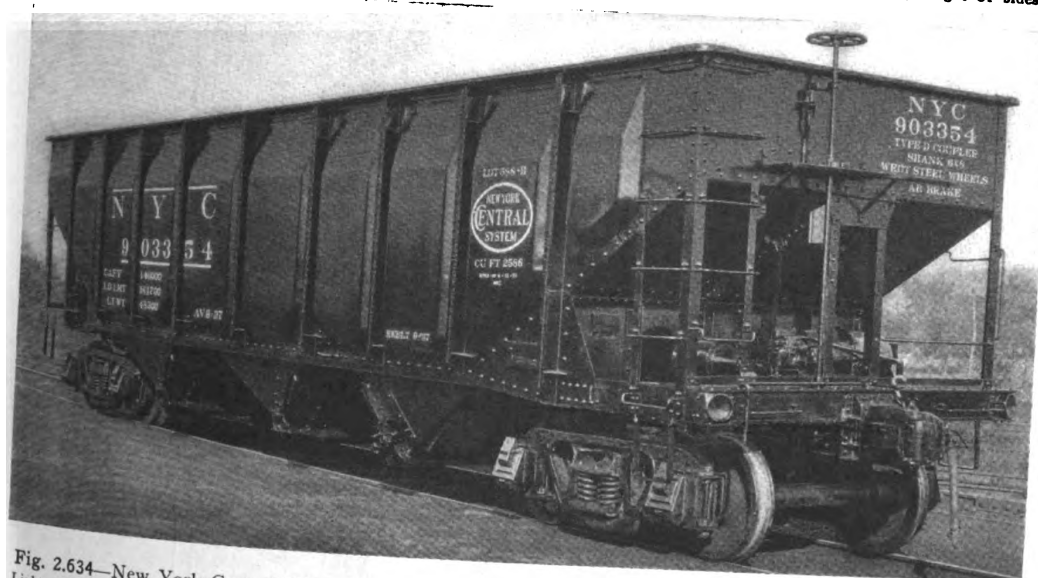
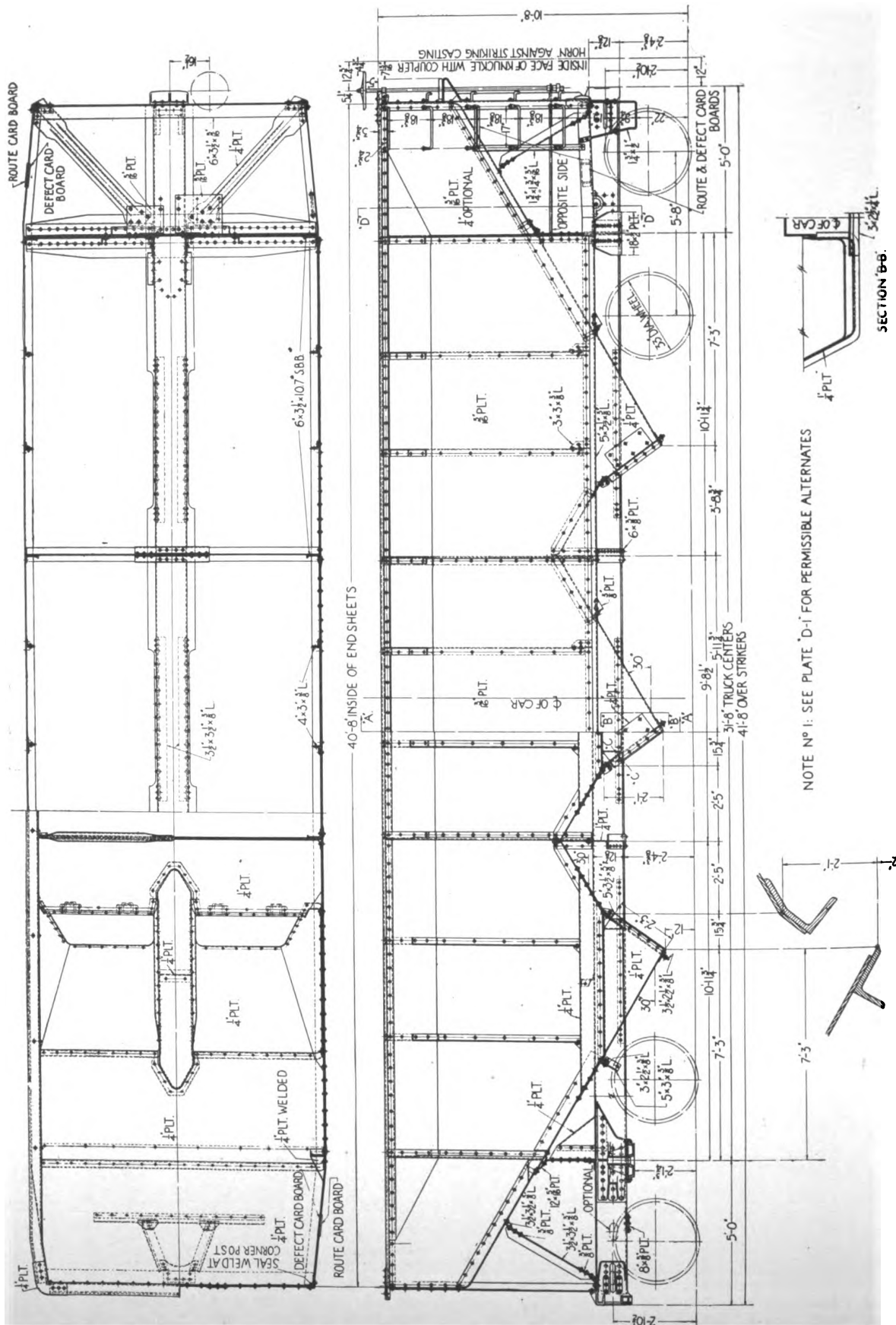
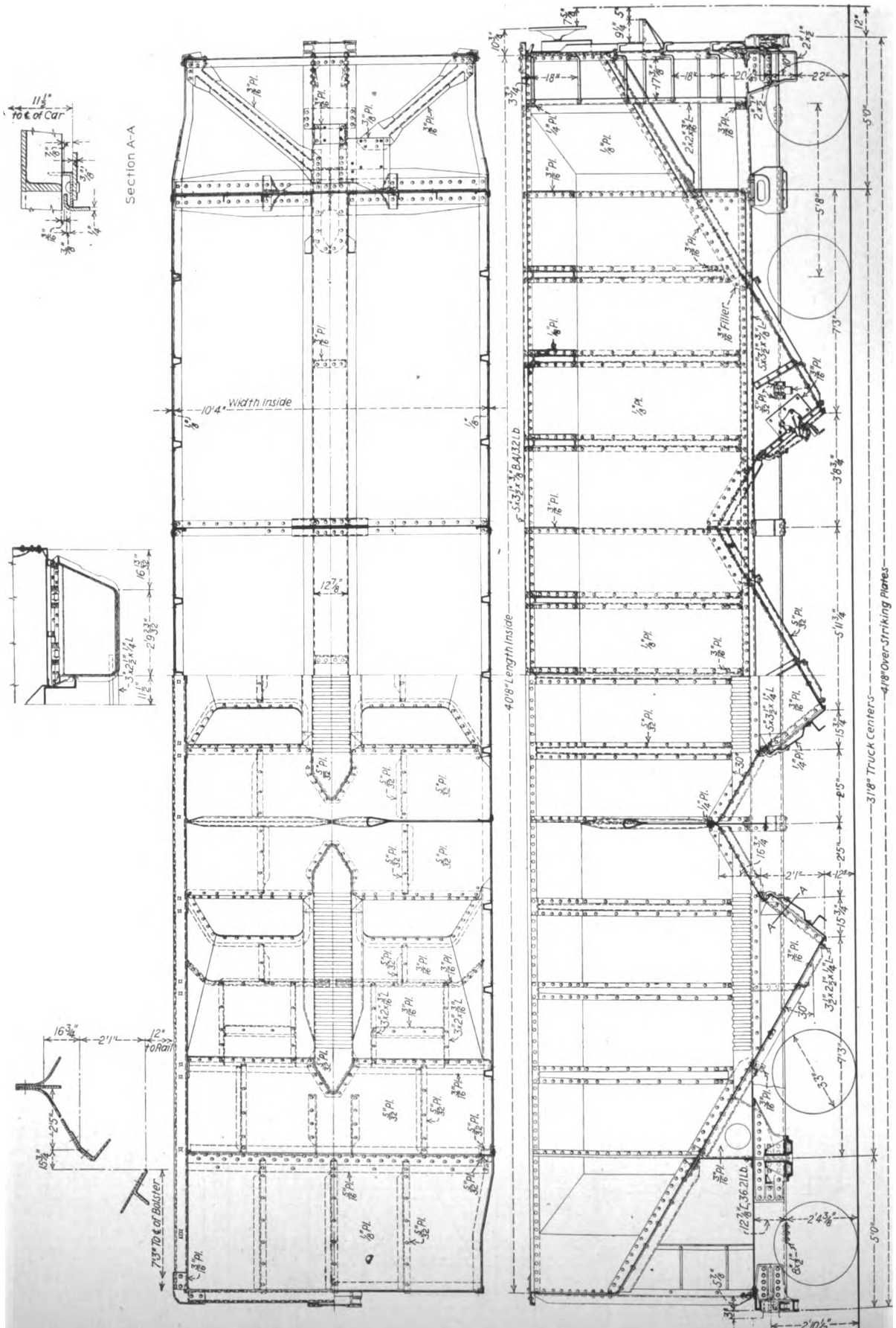


Fig. 2.634—New York Central 70-ton triple hopper car, rebuilt, with panel sides. Lot 588-H. A. A. R. Class HT.
 Light weight, 48,300 lb.; load limit, 161,700 lb.; capacity, 2,586 cu. ft.; inside, length 40 ft. 8 in.; width 10 ft. 3 in.; height of sides 10 ft. 8 in.





FREIGHT CARS: 70- and 90-Ton Triple Hopper, Class HT

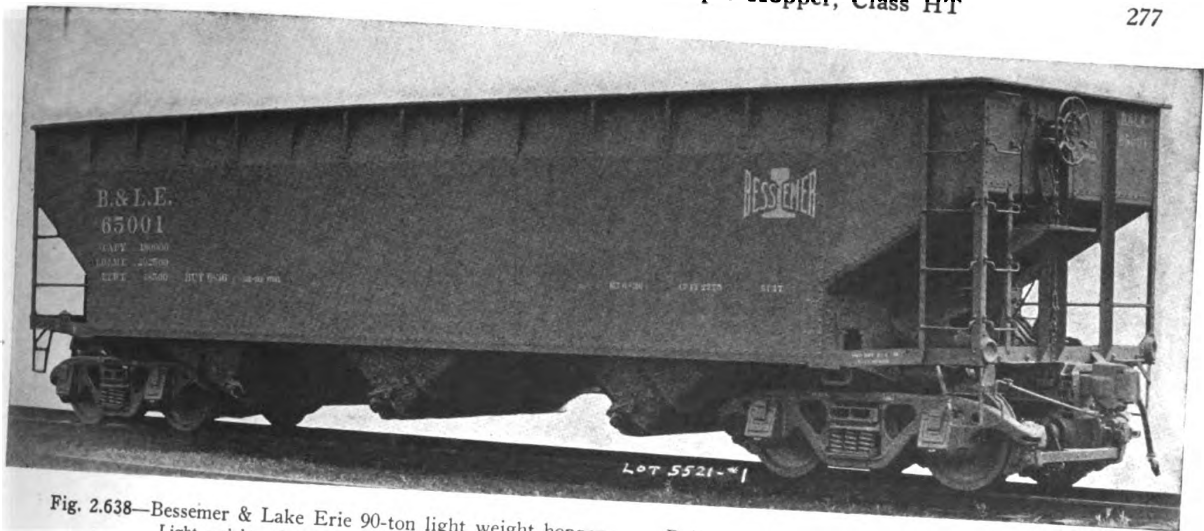


Fig. 2.638—Bessemer & Lake Erie 90-ton light weight hopper car. Built of USS Cor-Ten steel, Road Class HT17. Light weight, 48,500 lb.; load limit, 202,500 lb.; capacity, 2,775 cu. ft.; axle journals, 6 1/4 in. x 12 in. Also built in 70-ton capacity with 6 in. x 11 in. journals, Road Class H16. See Fig. 2.642.
 Note: Earlier 90-ton cars of carbon steel weighed 58,800 lb. with load limit 192,200 lb. (See also Page 276)

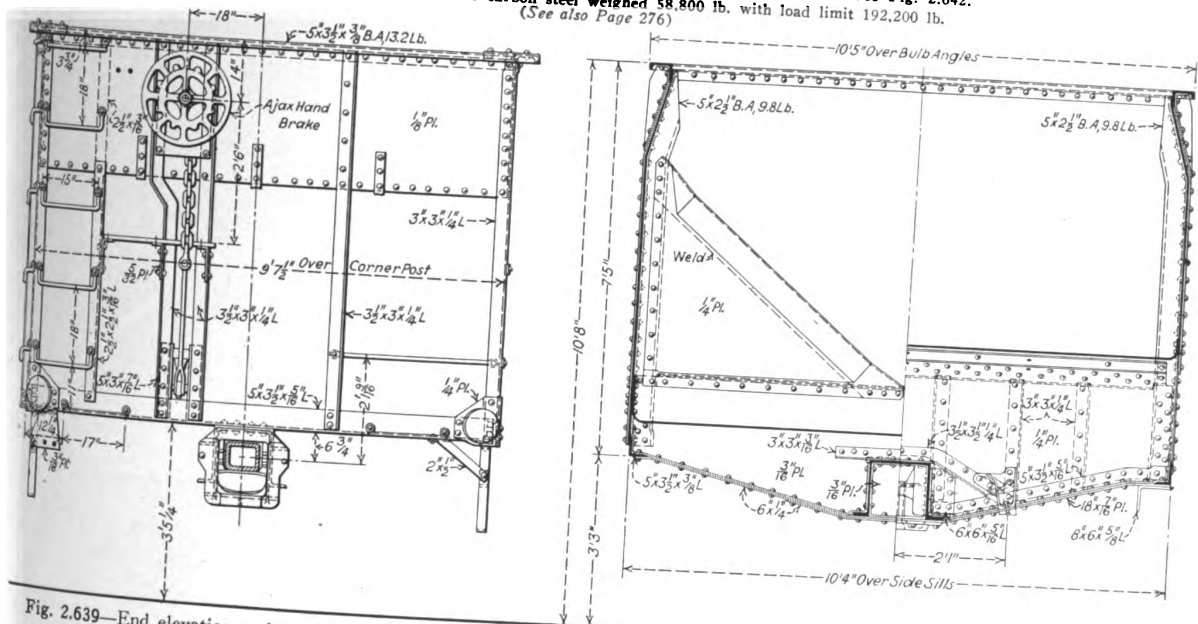
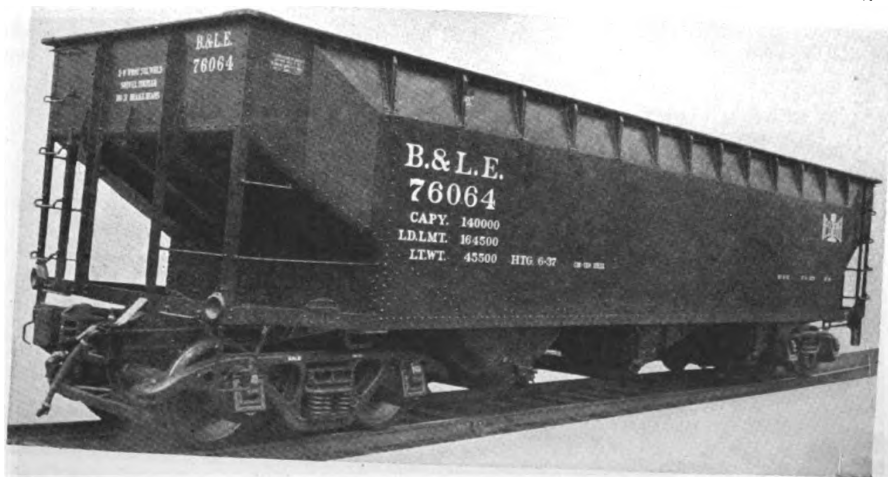


Fig. 2.639—End elevation and cross section of B. & L. E. 70-ton and 90-ton cars shown in Figs. 2.637, 2.638 and 2.640.

Fig. 2.640 — Bessemer & Lake Erie 70-ton light weight hopper cars of USS Cor-Ten steel. Road Class HT16.

Light weight..... 45,500 lb.
 Load limit..... 164,500 lb.
 Capacity 2,775 cu. ft.



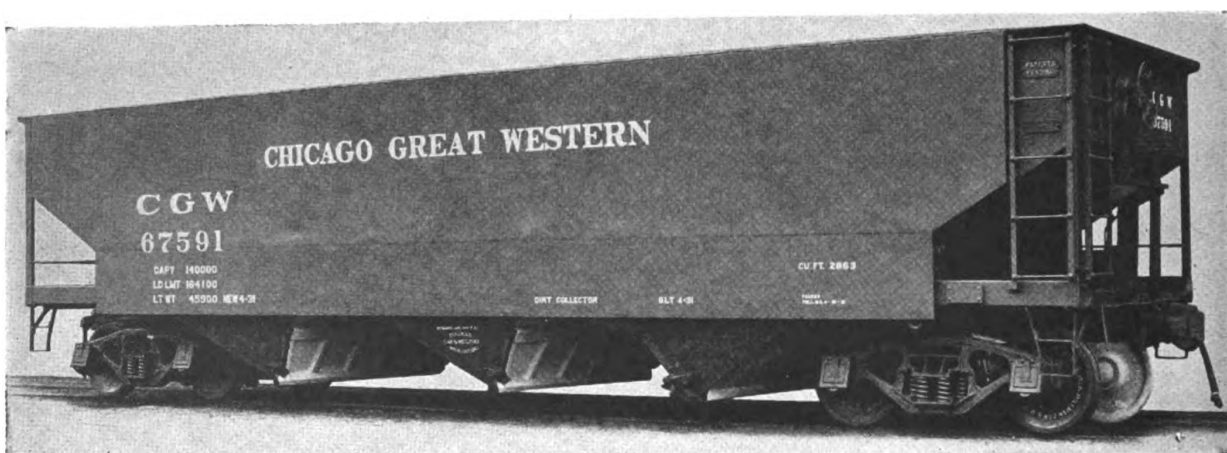


Fig. 2.641—Chicago Great Western 70-ton all-welded hopper car. Builder, Pullman-Standard Car Manufacturing Company.
Light weight, 45,900 lb.; load limit, 164,100 lb.; capacity, 2,863 cu. ft.
(Description—*Railway Mechanical Engineer*, August, 1931—*Railway Age*, May 9, 1931)

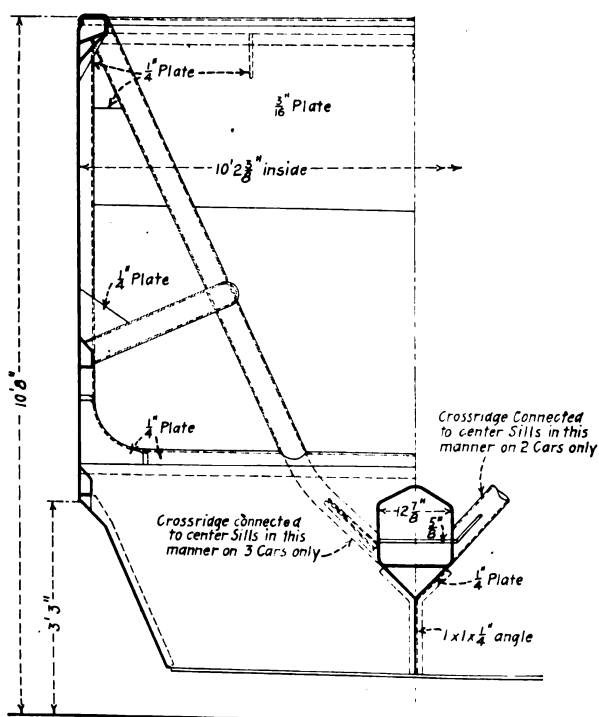


Fig. 2.642—Cross section of C. G. W. all-welded hopper car.

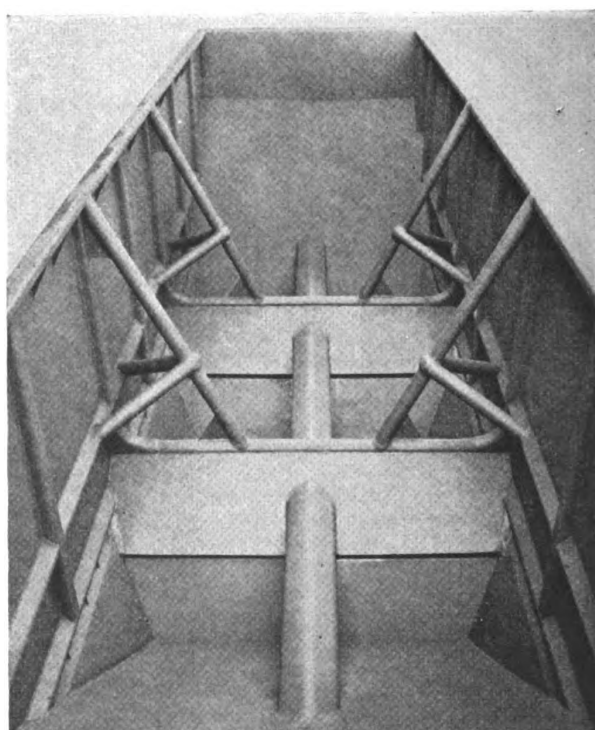


Fig. 2.643—Interior construction of C. G. W. all-welded hopper car.

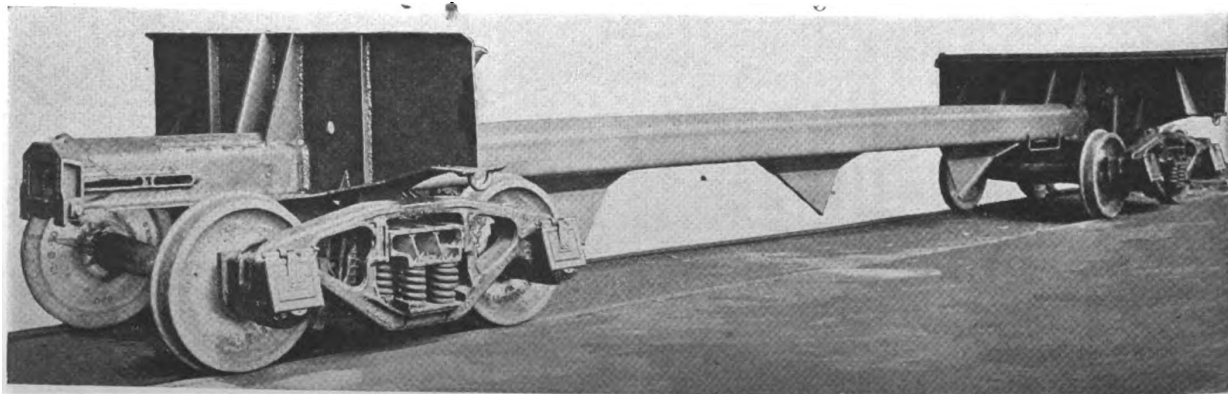


Fig. 2.644—All-welded tubular center sill and bolster of C. G. W. 70-ton hopper car.

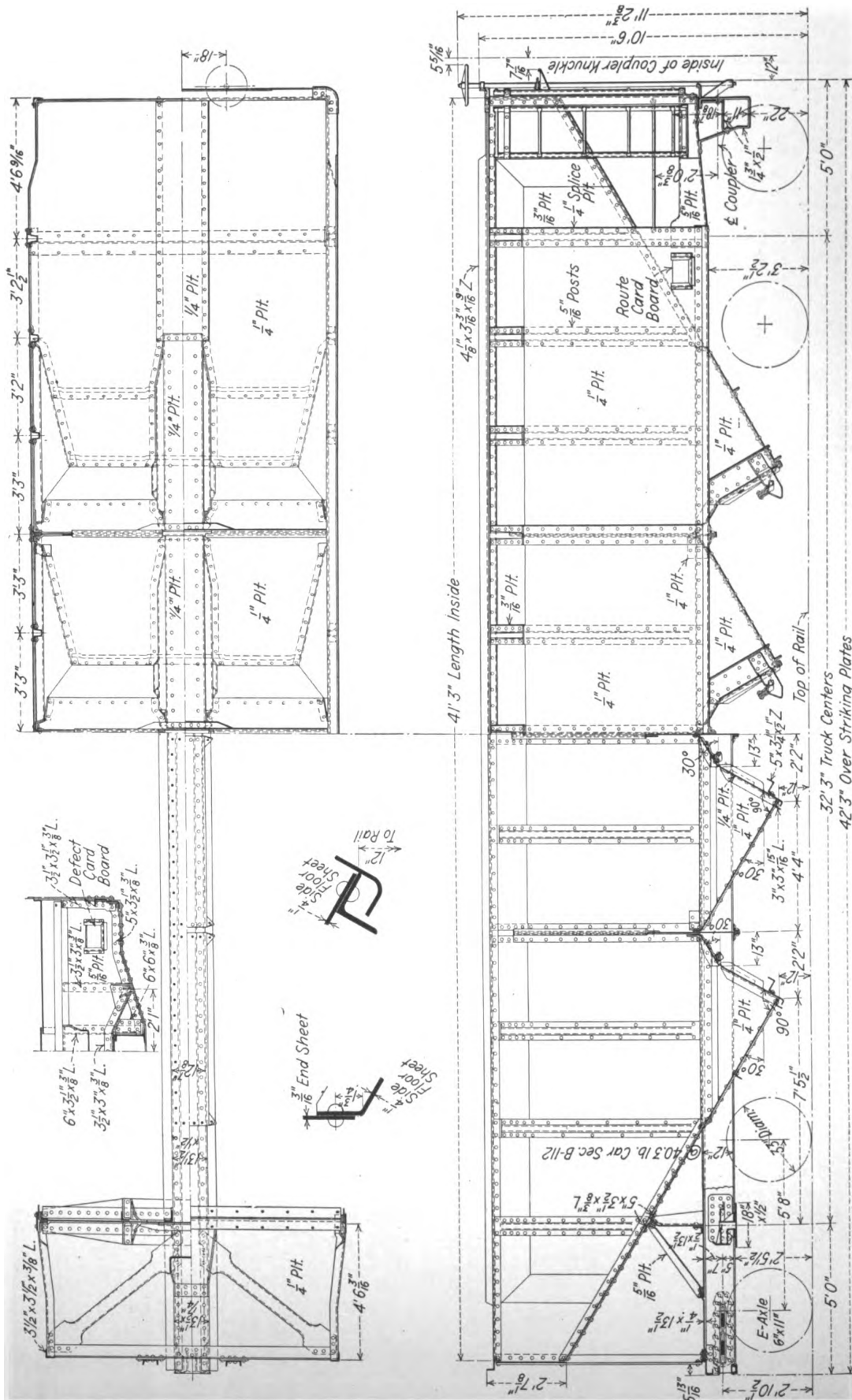
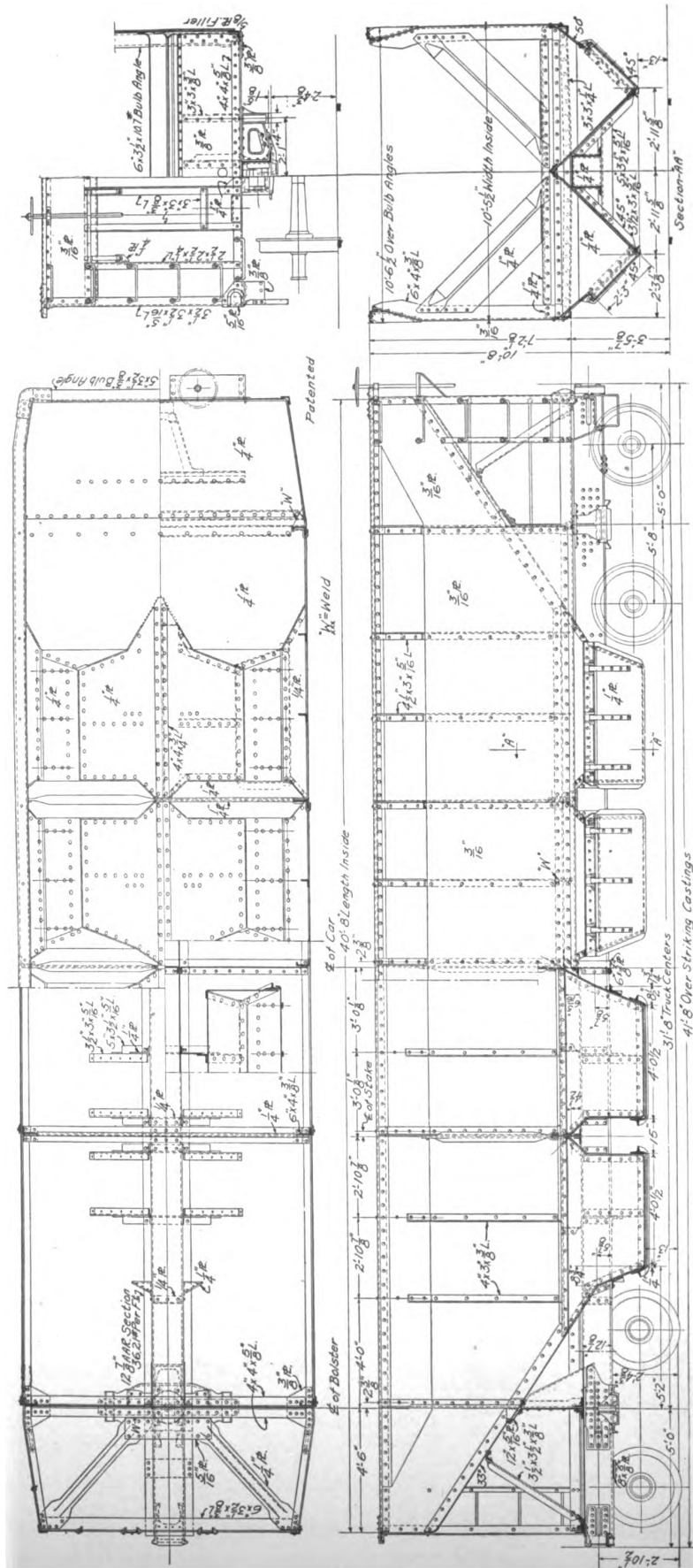


Fig. 2.646—Plan and elevation of Baltimore & Ohio 70-ton capacity quadruple hopper car. Design follows general lines of A. A. R. Recommended Practice Car, Class HT.
(See also Page 281)

FREIGHT CARS: 70-Ton Quadruple Hopper, Class HT





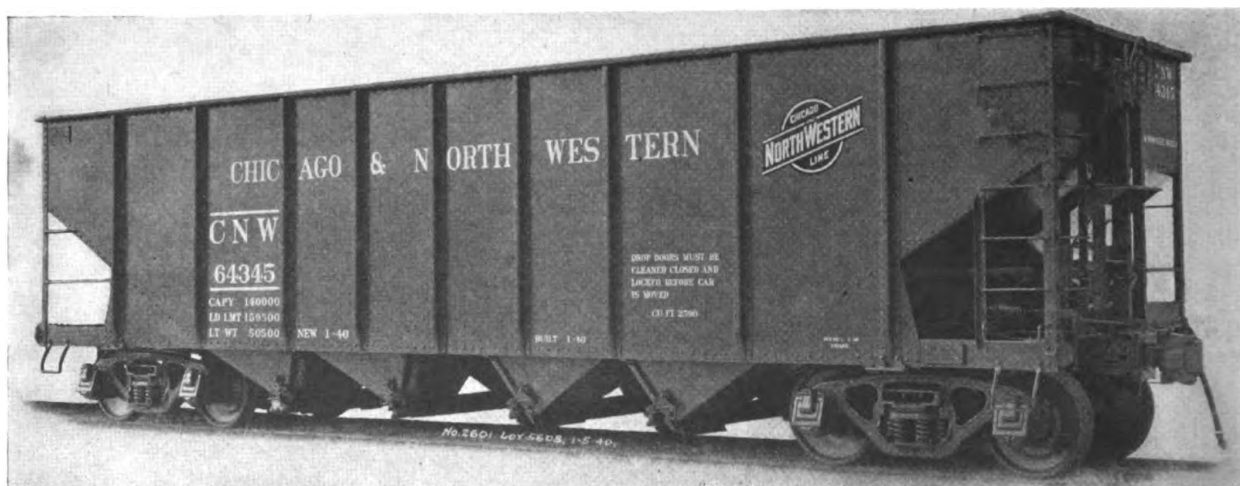


Fig. 2.651—Chicago & North Western 70-ton capacity quadruple hopper car, A. A. R. Class HT. Builder, Pullman-Standard Car Manufacturing Company.

Light weight, 50,500 lb.; load limit, 159,500 lb.; capacity, 2,590 cu. ft.; inside, length 39 ft. 0 in.; width 9 ft. 6 in.; height of sides 10 ft. 3 in.

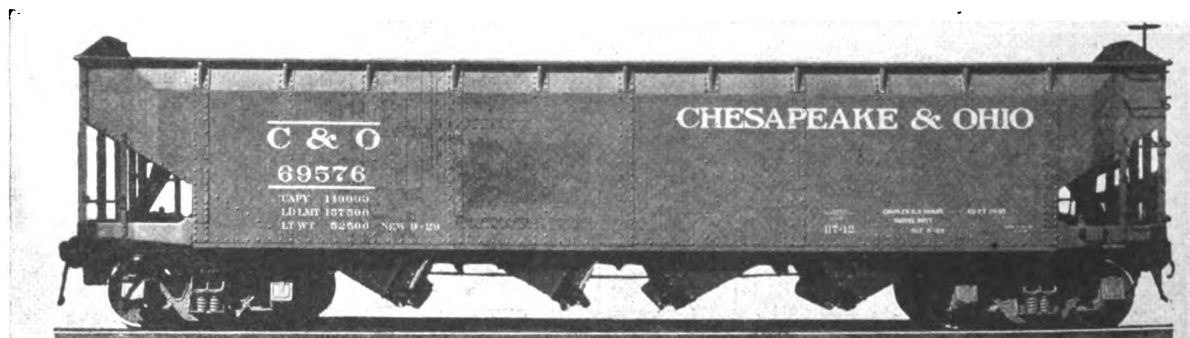


Fig. 2.652—Chesapeake & Ohio 70-ton capacity quadruple hopper car, Road Class H7-12, AAR. Class HT.

Light weight, 52,500 lb.; load limit, 157,500 lb.; capacity, 2,645 cu. ft.; inside, length 41 ft. 2 in.; width 10 ft. 0 in.; height of sides 10 ft. 1 in.

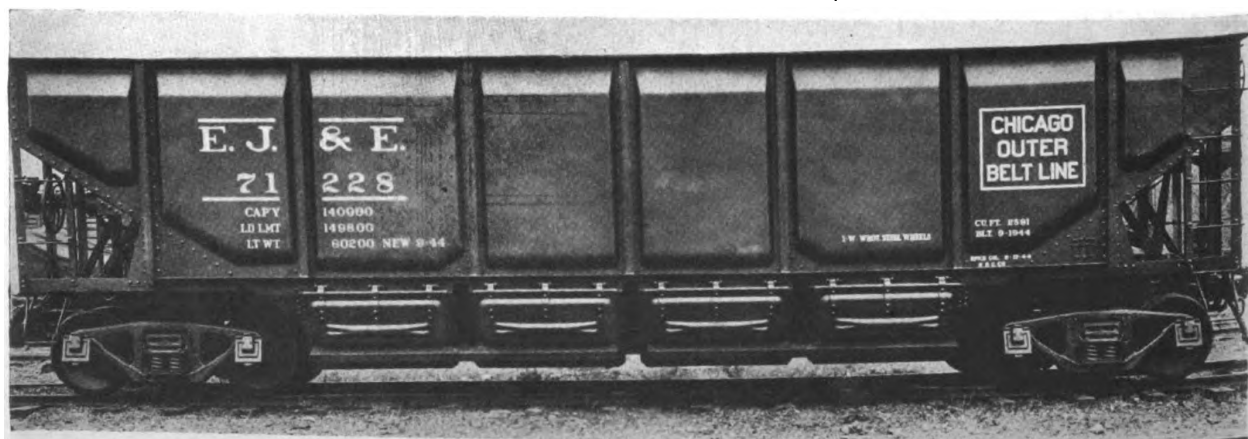


Fig. 2.653—Elgin, Joliet & Eastern 70-ton capacity side-discharge quadruple hopper car with panel sides. A. A. R. Class HD. Builder, Ralston Steel Car Co.

Series 70,250-71,249; light weight, 60,200 lb., load limit, 149,800 lb.; capacity, 2,591 cu. ft.; inside, length 39 ft. 6 1/4 in.; width 9 ft. 2 3/4 in.; height of sides 10 ft. 0 3/4 in.

FREIGHT CARS: Hopper Ballast, Classes HK or MWB



Fig. 2,654—Missouri-Kansas-Texas 70-ton Hart selective ballast and coal car. Builder, American Car and Foundry Company.
Light weight, 58,000 lb.; load limit, 151,000 lb.; capacity, 2,519 cu. ft.
(See also Page 287)



Fig. 2,655—Chicago, Rock Island & Pacific 70-ton all-steel hopper ballast car, AAR Class MWB. Enterprise fittings. Builder, Pressed Steel Car Co., Inc.
Light weight, 58,000 lb.; load limit, 152,000 lb.; capacity, 2,446 cu. ft.; length, inside 40 ft. 5 in.



Fig. 2,656—Chicago, Milwaukee, St. Paul & Pacific 70-ton multi-service hopper ballast car, AAR Class HK. Enterprise fittings. Builder, General American Transportation Corp.
Light weight, 62,100 lb.; load limit, 147,900 lb.; capacity, 2,766 cu. ft.



Fig. 2.657—Northern Pacific 70-ton Hart selective ballast and coal car.
 Light weight, 54,800 lb.; load limit, 155,200 lb.; capacity, 2,505 cu. ft.; inside, length 40 ft. 8 in.; width 10 ft. 1 in.; height of sides 10 ft. 8 in.; length over strikers 41 ft. 8 in.

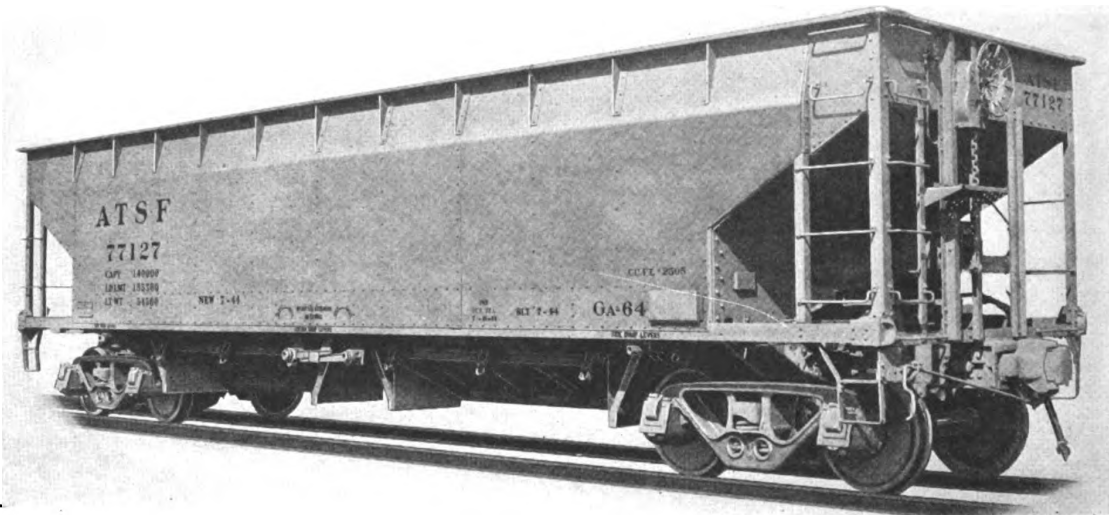


Fig. 2.658—Atchison, Topeka & Santa Fe 70-ton Hart selective ballast and coal car, Road Class GA-64.
 Light weight, 54,500 lb.; load limit, 155,000 lb.; capacity, 2,505 cu. ft.

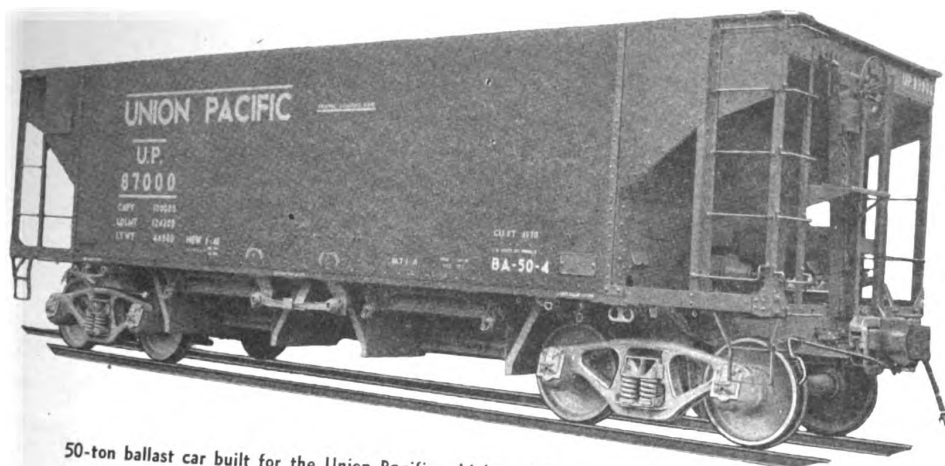


Fig. 2.659—Chicago, Burlington & Quincy 70-ton Hart selective ballast and coal car.
 Light weight, 56,100 lb.; load limit, 153,900 lb.; capacity, 2,505 cu. ft.

American Car and Foundry Company
 (See also Page 287)

A.C.F. Ballast Cars

Double-purpose equipment suitable for maintenance-of-way operations or for revenue service



50-ton ballast car built for the Union Pacific. Light-weight, 44,800 lb.; cubic capacity, 1970 cu. ft.; load limit, 124,200 lb.

A.C.F. has designed the cars illustrated on this page primarily for the proper distribution of ballast. The all-around efficiency of this type of car is such however, that during seasons of the year when ballasting operations are not possible or not required, the car can be used in revenue service for the shipment of sugar beets, coal, ore, and similar products handled in standard open-top hopper cars.

Four-Way Placing of Ballast

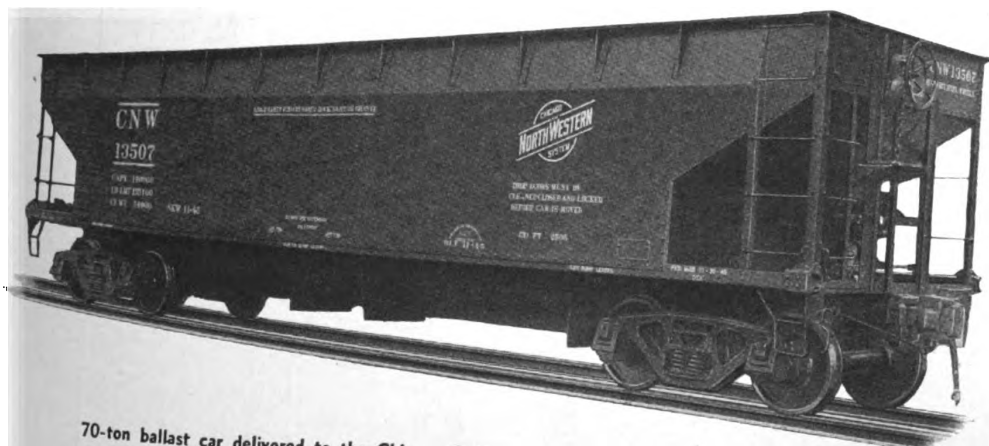
An important feature of these cars is the variety of locations where the ballast can be placed. The arrangement and operation of the doors is such that ballast can be poured (1) between the rails, (2) at one side only, (3) on both sides, outside the rails, (4) in the center and on both outsides.

Rugged Construction for Minimum Maintenance

The value of the rugged construction of these cars from the standpoint of maintenance has been fully demonstrated. All sills are protected from the lading. All doors are self-locking. Center doors operate with cast steel links and worm gear. Side doors rest on cast steel locking cams. Chains are used only to open and close side doors.

Designs Constantly Improved

When new materials and new manufacturing processes which will increase the operating economy of cars of these types, become available, A.C.F. engineers are quick to adapt them to the building of better ballast cars. Complete information covering the latest designs will be furnished promptly and gladly.



70-ton ballast car delivered to the Chicago & North Western. Light-weight, 54,900 lb.; cubic capacity, 2,505 cu. ft.; load limit, 155,100 lb.

AMERICAN CAR AND FOUNDRY COMPANY, NEW YORK, N. Y.

Products and Branch Offices Are Listed in the Classified Indexes

Sec. 2—287

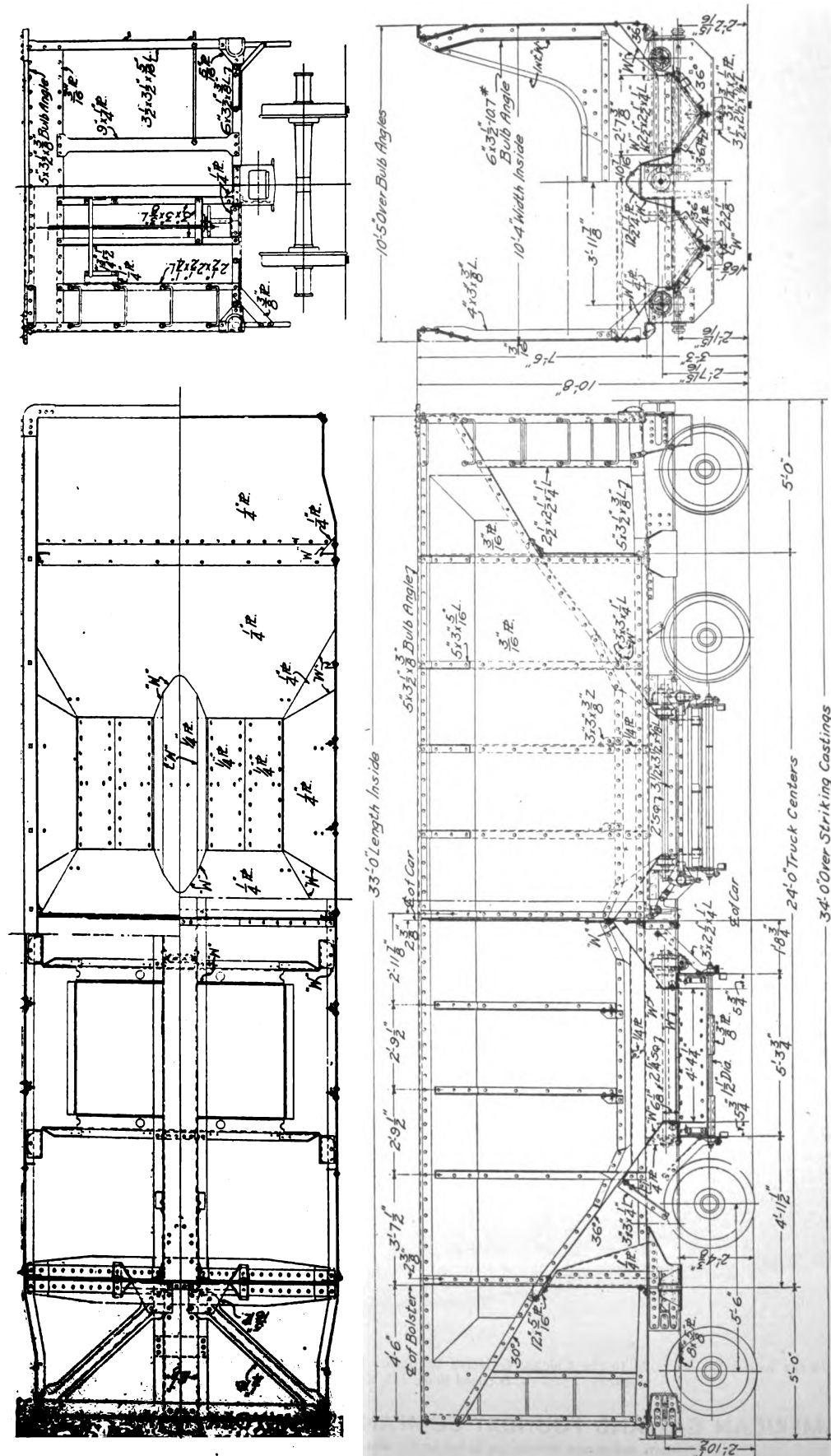


Fig. 2.660—55-Ton all-steel 5½ in. by 10 in. axle load Enterprise Multi-Service Hopper Car (duplex operation). A. A. R. Class HK. For ballast or coal service. Cubic capacity, 1,888 cu. ft. level or 2,203 cu. ft. with 12 in. average heap.

Enterprise Railway Equipment Company
(See also page 299)

FREIGHT CARS: Ballast, Classes MWB and GD

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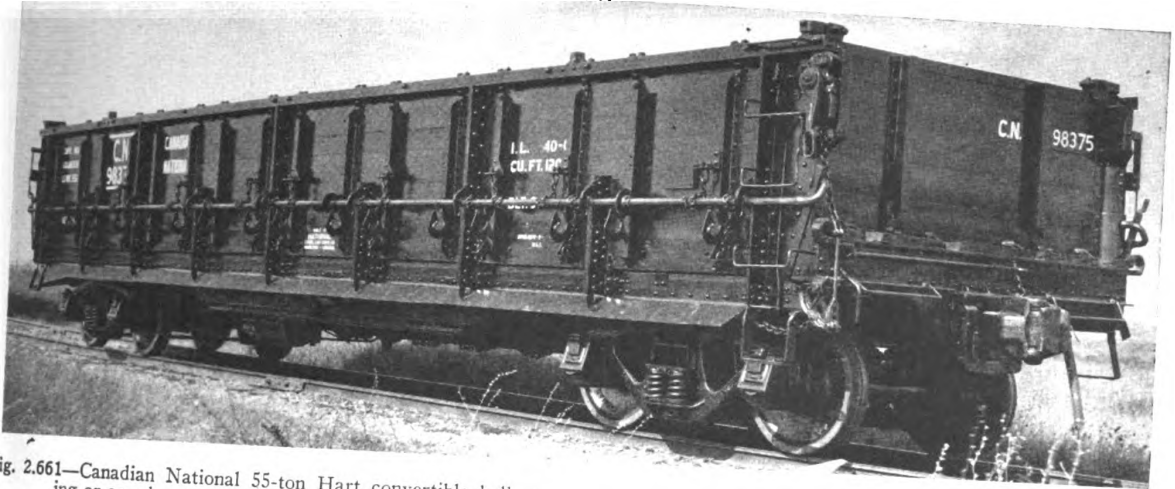


Fig. 2.661—Canadian National 55-ton Hart convertible ballast car. Can be operated as a gondola car with side and center unloading or as a hopper car. Ends movable. Dominion door mechanism. Builder, National Steel Car Corporation, Ltd.
Door mechanism by Dominion Dump Car Co.
Light weight, 55,200 lb.; load limit, 113,800 lb.; capacity, 1,200 cu. ft.; length inside, as gondola 40 ft. 0 in., as hopper 25 ft. 11 in.



Fig. 2.662—Interior of Canadian National convertible ballast car. Center adjusted for operation as a hopper car.

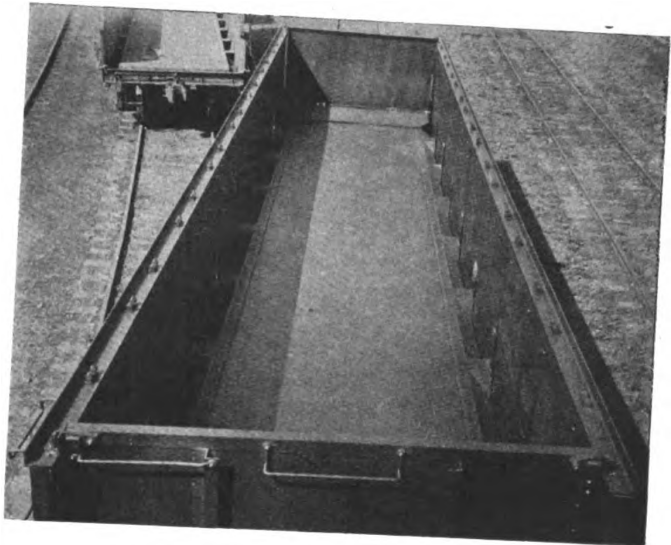


Fig. 2.663—Interior of Temiskaming & Northern Ontario side-dumping gondola ballast car.

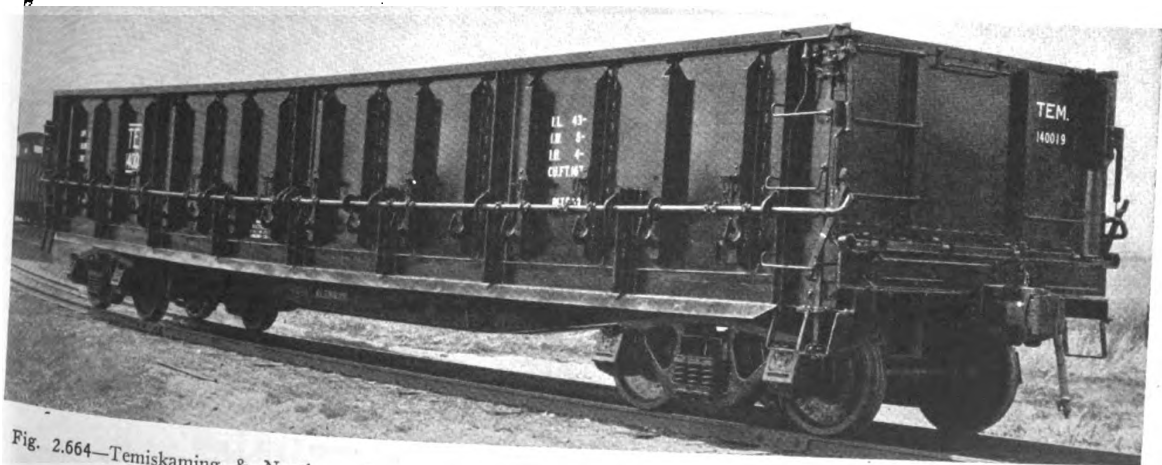
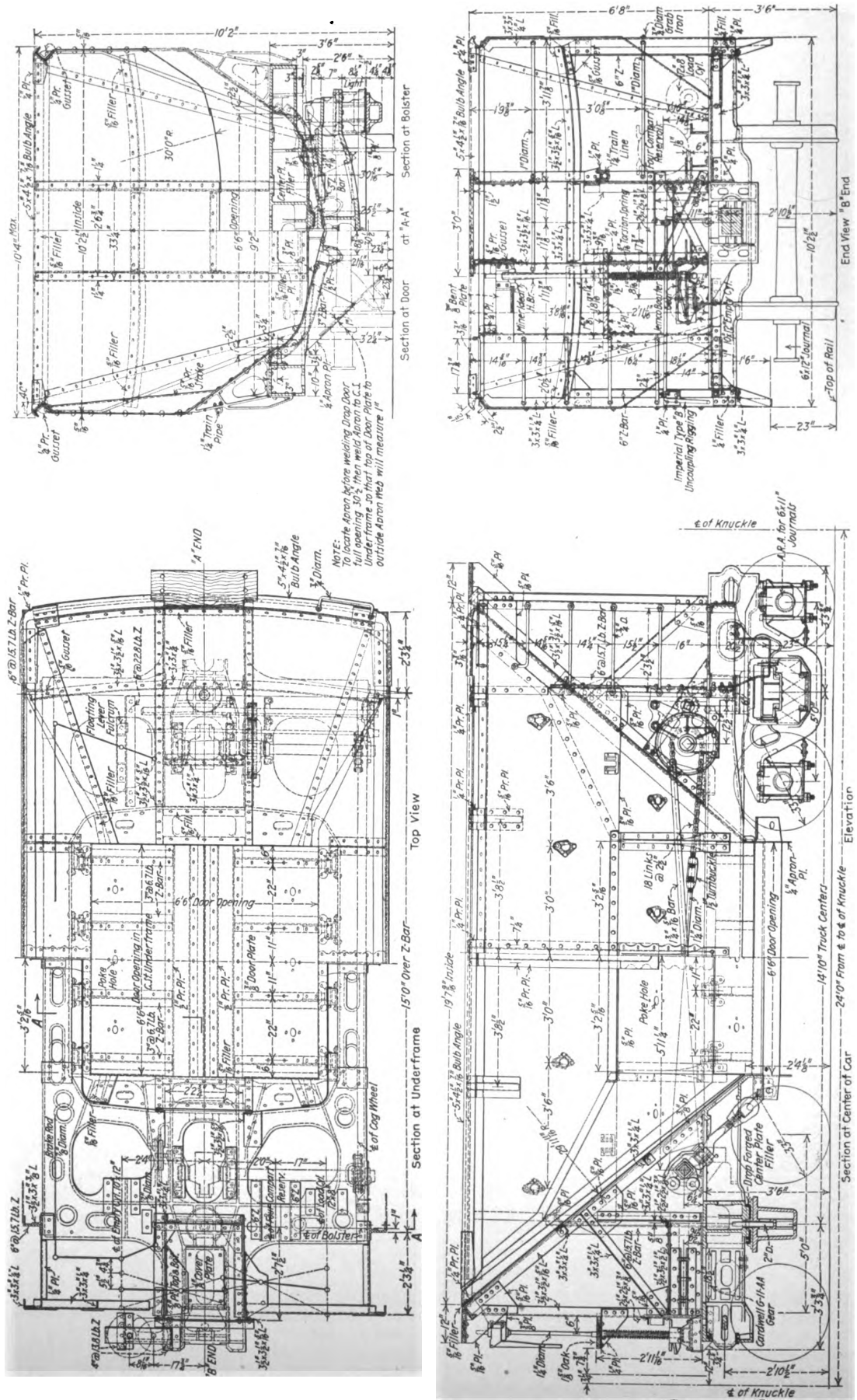


Fig. 2.664—Temiskaming & Northern Ontario 70-ton Hart side-dumping gondola ballast car. A. A. R. Class GD. Builder, National Steel Car Corporation, Ltd.
Inside, length 43 ft. 6 in.; width 8 ft. 9 in.; height of sides, 4 ft. 4 in.; capacity, 1,670 cu. ft.



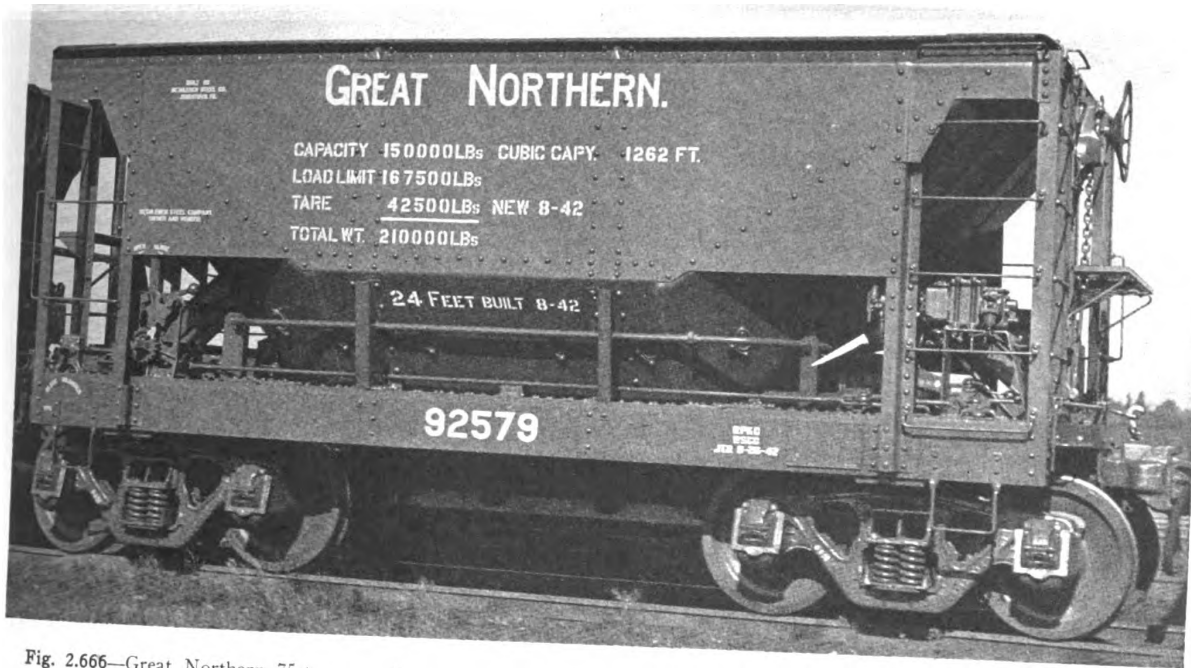


Fig. 2.666—Great Northern 75-ton capacity hopper iron ore car. Series 90,000-92,999. Builder, Bethlehem Steel Company.

A. A. R. Class.....	HMA	Length inside.....	19 ft. 10 3/4 in.
Nominal capacity.....	150,000 lb.	Width inside.....	10 ft. 5 1/2 in.
Load limit.....	167,500 lb.	Coupled length.....	24 ft. 0 in.
Cubic capacity, level.....	1,262 cu. ft.	Length over strikers.....	21 ft. 5 1/2 in.
Light weight.....	42,500 lb.	Width outside.....	10 ft. 6 in.
Axle journals.....	6 in. x 11 in.	Height of sides.....	10 ft. 2 in.

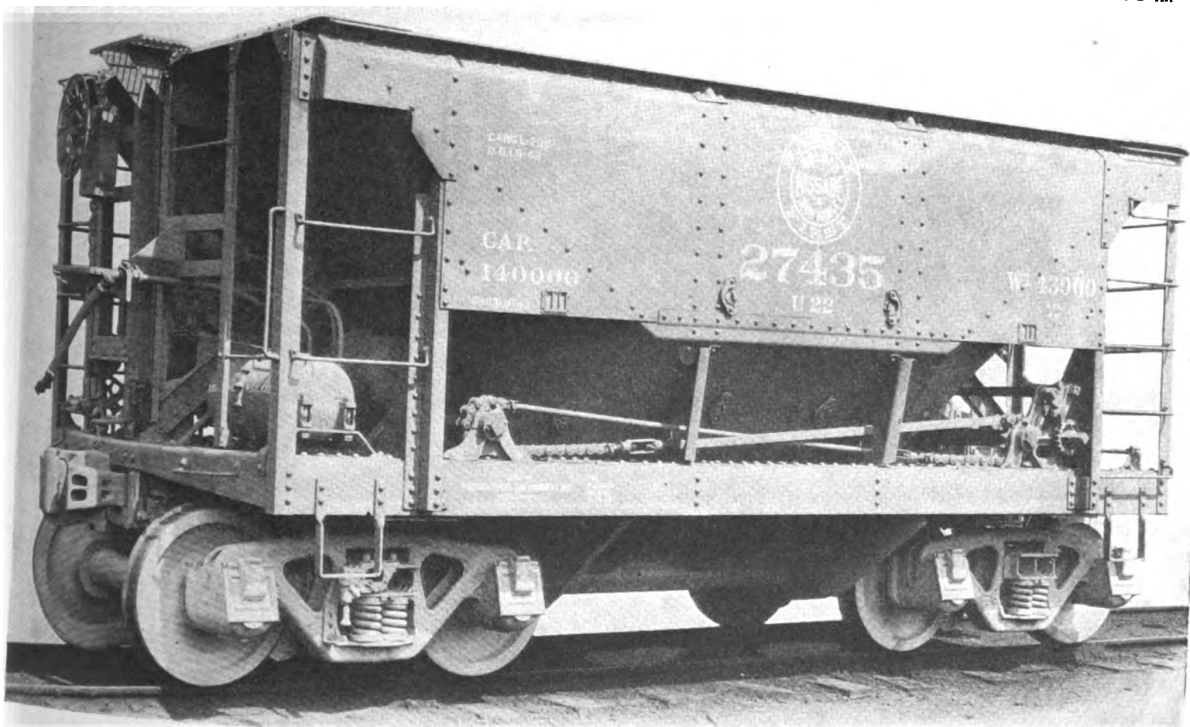


Fig. 2.667—Duluth, Missabe & Iron Range 70-ton capacity hopper iron ore car. Road Class U22. Builder, Pressed Steel Car Company, Inc.

A. A. R. Class.....	HMA	Axle journals.....	6 in. x 11 in.
Nominal capacity.....	140,000 lb.	Length over strikers.....	21 ft. 6 in.
Load limit.....	166,100 lb.	Length inside.....	19 ft. 11 in.
Cubic capacity, level.....	1,000 cu. ft.	Width inside.....	10 ft. 5 1/2 in.
Light weight.....	43,900 lb.	Height of sides.....	10 ft. 2 in.

FREIGHT CARS: Hopper Ore, Class HD

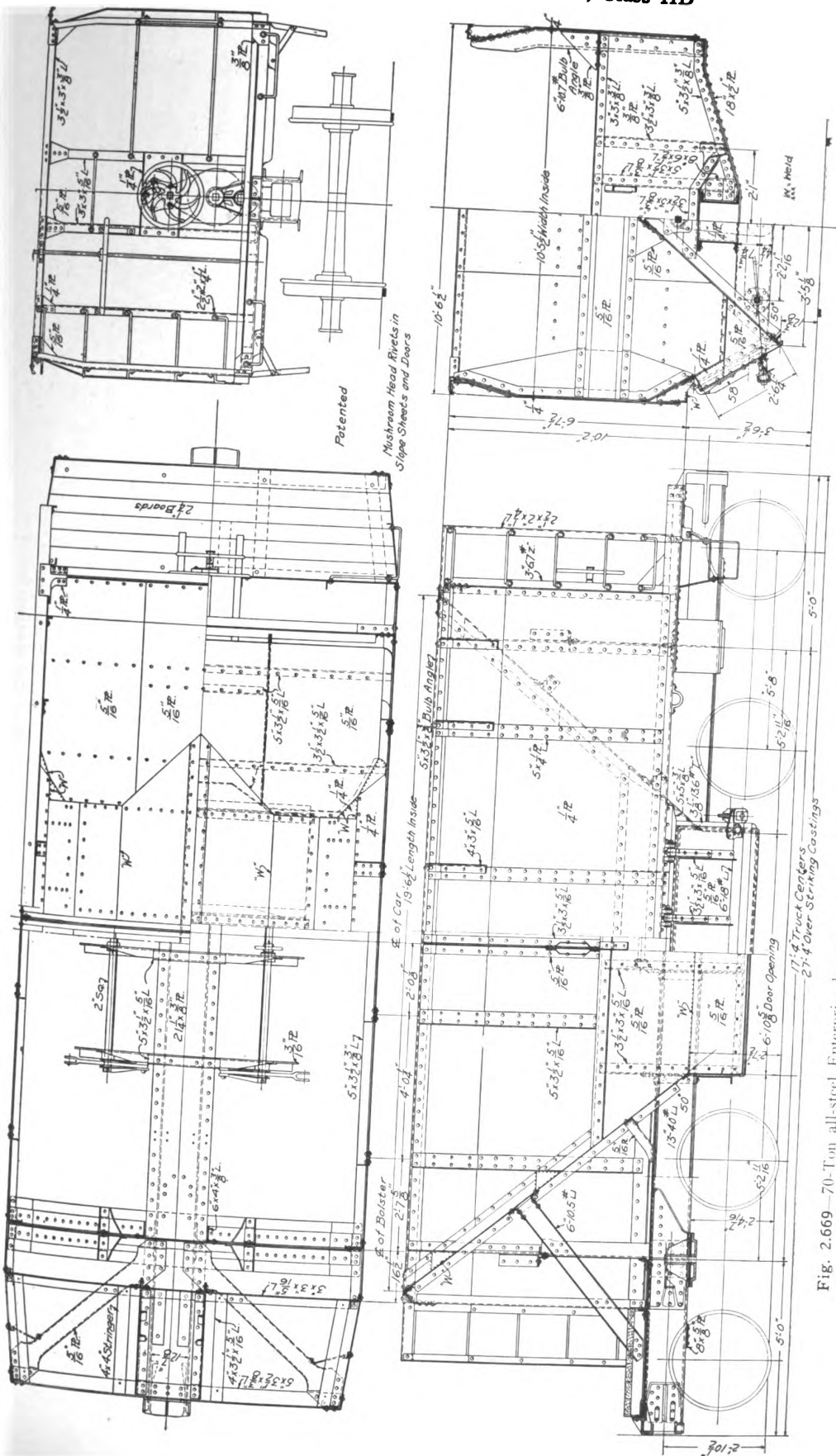


Fig. 2.669—70-Ton all-steel Enterprise hopper ore car, side discharge. Cubic capacity, 981 cu. ft. level or 1,170 cu. ft. with 12 in. average heap.
Enterprise Railway Equipment Company
(See also Page 299)

FREIGHT CARS: Hopper Ore

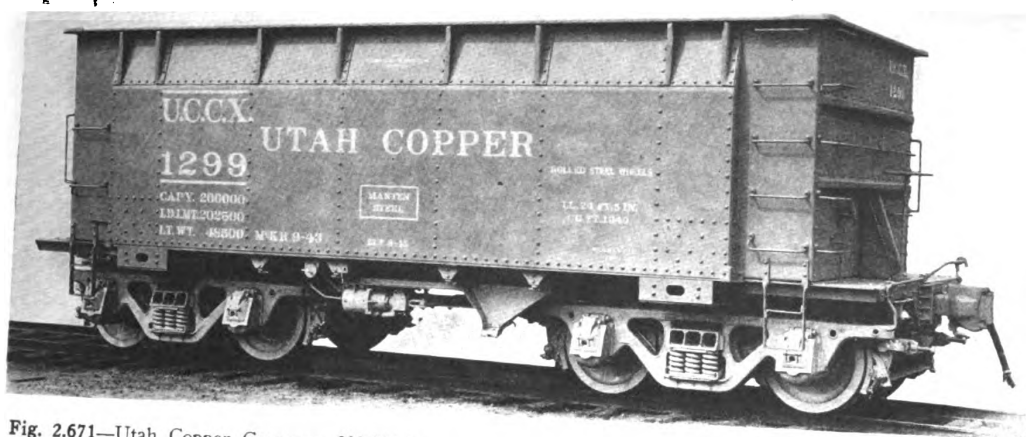


Fig. 2.671—Utah Copper Company 200,000-lb. capacity high-tensile steel, flat bottom, ore car. Unloaded by car dumper. Builder, Pressed Steel Car Company, Inc.
Light weight, 48,500 lb.; load limit, 202,500 lb.; capacity, 1,640 cu. ft.; inside, length 24 ft. 5 in.; width 10 ft. 6 in.; height 6 ft. 6 $\frac{3}{4}$ in.
Description of earlier lot: Railway Age, October 30, 1937

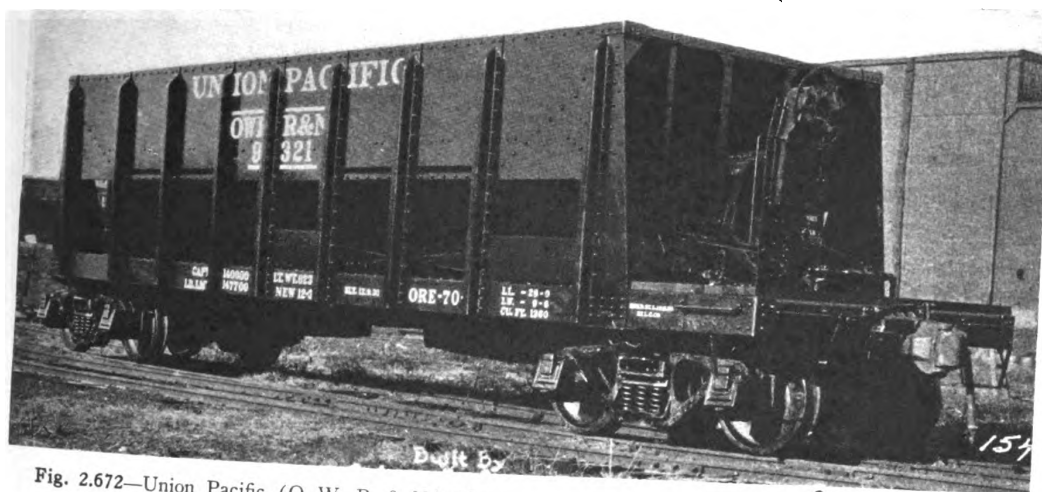


Fig. 2.672—Union Pacific (O-W. R. & N.) 70-ton ore car, AAR Class HMA. Builder, St. Louis Car Company.
Light weight, 62,300 lb.; load limit, 147,700 lb.; capacity, 1,360 cu. ft.; inside, length 28 ft. 0 in.; inside, width 9 ft. 6 in.

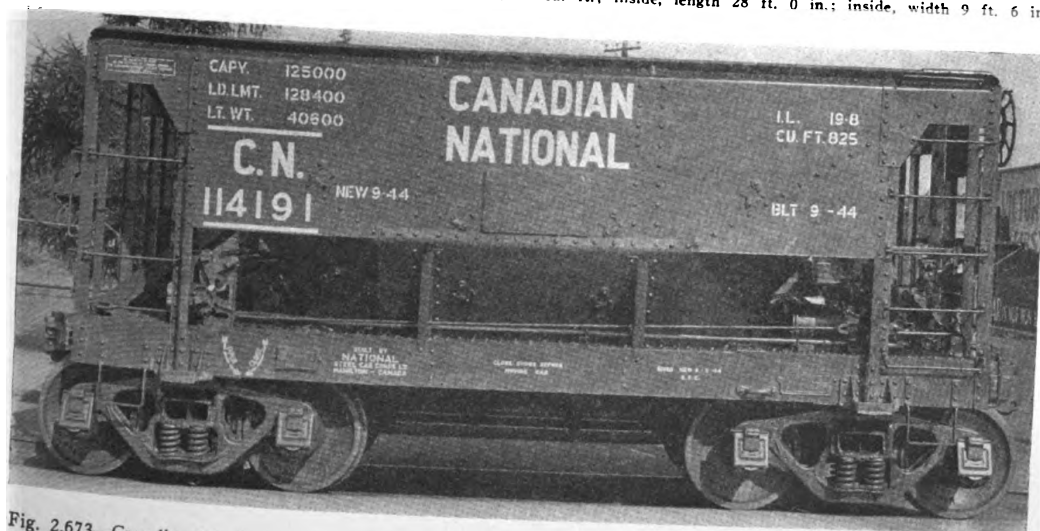


Fig. 2.673—Canadian National 50-ton center discharge ore car for use at Steep Rock mining operations. Built by National Steel Car Corporation, Ltd.
Light weight, 40,600 lb.; load limit, 128,400 lb.; capacity, 825 cu. ft.; length inside, 19 ft. 8 in.
(See also page 294)

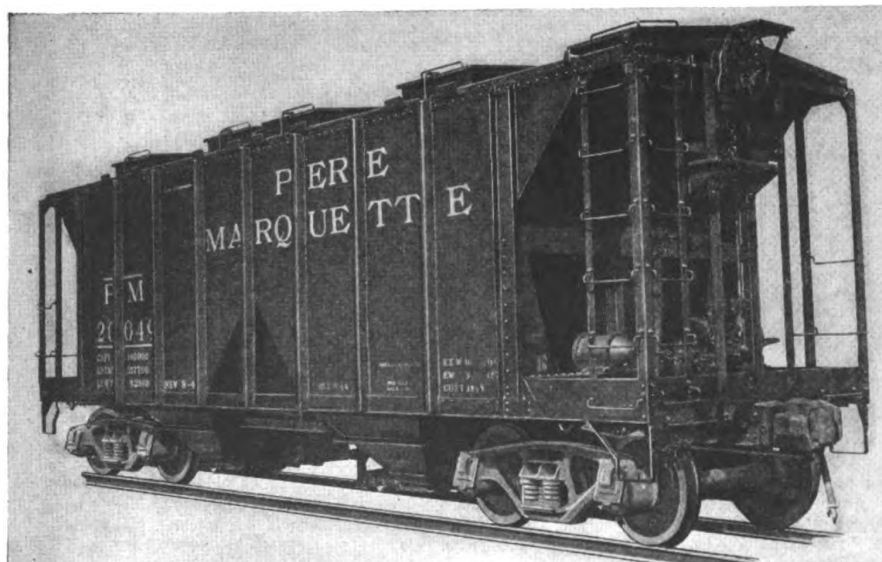


Fig. 2.674—Pere Marquette 70-ton covered hopper car with eight hatches and two outlets. A. A. R. Class LO.

Capacity 1,958 cu. ft.; light weight 52,300 lb.; load limit 157,700 lb.

Fig. 2.675—Wabash 70-ton covered hopper car with eight hatches and two outlets. Series 30,000-30,089. A. A. R. Class LO.

Capacity 1,958 cu. ft.; light weight 50,900 lb.; load limit 159,100 lb.; length 35 ft. 2 $\frac{3}{4}$ in.; height over running board 12 ft. 9 $\frac{3}{4}$ in.

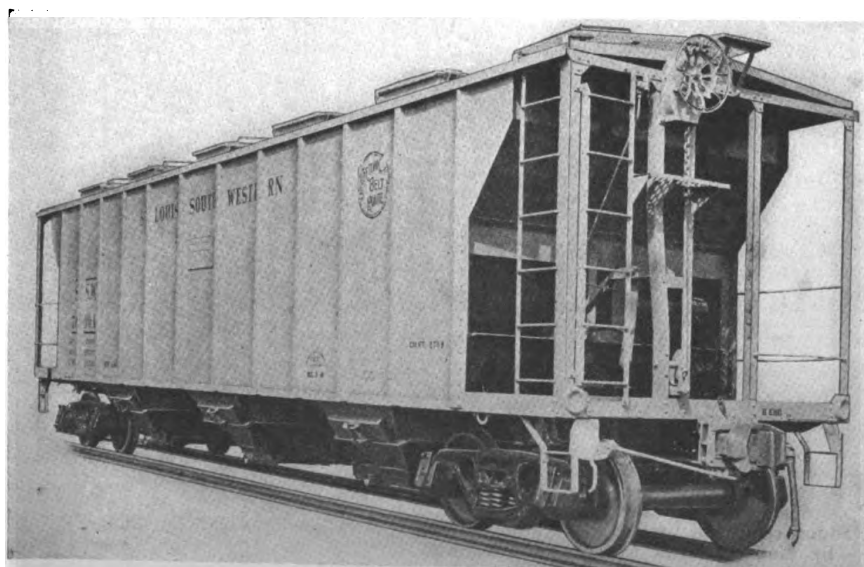
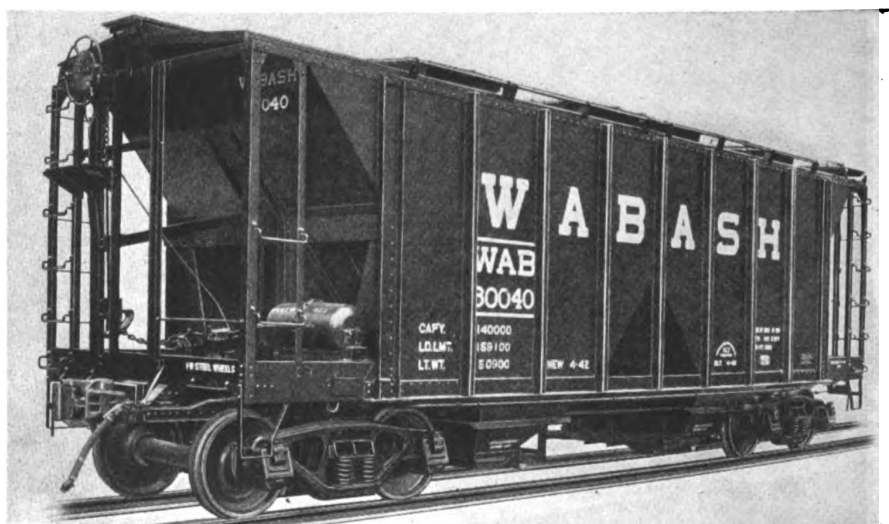


Fig. 2.676—St. Louis-South Western 70-ton triple-gate covered hopper car with three outlets. A. A. R. Class LO.

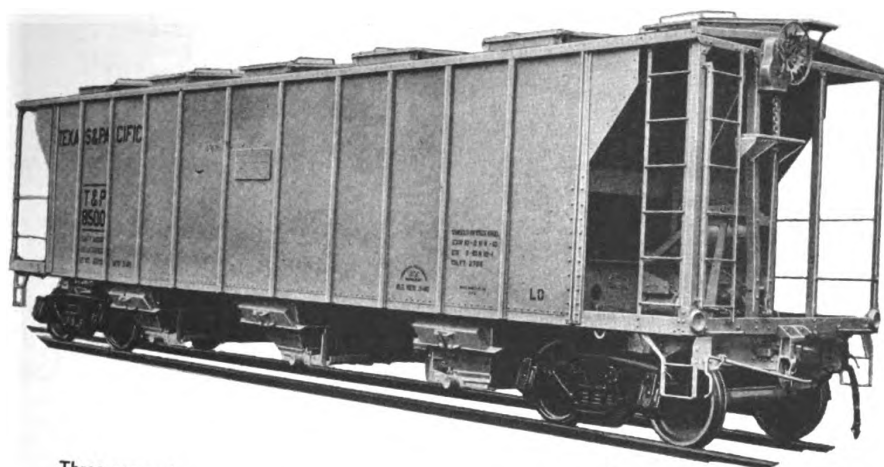
Capacity 2,675 cu. ft.; light weight 55,500 lb.; load limit 154,500 lb.; inside length 39 ft. 10 in.; width 9 ft. 9 in.; height over running board 12 ft. 9 $\frac{3}{4}$ in.

American Car and Foundry Company

(See also Page 297)

A.C.F. Covered Hopper Cars

Designed for more economical bulk shipment of granular lading



Three-compartment covered hopper car for the Texas & Pacific. Nominal capacity, 140,000 lb., or 2840 cu. ft., and, with light-weight of 57,300 lb.; load limit, 152,900 lb. Triple gate facilitates fast unloading.

THE economy and convenience of transporting pulverized and granular ladings in bulk in covered hopper cars have been demonstrated beyond question. Cars of this type, originally designed and built by A.C.F. were among the very first to be used in this class of service, until now A.C.F. has designs available for better handling of cement, carbon black, edible grains, wood flour, fullers' earth, soda ash, and other similar commodities.

A Notable New Triple-Gate Car

The design of the Texas & Pacific covered hopper car illustrated here embodies many improvements developed through study and inspection of covered hopper cars now in service. Increased capacity up to 800 cu. ft. provides larger pay loads on bulk commodities where weather-proof protection is a requirement. Although there is a slight increase in weight

this is more than offset by a considerable increase in volume. Efficiency and speed in handling is facilitated by three vented compartments which can be unloaded separately or simultaneously.

This new-design Triple Gate Hopper Car is used primarily for handling in bulk, commodities such as silica-gel, sulphur, hydraulic lime, etc., and other commodities of relatively light weights.

The Nickel Plate car is an excellent example of the latest design of double-gate covered hopper car.

Advantages of This Type of Car

Dust-tight and watertight construction affords perfect protection for the lading, while the cost of bags and bagging is saved. The time and expense of loading and unloading are much lower.

Consult A.C.F. when contemplating the purchase of new covered hopper cars.



Two compartment covered hopper car for the Nickel Plate. Nominal capacity, 140,000 lb., or 1,958 cu. ft., with light-weight of 52,300 lb. Load limit, 157,700 lb.

AMERICAN CAR AND FOUNDRY COMPANY, NEW YORK, N. Y.

Products and Branch Offices Are Listed in the Classified Indexes

Enterprise Bulk Commodity, Ore and Ballast Cars

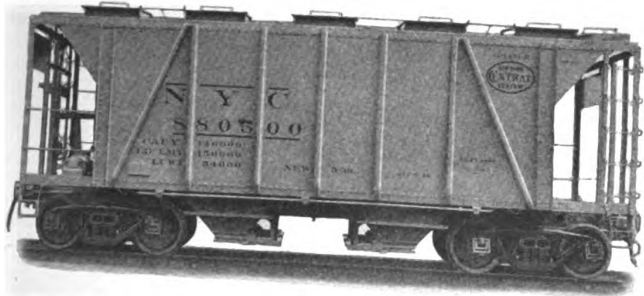


Fig. 2.678—70-ton Bulk Commodity Covered Hopper Car

THE Bulk Commodity Covered Hopper Car has become a standard service car for many commodities formerly hauled in sack, barrel or loosely in box cars.

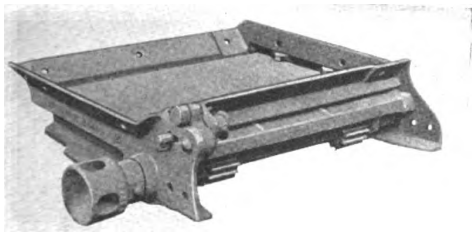


Fig. 2.679—Enterprise Bulk Commodity Outlet

The Enterprise Outlet Unit illustrated in Fig. 2.679 is of cast steel, a finished machined product which provides a close, tight seal against leakage, a large opening and convenient means for operating. For general plan of Enterprise 70-ton car see Fig. 2.677, page 298 and application of outlet see Fig. 3.218, page 496.

The Enterprise has also developed a new seal tight Hatch with Door Lock for use in loading this type of car, which is illustrated and shown applied in Fig. 2.677, page 298, details, Figs. 3.221 and 3.222, page 497.

Enterprise Multi-Service Ballast Cars

The Enterprise Multi-Service Ballast Car illustrated in Fig. 2.680 is of 55 tons capacity and of Standard A.A.R. dimensions, 34 ft. 0 in. overall length and 10 ft. 8 in. height.

The car is designed to release ballast from a moving train to the sides or center of the track, free of the rails and in quantities as desired by the operator.



Fig. 2.680—55-ton Multi-Service Car

The floors of the car are steep; corner pockets are eliminated and the passageways between the floors and outlet hoppers are wide, providing for a free unrestricted flow of the ballast which is essential to prompt and clean unloading of the car. For general design, see page 288.

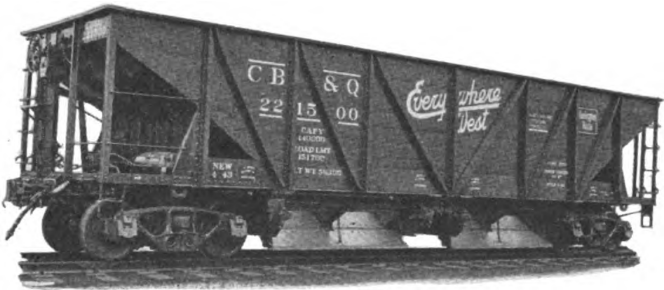


Fig. 2.681—70-ton Multi-Service Car

Enterprise Ore Car—Door Mechanism

The 75-ton Hopper Ore Car shown in Fig. 2.682 illustrates the Center Discharge Car commonly used in the Iron Ore Service. Steep floors, rounded corners and a large door opening are essential to quick and free discharge of the load. The door opening is closed by a pair of longitudinally hinged doors which are controlled by the Enterprise Door Mechanism which is operative from either side of the car and securely locks the doors when in closed position. A general plan of Enterprise 75-ton ore car is illustrated in Fig. 2.668, page 292. A side discharge ore or concentrate car is illustrated in Fig. 2.669, page 293.



Fig. 2.682—75-ton Center Discharge Ore Car

ENTERPRISE RAILWAY EQUIPMENT COMPANY, 59 E. Van Buren St., CHICAGO 5, ILL.

Products and Branch Offices Are Listed in the Classified Indexes



Fig. 2.683—Baltimore & Ohio 70-ton bulk cement hopper car with Duryea cushion underframe. Road Class N-36, A. A. R. Class LO. Light weight, 50,300 lb.; load limit, 159,700 lb.; capacity, 1,800 cu. ft.; axle journals, 6 in. x 11 in. Built by Greenville Steel Car Co.

Description of an earlier lot, Class N-34, *Railway Age*, June 15, 1940

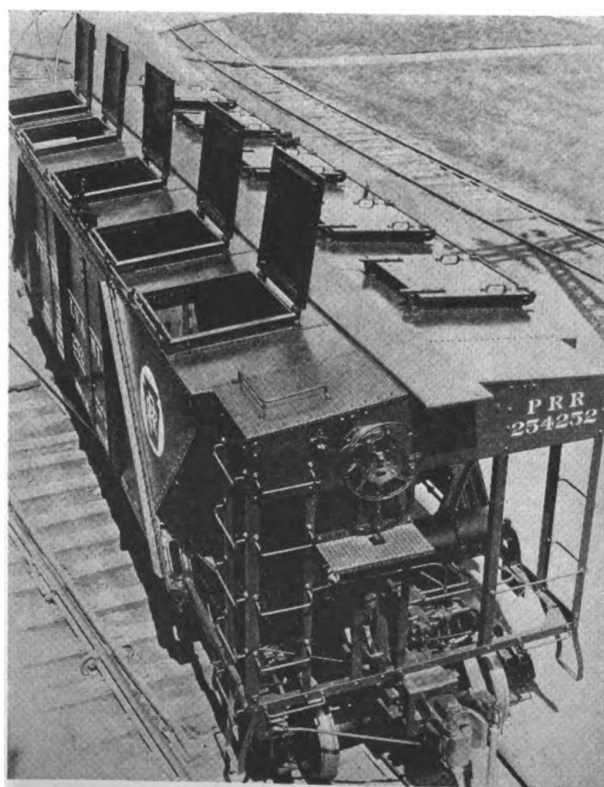


Fig. 2.684—Top view of the Pennsylvania Railroad 70-ton covered hopper car for cement service shown in Fig. 2.686. Roof doors open on one side and closed on other side.

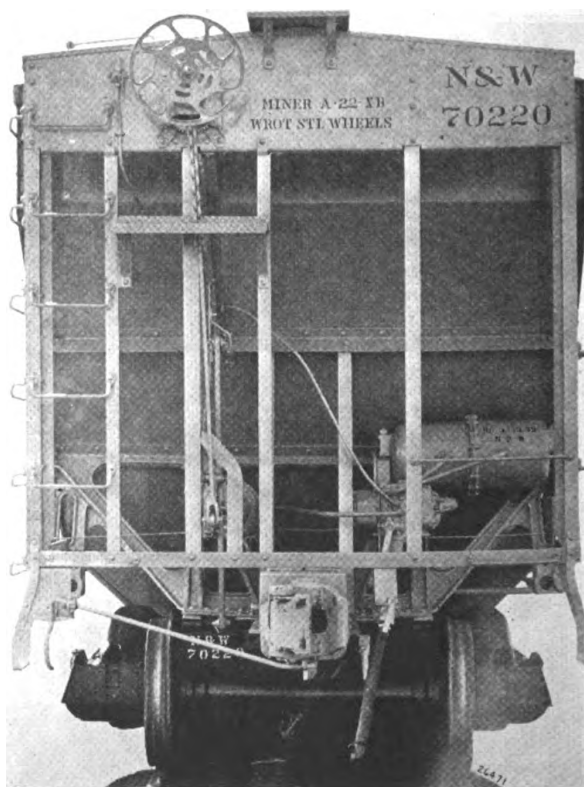


Fig. 2.685—End view of Norfolk & Western 70-ton covered hopper car, Road Class HC-3.
(See also Fig. 2.688)

FREIGHT CARS: Covered Hopper, Class LO

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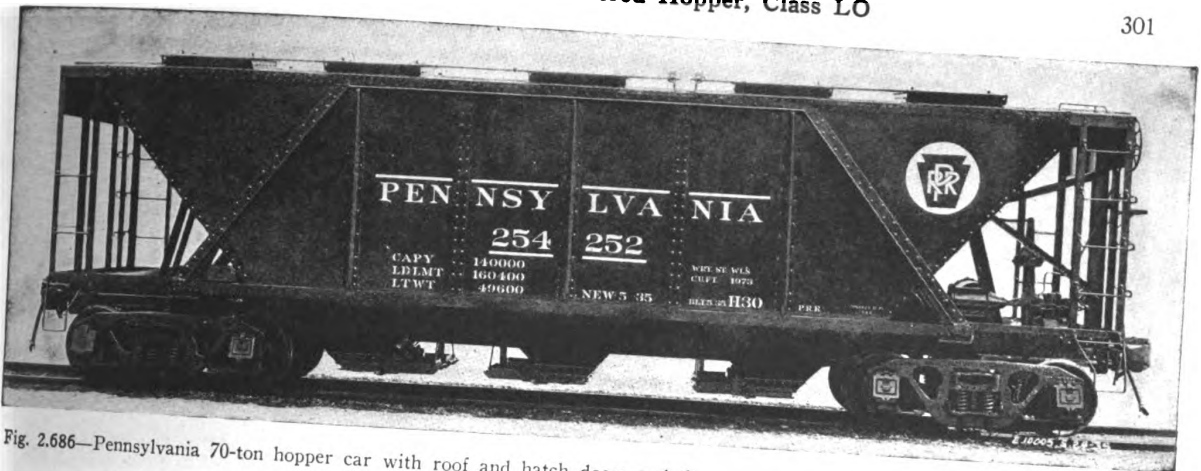


Fig. 2.686—Pennsylvania 70-ton hopper car with roof and hatch doors and three outlets. Road Class H30. Builder, Pennsylvania Railroad.
 Light weight, 49,600 lb.; load limit, 160,400 lb.; capacity, 1,973 cu. ft.; inside, length 31 ft. 0 in.; width 9 ft. 10 $\frac{1}{4}$ in.
 (See also Fig. 2.684)



Fig. 2.687—Aluminum Ore Co. (Shippers' Car Line Corp.) 70-ton covered hopper car. Builder, American Car and Foundry Co.
 Capacity, 1,958 cu. ft.; light weight, 53,000 lb.; load limit 157,000 lb.

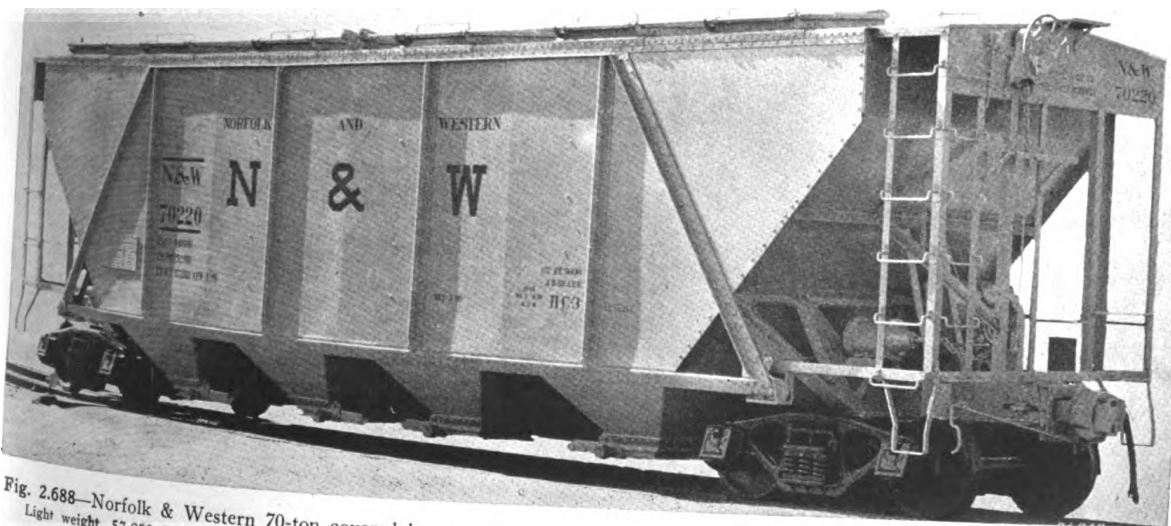


Fig. 2.688—Norfolk & Western 70-ton covered hopper car with four outlets for cement and other dry ladings. Road Class HC-3.
 Light weight, 57,200 lb.; load limit, 152,800 lb.; capacity, 3000 cu. ft.; inside, length 38 ft. 0 in.; width 9 ft. 10 in.; height over running board 12 ft. 7 in.
 (For end view see Fig. 2.685)

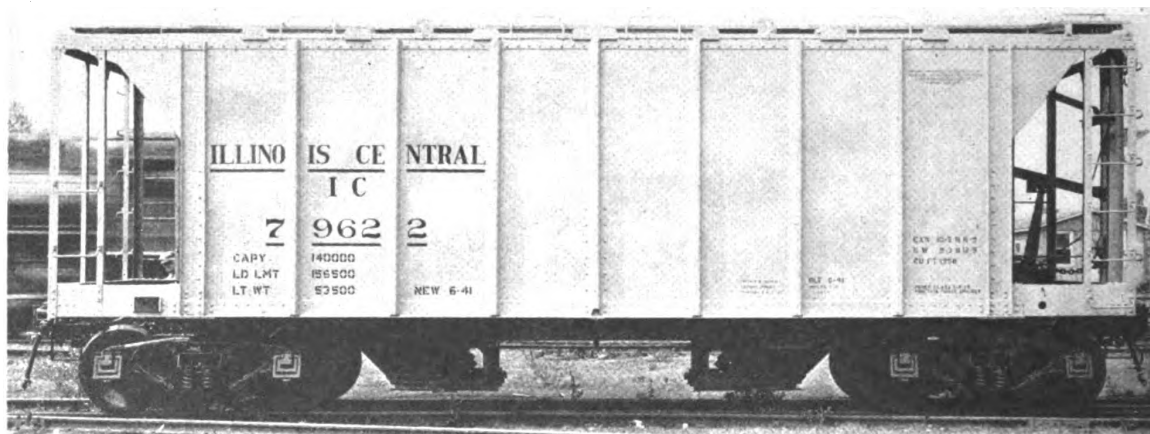


Fig. 2.689—Illinois Central 70-ton covered hopper car. Builder, General American Transportation Corp. Capacity, 1,958 cu. ft.; light weight, 53,500 lb.; load limit, 156,500 lb.; inside, length 29 ft. 3 in.; width 9 ft. 5½ in.; height over running board 12 ft. 9¾ in.

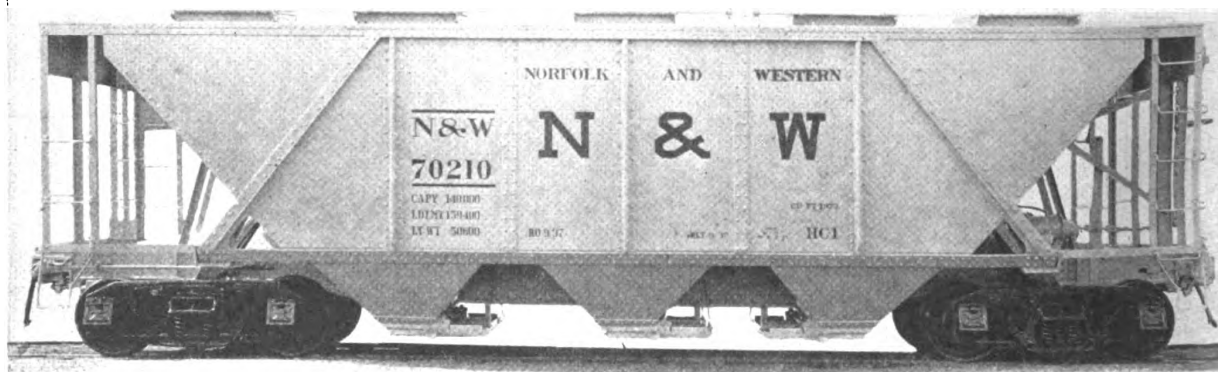


Fig. 2.690—Norfolk & Western 70-ton covered hopper car with three outlets. Road Class HC-1. Capacity, 1,973 cu. ft.; light weight, 50,600 lb.; load limit, 159,400 lb.; inside, length 31 ft. 0 in.; width 9 ft. 10 in.; height over running board 11 ft. 3 in.

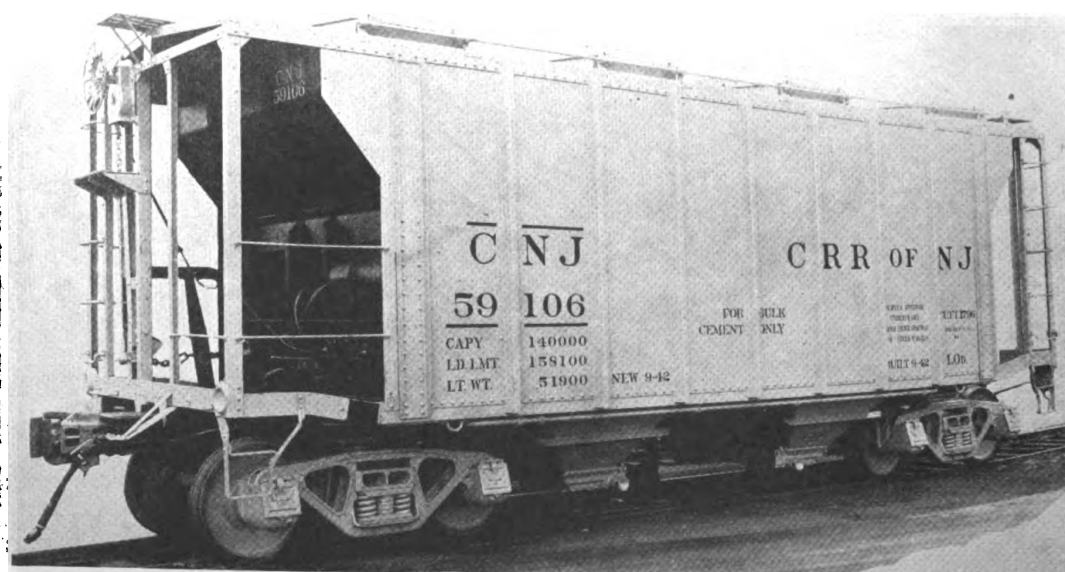


Fig. 2.691—C. R. R. of N. J. 70-ton covered hopper car with Duryea cushion underframe. Builder, American Car and Foundry Co. Capacity, 1,796 cu. ft.; light weight, 51,900 lb.; load limit, 158,100 lb.; inside, length 26 ft. 3 in.; width 9 ft. 8 in.; height over running board 12 ft. 11 in.

Fig. 2.692—Delaware & Hudson 70-ton covered hopper car with two outlets and eight roof hatches. Builder, American Car and Foundry Co.

Capacity 2,040 cu. ft.; light weight 48,300 lb.; load limit 161,700 lb.; inside, length 29 ft. 3 in.; width 10 ft. 0 in.; height over running board 12 ft. 11 in.

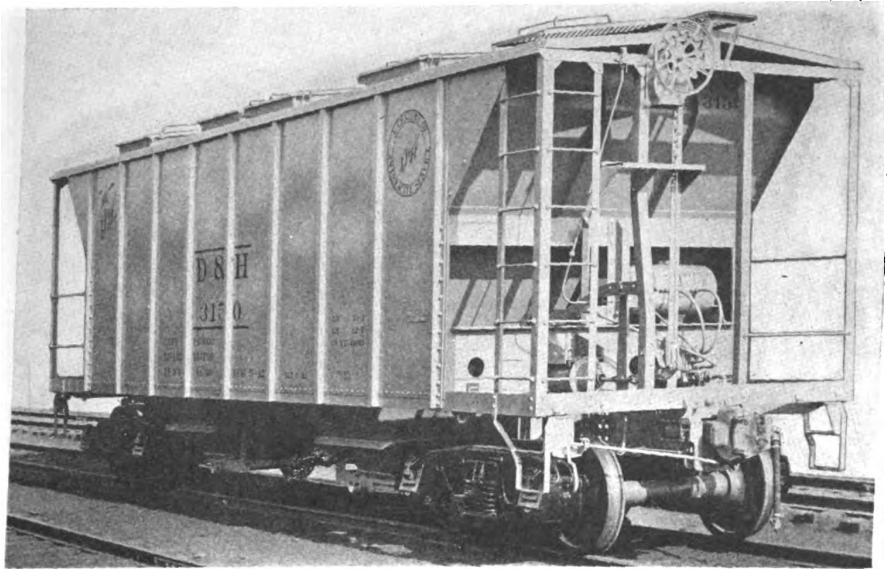


Fig. 2.693—Southern Railway 70-ton covered hopper car. Builder, Pullman-Standard Car Manufacturing Co. Capacity 1,958 cu. ft.; light weight 51,400 lb.; load limit 158,600 lb.; inside, length 29 ft. 3 in.; width 9 ft. 5 in.; height to top of running board 12 ft. 10 in.



Fig. 2.694—Chicago & North Western 70-ton covered hopper car. Builder, General American Transportation Corp. Capacity 1,958 cu. ft.; light weight 51,700 lb.; load limit 158,300 lb.; inside, length 29 ft. 3 in.; width 9 ft. 5 in.; height over running board 12 ft. 10 in.

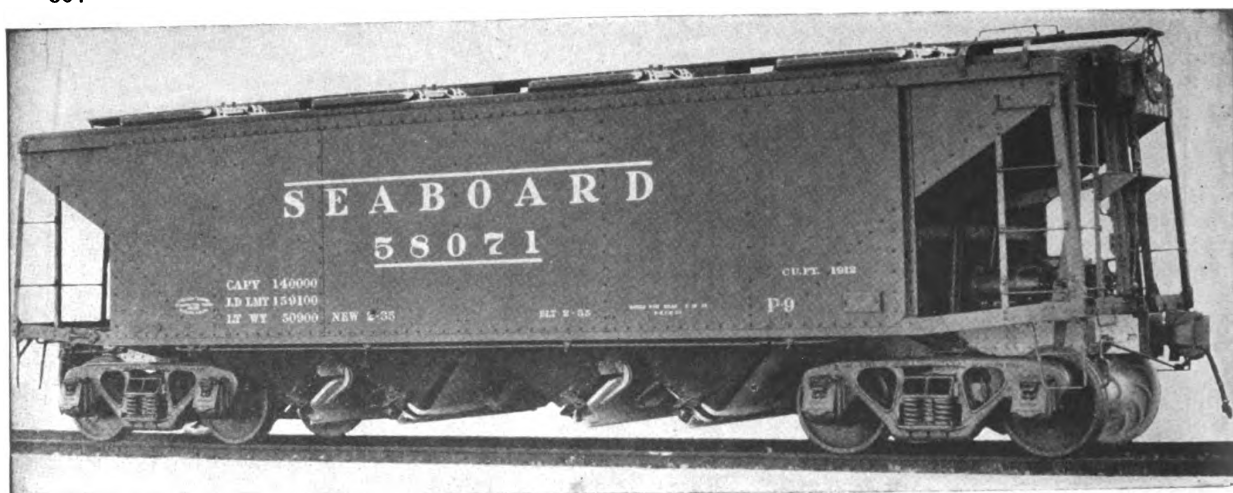


Fig. 2.695—Seaboard 70-ton quadruple covered phosphate hopper car, Road Class P-9, AAR Class LO.
 Light weight, 50,900 lb.; load limit, 159,100 lb.; capacity, 1,912 cu. ft.
 (Description: *Railway Mechanical Engineer*, May, 1937; *Railway Age*, April 10, 1936)

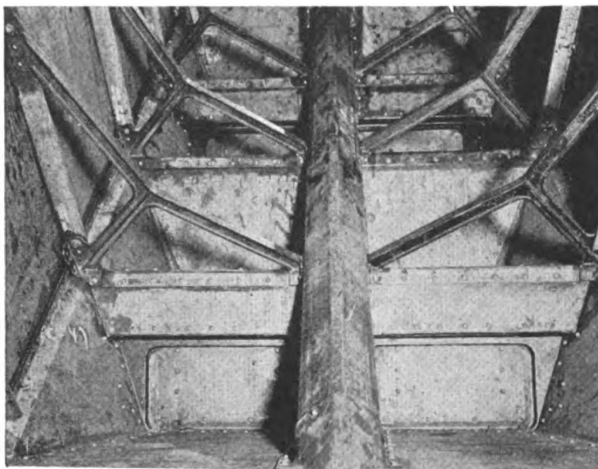


Fig. 2.695A—Inside view of Seaboard phosphate car showing Unitcast crossbearer application.

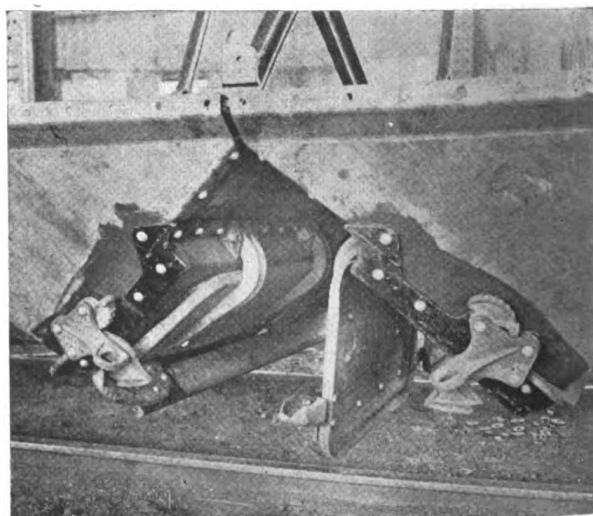


Fig. 2.695B—Seaboard phosphate car—Wine door frames and locks—Pressed USS Cor-Ten doors.

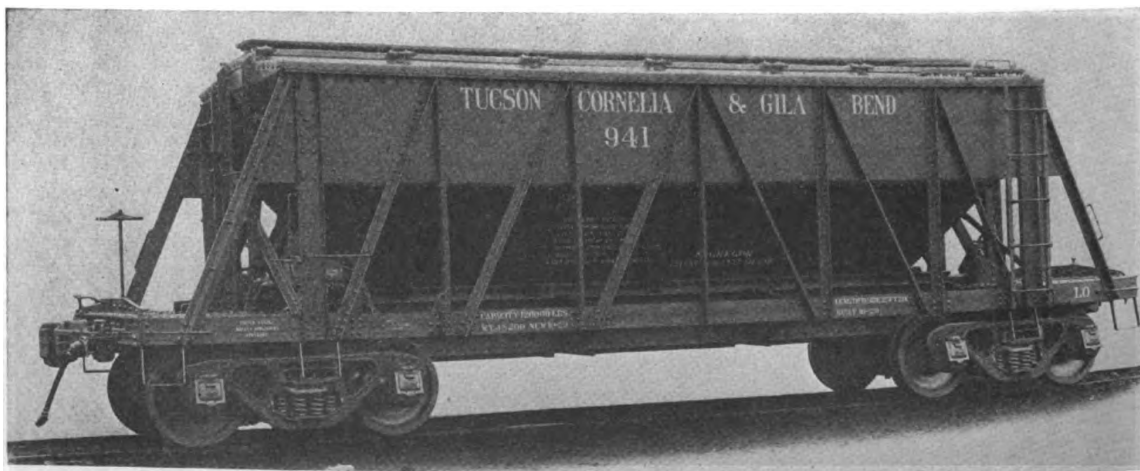


Fig. 2.696—60-ton McGregor type covered hopper concentrate car for Tucson, Cornelia & Gila Bend. Builder, Pressed Steel Car Company, Inc. (Industrial Division).
 Light weight, 48,200 lb.; load limit, 120,800 lb. capacity, 1,021 cu. ft.; length inside, 25 ft. 2 in.

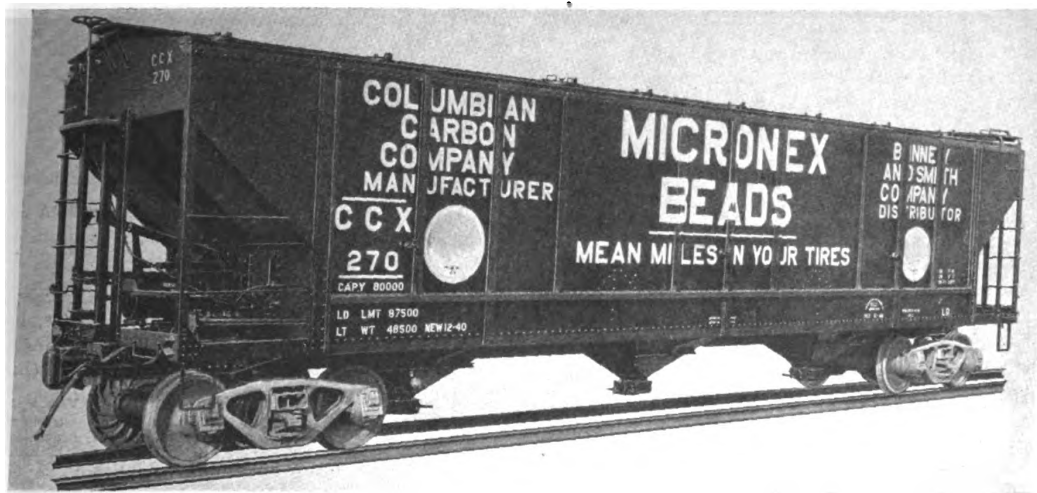


Fig. 2.697—40-ton covered hopper car for bulk shipment of carbon black. Builder, American Car and Foundry Co. Capacity 3,000 cu. ft.; light weight 48,500 lb.; load limit 87,500 lb.; inside, length 45 ft. 10 $\frac{3}{4}$ in.; width 9 ft. 6 in.

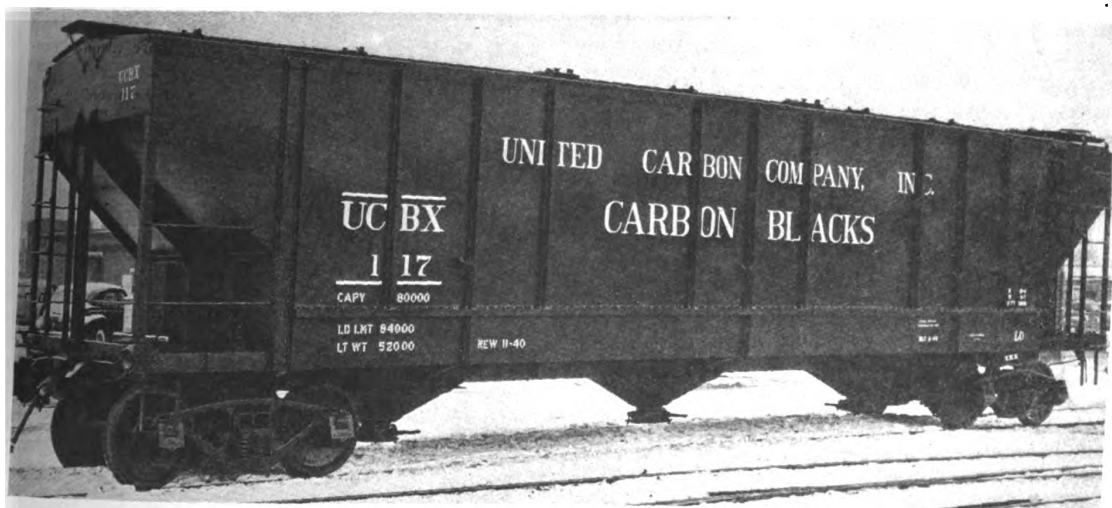


Fig. 2.698—40-ton covered hopper car for bulk shipment of carbon black. Builder, General American Transportation Corp. Capacity 3,000 cu. ft.; light weight 52,000 lb.; load limit 84,000 lb.

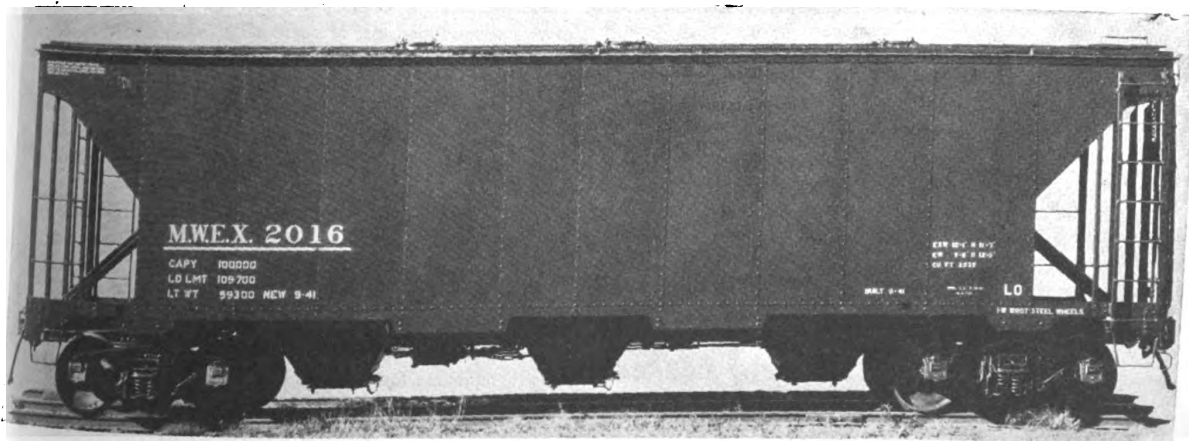


Fig. 2.699—50-ton insulated covered hopper car for transportation of refined sugar. Built for Mars, Inc., by General American Transportation Corp. Capacity 2,039 cu. ft.; light weight 59,300 lb.; load limit 109,700 lb.

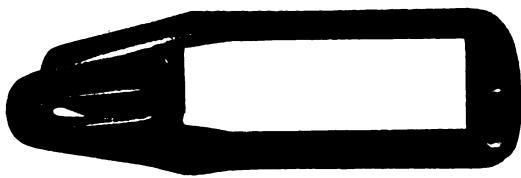


Fig. 10.99—Buckeye A.A.R. vertical-plane draft yoke for 24 $\frac{3}{8}$ in. friction gears.



Fig. 10.100—Buckeye A.A.R. vertical-plane draft yoke of high-tensile steel.

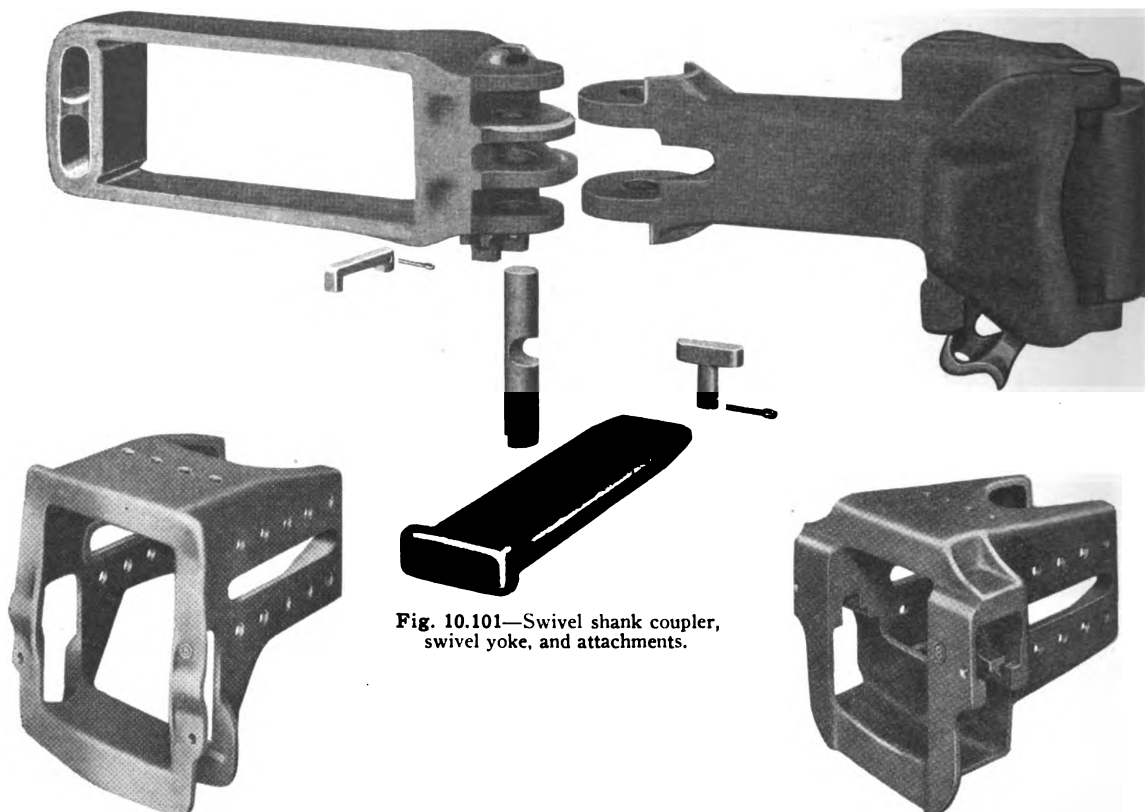


Fig. 10.101—Swivel shank coupler, swivel yoke, and attachments.

Fig. 10.102 — Striker with Integral Front Lugs and Swing Coupler Carrier.

Fig. 10.103—Swing Motion Striker with Integral Front Lugs.



Fig. 10.104—Bolster Center Filler and Rear Draft Gear Lugs for box car.

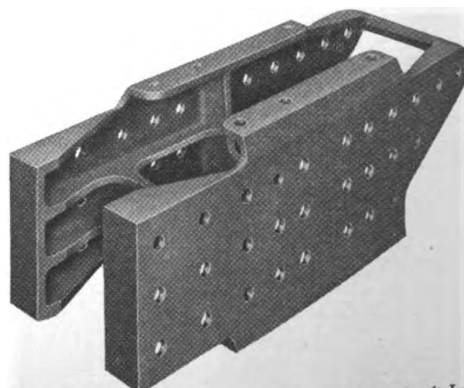


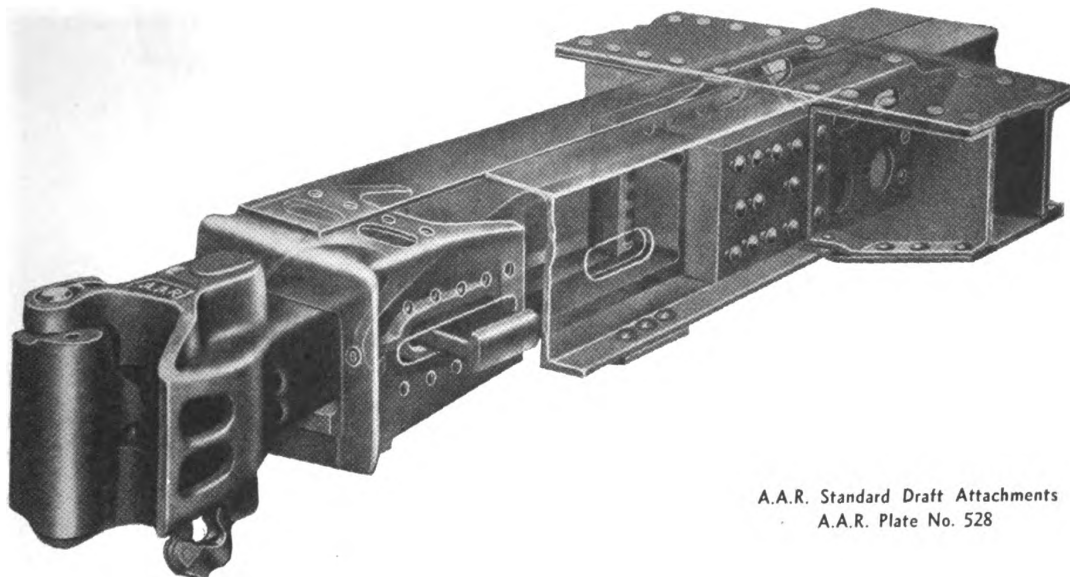
Fig. 10.105—Bolster Center Filler and Rear Draft Lugs for hopper car.

The Buckeye Steel Castings Company

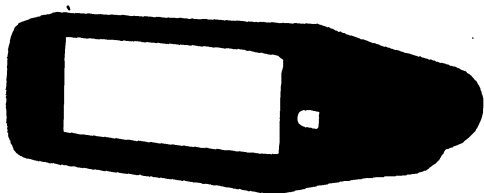
(See also Page 973)

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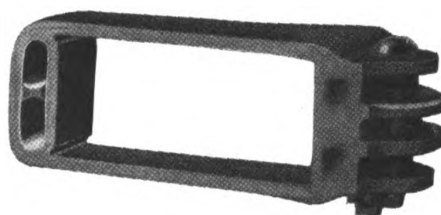
Buckeye Yokes and Draft Attachments



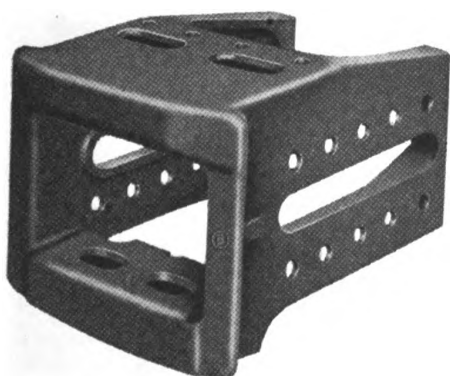
A.A.R. Standard Draft Attachments
A.A.R. Plate No. 528



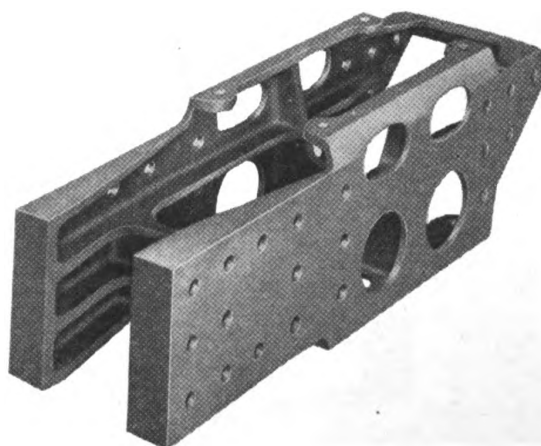
A.A.R. Standard
Vertical-Plane Draft Yoke



A.A.R. Alternate Standard
Vertical-Plane Draft Yoke



Striker with Integral Carrier
and Front Draft Lugs
A.A.R. Plate No. 532



Combined Bolster Center Filler
and Rear Draft Lugs
A.A.R. Plate No. 534

THE BUCKEYE STEEL CASTINGS COMPANY, COLUMBUS, OHIO

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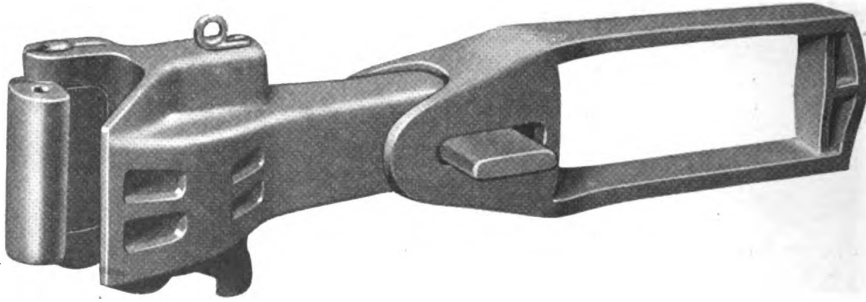


Fig. 10.106—A.A.R. Standard "E" Coupler and A.A.R. Standard Yoke Assembly.

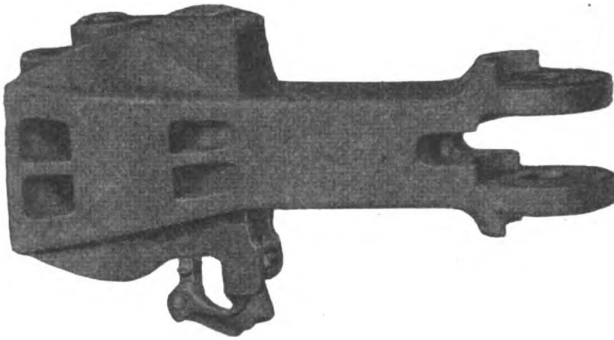


Fig. 10.107—A.A.R. Alternate Standard "E" Coupler with swivel shank.

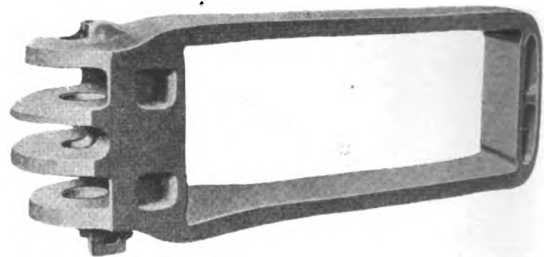


Fig. 10.108—A.A.R. Alternate Standard Swivel Yoke.

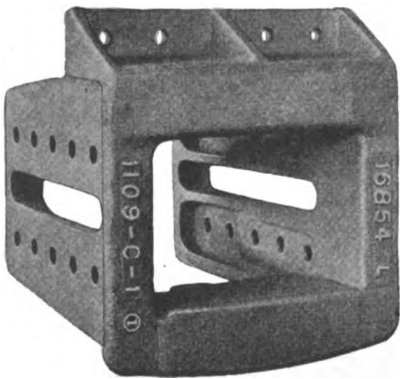


Fig. 10.109—Combined striking casting and front draft lugs.



Fig. 10.110—Combined bolster center filler and rear draft gear stops.



Fig. 10.111—A.A.R. Tightlock Coupler, Yoke and radial connections for passenger car service.

American Steel Foundries
(See also Page 925)

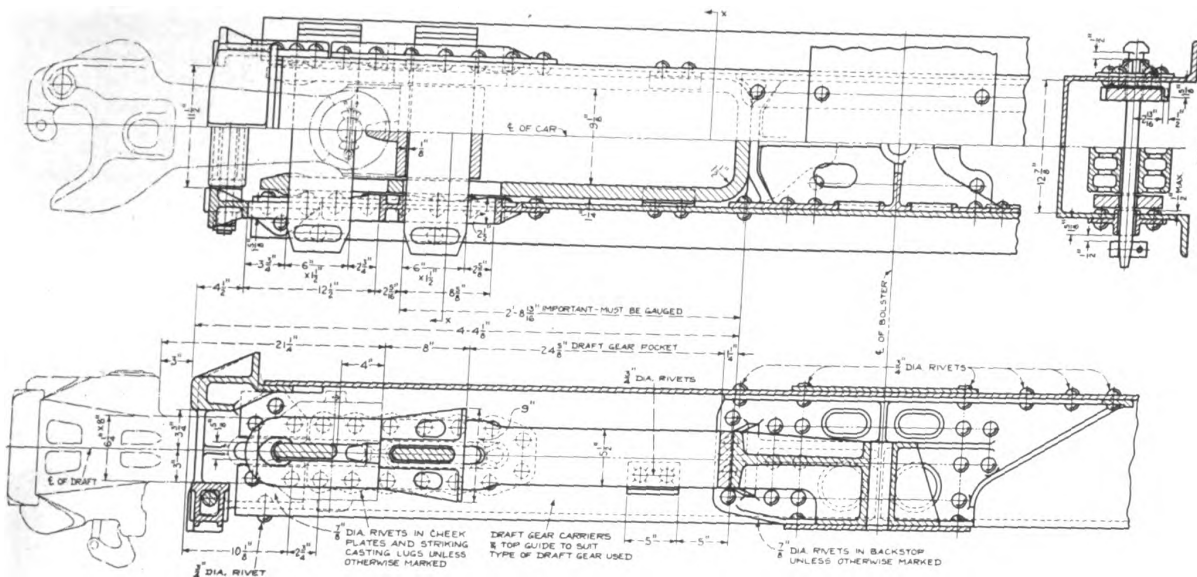


Fig. 10.112—Application of Farlow draft gear attachments.

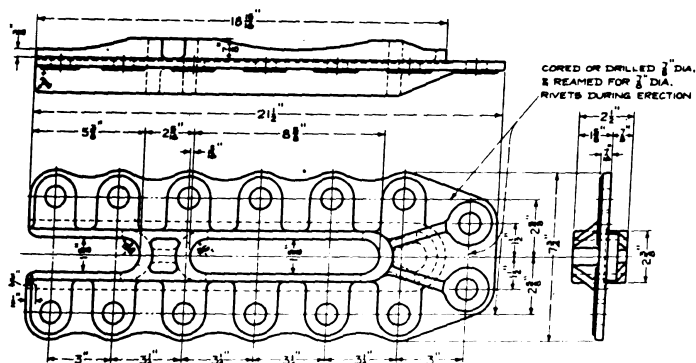


Fig. 10.113—Cheek plate for Farlow draft gear attachments.

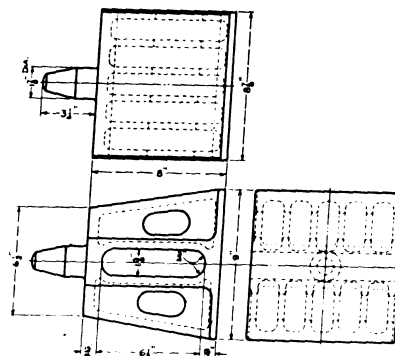
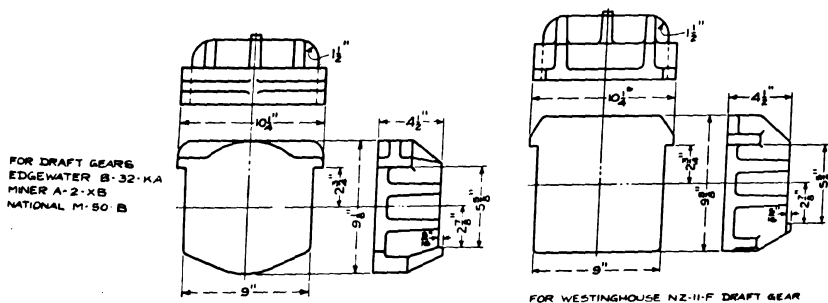


Fig. 10.114—Follower block.



Figs. 10.115 & 10.116—Cast steel yoke fillers for Farlow attachments.

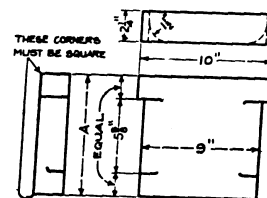


Fig. 10.117—O. H. Steel yoke filler for Farlow attachments.

TYPE OF DRAFT GEAR	A
MINER A-22-XB	9 1/8"
NATIONAL M-17-A	"
PEERLESS H-1-B	"
WESTINGHOUSE NY-11-F	9 1/8"
WAUGH-GOULD 403	12"

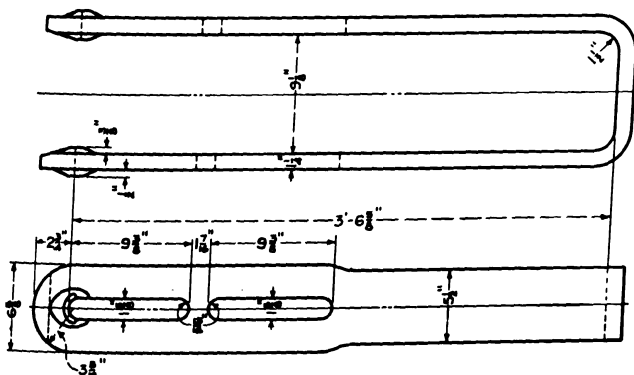
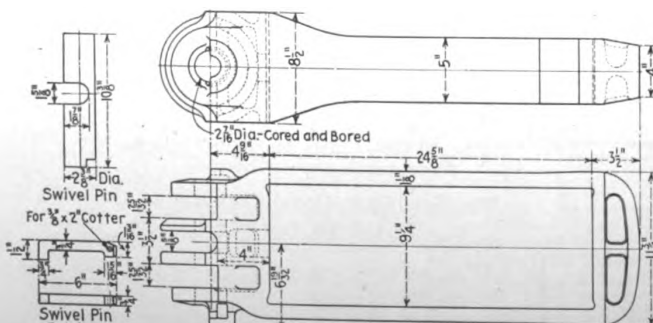
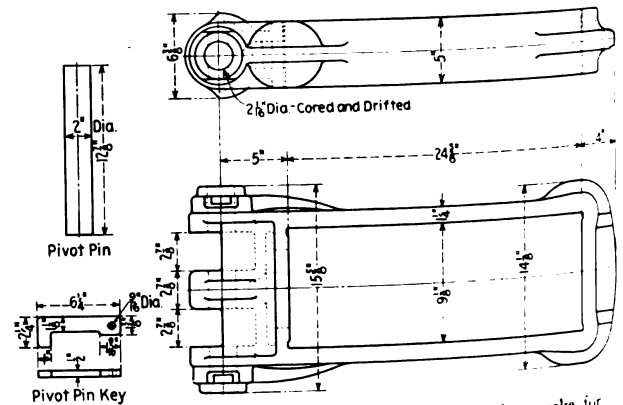
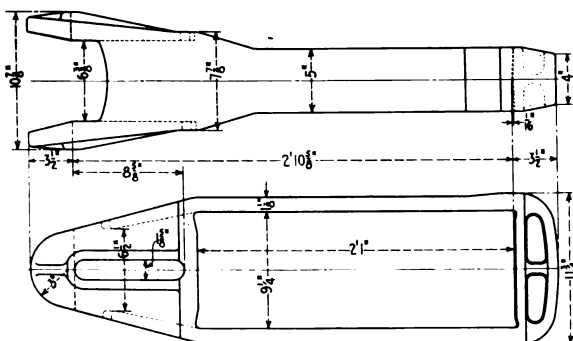
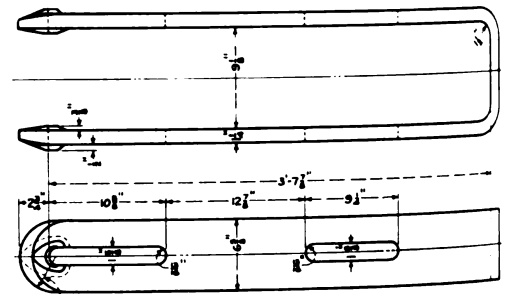
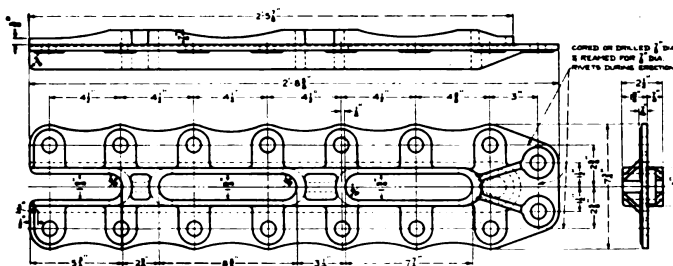
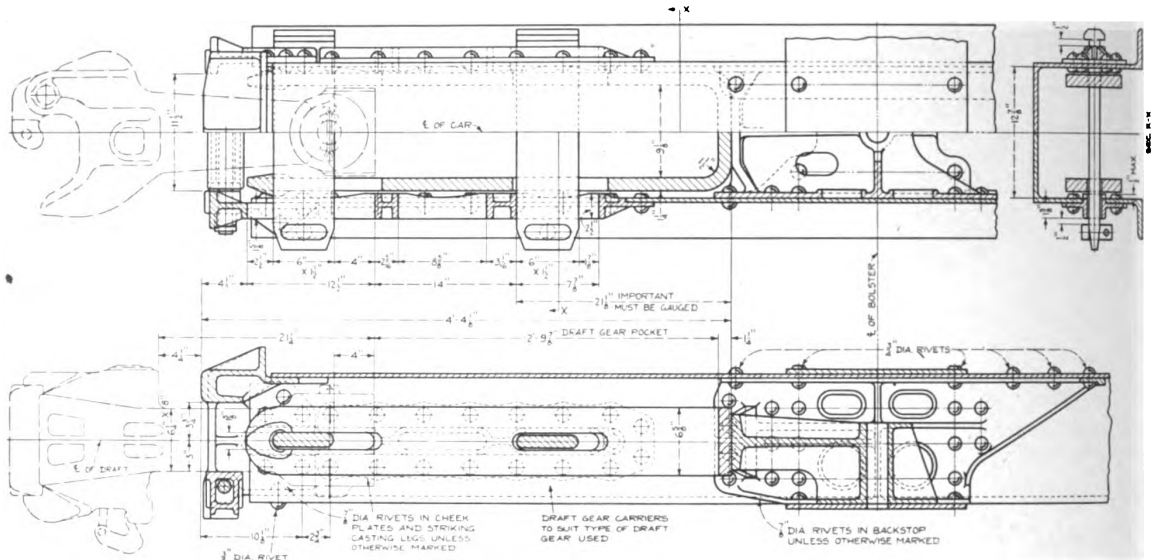


Fig. 10.118—(Left) Horizontal yoke for Farlow draft gear attachments.

The Symington-Gould Corporation
(See also Page 977)



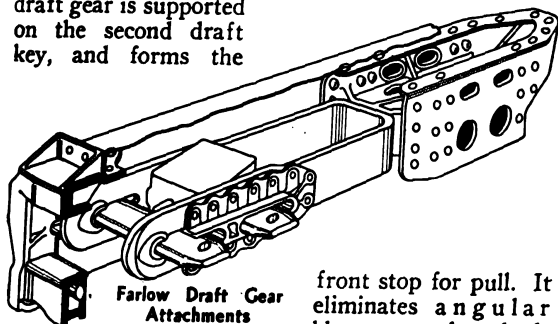
The Symington-Gould Corporation
(See also Page 977)

Farlow—Symington—Gould Draft Gear Attachments

Farlow Draft Gear Attachments

These are the A.A.R. alternate standard Horizontal Yoke type, designed to accommodate any of the approved self-contained A.A.R. draft gears, and provide for the standard draft gear travel in both pull and buff.

The follower block which is interposed between the coupler and the draft gear is supported on the second draft key, and forms the



front stop for pull. It eliminates angular blows on the draft gear when a rigid shank coupler is used. The cheek plates reinforce the center sills at the key slots, and provide adequate bearing area for the draft keys.

In the preferred construction of the striking casting the rearward extensions form the front ends of the cheek plates and are slotted for the coupler key. The combined bolster center filler and backstop is designed to suit the car construction at the bolster, and not only takes the major portion of the buffing load, but also provides an adequate support for the body center plate.

The draft gear carriers and yoke filler are arranged to suit the type of draft gear used. See Figs. 10.112 to 10.118 incl.

Symington Selective Travel Draft Gear Attachments

These are also of the Horizontal Yoke type, but designed to accommodate a special double end friction draft gear, which has 2-in. travel in pull, and 4-in. travel in buff. This is accomplished by keying the draft gear housing to the cheek plates with a standard draft key, arranged in a manner that will permit the housing to move in buff, but not in pull, thereby actuating only the back end of the gear in pull, but both ends in buff. The coupler is moved out 1½ in. to provide for the additional draft gear travel in buff.

The striking casting and combined bolster center filler and backstop are identical in design and location for Selective Travel attachments as for Farlow.

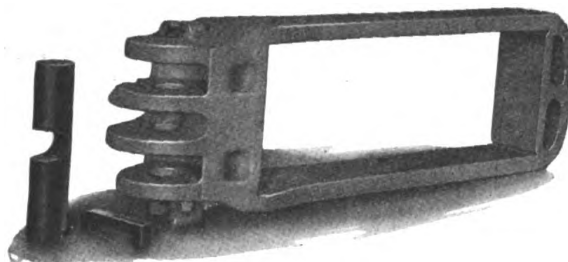
Selective travel cheek plates are provided with three key slots so that the A.A.R. alternate standard Farlow attachments may also be used therewith if desired.

The draft gear carriers, and yoke fillers if required, are arranged to suit the type of draft gear used. See Figs. 10.119, 10.120 and 10. 121.

Gould Vertical Yoke Draft Gear Attachments

This type of attachment is designed to accommodate any of the approved A.A.R. draft gears, and provides for the standard draft gear travel in both pull and buff. It comprises a vertical cast steel yoke, two front, and two rear draft lugs. The front draft lugs are usually cast integral with the striking casting and the rear lugs with the bolster center filler.

Two types of yokes are available, one the A.A.R. standard for use with a rigid shank coupler, and the other the A.A.R. alternate standard for use with a swivel shank coupler. When the swivel shank coupler is used the striking casting must have either a removable coupler carrier, or an opening in the casting large enough for the swivel shank to pass through. See Figs. 10.122 to 10.124.



Gould Vertical Cast Steel Yoke for Swivel Shank Coupler General

With either the Farlow, or Selective Travel type of attachments a portion of the buffing load over and above the capacity of the draft gear is taken by the draft key which passes through the follower block, or draft gear housing. Thus the heavy buffing load is distributed to the center sills at four points instead of two.

The Yoke for either type of Horizontal attachments is an O.H. steel forging, the back end of which bears directly on the face of the combined bolster center filler and backstop.

Both types of Horizontal Yoke attachments are suitable for the application of either the rigid shank, or swivel butt coupler, but when the swivel butt coupler is used the striking casting must have either a removable coupler carrier, or an opening in the casting large enough for the swivel butt to pass through.

For both types of Horizontal Yoke attachments the Cheek Plates and Follower Blocks for new cars must be purchased from The Symington-Gould Corporation, but Car Builders, Forge Plants, and Foundries are licensed to manufacture the remainder of the details to complete the attachments.

The Cheek Plates and Follower Blocks for both types of Horizontal Yoke attachments are furnished in cast steel. All Striking Castings and Backstops should be of cast steel.

Draft Keys for all types of attachments are O.H. steel, .40-.50 carbon A.A.R. specification M-102.

Both Farlow and Gould Vertical Yoke attachments suitable for 5 in. by 5 in. and 5 in. by 7 in. shank couplers with 5 in. by 1½ in. draft keys are available, and are extensively used on foreign cars.

This Corporation is in position to furnish Striking Castings and Backstops, machined and drilled when specified, to customer's specifications, in either A.A.R. Grade "B" or High Tensile Cast Steel. See Figs. 10.128 to 10.131 incl. Also A.A.R. tightlock Coupler Yokes for passenger cars.

Miscellaneous Castings

In addition to the specialties described above, The Symington-Gould Corporation with a combined foundry capacity of 70,000 tons per annum can make prompt delivery of grade B or alloy locomotive or miscellaneous castings in a weight range from 5 to 20,000 lb.

THE SYMINGTON-GOULD CORPORATION, ROCHESTER, N. Y.

Products and Branch Offices Are Listed in the Classified Indexes

Sec. 10—977

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Maximum height of platform from top of rail shall be fifty (50) inches.

HAND-BRAKES

Number.—Same as specified for "Box and Other House Cars."

Dimensions.—Same as specified for "Box and Other House Cars."

Location.—Each hand-brake shall be so located that it can be safely operated while car is in motion. The brake-shaft shall be located on end of car to the left of center.

Manner of application.—Same as specified for "Box and Other House Cars."

RUNNING-BOARDS

Number.—One continuous running-board around sides and ends. End platform shall form continuation of side running-board.

Dimensions.—Minimum thickness one and three-quarters ($1\frac{3}{4}$) inches. Minimum width on sides, ten (10) inches.

Location.—Continuous around sides and ends of cars. End platform shall form continuation of side running-board.

Manner of application.—Outside edge of side running-board shall extend not less than seven (7) inches beyond bulge of tank, safety hand-railing and dome ladder. In case of large tanks, where road limits will not permit the clearances specified, the outer edge of running-boards shall extend not less than seven (7) inches beyond bulge of tank and the foot of ladder shall have a clearance of at least seven (7) inches from outer edge of running-board.

Outside edge of end-platform shall extend not less than seven (7) inches beyond bulge of tank-head and safety hand-railing.

Running-boards shall be supported to prevent sagging. Where running-boards are spliced, joints must be flush and both ends supported.

Running-boards shall be securely fastened to platform and running-board supports.

SILL STEPS

Number.—Same as specified for "Box and Other House Cars."

Dimensions.—Same as specified for "Box and Other House Cars."

Location.—When located on side sill: Same as specified for "Box and Other House Cars." When located on running-board: One (1) near each end on each side, flush with outside edge of running-board, so that there shall be not more than eighteen (18) inches from end of car to center of tread of sill step. Tread shall be not more than twenty-four (24), preferably not more than twenty-two (22) inches above the top of rail.

Manner of application.—When located on side sill: Same as specified for "Box and Other House Cars." When located on running-board: Steps exceeding eighteen (18) inches in depth shall have an additional tread and be laterally braced. Sill steps shall be securely fastened with not less than one-half ($\frac{1}{2}$) inch bolts with nuts outside (when possible and riveted over, or with one-half ($\frac{1}{2}$) inch rivets.

SIDE HANDHOLDS

Number.—Eight (8).

Dimensions.—Same as specified for "Box and Other House Cars."

Location.—Four (4) horizontal: One (1) on face of each side sill near each end on tank cars with side sills; or one (1) near each end on each side of car over sill step, on running-board, projecting downward or outward. Clearance of outer end of handhold shall be not more than twelve (12) inches from end of car.

Four (4) vertical: One (1) as near as possible over each sill step, securely fastened to tank or tank band.

Manner of application.—Same as specified for "Box and Other House Cars."

END HANDHOLDS

Number.—Four (4).

Dimensions.—Same as specified for "Box and Other House Cars."

Location.—Horizontal: One (1) near each side of each end of car on face and end sill; or one (1) near each side on each end of car on platform, projecting downward or outward. Clearance of outer end of handhold shall be not more than sixteen (16) inches from side of car.

Manner of application.—Same as specified for "Box and Other House Cars."

SAFETY RAILINGS

Number.—One (1) continuous running around sides and ends of tank.

Dimensions.—Minimum diameter, seven-eighths ($\frac{7}{8}$) of an inch, wrought iron or steel rod or one and one-quarter ($1\frac{1}{4}$) inch pipe. Minimum clearance, two and one-half ($2\frac{1}{2}$) inches.

Location.—Running around sides and end of tank, not less than thirty-six (36) nor more than fifty-four (54) inches above platform or running-board.

Manner of application.—Safety-railings shall be securely fastened to tank or tank bands with a minimum of four brackets for each side of tank and one bracket on head at each end of tank, and secured against end shifting.

Uncoupling Levers.—Same as specified for "Box and Other House Cars."

End Ladder Clearance.—No part of car above end sills within thirty (30) inches from side of car, except buffer block, brake-shaft brackets, brake wheel, running-boards or uncoupling lever shall extend to within twelve (12) inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end of car or fixtures on same, above end sills other than exceptions herein noted, shall extend beyond outer face of buffer block.

LADDER, DOME PLATFORM, DOME PLATFORM HANDHOLD AND DOME HANDHOLD

Number.—One (1) ladder, one (1) dome platform, one (1) dome platform handhold and one (1) dome handhold.

Dimensions.—Ladder: Ladder stiles three-eighths by two ($\frac{3}{8}$ by 2) inches or equivalent, wrought iron or steel.

Ladder treads, minimum diameter, five-eighths ($\frac{5}{8}$) of an inch, wrought iron or steel.

Minimum clear length of tread, fourteen (14) inches.

Minimum spacing of treads, nineteen (19) inches. Safety railing will be considered a ladder tread.

Minimum clearance of treads and ladder stiles, two (2), preferably two and one-half ($2\frac{1}{2}$) inches.

Dome Platform.—Minimum width, seven (7) inches; minimum thickness one and three-quarters ($1\frac{3}{4}$) inches.

Dome Platform Brackets.—Three-eighths by one and one-half ($\frac{3}{8}$ by $1\frac{1}{2}$) inches, or equivalent, wrought iron or steel.

Dome Platform and Dome Handholds.—Minimum diameter, five-eighths ($\frac{5}{8}$) of an inch, wrought iron or steel.

Minimum clear length, fourteen (14) inches, preferably sixteen (16) inches.

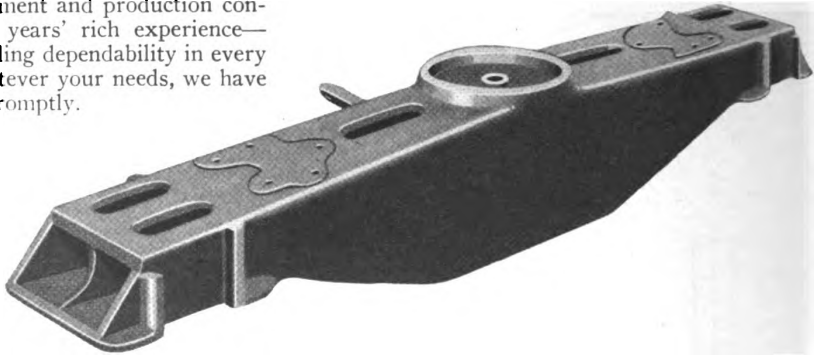
Minimum clearance, two (2) inches, preferably two and one-half ($2\frac{1}{2}$) inches.

Location.—On brake mast side of car leading to dome. When car is equipped with more than one dome, the step board shall be lengthened so that all dome covers will be accessible from same; or, ladder, dome platform and handholds provided leading to each dome.

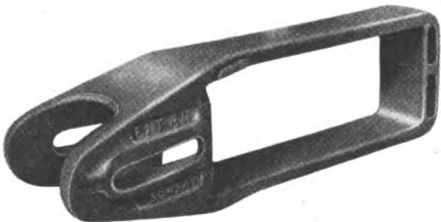
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THE most modern equipment and production controls—plus almost 50 years' rich experience—are your assurance of unfailing dependability in every Scullin steel casting. Whatever your needs, we have the facilities to fill them promptly.

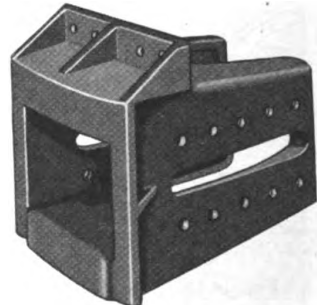
Truck
Bolster



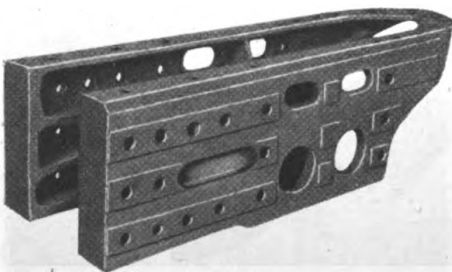
Integral-Journal-Box
Side Frame



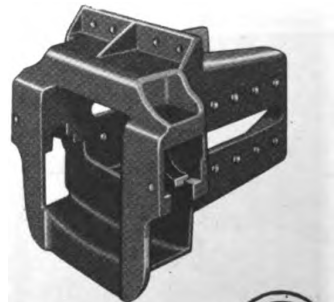
A.A.R. Vertical Plane Cast Yoke
for Friction Gear



Striker with Integral Carrier
and Front Lugs



Bolster Center Filler and
Rear Draft Lugs



Swing Motion Striker with
Integral Front Lugs



SCULLIN STEEL CO., ST. LOUIS 10, MISSOURI

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