THE MASTER CAR BUILDERS' ASSOCIATION

CAR BUILDERS' DICTIONARY

1909 Edition

The Car Builders' Dictionary

AN ILLUSTRATED VOCABULARY OF TERMS WHICH DESIGNATE AMERICAN RAILWAY CARS THEIR PARTS ATTACHMENTS AND DETAILS OF CONSTRUCTION WITH DEFINITIONS AND ILLUSTRATIONS OF TYPICAL BRITISH PRACTICE IN CAR CONSTRUCTION

SIX THOUSAND NINE HUNDRED AND THIRTY-FOUR ILLUSTRATIONS

1909 EDITION

COMPILED FOR THE MASTER CAR BUILDERS' ASSOCIATION

By Francis E. Lister

UNDER THE SUPERVISION OF THE FOLLOWING COMMITTEE:

C. A. Seley, *Mechanical Engineer, Chicago, Rock Island & Pacific.*
H. F. Ball, *Superintendent of Motive Power, Lake Shore & Michigan Southern.*
J. E. Muhlfeld, *General Superintendent of Motive Power, Baltimore & Ohio.*

The first edition of the Car Builders' Dictionary was published by the Railroad Gazette in 1879, under contract with and under the direction of the Master Car Builders' Association. It contained 811 engravings. It was revised and published under similar conditions in 1884, and contained 2,188 engravings. It was revised and similarly published in 1895 and contained 5,683 engravings. In 1903 it was again revised, the edition containing 4,971 engravings. The 1906 revised edition contained 6,344 engravings.

1909

THE RAILWAY AGE GAZETTE

NEW YORK: 83 Fulton Street. CHICAGO: Plymouth Building.

THE RAILWAY GAZETTE

LONDON: Queen Anne's Chambers, Westminster, S. W.

ACTION OF THE MASTER CAR BUILDERS' ASSOCIATION

At the Fifth Annual Convention, held in Richmond, Va., 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."

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

"The Committee to whom 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 they had finished their work, and were discharged."

At a meeting of the Executive Committee of the Master Car Builders' Association, held in New York, December 11, 1905, Messrs. C. A. Seley, H. F. Ball and J. E. Muhlfeld were appointed a Supervising Committee for the revision of the Car Builders' Dictionary.

PREFACE.

This is the fifth revised edition of the Car Builders' Dictionary since its first publication in 1879. The first edition was seven years in preparation. Five years after it was published, it was necessary to revise it for the first time. Eleven years elapsed before it was done again, in 1895, and eight years before the third revision, in 1903. The fourth revision, in 1906, was a thorough one. The present, 1909, edition shows the continuing tendency to increase in size, although all types and patterns known to be out of date are excluded. The general arrangement has been carefully preserved, with some minor changes which it seemed proper to make. In view of the publication of the Locomotive Dictionary along similar lines to this book, all references to devices and parts of devices belonging directly to the locomotive or tender have been taken out.

The illustrations of typical British cars, shown on pages 617 to 660, are interesting, and we regret that they are not more nearly complete. British practice differs in many respects from American practice and it is widely followed throughout the world, in the British colonies and elsewhere. Makers of railway equipment in seeking foreign markets find themselves confronted with the problem of adapting their devices to existing standards and dimensions of each country. The illustrations give a good general idea of the dimensions and principal constructive features of the standard designs of cars used in Great Britain. It has been impossible to illustrate them in detail to such an extent as has been done with American practice.

The revision of the definitions has been made with a view of eliminating superfluous and obsolete matter, changing the wording of definitions of such terms as have gradually taken on a new meaning, and adding definitions of terms and parts which have come into general usage during the last few years.

The members of the Supervising Committee appointed by the Master Car Builders' Association, Mr. C. A. Seley, Mr. H. F. Ball and Mr. J. E. Muhlfeld, have given the benefit of their wide experience in making many suggestions for the improvement of the book and, what has been far more helpful, their hearty support and encouragement. Acknowledgments are gratefully made to them.

F. E. L.

New York, November, 1909.

DIRECTIONS

For Using the Car Builders' Dictionary.

To find the meaning of a given word or term, refer to it in the alphabetical list which constitutes the first half of the book, where a definition similar to those contained in ordinary dictionaries and a reference to some engraving illustrating the object —if it is capable of such illustraton—will usually be found.

To find the name of a car, or part of a car, examine the alphabetical list of the different classes of engravings in the index which immediately precedes them, until the class is found to which the object looked for belongs, bearing in mind the **system of alphabetical classification for the engravings,** which is as follows:

CARS, CAR BODIES, CAR BODY DETAILS, CAR FURNISHINGS, TRUCKS AND TRUCK DETAILS, M. C. B. STANDARDS AND RECOMMENDED PRACTICE, HAND CARS, ELECTRIC CARS, BRITISH CARS, CAR SHOP MACHINERY.

By referring to the engravings included in that class a representation of the part or object sought will be found with either its name underneath or a reference number or letter by which number or letter the name may be learned from the list of names of parts accompanying the illustration and usually to be found in the immediate vicinity.

CLASSIFIED INDEX TO ADVERTISEMENTS.

(For Alphabetical Index see page following last page of illustrations.)

AIR BRAKE APPARATUS:
Westinghouse Air Brake Co., Pittsburg, Pa.

AIR COMPRESSORS:
Chicago Pneumatic Tool Co., Chicago, Ill.

AIR BRAKE CORD:
Samson Cordage Works, Boston, Mass.

AIR BRAKE HOSE:
Boston Belting Co., Boston, Mass.

ASBESTOS PROTECTED METAL SHEETS:
Asbestos Protected Metal Co., Canton, Mass.

AXLES:
Baume & Marpent, Ltd., Haine-St. Pierre, Belgium.
Bettendorf Axle Co., Davenport, Ia.
Cleveland City Forge & Iron Co., Cleveland, O.
Gould Coupler Co., New York, N. Y.
Russel Wheel & Foundry Co., Detroit, Mich.

BAGGAGE RACKS:
Adams & Westlake Co., Chicago, Ill.
Dayton Mfg. Co., Dayton, O.
Howard & Co., James L., Hartford, Conn.

BATTERIES, STORAGE:
Electric Storage Battery Co., Philadelphia, Pa.
Gould Storage Battery Co., New York, N. Y.
United States Light & Heating Co., New York, N. Y.

BEARINGS (CENTER AND SIDE):
American Steel Foundries, Chicago, Ill.
Cardwell Mfg. Co., Chicago, Ill.
Chicago Railway Equipment Co., Chicago, Ill.
Gould Coupler Co., New York, N. Y.
Joliet Railway Supply Co., Joliet, Ill.
Miner Co., W. H., Chicago, Ill.
Symington Co., T. H., Baltimore, Md.
U. S. Metal & Mfg. Co., New York, N. Y.
Western Railway Equipment Co., St. Louis, Mo.
Woods & Co., Edwin S., Chicago, Ill.

BELL AND SIGNAL CORD:
Samson Cordage Works, Boston, Mass.

BELL CORD COUPLING:
Samson Cordage Works, Boston, Mass.

BELTING (RUBBER):
Boston Belting Co., Boston, Mass.

BOLSTERS:
American Steel Foundries, Chicago, Ill.
Bettendorf Axle Co., Davenport, Ia.
Chicago Railway Equipment Co., Chicago, Ill.
Commonwealth Steel Co., St. Louis, Mo.
Gould Coupler Co., New York, N. Y.

BRAKES:
(See Air Brakes and Electric Brakes).

BRAKE BEAMS:
American Steel Foundries, Chicago, Ill.
Buffalo Brake Beam Co., New York, N. Y.
Chicago Railway Equipment Co., Chicago, Ill.
Davis Solid Truss Brake Beam Co., Wilmington, Del.
Joliet Railway Supply Co., Joliet, Ill.

BRAKE CYLINDER LUBRICATORS:
Emery Pneumatic Lubricator Co., St. Louis, Mo.

BRAKE JAWS:
Chicago Railway Equipment Co., Chicago, Ill.
Cleveland City Forge & Iron Co., Cleveland, O.
U. S. Metal & Mfg. Co., New York, N. Y.
Western Railway Equipment Co., St. Louis, Mo.

BRAKE LEVERS:
Cleveland City Forge & Iron Co., Cleveland, O.
Forsythe Steel Tie Co., Pittsburg, Pa.

BRAKE SHOES:
American Brake Shoe & Foundry Co., Mahwah, N. J.
Railway Materials Co., Chicago, Ill.

BRAKE SHOE KEYS:
Forsythe Steel Tie Co., Pittsburg, Pa.

BRAKE SLACK ADJUSTERS:
American Brake Co., St. Louis, Mo.
Chicago Railway Equipment Co., Chicago, Ill.
Western Railway Equipment Co., St. Louis, Mo.

BUMPING POSTS:
McCord & Co., Chicago, Ill.

CABLES, ELECTRIC:
Kerite Insulated Wire & Cable Co., New York, N. Y.

CAR CLOSETS:
(See Water Closets.)

CAR CURTAINS:
Curtain Supply Co., Chicago, Ill.
Pantasote Co., New York, N. Y.

CAR DOORS:
Fitz-Hugh, Luther Co., Chicago, Ill.
Hicks Locomotive & Car Works, Chicago, Ill.
McGuire-Cummings Mfg. Co., Chicago, Ill.
U. S. Metal & Mfg. Co., Chicago, Ill.
Western Railway Equipment Co., St. Louis, Mo.

CAR DOOR FASTENERS (FREIGHT):
National Malleable Castings Co., Cleveland, O.
Western Railway Equipment Co., St. Louis, Mo.

CARS (FREIGHT):
American Car & Foundry Co., New York, N. Y.
Barney & Smith Car Co., Dayton, O.
Baume & Marpent, Ltd., Haine-St. Pierre, Belgium.
Bettendorf Axle Co., Davenport, Ia.
Brill Co., J. G., Philadelphia, Pa.
Clark Car Co., Pittsburg, Pa.
Fitz-Hugh, Luther Co., Chicago, Ill.
Goodwin Car Co., New York, N. Y.
Hicks Locomotive & Car Works, Chicago, Ill.
Joliet Steel Car Mfg. Co., Joliet, Ill.
McGuire-Cummings Mfg. Co., Chicago, Ill.
Pressed Steel Car Co., Pittsburg, Pa.
Ralston Steel Car Co., Columbus, Ohio.
Russel Wheel & Foundry Co., Detroit, Mich.
Standard Steel Car Co., Pittsburg, Pa.
Western Steel Car & Foundry Co., Chicago, Ill.
Whipple Car Co., Chicago, Ill.

CARS (MISCELLANEOUS):
American Car & Foundry Co., New York, N. Y.
Baume & Marpent, Ltd., Haine-St. Pierre, Belgium.
Bettendorf Axle Co., Davenport, Ia.
Brill Co., J. G., Philadelphia, Pa.
Fitz-Hugh, Luther Co., Chicago, Ill.
McGuire-Cummings Mfg. Co., Chicago, Ill.
Pressed Steel Car Co., Pittsburg, Pa.
Russel Wheel & Foundry Co., Detroit, Mich.

CARS (PASSENGER):
American Car & Foundry Co., New York, N. Y.
Barney & Smith Car Co., Dayton, O.
Brill Co., J. G., Philadelphia, Pa.
Fitz-Hugh, Luther Co., Chicago, Ill.
Harlan & Hollingsworth Corpo., Wilmington, Del.
Hicks Locomotive & Car Works, Chicago, Ill.
Pressed Steel Car Co., Pittsburg, Pa.
Standard Steel Car Co., Pittsburg, Pa.
Wason Mfg. Co., Springfield, Mass.

CARS, REPAIRED AND REBUILT:
Fitz-Hugh, Luther Co., Chicago, Ill.
Hicks Locomotive & Car Works, Chicago, Ill.
Whipple Car Co., Chicago, Ill.

CAR SHOP MACHINERY:
(See Wood Working Machinery.)

CAR FLOORING:
American Mason Safety Tread Co., Boston, Mass.
Wood, Guilford S., Chicago, Ill.

CAR HEAD LININGS:
Adams & Westlake Co., Chicago, Ill.
Asbestos Protected Metal Co., Canton, Mass.
Pantasote Co., New York, N. Y.
Rapp Co., J. W., New York, N. Y.

CAR HEATING:
Consolidated Car Heating Co., New York, N. Y.
Safety Car Heating & Lighting Co., New York, N. Y.

CAR LIGHTING:
Adams & Westlake Co., Chicago, Ill.
Commercial Acetylene Co., New York, N. Y.
Dayton Mfg. Co., Dayton, O.
Electric Storage Battery Co., Philadelphia, Pa.
General Electric Co., Schenectady, N. Y.
Gould Coupler Co., New York, N. Y.
Gould Storage Battery Co., New York, N. Y.
Safety Car Heating & Lighting Co., New York, N. Y.
United States Light & Heating Co., New York, N. Y.

CAR LINES:
Cleveland Car Specialty Co., Cleveland, O.
Standard Railway Equipment Co., St. Louis, Mo.

CAR LINING, REFRIGERATOR:
Union Fibre Co., Winona, Minn.

CAR REPLACERS:
U. S. Metal & Mfg. Co., New York, N. Y.

CAR ROOFING:
Asbestos Protected Metal Co., Canton, Mass.
Excelsior Car Roof Co., St. Louis, Mo.
Standard Paint Co., New York, N. Y.
Standard Railway Equipment Co., St. Louis, Mo.

CAR SEATS:
Adams & Westlake Co., Chicago, Ill.
Hale & Kilburn Mfg. Co., Philadelphia, Pa.
Scarritt Car Seat Works, St. Louis, Mo.

CAR TRIMMINGS:
Adams & Westlake Co., Chicago, Ill.
Dayton Mfg. Co., Dayton, O.
Hale & Kilburn Mfg. Co., Philadelphia, Pa.
Howard & Co., James L., Hartford, Conn.
Rapp Co., J. W., New York, N. Y.

CAR UPHOLSTERY:
Pantasote Co., New York, N. Y.
Wood, Guilford S., Chicago, Ill.

CAR WHEEL PRESSES:
Watson-Stillman Co., New York, N. Y.

CAR WHEELS:
(See Wheels.)

CAR WINDOWS:
Edwards Co., O. M., Syracuse, N. Y.

CASTINGS:
(See Forgings and Castings.)

CASTINGS (BRONZE AND BRASS):
Adams & Westlake Co., Chicago, Ill.
Dayton Mfg. Co., Dayton, O.
Howard & Co., James L., Hartford, Conn.

CENTER PLATES:
Gould Coupler Co., New York, N. Y.
Joliet Railway Supply Co., Joliet, Ill.

CHEMISTS:
Hunt & Co., Robert W., Chicago, Ill.

CONTROLLERS, MULTIPLE UNIT:
General Electric Co., Schenectady, N. Y.

COUPLERS, AIR AND STEAM:
Consolidated Car Heating Co., New York, N. Y.
Safety Car Heating & Lighting Co., New York, N. Y.
Westinghouse Air Brake Co., Pittsburg, Pa.

COUPLERS, CAR:
American Steel Foundries, Chicago, Ill.
Gould Coupler Co., New York, N. Y.
McConway & Torley Co., Pittsburg, Pa.
National Malleable Castings Co., Cleveland, O.
Standard Coupler Co., New York, N. Y.

CRANES:
Northern Engineering Works, Detroit, Mich.
Vulcan Steam Shovel Co., Toledo, O.

CROSS TIES, STEEL:
Forsythe Steel Tie Co., Pittsburg, Pa.

CURTAINS:
(See Car Curtains.)

CURTAIN FIXTURES:
Curtain Supply Co., Chicago, Ill.

DIAPHRAGMS (VESTIBULE):
Wood, Guilford S., Chicago, Ill.

DOOR CHECKS:
Yale & Towne Mfg. Co., New York, N. Y.

DOORS, EXTENSION PLATFORM TRAP:
Edwards Co., O. M., Syracuse, N. Y.

DOORS, HOPPER:
U. S. Metal & Mfg. Co., New York, N. Y.

DOOR LOCKS:
Adams & Westlake Co., Chicago, Ill.
Dayton Mfg. Co., Dayton, O.
Howard & Co., James L., Hartford, Conn.
Yale & Towne Mfg. Co., New York, N. Y.

A DICTIONARY OF TERMS

USED IN

CAR BUILDING

"A" Car Roof. A car roof with straight carlines, meeting at a point like rafters in the center of the upper deck.

"A" Frame (Steam Shovel). 13, Figs. 596-598. A strut to which are fastened the boom guys.

"A" Frame Step (Steam Shovel). 14, Figs. 596-598. The supports for the bottom ends of the **"A" Frame,** which see.

Accordeon Hood (Buhoup Vestibule). 124, Figs. 2215, 2263.

Accordeon Hood Band (Buhoup Vestibule). 123, Figs. 2215-2263.

Acetone. A colorless liquid, obtained from the destructive distillation of wood, which resembles alcohol and which has the property of absorbing acetylene gas under pressure in a high degree. It is used in the storage tanks of the **Commercial Storage System of Car Lighting,** which see.

Acetylene Gas. A colorless gas, C_2H_2, produced when water is brought in contact with calcium carbide. It has a distinctive odor and burns with a bright, luminous flame. It is used in car lighting with success. It may be generated in the car, as in the Adlake System, under the car, as in the Avery System, or carried in tanks filled with acetone and asbestos under pressure, as in the Commercial Storage System. See **Adlake System, Avery System** and **Commercial Storage System.**

Acetylene Gas Lamps and Fixtures. Figs. 3276-3364. See **Safety Car Heating & Lighting Co. Acetylene Lamps, Avery System, Adlake System, Commercial Storage System.**

Acme Automatic Window Shade. Fig. 4670. A car shade with a shade holding device, which consists of a hollow tube with a metallic guide at either end, through which two cords are passed, one end of each being fastened to the casing on either side of the shade near the top, the cords passing down the side to the bottom of the shade, thence through the tube and down the other side to the bottom, being fastened at the bottom of the window to the casing.

Acme Brake Beam. Figs. 5114-5119, 5191.

Acme Burner. Fig. 3588. A lamp burner constructed upon nearly the same principle as a locomotive headlight burner, and which gives a powerful light.

Acme Curtain Fixture. Fig. 4670.

Acme Dry Closet. Figs. 4047-4048.

Acme Improved Diaphragm. Figs. 2286-2288.

Acme Lamp. A lamp fitted with an **Acme Burner,** which see.

Acme Pipe Clamps. Figs. 1193-1198.

Acme Spring. A form of elliptic spring, the peculiarity of which consists in tapering a single leaf from the center toward the ends, without the use of a number of separate leaves. One type is constructed of

plates with a beveled edge, arranged one above the other as usual, and held in position by a wrought iron band. Not in general use in car building.

Acorn. A general term for the ornaments of tips resembling the acorn, used to finish the ends of rods of various forms.

Adjustable Foot Rest. A sliding foot rest, supported by various mechanical devices—as by a ratchet arc or on rabbet pieces. A foot rest or rail under a seat which can be adjusted to suit the passenger using it. See **Foot Rest.**

Adjustable Lamp Canopy. Fig. 3557.

Adlake Acetylene Gas System of Car Lighting. Figs. 3331-3332. A system of car lighting using acetylene gas, which is generated in the apparatus shown in Figs. 3331-3332, which is enclosed in one end of a car, as in Fig. 3333. The carbide is contained in cartridges, Fig. 3332, in pockets or baskets. The water flowing down from above and coming into contact with the carbide generates acetylene gas, which is stored in the receiving tank, Fig. 3346, under the car. The piping and arrangements through the car are similar to the Pintsch system. The form of the lamp is shown in Fig. 3344.

Advertising Rack Rail (Street Cars). A strip of wood to which the frames for advertising cards are screwed or otherwise fastened.

Agosote. A substitute for wood in headlinings and paneling of coaches. Composition secrete. Made under hydraulic pressure, which forces fibers into homogeneous material, which is impervious to water. One grade fireproof.

Air Brake. Any brake operated by air pressure, but usually restricted to systems of continuous brakes operated by compressed air, in distinction from **Vacuum Brakes,** which see, which are operated by creating a vacuum. The air is compressed by some form of pump on the locomotive, or a motor compressor on electric cars, and is conveyed by pipes and flexible hose between the cars to cylinders and pistons under each car, by which the pressure is transmitted to the brake levers, and thence to the brake shoes. This system is what is now termed the straight-air brake. This brake is now obsolete in steam road practice, having been replaced by the **Automatic Air Brake,** which see, and also see **Westinghouse Air Brake, Quick Action Air Brake, Vacuum Brake, New York Air Brake.**

Air Brakes. General arrangement and details. Figs. 1205-1292, 5527-5531, 5562-5565, 5570-5571, 5944-5947, 6000-6009. The general arrangement and details of brake gear for air brake cars, as shown, are M. C. B. Standards. The following standards have also been adopted in this connection: 1. Maximum train pipe pressure, 70 pounds per square inch. 2.

Maximum brake power in freight cars, 70 per cent. of the light weight of car. 3. All levers 1 inch in thickness; all pins to be $1\frac{3}{32}$ inches in diameter; all jaws or clevices made of ¾-inch by 2½-inch iron; all rods ¾ inch diameter. 4. Angle of brake beam lever, 40 degrees with vertical.

The revision made in 1896 consisted in the omission of such detail dimensions as could not be used in all cases, such as the length and proportions of main levers, and the omission of some of the smaller parts from the drawing, such as the pipe clamps, staples, etc. The dimensions of the cross-section of the malleable iron truck lever connection were increased, and the letters W. I., M. I., C. I., etc., indicating the material of which the parts were to be made, were omitted from the drawing.

In 1898 the following changes were made:

Diameter of truck lever connection for outside hung brakes changed from ¾ inch to ⅞ inch, and a note to this effect was added under title on this sheet.

Diameter of hole for cotter in air brake pin was first indicated as $\frac{7}{16}$ inch.

Addition was made to note under drawing of truck lever connection for inside hung brakes as follows: "If made of round iron or steel, must not be less than 1⅝ inches diameter."

Dummy coupling was omitted from drawing and air hose was shown as hanging down.

The words "33 inches or" were omitted from height shown for air brake pipe above rail.

Diameter of release valve rod was changed from ¼ inch to ⅜ inch.

In 1900 a standard brake pipe nipple, 10 inches long, was ordered shown, located directly back of the angle cock.

In 1904 the location of the main air pipe and angle cock was changed from Recommended Practice to Standard.

In 1907 the following specifications were adopted:

That ⅜ inch straight link chain be made standard for hand brake chain, except on cars on which there is rapid deterioration, on which $\frac{7}{16}$ inch chain shall be used. Hand brake chain to be attached to brake mast by a ½-inch machine bolt instead of an eye bolt.

In 1908 the diameter of the holes in the different levers, guides, brackets and connections were omitted, and a note added to Sheet M. C. B. 9 reading as follows: "All holes for brake pins not less than $1\frac{3}{32}$ inches diameter nor more than 1⅛ inches diameter."

In 1899 a Recommended Practice for the location of air brake parts on different classes of cars was adopted, as follows:

1. Location of air brake cylinders and triple valves on box cars and other clear bottom cars.

2. Location of air brake cylinders and triple valves on hopper gondola cars and drop bottom gondola cars.

3. Arrangement of piping for clear bottom cars, or cars of the box car type.

4. Location of main air pipe at ends of cars.

5. As to the matter of fastening air cylinder reservoirs, retaining valves, etc., to the frame work of cars, the bolts fastening the cylinders and reservoirs should be either double-nutted or cottered, so as to prevent the same from working loose. The air pipes should be fastened to the frame work of the car with a liberal number of clamps.

One elbow should be applied to the retaining valve pipe, it being located at the end sill of the car where pipe turns upward.

One union should be applied as close to the triple valve as practicable to permit the easy removal of same; the pipe to be carried along the under side of the intermediate sill when practicable from the triple valve to end of car, and be supported by either staples or clamps, not to exceed six feet apart.

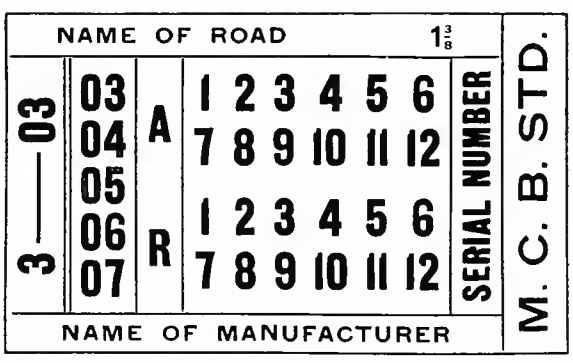
6. Badge for marking air brake hose to show dates of application and removal, manufacturer's name and name of the railway company.

Air Brake Cut-Out and Defect Card (M. C. B. Recommended Practice). See **Air Brake Repair Card.**

Air Brake Hose. See **Brake Hose.**

Air Brake Hose, Label for (M. C. B. Standard). In 1902 the label for hose, as shown, was made a standard. Revised in 1903. The specification for its use is as follows:

Each standard length of hose must be branded with the name of the manufacturer, year and month when made, and serial number, the initials of the railway company, and also have a table of raised letters at least $\frac{3}{16}$ inch high to show the date of application and removal, thus:



The above gives outline of modification of label, extension being on right hand end.

All markings to be full and distinct and made on a thin layer of white or red rubber, vulcanized, and so applied as to be removed either by cutting with a knife or sharp instrument.

Air Brake Instruction Car. Figs. 244, 258-260. A car, usually converted from a passenger car, in which is mounted all the apparatus necessary to illustrate and explain the construction and operation of all the parts of the air brake. It is used for the instruction of railroad employees and 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 provided with living quarters in the car.

Air Brake Repair Card (M. C. B. Standard). In 1894 a Recommended Practice was adopted to use an air brake repair card, as shown, to report to division terminals such defects as are found by trainmen which require brake to be cut out. This was revised in 1898 and is now as shown to be attached as near to the car number as possible. In 1902, adopted as standard. In 1903 letters were substituted for figures to indicate the various defects.

Air Brake Tests (M. C. B. Recommended Practice). In 1895 a code for the guidance of the Committee on Air Brake Tests in testing triple valves was adopted as recommended practice for such tests, which code is as follows:

Conditions of Tests.—No. 1.—Construction of Rack.—Brakes will be tested on a rack representing the piping of a fifty 34-foot car train. All cocks, angles and connections will be as nearly as possible identical with those in train service. The rack shall conform to a blue-print which is in the hands of the committee, which gives the proper fitting, piping, dimensions of cylinder, auxiliary reservoirs, main reservoirs, engineer's valve, etc.

No. 2.—Pressure.—Tests will be made with a uniform brake pipe pressure of 70 pounds.

No. 3.—Construction of Triples.—Triples must be constructed so that they can be secured and operated on apparatus conforming to diagrams, Figs. 1 and 2 (see pages 166 and 167 of the 1892 Annual Report).

No. 4.—To secure accuracy in measurement of time application and release tests, electrical recording apparatus will be used, arranged to give an indicator card in the fiftieth car.

THE ..... RAILWAY CO.

AIR-BRAKE CUT-OUT CARD.

Applied to Car No. ..... *Initials* .....

Date ..... *at* .....

By ..... *Inspector.*

By ..... *Cond'r.* *Train No.* .....

Defects .....

USE LETTERS TO DESIGNATE DEFECTS.

THE ..... RAILWAY CO.

DEFECTIVE AIR-BRAKE CARD.

Applied to Car No. ..... *Initials* .....

Date ..... *at* .....

By ..... *Inspector*

By ..... *Cond'r.* *Train No.* .....

Defects .....

USE LETTERS TO DESIGNATE DEFECTS.

The ..... Railway Co.

AIR-BRAKE CUT-OUT.

CAR CAN BE PLACED BETWEEN AIR-BRAKE CARS.

Car No. ..... *Initials* ..... *Date* .....

Card Applied at ..... *Train No.* .....

DEFECTS.			
A	TRIPLE VALVE.	O	CYLINDER PACKING.
B	RESERVOIR.	L	BRAKE RIGGING.
C	CYLINDER.	F	RELEASE COCK.
		M	ODD BRAKE.
H	CROSS-OVER PIPE.	N	

Inspector. | *By* ..... *Conductor.*

The ..... Railway Co.

DEFECTIVE AIR BRAKE.

CAR CANNOT BE PLACED BETWEEN AIR-BRAKE CARS.

Car No. ..... *Initials* ..... *Date* .....

Card Applied at ..... *Train No.* .....

DEFECTS.			
A	TRIPLE VALVE.	F	RELEASE COCK.
B	RESERVOIR.	G	ANGLE COCK.
C	CYLINDER.	H	CROSS-OVER PIPE.
D	CYLINDER PACKING.	J	TRAIN PIPE.
E	CUT-OUT COCK.	K	HOSE CONNECTION.
		L	BRAKE RIGGING.
		M	ODD BRAKE.
		N	

Inspector. | *By* ..... *Conductor.*

..... DIVISION. ..... DIVISION.

No. 5.—Tests shall be repeated three times under the same general conditions. The temperature at the time of the tests will be recorded.

No. 6.—Classification.—Triples shall be classified Nos. 1, 2, 3 and outlawed. In grading triples the reasons for their classification shall be given.

No. 7.—The three essentials for a quick-action brake are as follows:

First. Graduation.

Second. Release.

Third. Quick action.

Rack Tests.—No. 1.—Application Test (a) (Service).—Brakes must show with full service application and 6 inches piston travel, a brake cylinder pressure of 50 pounds. The minimum pressure must not be less than 48 pounds, nor the maximum pressure over 52 pounds. This test will be made with:

(1) 4 inches piston travel.

(2) 6 inches piston travel.

(3) 12 inches piston travel.

The necessity for the 4-inch and 12-inch piston travel tests will depend upon the character of the brakes being tested.

Note.—The object of this test is to secure such proportion between the auxiliary reservoir and the brake cylinder as will give the desired maximum power in a full service application of the brake.

No. 2.—Application test (b) (Emergency).—Brakes must be applied on the fiftieth car with at least 45 pounds pressure with 6 inches piston travel in three seconds from the first movement of the engineer's handle. They should indicate at least 55 pounds in three and one-half (3½) seconds. The final maximum pressure in this test must not be less than 15 per cent., nor more than 20 per cent. above the pressure given by the same brake in full service application.

This test will be made to determine that quick action is obtained in each case, with

(1) 4 inches piston travel.

(2) 6 inches piston travel.

(3) 12 inches piston travel.

Note.—The object of this test is to secure, as nearly as possible, uniformity of pressures in the brake cylinders in an emergency application, and as nearly as possible a uniformity of time required to attain the pressures; to secure a minimum length of stop, of shock and of trains parting.

No. 3.—Application Test (c).—Commencing with the first car from the engine, the brakes of three successive cars, or less, if they fail to jump three, will be cut out until the fifth, sixth and seventh are cut out, the brakes in each case to be applied as per Test No. 2. After the first series of three has been tested, in order to test the second series the first car must be cut in, and so on. The quick-action brake should pass the three cars cut out and apply on the fiftieth car in the same time as in Test No. 2. Tests will be made with piston travel of 4 inches.

In addition, at least two other applications shall be made with three successive triples cut out in any portion of the rack beyond the fifth car.

Note.—In freight car service the most common method of remedying a defective brake is to cut the brake out; hence it is essential that a limited number of brakes can be cut out successfully without destroying the quick-action feature.

No. 4.—Graduating Test (a).—Seventy pounds brake pipe pressure having been secured, the following tests will be made:

(1) A reduction of 8 pounds in brake pipe pressure. This should apply lightly the fifty brakes.

(2) A further reduction of 4 to 6 pounds. This should increase the braking power on all the brakes.

(3) A reduction of 30 pounds should equalize the pressure between the auxiliary reservoirs and brake cylinders. The piston travel in this test will be six inches.

(b).—One or more triples shall also be tested, having substituted for the brake cylinder a reser-

voir having the capacity of a cylinder with 8-inch stroke. The first admission to the cylinder should be made with a reduction of brake pipe pressure not exceeding five pounds; each succeeding reduction should reduce the pressure in the auxiliary reservoir not to exceed three pounds, until full equalization takes place. The pressure in the brake pipe should not be more than three pounds lower than the equalized pressure in the brake cylinder and reservoir at full equalization.

No. 5.—Test to Determine the Sensitiveness of the Service Valve.—Three valves selected at random will be taken for this test and each tried separately. They will be tested on a brake pipe representing a locomotive and one car, the engine and tender brake being cut out.

A brake pipe pressure of 70 pounds having been secured, the air will be discharged as rapidly as it may through an opening in the engineer's valve of two sixty-fourths to three sixty-fourths (2 to 3-64) inch diameter. Under this condition the service action must take place and continue to take place without any appearance of quick action (P. E., Partial Emergency) until the disk has been enlarged up to and including a 10-64-inch opening.

Note.—The object of this test is to insure the working of triples in "service" with practically the same reduction of air.

No. 6.—Test to Determine the Sensitiveness of the Quick-Action Valve.—The same three valves as in No. 5, or others selected at random, will be taken for this test and each tried separately. They will be tested under the same brake pipe conditions as Test No. 5. Engine and tender brake cut out.

A brake pipe pressure of 70 pounds having been secured, the air will be discharged as rapidly as it may through disk openings, as in the preceding test, increasing in diameter by 1-64 inch. Triples must not show a range of more than 3-64 before full quick action is reached. Full quick action must not take place before 11-64, but must take place when the opening is 14-64.

Note.—The object of this test is to check the introduction of triples which will cause quick-action application when not wanted.

No. 7.—Test to Determine the Holding Power of the Brake in Service Application and Quick-Action Application.

(a) Service Application.—Gages will be placed on the cylinder and auxiliary reservoir of the first, twenty-fifth and fiftieth cars with 70 pounds brake pipe pressure; brakes will be applied by admitting, as nearly as may be, 15 pounds into the cylinder of the first car. Record of pressure in the auxiliary reservoirs and cylinders will be taken as follows:

(1) At the first application.
(2) In five minutes from first application.
(3) In ten minutes from first application.
(4) In fifteen minutes from first application.

(b) Quick-Action Application.—This will be the same as above, except that all the air will be exhausted from the brake pipe.

(c) Dummy Cylinder Test.—A modification of the holding test, as with the graduating test by the introduction of dummy cylinders.

No. 8.—Release Test.—The following conditions should be observed in this test:

(a) Main air reservoir cut in.

(b) Any pump or boiler pressure may be used that will maintain a uniform head of 90 pounds pressure.

A uniform pressure of 70 pounds having been secured in the brake pipe, all the air will be exhausted by a quick-action application. A pressure of 90 pounds will then be maintained against a diaphragm perforated by a 3-32 hole, and a record taken of all brakes that release inside of thirty minutes. In making this test special care must be taken to see that there is no leak in the brake pipe.

It will not be considered satisfactory if a greater proportion than ten per cent. fail to release in the prescribed time.

Note.—This test, in addition to testing the release feature of the triples, is intended as an equivalent to a release after a break-in-two in train service.

No. 9.—Test to Determine the Time of Charging One Auxiliary Reservoir:

(a) Cut out the brake to be tested by the cut-out cock.

(b) Bleed the auxiliary reservoir empty and close the bleed cock.

(c) Keep the pump running and maintain a head of 90 pounds in main air reservoir and brake pipe during test.

(e) Cut in the brake to be tested and note from the reading of the gage the time occupied in charging to 70 pounds. The time of charging should be 55 seconds. The reservoir should not be charged in less than 45 seconds nor more than 60 seconds.

Note.—The object of this test is to prevent irregular charging of auxiliary reservoirs and thus insure that the front brakes will not apply after charging.

No. 10.—Test to Determine whether Quick Action will Follow a Service Application:

Commencing with a service application of 20 pounds pressure in the first cylinder, a full quick-action reduction will follow. It will be observed whether quick action takes place or not. The pressure in the first cylinder will be increased or decreased by steps of about 5 pounds until the point at which quick action ceases or commences is determined. Quick action should take place with not less than 20 pounds in the first cylinder.

Note.—The object of this test is to determine whether, after a service application, quick action can be obtained without first releasing the brakes.

No. 11.—Such additional tests as in the judgment of the committee the construction of the triples submitted to them for test warrants.

Train Tests.—No. 1.—In order to provide against defects which a rack test may not develop, it is recommended that railroads make a 50-car train test in actual service before accepting the result from the rack test as final.

No. 2.—In making Application Test No. 2 with a train, the measurement of time from the first car to the fiftieth car should be provided for. This will determine the time occupied by the engine brake as against the car brake.

No. 3.—Special care should be taken with the engine and tank brakes in order that they may do their share of the braking during the stops, and not pull away from the train.

No. 4.—All brake shoes must have a proper bearing on wheels, which is best accomplished by giv-

ing them some previous service before testing, and all should be of the same material.

No. 5.—Tests to determine the shock should be made on a level track, with all the slack in the train pulled out at the time the brakes are applied.

Air Compressor (Westinghouse). Figs. 1221-1224.

Air Controller (Pintsch Lamp). 458, Figs. 3208-3224.

Air Cylinder Gasket (Motor Compressor). 29, Figs. 1221-1224. See **Gasket.**

Air Flue (Refrigerator Cars). The vertical passage of the car through which the chilled air passes to enter the refrigerator.

Air Gage (Air Brake). Figs. 1277-1279. A gage to register the pressure of air in the reservoirs, brake pipe or brake cylinders, similar to an ordinary steam pressure gage. They are made either with a single pointer, Fig. 1277, or with two pointers, Figs. 1278-1279, to indicate on one dial both the reservoir pressure and the brake pipe pressure. The latter type is called a duplex gage.

Air Gaps in Generators. The clearance between the body or iron core of the rotating armature and the stationary field poles or pieces of a generator. Small air gaps are beneficial in that they permit of smaller, lighter, slower speed and cheaper machines than is the case with large air gaps. On the other hand, the bearings of machines with small air gaps require closer attention and more frequent renewals and are more apt to give trouble at the commutators and brushes than machines with large air gaps. These should be thoroughly understood as they have an important bearing on the cost of electric car lighting.

Air Inlet. An opening for the admission of air to an air compressor or a refrigerator car. The term includes both the air strainer and air pipe.

Air Pipe (Air Brake). More properly brake pipe. Often called train pipe.

Air Pipe Strainer. Fig. 1283. More properly **Brake Pipe Air Strainer,** which see.

Air Piston (Motor Compressor). 5, Figs. 1221-1224. See **Piston.**

Air Piston Packing Rings (Motor Compressor). 6, Figs. 1221-1224.

Air Pump and Motor. Figs. 1221-1224, 1296-1297. A machine for compressing air, mounted beneath the floor of a car, consisting of air cylinders, the pistons of which are gear-driven by an electric motor. See **Motor-Driven Air Compressor.**

Air Hose Bracket. See **Brake Hose Bracket.**

Air Pump Cylinder (Motor Compressor). 17, Figs. 1221-1224. A hollow cast iron cylinder with a piston, which piston compresses the air required to operate the brakes. The pistons in the air cylinders are connected with connecting rods to a crank shaft geared to a small motor.

Air Pump Cylinder Head (Motor Compressor). 25, Figs. 1221-1224. The cover for the lower end of the air cylinder of a motor driven air pump for an air brake. See **Cylinder Head.**

Air Pump Governor. See **Electric Pump Governor.**

Air Signal. See **Train Air Signal.**

Air Signal Reducing Valve. See **Reducing Valve.**

Air Space (Refrigerator Cars). C, Figs. 305-321. A space left between the linings to aid in insulation. It is sometimes called dead air space in distinction from the ventilating passages, as the air in it is confined and is not being constantly changed.

Air Strainer. Fig. 1283. A **Brake Pipe Air Strainer,** which see.

Air Valve (Gold Steam Heating). Fig. 2876. A small outlet valve which will pass air but not water, applied to the ends of storage heaters to allow the air to escape when the steam or hot water is turned on.

Aisle. The longitudinal passageway through a passenger car, between the seats.

Aisle Seat End. The end or arm of a transverse car seat next the aisle. See also **Wall Seat End.**

Ajax Diaphragm. Figs. 2297-2299. A cotton fabric diaphragm for vestibules made of sections riveted at the joints and bound with leather at the corners. Made in two styles, single for Pullman and double for Gould Vestibules.

Ajax Forging Machinery. Figs. 6856-6883.

Alcove. A recess. See **Faucet Alcove, Lamp Alcove, Water Alcove.**

Alcove Faucet. Figs. 3653-3654. A faucet in a water alcove connected with a water cooler to supply drinking water. See **Faucet.**

Alcove Lamp. A lamp placed in a recess in the side of a car. Also called Panel Lamp, as it is usually covered by a panel.

Allen Paper Wheel. Figs. 5402-5403. A car wheel with a steel tire, a cast iron hub or center, and the space between the tire and center filled with compressed paper and held in place by wrought iron plates on either side extending from the center to the tire and bolted thereto. See **Steel Tired Wheel.**

Alleyway. More properly a corridor. A narrow passage at the side of staterooms or compartments in parlor or sleeping cars.

American Automatic Slack Adjuster. Figs 1187-1192.

American (Continuous) **Draft and Buffing Apparatus.** An apparatus by which the drawbars at both ends of the car are connected by two rods with loops at the ends, that hook over the ends of a bar or key passing through the shank of each drawbar. Each car is in this manner pushed from the rear end and all the pull is transmitted through the train by the draft rods. It has two buffer springs and two follower plates at each end of the car. Not now used in new construction.

American Dust Guard. A dust guard in two pieces, which are held together and against the axle by a spring.

American Woodworking Machinery. Figs. 6793-6807.

Andrews Automatic Ventilator. Figs. 4442-4443.

Angle Clips (M. C. B. Coupler). Plates to fit the angles or bends of an uncoupling rod. They are fastened by an angle clip bolt.

Angle Cock (Air Brakes). Fig. 1282. A cock placed in the brake pipe under each end of the car just in front of the hose connection. This must always be open except at the rear end of the last car, where it must always be closed to prevent escape of air from the brake line and setting of the brakes.

Angle Iron or Angle. A general term applied by makers to iron or steel rolled in the form of an L, but with the corner rounded off somewhat. When the angle is rolled to a sharp corner and not rounded off, it is termed a square-root angle.

Anti-Friction Car Door Hanger. Figs. 2655-2657. See **Car Door Hanger.**

Anti-Friction Side Bearings and Center Plates. Fig. 5340. Devices, a few of which the shown, to eliminate the friction between body and truck in curving. The two general forms are roller side bearings and ball-bearing side bearings and center plates.

Anti-Telescoping Device. A type of end framing adopted by the Pullman Company, in which the end sill is greatly strengthened by an end sill stiffening plate, an end sill stiffening angle bar, corner angle posts, and end plate strengthening angles or knee irons. The device is known as the "Sessions" anti-telescoping device, and the patents are owned by the Pullman Company.

Anvil (of Track Torpedoes). Interior pieces of iron placed directly over the fulminating powder to insure its ignition. Some track torpedoes have three anvils.

Apron. See **Door Apron, Roof Apron, Bunk Apron.**

Arbor. "A spindle or axle for a wheel or pinion; a mandrel on which a ring or wheel is turned in a lathe."—Knight. See **Door Latch Arbor.**

Arch (Elliptic Spring). The height from the center of the scrolls at the ends of the elliptics to the under side of the main leaf of the spring. Twice the arch of an elliptic spring, less the thickness of the spring bands, is the set and is the maximum amount which an elliptic spring can be compressed. In a half elliptic spring the arch and set differ only in the thickness of the spring band.

Arch Bar. Figs. 5697-5705; 14, Figs. 4705-4713. A bent wrought iron or steel bar, which forms the top member of an iron truck side frame. In the diamond truck the next lower member is the inverted arch bar, and the next lower (occasionally used) is the auxiliary arch bar. The tie bar comes under all, and sometimes becomes an arch bar. See also **Center Bearing Arch Bar** and **Center Bearing Inverted Arch Bar,** for six-wheel trucks.

Arch Bars and Column Bolt for 80,000-Pounds Capacity Cars (M. C. B. Standard). Figs. 5697-5705. In 1897 a committee on this subject reported designs, which were subsequently adopted by letter ballot as Recommended Practice.

In 1901 these were, by letter ballot, changed from Recommended Practice to Standard.

Arch Plate (Buhoup Vestibule). 46 and 91, Figs. 2215-2263.

Arch Plate and Buffer Spring (Buhoup Vestibule). 46, Figs. 2215-2263.

Arch Plate Band (Buhoup Vestibule). 49, Figs. 2215-2263.

Arch Rail (British). See **End Arch Rail.**

Arched Roof. A roof, the surface of which is curved, and which has no upper deck or clear story. It is at the present time little used for passenger cars. A **Turtle Back Roof,** which see.

Argand Burners. Figs. 3096-3097. See **Lamp Burner** and **Argand Lamp.**

Argand Lamp. A lamp invented by Argand, a native of Geneva, about the year 1784. The burner consists of two concentric cylindrical tubes in which is the annular wick. The tube inclosing the wick is closed at the bottom and communicates by a pipe with the oil reservoir. The interior tube being open, free access of air is allowed to the interior and exterior of the flame, insuring more perfect and equal combustion. Some gas lamps are constructed on this principle.

Arm. See **Berth Arm. Gas Arm. Lamp Arm. Seat Arm. Seat Back Arm. Striker Arm.**

Arm Cap. Figs. 4189-4193. A metal plate, wooden cap, or piece of upholstery with which the top of a seat end, arm rest or chair arm is covered. Those for chair arms, however, are also called **Chair Arm Plates,** which see. An **Arm Rest,** which see, is fixed to the side of the car.

Arm Holder (British). See **Arm Sling.**

Arm Pivot. See **Seat Arm Pivot.**

Arm Plate. See **Seat Arm Plate.**

Arm Rest. A wooden or metal bar or ledge attached to the side of a car, and not, like an arm cap, to the top of a seat end, for passengers to rest their arms on.

Arm Rest Bracket. See **Arm Rest.** A bracket supporting the arm rest.

Arm Sling (British). In a carriage, a padded ornamental leather strap, looped and secured to the doorway pillar. Also called arm holder or arm strap.

Armature. 60, Figs. 1221-1224; Fig. 5817; 4, Figs. 5818-5850, etc. The rotating part of a motor or dynamo. It consists of a laminated iron cylinder or core keyed to a shaft, and in slots of which are wound the armature coils of insulated copper wire or ribbon. At one end of the core on the shaft is mounted the commutator, a copper cylinder composed of insulated segments, which are connected to corresponding armature coils.

Armored Brake Hose. Brake hose covered with a woven wire fabric, to protect it from injury or abrasion. Another form of armored brake hose is formed by winding a continuous wire spirally around it by a machine which makes the spiral slightly smaller than the tube, so that it grips tightly. Vacuum brake hose, for vacuum brakes, is usually lined with coiled wires on the inside to prevent collapsing, but such is not properly termed armored brake hose. M. C. B. standard brake hose is not armored.

Arms Horse Car. Figs. 114-117. A car built especially for the transportation of valuable horses and fitted with removable partitions forming stalls.

Asbestos Headlining. Fig. 3801. See **Asbestos Protected Metal.**

Asbestos Felt. A preparation of asbestos in loose sheets similar to felt, for use as a non-conductor. It is largely used in refrigerator cars. It is manufactured for that purpose in rolls about 42 in. wide, and weighs about 1 lb. per square yard. It must be handled with care to prevent tearing.

Asbestos Pipe Covering. Fig. 3013.

Asbestos Protected Metal. Fig. 3801. A material for use as roofing, side walls, partitions and ceilings in buildings; also for inside box car roofs, passenger car and locomotive cab roofs, head linings and interior finish for passenger cars. Its composition is as follows: A sheet of steel rolled true to gage and sheared to exact size, which gives structural strength and rigidity against torsional and direct load strains and prevents the asbestos surface of the finished material from being torn or stretched. A coating of special asphaltum compound, containing heavy natural oils, which is rendered permanent and practically non-inflammable. By a special process of manufacture this coating is applied to the steel core of the material at a temperature of 600 deg. F. It is impervious to the attack of moisture and acid gases of all kinds and hermetically seals the steel core, giving it absolute protection from the corroding attack of the various destructive agents to which an exposed material is subjected. A layer of pure asbestos felt made especially for use in the manufacture of asbestos protected metal applied on both sides of the sheet under great pres-

sure and firmly imbedded in the asphaltum compound. This asbestos coating will not rot or disintegrate, and presents an unbroken pure mineral surface, which is absolutely fireproof. It is manufactured in three colors—white, gray and terra-cotta, or in any combination of these three.

Asbestos Wick (Pintsch Lamp). 299, Figs. 3208-3224.

Ascending Rail (British). Nearest American equivalent, grab iron or hand rail. The end ascending rail is a long wrought iron bar secured at the ends of a covered vehicle, serving as a hand rail for ascending to the roof. The roof ascending rail, or roof commode handle, is a similar hand rail at the end of the roof of a covered vehicle.

Ascending Step (British). Nearest American equivalent, ladder round. A rough wrought iron plate secured to the ends of a covered vehicle serving as a step to ascend to the roof. They are used in Great Britain on both passenger and freight cars.

Ash Pan (Baker Heater). Fig. 2176.

Ash Pit. Figs. 2685-2701. The lower portion of every stove, under the grate, into which the ashes fall. Under it is sometimes placed an ashbox, Fig. 2681. The ash pit is made up of a casting usually called the ash pit base, and closed by an ash pit front carrying one, or more commonly two ash pit doors. An ash pit ring serves as a hopper to guide the coal and ashes on to the grate. The doors are distinguished as right and left; as for a person standing facing the stove. The ash pit doors are sometimes carried as in Fig. 2680, in an ash pit frame instead of an ash pit front.

Ash Pit (Baker Heater). Fig. 2685.

Ash Pit Door (Baker Heater). Figs. 2703-2719.

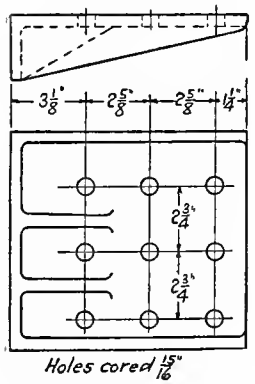
Asphalt Car Roofing. A saturated and coated felt applied in sheets.

Atmospheric Brake. See **Air Brake, Vacuum Brake.** This term, but little used, includes both the air brake and the vacuum brake.

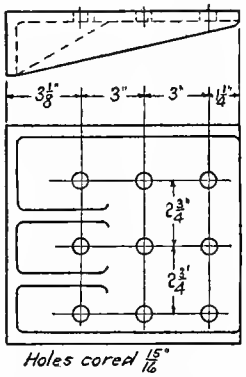
Attachment of Couplers to Cars. Fig. 7. In 1907 the following details were advanced from recommended practice to standard.

Spacing between center sills.—That the spacing between steel center sills be 12⅞ inches.

Front and back stops.—That front and back stops with riveted holes 15/16 inch in diameter be spaced as shown below.



Drawing A.



Drawing B.

Spacing between coupler horn and buffer beam.—That the spacing between coupler horn and buffer beam be 1¾ inches for all spring gear and 2¾ inches for all friction gear

Followers.—That flat followers be made of wrought iron or open hearth steel 1⅝ inches thick for tandem spring gear and 2¼ inches thick for twin spring and friction gear.

Side clearance of coupler.—That the total side clearance of the coupler be not less than 2½ inches.

In 1907 the back wall of butt was changed to ¾ inch thick, owing to the fact that the tail pin had fallen into disuse and there was no necessity for so much metal there.

The width of shank was changed to 5 inches on both sizes of coupler shanks to properly provide for securing yokes.

A dimension of not less than 1¼ inches was shown forward of the 9⅛-inch butt to provide for the increased length of gib. A limiting dimension of not more than 1 inch was shown for the diameter of core hole in lug of knuckle to prevent a recurrence of the slotted knuckle weakness. A note was added to the effect that there should be no projections on the bottom of the shank from the line of the horn back for 12 inches to provide for proper movement of shank on carrier iron.

In 1908 the use of 1¼-inch rivets for attaching yokes to coupler butts was advanced from Recommended Practice to Standard.

In 1908 the diameter of rivet holes in coupler butts was changed from 1 3/16 inches to 1 5/16 inches.

In 1908 the following notes were added:

That all new types of couplers put on the market after January 1, 1909, have a dimension of 9¼ inches from back of coupler horn to inside face of knuckle, and that the face or front wall of coupler have a minimum thickness of 1¼ inches.

That the total lift of locking pin be not more than 6 inches.

That all couplers must have an eyelet for locking device located immediately above locking pin hole.

Automatic Air Brake. One which is automatically applied by a rupture in the hose couplings or brake pipe or by train separation. The term is indefinite, but usually refers to the **Westinghouse Air Brake,** Figs. 1101-1188, which see, which is the one in most general use throughout the world.

Automatic Car Coupler. Figs. 1583-1847. A device for automatically coupling cars by impact without the necessity of a person going in between the cars. The Master Car Builders' standard type of coupler which is in universal use in the United States is any coupler of the so-called vertical plane type which conforms to certain contour lines adopted by the M. C. B. Association. This type of coupler is shown in Figs. 5579-5597. The standard contour lines are shown in Fig. 5579.

This form of automatic coupler was adopted as standard in 1887. Further details were adopted in 1889 and 1893. An action of the Association in 1889 permits the use of a coupler 28 inches long instead of 30 inches as shown, for use only on cars already in service and requiring such length coupler. In 1889 the Association decided that the opening in the carrier iron, where coupler enters, should be 5¾ inches vertically and 5½ inches horizontally.

Drawing revised in 1896.

In 1903 the solid knuckle was adopted as a standard of the Association to be used for all repairs and in all new couplers after January 1, 1904.

In 1903 a recommendation was made that for new equipment purchased after January 1, 1904, only such couplers as have a lock set on or within the head and which do not depend upon the uncoupling lever to hold up the lock should be specified. By letter ballot this was adopted as a standard.

The revision made in 1896 consisted in the elimination of the carrier iron from the Recommended Practice.

In 1899 the play of the shank of the coupler in the carry arm was changed to not less than ½ inch on each side.

In 1899 the vertical dimension of the knuckle was fixed at 9 inches as a minimum.

In 1899 the vertical dimension of the end of guard arm was fixed at 7½ inches as a minimum.

In 1899 the recommendation of the Coupler Committee that the horizontal plane containing the axis of the shank of the coupler bisect the vertical dimensions of the knuckle and end of guard arm, was adopted as a standard of the Association.

In 1899 the vertical height of the stop shoulder, or horn of coupler, was fixed at not less than 3½ inches.

In 1899 the recommendation of the Coupler Committee that the horn of the coupler be arranged to touch the striking plate before the back of the head of the coupler strikes the ends of the draft timbers, was adopted as a standard of the Association.

In 1899 the sizes of pivot pins were fixed as follows:

1½ inches or 1⅝ inches in diameter and 13½ inches from the under side of head to center of pin hole for ⅝-inch cotter.

In 1901 a design of shank 5 by 7 inches back of the head was submitted, and, upon reference to letter ballot, was adopted as standard.

In 1904, as a result of the letter ballot, the note relating to pivot pins, was changed to read as follows:

"Pivot pin must be of steel, 1⅝ inches in diameter, of sufficient length to permit applying a ⅝-inch cotter pin below the coupling lug."

In 1905 an additional dimension "not less than 20¾ inches" was added to plan view of 5 by 7-inch coupler, Figs. 5579-5597, to definitely locate the point at which shank shall measure 7 inches. Also the note, "Tail End for Continuous Draft," under the drawing of slotted tail coupler was omitted as being unsuited for present approved practice.

In 1907 a butt 5 x 5½ x 9⅛ inches for friction draft gear was adopted as standard.

Standard contour line was announced by Executive Committee under instructions from the Association April 8, 1888. Limit gages for preserving standard contour line were adopted in 1891.

These gages, properly proven by master gages. may be procured from Pratt & Whitney Company, of Hartford, Connecticut. A duplicate set of master gages is held in the office of the Secretary for reference when desired.

In 1899 the contour line showing the length of the guard arm was extended about one inch.

In 1899 the M. C. B. standard limit gage for new couplers was changed by moving the screw to a new position.

In 1902 the contour gage was strengthened by the use of a solid web in the weak part of the frame, and part of the outside flange increased to ¼ inch in thickness. The handhold was also reduced in size to give greater strength.

In 1903 the contour line of the M. C. B. coupler was changed as now shown in Fig. 5579.

In 1904 the coupler and knuckle limit gages were changed to conform to the contour lines adopted in 1903 and to have raised figures "1904" cast on them.

Other types of couplers are shown as follows:

Buckeye, Figs. 1739-1742.
Chicago, Figs. 1757-1765.
Climax, Figs. 1630-1638.
Gould, Figs. 1593, 1828-1829.
Janney, Figs. 1608-1615 1715-1720, 1812-1819.
Janney, R. E., Figs. 1583-1588.
Kelso, Figs. 1706-1714.
Latrobe, Figs. 1648-1657.
Major, Figs. 1743-1756.
Melrose, Figs. 1766-1775.
National, Figs. 1594-1598. 1830-1847.
Pitt, Figs. 1721-1729.
Sharon, Figs. 1616-1629, 1798-1809.
Simplex, Figs. 1589-1592.
Standard, Figs. 1599-1607.
Tower, Figs. 1639-1647.
Trojan, Figs. 1777-1793.
Washburn, Figs. 1730-1738, 1810-1811.

Automatic Car Couplers, Specifications for (M. C. B. Standard).

In 1899 specifications and tests for M. C. B. automatic couplers were adopted as Recommended Practice. In 1903 they were revised. In 1905 they were revised and adopted as standard. For drop testing machine and details, see Figs. 6024-6027.

The couplers furnished under this specification must be made of steel in accordance with the best foundry methods and must not be painted.

1. Couplers will be subject to the inspection and test of the above named company as to their mechanical workings, general condition and strength. The test and inspection will be made at the place of manufacture, where assistance and labor necessary to make satisfactory and prompt inspection and shipment must be furnished free by the manufacturer. The testing machine and gages approved by the M. C. B. Association must be used in the test and inspection of couplers.

2. Couplers will be ordered as far as practicable in lots of one thousand; for each one thousand ordered the manufacturer shall furnish 1,104 and in the event of additional couplers being required to carry out the prescribed tests, they shall be furnished free of cost by the manufacturers.

3. Bars, knuckles and locking pins or blocks must be accurately made to gages furnished by the manufacturer. These gages must govern all dimensions representing fitting surfaces, thereby insuring absolute interchangeability and freedom of motion between the assembled parts without further adjustment or machining. When assembled, knuckles and locking pins or blocks must work freely, but the lost motion between knuckles and bars must not permit more than ⅛ inch vertical play, or between knuckles and locks must not permit the knuckle to drop forward beyond the proper contour line, but ¼ or ⅜ of an inch lost motion in opposite direction is desirable.

4. Couplers must conform to M. C. B. standard drawings and contour lines and must have a lock set within the head of the coupler. They must couple and uncouple with each other (with either or both knuckles open) and also with the master or sample coupler; they should lock easily when the knuckle is pushed in by hand. They must have steel pivot pins 1⅝ inches in diameter of sufficient length to permit applying a ⅝-inch cotter pin through the pin below the coupler lug. Pivot pins, after having the heads struck up, must be properly annealed.

5. Bars and knuckles shall not be accepted if distorted by improperly matched flasks or any other defects due to molding. They must be free from injurious shrinkage, cracks, flaws, checks, sand, sand holes or blow holes. The holes for pivot pins in lugs of bars and knuckles should be drilled or, if cored,

must be broached out, and must not be more than $\frac{1}{16}$ inch larger than pin. The holes must be parallel to the face of the bar or knuckle and at right angles to the axis of bar or knuckle. As many bars and knuckles as possible must be cast from the same heat of steel. All parts must be well annealed throughout.

6. The pulling and contact faces of coupler and knuckle must be clean, smooth and at right angles to axis of the bar. The dimensions of butt and shank must be within the limits of variation shown by the company's drawing.

7. The name of coupler must be legibly cast on the top side of head of the bar. Each knuckle and each drawbar must bear a serial number legibly stamped or cast upon it. The knuckle must also bear the name of the coupler and the manufacturer's name or identification mark legibly cast or stamped at some point where it will not be worn off.

1, hereafter specified. If the coupler fails to stand the prescribed tests but, before failing, stands a sufficient number of blows to make a retest admissible, a second coupler shall be taken from the same lot from which the first coupler was taken. If it stands the test, that lot of couplers shall be accepted as far as test No. 1 is concerned; otherwise that lot of couplers shall be rejected and another lot substituted and tested in the same way.

2. From each 1,004 couplers accepted by test No. 1 four complete couplers shall be selected by the inspector, one of which shall be subject to test No. 2, one to test No. 3 and two to test No. 4, hereafter specified. If any coupler or pair of couplers fails to stand the prescribed test but, before failing, stands a sufficient number of blows to make a retest admissible, a second coupler or pair shall be taken from the same lot or lots from which the first were taken. For in-

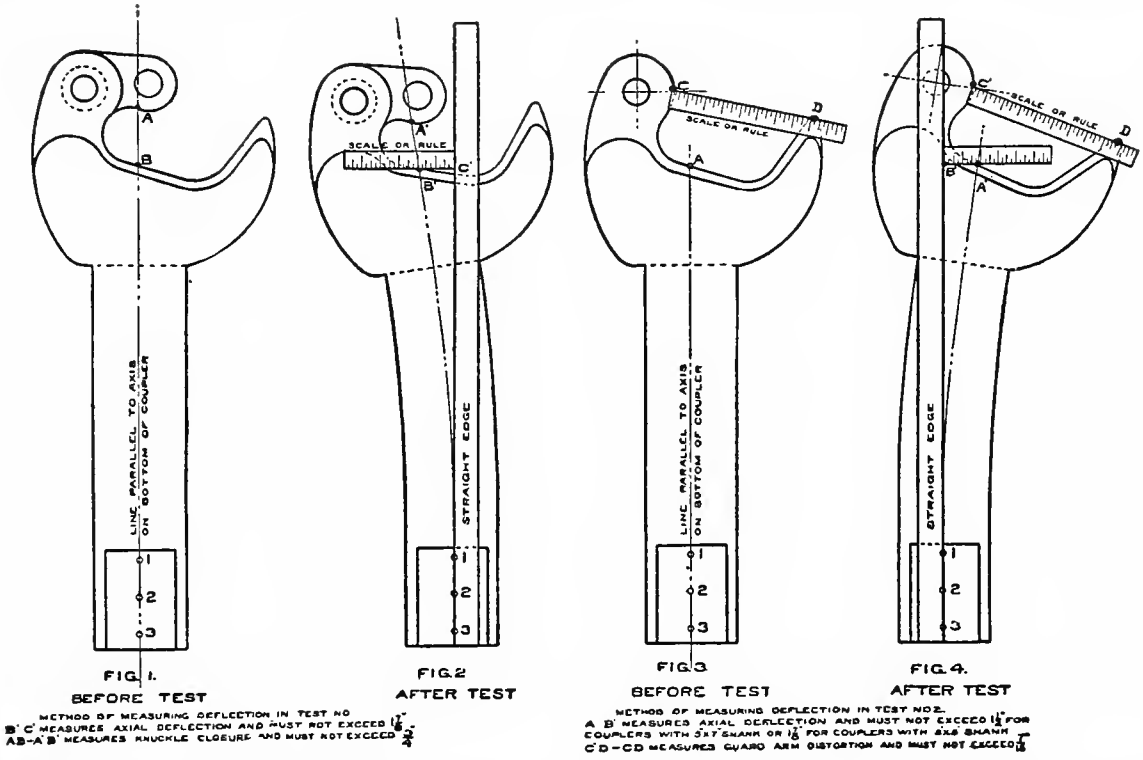


FIG. 1. BEFORE TEST — FIG. 2 AFTER TEST

METHOD OF MEASURING DEFLECTION IN TEST NO 1
B'C' MEASURES AXIAL DEFLECTION AND MUST NOT EXCEED $\frac{1}{8}$"
AB-A'B' MEASURES KNUCKLE CLOSURE AND MUST NOT EXCEED $\frac{3}{4}$"

FIG. 3 BEFORE TEST — FIG. 4. AFTER TEST

METHOD OF MEASURING DEFLECTION IN TEST NO 2.
A B' MEASURES AXIAL DEFLECTION AND MUST NOT EXCEED $1\frac{1}{2}$" FOR COUPLERS WITH 5X7 SHANK OR $1\frac{3}{8}$" FOR COUPLERS WITH 6X8 SHANK
C'D-CD MEASURES GUARD ARM DISTORTION AND MUST NOT EXCEED $\frac{1}{16}$"

8. Every coupler complying with the above requirements must have legibly cast in raised letters on the head, and in plain view where they will not be worn off, the letters "M. C. B."; this mark to be evidence that the coupler is an M. C. B. standard.

INSPECTION.

1. The couplers, after having been thoroughly inspected by the manufacturer to see that they meet the requirements as to interchangeability, soundness and dimensions of parts, etc., herein specified, should be arranged in lots of 101 and 102, so as to provide for the necessary 1,014 couplers and, where possible, care should be taken to put all couplers of the same heat number or numbers in the same lot or lots. The inspector shall then inspect and gage each coupler as to its compliance with drawing sizes, and for surface defects and proper contour lines. Any irregularities or swollen parts on the working or bearing faces must be ground or chipped off before the couplers are accepted.

After this inspection the inspector shall select one complete coupler taken at random from each of the lots as provided for above and subject them to test No.

stance, if the couplers selected for the test No. 3 have been taken from the fourth one hundred couplers and the failure allows a retest, a second pair shall be taken from the fourth one hundred couplers. If they stand the test, that lot of one thousand couplers shall be accepted as far as that test is concerned; otherwise that lot shall be rejected and another lot of one thousand couplers substituted. Any part of any coupler which has been subjected to tests is condemned for service.

PHYSICAL TESTS.

Test No. 1.—Striking Test on Closed Knuckle of Complete Coupler.—As a preliminary the coupler must be marked on bottom of butt with a center-punched line parallel to axis of shank, this line to extend to the inner face of knuckle (see Fig. 1); the coupler must then be rigidly fixed in the machine in a vertical position, with the axis of coupler in the center line of drop, the pivot pinhole parallel to line through center of legs of the machine and the butt blocked solidly on the anvil to prevent lateral motion by means of steel fillers and wedges, the latter sledged down tight and this sledging repeated after each blow. The heights of

support from bottom of butt end should not be greater than 19½ inches.

Blows to be struck directly on knuckle.

Three blows of 1,640 pounds falling five (5) feet.

Three blows of 1,640 pounds falling ten (10) feet.

The coupler shall be considered as having failed to stand this test if it is broken before it has received three blows at 5 feet and three blows at 10 feet, or if any cracks appear more than one inch long or open more than 1-16 inch, or the center-punched line measured at contour is distorted more than 1⅞ inches after having received three blows at 10 feet, or if the knuckle is closed more than ¾ of an inch from its original position when pulled out against the lock by hand after receiving three blows at 5 feet, or if the knuckle will not open, or if the locking device is inoperative after test. For measuring axial distortion and knuckle closure, see Figs. 1 and 2. Should the coupler before failing stand three blows at 5 feet and one blow at 10 feet, another complete coupler should be provided and tested as per Section 8 governing retest.

Test No. 2.—Guard Arm Test of Drawbar.—As a preliminary, pivot, knuckle and locking device having been removed, the coupler must be marked on bottom with a center-punched line (see points 1, 2 and 3 in Figs. 3 and 4) parallel to axis of shank and extending to the contour face; a center-punch mark must also be placed at the end of guard arm and on lug (see Fig. 3). The coupler must be blocked rigidly in a vertical position in the machine with steel fillers and wedges, the latter sledged down tight and the sledging repeated after each blow. The butt must rest solidly on the anvil and must be blocked to prevent lateral motion. The edge of guard arm must be on line through centers of legs of machine.

Blows to be struck directly on guard arm.

Three blows of 1,640 pounds falling three (3) feet.

Four blows of 1,640 pounds falling five (5) feet.

The coupler shall be considered as having failed to stand this test if it is broken before it has received three blows at 3 feet and four blows at 5 feet, or if any crack appears more than one inch long or open more than 1-16 inch, or if the center-punched line is distorted more than 1½ inches for 5 in. by 7 in. shank or 1⅞ inches for 5 in. by 5 in. shank couplers, or if the distance between center-punch marks on bottom of head has widened more than 7-16 inch. For method of measuring axial and guard arm deflection, see Figs. 3 and 4. Should the bar before failing stand three blows at 3 feet and two blows at 5 feet, another coupler shall be provided and tested as per Section 8 governing retest.

Test No. 3.—Jerk Test of Complete Couplers.—One coupler shall be placed in an inverted position in the yoke forging of test machine and equalizer bar placed so as to rest level, one end in the closed knuckle, the other resting central on the spring follower cap. The weight must strike the equalizer bar midway between the center line of coupler and the center line of the spring follower cap.

Three blows of 1,640 pounds falling five (5) feet.

Three blows of 1,640 pounds falling ten (10) feet.

A coupler shall be considered as having failed to stand this test if it is broken before it has received three blows at 5 feet and three blows at 10 feet, or if cracks appear more than one inch long or open more than 1-16 inch, or if the knuckle is open more than ¾ inch from its original position after third blow at 10 feet, or if the equalizer bar will not stay in place when struck, or if the knuckle will not open, or if the locking device is inoperative after receiving the full test. Should the coupler fail to stand the prescribed test, but stand three blows at 5 feet and one blow at 10 feet, another complete coupler shall be provided and tested as per Section 8 governing retest.

Test No. 4.—Pulling Test for Complete Couplers.—Two couplers shall be supported in the machine by yoke forgings and locked together as in running position, with their axis in the same straight line. The couplers must stand a steady pull of 120,000 pounds. A coupler shall be considered as having failed to stand this test if it is broken before it has been pulled the prescribed number of pounds, or if any cracks appear more than one inch long or open more than 1-16 inch, or if the knuckle has opened more than ¾ inch from its original position when pulled out against the lock. The measurement of knuckle opening must be obtained after the pressure is released. The couplers shall be considered as having failed to stand this test is they slip apart in the machine, or if the knuckle will not open, or if the locking devices are inoperative after above tests. Should either or both couplers fail to stand the prescribed test, but both stand 90,000 pounds, another complete coupler or pair of couplers shall be provided as per Section 8 governing retest.

10. The final failure of any part to meet test shall not condemn the complete coupler, but only that part which fails, and such part in all couplers presented shall be replaced, after which the test shall be proceeded with, using new couplers, as if no part of the test had been made.

SPECIFICATIONS FOR SEPARATE KNUCKLES.

In 1904, specifications were adopted for separate knuckles, as follows:

The knuckles furnished under this specification must be made of steel in accordance with the best foundry methods and must not be painted.

1. Knuckles will be subject to the inspection and test of the above named company as to their general condition and strength. The tests and inspection will be made at the place of manufacture, where assistance and labor necessary to make satisfactory and prompt inspection and shipment must be furnished free by the manufacturer. The testing machine and gages approved by the M. C. B. Association must be used in the test and inspection of knuckles.

2. Knuckles will be ordered as far as practicable in lots of 100; for each 100 ordered the manufacturer shall furnish 102, and in the event of additional knuckles being required to carry out the prescribed tests, they shall be furnished free of cost by the manufacturers.

3. Knuckles must be accurately made to gages furnished by the manufacturer. These gages must govern all dimensions representing fitting surfaces, thereby insuring absolute interchangeability without machining.

4. Knuckles will not be accepted if distorted by improperly matched flasks or any other defects due to molding. They must be free from injurious shrinkage cracks, flaws, checks, sand, sand holes or blow holes. The holes for pivot pins in knuckles should be drilled or, if cored, must be broached out, and must not be more than 1/16 inch larger than 1¾-inch diameter pivot pin. The holes must be parallel to the face of the knuckle, and at right angles to the axis of knuckle. As many knuckles as possible must be cast from the same heat of steel. All parts must be well annealed throughout.

5. The pulling and contact faces of knuckle must be clean and smooth.

6. Each knuckle must bear a serial number and the manufacturer's name or identification mark legibly cast or stamped at some point where it will not be worn off.

INSPECTION.

7. The knuckles, after having been thoroughly inspected by the manufacturer to see that they meet the requirements as to interchangeability, soundness and dimensions of parts, etc., herein specified, should be arranged in lots of 102, and where possible, care should be taken to put all knuckles of the same heat number or numbers in the same lot or lots. The inspector shall then inspect and gage each knuckle as to its compliance with drawing sizes, and for surface defects and proper contour lines. Any irregularities or swollen parts on the working or bearing faces must be ground or chipped off before the knuckles are accepted.

After this inspection the inspector shall select two knuckles taken at random from the lot or lots as provided for above, and subject one of them to Test No. 1 and the other to Test No. 2, hereafter specified. If one of these knuckles fails to stand prescribed Test No. 1, but before failing, stands a sufficient number of blows to make retest admissible, another knuckle shall be taken from the same lot from which the first knuckles were taken. If it stands the test, that lot of knuckles shall be accepted as far as Test No. 1 is concerned; otherwise that lot of knuckles shall be rejected and another lot substituted and tested in the same way.

The other knuckle selected by the inspector shall be subjected to Test No. 2. If this knuckle fails to stand prescribed Test No. 2, hereafter specified, but before failing, stands a sufficient number of blows to make a retest admissible, another knuckle shall be taken from the same lot from which the first knuckles were taken. If it stands the test, that lot of knuckles shall be accepted; otherwise that lot of knuckles shall be rejected and another lot substituted and tested in the same way.

PHYSICAL TEST.

Test No. 1.—Striking Test.—The striking test back block and knuckle supports are placed in the housing against the back and sides, the knuckle dropped in between the supports and held by inserting the pin through the holes in the knuckle supports. The knuckle is then adjusted by means of liners between the back block and the knuckle supports, and between the knuckle supports and the housing. The striking block is then placed in the housing casting resting upon the knuckle. A fitting piece made to suit the type of knuckle is slipped in position between the tail and housing casting so that the striking face of the knuckle is in a horizontal position.

Blows to be struck on striking block through which they are transmitted to knuckle.

Three blows of 1,640 pounds falling four (4) feet.

Three blows of 1,640 pounds falling eight (8) feet.

The knuckle shall be considered as having failed to stand this test if it is broken before it has received three blows at 4 feet and three blows at 8 feet, or if any cracks appear more than 1 inch long or open more than $\frac{1}{16}$ inch. Should the knuckle before failing stand three blows at 4 feet and one blow at 8 feet, another knuckle shall be provided and tested as per Section 7 governing retest.

Test No. 2.—Jerk Test.—The jerk test back block and knuckle supports are placed in the housing against the back and sides, the knuckle dropped in between the supports and held by inserting the pin through the hole in the knuckle supports. The knuckle is then adjusted by means of liners between the back block and the knuckle supports, and between the knuckle supports and the housing. The striking block is then inserted resting on the inner face of the knuckle, and a block of suitable size inserted between the tail of the knuckle and striking block, so that the striking face of the knuckle is in a horizontal position.

Blows to be struck on the striking block through which they are transmitted to the knuckle.

Three blows of 1,640 pounds falling three (3) feet.

Two blows of 1,640 pounds falling six (6) feet.

The knuckle shall be considered as having failed to stand this test if it is broken before it has received three blows at 3 feet and two blows at 6 feet, or if any cracks appear more than 1 inch long or open more than $\frac{1}{16}$ inch. Should the knuckle before failing stand three blows at 3 feet, another knuckle shall be provided and tested as per Section 7 governing retest.

Automatic Coupling (Steam and Air Pipes). Figs. 1199-1204, 6410-6414. A device by means of which the steam, air brake and signal pipes are automatically coupled by impact. It is usually supported by a hanger from the coupler, and springs back of the head keep the parts tight together. Allowance is made for vertical and lateral movement, and arrangement provided for interchange with cars not equipped with the device.

Automatic Deck Sash Ventilator. Figs. 4438-4441.

Automatic Lubricator. A device for feeding at regular intervals a certain quantity of oil or lubricant to a cylinder or some mechanism requiring lubrication. See **Lubricator.**

Automatic Reducing Valve (High Speed Brakes). Figs. 1143-1147. A valve attached to the brake cylinder to automatically bleed the pressure down to 60 lbs. after an emergency application, when the pressure in the cylinder rises to 85 lbs. or more. The triangular port gives a graduated reduction. It also prevents the brake cylinder pressure from exceeding 60 lbs. pressure in a service application. The triangular port then gives a wide opening.

Automatic Slack Adjuster. Figs. 1173-1182, 1187-1192. See **Slack Adjuster.**

Automatic Switch (Electric Car Lighting). A device connected to the armature of the dynamo, by which the current is automatically turned onto the lights and batteries when the armature has reached a predetermined speed of rotation and consequent voltage output.

Automatic Tee Trap. Figs. 2849-2850.

Automatic Vapor Regulating Valve. Figs. 2844-2845.

Automatic Ventilator. Figs. 4418-4433. A ventilator which is self-adjusting, so as to exhaust air from a car if the train runs in either direction. A great variety of such devices exists, not all shown. See **Ventilator.**

Automatic Window Catch. A device to hold a window sash from being shoved up or down. See **Sash Lock.**

Automobile Car. A special baggage car having wide side doors and an end door extending almost the entire width of the car, used for carrying automobiles on passenger trains.

Auxiliary Arch Bar. A wrought iron bar sometimes used, which forms the lower member of a diamond truck side frame. See **Arch Bar.**

Auxiliary Belt Rail. 65a, Figs. 645-647. A thin strip of wood nailed on top of the **Belt Rail,** which see.

Auxiliary Brake Equalizing Lever (Six-Wheel Truck). A short lever to which the brake lever connecting rod is fastened, and which divides the power equally between the center pair of wheels and the outside pair of wheels.

Auxiliary Buffer Spring. A spring placed back of a draft spring to give greater resistance to compres-

sion on the drawbar in buffing. In this manner two springs operate in buffing, and only one in tension. Seldom used.

Auxiliary Compression Beam Brace. 165b, Figs. 577-581; 164b, Figs. 599-619. The same as a **Center Compression Beam Brace,** which see.

Auxiliary Reservoir (Westinghouse Automatic Air Brake). Figs. 1260-1276, 1292. A cylindrical reservoir made of steel tubing, attached to the under side of a car or tender by auxiliary reservoir bands attached through auxiliary reservoir beams. In freight cars, auxiliary reservoir beams are termed brake cylinder blocks and end blocks. The reservoir serves to hold a supply of compressed air to operate the brakes of each car, and is supplied from the main reservoir on the engine through the brake pipe. For freight train service the auxiliary reservoir, triple valve and brake cylinder are combined in one piece, Fig. 1275.

Auxiliary Reservoir Bands (Air Brake). Figs. 910-912. See above.

Auxiliary Reservoir Beams (Air Brake). Short wooden timbers bolted to the under side of the sills. In freight cars called brake cylinder blocks. See above.

Auxiliary Reservoir Bleeding Cock. Fig. 1284. See **Reservoir Drain Cock.**

Auxiliary Reservoir Hanger. Figs. 986-987. An **Auxiliary Reservoir Band,** which see.

Avery System of Acetylene Lighting. Figs. 3357-3364. A system of acetylene gas lighting employing a gas generator mounted under the car in distinction from the Adlake System which employs a generator mounted in the car. The carbide is put in a cartridge which is put in or removed from the generator, as shown in Figs. 3358-3359.

Axle. 2, Figs. 4771, 6207. A shaft made of wrought iron or steel, to which a pair of wheels is attached by pressing on in a hydraulic wheel press. They are distinguished according to use, as passenger car, freight car, hand car, street car axle, etc., and according to mode of manufacture, as hammered, fagoted, muck bar axles, etc. See also **Car Axle.** The M. C. B. standard axles are shown in Figs. 5510-5513.

Axle (M. C. B. Standard). In 1899 it was decided that the standard axles should be known by letters.

In 1901 a designation was given the standard axles, whereby each shall be known to carry a definite weight instead of for cars of particular capacity. See Figs. 5510-5513.

Axle.—A. With journals 3¾ by 7 inches. Designed to carry 15,000 pounds. This axle is the standard of the Association for cars of 40,000 pounds capacity.

In 1873 a standard for car axles was recommended, the form and dimensions of which, excepting the diameter in the middle, were substantially the same as shown in this sheet. In 1884 the diameter at the middle was increased from 3⅞ inches to 4¼ inches, by letter ballot.

In 1901 the diameter of wheel seat was changed from 4⅞ to 5⅛ inches.

In 1901 a notation was added to the drawing of this axle showing a straight taper between certain points on the axle, also a diagram showing location of the borings to be taken from steel axles for analysis. See Figs. 5767-5768.

In 1902 further changes were made in the diameter of the tapered portion where it joins the fillet next to the rough collar; also in the diameter of the rough collar.

In 1907 the radius between the wheel seat and the rough collar on the inside of the hub of the wheel was changed to ¾ inch, with the center from which the radius is struck coincident with the inside face of the hub of the wheel.

The radius between the dust guard and wheel seat was changed to ¼ inch.

Axle.—B. With Journals 4¼ by 8 inches. Designed to carry 22,000 pounds. This axle was adopted as a standard of the Association for cars of 60,000 pounds capacity, by letter ballot, in 1889.

In 1901 the diameter of wheel seat was changed from 5⅜ inches to 5¾ inches.

In 1901 a notation was added to the drawing of this axle, showing a straight taper between certain points on the axle, also a diagram showing location of borings to be taken from steel axles for analysis. See Figs. 5767-5768.

In 1901 the diameter of the middle was increased from 4⅝ inches to 4¾ inches.

In 1902 changes were made in the diameter of the tapered portion of the axle where it joins the fillet next to collar.

In 1907 the radius between the wheel seat and the rough collar on the inside of the hub of the wheel was changed to ¾ inch, with the center from which the radius is struck coincident with the inside face of the hub of the wheel.

The radius between the dust guard and wheel seat was changed to ¼ inch.

Axle.—C. With Journals, 5 by 9 inches. Designed to carry 38,000 pounds. This axle was adopted as a standard of the Association in 1899. made a standard of the Association in 1898.

In 1901 the diameter of wheel seat was changed from 6⅜ inches to 6½ inches.

In 1901 a notation was added to the drawing of this axle, showing a straight taper between certain points on the axle, also a diagram showing the location of borings to be taken from steel axles for analysis. See Figs. 5767-5768.

In 1902 changes were made in the diameter of the tapered portion of the axle where it joins the fillet next to collar; also in the diameter of the rough collar.

In 1907 the radius between the wheel seat and the rough collar on the inside of the hub of the wheel was changed to ¾ inch, with the center from which the radius is struck coincident with the inside face of the hub of the wheel.

The radius between the dust guard and wheel seat was changed to ¼ inch.

Axle.—D. With Journals, 5½ by 10 inches. Designed to carry 38,000 pounds. This axle was adopted as a standard of the Association in 1899.

In 1901 the diameter of wheel seat was changed from 6⅞ inches to 7 inches.

In 1901 a notation was added to the drawing of this axle showing a straight taper between certain points on the axle, also a diagram showing the location of borings to be taken from steel axles for analysis. See Figs. 5767-5768.

In 1902 changes were made in the diameter of the tapered portion of the axle where it joins the fillet next to collar; also in the diameter of the rough collar.

In 1906 a ¾ inch radius was adopted between the

wheel fit and the rough collar adjoining the inside hub of the wheel; also the radius between the dust guard and wheel fit was increased to ¼ inch.

In 1907 the center from which the radius of ¾ inch is struck was made coincident with the inside face of the hub of the wheel.

Axles (M. C. B. Recommended Practice for Specifications for Iron and Steel Axles). Specifications for Iron Axles.

In 1899 the following specifications, including tests for iron axles, were adopted as Recommended Practice:

Car axles for the use of this company will be ordered subject to the following conditions:

1. All axles must conform in shape and size to the dimensions shown on the blue print, which will be furnished by the.....R. R.

2. All axles must be cut off and faced to exact lengths, and be centered with 60 degree centers in the manner indicated in blue prints, so as to prevent lathe centers from bottoming. Axles must be made of double-work fagoted scrap, 16 per cent. of new bar iron worked into the center of the axles being allowed if desired. Axles must be well hammered and free from any clearly defined open seams. They must finish in the lathe with journals free from flaws in the shape of holes, pieces shelled out, or open seams large enough so that with a knife blade scale or dirt can be removed from such seams, or open seams showing a clear opening of 1/32 inch or over, and being more than 1 inch long. The maker's name or initials must be stamped plainly on each axle.

3. All axles are to be inspected and tested at the works where they are made. The ..... shall be notified when they are ready for inspection. Under no circumstances shall car axles be shipped from the works where they are made until they have been tested, inspected and accepted by a proper representative of the company.

4. For each one hundred axles or fraction thereof ordered one additional axle must be furnished for test. This axle will be selected at random from the pile and subjected to the prescribed drop test for iron axles of its class. If it stands the test, the one hundred axles, or fractional part thereof that it represents, will be inspected, and only those accepted that are made in a workmanlike manner and are free from defects mentioned in these specifications. All axles received are subject to rejection if they do not finish in the lathe in accordance with the requirements herein given. The manufacturer must furnish, free of charge, the axles that are to be tested, the testing apparatus and the assistance necessary to enable the inspector to make a satisfactory inspection and test. Axles will not be accepted if the diameters fall below the dimensions for forged sizes given in the blue prints, or if exceeding those dimensions by more than ⅛ inch. Car axles in the rough must not have less than the prescribed minimum weight, nor more than the prescribed maximum weight for axles of their class.

Axle Drop Test:

5. All axles will be tested physically by drop test. The testing machine must conform in its essential parts to the drawings adopted by the Master Car Builders' Association. These essential parts are: The points of supports on which the axle rests during tests must be three (3) feet apart from center to center; the tup must weigh 1,640 pounds; the anvil, which is supported on springs, must weigh 17,500 pounds; it must be free to move in a vertical direction; the springs upon which it rests must be twelve in number, of the kind described on drawing, and the radius of the supports and of the striking face on the tup in the direction of the axis of the axle must be five (5) inches. When an axle is tested it must be so placed in the machine that the tup will strike it midway between the ends, and it must be turned over after the first and third blows, and when required, after the fifth blow. After the first blow the deflection of the axle under test will be measured in the manner specified below.

6. It is desired that the axles when tested as specified above shall stand the number of blows at the heights specified in the following table without rupture, and without exceeding, as the result of the first blow, the deflections given:

Axle—	No. Blows.	Height of Drop.	Deflection.
M. C. B. 4¼ by 8 inch journals	5	21½ ft.	7⅛ in.
M. C. B. 5 by 9 inch journals	5	29 ft.	6 1-16 in.
M. C. B. 5½ by 10 inch journals	5	36 ft.	5 7-16 in.

7. Axles will be considered as having failed on drop test and will be rejected if they rupture or fracture in any way, or if the deflection resulting from the first blow exceeds the following:

M. C. B. axle, 4¼ by 8 inch journals..8⅛ inches
M. C. B. axle, 5 by 9 inch journals..8 1-16 inches
M. C. B. axle, 5½ by 10 inch journals..6 1-16 inches

In order to measure the deflection, prepare a straightedge as long as the axle by reinforcing it on one side, equally at each end, so that when it is laid on the axles the reinforced parts will rest on the collars of the axle, and the balance of the straightedge not touch the axle at any place. Next place the axle in position for test, lay the straightedge on it, and measure the distance from the straightedge to the axle at the middle point of the latter. Then, after the first blow, place the straightedge on the now bent axle in the same manner as before, and measure the distance from it to that side of the axle next to the straightedge at the point farthest away from the latter. The difference of the two measurements is the deflection.

Specification for Steel Axles. In 1899 the following specifications, including tests for steel axles, were adopted as Recommended Practice:

1. Axles will be ordered not less than 100 on one order. All axles must be made and finished in a workmanlike manner, and must be free from cracks, or seams, or flaws which can be detected by the eye. All parts must be rough-turned, except at point "A" on diagram below.

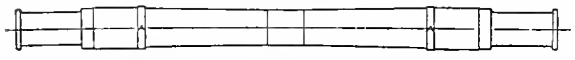
2. All axles must be made of steel, and the material desired should have the following composition:

Carbon	0.40 per cent
Manganese, not above	0.50 per cent
Silicon	0.05 per cent
Phosphorus, not above	0.05 per cent
Sulphur, not above	0.04 per cent

3. All axles must conform in sizes, shapes and limiting weights to the requirements given on the order or print sent with it. The rough-turning must be done with a tool so shaped as to leave the surface free from ridges; and in centering them 60 degree centers must be used, with proper clearance for lathe centers. All axles must be legibly stamped, when offered for test, on the unfinished portion, "A" on diagram below, with the blow or heat number and the date, and on the cylindrical portion at center they must be stamped with the name of the maker.

Portions marked "A" to be unfinished and to have stamped upon either of them blow number and date.

Portions marked "A" to be unfinished and to have stamped upon either of them blow number and date.



4. Manufacturers must notify ..... when they are ready to ship not less than 100 axles; must have all the axles made from each heat, and no others, in a pile by themselves; must furnish the testing machine referred to in Section 6, and the proper appliances for checking the dimensions and weights; must have a car or cars ready to receive shipment; must furnish the labor and power necessary to enable the inspector to promptly inspect and test; and ship or store the axles when tests are finished. Axles which, when offered for test, are so rusty as to hide defects will not be considered.

5. A shipment of axles being ready for test, the inspector will first make a list of the heat numbers in the various piles of axles offered, and the number of axles bearing the same heat number in each pile. If he finds in any pile axles bearing different heat numbers he must, before going further, have the pile rearranged, so that only those axles having the same heat number will be in the same pile. Also, if he finds in any pile any axles having evidence of changed or defaced heat numbers, or any axles having heat numbers not clearly legible, or any bearing heat numbers previously rejected, he will exclude such axles from further consideration. He will then examine the axles in each pile or heat, as to workmanship and defects visible to the eye, and as to whether they conform to dimensions and directions on the order, or tracing, or in these specifications. All axles not satisfactory in these respects must be laid aside and will not be further considered. This being done, if less than thirty axles in any heat are left, he will refuse to consider that heat further. If in this inspection defects are found which the manufacturer can remedy while the inspector is at the works, he may allow such defects to be cured and may count the axles which are successfully treated in this way as a part of the thirty above mentioned. Not less than thirty axles from any one heat having passed the foregoing inspection, the inspector will select from each pile or heat, one axle at random, and subject it to the physical test prescribed for such axles as may be under consideration. If the test axle fails to fill the physical requirements, all the axles from that heat of steel will be regarded as rejected, and none of them will at any time be considered again. If the test axle passes the physical test the inspector will draw a straight line parallel with the axis of this test axle ten (10) inches long, starting from one end of it, and prick-punch this line at several points. He will then have a piece about six (6) inches long cut off from the same axle, so as to leave some of the prick-punch marks on each piece of the axle. The 6-inch piece must be sent at once properly tagged to ..... The piles of axles which have passed the physical test will be allowed to remain as the inspector leaves them, until the results of the chemical test are known. The 6-inch piece being received at the laboratory, a line will be drawn from the prick-punch line above described, through the center of the axle across the cut-off end, and a prick-punch mark made on this last line, 40 per cent. of the distance from the center to the circumference of the axle. Borings for analysis will be taken by means of a 5/8-inch diameter drill, acting parallel to the axis of the axle, and starting with its center in the last described prick-punch mark. The borings will be analyzed in accordance with standard methods, and the results of analysis will be communicated to the Inspector, who will at once proceed to the works, and reject, or accept and ship, or mark and store, as the case may be, the axles in question. If the analysis of any test axle shows that the steel does not meet the chemical requirements, all of the axles of that heat will be regarded as rejected, and none of them will at any time be considered again. If the analysis of any test axles shows that the steel meets the chemical requirements, all of the axles of that heat which have passed inspection and the physical test will be regarded as accepted. The inspector will proceed to load and ship from the accepted axles as many as may be required to fill the order. If, as the result of inspection and the physical and chemical tests, more axles are accepted than the order calls for, such accepted axles in excess will be stamped by the inspector with his own name, and will then be piled and allowed to remain at the works, subject to further orders from the purchasing agent. On receipt of further orders, axles once accepted will, of course, not be subject to further test, but in no case will even accepted axles be loaded and shipped except in the presence of the inspector. In all cases the inspector will keep an accurate record of the heat numbers, of the number of axles in each heat which are rejected, or stored, and will transmit this information with each report.

6. All axles will be tested physically by drop test. The testing machine must conform in its essential parts to the drawings adopted by the Master Car Builders' Association. These essential parts are: The points of support on which the axles rest during tests must be three feet apart from center to center; the tup must weigh 1,640 pounds; the anvil, which is supported on springs, must weigh 17,500 pounds; it must be free to move in a vertical direction; the springs upon which it rests must be twelve in number, of the kind described on the drawing; and the radius of supports and of the striking face on the tup in the direction of the axis of the axle must be five (5) inches. When an axle is tested it must be so placed in the machine that the tup will strike it midway between the ends, and it must

be turned over after the first and third blows, and when required, after the fifth blow. After the first blow, the deflection of the axle under test will be measured in the manner specified below.

7. It is desired that the axles, when tested under the drop test as specified above, shall stand the number of blows at the height specified in the following table without rupture and without exceeding as the result of the first blow the deflections given:

Axle.	No. Blows.	Height of Drop.	Deflection.
M. C. B. 4¼ by 8 inch journals for 60,000-pound cars	5	34 feet	7 inches
M. C. B. 5 by 9 inch journals for 80,000-pound cars	5	43 "	5¾ "
M. C. B. 5½ by 10 inch journals for 100,000-pound cars	7	43 "	4 "

8. Axles will be considered as having failed on physical test and will be rejected if they rupture or fracture in any way, or if the deflection resulting from the first blow exceeds the following:
M. C. B. axle, 4¼ by 8 inch journals...7½ inches
M. C. B. axle, 5 by 9 inch journals....6¼ "
M. C. B. axle, 5½ by 10 inch journals..4½ "

9. Axles will be considered to have failed on chemical test and will be rejected if the analysis of the borings taken as above described gives figures for the various constituents below, outside the following limits, namely:
Carbon, below 0.35 per cent. or above 0.50 per cent.
Manganese. ..... " 0.60 "
Phosphorus ..... " 0.07 "

10. In order to measure the deflection, prepare a straightedge as long as the axle, by reinforcing it on one side, equally at each end, so that when it is laid on the axle, the reinforced parts will rest on the collars of the axle, and the balance of the straightedge not touch the axle at any place. Next place the axle in position for test, lay the straightedge on it and measure the distance from the straightedge to the axle at the middle point of the latter. Then, after the first blow, place the straightedge on the now bent axle in the same manner as before, and measure the distance from it to that side of the axle next to the straightedge at the point furthest away from the latter. The difference in the two measurements is the deflection.

Axle Box (British). A **Journal Box**, which see. See **Grease Axle Box, Oil Axle Box.**

Axle Box Cover (British). A hinged movable cover on the axle box through which the lubricant is introduced. On British oil axle boxes the cover is generally bolted to the box, with a strip of leather interposed to make an oil-tight joint. The oil is replenished through a small orifice closed by a screw plug or spring hinge. See Figs. 6760-6777.

Axle Box Keep (British). The lower part of an axle box, which in an oil box contains the lubricant, and in a grease box simply protects the under side of the journal from dust.

Axle Collar. Fig. 5510. A rim or enlargement on the end of a car axle, which takes the end thrust of the journal bearing.

Axle Gages. Gages for fixing the lengths and diameters of an axle. Were at one time standards of the M. C. B. Association.

Axle Generator. A small direct current generator usually mounted on the truck and driven by a belt from a pulley mounted upon the axle and running over a pulley mounted upon the shaft of the generator. These generators are always provided with some automatic device, forming either a part of the machine itself or being in the form of an auxiliary device mounted inside the car for preserving the polarity of the terminals or leads of the generator. The fact that a car may run in either direction and thereby cause rotation in either direction of the armature of the generator renders an automatic device of this kind absolutely necessary.

Axle Guard. 1. (British.) American equivalent, pedestal. The ordinary or W pattern consists of a wrought iron plate attached to the sole bar, which permits vertical motion of the axle box, but restrains movement in any other direction. Fig. 6656.

2. Axle guard has been applied to the axle safety strap. It has also been applied to the safety beam, Figs. 4800-4801.

Axle Guard Crown (British). The main part of the **Axle Guard**, which see.

Axle Guard Crown Washer (British). A piece of wrough iron plate, used as a washer for three or more bolts, which secure the main part of the axle guard to the sole bar.

Axle Guard Keep or **Horn Stay** (British). A piece of iron which secures the lower end of the jaws of the axle guards together. See Fig. 6656.

Axle Guard Stay Rod or **Axle Guard Stretcher** (British). American equivalent, pedestal tie bar. A longitudinal rod connecting the lower ends of the axle guards,a and keeping them in position.

Axle Guard Truss. A wrought iron forged bar connecting the iron transoms of a six-wheel truck, and carrying the middle safety beam. It were better called the middle safety beam truss.

Axle Guard Wing (British). The inclined part of an axle guard, strengthening it fore and aft.

Axle Guard Wing Washer (British). A piece of iron plate used as a washer for two or more bolts securing the wing of the axle guard to the sole bar. See **Axle Guard Wing.**

Axle Light System of Lighting. So salled from the fact that the current is generated from a dynamo connected either directly or by belt to the car axle. Auxiliary storage batteries, which are charged while the train is running, supply current when the train is standing still or going slow. Automatic switches throw in the current for charging and cut the generator in and out. There are a number of systems in limited use, but the demand is growing rapidly. See **Gould Electric Car Lighting. Consolidated Electric Car Lighting, Newbold System, Bliss System.**

Axle Packing. A **Dust Guard**, which see. The journal packing is often called axle packing.

Axle Pulley. The belt pulley mounted upon the car axle for driving the axle generator. This pulley is always split and provided with a bushing that is bored out to fit the tapering axle.

Axle Pulley Bushing. A bushing or sleeve, split longitudinally and bored conically inside to fit the tapering car axle and turned cylindrically outside to fit the hub of the axle pulley.

Axle Safety Bearing (Passenger Car Trucks). 51 and 55, Fig. 4780. The safety beam of a truck above the axle and the axle safety strap, 55, below it, together forming a circle around the axle.

Axle Safety Strap. 55, Fig. 4771. See above.

Axle Seat. The inside surface of the hole in a car wheel which comes in contact with the axle, and not the hole itself. The corresponding part of an axle is called the wheel seat or wheel fit.

B

Babbitt Metal. "An alloy, consisting of 9 parts of tin and 1 of copper, used for journal boxes; so called from its inventor, Isaac Babbitt, of Boston. Some variations have been made, and among the published recipes are:

Copper	1	1
Antimony	1	5
Tin	10	50

Another recipe substitutes zinc for antimony.

The term is commonly applied to any white alloy for bearings, as distinguished from the box metals or brasses in which copper predominates."—Knight.

Babbitt Metal Bearings. A style of bearing of which a great variety of forms exist, which in effect substitutes Babbitt metal in some of its many forms for brass as a bearing surface. **Lead Lined Bearings,** which see, are different in that they merely use a thin sheet of lead over the brass, to correct slight irregularities and give an even bearing surface. The bearing or brass should be bored out to remove scale.

Babcock Fire Extinguisher. Fig. 3849. A device for causing rapid generation of carbonic acid gas when desired by breaking a bottle of acid in the interior by means of the bottle breaking head (the handle projecting up in the center of the top of the apparatus). The solution within consists of about 2½ lbs. of bicarbonate of soda in about 6 gals. of water.

Back (for a Pipe Clip). Fig. 2755. A metal strap sometimes used to attach the clips to, instead of attaching the latter directly to the surface to which the clip is attached. See **Seat Back.**

Back Band (Car Seat). The molding or metallic band that protects the top, bottom and side edges of a seat back. A seat back molding. Figs. 4174, 4197.

Back Cylinder Head (Air Brake Cylinder). 4, Figs. 1275-1276. See **Non-Pressure Head.**

Back Face Plate (Steel Tired Wheels). The inner one of the two plates connecting the tire with the hub. See **Face Plate.**

Back Guy (Steam Shovel). 15, Figs. 595-598. An iron rod running from the top of the "A" frame to an anchor over the body bolster under the boiler.

Back Plate (Kirby's Door Lock). I, Figs. 2480-2481.

Back Seat Bottom Rail (Longitudinal Seat). A horizontal wooden strip at the back edge, to which a wooden seat bottom is attached. See **Seat Bottom Rail.**

Back Seat Rail (Street Car Seats). A longitudinal strip of wood which extends along the back edge, and is fastened to the window posts.

Back Seat Rail (British). In a carriage, a small transverse wooden bar secured to the partition and supporting the seat boards.

Back Squab (British). American equivalent, seat back. In a carriage, that part of the seat which fits the small of the passenger's back, and also supports the head and a fixed back, covered with cloth and stuffed with curled hair. Made elastic by springs.

Back Squab Sofa Springs (British). Analogous to the American seat back springs. One end of these springs butts against the partition and the other against a sheet of stout canvas, the back squab resting against the latter.

Back Stop Timbers. Short sub-sills bolted and keyed by packing blocks to the center sills of a car in line with the draft timbers, to assist the draft or center sills in transmitting the buffing shocks and strains. Usually called a buffing sub-sill.

Baggage Car. Figs. 192, 617-619. A car for carrying the baggage of passengers. A combination baggage car, Fig. 193, is one having compartments set off for express or mail, or both. A combination car or coach, Fig. 188, etc., is a passenger car with a baggage compartment. A **Push Baggage Car,** which see, is a light car for use at stations.

Baggage Truck. See **Baggage Wagon Truck.**

Baggage Wagon Truck. A four-wheeled vehicle with a frame or rack for carrying baggage, used to move the latter by hand about railway stations. A two-wheeled vehicle for the same purpose is called a baggage barrow.

Bail. A curved handle of a more or less semi-circular form for a pail, bucket, lantern or other utensil. As applied to lanterns, Fig. 3618.

Baker Car Heater. Figs. 2676-2783. A stove invented and patented by Mr. Wm. C. Baker for warming cars. It is arranged so as to heat water in a coil of pipe in the inside of the stove, and cause it to circulate through a series of pipes laid near the floor of the car. The original heater has undergone many changes, and only those forms are shown that are in current use. They are: The Single-Coil Fireproof, Figs. 2676-2695; the Two-Coil Fireproof, Figs. 2696-2716; the Perfected, Figs. 2717-2735, and the Mighty Midget, Figs. 2736-2748, with the parts belonging to them.

Balance Spring (Passenger Truck Brake Gear). Figs. 4851-4853. A flat spring from which the adjusting hanger is suspended and which keeps the brake head balanced in its proper position.

Balance Valve Pressure Regulator. Fig. 2815. A valve for automatically regulating the pressure in the steam pipes in a car-heating system.

Ball-Bearing Butt Hinge. Fig. 2449. A butt hinge, the washer of which is a ball bearing.

Ball-Bearing Side Bearing and Center Plate. Fig. 5335.

Ballast Car. Figs. 80-89. A center dump car for hauling and distributing ballast. See **Rodger Ballast Car, Goodwin Car, Gravel Car.**

Ballast Plow. See **Rodger Ballast Car and Plow.**

Ballast Wagon (British). Figs. 6559-6560. American equivalent, gravel car. A four-wheeled gondola car, fitted with falling doors at the sides and ends, and used for conveying ballast, rails and ties.

Baltimore Ball-Bearing Center Plate and Side Bearing. Fig. 5335.

Band (for Seat Backs). Figs. 4197-4208. More properly **Seat Back Molding,** which see.

Band Saw (Woodworking Machinery). Figs. 6824-6825, 6826, 6828. A machine with two revolving wheels of large diameter over which a thin continuous ribbon or band of steel with teeth cut in the edge is run. The saw passes down through a table on which the work is placed to be cut.

Bar Lift. See **Bar Sash Lift.**

Bar Sash Lift. Fig. 4639. A sash lift having a short horizontal metal bar attached to two flanged studs or stanchions; used for the large sashes of sleeping and parlor cars.

Bar Shackle (of a Padlock). A rectangular, instead of U-shaped, shackle.

Barber Roller Side Bearing Truck. Figs. 4700-4704. See **Roller Side Bearing Truck.**

Barney & Smith Car Seats. Figs. 4134-4137.

Barney & Smith Steel Passenger Trucks (4-Wheel). Fig. 4736; (6-wheel), Fig. 4774.

Barr Vestibules. Two types of vestibules designed by Mr. J. N. Barr, which are called the wing vestibule and the toggle vestibule. Now little used.

Barrel Car. Fig. 25. A flat car, racked so as to carry many empty barrels. They are made long, and the racks are very high in order to make up a carload weight.

Barrel Door Bolt. Fig. 2386. A door bolt made of a round metal bar and held on its slide in a round tube or "barrel." It is constructed so that when it is either engaged or disengaged from its keeper it can be turned by a short lever or knob and held in either position by suitable stops.

Barrel Seat Lock. Fig. 4223. See **Seat Lock.**

Barrett Geared Ratchet Lever Jack. Fig. 3875.

Barrow Truck. This term has been used to designate two-wheeled vehicles used about railroads for moving freight and baggage by hand; but the more usual practice is to speak of Baggage Barrows or **Freight Trucks,** which see, although both are sometimes designated as barrow trucks.

Bartley Flange Nut Fastener. Fig. 3862.

Base Board Corner Molding. A light molding at the junction of the base board and the floor.

Base Plate (of a Derrick or Crane). A large plate placed on the floor of the car for supporting the mast. Another method is by a **Mast Pocket,** which see.

Base Washer (Passenger Car Platform Posts). 40, Figs. 648-651. A metal ring or plate, which forms a bearing for the post on the platform end timber.

Basin. 1, Fig. 3684. A hollow vessel made of porcelain or metal, and in cars usually fixed in a suitable stand with pipes and other attachments for filling it with water and emptying it. Such basins are used as lavatories in sleeping and other passenger cars. They are emptied at the bottom through a pipe connected to the basin by a basin coupling, or basin bushing, which is closed by a basin plug. The basin plug is attached to a basin chain, which again is fastened to a stanchion called the basin chain holder.

Basin Bushing and Plug. Figs. 3639-3641.

Basin Chain. See **Basin.**

Basin Chain Holder. Fig. 3660. See **Basin.** Frequently called a basin chain post, or basin chain stay.

Basin Couplings. Figs. 3639-3645. See **Basin.**

Basin Plug. Figs. 3640-3641. See **Basin.**

Basin Pump. A pump of peculiar construction for supplying the basin of sleeping and parlor cars from the tank carried under the slab. It is called single or double acting, according as the upward stroke only, or both the upward and downward strokes, eject water. Double acting most used. The use of basin pumps has been practically discontinued on standard sleeping cars, the water being carried in tanks under the car and forced through the pipes by compressed air. They are still in general use, however, on tourist sleeping cars, chair cars and many day coaches. See **Pullman Water Supply.**

Basin Valve. 5, Fig. 3684.

Basket Rack (British, **Parcel Net**). Figs. 2892-2932. 145, Figs. 648-651. A receptacle made of cast metal ends, rods, or a combination of rods and wire netting for holding parcels. They are attached to the sides of passenger cars, above the heads of the passengers, so as to be out of the way. Continuous basket racks extend the full length of the car, and are increasing in favor. One is shown in Figs. 3919-3932. Parlor cars usually have no basket rack, but sometimes package racks are placed between the windows. Basket racks are sometimes called bundle racks.

Basket Rack Bracket. 18, Fig. 2205 and Fig. 3904. A light metal or wooden support for the end or center of a basket rack.

Basket Rack Netting. Figs. 3894-3896. Wire or silk netting with very large meshes, which forms the bottom or back of a basket rack.

Basket Rack Rod. Figs. 3894-3896. A small round metal bar which forms the main portion of a basket rack, and to which the netting, when used, is fastened.

Basket Rack Tip. Figs. 3894-3896. An ornamental knob or acorn on the end of a basket rack rod.

Bastard Howe (Freight Car Framing). Fig. 267, etc A style of framing having the vertical rods and inclined posts like the familiar Howe truss, but having also an upright post connected with the rod and serving more or less as a part of the truss. The Howe truss proper has been used in freight car construction to a limited extent.

Bastard Pratt Framing. Is a modification of the Pratt bridge truss, which differs from the Howe truss in having vertical posts instead of rods, and inclined rods instead of braces. A combination truss embodying the essential features of both the Howe and Pratt trusses is quite commonly used.

Batted Flax Fibre. Fig. 2199.

Batten. "A piece of board or scantling of a few inches in breadth."—Webster.

Batten Wagon (British). A four-wheel flat car about 24 feet long, fitted to carry sawed timber about 23 feet long, termed battens.

Battery. See **Storage Battery.**

Bayonet Catch. A general term derived from the manner of fastening on a bayonet to a gun, applied to the mode used in many forms of hardware and mechanical construction for connecting separate parts so as to be firmly united and yet easily removable. Many lamps are held in place by a form of bayonet catch.

Bead. "A small salient molding of semi-circular section. Also the strips on the sash frame which form a guide for the sash. These beads are known as the inside bead, outside bead and parting bead."—Knight.

In car construction the place of the inside bead is taken by the window casing, or inside window stop; the place of the outside bead by the outside window stop, and of the parting bead by the sash parting strip, or stop bead. The term is also frequently applied to any form of small, light molding of simple outline. See **Molding** and **Stop Bead.**

Bead Molding (British). See **Bead** and **Planted Molding.**

Beam. "The term beam is generally applied to any piece of material of considerable scantling, whether

subject to transverse strain or not; as, for example, 'collar beam,' 'tie beam,' 'Brestsummer beam,' the two former being subject to longitudinal strains of compression and tension, respectively, and the latter to transverse strain."—Stoney.

1. "Any large piece of timber, large in proportion to its thickness and squared or hewed for use." —Webster.

2. A bar of metal of similar proportions is also called a beam.

3. "A bar supported at two points and loaded in a direction perpendicular or oblique to its length is called a beam."—Rankine.

By analogy the term has of late years come to be applied to similar pieces or bars of iron and steel. Thus we have iron **I-Beams** and **Deck Beams** (which see), to take the place of wooden beams in buildings. The term is also used to designate such things as the beam of a balance or scales, a plow beam, the walking-beam of a steam engine, brake beam, etc.

Bearing. That which supports or rests on something, and is in contact with it. Thus a block or stone on which the end of a timber rests is called a bearing. The metal block or bushing in contact with a journal is called a bearing.

For M. C. B. Standard journal bearing see Figs. 5104-5139, etc. See

Axle Safety Bearing.
Body Truss Rod Bearing.
Brake Hanger Bearing.
Brake Shaft Bearing.
Center Bearing.
Crank Shaft Bearing.
Cup Side Bearing.
Dust Guard Bearing.
Journal Bearing.
Lead Lined Journal Bearing.
Lever Shaft Bearing.
Lower Brake Shaft Bearing.
Rocker Side Bearing.
Side Bearing.
Stop Key Journal Bearing.
Swing Hanger Pivot Bearing.
Truck Side Bearing.
Truss Rod Bearing.
Upper Brake Shaft Bearing.

Bearing Casting (Tip Cars). A casting, one of a pair, attached to either the car body or to the truck which supports the car body and its loads. In tip cars it is pivoted or hinged so as to permit the body to tip or rock laterally and to thus discharge its load.

Bearing Spring. An occasional but not the conventional term for the bolster springs or main springs of the car.

Bearing Spring (British). American equivalent bolster spring. The spring which carries the weight of the vehicle and rests on the axle box. In British practice almost invariably a half-elliptic spring.

Bearing Spring Buckle (British). American equivalent spring band. A solid wrought iron strap which confines the plates of the bearing spring, and is generally provided with lugs on the lower side so that it cannot be moved transversely or longitudinally on the axle box. The plates are secured to the buckle by a ⅜-in. vertical rivet.

Bearing Spring Shoe (British). A cast iron lipped rubbing piece, secured to the under side of the sole bar, on which the ends of the bearing spring bear.

Bell. See **Recording Bell, Signal Bell, Smoke Bell,** etc.

Bell Cord. Fig. 2321. Originally a rope, one end of which is attached to a signal bell on the engine, and which extends through or along the tops of the cars the whole length of the train, and is used for signaling to the locomotive engineman. It is carried by various forms of **Bell Cord Bushings, Bell Cord Hangers,** and **Bell Cord Guides** (which see). In passenger trains it is attached to the rafters or purlins by suitable supports on the inside of the cars. On passenger trains, the bell cord is made of lengths equal to that of each car, and is fastened together with suitable couplings. Bell cord is made almost exclusively of cotton, solid braided, flax, Italian hemp, but sometimes leather, and is known by the following names in trade: Brass wire covered, fancy braided, flaxen, Italian hemp, solid leather and solid braided. The usual sizes are $\frac{7}{32}$ inch, ¼ inch and $\frac{8}{32}$ inch in diameter, and the usual colors are drab, mahogany. Since the introduction of the train air signal system the bell cord in each car is separate and not carried through the train. One end is attached to the car discharge valve and a pull on the cord releases the air in the signal pipe and blows the signal in the engine cab.

Bell Cord Beveled Bushing. Figs. 2308-2309. See **Bell Cord Bushing.**

Bell Cord Bushing. Figs. 2304-2314. A thimble lining a hole through a partition for a bell cord to pass through; in distinction from a bell cord guide, which is attached to the side or roof of the car or to the bell cord hanger and serves solely the purpose which its name implies. For passing the bell cord through inclined surfaces beveled bushings are used, which are frequently provided with one or more pulleys to avoid friction.

Bell Cord Chain Hanger. Figs. 2368-2369, 2377.

Bell Cord Coupling. Figs 2318, 2324-2325. The hook attached to the end of a bell cord to enable it to be connected or disconnected at pleasure with another bell cord; not to be confused with a bell cord splice, Fig. 2319, which is intended as a permanent connection.

Bell Cord End Hook. A common metal hook with a screw shank by which it is attached to the end of the car. The hook is used to fasten the end of a bell cord to the last car and thus hold it in its place and prevent it from being drawn out of its guides.

Bell Cord Guide. Figs. 2328-2341, 3961. A metal eye or ring attached to the roof or ceiling of a car, or to the end of a **Bell Cord Hanger** (which see), and by which a bell cord is carried or conducted. According to their method of attachment to the car, they are designated as bell cord guides, with flange, or with screw, or with screw and flange, and they are often provided with one or more pulleys, and are sometimes swiveled when the bell cord is to be conducted in an oblique line. The pulleys are ordinarily at the bottom, but sometimes at the side of the bell cord guide, according to the direction of probable strain. Certain tubelike forms of bell cord guides are occasionally miscalled **Bell Cord Bushings,** which see.

Bell Cord Guide Washer. An ornamental washer for making a finish for a bell cord guide where it is attached to a car roof.

Bell Cord Hanger. Figs. 2355-2377. A guide for the bell cord, hanging usually from the center of the clear story or upper deck. In its original form it consists of a bell cord strap, attached to a bell cord strap hanger bracket, which latter is screwed to the top of the car. The simpler forms of these brackets, as Figs. 2355-2359, are called screw tops. The lower end of the strap carries a ring called the bell

cord guide, which latter is often provided with a pulley at the bottom to obviate friction. To avoid unpleasant vibration, the double strap hanger has been used, giving lateral stability, and bell cord rod hangers, Figs. 2370-2373, have been used swinging on a pivot. Bell cord fixed hangers, Fig 2365, are used where the drop is small.

Bell Cord Hanger Bracket or **Screw Top.** Fig. 2356. See **Bell Cord Hanger.**

Bell Cord Hanger Straps. Figs. 2378-2385. See **Bell Cord Hanger.**

Bell Cord Pulley or **Sheave.** Figs. 2328-2353. A wheel in a bell cord guide over which a bell cord runs.

Bell Cord Rod Hanger. Figs. 2370-2373. See **Bell Cord Hanger.**

Bell Cord Sheave. A **Bell Cord Pulley,** which see.

Bell Cord Splice. Fig. 2319. A metal coupling with right and left hand screws for permanently splicing the ends of a broken cord. See **Bell Cord Coupling.**

Bell Cord Strap. Figs. 2378-2385. See **Bell Cord Hanger.**

Bell Cord Strap Hanger. Figs. 2355-2260. See **Bell Cord Hanger.**

Bell Cord Strap Hanger Bracket. Figs. 2355-2260. See **Bell Cord Hanger.**

Bell Cord Strap Hanger Screw Top. Figs. 23-56, 2365. See **Bell Cord Hanger.**

Bell Cord Thimble. A **Bell Cord Bushing,** which see.

Bell Crank. An L-shaped rectangular lever, often with the two extremities connected so as to be of triangular form, for changing the direction of motion by 90 degrees, more or less.

Bell Crank (Hand Car). 23, Figs. 6207-6209. A crank attached to the propelling lever shaft, giving more favorable direction to the power applied to the levers.

Bell Rope. A **Bell Cord,** which see.

Bell's Exhaust Hopper Ventilator. An attachment placed underneath the floor pipe of a closet hopper, on the under side of a passenger car, to produce a downward draft through the hopper when the car is in motion. The attachment is of a concave conical form, which by the motion of the train in either direction causes the air to pass downward through the floor pipe by creating a partial vacuum at the base.

Belt Aligning Device. Mechanism consisting of screws and slip collars for adjusting the alignment of the belt, by shifting the generator so that its pulley shall be in the same vertical plane with the axle pulley.

Belt Molding. A molding passing entirely around the interior of a passenger car directly above the windows, in the middle of the wide board called the inside lining.

Belt Tension. Mechanism consisting of springs, rods and nuts for adjusting and maintaining the tension of belt used for driving an axle generator.

Belt Rail. 49, Figs. 262-272, etc.; 65, Figs. 599-619. A part of the framing of a passenger or street car frame below the windows on the outside, extending the whole length of the car body and attached to each post. It is usually framed into the posts and supports the window sills. The term is often applied to the **Girth,** which see of a box car. The **Upper Belt Rail,** which see, is a similar strip directly above the window.

Belt Rail Band (Street Cars). An iron band on the outside of a belt rail covering the joint of the latter with the panel. It extends around each corner of the car to the door posts.

Belt Rail Cap. 81, Figs. 645-647. A thin strip of wood nailed to the top of a belt rail, and which forms a seat for the window sill.

Belting. See **Victor-Balata Belt.**

Bench Cap. Transverse timbers resting upon the side sills of a coal or ore car, to tie the sills together and prevent spreading, and also to support the doors or winding shaft about which the winding shaft chain is wound.

Bend (Iron Pipes). Fig. 2772, etc. See **Return Bend.** They are distinguished as close and open return bends.

Bent Ladder Round. The lower round of the ladder of box cars, having an angle turned up at the inside for the safety of trainmen, to prevent the foot slipping off the ladder round. The use of such rounds has been recommended by the M. C. B. Association. See **Ladder** and **Ladder Round.**

Berlin Woodworking Machinery. Figs. 6826-6834.

Berth. 1, 2, Figs. 2201-2202, 4112. A bed in a **Sleeping Car,** which see; also, the shelf or support on which the bed rests. There are two such beds in the space occupied by two double seats, which is called a section. The lower berth is made up on the seats and the upper one on a shelf, which can be raised or folded up out of the way in daytime, as shown in Fig. 2203. A full section with both the upper and lower berths made up is shown in Fig. 2201. See **Lower Berth, Upper Berth.**

Berth Arm. A **Berth Brace,** which see.

Berth Bolt. See **Berth Latch Bolt.**

Berth Brace. A metal rod, chain, or wire rope sometimes attached to the side and near the top of a sleeping car, and at the other end to the outer edge of a berth, which is supported by the brace. In the later designs it is done away with, the berth being supported by the berth chain.

Berth Brace Eye. A metal plate with suitable lugs for fastening the brace to the top of the car or to the berth.

Berth Bracket. Fig. 4235. A bracket on which an upper berth of a sleeping car rests when lowered.

Berth Catch and Plate. 48, Figs. 2201-2202; Figs. 3977-3978.

Berth Chain. 25, Figs. 2201-2202; C, Fig. 4365. A pitch chain passing from the berth spring through the overhead pulley and to the corner of the upper berth to support it. The berth spring is attached to the chain to counteract the weight of the berth. The berth chain does the service of the berth spring rope and berth brace.

Berth Chain End Plate. See **Berth Spring Lug.**

Berth Chain Pulley. 24, Figs. 2201-2202; L, Fig. 4365. A pulley attached to the roof of a sleeping car, over which a berth chain runs.

Berth Curtain. 17, Figs. 2201-2202. A curtain hung in front of a sleeping car section to hide the occupants from sight. A single curtain covers both berths, and is hung from the berth curtain rod.

Berth Curtain Hook. Figs. 4376, 4383. A metal hook attached to a berth curtain, and by which the latter is hung on a rod above the berths; usually covered with leather to prevent rattling.

Berth Curtain Pole. See **Berth Curtain Rod.**

Berth Curtain Rod. 16, Figs. 2201-2202, 4369-4372. A rod usually made of metal tubing, fastened above a section of a sleeping car and to which a berth curtain is hung. They are now made in sections,

supported by folding brackets, and swing into the upper berth out of sight, except when berths are made up. See **Berth Curtain Rod Bracket.**

Berth Curtain Rod Acorn. See **Berth Curtain Rod Tip.**

Berth Curtain Rod Bolt. A small vertical bolt, usually tipped with an acorn, fastening the curtain rod in the coupling on the bracket.

Berth Curtain Rod Bracket. 15, Figs. 2201-2202, and Figs. 4399-4405. A metal bracket attached to the deck side of a sleeping car, which forms a support for a berth curtain rod. Such brackets usually have a coat and hat hook attached to them. A hanger, Fig. 4405, is sometimes used as a substitute for a bracket at certain points. The stationary bracket has been replaced by the folding curtain rod bracket, which folds, with the rod attached, into the upper berth and out of sight when the curtains are not in use. See **Curtain Rod Folding Bracket.**

Berth Curtain Rod Coupling. A fastening by which a berth curtain rod of a sleeping car is secured to a bracket. It usually consists of a bolt or screw.

Berth Curtain Rod Hanger. Fig. 4405. See **Berth Curtain Rod.**

Berth Curtain Rod Socket. A metal flanged ring which is fastened to some part of a sleeping car to carry the berth curtain rod, also called berth curtain rod bushing.

Berth Curtain Rod Tip or **Acorn.** See **Acorn.**

Berth Extension Arms. Fig. 4318.

Berth Fixtures, etc. Figs. 4305-4410.

Berth Front. 4, 5, Figs. 2201-2202. The bottom of the upper berth when it is down. There are two parts, the upper part and the lower part, which is next to the car side. The berth front panel is between the two berth fronts.

Berth Front Borders and Corners. Figs. 4262-4267.

Berth Front Panel. 6, Figs. 2201-2202. The panel in the bottom of the upper berth between the two berth fronts.

Berth Handle. A **Berth Latch Handle,** which see.

Berth Headboard. 9, Figs. 2201-2202. See **Headboard.**

Berth Head Rest Pivot and Plate. Figs. 4216-4217.

Berth Hinge. Figs. 4349-4352. A hinge or joint by which the back edge of an upper berth of a sleeping car is attached to the side of a car. They are distinguished as loose and fast. A fast hinge is shown in Fig. 4355. The loose hinge fits in a plate or bushing. Shown with the hinges.

Berth Hinge Bushing. A hollow metal socket in which the spindle of a loose berth hinge works.

Berth Hinge Plate. Fig. 4353. A plate which takes the place of a berth hinge bushing.

Berth Lamps. Figs. 4385-4387. Electric lamps for the berths of sleeping cars. The Gibbs lamp is fixed in the partition between two berths, and the one lamp may light two berths, there being a metallic cover or slide which shuts it off at any time from either side of the partition.

Berth Latch. 47 and 48, Figs. 2201-2202 and Figs. 4356-4361. A spring bolt for holding the upper berth of a sleeping car up in its place when not in use. To obviate the danger of the berth shutting up in case of overturning of the car, the safety berth rope and attachments, 26, Figs. 2201-2202, are used. Safety berth latches have also been used to obviate the necessity of using a safety rope. See **Safety Berth Latch.**

Berth Latch Bolt. 48, Figs. 2201-2202. A bar or pin of a berth latch which engages in a corresponding strike plate or keeper to hold the berth up.

Berth Latch Face Plate. Figs. 4368, 4373-4374.

Berth Latch Handle. Figs. 4368, 4373-4374.

Berth Latch Keeper. Also called **Strike Plate,** which see. See **Berth Latch Bolt.**

Berth Latch Lever. The part by which the berth latch handle operates the berth latch bolt; also called a berth latch rocker plate.

Berth Latch (or Lock) **Plate and Bolt.** Figs. 4323-4324.

Berth Latch Rocker Plate. See **Berth Latch Lever.**

Berth Latch (or Lock) **Rods.** Fig. 4367.

Berth Latch Shell. A metal covering made in the form of a sea shell for covering and protecting the handle of a berth latch in a sleeping car.

Berth Lock. A **Berth Latch,** which see.

Berth Mattress. 18, Figs. 2201-2202. The mattresses which cover the seat cushions of the lower berth and the springs of the upper berth. When the berths are made up for day travel the mattresses are stored in the upper berth, as shown in the figure.

Berth Numbers. Figs. 4378-4382. Figures or numbers, usually made of metal or porcelain, for numbering the berths or sections of sleeping cars. They are frequently sewed to plush panels and hung from the berth curtain rods.

Berth or Bunk Partition. 8, Figs. 2201-2202. The partition between the upper berths of two adjacent sleeping car sections. It is of the same outline as the upper berth's cross-section.

Berth Pivot. Fig. 4327.

Berth Pivot Socket. Figs. 4305-4306.

Berth Rattle Stop. Figs. 4330-4331.

Berth Rest. See **Upper Berth Rest.**

Berth Safety Latch Handle, in place attached to car, 47, Figs. 2201-2202. See **Safety Berth Latch.**

Berth Safety Rope. 26, Figs. 2201-2202. A wire rope fastening the upper berth of a sleeping car to the fixed arms of the lower berth, to prevent accidental closing up of the upper berth in case of overturning of the car. The rope is fastened to the upper berth by a berth safety rope fastener and to the lower berth by inserting a knob into a berth safety rope holder.

Berth Safety Rope Fastener. See **Berth Safety Rope.**

Berth Safety Rope Holder. See **Berth Safety Rope.**

Berth Safety Rope Hook. Fig. 4384.

Berth Safety Rope Knob. See **Berth Safety Rope.**

Berth Spring. 23, Figs. 2201-2202; Fig. 4367. A spring usually made in a spiral form, like a watch spring, coiled within a device called the berth spring fusee and attached to the upper berth of a sleeping car by a berth chain so as to counteract the weight of the latter and make it easy to raise and lower it.

Berth Spring Frame. 23, Figs. 2201-2202 and Fig. 4367. A metal support which holds a berth spring and fusee.

Berth Spring Fusee. See **Fusee.**

Berth Spring Lug or **Clip.** M, Fig. 4365. The means by which the end of a berth chain is fastened to the upper berth, sometimes called a berth chain end plate.

Berth Striker Plate. A **Berth Latch Keeper,** which see.

Bettendorf Body and **Bolster.** Figs. 1125-1127, 1142. Body and truck bolsters made of I-beams having their webs compressed to give the necessary reduction in height at the ends. The two beams are placed side by side and tied together with end plates, the side bearing castings and center plates.

Bettendorf Cast Steel Truck. Figs. 4687-4692.

Bettendorf Underframe. Figs. 1019-1023, 1027-1029. A metal underframe for freight cars, built up of structural steel shapes, pressed and formed into the shapes as used in the car.

Beveled Bushing. Fig. 2308. See **Bell Cord Bushing.**

Beveled Washer. Fig. 743. A washer used to give an even bearing for rods which stand at an acute angle to the surface on which the nut or bolt head bears. Sometimes two such washers which come near together are cast in one piece, and are then called double beveled washers. See **Triangular Washer.**

Bezel. "A term applied by watchmakers and jewelers to the groove and projecting flange or lip by which the crystal of a watch is retained in its setting. An ouch."—Knight. Hence **Globe Bezel** (Pintsch Gas Lamp), which see, 307, Figs. 3208-3224.

Bibb. A curved nozzle for conveying liquids and changing the direction of their flow, usually from a horizontal to a vertical current. Hence—

Bibb Cock. Fig. 3656. Literally, a cock with a curved nozzle or spout, but commonly restricted to a cock with a plain valve without springs, moved by the hand only.

Billet Car. Figs. 372-375. A low side gondola car, built of steel throughout for transportation of hot steel billets or other heavy material.

Bin Coke Car. Figs. 521-523. A steel car for carrying coke, which has the floor divided up into a number of separate hoppers or bins so that all or only part of the load may be discharged by opening one or more of the doors at the bottoms of the bins.

Bit (of a Key). The part of a key which enters the lock and acts upon the bolt and tumblers. The bit consists of the web and wards. The web is the portion left after the wards are cut out. The wards (of a key) consequently are those spaces which fit over the **Wards** of a lock, which see. Some bits have no wards.

Blake Butt. An indefinite term, meaning in general a plain cast iron butt hinge, having a washer, but no acorns or screw pin.

Blank Hinge. A hinge which permits the door to swing open in either direction. It is intended as a substitute for one of a pair of **Double-Acting Spring Hinges,** which see, as being lighter and cheaper.

Bleeding Valve or **Bleeding Cock.** Another term for **Release Valve** or **Release Cock,** which see. The operation of releasing the brakes when applied upon a car detached from the locomotive is sometimes called bleeding. The bleeding valve is located in the auxiliary reservoir, and the brakes may be released by opening it and allowing the air in the brake cylinder and auxiliary reservoir to escape.

Blind. A **Window Blind,** which see. They are sometimes single, but usually double, distinguished as lower and upper. Flexible window blinds are rarely used now, having been displaced by window shades.

Blind Ceiling (Refrigerator Car). L, Figs. 305-308. A layer of light boards next above the inside ceiling in the roof of the car.

Blind Floor (Refrigerator Cars). I, Figs. 305-321. A layer of boards under the sub-floor and fastened to nailing strips secured to the bottom of the sills.

Blind Lifts, Bushing, Bolt, etc. Fig. 4527. See **Window Blind Lift,** etc.

Blind Lining (Refrigerator Cars). E, Figs. 305-321. A thin layer of boards between the outside sheathing and the inside lining; also called intermediate lining, 53a, Figs. 305-321.

Bliss Folding Platform Gate. Figs. 4013-4014. A metal gate for platforms of railroad and street cars which has a joint in the middle and which folds together when opened, and does not occupy much space.

Bliss System of Electric Train Lighting. Figs. 3371-3491. Includes the so-called axle light system for individual cars and the head-end system, as applied to entire trains. For generating the current on single cars it employs generators of various capacities, ranging from 1½ to 6 k.w., while for head-end working generators from 8 to 25 k.w. are used. All the smaller generators are belt driven, while the largest are fitted with gears and special axles similar to street railway motors. The generators are automatically connected and disconnected from the lighting and battery circuits by special electrically operated switches, thus preventing discharge of batteries through generators when the latter run under operative speed or are at rest.

The output of all sizes of generators may be regulated to compensate for varying train speeds by any of the standard types of regulators made by the company of which a number have been developed to meet varying conditions. They all operate to secure maximum output within the limits of the capacity of the generator, and are further arranged to prevent over-charging the storage batteries, which constitute an essential element in this system.

The lamp voltage, in all cases, is maintained constant by means of sensitive, though ruggedly constructed special lamp regulators. The result is that all batteries are fully charged whenever the power ceases, which is the case when the car or train stops. The discharge taken from the batteries for lighting lamps at stops or terminals is quickly restored after the axle generators become operative again. All apparatus is automatic and requires no attention on the road.

The system has also been extended to include the proper regulation of steam-drive, head-end generators to secure maximum economy in battery operation and maintenance, the same general types of generator regulators and lamp regulators being employed. The system also embraces all the train lighting appurtenances, such as train line couplers, automatic jumpers, etc. A train may be operated by a head-end generator, and, in addition, any number of the cars may be equipped with individual axle light plants, while some of the cars may be supplied with batteries and lamps only, and still others with nothing but lamps. All the cars may be coupled together by the train lines, and yet all the various pieces of apparatus will act in unison and harmony together, one car helping another, if need be, without overloading generators and regulators and without interfering with the operation of the lamps. A flexible, universal, interchangeable and complete system of electric car and train lighting.

Block. 1. "A heavy piece of timber or wood, usually with one plane surface; or it is rectangular and rather thick than long."—Webster.

2. "A pulley or system of pulleys mounted on its frame or shell, with its band or strap. A block consists of one or more pulleys or sheaves, in a groove of which the rope runs, fastened in a shell or frame by pins, on which they revolve; of a shell or frame enclosing the pulley or pulleys; and of a

strap or band, consisting of a rope, encompassing the shell, and attached by an eye of rope or a hook to some object."—Ed. Ency.

The interior wheels are termed sheaves, which latter term is often used to designate the whole block or pulley, but incorrectly. A snatch block is a block with only one sheave, and with an opening at the side for the ready insertion and removal of the rope. Blocks without this opening, however, are sometimes loosely termed snatch blocks. See,

Body Bolster Spacing Block.
Body Bolster Truss Block.
Brake Block.
Brake Cylinder Block.
Buffer Block.
Center Plate Block.
Dead Block.
Distance Block.
Floor Timber Distance Block.
Guide Block
Packing Block.
Safety Beam Block.
Spring Block.
Swing Hanger Friction Block.
Transom Bearing Block.
Transom Truss Block.
Truck Bolster Guide Block.
Truck Bolster Truss Block.
Truss Block.

Block and Tackle. A general term applied to a pair or more of pulleys and accompanying rope. Also termed fall and tackle, or simply tackle.

Block Car. A car generally attached to wrecking trains, behind the wrecking crane, for carrying blocking, ropes, chains and other tools. Usually a common box car, sometimes fitted up with bunks.

Blocking. A mode of securing together the vertical angles of woodwork by blocks of wood glued or nailed in the inside angle. The method is largely used in every form of carpentry, where great strength is not required in the joint. In car work, generally known as furring blocks.

Blount Door Check. Fig. 2652.

Board. "A piece of timber sawed thin, and of considerable length and breadth, compared with the thickness, used for building and other purposes."—Webster. See

Brake Foot Board.
Deck Soffit Board.
Eaves Fascia Board.
Fender Board.
Head Board.
Inside Cornice Fascia Board.
Inside Cornice Sub-Fascia Board.
Letter Board.
Roof Boards.
Roof Running Board.
Running Board.
Seat Back Board.
Soffit Board.
Splash Board.
Tread Board.

Board Roofs (Freight Cars). A very indefinite term, usually meaning either one with a double layer of boards only, with or without painted canvas or other packing, or a single layer of boards covered with sheet metal. The Winslow and other roofs have boarding over the metal sheets.

Boarding Car. A car fitted up for cooking and serving meals to men at work on the line of a road. It is sometimes fitted with sleeping berths and bunks.

Body. 1. (Of a Car). The main or principal part in or on which the load is placed. American cars usually consist of a body carried on two trucks.

2. (Of a Valve, Cylinder, etc.) The main or principal part, to which the other parts are attached, as cylinder body, etc.

Body Bolsters. Figs. 1077-1115; 12, Figs. 262-272; 10, Figs. 577-578-599, 619. The transverse members of the underframe over the trucks which transmit the loads carried by the longitudinal sills to the trucks through the center plates. Metal body bolsters are becoming standard for use on freight cars regardless of whether the sills are of wood or steel. For passenger cars, built-up iron double-body bolsters or cast steel double-body bolsters are commonly used. Built-up metal body bolsters are made in the form of a truss, the top member being known as the top plate and the bottom member as the bottom plate or compression bar, the two being held apart by a web filler or small castings called body bolster thimbles. The term body transom is sometimes applied to the bolster, but incorrectly, as this term applies more properly to the cross tie timber.

Body Bolster Compression Bar. 2, Figs. 1128-1129, and 12b, Figs. 262-272.

Body Bolster End Pocket Casting. A cast cap that fits over the end of a composite body bolster, through which the truss rods pass, and on which the truss rod nuts bear. It is a body bloster truss rod washer enlarged so as to cover the entire end of the bolster.

Body Bolster Flitch Plates. Plates of iron or steel sandwiched in between pieces of wood and bolted together to give a wooden bolster greater strength. Frequently called body bolster sandwich plates.

Body Bolster Sandwich Plates. See above.

Body Bolster Tension Bar. Figs. 1128-1129, and 12a, Figs. 262-272, etc.

Body Bolster Thimble. Figs. 941, 948. See also **Body Bolster.**

Body Bolster Truss Block. 15, Figs. 341-344. A block of wood or distance piece on the top of a wooden body bolster between the center floor timbers and underneath the bolster truss rods.

Body Bolster Truss Rod. 13, Figs. 262-272. A metal rod which lies parallel with and passes above the center of the bolster over the truss rod bearing so as to form a truss; generally two are used for each bolster.

Body Bolster Truss Rod Bearing. See **Body Bolster Truss Rod.**

Body Bolster Truss Rod Saddle Straps. Straps that connect the truss rods, passing diagonally through the two ends of the body bolster. The strap is a flat bar of iron about 3 x ½ inch, with a rectangular bend at the ends, into which the truss rod heads fit. These straps bear upon the center sills.

Body Bolster Truss Rod Washer. 14, Figs. 262-272. An iron bearing plate on the end of a body bolster; often made to take two or more rods.

Body Brace. 33, Figs. 262-272. An inclined member of the body side or end framing. In the usual form of side framing for freight cars the braces are inserted in the panels between the bolster and the center of the car, inclining toward the center of the car while the counter braces are framed in the panel between the bolster and the end of the car, inclining toward the end of the car. See **Brace** and **Counterbrace.**

Body Brace Rod. 34, Figs. 262-272. An inclined iron rod in the side or end of a car body frame, which acts as a brace. They are distinguished as end and side body brace rods. A brace straining rod is a short vertical rod in the side of a passenger car under the window.

Body Center Plate. Figs. 952-953; 17, Figs. 262-272; 11, Figs. 1046-1047. The center plate attached to the under side of the body bolster. See **Center Plate.**

Body Check Chain Eye. Fig. 944. An eye bolt or clevis for fastening a truck check chain or safety chain to the car body. See also **Truck Check Chain Eye.**

Body Check Chain Hook. An iron hook on the **Check Chain,** which see, which enters into the check chain eye.

Body Counterbrace. 37, Figs. 262-272, etc. A brace in the side frame of a car body between the bolsters and the end of the car. These braces are inclined in a direction opposite to those between the bolster and center of the car. Sometimes counter braces are inserted in the central portion of the car between the two bolsters. They are then termed center counter braces. See **Counterbrace** and **Framing.**

Body Counterbrace Rod. 37, Figs. 262-272. Usually an inclined iron rod in the side frame of a car body, between the bolster and the end of the car. It may be a diagonal brace rod in a Pratt truss, which runs counterwise with those rods which carry the load. It may then be between the bolsters.

Body End Furring. Furring in the end of a car. See **Furring.**

Body End Plate. A wooden plank across the end of the car joining the side plates together. They are frequently made very wide and heavy. See **End Plate.**

Body End Rail. See **End Rail.**

Body End Rib (Street Car). A rib in the end of a street car. See **Body Rib.**

Body Hand Rail. 44, Figs. 648-651. An iron rod or bar attached to the end of passenger and street cars for persons to take hold of in getting on or off the cars; not to be confused with **Platform Rail,** which see.

Body Knee (British). No American equivalent. A heavy wrought iron knee, securing the sides of the body to the underframe and keeping them at right angles to one another.

Body Post (Freight Car Bodies). 42, Figs. 262-272. An upright timber which is framed into the sill and plate of a freight car. The body posts and corner posts form the vertical members of the side frame of a car body. In passenger cars such posts are called **Window Posts,** which see. See **Post.**

Body Post Pocket. 42a, Figs. 262-272, etc. See **Pocket.**

Body Queen Post. 22, Figs. 599-619. An iron rod, bar or casting, on the under side of a car body and against which the body truss rods bear. It is often stiffened laterally and longitudinally by a body queen post stay. Fig. 989. See also **Queen Post.**

Body Queen Post Stay or **Brace.** 22b, Figs. 648-651. See **Body Queen Post.**

Body Rib or **Side Stud** (Street Car). A rib or vertical post of the car body framing which corresponds to the studs. They are curved to conform to the shape of the street car body.

Body Ring (Pintsch Lamp). 301, Figs. 3208-3224.

Body Side Bearings. 16, Figs. 262-272; 9, Figs. 1046-1047. The upper one of the two **Side Bearings,** which see, attached to the body bolsters.

Body Spring. A **Bolster Spring,** which see.

Body Transom. 22, Figs. 262-272, etc. A name sometimes given to the **Needlebeam** or **Cross Tie Timber,** which see, bolted to the under side of the sills.

Body Truss Rod. 19, Figs. 262-272; 20, Figs. 599-619; Figs. 886-887. An iron rod usually 1¼ in. or 1½ in. in diameter extending from end sill to end sill, passing over the body bolsters on truss rod saddles and under the truss rod queen posts hung from the cross tie timbers. With the sills they form a truss and support the car body, preventing the sills from sagging between the bolsters. In passenger cars truss rod anchor irons are sometimes used, which are fastened to the sills near the bolsters. The truss rods are then attached to these anchors and are not brought out through the end sills. Truss rods are distinguished as center, intermediate and side or outside truss rods. Usually only four are used, but sometimes six or eight.

Body Truss Rod Bearing. 21, Figs. 262-272; Figs. 753-755. A cast or wrought iron plate or post on the under side of a truss block, or of a cross tie timber, serving the purpose of a **Body Queen Post,** which see.

Body Truss Rod Hopper Strap. A tie strap passing under and supporting the hopper of a gondola car, the ends of which strap are fastened to the body truss rods, which carry the stress to the end sills.

Body Truss Rod Saddle. 20, Figs. 262-272; 21, Figs. 599-619. A block of wood or a casting which forms a distance piece on top of a bolster, and on which a continuous body truss rod bears. Properly speaking, a saddle means a common bearing for a pair of rods with a central support, but it is not restricted to such use.

Body Truss Rod Washer. 19a, Figs. 262-272. A heavy iron washer on the outside face of the end sill, on which the nut on the end of the body truss rod bears.

Bogie (British). Figs. 6737-6738. A swiveling **Car Truck,** which see. All American eight-wheeled cars and coaches are what are termed in Great Britain bogie carriages, or wagons.

Bogie Carriage (British). Figs. 6466-6467, etc. A vehicle for passenger service recently much used on the fastest trains. The body is from 40 to 54 feet long, usually divided into compartments, with side doors, but often having a through corridor, and seating from 30 to 80 passengers. It is carried on four or six-wheel trucks. See also **Carriage.**

Bogus Plate (Refrigerator Cars). A horizontal timber attached to the posts on the inside of the car, a short distance below the plate. The bogus plates support horizontal cross timbers, called meat timbers, or hanging bars, to which hooks are attached for hanging meat.

Bohn Refrigerator. Figs. 329-331. A system of refrigeration in which the cold air is siphoned from the ice tanks into the circulating passages of the car. The same principle is used on small refrigerators for dining and café cars.

Boies Car Wheels. Figs. 5412-5413. A steel-tired wheel with a wrought iron single plate, or with a double plate center. The single plate seems most in favor, and is fastened by what the manufacturers call an integral tire lock. This lock and the manner of fastening the tire are shown in the engravings, with the cross section of the tire.

Boiler (Steam Shovel). 26, Figs. 596-598.

Boiler Wagon (British). A six or eight-wheeled car having two bogies or trucks at the ends with a drop-down platform between them, adapted to carry any exceptionally heavy or bulky load, such as a boiler, a heavy piece of machinery or a portable engine. It is mechanically an American freight car, with the middle portion dropped down to near the level of the rails. Also called **Well Wagon** or **Trolley Wagon,** which see.

Bolster. Figs. 1077-1115, 4796-4797, etc. A cross timber or trussed beam on the under side of a car body (**Body Bolster,** which see), and in the center of a truck (**Truck Bolster,** which see). The bolsters carry the body and truck center plates, the body

bolster resting on the truck bolster. Special forms for passenger cars are **Compound Bolster, Double Body Bolster,** which see. Fig. 1147.

Truck bolsters are either **Swing Bolsters,** which see, admitting of lateral motion to ease off shocks, or rigid bolsters, which permit no lateral motion. All passenger trucks have swing bolsters. In freight car service the rigid bolster has the preference, and rigid bolster trucks are the more numerous.

Bolster Bridge (Six-Wheel Truck). 62, Figs. 4780-4783. A **Side Bearing Bridge,** which see.

Bolster Center Casting. A hollow rectangular-shaped casting placed between the draft timbers and body bolster plates; the king bolt passes through it.

Bolster Chafing Plate. Figs. 4928-4929. An iron plate attached to the side of the transom to prevent wear from abrasion by movement of the bolster. More properly, **Transom Chafing Plate,** which see. The corresponding casting on the side of the bolster which is, strictly speaking, the bolster chafing plate, is commonly called friction block or friction plate. Figs. 4930-4931.

Bolster Distance Block. The same as a **Body Bolster Thimble,** which see.

Bolster Flitch Plate. The iron or steel plates of a built-up bolster, sandwiched between wood pieces. They are rarely met with now, having been almost entirely superseded by the metal bolster. They are also called bolster sandwich plates.

Bolster End Cap. A metal plate over the end of the truck bolster, replacing the bolster truss rod washers used on trussed wooden bolsters.

Bolster Hanger. See **Swing Hanger.**

Bolster Hanger Carrier. Figs. 4893-4895. A **Swing Hanger Pivot Bearing,** which see.

Bolster Jack Screws (Wrecking Cars). Jack screws attached to the spring plank for the purpose of taking the load off the springs and making the entire truck and car body one rigid structure when the derrick of the wrecking car is in use. **Tongs** or **Crabs,** which see, and detached jack screws are used to accomplish the same end.

Bolster Plate (Passenger Car Trucks). Fig. 4977. Wrought iron plates bolted to the sides of wooden bolsters to strengthen them.

Bolster Sandwich Plate. See **Bolster Flitch Plate.**

Bolster Springs. 80, Figs. 4705-4713, 4771-4777, and Fig. 5371. The main springs of a car, carried on the spring plank and supporting the truck bolster, on which the weight of the car body rests.

Bolster Spring Cap. 75, Figs. 4771-4777. See **Spring Plate.**

Bolster Spring Seat. 74, Figs. 4771-4777. See **Spring Plate.**

Bolster Truss Block. A timber serving as a distance piece to fill a vacant space between the bolster and the center plate. There are two, a **Body Bolster Truss Block** and a **Truck Bolster Truss Block,** which see.

Bolster Truss Rod. See **Body Bolster Truss Rod, Truck Bolster Truss Rod.**

Bolster Truss Rod Washer. See **Body Bolster Truss Rod Washer.**

Bolt. 1. A pin, rod or bar of metal used to hold or fasten anything in its place; ordinarily a bolt has a head on one end and a screw and nut on the other, while a rod has a nut on both ends.

Various forms of bolts, which see for further definition, are as follows:

Carriage Bolt.
Eye Bolt.
Jaw Bolt.
Joint Bolt.
Key Bolt.
Lug Bolt.
Machine Bolt.
Strap Bolt or **U-shaped Bolt.**

For bolts whose names are derived from the purpose for which they serve, see

Box Bolt.
Column Bolt.
Draft Bolt.
Drawbar Bolt.
Hub Bolt.
Journal Box Bolt.
Journal Box Cover Bolt.
King Bolt or **Center Pin.**
Stake Pocket U-Bolt.
Stop Bolt.
Tire Bolt.

2. (Locks and Latches.) A bar which enters the keeper or strike plate and effects the lock. See

Berth Latch Bolt.
Cupboard Bolt.
Door Latch Bolt.
Door Lock Bolt.
Door Sash Bolt.
Seat Lock Bolt.
Sofa Bolt.

3. Figs. 2391-2405. A **Door Bolt,** which see, moved in slides directly by the hand to fasten an opening. See also

Barrel Door Bolt.
Flush Bolt.
Head Board Bolt.
Window Blind Bolt.

Bolt Cutter. Figs. 6842-6844.

Bolt Stop (Seat Lock). Fig. 4223. A small pin passing through the bolt to check excessive withdrawal.

Bonnet (Passenger Cars). A **Platform Hood,** which see.

Books, Catalogues, Pamphlets, etc. (M. C. B. Standard Sizes). See **M. C. B. Reports.**

Boom (Steam Shovel). 6, Figs. 596-598. The heavy swinging arm which carries the boom engine and ratchet beam. It is stepped at the foot of the "A" frame and held in its inclined position by boom guys.

Boom Cap Clevis (of a Derrick, Steam Shovel or Crane). Figs. 596-598. A **Clevis,** which see, sometimes attached to the upper end of the boom, to which the fixed end of the hoisting rope is attached. In other cases the clevis for this purpose is carried on the hoisting block.

Boom Engine (Steam Shovel). 8, Figs. 596-598. An engine mounted on the boom to operate the ratchet beam.

Boom Foot Sheave (Steam Shovel). 31, Figs. 596-598. A fixed sheave or pulley at the bottom of the boom over which the hoisting chain is passed.

Boom Guys (Steam Shovel). 12, Figs. 596-598. Iron rods from the point of the boom to the top of the "A" frame, holding the boom in its inclined position.

Boom Idler Sheave (Steam Shovel). 32, Figs. 596-598. A fixed sheave mounted on the boom the purpose of which is to slightly change the direction of the hoisting chain.

Boom Point Sheave (Steam Shovel). 33, Figs. 596-598. The pulley at the outer end of the boom over which the hoisting chain runs. See **Boom Sheave.**

Boom Sheave (of a Derrick, Steam Shovel or Crane). Figs. 596-598. A sheave carried at the upper extremity of the boom, over which the hoisting chain passes.

Boom Shoe (of a Derrick or Crane). A casting carried at the foot of the mast and constructed so as to be able to revolve against the boom base. It is supported by boom shoe rods.

Boom Shoe Rods (of a Derrick or Crane). Iron rods attached to the head block or cap at the top of the mast and supporting the boom shoe.

Boom Shoe Rollers (of a Derrick or Crane). Rollers at the foot of the mast upon which the boom shoe revolves.

Boom Step and Trunnion (Steam Shovel). 11, Figs. 596-598. The socket in which the boom is seated and about which it turns.

Booster. A direct electro-motive force generator arranged to add its E. M. F. to that of another circuit or "boost" the same. Directly opposite of **Bucker.**

Boring Machine or **Borer** (Woodworking Machinery). Figs. 6797, 6810, 6819. A tool with one or more spiral cutting bits or augers mounted in a frame and rapidly revolved. The bits are sometimes vertical as in Fig. 6797, or horizontal as in Fig. 6819, or arranged to bore at any angle as in Fig. 6816.

Bosley Weather Strips. Figs. 2648-2651. See **Weather Strips.**

Boss or **Hub** (of a Steel Tired Wheel). The central portion, through which the axle passes. Boss is the usual British term, but little used in the United States.

Boston Finish Flush Door Bolt. Fig. 2262.

Bottle Bracket. Fig. 3674.

Bottle-Breaking Head (Babcock Fire Extinguisher). Fig. 3489. It breaks the acid bottle by screw pressure.

Bottom. "The lowest part of anything; as the bottom of a well, vat or ship."—Webster. See

Alcove Pan or **Bottom**	**Hopper Bottom.**
Candle Bottom.	**Lamp Bottom.**
Drop Bottom.	**Seat Bottom.**

Bottom Arch Bar. 15, Figs. 4705-4713. An inverted arch bar. The pedestal tie bar is sometimes called bottom arch bar. See **Arch Bar.**

Bottom Chord (of Trusses). See **Lower Chord.** Neither term is regularly used to designate any part of car trusses, but the side sills are bottom chords in trussed side frames.

Bottom Cross Piece (British). The transverse piece in the **Underframing,** which see, supporting the floor and partition. Also called bottom cross bar.

Bottom Door Panel (British). The lowest panel on the outside of the door of a carriage. See **Panel.**

Bottom Door Rail. 5, Figs. 1329-1337 and 147, Figs 599-619. The lower transverse piece of a **Door Frame,** which see.

Bottom Door Track. 66, Figs. 262-272, and Fig. 929. A door track below a sliding door. Usually a metal bar. Sliding doors are often provided with rollers or slides, which rest on the track. Freight car doors usually slide on a **Top Door Track,** which see. See also **Door Hanger** and **Car Door Hanger.**

Bottom End Piece (British). American equivalent, end sill. The transverse end piece in the underframe of a passenger vehicle.

Bottom Light Rail (British). A part of the body framing of a carriage, forming the bottom of the window opening.

Bottom Panel Batten (British). American equivalent, furring. In a carriage, a part of the body framing used to stiffen the panel, which is pinned to it. See **Bottom Side Panel.**

Bottom Plate (Metal Body Bolster). 12b, Figs. 262-272: 2, Figs. 1128-1129. See **Body Bolster.**

Bottom Rail (of a Sash or Door). 147, Figs. 599-619; 5, Figs. 1329-1337. The lowermost horizontal bar or member of a frame.

Bottom Side (British). The lower longitudinal framing of the body of a passenger vehicle.

Bottom Side and End Knee (British). A wrought iron knee, joining together the side and end members of the bottom of the body framing of a carriage.

Bottom Side Panel (British). The lowest panel on the outside of the body of a carriage.

Bottom Stove Plate (Baker Heater). Fig. 2730.

Bottom Truck Connection. The common name for a Brake Lever Coupling Bar, which see.

Bow. See **Platform Hood Bow.**

Bowl. See **Basin.**

Bowl (Pintsch Gas Lighting). Figs. 3126-3121. A glass bowl used on all center and vestibule lamps.

Box. See **Journal Box, Wheel Box** (Street Cars).

Box Bolt (Diamond Trucks). The bolts holding the journal box in place. More properly, journal box bolts.

Box Car. Figs. 1-11, 262-304; details, 697-931. A common form of American freight car, with roof and sides inclosed, to protect its contents. They are mounted upon two four-wheel trucks. They are usually lined for half their height with inside lining, and sometimes provided with an interior grain-tight grain door. See **Car, Freight Car.**

Box Cars (M. C. B. Recommended Practice for Inside and Outside Dimensions). In 1904, the inside dimensions of box cars approved by the American Railway Association; namely, 36 feet long, 8 feet 6 inches wide and 8 feet high, were adopted as a Recommended Practice.

In 1904, the following dimensions for box cars built on low trucks (3 feet 6 inches to top of floor) were adopted as Recommended Practice:

Height from top of rail to upper edge of eaves, 12 feet ¾ inch; width at eaves at above height, maximum, 9 feet 7 inches.

Box Car Details. Figs. 697-931.

Box Cars, Framing for (M. C. B. Recommended Practice). In 1904, the style of framing shown in Figs. 6021-6023 for cars of 60,000 pounds capacity was adopted as Recommended Practice.

In 1904, the style of framing shown in Figs. 6021-6023, for cars of 80,000 pounds and 100,000 pounds capacity, was adopted as Recommended Practice.

In 1904, the style of end framing shown in Figs. 6021-6023, for cars of 60,000 pounds, 80,000 pounds and 100,000 pounds capacity, was adopted as Recommended Practice.

In 1904, the use of a plank lining 1¾ inches thick, on the inside of the ends of cars, extending from the floor to the underside of the carline, was adopted as a Recommended Practice.

Box Car Side Door and End Door Fixtures. Figs. 5961-5999. (M. C. B. Recommended Practice.) In 1897 a committee on this subject reported with details which were afterward adopted by letter ballot as Recommended Practice of the Association.

Box Cover. See **Journal Box Lid.**

Box Cushion. Fig. 4180, etc. A cushion for passenger car seats made on a wooden frame. In distinction from a squab cushion, now little used, which is a loose pad on the seat. Box cushions are sometimes stuffed with hair or other elastic material alone, but usually steel springs are used in addition.

Box Fruit Car. Figs. 21, 341-344. See **Ventilated Box Car.**

Box Guide. See **Journal Box Guide, Pedestal.**

Box Lid. See **Journal Box Cover** or **Lid.**

Box Packing. **Journal Packing,** which see.

Box Room (Axle). The **Dust Guard Bearing,** which see.

Box Steps. 45, 46, 48, Figs. 599-619, 617-619. Passenger car steps made with wooden stringers or sides. They are distinguished from open steps. Ordinarily called platform steps.

Box Stock Car. An ordinary box car with large grated openings for ventilation, but excluding rain. Little used except for horses. See **Stock Car.**

Brace. 33, Figs. 262-272; 51, Figs. 599-619. An inclined beam, rod, or bar of a frame, truss, girder, etc., which unites two or more of the points where other members of the structure are connected together, and which prevents them from turning about their joints. A brace thus makes the structure incapable of altering its form from this cause, and it also distributes or transmits part of the strain at one or more of the joints toward the point or points of support, or resistance to that strain. A brace may be subjected to either a strain of compression or tension. In the former case, in car construction it is called simply a brace; in the latter it is called a brace rod.

They are called right or left handed, according to the inclination of their top to a person standing facing the car. See

Berth Brace.
Body Brace.
Brake Lever Bracket Brace.
Brake Shaft Step Brace.
Compression Beam Brace.
Door Brace.
End Brace.
Pedestal Brace.
Roof Brace.
Side Lamp Brace.

Brace Pocket. 39 and 41, Figs. 262-272, and Figs. 707-709. A casting which forms a socket for holding the ends of the braces in the car body framing. See **Brace,** also **Double Brace Pocket.**

Brace Rod. 34, Figs. 262-272. An inclined iron rod which acts as a brace. A vertical rod acting in conjunction with a brace is called a sill and plate rod, or, in passenger cars, for short rods below the window, brace straining rod. See **Body Brace Rod, Counterbrace Rod.**

Brace Rod Washer. 38, Figs. 262-272; Figs. 743-744 and 770-771. A bearing plate for the nut or head of a brace rod, sometimes made triangular or beveled shape, and sometimes a flat bar of iron bent to fit into a notch cut in the timber.

Brace Straining Rod (Passenger Car Framing). A vertical iron rod in the side or end frame of a car body by which the upper end of a brace is connected or tied to the sill of the car. The brace rods are members of the truss, of which the sill, braces, posts or plates, etc., form parts. Such rods often have hook heads at the upper ends against which the braces bear, and nuts at the lower ends by which they are screwed up, and are thus brought into a state of tension and the braces into compression. An equivalent in freight service is the sill and plate rod.

Bracket. 1. "An angular stay in the form of a knee to support shelves and the like."—Webster. See

Arm Rest Bracket.
Basket Rack Bracket.
Bell Cord Strap Hanger Bracket.
Berth Bracket.
Berth Curtain Rod Bracket.
Brake Lever Bracket.
Brake Shaft Bracket.
Brake Step Bracket.
Cylinder Lever Bracket.
Door Track Bracket.
Hand Rail Bracket.
Lamp Bracket.
Lamp Chimney Bracket.
Longitudinal Step Bracket.
Running Board Bracket.
Seat Rail Bracket.
Side Lamp Bracket.
Signal Lamp Bracket.
Sliding Door Bracket.
Smoke Bell Bracket.
Towel Roller Bracket.
Window Curtain Bracket.

2. (Framing for Bridges or Cars.) An L-shaped angle plate riveted to each of two members which it is desired to connect at right angles to each other as an end sill bracket or sill knee iron, 8, Figs. 599-619. A stronger form, now used in car construction, is called a triangular **Gusset Plate,** which see.

Bracket (Cast Iron Wheels). Fig. 5462, etc. The stiffening ribs cast on the plate.

Bracket Gas Burner. A gas burner attached to the side of a car. See **Bracket Lamp.**

Bracket Lamp. Figs. 3180-3182. A **Side Lamp,** which see. See **Pintsch Gas Lamp.**

Bracket Nut. A small nut, turned by a **Spanner,** which see.

Bracket Steps (Hopper Cars). 28, Figs. 474-477. Steps secured to the side of the car on the inside to serve as a substitute for a **Running Board,** which see.

Brake or **Brake Gear.** Figs. 1173-1325, 5072-5253; (M. C. B. Standards and Recommended Practice) Figs. 5710, 5519-5565, 5570-5571, 6000-6009, 6028-6176. The whole combination of parts by which the motion of a car is retarded or arrested. The **Foundation Brake Gear,** which see, includes all the parts by which the pressure of the air in the brake cylinder is transmitted to the wheels. See

Air Brake.
Automatic Air Brake.
Brake Beam.
Brake Lever.
Brake Shoe.
Foundation Brake Gear.
High Speed Air Brake.
Quick Action Brake.
Straight-Air Brake.
Traction Brake.
Vacuum Brake.
Westinghouse Brake.

Brake Axle (Hand Car). A shaft carrying a **Brake Shoe,** which see.

Brake Beam. Figs. 5083-5193; 84, Figs. 4771-4777. Transverse iron, steel, or wooden bars to which the brake heads and shoes are attached. They are either inner hung or onter hung, and often trussed especially in passenger service.

Brake Beam Adjusting Hanger. A link sometimes attached to a brake beam to cause the latter and the brake head and shoe to maintain the same relative positions when the brakes are released, so as to prevent the ends of the brake shoes from coming in contact with the wheel when the brakes are released. It is attached to the truck transoms or truck bolster in freight trucks, and to the truck frame end piece in passenger trucks, by a projecting brake beam adjusting hanger carrier, and to the brake beam by an eye or clip. Sometimes called a parallel brake hanger.

Brake Beam Adjusting Hanger Carrier. See above.

Brake Beam Chafing Plate. A plate attached to a brake beam against which a brake spring bears, designed to resist the wear due to the action of the spring.

Brake Beam Data. (M. C. B. Standard.) Fig. 5710. Certain dimensions and capacities of brake beam were adopted as standard of the Association, by letter ballot, in 1889, and these standards, as modified by subsequent action, are shown for iron brake beams.

All beams must be capable of withstanding a load of 7,500 pounds at center without more than $\frac{1}{8}$ inch deflection; where it is necessary to use a stronger beam it must be capable of standing a load of 15,000 pounds at center without more than $\frac{1}{8}$ inch deflection.

The angle of brake beam lever is 40 degrees from vertical. Standard heights of brake beams, when measured from the tops of the rails to the center of the face of new shoes, were adopted in 1894, as follows:

For inside hung beams, 13 inches.

For outside hung beams, 14½ inches.

In 1907 the following details for brake beams and gages were adopted as standard:

All brake beams shall be 60¼ inches in length from center to center of break head, with an allowable variation of ⅛ inch in either direction.

All brake beams shall be proven by gage shown, which shall be the standard gage for this purpose

Attachments for safety hangers shall be 51 inches from center to center.

The angle of the lever fulcrum shall be 40 degrees from the vertical.

The lever pin hole shall be either 2 inches or 3 inches in front of the top of the brake head lugs. The variations in either directions from above measurements shall not exceed $\frac{1}{16}$ inch. Holes should be made straight and true by drilling, reaming or broaching, and shall be not less than $1\frac{3}{32}$ inches nor more than 1⅛ inches in diameter.

All lever pin holes shall be proven by gage shown, which shall be the standard gage for that purpose.

In 1908 the following detail regarding brake beams was advanced from Recommended Practice to Standard:

Brake beam hangers shall be ⅞ inch in diameter.

In 1908 two brake beams were adopted as standard, as follows:

Brake beam No. 1 to be suitable for cars weighing not over 35,000 pounds light weight.

Brake beam No. 2 to be suitable for cars exceeding 35,000 pounds light weight.

BRAKE BEAM SPECIFICATIONS AND TESTS.

For each 500 brake beams or less, which pass inspection and are ready for shipment, one representative beam shall be taken at random and subjected by the company manufacturing the beams, and in the presence of the railroad company's inspector, to the following test in a suitable machine:

The beams shall be equipped with suitable heads and shoes, and the shoes placed in contact with castings representing the tread of the wheel; when mounted in this manner the load shall be applied to the fulcrum in the normal line of pull. As a preliminary to the test a load of 6,000 pounds shall be applied and released, after which observations for records shall be taken. Beam No. 1, under a load of 6,500 pounds shall not deflect to exceed .0625 inch; beam No. 2, under a load of 12,000 pounds, shall not deflect to exceed .0625 inch.

In case a beam shall fail in this test, then a second beam shall be taken from the same lot and similarly tested. If the second beam stands the test it shall be optional with the inspector whether he shall test a third beam or not. If he does not do so, or if he does, and the third beam stands the test, the 500 beams or less shall be accepted as filling the requirements of this test.

Individual beams will not be accepted which (1) do not conform to standard dimensions, and (2) those that have physical defects. Any lot of 500 beams or less submitted for test that failed to meet the prescribed test will not be accepted.

On cars built after September 1, 1909, it will not be permissible to hang brake beams from any portion of the body of the car.

In 1907 the following details regarding brake beams were adopted as recommended practice:

That brake hangers shall have an angle as nearly as possible to 90 degrees from a line drawn from the center of the brake shoe to the center of the axle when the shoes are half worn.

That brake-beam hanger brackets shall be attached to some rigid portion of the truck.

That the opening between the gibs of the yoke for the 9½-inch butt-coupler be made 6¾ inches instead of 7¾ inches, in order to increase the bearing of the present yoke on the coupler butt.

Brake Beam Eye Bolt. Properly an eye bolt for fastening a lower brake rod to a wooden brake beam, they have threads cut nearly their entire length, and usually a nut is placed on each side of the brake beam, which can be screwed up so as to take up the wear of the brake shoes.

Brake Beam Fulcrum. See **Brake Lever Fulcrum.**

Brake Beam Gage (M. C. B. Standard). A metal templet for ascertaining or regulating the several dimensions of standard brake beams. See **Templet.** In 1907 a standard brake beam gage was adopted. Fig. 5708.

Brake Beam Hanger (Hand Car). 28, Figs. 6207-6209. A **Brake Hanger,** which see.

Brake Beam King Post. A post or distance piece which forms a bearing for the truss rods of a brake beam. In metal brake beams the brake lever is attached to it, and it then becomes a brake lever fulcrum.

Brake Beam Release Spring. See **Release Spring.**

Brake Beam Safety Chain. See **Brake Safety Chain.**

Brake Beam Safety Guard. See **Brake Safety Chain.**

Brake Beam Strut. A **Brake Beam King Post,** which see.

Brake Beam Truss Rod. A rod used to truss or strengthen a brake beam.

Brake Block. Another name for a **Brake Head,** which see. Brake block is the usual British term for the combined brake head and shoe. The two are often combined in one piece on British cars, no removable shoe being used.

Brake Carrier. See **Brake Hanger Carrier.**

Brake Chain. See **Brake Shaft Chain.**

Brake Chain Connecting Rod. An iron rod connecting the brake chain to one of the brake levers, usually the floating lever.

Brake Chain Sheave. 160a, Figs. 648-651. An iron wheel or pulley around which the brake chain passes.

Brake Chain Worm. 1. 160, Figs. 648-651; Fig. 946. A conical casting attached to the brake shaft with a screw-shaped groove for the brake chain. Its object is to produce a rapid motion at first and increase the power when the brake shoes are brought to a bearing.

2. A cylindrical casting with a screw-shaped groove intended only to make the chain wind evenly.

Brake Clevis. A **Brake Lever Fulcrum,** which see.

Brake Connecting Rod. More properly, **Brake Chain Connecting Rod,** which see.

Brake Connection. Fig. 867. A **Brake Rod,** which see. A round iron rod, usually made with jaws on the ends to fit over the brake levers. They transmit the pressure on the brake cylinder piston from one brake lever to another and finally to the brake shoes. The rods take their names from the brake

lever to which they are attached which is farthest from the cylinder.

Brake Cord Guide. A guide similar to a bell cord guide for the air brake cord, which passes through every car fitted with the Westinghouse air brake apparatus, and operates the conductor's valve. See **Bell Cord.**

Brake Cut-out Cock. Fig. 1281. A valve inserted in the branch pipe from the brake pipe to the triple valve which can be closed and the brakes on that one car put out of action in case they are not working properly. The closing of this valve does not interfere with the operation of the brakes under any other car in the train.

Brake Cylinder (Air Brake). Figs. 1257-1276. A cast iron cylinder attached to the frame of the car, containing a piston which is forced outwardly by the compressed air to apply the brakes, and when the air pressure is released is returned to its normal position by a release spring coiled about the piston rod inside the cylinder. On passenger cars the brake cylinder is fitted with two heads, the pressure head and the non-pressure head. For freight cars the brake cylinder and the auxiliary reservoir are usually combined, the reservoir being bolted to one end of the cylinder and forming one of the cylinder heads. The piston rod of the passenger brake cylinder, Fig. 1257, has a crosshead at its outer end, to which is attached the cylinder lever. The piston rod of the freight brake cylinder, Fig. 1259, is hollow and loosely encloses a push rod which is attached to the cylinder lever. In the **Vacuum Brake,** which see, a somewhat similar cylinder is used.

Brake Cylinder Block (Westinghouse Freight Brake). A stick for attaching the combined Cylinder and auxiliary reservoir to the under side of the sills. See **Auxiliary Reservoir Beam,** a similar part for passenger cars.

Brake Cylinder Pipe (Westinghouse Brake). The pipe which connects the brake cylinder with the triple valve.

Brake Cylinder Plate (Westinghouse Freight Brake). Fig. 884. The steel plate to which the brake cylinder is bolted and by which it is attached to the sills.

Brake Dog. A **Brake Pawl,** which see.

Brake Drum. A **Brake Shaft Drum,** which see.

Brake Eye Bolt. A **Brake Beam Eye Bolt,** which see.

Brake Finger. A **Brake Pawl,** which see.

Brake Foot Board. A **Brake Step,** which see.

Brake Gear (Air) for Freight Cars (M. C. B. Standards). Figs. 1101-1188. See **Air Brakes, General Arrangements and Details, Foundation Brake Gear.**

Brake Gear, Foundation (M. C. B. Standard and Recommended Practice). Freight, Figs. 5527-5565. Passenger, Figs. 6028-6176. See **Foundation Brake Gear.**

Brake Hand Rail. 190, Figs. 352-355. A hand rail, on the roof of box and stock cars, usually made of gas pipe, for the protection of brakemen when applying brakes. It is stiffened by a hand rail brace.

Brake Handle. See **Lindstrom Ratchet Brake Handle.**

Brake Handle Wheel. 93, Figs. 262-272 and Figs. 731-732. See **Brake Wheel.**

Brake Hanger. 86, Figs. 4771-4773. A link or bar by which brake beams and attachments are suspended from a truck frame or car body. It is attached to the truck or car body by a brake hanger carrier. Brake hangers are distinguished as hooked, linked and U-shaped. Best practice locates this hanger so as to have the brake shoes a predetermined height above the rail, thus insuring the same piston travel, regardless of whether the car is empty or loaded.

2. (British.) A wrought iron bar by which the brake block is suspended. No brake beam is commonly used.

Brake Hanger Bearing. Fig. 4864. A pin held in a brake hanger carrier, which forms a bearing for a brake hanger.

Brake Hanger Bolt. A bolt which fastens the brake hanger to the brake hanger carrier.

Brake Hanger Bracket (British). American equivalent, brake hanger bearing. A bearing for the brake hanger, generally made of wrought iron.

Brake Hanger Carrier. 87, Figs. 4771-4777 and Fig. 4854. An eye or U-bolt, a casting or other fastening by which a brake hanger is attached to the truck or body of a car. See **Brake Beam Adjusting Hanger Carrier.**

Brake Hanger Pin. Fig. 4864. A pin passing through the brake hanger carrier and brake hanger.

Brake Hanger Timber. A short transverse timber between the floor timbers of a car body, which is framed into them, and to which the brake hangers, when hung from the body of a car, are attached.

Brake Head. 83, Figs. 4771-4777, 5205. A casting attached to a brake beam which carries a detachable **Brake Shoe,** which see. See **Christie Brake Shoe** and below.

Brake Head Gage (M. C. B. Standard). A metal templet for ascertaining or regulating the several dimensions of standard brake heads. See **Templet.** In 1907 a standard brake head gage was adopted. Fig. 5706.

Brake Head and Shoe (M. C. B. Standard). Figs. 5519-5526. The brake head and shoe shown and known as the Christie brake head and shoe, were adopted as a standard of the Association, by letter ballot in 1886, with the exception of some slight modification in details made since that date. Drawing revised in 1896 and in 1898.

The revision made in 1896 consisted in the modification of the designs of brake head and shoe so as to secure increased clearance at the ends of shoe and equal clearance both above and below the central lug on the back of the shoe; also, the addition of brackets to support the lower bridge lug of brake head similar to the brackets formerly used to support the upper bridge lug. The taper of the shoe was altered so that it would correspond with the taper of the standard wheel tread, by increasing the thickness of the inner edge of the shoe from $1\frac{3}{16}$ inches to $1\frac{5}{16}$ inches.

The revision made in 1898 consisted in reducing the clearance allowed on either side (above and below) the central lug of brake shoe and adjacent lugs of brake head from $\frac{1}{8}$ inch to $\frac{1}{16}$ inch—the change being made wholly in the head and no change in the shoe.

In 1907 the drawing was further revised to show only the standard dimensions of the brake head and also in the combined drawing of the brake head and shoe.

The drawing showing the shoe was also revised in part, as well as a drawing showing the relation of hands of head and shoe.

In 1908 the projection top and bottom at back of brake shoe, which forms spacer between lugs of brake head, was increased to $\frac{9}{16}$ inch in depth.

Brake Head Gage (M. C. B. Standard). Fig. 5706.

Brake Hose (Air Brakes). Figs. 1290, 1323. Flexible tubes made of rubber and canvas by which the cars are connected together, and compressed air, which operates the brakes, conducted through the train. The hose is made with a coupling at each end of the car, so that it can readily be connected or disconnected. See **Armored Brake Hose** and **Air Hose.**

Brake Hose Armor. See **Armored Brake Hose.**

Brake Hose Bracket. Fig 1315.

Brake Hose Clamp. Fig. 1291.

Brake Hose Coupling (Air Brake). Figs. 1285. A contrivance for coupling or connecting the ends of a pair of brake hose together, so that the air by which the brakes are operated can pass from one vehicle in a train to another. The couplings for train air signal apparatus are similar to brake hose couplings, but are arranged so that they will not couple to the latter.

Brake Hose Coupling Case (Air Brake). Fig. 1285. A hollow casting which joins the main part of a coupling to which the hose is attached.

Brake Hose Nipple (Air Brake). Fig. 1287. A short iron tube fitting into the end of the brake hose and fastened by a suitable clamp and screws. One end is threaded and screws into the angle cock.

Brake Hose, Specifications for. (M. C. B. Standard.) In 1901 specifications and tests for air brake hose were adopted as Recommended Practice. Advanced to Standard in 1903. Revised 1905.

1. All air brake hose must be soft and pliable, and not less than two-ply nor more than four-ply. They must be made of rubber and cotton fabric, each of the best of its kind made for the purpose. No rubber substitutes or short-fiber cotton to be used.

2. The tube must be hand-made, composed of three calenders of rubber. It must be free from holes and imperfections, and in joining must be so firmly united to the cotton fabric that it cannot be separated without breaking or splitting the tube. The tube must be of such composition and so cured as to successfully meet the requirements of the stretching test given below; the tube to be not less than 3-32 inch thick at any point.

3. The canvas or woven fabric used as wrapping for the hose to be made of long-fiber cotton, loosely woven, and to be from 38 to 40 inches wide, and to weigh not less than 20 and 22 ounces per yard, respectively. The wrapping must be frictioned on both sides, and must have, in addition, a distinct coating or layer of gum between each ply of wrapping. The canvas wrapping must be applied on the bias. Woven or braided covering should be so loose in texture that the rubber on either side will be firmly united.

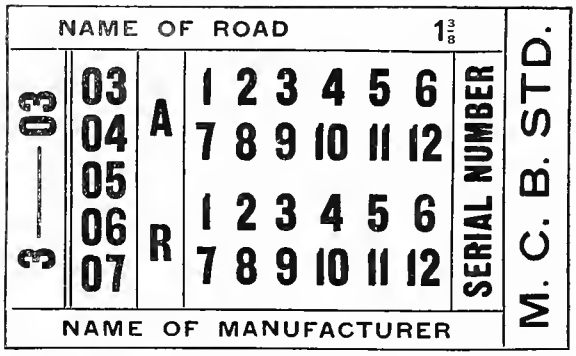
4. The cover must be of the same quality of gum as the tube, and must not be less than $\frac{1}{16}$ inch thick.

5. Hose is to be furnished in 22-inch lengths. Variations exceeding ¼ inch in length will not be permitted. Rubber caps not less than $\frac{1}{16}$ inch nor more than ⅛ inch must be vulcanized on each end.

6. The inside diameter of hose must not be less than $1\frac{3}{8}$ inches nor more than $1\frac{7}{16}$ inches, nor must the outside diameter exceed $2\frac{1}{8}$ inches. Hose must be smooth and regular in size throughout its entire length, except at a point $2\frac{1}{2}$ inches from either end, where the inside calendar of rubber may be increased $\frac{1}{16}$ inch for the distance of ¼ inch toward either end and then tapering to the regular diameter.

7. Each length of hose must have vulcanized to it a badge of white or red rubber, as shown. On the top of the badge the name of the purchaser; on the bottom the maker's name; on the left-hand end the month and year of manufacture, and on the right-hand end the serial number and the letters "M. C. B. Std." These letters and figures must be clear and distinct, not less than $\frac{1}{16}$ inch in height, and stand in relief not less than $\frac{1}{32}$ inch, so that they can be removed by cutting without endangering the cover. Each lot of 200 or less must bear the manufacturer's serial number, commencing at one (1) on the first of the year, and continuing consecutively until the end of the year.

For each lot of 200, one extra hose must be furnished free of cost.



The above gives outline of modification of label, extension being on right hand end.

8. Test hose will be subject to the following tests:

Bursting Test.—The hose selected for test will have a section 5 inches long cut from one end and the remaining 17 inches will then be subjected to a hydraulic pressure of 100 pounds per square inch, under which pressure it must not expand more than ¼ inch nor develop any small leaks or defects. The section will then be subjected to a hydraulic pressure of 400 pounds per square inch for ten minutes, without bursting.

Friction Test.—A section one inch long will be taken from the 5-inch piece previously cut off, and the quality determined by suspending a 20-pound weight to the separated end, the force being applied radially, and the time of unwinding must not exceed 8 inches in ten minutes.

Stretching Test.—Another section one inch long will be cut from the balance of the 5-inch piece, and the rubber tube or lining will be separated from the ply and cut at the lap. Marks two inches apart will be placed on this section, and then the section will be quickly stretched until the marks are 8 inches apart and immediately released. The section will then be remarked as at first and stretched to 8 inches and will remain so stretched 10 minutes. It will then be released, and 10 minutes later the distance between the marks last applied will be measured. In no case must the test piece break or show a permanent elongation of more than ¼ inch between the marks last applied. Small strips taken from the cover or friction will be subjected to the same tests.

9. If the test hose fails to meet the required tests, the lot from which it was taken may be rejected without further examination and returned to the manufacturer, who shall pay the freight charges

in both directions. If the test hose is satisfactory, the entire lot will be examined, and those complying with the specifications will be accepted.

In 1907 the following specifications were adopted for Woven and Combination Woven and Wrapped Air-Brake Hose, as Recommended Practice. In 1908 they were advanced to Standard.

All air-brake hose under this specification is to consist of not less than three plies of woven, braided or knitted fabric, or of two or more plies of canvas wrapping surrounded by at least one ply of woven, knitted or braided fabric. The hose should be flexible without kinking easily. The rubber, fabric or duck should be the best of its kind made for the purpose, and no rubber substitute or short-fiber fabric will be allowed.

The inner tubes should be composed of three calenders of rubber and not less than $\frac{3}{32}$ inch thick at any point. Should a machine-made tube be used, it must not be less than $\frac{1}{8}$ inch thick at any point. It must be free from holes and imperfections, and in joining it must be so firmly united to the cotton fabric that it cannot be separated without breaking or splitting the tube. Each ply of the hose should be separated by a distinct layer of rubber, and over this is to be a cover $\frac{1}{16}$ inch thick, and at each end a $\frac{1}{16}$-inch cap should be vulcanized on, the cover and the cap to be of the same material as the inner tube.

The hose is to be furnished in 22-inch lengths, and variations exceeding $\frac{1}{4}$ inch from this length will not be permitted. The rubber caps at each end are not to be less than $\frac{1}{8}$ inch nor more than $\frac{1}{4}$ inch thick. The inside diameter of the hose must not be less than $1\frac{3}{8}$ inches not more than $1\frac{7}{16}$ inches, nor must the outside diameter be less than $2\frac{5}{32}$ inches nor greater than $2\frac{3}{32}$ inches. The hose must be smooth and regular in size throughout its entire length.

Each hose must have vulcanized to it a badge of white or red rubber as shown; on the top of the badge the name of the purchaser, on the bottom the maker's name, on the left-hand end the month and year of manufacture, and on the right-hand end the serial number and letters "M. C. B. Standard." The letters and figures must be clear and distinct, not less than $\frac{3}{8}$ inch in height, and stand in relief not less than $\frac{1}{32}$ inch, so they can be removed by cutting without endangering the cover.

Each lot of 200 or less must bear the manufacturer's serial number, commencing at "1" on the first of the year and continuing consecutively until the end of the year, and the serial number should not be duplicated, even though the hose bearing the original numbers be rejected. For each lot of 200, one extra hose must be furnished free of cost.

Tests to which samples will be subjected:

Bursting Test.—All hose selected for test will have a section 5 inches long cut from one end and the remaining 17 inches will then be subjected to a hydraulic bursting pressure of 400 pounds per square inch for 10 minutes, which it must stand without failure. At a pressure of 100 pounds per square inch it must not expand more than $\frac{1}{4}$ inch in diameter or change in length more than $\frac{1}{4}$ inch, nor develop any small leaks or defects.

Friction Test.—A section 1 inch long will be taken from the 5-inch piece previously cut off, and the quality determined by suspending a 20-pound weight to the separated end, the force being applied radially, and the time of unwinding must not exceed 8 inches in 10 minutes.

Stretching Test.—Another section 1 inch long will be cut from the balance of the 5-inch piece and the inner tube or lining will be separated from the ply and cut at the lap. Marks two inches apart will be placed on this section, and then the section will be quickly stretched until the marks are 8 inches apart and immediately released. The section will then be remarked as at first and stretched to 8 inches and will remain so stretched 10 minutes. It will then be released and 10 minutes later the distance between the marks last applied will be measured. In no case must the test piece break or show a permanent elongation of more than $\frac{1}{4}$ inch between the marks last applied. One-inch strips will also be taken from the cover and will be subjected to the same test.

Tensile Test.—Another section 1 inch long will be cut from the remainder of the 5-inch piece and the rubber tube or lining will be separated from the ply and cut at the lap. It will then be reduced in the middle for a distance of 2 inches by $\frac{1}{2}$ inch wide parallel. The parallel section shall be spread to the full width of 1 inch at the end by curves of $\frac{1}{2}$ inch radius. This specimen shall be stretched uniformly by gripping the enlarged ends, and in no case should the tensile strength per square inch be less than 400 pounds, nor the elongation at the time of failure less than 8 inches, measured by marks placed originally 2 inches apart before breaking.

If the test hose fails to meet the required tests the lot from which it was taken may be rejected without further examination and returned to the manufacturer, who shall pay the freight charges in both directions. If the test hose is satisfactory the entire lot will be examined and those complying with the specifications will be accepted.

Brake Jaw. Fig. 5215.

Brake Lever (Air Brakes). Figs 4842, 5209. A general term including all the levers in the **Foundation Brake Gear**, which see. See also **Dead Lever, Live Lever, Floating Lever, Cylinder Lever.**

Brake Lever Arrangement (Traction Brakes). Fig. 1289.

Brake Lever Bracket. A wrought iron knee on the under side of a car, to which the fulcrum of a brake lever is sometimes attached.

Brake Lever Bracket Brace. A diagonal wrought iron brace to stiffen the brake lever bracket.

Brake Lever Clevis. A **Brake Lever Fulcrum**, which see.

Brake Lever Coupling Bar (Inner Hung Brakes). A compression bar connecting the two brake levers (dead lever and live lever), to which it is fastened by the coupling bar pin. When the brakes are outer hung, this member becomes in tension instead of compression and is known as the lower brake rod. It is usually called bottom truck connection.

Brake Lever Fulcrum. 93, Figs. 4771-4777, and Figs. 4938-4939, 5201-5202. A forked iron attached to the brake beam, by means of which a brake lever is connected to the beam. In the trussed metal brake beam the king post of the brake beam becomes the brake lever fulcrum. See **Brake Beam King Post.**

Brake Lever Guard (British). No American equivalent. A curved wrought iron bar which confines the

movement of the brake lever within proper limits. See also **Brake Lever Ratchet.**

Brake Lever Guide. 95, Figs. 4771-4777; Figs. 845-847, 4856-4858. An iron bar which guides the upper end of a brake lever. Further distinguished as live lever and dead lever guides, the latter provided with pins for readjustment as the brake shoes wear; and also called a brake lever stop.

Brake Lever Handle (British). The handle at the end of the brake lever.

Brake Lever Jaw. A **Brake Lever Fulcrum,** which see.

Brake Lever Ratchet (British). Teeth cut in the **Brake Lever Guard,** which see, to prevent the brake coming off after being applied.

Brake Lever Stop. 95, Figs. 4771-4777 and Fig. 5223. An iron bar or loop attached to a truck or car frame, and which holds the upper end of a fixed or dead brake lever. It usually has holes in it in which a fulcrum pin is inserted. By moving the pin from one hole to another the lever is adjusted so as to take up the wear of the brake shoes. More commonly **Dead Lever Guide,** which see.

Brake Lever Strut. Figs. 5216-5217. A brake lever coupling bar or **Bottom Truck Connection,** which see.

Brake Mast. A **Brake Shaft,** which see.

Brake Pawl. 103, Figs. 262-272, etc., and Figs. 879-880. A small pivoted iron bar for engaging in the teeth of a **Brake Ratchet Wheel,** which see. It is placed in such a position as to be worked in or out of engagement with the ratchet wheel teeth by the foot.

Brake Pawl Carrier. Fig. 749. See **Brake Pawl** and **Brake Ratchet Wheel.**

Brake Pawl Dog. Fig. 779. A pivoted casting serving as a weight to throw up the brake pawl so as to engage with the ratchet when the ratchet is on the under side of the brake ratchet wheel. Also applied to an eccentric which holds a pawl against a ratchet wheel.

Brake Pin. Fig. 853. A small metal pin used in the brake lever connections.

Brake Pipe (Air Brake). An iron pipe extending from one end of the car to the other, under the car body and connected to the pipes on adjoining cars by flexible brake hose. The air from the air pump or motor compressor is conveyed through the brake pipe to the auxiliary reservoir under each car. The brake pipe is normally filled with compressed air at 70 lbs. pressure and the auxiliary reservoirs with air at the same pressure. A reduction of this pressure in the brake pipe of from 5 to 20 lbs. causes the triple valves to open communication between the auxiliary reservoir and the brake cylinder so that the compressed air stored in the reservoir acts on the piston and brake levers and applies the brakes. This is called a service application. In case the train parts or a hose bursts, the air is suddenly and completely released from the brake pipe and the triple valves automatically apply the brakes as before, only with more speed and greater power at first. In an emergency application the full main reservoir pressure of 90 to 110 lbs. is turned into the brake pipe and this increase of pressure causes the triple valves to open communication from the brake pipe direct to the brake cylinder, applying the brakes with great force and very suddenly. To release the brakes the brake pipe pressure is restored to normal and the triple valves equalize the pressures in the auxiliary reservoirs and the brake pipe, at the same time opening the brake cylinder to the atmosphere and releasing the brakes. This pipe is sometimes called train pipe, train line, or train brake pipe, but its proper name is brake pipe to distinguish it from the signal and steam heating pipes.

Brake Pipe Air Strainer. Fig. 1283. A wire strainer inserted in the brake pipe to prevent foreign matter from entering the brake apparatus under the car.

Brake Pipe Strainer (Air Brake). Fig. 1283. A **Brake Pipe Air Strainer,** which see.

Brake Ratchet Gear, Complete. Includes the ratchet wheel, the pawl, the dog, the carrier.

Brake Ratchet Wheel. 103, Figs. 262-272. A wheel attached to a brake shaft, having teeth shaped like saw teeth, into which a pawl engages, thus preventing the wheel and shaft from running backward. In some forms the ratchet wheel has the ratchet upon the under side, instead of on the edge; the brake pawl being automatically pressed upward against the teeth by a counterweight, called a brake pawl dog, and without being adjusted by the foot of the brakeman. Such a ratchet wheel is shown in Fig. 761. The brake pawl is pivoted in the brake pawl carrier, Fig. 681, which latter is bolted to the roof of the car.

In 1879 the M. C. B. Convention recommended that the practice of placing the ratchet gear on a small platform or brake step be discontinued, and that it be fastened to a suitable casting on the roof. Their recommendation has not been universally adopted, though it is a very common practice.

Brake Reservoir Plate. Figs. 910-912. See **Reservoir Plate.**

Brake Rod. 1. Any rod serving to connect brake levers, but especially the **Lower Brake Rod,** 97, Figs. 4771-4777, which see. The brake shaft connecting rod is sometimes called the main brake rod.

2. (British.) A bar of iron connecting the brake shaft arms to the brake blocks.

Brake Rod Guide. Any form of special support for a brake rod.

Brake Safety Chain or **Link.** 88, Figs. 4771-4777 and Fig. 4873. A chain attached by brake safety chain eye bolts to a brake beam and to the truck or body of a car. It is intended for the same purpose as a **Brake Safety Strap,** which see, to hold the brake beams in case a brake hanger should break. Sometimes made of a single link or bar. A brake beam safety guard is not bolted or fastened to the brake beam, but is usually a T-shaped forging, the stem being bolted to the truck frame, the cross bar hanging under the brake beam to prevent it falling upon the track if the hanger breaks.

Brake Safety Chain Eye Bolt. Figs. 944-945; 89, Figs. 4771-4777. An eye bolt attached to a truck or car body, and which holds a brake safety chain.

Brake Safety Strap. 90, Figs. 4771-4777. A strap of iron fastened to the end piece or transom of a truck and bent into such a shape as to embrace the brake beam. In case any of the hangers should give way, the safety strap is intended to catch and hold the beam and prevent it from falling on the track. Sometimes it is made of steel, and used as a release spring for throwing off the brake. A **Brake Safety Chain,** which see, is another device for the same purpose.

Brake Shaft. 1. 94, Figs. 262-272, 5203-5204, 5207-5208. A vertical iron shaft on which a chain is wound and by which the power of a hand brake is applied to the wheels. It is sometimes made horizontal,

and so called, as 95, Figs. 267-268, etc. In box and stock cars it extends above the roof, and is called a long brake shaft.

The M. C. B. Association (1879) recommended "that all brake shafts be placed on the left-hand corner of a car when a person is standing on the track facing the end of the car." See **Horizontal Brake Shaft, Long Brake Shaft.**

2. (British.) A horizontal shaft to which are attached brake shaft arms, which actuate the brake blocks. A long lever is attached to it, provided with a handle, by which the brakes can be applied.

Brake Shaft (M. C. B. Standard Position and Dimensions). Figs. 5635-5636. See **Safety Appliances.** In 1907 a standard maximum height of brake staff, for standard box cars from top of rail to top of brake staff of 14 ft., was adopted.

Brake Shaft Arm (British). See above.

Brake Shaft Bearing. Figs. 749-752, 772-773, 783-784. A metal eye by which a brake shaft is held in its place, and in which it turns. See **Brake Shaft Step, Lower Brake Shaft Bearing, Upper Brake Shaft Bearing.**

Brake Shaft Bevel Gear Wheel. 160a, Figs. 648-651. A bevel gear on the lower end of the brake shaft engaging with a similar gear on the horizontal brake chain worm.

Brake Shaft Bracket. 99, Figs. 267-268. A support for holding a horizontal brake shaft in its place.

Brake Shaft Chain. Figs. 875-876. A chain connecting the brake shaft with the brake levers through the brake shaft connecting rods, to the end of which it is attached. The force exerted on the shaft is transmitted by this chain. See **Horizontal Brake Shaft Chain.**

Brake Shaft Chain Sheave. 105, Figs. 262-272. A roller over which a brake shaft chain passes.

A sheave attached to the end sill for the chain of a horizontal brake shaft to work in, 105, Figs. 267-268.

A sheave or pulley is sometimes attached to the end of the hand brake connection and the brake chain, secured at one end to the end sill of the car, is passed around this sheave and back to the brake shaft winding drum. It thus doubles the power of the hand brake, but also doubles the amount of chain to be wrapped and is objectionable from this standpoint.

Brake Shaft Connecting Rod. Figs. 873-874. A rod which is attached at one end to a brake chain and at the other to one of the levers in the foundation brake gear.

Brake Shaft Crank (Street Cars). An elbow attached to the upper end of the brake shaft, carrying a handle for turning the brake shaft and operating the brake. See **Lindstrom Ratchet Brake Handle.**

Brake Shaft Crank Handle (Street Cars). Called also a brake shaft crank or a brake handle. See above.

Brake Shaft Cross Bearer (British). A piece of timber secured to the underframe and carrying a wrought iron bracket, in which the brake shaft works.

Brake Shaft Drum. The part of a brake shaft on which the brake chain is wound. See **Brake Chain Worm.**

Brake Shaft Gear Wheel. 160a, Figs. 648-651. A bevel gear wheel attached to the brake shaft, by which the power applied to the brake hand wheel is conveyed to a horizontal winding shaft or worm, called a brake chain guide casting.

Brake Shaft Hanger (British). A bracket by which the brake shaft is carried and in which it is free to revolve.

Brake Shaft Holder. A **Brake Shaft Bearing,** which see.

Brake Shaft Stand. A **Brake Shaft Step,** which see.

Brake Shaft Step. 100, Figs. 262-272, etc.; Figs. 820-821. A bearing which holds the lower end of a brake shaft. It usually consists of a U-shaped bar of iron, the upper ends of which are fastened to the car body, with a hole in the curved part of the bar which receives the end of the shaft. The brake shaft step should not be confounded with a brake step, which latter is a shelf on which the brakeman may step when applying brakes.

Brake Shaft Step Brace. A wrought iron brace attached to the brake shaft step to resist the pull of the brake chain.

Brake Shaft Thimble. An iron bushing attached to the end of the car to form a bearing for a brake shaft.

Brake Shoe. Figs. 5236-5253; 98, Figs. 4771-4777. A piece of metal shaped to fit the tread of a car wheel and attached by a key or otherwise to a brake block or brake head. The brake shoe rubs against the tread of the wheel when the brakes are applied. Such shoes are made of cast, wrought or malleable iron or steel, usually cast iron.

Brake Shoe Key. Fig. 5524. A key or wedge by which a brake shoe is fastened to a brake block.

Brake Shoes, Specifications for (M. C. B. Standard). In 1901 the following specifications were adopted as standard as a result of letter ballot:

For Cast Iron Chilled Wheels.—Shoes when tested on the Master Car Builders' Association testing machine, in effecting stops from an initial speed of forty miles per hour, shall develop upon a cast iron chilled wheel a mean coefficient of friction not less than

22 per cent. when the brake shoe pressure is 2,808 pounds.

20 per cent. when the brake shoe pressure is 4,152 pounds.

16 per cent. when the brake shoe pressure is 6,840 pounds.

For Steel Tired Wheels.—Shoes, when tested on the Master Car Builders' Association testing machine, in effecting stops from an initial speed of sixty-five miles per hour, shall develop upon a steel tired wheel a mean coefficient of friction of not less than

16 per cent. when the brake shoe pressure is 2,808 pounds.

14 per cent. when the brake shoe pressure is 4,152 pounds.

12 per cent. when the brake shoe pressure is 6,840 pounds.

Brake Slack Adjusters. Figs. 1173-1182, 1187-1192, 1259. A device to automatically take up any slack in the brake gear between the air brake cylinder and the brake shoe, so that the piston travel shall not be too great. See **Slack Adjuster.**

Brake Spool. Also see **Brake Shaft Drum.** An enlargement by a sleeve or otherwise of a brake shaft to give greater speed and less power to the brake gear. A **Brake Chain Worm,** which see, is a somewhat similar device.

Brake Spool Step (Logging Cars). A U-shaped strap inclosing the brake spool, and equivalent to a **Brake Shaft Step,** which see.

Brake Spring. A **Release Spring,** which see.

Brake Staff. A **Brake Shaft**, which see.

Brake Step. 100, Figs. 262-272, etc. A small shelf or ledge on the end of a freight car near the top, on which the brakeman stands when applying the brake from the top of a car. Also called a brake footboard. A brake step should not be confounded with a **Brake Shaft Step**, which see, which is a bearing for the lower end of a brake shaft.

The use of brake steps has been discouraged by the Master Car Builders' Association, which recommended (Chicago, 1879) "that the small platform (brake step) placed at one end of freight cars, to fasten the brake pawl, etc., be discontinued; the ratchet wheel and pawl to be fastened to a suitable casting on the roof."

Brake Step Bracket. 101, Figs. 262-272; and Figs. 897-899. An iron bracket to support a brake step.

Brake Strut. 97, Figs. 4771-4777. A compression bar or strut between the live and dead levers of a truck with inside hung brakes. Probably the term brake strut is more common than brake lever coupling bar. Brake strut should not be confused with brake beam strut. A **Brake Lever Coupling Bar**, which see.

Brake Treadle (Hand Cars). A lever for applying brakes with the foot.

Brake Valve (Air Brakes). Figs. 1225-1232, 1300-1310. The valve operated by the motorman to apply and release the brakes. Also called operating valve and motorman's brake valve.

Brake Van (British). Figs. 6506-6510. American equivalent, caboose, or baggage car. A covered vehicle in which the conductor (guard) of a train travels, and which is fitted with a powerful screw hand brake. On passenger trains it carries the passengers' baggage (luggage), express matter (parcels), and dogs, etc. On freight (goods) trains it is weighted with pig iron, and is primarily used as a source of brake power. Also called guard's van.

Brake Wheel. 93, Figs. 262-272, 731-732, 3947. An iron wheel attached to the upper end of the brake shaft, and by which the latter is turned to apply the brakes by hand.

Brake Windlass. A term sometimes used to designate the **Brake Shaft**, which see, with all its attached parts.

Brakeman's Step (Vestibule Fittings). Fig. 3945.

Brass. "An alloy of copper and zinc. The term is commonly applied to the yellow alloy of copper with about half its weight of zinc, in which case it is called by engineers yellow brass; but copper alloyed with about one-ninth its weight of tin is the metal of brass ordinance or gun metal. Similar alloys used for the 'brasses' or bearings of machinery are called hard brass, and when employed for statues and metals they are called bronze."—Toml. Cycl. Useful Arts.

According to present usage, alloys of copper and tin, or of copper, tin and zinc, are termed **Bronzes**, which see. Railroad **Journal Bearings**, which see, are often termed brasses, but they have the composition of bronzes.

Bridge. In car construction the term bridge means a timber, bar or beam which is supported at each end. See **Bolster Bridge, Center Bearing Bridge, Side Bearing Bridge.**

Bridging (Passenger Car Framing). 6, Figs. 599-619. Short transverse distance blocks between the sills of an underframe to keep the sills from displacement or buckling. A sill tie rod is usually employed to keep the sills drawn tightly against the bridging. It is toenailed and sometimes tenoned into the sills with small tenons.

Brill's Maximum Traction Pivotal Trucks (Street Car). Fig. 6432.

Brill's Street Car Trucks. Figs. 6429-6432.

Broad Base Jack. Fig. 3866. See **Jack Screw, Hydraulic Jack.**

Broad Gage. A term applied to a gage when the distance between the head of the rails is greater than 4 ft. 9 ins. The principal broad gage was 5 ft.; other gages were 5 ft. 3 ins., 5 ft. 6 ins., 6 ft., etc. These gages have been abandoned and the 4 ft. 8½ in. or 4 ft. 9 in. gage adopted throughout this country on all lines. The broad gages, if any exist, are confined to short branches of no importance. Tracks of 4 ft. 8½ in. and 4 ft. 9 in. gage allow cars which are gaged by the Interchange Rules to pass over them. See **Narrow Gage, Standard Gage.**

Broad Lace (British). A woolen fabric made in bands about 4 ins. wide and sometimes used as an ornamental border to the upholstery of a carriage.

Brooks Car Seals. Fig. 4072.

Broom Holders. Fig. 3838.

Bronze. An alloy composed of copper and tin, sometimes with a little zinc and lead. Bronzes also often contain various other metals and chemical substances, as **Phosphor Bronze**, which see. Brass is an alloy of copper and zinc. Most journal bearings are bronzes. The variety of proportions of the various metals is very great.

Brown Metallic Window Strip. Figs. 4648-4649.

Brush. Fig. 3841, etc. See **Car Window Brush.**

Brush and Comb Rack. Figs. 3675, 3677, 3678.

Brush Holder. Fig. 6370. A support for the brushes of an electric motor, providing by means of springs for a constant pressure of the brushes on the commutator.

Brushes. Carbon plates pressing on the commutator of an electric motor for supplying current to the armature.

Bucker (Bliss System of Electric Car Lighting). Fig. 3379. An automatic electric regulator consisting of a motor driven counter electro motor force generator, the latter so constructed as to generate independent and suitably proportioned counter E. M. F.'s in the field circuit of an axle generator and also in the circuit of the lamps operated in connection therewith. The word describes the action of the device, the C. E. M. F.'s being said to oppose or "buck" the direct E. M. F.'s of the circuits mentioned. Directly opposite of **Booster.**

A machine somewhat like a small dynamo which has a field and a revolving armature and which is used for automatically maintaining a constant predetermined voltage in the lamp circuit regardless of the speed of the dynamo or the demand for lights.

Buckeye (Little Giant) **Coupler.** Figs. 1739-1742.

Buckeye Heater. Fig. 6933. An oil heater mounted on a compressed air tank and having a special burner which produces an intense heat. The heater is portable and is largely used in making repairs to steel cars and similar work.

Buckeye Oil Paint Sprayer. Fig. 6932.

Buckeye Pressed Steel Truck. Fig. 4695. A pressed steel truck using a plate side frame somewhat similar to the arch bar form of truck.

Buckeye Sand Blast Machine. Fig. 6934. A device with compressed air and sand tanks used to blow

sand in a powerful jet of air and by the erosive action of the sand to clean steel work. Largely used for removing rust and paint from steel cars, bridges, etc., before repainting. See **Sand Blast.**

Buckle (British). See **Bearing Spring Buckle.**

Buda Hand Cars. Figs. 6191, 6194-6195, etc.

Buffalo Brake Beam. Figs. 5160-5177.

Buffer. Figs. 1975-2066. An elastic apparatus or cushion attached to the end of a car to receive the concussions of other cars running against it. The term is generally applied to those attachments in which springs are used to give the apparatus elasticity. The term is often applied to a **Drawbar,** which see. For British practice in buffers, see Figs. 6656-6683, 6730-6736.

Buffer Arm. A **Drawbar Timber,** which see.

Buffer Band (Street Cars). A band of iron or steel fastened to the face of the buffer beam to save it from wear and bruising.

Buffer Bar. A wrought iron bar at the end of a car carrying a **Buffer Plate,** which see.

Buffer Beam. 1. (Freight Cars.) 32a, Figs. 262-272. A short timber bolted to the face of the end sill, usually protected with a striking plate, against which the shoulder on the head of the drawbar strikes when the draft gear springs are closed solid. Its function is to protect the end sill from damage and to act as a distance block to keep the cars a sufficient distance apart to allow a man to step in between them. It is distinguished from **Buffer Blocks,** which see, and is frequently called a **Deadwood** or **Dead Block,** which see.

2. (Passenger Cars.) A term sometimes used to designate a platform end sill.

Buffer Blocks. 32, Figs. 262-272, etc. Two blocks of wood or iron attached to the end sill or buffer beam of a freight car, in contradistinction to buffer beam, which is a single block in the middle of the end sill, although the latter also is sometimes designated as a single dead block. Buffer blocks are sometimes called dead blocks.

Buffer Block Angle. Figs. 913-915.

Buffer Block Face Plate. A metal plate bolted to the face of a wooden buffer block to protect the wood from wear. Usually called striking plate.

Buffer Cushion. A circular rubber pad to prevent the platform or buffer springs from being overloaded.

Buffer Guide. See **Buffer Stem Guide.**

Buffer Pin (Buhoup 3-Stem Coupler). 628, Figs. 1886-1935.

Buffer Plate. 42a, Figs. 599-619; Y, Figs. 648-651; 614, Figs. 1886-1935. An iron or steel plate (usually bolted to the end of the buffer stems) which bears and rubs against the opposing plate of the next car of the train. The vestibule face plate is bolted or riveted to, and carried by, the buffer plate.

Buffer Plate Spring (Buhoup Vestibule). 81, Figs. 2215-2263.

Buffer Rod (British). A rod which transmits buffing strains from the buffer head to the buffer spring. See also **Buffer Stem.**

Buffer Rod Guide or **Buffer Block** (British). A casting bolted to the outer side of the end sill or head stock through which the buffer stem or rod passes.

Buffer Rod Shoe (British). A casting keyed to the end of the buffer rod which bears on the buffing spring.

Buffer Safety Lug. A projecting horn cast on top of freight couplers to bear against a buffer block and relieve the draw gear from excessive compressive strains. **Coupler Horn,** which see, is the more common name.

Buffer Shank. The square part between the buffer head and buffer stem.

Buffer Spring. 1. (Passenger Cars.) 630, Figs. 1886-1935. In the Buhoup and other platform equipments the springs that resist the compression of a train or the impact when they come together as in coupling. In passenger equipment this thrust is not taken by the drawbar alone, but by the buffers, which transmit it to the buffer springs, which absorb or transmit it to the car body.

2. (Freight Cars.) A synonymous term for draft spring, there being but one set of springs for buffing and pulling strains. Draft spring is the preferred term, although both are used.

Buffer Spring Bed (British). Serves the purpose of the American draft timber. A timber or casting in the center of the underframe which receives the thrust of the buffing spring. A buffing spring cradle.

Buffer Stem (Buhoup 3-Stem Coupler). 620, Figs. 1886-1935. The round part which passes through the buffer springs. The term is sometimes applied to the buffer bar, which includes the round stem and the square shank.

Buffer Stem Bracket (Buhoup 3-Stem Coupler). 634, Figs. 1886-1935.

Buffer Stem End Washer (Buhoup 3-Stem Coupler). 156, Figs. 1886-1935.

Buffer Stem Guides. 641, Figs. 1886-1935. Iron bushings inserted in the platform end sill, in which the buffer stems work. They are to protect the wood from abrasion and wear.

Buffer Stem Ring Washer (Buhoup 3-Stem Coupler). 154, Figs. 1886-1935.

Buffet Car. Figs. 165-166, 220, 225. A term (meaning, literally, sideboard car) applied to a style of sleeping car or parlor car which has an ornamental buffet, where light lunches can be prepared for the passengers. Buffet smoking cars are also built in the same general style of finish.

Buffing and Draw Spring (British). See **Plate** or **Laminated Buffing and Draw Spring.**

Buffing Sub-Sill. A sub-sill bolted to the center sills on the underside and forming a continuous buffing sill in conjunction with the draft timbers. They are bolted and keyed to the center sills with key blocks and bolts. Also called back stop timber.

Buhoup 3-Steam Platform Equipment. Figs. 1886-1935. An improved form of the original Janney draft gear for passenger cars. The coupler head is connected to the center stem and the two side stems and its movement out of the center line of the car is resisted by the side stem springs. The center stem is backed up by the draft spring proper which is held in a pocket between the sills and which absorbs most of the shocks. The buffer plate is backed up by two buffer stem springs which aid in absorbing buffing shocks.

Buhoup Wide Vestibule. Figs. 2215-2263.

Bulkhead (Steel Coach). Fig. 1355.

Bulldozer. Figs. 6882-6883. A machine with a reciprocating power-driven ram or head in which small forgings are made. Largely used instead of drop hammers for making duplicate pieces.

Bull's-Eye. A convex glass lens, which is placed in front of a lamp to concentrate the light so as to make it more conspicuous for a signal. They are used to close the opening in fixed lamps at the end of cars, and also in signal lanterns.

Bull's-Eye Lamp. See **Train Signal Lamp.**

Bumper. An indefinite term used to designate a buffer or drawbar, or a **Buffer Block,** which see.

Bumper Block. A **Buffer Block,** which see.

Bundle Rack. See **Basket Rack.**

Bunk. 1. A rough form of sleeping berth permanently built against the side of a car. Is also applied to the upper berth of a sleeping car, though it be finished and decorated.

2. (Logging Cars.) A crosspiece similar to a body bolster, on which timber is loaded. See **Body Bolster.**

Bunk Apron. 7, Figs. 2201-2202. In a sleeping car, a board nailed to the upper deck sill and projecting several inches below it to cover the edge of the upper berth when it is folded up. In the latest Pullman pattern of berths it has been done away with by rounding the edge of the upper berth or bunk and closing the upper edge against the upper deck sill.

Bunk End. 20, Figs. 2201-2202. The end board of the upper berth box.

Bunk Panel. 21, Figs. 2201-2202. A window panel below the inside cornice fascia of a sleeping car, in the upper berth. It shuts off the upper part of the car window.

Bunk Partition. 8, Figs. 2201-2202. The partition between the two upper berths of two adjacent sleeping car sections.

Bunk Truss (Logging Cars). An iron strap to stiffen the bunk.

Bunter Beam. A buffer beam.

Burlap. A coarse canvas for use in car upholstery, generally manufactured 24 or 40 ins. wide.

Burner. "That part of a lighting apparatus at which combustion takes place."—Knight. (Pintsch Lamp) Fig. 2926. (Acetylene Lamp) Fig. 3200. See **Lamp Burner.**

Burner Cock (Pintsch System of Gas Lighting). Fig. 3095. It is used in wall lamps only. This cock is handled with a key, Fig. 3094.

Bushing. 1. "A lining for a hole."—Knight. Usually a metal cylindrical ring which forms a bearing for some other object, as a shaft, valve, etc., which is inserted in the hole. Often contracted into bush. See

Bell Cord Bushing.
Berth Curtain Rod Bushing.
Berth Hinge Bushing.
Deck Sash Pivot Bushing.
Head Board Bushing.
Pipe Bushing.
Sash Lock Bushing.
Window Blind Bushing.
Window Rod Bushing.

2. (Pipe Fitting.) A short tube with a screw cut inside and outside, used to screw into a pipe to reduce its diameter. Generally, a bushing has a hexagonal head by which it is turned, and is sometimes called reducer.

Business Car. A term often applied to an officer's or director's car, and sometimes applied to a pay car.

Butler Drawbar Attachment. Figs. 1470-1483. A form of attachment using the strap pocket or yoke with thimbles, which engage in what is termed a case or housing, with lugs on the sides that engage in grooves cut in the draft timbers.

Butt. A contraction of **Butt Hinge,** which see, and generally used as a substitute for the longer term.

Butt Hinge. A hinge for hanging doors, etc., which is fastened with screws to the edge of a door, so that when the latter is closed the hinge is folded up between the door and its frame. A hinge the two parts of which are so fastened together that they cannot readily be detached is called a fast joint butt hinge. Other forms are: **Loose Joint Butt Hinge,** Fig. 2453, and **Loose Pin Butt Hinge,** Fig. 2449. In Fig. 2442 the wear is taken by a hinge pin screwing into the knuckle and bearing against a washer. The hinge pin is often ornamented with an acorn, and those having a washer between the two knuckles, but no acorns, are known as **Blake Butts,** which see. The best butt hinges have washers, which are generally plain, but Figs. 2449-2452 show a butt hinge with ball-bearing washers. Butt hinges are commonly termed simply butts.

Button. This term, besides its usual meaning has been used to designate an axle collar, but the term is now obsolete. See **Tufting Button.**

C

Cabin (Pile Driver Car). A small house for the engine and hoisting gear, usually built on the swinging platform.

Cabin Car. Figs. 86, 577-588. A term sometimes applied to **Caboose Cars,** which see; more particularly to four-wheeled caboose cars.

Cabin Door Hooks. Figs. 2828-2831.

Cabinet Lock. Figs. 2600-2609. A lock used on furniture or cabinet work. It may be applied either to the inner edge of the door or drawer or set into a mortise. Cabinet locks vary from the cheapest type to the pintumbler type which gives the highest possible security.

Cable Car. A car designed for a street railway in which the tractive power is a cable. The cable is usually placed between the rails and underground in a conduit.

Caboose Car. Figs. 118-122, 577-587. A car attached to the rear of all freight trains for the accommodation of the conductor and trainmen, and for carrying the various stores, tools, etc., required on freight trains. Also, but rarely, called conductor's car, cabin car, cabin, or train car. Cabooses are made with a lookout for displaying train signals to the locomotive and trains following, and to give the trainmen a view of the train. Caboose cars are either four-wheel or eight-wheel, and both are in general use; four-wheeled cabooses are sometimes termed cabin cars. The eight-wheeled cabooses are frequently provided with lockers, cooking stove, writing desks, and other conveniences for living.

Café Car. Figs. 143, 226-228. A car in which light meals are served, usually à la carte. It may be either a café coach, a café parlor car, or a combination café and baggage car.

Café Coach. Figs. 137, 146-147. A combination day coach and dining car. See **Kitchen Car.**

Calamined Iron. See **Kalamined Iron.**

Caldwell Sash Balance. Fig. 4659. See **Sash Balance.**

Cam. (Yale Lock). The revolving disk, usually a spiral eccentric or heart-shaped, fixed on the outside of the shaft which carries the tumblers.

Camber. The upward deflection or bend of a beam, girder, or truss. Freight cars are usually heavily cambered when new by screwing up the body truss rods. Passenger cars have little or no camber.

Campbell Drop-Bottom Gondola Car. Figs. 421-424. A car with the bottom made up of drop doors hinged over the center sills and raised and lowered with a continuous crank shaft having cranks under each door.

Campbell-Olden Dump Car. Fig. 95.

Canda Box Car. Figs. 277-278. A box car of large capacity, built with wooden underframe and reinforced sills.

Canda Hopper Car. A wood hopper car in which the sides are trussed with posts and braces on the outside of the planks.

Canda Refrigerator Car. A refrigerator car in which the chief features are: (1) the insulation, (2) the economic method of effecting it, (3) the arrangements for icing, (4) the circulation of air within the car. The insulation consists of an exterior sheathing of boards which are fluted on the inside and allow a circulation of free air beneath them. This is to put the car in the shade and to give a free circulation of air around about the inclosed and shaded car, thus preventing the heat of the sun penetrating to the insulated part of the car. Beneath this exterior sheathing of weather boards is a sub-sheathing, several layers of tar paper, one of felt 1 in. thick, two ⅜-in. wood partitions and a lining ⅝ in. thick. The tar paper is tacked upon both sides of triangular frames, which frames wedge the felt in place, thus saving any nailing and fitting.

Candle. A special kind of large diameter called car candles are used for lighting passenger cars and burned in **Candle Lamps,** Figs. 3580-3585, which see. Since the introduction of high-proof mineral oils they are now rarely used. The best car candles are made of paraffin and hydraulic pressed.

Candle Bottom. Fig. 3183. See **Candle Lamp.**

Candle Bracket Lamps (Pintsch System). Figs. 3183 3186. Are for use in emergency, as in case gas gives out. May be attached to wall or to any center lamp at will.

Candle Holder. See **Candle Lamp.**

Candle Holder Cap. 21, Figs. 3585-3601. See **Candle Lamp.**

Candle Holder Cup. 22, Figs. 3585-3601. See **Candle Lamp.**

Candle Lamp. Figs. 3580, 3585. A lamp for burning candles, sometimes elaborated into a chandelier with two or three burners. Candles, however, are now but little used except in emergency bracket lamps, to be used when the gas or electric lights fail. The candle is placed within a candle holder, carried within a candle bottom. The candle holder consists of a candle holder cup and candle holder cap connected by the candle rods and having a light spiral candle spring within. As the candle burns away it is pressed upward by the candle spring against the cap so as to keep the flame always in one position.

Canfield Underframe. A draft frame or auxiliary underframe bolted under the usual center sills of a car and serving as a continuous draft beam from end to end of the car. It is made up of two channels or draft sills at each end, extending from the end sills to the bolsters, a heavy I-beam between the bolsters and light I-beam needle beams.

Canopy. Fig. 3159. See **Lamp Canopy.** Also called a **Smoke Bell,** which see. A platform hood is sometimes called a canopy.

Canopy Ventilators. Fig. 4420. See **Ventilators.**

Cant Rail (British). American equivalent, plate. A horizontal timber running along the top of the upright pieces in the sides of the body, and supporting the roof and roof sticks. Its upper edge is cut to the bevel of the roof; hence its name.

Cantilever Truss (Overhang of Underframe). An inverted truss which bears upon the side sill directly over the body bolster. The inner end is connected by a tie rod to the inner end of the truss at the other end of the car body, while the outer end supports the overhang of the underframe by a vertical tie rod and by a diagonal brace rod similar to the overhang truss rod of the old Pullman framing.

Canvas. A coarse cloth, made of cotton, used for upholstering seats, and sometimes for the finish of the ceiling of passenger cars when it is painted or otherwise decorated. Roofing canvas is used for covering street cars.

Cap. The top or covering of anything. See

Arm Cap.	**Smoke Pipe Cap.**
Belt Rail Cap.	**Spiral Spring Cap.**
Bolster Spring Cap.	**Spring Cap.**
Candle Holder Cap.	**Tank Nozzle Cap.**
Equalizer Spring Cap.	**Trimming Cap.**
Inside Lining Cap.	**Truss Plank Cap.**
Lever Frame Cap.	**Window Sill Cap.**

Cap Screw. (Triple Valve). 25, Fig. 1233.

Cap Socket Washer. Figs. 932-933.

Car. The term used in the United States to designate a vehicle or carriage for running on a railway. As the term is usually employed, it denotes any vehicle used for transportation and not belonging to the motive power of a railroad.

The term **Coach,** which see, is synonymous with passenger car. In Great Britain passenger cars, or coaches, are called carriages (first, second and third-class), and freight cars are called wagons, or trucks and vans.

Cars are divided into two general classes, passenger cars and freight cars. The latter is also further subdivided into freight cars proper and working or construction cars, the latter including a great variety of types, but a comparatively small number of each type. The prices allowed by the Master Car Builders' Association for the various forms of freight cars will be seen under **Interchange of Traffic,** which see. Street cars, for city and suburban use, take their names from the motive power employed to move them, as electric motor cars, cable cars, etc. They constitute a class by themselves. **Hand Cars,** which see, are a light vehicle moved by hand power, and under this head should be classed velocipede cars. Among passenger equipment cars the following vehicles are usually classed, not because they carry passengers alone, but rather for the reason that they are run in trains which carry passengers:

Automobile Car.	**Mail Car.**
Baggage Car.	**Officers' Car.**
Buffet Car.	**Parlor Car.**
Combination Baggage Car.	**Passenger Car** or **Coach.**
	Postal Car.
Dining Car.	**Private Car.**
Drawing Room or **Parlor Car.**	**Sleeping Car.**
	Smoking Car.
Express Car.	**Tourist Sleeping Car.**

Among the cars for regular freight service are:

Ballast Car.	**Gravel Car.**
Billet Car.	**Heater Car.**
Box Car.	**Hopper Bottom Car.**
Caboose Car or **Cabin Car.**	**Hopper Car.**
	Ice Car.
Coal Car.	**Lumber Car.**
Coke Car.	**Milk Car.**
Double-Deck Stock Car.	**Mine Car.**
Drop Bottom Car.	**Oil** or **Tank Car.**
Dump Car.	**Ore Car.**

Flat Car.	Poultry Car.
Fruit Car.	Refrigerator Car.
Furniture Car.	Stock Car.
Gondola Car.	Tip Car.
Grain Car.	Ventilated Box Car.

Among working cars are:

Air Brake Instruction Car.	Pile Driver Car.
Boarding Car.	Push Pole Car.
Derrick Car.	Snow Plow or Flanger.
Ditching Car.	Steam Shovel.
Inspection Car.	Sweeping Car.
Locomotive Crane.	Tool Car.
	Wrecking Car.

Car Axle. Figs. 5510-5513. (M. C. B. Standard.) Also 2, Figs. 4705-4713, 4771-4777. A shaft made of wrought iron or steel to which a pair of car wheels is attached. The wheels are both rigidly fastened to the axle by making a hydraulic press fit. The following are the names of the parts of an axle: Center of Axle, Neck of Axle, Wheel Seat, Dust Guard Bearing, Collar, Journal. See **Axle.**

Car Bodies. Figs. 262-696.

Car Box. A **Journal Box,** which see.

Car Candle. See **Candle.**

Car Closet (Flush or Dry). See **Hopper.**

Car Coupler. An appliance for connecting or coupling cars together. All passenger car couplers and the greater part of the freight car couplers in use are automatic.

By Act of Congress, Feb. 27, 1893, all engines, passenger and freight cars engaged in interstate commerce must be equipped with couplers that couple automatically by impact and that may be uncoupled without going between the cars, on or before Jan. 1, 1898. A penalty of $100 is imposed for each violation of this act, unless the time shall have been extended for each road by the Interstate Commerce Commission after a hearing and for a good cause.

Of automatic couplers there are a great many; the freight couplers all conform to the lines adopted by the M. C. B. Association and shown in Fig. 5579; they differ chiefly in the lock and the device for uncoupling. The general dimensions of the coupler universally adopted for freight service are given under Figs. 5580-5585, with the limit gages to which all M. C. B. couplers should conform. The same gages are applicable to passenger couplers. See **Automatic Car Coupler.**

Car Cylinder (Air Brake). Any one of several kinds of brake cylinders shown in Figs. 1257-1276.

Cardwell Friction Draft Gear. Figs. 1540-1545.

Car Discharge Valve (Train Air Signal Apparatus). Fig. 1115. A valve placed in the end of the car and connected with the signal cord. When the cord is pulled the car discharge valve is opened and the air escapes, which blows the whistle in the locomotive cab. See **Train Air Signal Apparatus.**

Car Door Hangers. Figs. 2654-2662. A device for hanging a sliding door so that it may be movable. In common practice the simple hooks upon which most freight car doors are hung are termed simply **Door Hangers,** which see, while more elaborate forms with rollers have their names expanded into car door hangers.

Car door hangers with wheels or rollers to prevent friction are termed door sheaves, of which there are various types.

Car Door Lock. Figs. 2386-2390. A lock for a car door, usually meaning for a passenger car door. See **Freight Car Lock, Padlock.**

Car Door Sheaves. See **Door Sheaves** and **Car Door Hangers.**

Car Drain Cup (Air Brake). Fig. 1283. An attachment to the brake pipe of every car to collect the water of condensation, which is drawn off from time to time through a hole at the bottom closed by a plug; it is usually combined with an air strainer and so called.

Cartiller's Lantern. Fig. 3160.

Car Furnishings. Figs. 2304-4686. The hardware, upholstery materials and other fittings, such as lamps, ventilators, water coolers, etc., used in finishing a passenger car. In general it includes those parts of a car that are applied after it has left the paint shop.

Car Heater. Any apparatus for heating cars by convection; that is, by conveying hot water, steam or warmed air into, or through, the car. It generally refers to any arrangement for warming cars other than stoves. See **Baker, Consolidated, Gold, Safety** and **Vapor Heating Systems.** See also **Stove** and **Electric Heater.**

Car Moldings. See **Moldings.** See also **Seat Back Moldings,** Figs. 4197-4208, which latter are metal bands for seat backs.

Car Platform. More commonly, simply **Platform,** which see. See **Platform Furnishings.**

Car Pump. A **Basin Pump,** which see.

Car Replacer. Figs. 3864-3865. A device for getting a derailed truck back on to the track. It usually consists of two inclined planes, by which the wheels are raised so that the flange of the outside wheel can ride upon and over the rail. They are placed at an acute angle with the track so as to guide the wheels and force them upon the track. One or more are usually carried on the engine or in the caboose or baggage cars for use in emergencies. See **Wrecking Frog.**

Car Replacing Jack. Fig. 3886.

Car Roof. Figs. 2189, 2098-2198. A covering for a car, supported by the carlines and purlins. The various forms in use in freight car construction may be divided generally into the four following classes: First, what is known as a double board roof, with or without felt or other material between boards. To this class belong many roofs in which the boards are tongued and grooved and have a sheet of painted canvas, asphalt roofing material or other prepared materials between them. Second, single board roofs, covered with tin or other sheet metal. Third, roofs made of metal sheets, fastened to purlins and roof strips, and protected by a single layer of roughly matched boards. Fourth, a type of double roof consisting of an inside roof covered with felt, tar paper or asphalted canvas, and an outside roof built over it to protect the roofing material from injury. Passenger car roofs are commonly of tin, zinc or galvanized iron or steel of about 22 W. G., painted. For street cars, painted canvas is used. See also **Board Roof.** In respect to form, see **Arched Roof, A-Car Roof.**

Car Seal. Figs. 4072-4092. A device to secure freight car doors against opening by making it impossible without destroying the seal. The original form consisted of a lead disk with two holes to receive a piece of twisted wire, which is compressed by a die so as to leave a seal mark, which must be defaced or the wire cut before the door can be

opened. To prevent stripping the seal from the wire and re-inserting it, a detective wire of irregular cross section is used. Sheet metal eye shackles, in a variety of other forms, are now also used, with or without tin return tags, and also a simple lead rivet with a tin shackle. Tin shackles often have the name of the road printed on them. Of seals there are a great variety, some of the more common of which are shown. See also **Seal Locks, Seal Press.**

Car Seat. Figs. 4039-4165. The complete set of fixtures on which passengers sit in a car. It ordinarily consists of a seat frame, seat cushions, seat back, arm rest, foot rest, and their attachments. Ordinarily, the seats in American cars are placed crosswise of the car, and are made for two passengers. The backs of the seats are generally made reversible. The seats of parlor cars are commonly called chairs; see **Revolving Chair, Richards Panel Back Chair.** In private and parlor cars, sofas, placed longitudinally against the side of the car, are sometimes used. In order to give an inclination to the seats which makes them more comfortable, various devices have been introduced. In fact, all first-class car seats not only incline the seat cushion, but they move it bodily forward, as well as automatically adjust the back. The covering of seats is usually plush, but sometimes cane or rattan seats, canvas-lined cane seats, perforated veneer seats, woven wire seats, are used. The seats of street cars are usually placed longitudinally on each side of the car, but in open cars they are usually transverse and in length equal to the full width of car.

Car Seat Connecting Rod. A round rod connecting the wall and aisle seat ends of a Scarritt seat with adjustable foot rests.

Car Seat Moldings. Fig. 4174. Metal bands, usually nickel-plated, used to finish seat backs. They are either plain or beaded. See **Moldings.**

Car Shop Machinery. Figs. 6793-6934.

Car Signal Valve (Train Air Signal Apparatus). Fig. 1220. A valve placed in every car and attached to the bell cord or signal cord, by which air is allowed to escape from the signal pipe, thus blowing the signal whistle on the engine. A **Car Discharge Valve,** which see.

Car Spring. Figs. 5370, 6010, etc. See **Spring, Spiral Spring, Elliptic Spring, Bolster Spring.** A general term applied to springs on which the weight of a car rests, and also to draw and buffer springs.

Car Steps. See **Platform Steps.**

Car Truck. Figs. 4687-4783. Mechanically, a small, low, four-wheel (or sometimes six-wheel) car, carrying as a dead load one-half the weight of a long car body. The car body is usually carried on a pair of center plates (truck center plate and car body center plate), with a center pin or king bolt passing through them, about which the truck, or, more properly speaking, the car body, can swivel. In England such trucks are called "bogies." See **Truck.**

Car Washer. Fig. 3841. A brush made for washing the outside of passenger cars. It is made of bristles or feathers.

Car Wheel. Figs. 5390-5465; 1, Figs. 4771-4777. A wheel for a railway car. Chilled wheels are called single plate wheels or double plate wheels, according to the number of plates between the hub and rim. When one plate is used it is sometimes made flat, with ribs called brackets on the back, and sometimes corrugated, without ribs. The disks of double plate wheels also are generally corrugated. What is known as the Washburn wheel has two corrugated disks extending from the hub about half way to the tread, and a single plate, with curved brackets on the back between the tread and the double plates. This wheel is generally known as a double plate wheel. Cast iron wheels are also made with spokes, either solid or hollow, principally for locomotive use. Those in use in this country are either cast iron, with a chilled tread and called chilled wheels, or are steel tired with wrought or cast iron or combination centers. For freight cars the cast wheel with a chilled tread is largely in use.

Prices of wheels and axles and cost of work on same have been fixed at various times by the rules for interchange of cars of the M. C. B. Association. See **Interchange of Traffic.**

The parts of wheels are the flange, tread, rim, tire, retaining rings, plate, ribs, spokes, center, hub and axle seat.

The varieties of cast iron wheels besides the single plate, double plate and Washburn, above mentioned, are the combination plate wheel, combination wheel, hollow spoke wheel, open plate wheel, spoke wheel. See **Steel Tired Wheel.**

In 1893 the M. C. B. Association adopted specifications for cast iron wheels and a form of guaranty by manufacturers as Recommended Practice. These had formerly been standards of the Association. See **Wheels, Specifications and Guarantee.**

Car Wheel Grinder. Fig. 6846.

Car Window. See **Window.**

Car Window Blind. See **Window Blind.**

Car Window Brush. Fig. 3844.

Card Rack. A small receptacle on the outside of a freight car to receive cards giving shipping directions.

Card Table. 27, Figs. 2201-2206. See **Table.**

Cardwell Friction Draft Gear. Fig. 1540.

Cardwell Rocker Side Bearing. Fig. 5360.

Carey Plastic Car Roof. Fig. 2168. A roofing material the body of which is composed of a very heavy layer of woolen felt, thoroughly saturated with a secret compound which it is claimed preserves the roofing itself and also the upper and lower boarding with which it comes in contact. See **Car Roof.**

Carleton & Stroudly Fastening (Steel Tired Wheels). Fig. 5079. See **Tire Fastening.**

Carline or **Carling.** 81, Figs. 262-272; 82, Figs. 305-321; 100, Figs. 599-619, and Figs. 2171-2188. A transverse bar of wood or iron which extends across the top of a car or from one side to the other, and which supports the roof boards. In passenger cars carlines are divided into main carlines, passing entirely across the car; short carlines or deck carlines, which are confined to the upper deck, and rafters, which are confined to the lower deck. The carlines of freight cars are also rarely called rafters. The main carlines are usually compound, i. e., built up of wood and iron. They sometimes pass directly from side to side of the car across and under the upper deck, when they are termed continuous or straight carlines, but usually are bent to the outline of the clear story, when they are termed profile carlines. In freight cars the main carline is one made stronger than the others for carrying the purlins and roof. Recently carlines made of a light

channel or of pressed steel have been extensively introduced. Other carlines having special names, which see, are:

End Carline. **Platform Roof End Carline.**
Platform Hood Carline.
Platform Roof Carline.

Carline Knee Iron. An angle iron which connects the end carline to the plate. Also termed inside corner iron.

Carpet Eyelet. Fig. 2663. See **Eyelet.**

Carpet Knob. An **Eyelet Nail,** which see.

Carriage or **Railway Carriage** (British). Figs. 6460-6539, etc. American equivalent, passenger car, or coach. A vehicle for passengers having four, six, eight or twelve wheels (usually six wheels). It is divided into compartments by transverse partitions extending the full width of the car. A first-class compartment seats six or eight passengers, and a second or third-class compartment ten passengers. A large proportion of the total number of passengers travel third-class, which really corresponds to the so-called "first-class" here, the real first-class being carried in sleeping and parlor cars. The English first-class is used by about 3½ per cent. of the passengers. The second is an intermediate class which is gradually going out of use. See also

Bogie Carriage. **Second-Class Carriage.**
Composite Carriage. **Third-Class Carriage.**
Corridor Carriage. **Tri-Composite Carriage or Tri-Compo.**
First-Class Carriage.
Lavatory Carriage.

Carriage Bolt. A bolt made square under the head so as to prevent it from turning when in its place. They usually have button-shaped heads and are used for fastening wooden pieces together.

Carriage Truck (British). An open four-wheeled vehicle, with low sides, adapted to run on passenger trains, and carry a road vehicle.

Carrier. See

Brake Hanger Carrier. **Parallel Brake Hanger Carrier.**
Brake Pawl Carrier.
Foot Rest Carrier. **Spring Plank Carrier.**

Carry Iron. See

Drawbar Carry Iron. **Draw Timber Carry Iron.**
Drawbar Stirrup.

Case. "A covering, box, or sheath; that which incloses or contains: as a case for knives; a case for books; a watch case; a pillow case."—Webster. See

Brake Hose Coupling Case. **Door Case.**
Lock Case. **Lamp Case.**
Spring Case. **Tool Case.**

Casing. 1. (For Heaters.) See

Heater Pipe Casing. **Perforated Smoke Pipe Casing.**
Inside Casing.
Outside Casing. **Smoke Pipe Casing.**

2. (For Windows.) The frame which surrounds a window. See **Window Casing.**

Cast Iron Top (Baker Heater). Fig. 2729. A plate which forms the top of the fire chamber. It has perforations around the outside and an opening in the center through which the stove is supplied with coal.

Caster. Figs. 4279-4282. A small wheel on a swivel attached to furniture and on which it is rolled on the floor. By custom of the trade furnishings which are in reality mere sockets or knobs are termed casters, although they are, strictly speaking, not such, not having any rollers. They are distinguished as chair casters, table casters, sofa casters, etc., according to size and probable use.

Caster Holder (Dining Cars). A shelf or tray for holding bottles of condiments.

Casting. Any piece of metal which has been cast in a mold. See

Corner Casting. **Side Casting.**
Drawbar Side Casting. **Transom Casting.**
Roof Corner Casting.

Caswell Drop-Bottom Gondola Car. Figs. 396, 402-403. A car with the bottom made up of drop doors which are raised and lowered by chains wound on a continuous winding shaft running longitudinally under each side of the car.

Catch. A device to prevent a gate, door or window from opening, usually by means of a bolt held in place by some form of spring which engages with a keeper when closed. See

Bayonet Catch. **Deck Sash Catch.**
Cupboard Catch. **Door Holder Catch.**

Catch Lever (Buhoup 3-Stem Coupler). 523, Figs. 1886-1935. A crank lever passing vertically through the catch, by means of which it is caused to release the knuckle for uncoupling.

Catch Spring (Buhoup 3-Stem Coupler). 528, Figs. 1886-1935. A coiled spring on the catch spring bolt operating the catch.

Cattle Car. Figs. 108, 345-355. More properly **Stock Car,** which see.

Ceiling. The inside or under surface of the roof or covering of a room or a car opposite the floor. This term is sometimes used to mean **Sheathing,** which see. When the ceiling of a passenger car is made of painted canvas or other decorated lining it is termed head lining, the term ceiling in modern usage being restricted to wood ceiling. The term panel ceiling is also used as synonymous with wood ceiling, although cloth head lining is also sometimes put on in panels. **Deafening Ceiling,** which see, is boarding under the sills of the car, making an air space between the sills. See **Lignomur, Veneering, Paneling.**

Ceiling Furring. Strips or pieces fastened to the carlines overhead, and to which the paneling or veneering of the ceiling is applied.

Ceiling Hook.

Ceiling Veneers. Thin boards with which the ceilings of passenger cars are covered. The term is also misapplied to the thin preparations of papier maché, etc., in imitation of natural wood veneers. See **Veneer.**

Center Bearing. The place in the center of a truck where the weight of the body rests. A body center plate attached to the car body here rests on a truck center plate attached to the truck. The general term center bearing is used to designate the whole arrangement and the functions which it performs, in distinction from **Side Bearing,** which see. See also **Center Plate.**

Center Bearing Arch Bar. 66, Figs. 4780-4783. See **Center Bearing Bridge.**

Center Bearing Beam. Figs. 4876-4877. See below. Also called center block.

Center Bearing Bridge (Six-Wheel Trucks). 66-67, Figs. 4780-4783. A longitudinal iron beam, formerly sometimes a wooden beam, the ends of which rest upon the spring beams, and by which the truck center bearing beam, carrying the center plates, is supported. It consists of the center bearing arch bar and inverted arch bar, inclosing

between them the center bearing beam. Truck side bearings, 61, similar in form to an arch bar, are also attached to the extremities of the spring beams, connecting them together.

Center Bearing Inverted Arch Bar. 67, Figs. 4780-4783. See above.

Center Block. A **Center Bearing Beam**, which see.

Center Block Column. A column placed on top of the center plate block and between it and the center bearing arch bar.

Center Block Flitch Plate. Figs. 4975-4976. See **Center Block and Flitch Plates.**

Center Body Truss Rods. Those nearest the center when two or more body truss rods are used under each side of a car body.

Center Bracket.

Center Buffer Spring. A spiral spring situated above the draft springs in some forms of passenger draft gear and intended for buffing purposes only.

Center Buffer Stem. See **Buffer Stem.**

Center Compression Beam Brace. In passenger car framing, a brace for the compression beam in the center of the side truss.

Center Counterbrace. A counterbrace in the body of the car between the trucks, to stiffen a **Compression Beam Brace**, which see. See also **Counterbrace.**

Center Cross Bar (British). See **Brake Shaft Cross Bearer.**

Center Cross Beam. A cross timber framed into the two intermediate sills of a coal or ore car, to which the center doors are hung.

Center Cross Beam Cap. A cap piece to cover the center cross beam.

Center Cross Tie Timber. A cross tie timber in the middle of a car, generally placed between the double drop doors of a gondola car.

Centering Devices. Figs. 2085-2096.

Center Door Hinge and Stop (British). The center of three brass hinges securing the side door of a passenger carriage to the body. The insertion of two rubber plugs into striking pieces or side wings on the hinge constitutes Cross's patent stop, which is used to prevent the door striking the outside of the body when thrown violently open.

Center Door Rail. See **Middle Door Rail.**

Center Draft Drawbar. A drawbar which is connected directly with the king bolt of a truck. It is a style specially designed for use on the very sharp curves (of 90 and 100 ft. radius) of elevated railroads, and is confined to those lines. Sometimes termed radial draw gear. See **Van Dorn Radial Draft Gear.**

Center Draft Tube (Argand Lamp). The hollow passage for air in the center of the burner.

Center Dump Car. Figs. 80, 89, 93, 529-531, 536-542. A car which will discharge its entire load between the rails. See **Ballast Car, Goodwin Car, Hart Convertible Car.**

Center Floor Timbers. The **Center Sills**, which see.

Center Girth. See **Door Center Girth.**

Center Lamp. 1. Fig. 3327. A lamp suspended from the center of a ceiling of a car. The term is used to distinguish center lamps from side lamps, the latter being attached to the sides of cars. Center lamps having two or more burners are commonly called chandeliers.

2. **Pintsch Gas Lamps**, which see. Figs. 3201, etc.

Center Pin or King Bolt. Figs. 813-814; 18, Figs. 262-272. A large bolt which passes through the center plates on the body bolster and truck bolster. The truck turns about the bolt. It normally has no strain upon it and no key or nut at the lower end. It is therefore a mere pin and not a bolt in the usual sense, but in wrecking cars the center pin is sometimes provided with keys to fasten the truck and car body firmly together. The name king bolt is derived from the name of the corresponding part for the front wheels of a wagon. Center pin, however, is the more common term.

Center Pin Floor Plate. Fig. 934. An ornamental casting set into the floor of a passenger car to cover the head of the **Center Pin**, which see.

Center Plate. Figs. 801-803, 952-953, 4815-4816; 17, Figs. 262-272. One of a pair of plates made of cast or malleable iron or pressed or cast steel which fit one into the other and which support the car body on the trucks, allowing them to turn freely under the car. The center pin or king bolt passes through both, but does not really serve as a pivot. The body center plate or male center plate is attached to the under side of the body bolster or in cast steel bolsters is made an integral part of the casting. The female or truck center plate is attached to the top side of the truck bolster. When the car is tilted, as on a curve, part of the weight is carried on the **Side Bearings**, which see.

Center Plates (M. C. B. Standard). In 1903 the center plates shown in Figs. 5711-5712 were adopted as standard.

Center Plate Block. 64, Figs. 4705-4713, 4771-4777. A piece of wood placed under a truck center plate to raise it up to the proper height.

Center Sills. 1. 4, Figs. 262-272, 599-619; 10, Figs. 6207-6209. The two main longitudinal members of the underframe of a car which are usually close together in the center of the car. They form as it were the back-bone of the underframe and transmit most of the buffing shocks from end to end of the car. In steel underframe cars the center sills are usually heavy I-beams, channels, deep built up fish-belly girders or pressed steel fish-belly girders often with reinforcing flange angles.

2. (Hand Car.) 10, Figs. 6207-6209. The corresponding member in the floor framing of a hand car.

Center Sill Cover Plate (Steel Cars). 121, Figs. 428-431. A flat plate riveted across the top of the center sills to give additional strength in resisting longitudinal shocks and to prevent buckling of the sills.

Center Sills, Splicing of (M. C. B. Recommended Practice). In 1905, the following methods for splicing center sills on steel cars and cars constructed with steel underframe were adopted as Recommended Practice. Drawings illustrative of these methods of splicing are shown in Figs. 5953-5960.

The splice for center sills, except as otherwise herein stated, to be located not less than 8 inches from either side of the body bolster, consisting of butt joints. The butt joints to be reinforced by plates on both sides to be not less than twice the length of the protruding end, but not exceeding 24 inches, and not less than same thickness of web plate, with the one on the flange side of channel to include flanges, while the outside plate should only cover the web. The rivets to be spaced as shown on Figs. "A" and "B."

Fig. "A" shows the method of splicing center sills in front of body bolster, and Fig. "B" shows method of splicing center sills back of body bolster.

Fig. "C" shows method of splicing in cases where cars are damaged to such extent that the center sills have to be cut off less than 8 inches from the front side of the body bolster; this method is not recommended for sills with protruding end less than 3 inches. The outside plate in this splice may be made of pressed steel or a casting. The rivets to be spaced as shown on sketch.

Fig. "D" shows the method of splicing side sills; this splice may be located on either side of the body bolster. The rivets to be spaced as shown on sketch.

Center Stay (of a Chandelier). 30, Figs. 3585-3601. The central support around which the lamps are grouped. In some cases it is the only method of attaching the chandelier to the ceiling, and in others there are several inclined roof braces or vertical lamp arms in addition.

Center Stem (Buhoup 3-Stem Coupler). 987, Figs. 1886-1935.

Center Stem Pivot Pin (Buhoup 3-Stem Coupler). 1200 and 1204, Figs. 1886-1935.

Center Stem Thimble (Buhoup 3-Stem Coupler). 845, Figs. 1886-1935.

Center Stop (Tip Car). A bracket or block attached to a draw timber to restrain the body from moving longitudinally.

Center Strut for Hopper Floor (Hopper Car). 46, Figs. 474-500. An inclined strut or support for the hopper floor between the bolster and the end of the car, fastened to the center of the end sill. See **Side Strut for Hopper Floor.**

Center Suspension Lamp. See **Pintsch Lamps.**

Centering Gage. A gage to fix the middle point of an axle. See **Mounting Wheels.**

Central Filling Piece (Steel Tired Wheels). The part surrounding the hub and connecting it with the tire. Also termed the skeleton. A wheel center is a hub and central filling piece combined.

Chafing Plate. 1. A metal plate to resist wear, used on brake beams, truck transoms, swinging spring beams, etc. See

Brake Beam Chafing Plate.
Check Chain Chafing Plate.
Coupling Pin Chafing Plate.
Drawbar Chafing Plate.
Transom Chafing Plate.
Truck Bolster Chafing Plate.

2. (Buhoup 3-Stem Coupler.) 1120, Figs. 1886-1935. A bar across the top of the stirrup.

Chaffee Drawbar Centering Device. Fig. 2089. A device to permit displacement of the drawbar on rounding curves, which also tends to hold the drawbar in a central position at all other times.

Chain. "A series of links or rings connected, or fitted into one another, usually made of some kind of metal."—Webster. See

Basin Chain.
Berth Chain.
Brake Safety Chain.
Brake Shaft Chain.
Check Chain.
Connecting Chain.
Coupling Chain.
Door Pin Chain.
Driving Chain.
Drop Door Chain.
Hoisting Chain.
Horizontal Brake Shaft Chain.
Lock Chain.
Manhole Cover Chain.
Platform Railing Chain.
Railing Chain.
Safety Coupling Chain.
Uncoupling Chain.

Chain and Eye (for Door Bolt, Postal Car Fittings). Fig. 4033.

Chain Block. Fig. 6852.

Chain Coupling Link (British). Two or more coupling links attached together like a chain. Used with a **Draw Hook,** which see.

Chain Holder (for Basin Plug). Fig. 3660. A **Stanchion,** which see, provided with screw thread and nut for passing through the marble slab. Also called a chain post, or chain stay.

Chain Post or Stay. Fig. 3660.

Chair. The usual designation for the seats of parlor cars. See **Reclining Chair, Revolving Chair.**

Chair Arm Plate. A metal plate for the top of a chair arm. If for common passenger car seats, it is called an **Arm Cap,** which see.

Chair Car. Fig. 133. The term chair car generally is applied to a car equipped with reclining chairs or twin car seats, which car is run on local night trains so that passengers may rest.

Chair Caster. See **Caster.**

Chair Leg Caster or Socket. Fig. 4279. A hollow casting which fits on the end of a chair leg. Such casters, when casters proper, are provided with wheels, but frequently in car construction they are without wheels, and are then by custom of the trade still called casters (fixed or rigid casters), although properly not such.

Challender Truss. A substitute for the truss plank and side body bracing of passenger car frames, and used at one time on the Chicago, Burlington & Quincy Railroad. It consists of a thin plate of iron with an angle iron riveted to the bottom, and sometimes one at the top and bottom. It is fastened to each post by large wood screws and is bolted to the side sills. It is sometimes made to serve as a substitute for truss rods under the car, and it forms a part of the inside finish under the window. Cars trussed in this way are said to be as light and cheap as those in which the ordinary form of construction is used, but the truss has not so far found sufficient favor to be adopted as standard, even by a few roads.

Chandelier. A center lamp having two or more burners, but generally meaning only those of very elaborate form or having more than two burners, as the two and four light chandeliers, Figs. 3347-3490.

Channel Bar. More commonly merely channel. A general term applied by makers to iron or steel rolled with the following section: [. They are in use for the sills of metal underframe cars, for transoms and spring planks of trucks. **I-Beams,** which see, are used for sills of underframes and for truck bolsters, etc.

Chaplet. A piece of iron used in a mold for casting, to hold a core in its place.

Chapman Jack. Fig. 3870. See **Screw Jack.**

Charging Receptacle. An electric fitting or connection device attached to the under side of the car body from which wires lead to the storage battery. There is generally one on each side of a car.

Charging Plug. An electric fitting or connection device to which wires leading to a yard charging plant or electric-light circuit are attached. The plug is made to fit the receptacle in such a manner that the positive wire from the charging plant will invariably be connected to the positive battery wire. By inserting the plug in the receptacle the battery on the car may be connected with and charged from the stationary charging plant. These

devices are used principally in straight storage work where no generating plant is carried on the car.

Check Chain. 68, Figs. 4771-4777 and Fig. 4847. A chain attached to a truck and the body of a car to prevent the former from swinging crosswise on the track in case of derailment. Such chains are usually attached either to two or to each of the four corners of a truck and to the sills of the cars.

At the eighth Annual M. C. B. Convention, Cincinnati, 1874, it was

"Resolved, That truck and car body check chains are, when properly applied, a valuable acquisition on passenger equipment, and your committee recommend their general use." In 1893 the use of truck and car body check chains, properly applied, was adopted as a Recommended Practice.

A difficulty with check chains has been that the eyes by which they are attached to the body and truck were not strong enough to resist the strain, and that the chains themselves have been too long to come to a bearing soon enough to have the trucks controllable.

Check Chain Chafing Plate. A plate attached to a truck timber to resist the wear of a **Check Chain**, which see.

Check Chain Eye. 70, Figs. 4771-4777. See **Truck Check Chain Eye.**

Check Chain Hook. 69, Figs. 4771-4777. See **Body Check Chain Hook, Truck Check Chain Hook.**

Check Gage (M. C. B. Standard for Mounting Wheels). Fig. 5599. In 1896 a standard reference gage for mounting and inspecting wheels was adopted by letter ballot to take the place of the check gage for mounting wheels, formerly shown, and the gage for distance between wheels, formerly shown. At same date a standard check gage was adopted. In 1907 these were modified.

Check Valve (Triple Valve). 15, Fig. 1233. The valve under the emergency valve which prevents the escape of brake cylinder pressure back into the train line when a hose bursts or the train parts. In an emergency application the emergency valve opens and allows the brake pipe pressure to enter the brake cylinder through the check valve which is raised off its seat.

Check Valve Case (Triple Valve). 13, Fig. 1233. See above.

Check Valve Case Gasket (Triple Valve). 14, Fig. 1233. See above.

Check Valve Spring (Triple Valve). 12, Fig. 1233.

Chicago & North Western Car Heating System. Fig. 2922.

Chicago Car Coupler. Fig. 1757.

Chicago Car Roof. Fig. 2131. An inside metallic iron roof made up of an inside layer of boards, a covering of sheets of corrugated sheet iron and an outer roof of boards.

Chicago-Cleveland Car Roofs. Figs. 2121-2130.

Chicago Grain Door. Figs. 1402-1108. One of several grain doors, which slides up and down on a grain door rod fastened to the door post, and is hung to the carlines when not in use. The top of the door is fastened to the rods by a ring and a door arm. A small wicket or door is built in the bottom half of the door for unloading part of the load when desired, without shoveling.

Chicago Improved Winslow Car Roof. Figs. 2142-2150.

Chicago Pneumatic Tools. Figs. 6884-6896.

Chill. A kind of crystallization produced when melted cast iron is cooled suddenly. It is usually accomplished by bringing the molten iron in contact with a cold metal (usually iron) mold. The hardened part of a car wheel is called the chill. The mold in which a chill is produced is sometimes called a chill, but the name chill mold has been given to this. See **Wheel Specification.**

Chill Crack. An irregular crack developed in casting upon the chilled surface of the tread of car wheels. Chill cracks not over ⅛ in. wide, and not extending to the flange, are not considered as injuring the wheel or as indicating weakness or inferior quality. Iron which makes the most durable car wheels is most liable to chill cracks. See **Wheel Specifications, Interchange of Traffic.**

Chimney (for Lamps). Fig. 3154. See **Lamp Chimney** for table of standard dimensions. See also

Globe Chimney. **Smoke Pipe.**
Lamp Case Chimney. **Stove Pipe.**
Lamp Globe Chimney.

Chipping (of Chilled Car Wheels). A scaling off of small portions of the chilled metal, due to imperfect or irregular crystallization. Wheels chipped on the tread to a depth of more than ½ in. or having the tread less than 3½ in. wide are rejected under the rules for interchange of cars. See **Wheel Specifications.**

Chock or **Chock Piece.** "In shipbuilding a wedge or triangular-shaped block or timber used to unite the head and heel of consecutive timbers."—Century. Also intended as a filling piece to give form or shape. Hence in a snow plow a timber which joins successive timbers, and fills out to give shape.

Chord (of a Truss). The long horizontal members at the top and bottom of a truss. The side sills and plates of a car body are top and bottom chords of the side trusses, but the terms are not used in car building. In Great Britain the chords are sometimes termed booms.

Christensen Air Brake. Figs. 1293-1294. A system essentially the same as the Westinghouse, for use on electric cars. The air is compressed by a motor-driven compressor under the car. All the other parts for the automatic and straight-air system operate in the same manner as the systems in use on steam roads.

Christie Brake Shoe and Head. Fig. 5519. One of the many forms of this detail in which combined strength and convenience of removal have been sought. It has been adopted as standard by the M. C. B. Association.

Chute (Baker Heater). Fig. 2553. The interior frame of the feed door forming a passage for the fuel.

Cigar Holder. Fig. 4396.

Circuit Breaker. Figs. 6342-6343. A device for automatically opening the circuit from the trolley or third rail shoe to the controller when the current exceeds a predetermined amount. It is usually provided with magnetic blow-out.

Circulating Drum (Baker Heater). Figs. 2704, 2721. A cast iron vessel with hemispherical ends, on top or inside of the car, filled with water, and connected by two pipes with the coil in the stove and with the pipes which extend through the car. As the water in the coil becomes heated it ascends to the drum, and from there it descends through the other pipe to the radiating pipes in the car. After passing through them it is brought back by return pipes to the coil, when it is again heated. Thus a

continuous circulation is kept up. It is also called the expansion drum. There are several styles, among them the upright, Fig. 2718; the horizontal, Fig. 2721.

Circulating Pipes (Baker and Other Heaters). Fig. 2783. A general name for the pipes which carry the steam or heated fluid through the car and return it again to the heater. The term radiating pipes is also used.

Circumference Measure (M. C. B. Standard). Fig. 5514. A steel tape measure specially designed to measure the circumference of car wheels. Adopted as standard in 1900.

Clamp. 1. "In general, something that fastens or binds a piece of timber or of iron used to fasten work together."—Webster.

2. (Joinery.) "A frame with two tightening screws, by which two portions of an article are tightly compressed together, either while being formed or while their glue joint is drying."—Knight. See **Pipe Clamp.**

Clamp Lock (Steam Couplers). Fig. 2901. A **Coupler Latch,** which see.

Claw Jack. Figs. 3867, 3881. A jack having a step or projection at the bottom of the movable column, used when a bearing close to the ground is required.

Cleaning Air Brakes. In 1902 the following method for cleaning air brakes was adopted as the Recommended Practice of the Association:

Inspection and Cleaning of Triple Valves.—The triple valve should be removed from the car for cleaning in the shop, and should be replaced by a triple in good condition. It should be dismantled, and all the internal parts, except those with rubber seats and gaskets, immersed in kerosene oil to soften the accumulated oil and gum. No hard metal should be used to remove gum or dirt, or to loosen the piston packing ring in its groove, as the almost inevitable result will be damage to some vital part of the triple. Particular pains should be taken in cleansing the feed groove not to enlarge it. Rags, or, better still, chamois skins, should be used rather than waste, as the latter invariably leaves lint on the parts on which it is used. Great care must be used in removing the emergency valve seat, as this is frequently found bruised and distorted in triples which have been cleaned. The working parts should be carefully examined to know that they are in good order. Particular attention should be given the triple piston packing ring. It should have a neat fit in its groove in the piston, and also in the triple piston bushing. The fit of the packing ring in its groove and bushing and the condition of the bushing should be such as to pass the prescribed tests. The graduating stem should work freely in its nut, and the graduating spring be of standard dimensions and free from corrosion. The slide valve, triple piston packing ring and bushing should be lubricated with a few drops of light-bodied, high-grade mineral lubricating oil, such as dynamo oil; but the emergency piston, valve and check should not be oiled.

Should the triple piston packing ring need to be renewed, or the bushing require truing, we strongly recommend that such work be done by the manufacturers. We are thoroughly convinced that the average workman cannot, or at least does not, do work of this kind satisfactorily, and that by far the largest proportion of the attempts to economize in this way result in inefficient air brakes and slid, flat wheels. It also permits a departure from the maintenance of standards in the several parts, which cannot but result in demoralization in repairs.

Usually, sufficient attention is not paid to the condition of the emergency parts of the triple, as shown by their condition. The emergency valve seat is found damaged, the stem bent, the rubber seat imperfect and the check valve not properly fitting in a number of cases. These facts account for a large number of slid, flat wheels.

The cylinder cap gasket and check valve case gasket should be carefully examined and cleaned by using a cloth. They should not be scraped with a metal tool. Judging by an examination of a number of triples, these gaskets should be renewed more frequently than they are.

Before assembling the parts after cleaning, the casings and body of the triple should be thoroughly cleaned out with a blast of compressed air. In taking down and replacing the emergency parts of the triple, the greatest care should be exercised not to injure any of them. More damage is done by careless workmen in taking down these parts than is done in replacing them.

When replacing the triple valve on the auxiliary reservoir, the gasket should be fitted to the triple instead of the reservoir. Home-made gaskets should be avoided, and standard gaskets of the manufacturer be used. Reports have been made where triple pistons have been found bent, due to the use of gaskets of irregular thickness, and trouble has been experienced in using gaskets which are too thick or too thin.

Cleaning and Inspection of the Brake Cylinder.—The brake cylinder need not be removed from the car for cleaning. First secure the piston rod firmly to the cylinder head; then, after removing the cylinder head, piston rod, piston head and release spring, scrape off all deposits of gum and dirt with a narrow putty knife or its equivalent, and have the removed parts wiped with waste saturated with kerosene or other light oil. The packing leather should never be permitted to soak in kerosene oil, as the penetrating qualities of kerosene reach into the pores of the leather, and force out the life-giving qualities of the special oil in which the leather is treated by the manufacturer. Particular attention should be paid to cleaning the leakage groove and the brake cylinder tube. The packing leather and expander ring should receive their share of proper inspection and cleaning. The expander ring should be of a circumference which shall fit the bore of the brake cylinder when the ring is removed from its place between the follower and packing leather and entered in the cylinder. In all cases the follower nuts should be drawn up snugly before replacing the piston, and the inside of the cylinder and packing leather evenly coated with a suitable grease or vaseline. A goodly quantity of grease should be placed on the expander ring and the adjacent side of the packing leather, thus permitting the pressure to force the grease into the leather and give it greater life.

No sharp tool should be used in getting the packing leather into the cylinder. After the pis-

ton is in place and before the cylinder head is fastened on, the piston rod should be slightly rotated in all directions about three inches from the center line of the cylinder, in order to be certain that the expanding ring is not out of place. The old stencil marks should be removed. The auxiliary reservoir should be stenciled on both sides, with the date and place of cleaning, using white lead for the purpose; and if the car belongs to a foreign road, a repair card should be attached, as provided by the rules. The bolts or nuts holding the cylinder and reservoir to the car should be tightened.

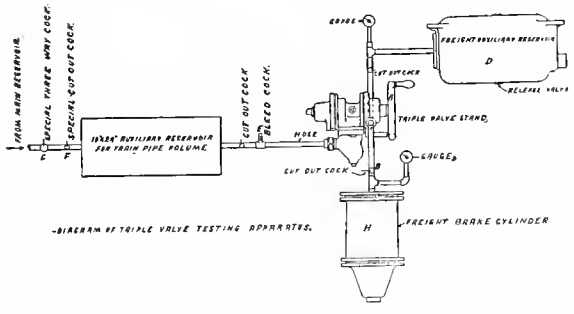
Testing Triples.—After cleaning and repairing, it is essential that triples be tested and come within required limits, if a reasonable efficiency of the air brakes is to be maintained.

Test No. 1.—The tightness of the slide valve, the emergency and check valves and all joints should be determined by painting with soap suds.

Test No. 2.—Maintaining a pressure of ninety pounds in the brake pipe, the auxiliary reservoir should reach seventy pounds in not less than forty-five seconds or more than sixty seconds, as provided for in Test No. 9 of the M. C. B. Air Brake Tests Code.

Test No. 3.—To test repaired triples for release, charge the auxiliary to seventy pounds pressure and make a full service reduction of twenty pounds, or until the auxiliary and cylinder pressure are equal. Place the special cut-out cock in such position that pressure must pass through the 3-64-inch port, and turn main reservoir pressure of ninety pounds into the brake pipe. If the triple does not release under these conditions it should be condemned.

Test No. 4.—The triple piston packing ring should be tested for leakage by blocking the piston in the graduating position, preferably by use of the device shown at "A" in the accompanying diagram, maintaining the brake pipe pressure at seventy pounds. Under these conditions the



pressure in the auxiliary reservoir should not increase faster than fifteen pounds per minute.

Clearance (of Track Gage). The total difference between the gage of the rails and the gage of the exterior bearing surface of the flanges is at present fixed at about ⅜ of an inch, as adopted in June, 1894. See Fig. 5599. The method of testing wheels for this purpose has been by measuring the distance in the clear from inside to inside of car wheel. By resolution of the Master Car Builders' Association, 1883, the standard distance for flanges was fixed at 4 ft. 5⅜ in. The limit of ⅛ in. either way from 4 ft. 5⅜ in. was adopted in 1885. In 1894 a standard check gage for mounting wheels was adopted (see Fig. 5599) which is intended to make the clearance of flanges a fixed distance. The relation of wheel gage to track and guard rails is shown in Fig. 5601.

Clearance or **Clearance Limit.** British equivalent, loading gage. The limiting dimensions of height and width for cars in order that they may safely clear all bridges, tunnels, station platforms and other structures.

Clearance Car. A car with a light frame built out on all sides to the extreme width and height required for any car that is to pass over the road. It is run over the road first to ascertain if the car can with safety be sent over the road. The car may also be used to ascertain what is the maximum cross-section of tunnels, bridges, etc., over a road so that cars can be built within the limits determined by the clearance car.

Clearance, Couplers, Side. See **Attachment of Couplers to Cars.**

Clear Story. 110, Figs. 599-619. "An upper story or row of windows in a church, tower, or other erection, rising clear above the adjoining parts of the building."—Webster. Also spelled clere story. Hence the portion of a passenger car roof which rises above the roof proper, in the manner which is now customary in nearly all American passenger cars, has been termed the clear story, and this name was exclusively used in the first edition of this dictionary. Since the issuing of the first edition the use of the term deck for clear story seems to have become practically universal among car builders and manufacturers, especially in compound words. As a general name for designating the entire space included within the upper deck, however, the term clear story is frequently used. The clear story was first used in American car framing about 1860. The part corresponding to a clear story in freight cabooses is termed a lookout.

Cleat. "1. A narrow strip of wood nailed on in joinery. 2. A term applied to small wooden projections in tackle to fasten ropes by."—Webster.

Cleveland Pressed Steel Carline. Figs. 2173-2188.

Cleveland Turnbuckle. Fig. 3857. See **Turnbuckle.**

Clevis. "A stirrup-shaped metallic strap used in connection with a pin to connect a draft chain or tree to a plow or other tool."—Knight. The term is applied to various kinds of irons resembling a plow clevis in shape, and also to bolts with forked ends. See **Boom Cap Clevis, Brake Lever Clevis.**

Climax Coupler. Figs. 1630-1638, 1517-1525.

Climax Curtain Fixture. Fig. 4671.

Climax Journal Box. Figs. 5270-5275.

Clinch Nail. A wrought iron forged nail, so named because it can be bent or clinched without breaking. Cut nails, the common and cheapest kind, although of wrought iron, will not clinch.

Clip. A U-shaped strap for attaching any body, more particularly a pipe, to the side of a partition. See **Deck Sash Quadrant Clip, Pipe Clip.**

Close Return Bend. Fig. 2780. A short cast iron tube made of a U shape, for uniting the ends of two wrought iron pipes. It differs from an open return bend in having the two branches in contact with each other.

Closed Car (Street Cars). Generally a car with end doors, and the sides closed by the car panels or sheathing, and windows, so that the passengers are protected from the wind and weather.

The term is used for a winter car to distinguish it from an open or summer car, in which the seats

are usually transverse to the car, and the sides open, except for curtains.

Closed Door Stop (Freight Car Doors). A block of wood or iron to prevent outside sliding doors from moving too far when they are closed. See also **Open Door Stop.**

Closet. 1. A small room, usually for storage. See **Linen Closet, Wine Closet,** etc. A locker is a closet of less than the full height of the car, but this distinction is not always observed.

2. A retiring room for sanitary purposes, more commonly called a **Saloon,** which see.

Closet Hopper. Fig. 4054. Also called soil hopper. A metal or porcelain hopper used in saloons.

Closet Hopper Ventilator. See **Bell's Exhaust Hopper Ventilator.**

Clusters (Pintsch Lamps). The four-flame cluster, No. 227, Fig. 3098, is the one ordinarily used in center lamps. Where a large amount of light is required, as in compartments having but one lamp, five or six-flame clusters (Nos. 228, 229) may be used. Where a small amount is needed, as in central corridors at ends of cars, two-flame clusters (No. 226) may be used.

For vestibule lamps the two-flame cluster (No. 226A), Fig. 3099, is required. Four-flame vestibule lamps use the ordinary four-flame cluster (No. 227).

All clusters are provided with check screws, placed at the base of the burner arm, by means of which the flow of gas to each burner can be regulated. These check screws are locked in place by small nuts.

Cluster Stem (Pintsch Lamp). 305, Figs. 3208-3224.

Cluster Stem Flange (Pintsch Lamp). 305a, 305b, Figs. 3208-3224.

Clutch Coupling. See **Brake Hose Coupling.**

Coach. Figs. 131-146, 237-240, 599-604. A term used to designate cars for the conveyance of passengers, in distinction from freight, baggage and express cars. By increasing usage the term is used as an equivalent for day car in distinction from sleeping cars as well as freight and baggage cars.

Coach Bolt (British). American equivalent, **Carriage Bolt,** which see.

Coach Screw (British). American equivalent, lag screw, but coach screw is also used. A square-headed screw with a pointed end used to screw into wood.

Coal Box. In passenger cars a box for carrying coal. It is usually a long narrow deep box, placed between the heater and the end of the coach.

Coal Car. Figs. 35-66. A car for carrying coal. The standard cars built for coal service to-day are largely what are termed gondolas. They are from 27 to 36 feet long and carry from 60,000 lbs. to 100,000 lbs. They are usually designated by the character of the dumping devices applied, as drop bottom, hopper bottom, hopper, twin hopper, etc. See

Drop Bottom Car.
Goodwin Car.
Hopper Bottom Car.
Hopper Car.
Twin Hopper Car.

Coal Feed Chute (Baker Heater). Fig. 2684.

Coat Hook. Fig. 3827.

Coat and Hat Hook. Fig. 3815.

Cock. 4 and 6, Figs. 3684-3686 and 2766. "A spout; an instrument to draw out or discharge liquor from a cask, vat or pipe."—Webster.

Bibb Cock.
Combination Cock.
Compression Faucet.
Drain Cock.
Main Cock.
Reservoir Drain Cock.
Self-Closing Cock.
Stop Cock.
Telegraph Cock.
Vertical Telegraph Cock.

Coes Wrench. Fig. 3859.

Coil (Baker Heater). Figs. 2688, etc. An iron pipe which is bent in a spiral form and placed in the fire, for heating water which circulates through the car.

Coil Jacket Steam Heating System (Safety Car Heating System). This system is primarily a system devised to meet the requirements of those who demand that all the jackets and circulating piping be retained entirely within the car. The jackets are shown in Fig. 2951; and in these the circulating water is heated by steam from the locomotive. See **Safety Car Heating Co.'s Systems of Car Heating.**

Coke Car. Figs. 75-79, 513-531. A car made of large cubic capacity for carrying coke. Modified forms of hopper cars with doors which discharge the load to one or both sides of the track are now commonly used. A coke rack is often applied to the sides of gondola cars as in Figs. 56, 381-382, to give additional cubic capacity. Box and stock cars are often used for carrying coke.

Coke Quenching Car. Fig. 77. Light weight car, with inclined floor, into which coke is discharged from the furnace and quenched with water.

Coke Rack. A wooden slatted frame or light box applied above the solid plank sides of gondola cars to increase the height of side and the cubic capacity for carrying coke or other light bulk freight. The posts of the rack are made to fit in **Stake Pockets,** which see, attached to the permanent sides and ends of the car.

Coke Rack Stake Pocket. A metal socket fastened to the side or end planks of a gondola car which takes the stakes of a rack or railing put on when the car is loaded with coke to increase its cubic capacity.

Cold Shot. Small globules of iron resembling ordinary gun shot, which are found in the chilled portion of cast iron wheels.

Collar, 1. "A ring or round flange upon or against an object."—Knight. Ordinarily an axle collar, below, is meant.

2. (Of Journal.) Fig. 5510. A rim or enlargement on the end of the car axle which takes the end thrust of the journal bearing.

Collection of Salt Water Drippings (M. C. B. Recommended Practice). In 1898 the subject of rust on trucks and track from salt water drippings from refrigerator cars was discussed, and a Recommended Practice for the collection of such drippings was adopted. See Figs. 5776-5778.

Collins Brake Head. A brake head with the shoe fastened by a dovetail, which is wedge-shaped. Not now used.

Colonist Sleeping Car. Figs. 605-606. A sleeping car for carrying colonists, excusionists or emigrants, finished in less luxurious manner than a standard sleeping car. A **Tourist Sleeping Car,** which see.

Color Coat (Painting). The coat or coats which follows the rough stuff or scraping filling coat in painting passenger car bodies. It is applied before the lettering and striping. The colors are mixed with turpentine and dryers, as little oil as possible being used, only sufficient to prevent the color

from rubbing off. Twenty-four hours are allowed to each coat to dry, and the processes of lettering, striping and varnishing then follow, which vary greatly in the time and care given to them, but which are always very carefully done. See **Finishing Varnish** and **Painting.**

Columbia Locknut. Figs. 3855-3856.

Column. 1. (Diamond and Other Trucks.) 37, Figs. 4705-4713. Another name for a **Bolster Guide Bar,** which see.

2. (Of Crane.) Another name for the mast, especially when entirely supported from below.

Column Bolt. 109, Figs. 4705-4713. A bolt passing through the arch bars and holding the column in place and the truck frame together.

Comb and Brush Rack or **Case.** Figs. 3675, 3677-3678

Combination Baggage Car. Fig. 193. A baggage car having compartments for express or mail, or both, as well as for baggage. See **Combination Car.**

Combination Car. Figs. 138, 188, 231-232 and 614-616. A passenger car, one portion of which is devoted to passengers and the other to the conveyance of mail, baggage or express. The section for passengers is usually reserved for smokers.

Combination Cock (Baker Heater). Fig. 2767. A cock with funnel attached, used at the top of the water tank for filling. When opened with the key it allows the inward passage of the water, and at the same time the outward passage of air through a separate channel. Hence the name.

Combination Hot and Cold Water Faucets. 6, Figs. 3684-3686 and Fig. 3658.

Combination Valve (Steam Heating). Figs. 2984-2987.

Combined Triple Valve, Reservoir and Brake Cylinder (Westinghouse Freight Brake). Fig. 1275. To lessen the complication and reduce the cost of freight brake gear these three parts, which are separate in passenger brake gear, are combined in freight.

Combination Vapor-Pressure Trap. Figs. 2902-2904.

Commercial Acetylene System of Car Lighting. Details, Figs. 3284-3327. This system uses acetylene gas stored in tanks filled with asbestos and charged with 4/10 of a volume of acetone, a colorless liquid obtained from the dry distillation of wood which absorbs large quantities of acetylene under pressure. When the pressure is relieved the acetylene is given off and the acetone remains in the tank and may be used over again on recharging; 2,000 cubic feet of acetylene may be stored under a pressure of 150 lbs. in a 114-in. x 20-in. tank and may not be exploded by any known means when in the tanks filled with asbestos bricks. Such a supply is sufficient for more than one month's lighting of an ordinary car. The gas is generated in stations at terminals, and the tanks, when empty, are replaced by full tanks supplied from the charging stations or charged from yard lines. The lamps and piping for the car are practically the same as the Pintsch.

Commode Handle (British). Nearest American equivalent, body hand rail. A piece of brass or iron secured to the sides of the body, and shaped so as to be conveniently grasped by the hand in entering and leaving the carriage or in passing along the train outside the carriages.

Common Sense Bolster. Fig. 1139. A type of bolster having a top and bottom plate of wrought iron and a center filling piece of steel.

Communication Cord Pulley (British). American equivalent, bell cord pulley. A small brass pulley fixed to the eaves of the roof and carrying the communication cord (bell cord) running outside the train.

Commutator. Fig. 6345; Figs. 6293-6313. See **Armature.**

Compartment. A subdivision of a passenger car. In British carriages it usually runs entirely across the car. In American parlor and sleeping cars, in which alone compartments often occur, it runs only partially across, leaving room for a passage or corridor at the side. Often called **Stateroom,** which see.

Compartment Sleeping Car. Figs. 180-181, 216. A sleeping car which is divided into staterooms all opening into a common corridor which runs the whole length of the car. See **Sleeping Car.**

Composite Car. Figs. 220, 230, 232. Another name for **Combination Car,** which see.

Composite Underframe. Figs. 1168-1172.

Composite Carriage or Composite (British). A coach in which compartments for more than one class of passengers are provided. A compartment for baggage is often included.

Composite End Framing. Figs. 691-696. A type of framing adopted by the Vanderbilt system of railways, which combines iron and wood, in the sills posts, plates, etc. The sills and plates of the body and deck consist of two pieces of wood with an iron or steel flitch plate between, the three pieces being bolted together as one. To these iron flitch plates and mortised into wood flitch planks of the sills and plates are bolted or riveted upright iron posts. These iron posts are also sandwiched between wood studs, making a composite post of great stiffness and strength. The end plate is also strengthened in the same manner, as are all the important members of the car body end frame.

Composite End Post. See **Composite End Framing.**

Compound Bolster. A bolster composed of one or more sticks of timber stiffened with vertical plates of iron. The use of all-metal body bolsters is now almost universal. Compound bolsters are still used in passenger trucks.

Compound Carline. 100, Figs. 599-619. A carline, of which the main or central portion is made of wrought iron, with a piece of wood on each side. They are commonly used for cars with clear stories, and either extend directly from one plate to the other or are bent to conform to the shape of the clear story. In the latter case they are called profile carlines. See **Carline.**

Compression Beam. 163, Figs. 599-619. A horizontal timber in the center of the side of a car body, which acts as the compression member of a truss for strengthening the body. The compression beam brace abuts against it. An end compression beam is sometimes used. The compression beam is sometimes made double, one piece above the other, with separate braces (main compression brace and center compression brace) acting upon each.

Compression Beam Brace. 164, Figs. 577-581, 599-619. A timber used in connection with a compression beam to form a truss in the side of a passenger car. It is sometimes stiffened by a center counter-brace, and sometimes two or more braces are used It is then termed main compression brace.

Compression Faucet. Fig. 3659, and 4, Figs. 3684-3686. A spring faucet with a flat disk on top, letting on the water by direct vertical compression. **Telegraph Faucets**, which see, are in a sense compression faucets, but are not so called.

Compression Member. Any bar, beam, brace, etc., which is subjected to strains of compression, and forms part of a frame truss, beam, girder, etc. Struts, body braces, etc., are compression members. Similarly a tension member is used for tensile strains.

Concealing Urinal. One designed to be opened for use by a handle at the top, and then closed up flush with the woodwork so to be invisible. They are in limited use, but not generally approved.

Concealing Water Closet. A form of closet covered with a small seat and usually placed in the corner of compartments or staterooms in private and sleeping cars.

Condensing Diaphragm (Refrigerator Cars). Sheets of metal placed in the cold air flue on which moisture may be precipitated.

Conductor (Refrigerator Car). The drip pipe from the ice pan.

Conductor's Car. A **Caboose Car**, which see.

Conductor's Lantern. Fig. 3621. One with an extra sized bail attached to it by which it can be held on the arm, leaving the hands free. It is sometimes provided with a reflector. They are often elaborately finished, and sometimes bear the name of the conductor cut on the globe.

Conductor's Valve (Westinghouse Air Brake). Fig. 1280. A valve for applying the train brakes, placed at some convenient point in each passenger car, usually in the saloon.

Conductor's Valve Discharge Pipe (Westinghouse Brake). A pipe leading from the conductor's valve down through the floor of the car to carry off the escaping air.

Conductor's Valve Pipe (Westinghouse Brake). Fig. 1280. Connects the brake pipe with the conductor's valve.

Conduit Plow. Figs. 6335-6336. A collecting device used with the open conduit system, consisting of metal contact shoes mounted upon a thin steel carrier, and designed to make contact with two insulated contact rails located in a conduit between the running rails. Copper leads through the steel carrier connect the shoes to the car wiring. The plow is supported by the trucks in such a manner as to allow lateral motion to permit its readily following the conduit slot.

Cone and Apron Ventilator. Fig. 4419. See **Ventilators.**

Cone Cap Ventilator. Fig. 4418. See **Ventilators.**

Cone Lamp Shades. Fig. 3577. See **Lamp Shade.**

Coned Closet Hopper. Fig. 4056. See **Closet Hopper.**

Congdon Brake Shoe. Fig. 5237. A shoe with soft cast iron body and wrought iron inserts. Especially adapted for use on chilled wheels.

Connecting Chain (Steam Shovel). A pitch chain, connecting the pitch gear on the two axles of a truck, used for making the car self-propelling.

Connecting Rail. The wood or metallic bars that join the wall and aisle ends of a car seat.

Connecting Rod. 1. A rod which connects two or more parts or objects together. See **Brake Shaft Connecting Rod, Floating Lever Connecting Rod, Car Seat Connecting Rod.**

2. (Hand Car.) 24. Figs. 6207-6209. The iron rod which connects the bell crank and the crank shaft together.

Consolidated Axle Light System of Electric Car Lighting. Fig. 3441. The equipment of this system consists essentially of a generator installed on the truck of the car and driven from the axle; a regulator installed on the car and a storage battery in a box under the car body. The voltage used is 30 or 60. The output of the generator is controlled and kept constant by varying the resistance in the field circuit to correspond to varying train speeds and the voltage at the lamps is kept constant at all times whether they are being fed by the battery alone as when the car is stationary or running below the critical speed, or whether they are connected in multiple with both the generator and battery at speeds above the critical. The controlling apparatus to accomplish this is thrown into action by any variation of the generator output from normal. The voltage of the lamp circuit is controlled by a variable resistance in series with it, actuated by the regulator.

Consolidated Car Heating Systems. Fig. 2878. Several systems of car heating, including a **Direct Steam System** and a **Multiple Circuit Drum System**, which see.

Consolidated Steam Hose Coupling. Fig. 2900. A straight port coupling used on Consolidated Car Heating Co.'s equipments.

Construction Car. A car used in building a new line of railroad or making repairs to roadbed and structures. See **Ballast Car, Contractor's Car, Dump Car, Goodwin Car.**

Contactor. Fig. 6369. See **Control System.**

Continuous Basket Rack. 145, Figs. 648-651; Fig. 3920. See **Basket Rack.**

Continuous Brake. A system of brakes so arranged that by connecting together the brake apparatus on the different vehicles forming a train it can be operated on all of them from one or more points on the train, as from the engine or from any of the cars. See **Air Brake, Vacuum Brake.**

Continuous Carline. A **Carline**, which see, which passes directly from side to side of the car, across and under the clear story or upper deck, in distinction from a profile carline, which is bent to follow the outline of the clear story.

Continuous Deck Sash Opener. Fig. 4463.

Continuous Counterbrace Rod. The body counterbrace rods are sometimes combined into one long rod passing from one end of the car to the other, which is then sometimes termed a continuous counterbrace rod; also, overhang truss rod, inverted truss rod, or hog chain rod.

Continuous Draft Gear. A draft gear, having a continuous rod or rods extending throughout the length of the car from the drawbar at one end to the drawbar at the other end, whose office is to transmit the tractive strains and relieve the draft timbers. The American continuous draft gear employs two rods attached to flat keys or iron bars which pass through slots in the shank of the couplers. In running the tractive force is transmitted directly to the rear coupler and draft gear and each car is in effect pushed and not pulled. In buffing the rods are not in action.

Continuous Top Side (British). Nearest American equivalent, top side rail. A side board run continuously from end to end of a wagon in order to

stiffen it vertically and assist in tying the ends together.

Continuous Truck Frame. An iron bar which is welded together in a rectangular shape so as to form the sides and ends of a truck frame.

Contractor's Cars. Figs. 95a-99a. Light dump and flat cars, usually narrow gage, for contractor's use in construction work.

Control System (Type M., Gen. Electric Co.). Figs. 6329-6350. A system of control where one or more controllers are operated from a distance.

This system has been developed with special reference to the operation of a train consisting of several motor cars coupled together, all motors being controlled simultaneously by a single operator. Each motor car is equipped with a motor controller, one or two master controllers, and control couplers, together with such other apparatus as switches, fuses, rheostats, etc., as constitutes a complete operative motor car equipment.

The motor controller consists of a number of electrically operated switches, called "contactors," which close the various power and motor circuits, and which carry only the current for the operating coils of the contactors. These latter are designed to open the motor circuit contacts by gravity, and are provided with an efficient magnetic blowout for quickly and positively disrupting the arc thus formed. The motor controller also includes an electrically operated reversing switch, called "reverser," the function of which is to connect the motor armatures and fields in the proper relations for giving forward or backward movement of the car. The reverser consists of a drum having two positions and carrying the necessary contacts for engaging fixed contact fingers, together with two operating coils, one for throwing the reverser to each position. The operation of this reverser is also effected by the master controller.

The master controller is similar in construction to the ordinary hand controller, but very small and easily operated. It is provided with separate operating and reversing interlocked handles, and has a magnetic blowout for disrupting the arcs formed on opening the control circuit connections.

The combinations of motors, rheostats, etc., effected by the motor controllers are the same as those accomplished by ordinary hand controllers, giving series and parallel operation of motors and two economical running speeds. (See **Controller.**)

Where several cars are coupled in a train the control circuits of the various cars are joined together by means of couplers located at the end of each car, so that all motor controller operating circuits and all master controllers are connected together, making all of the motor controllers operative from any master controller. The cars may be coupled into a train without reference to their relative positions, and either end of any car may be coupled to any other car in the train.

The couplings for connecting the control circuits between cars consist of a coupler socket fixed to the end of the car, and a jumper consisting of two coupler plugs connected by a multiple cable. The coupler sockets and plugs contain corresponding metal contacts for the connection of the electrical circuits.

A cut-out switch is provided on each car, by means of which damaged motors or motor controllers may be disconnected from the energizing circuits.

Control System, Multiple Unit. See **Westinghouse Electro-Pneumatic System of Control.**

Controller. Figs. 6331-6332, 6334, 6357-6360, 6385-6390. An electric switching mechanism for controlling the speed and direction of rotation of electric motors. It includes the necessary movable and fixed contacts for connecting the motors to the power circuit and to a variable resistance in the combinations necessary for starting, accelerating and reversing the car. Practically all railway controllers are of the series parallel type, arranged to connect the motors first in series with each other, and then in parallel across the power circuit, giving two running speeds. While accelerating to these speeds, variable resistances introduced into the circuit prevent undue rise of current.

The controller consists of a main cylinder, carrying the necessary contacts insulated from the shaft and from each other for engaging with fixed contacts or fingers, thus effecting the required electrical connections for placing motors either in series or in parallel, and regulating the resistances in series with them. A reversing cylinder makes the necessary connections for reversing the direction of rotation of the motors. The arcs formed on opening the circuits are disrupted by a magnetic blowout. The controller is enclosed in an iron casing, which protects all parts and serves to attach it to the car framing. One controller is usually located on each platform of the car, which can be operated from either end. See **Control System.**

Convertible Car (Electric). Figs. 6219, 6237, 626,6268, 6275-6277. A type of car which may be readily converted from a closed car to an open car. The seats are arranged crosswise and the side of the car is made up of panels between the posts. When it is desired to change the car from closed to open, the roof, as shown in Figs. 6275-6277. See **Semi-Convertible Car.**

Cope. The upper portion of a mold or flask used in making metal castings.

Coping (British). A bar of iron secured to the top of the sides and ends of a gondola car (open wagon), and protecting them from local distortion.

Coping Machine. Fig. 6847.

Cord. "A string or small rope composed of several strands twisted together."—Webster. See **Bell Cord.**

Cord Wall (Refrigerator Cars). One of the means of insulation.

Corner Angle Post. A corner post in the body framing of a car which consists of an angle bar, usually in combination with a wooden post.

Corner Brace (Street Car). A diagonal floor timber in the underframe between the end sill and transverse floor timber or bolster.

Corner Casting. A **Knee Iron,** or a **Corner Plate,** which see. See also **Roof Corner Casting.**

Corner Handle. More commonly a **Hand Hold** or a **Grab Iron,** which see. 60, Figs. 262-272.

Corner Pillar (British). American equivalent, corner post. An upright piece at the corners of the car body.

Corner Plate. I. (Freight Car Bodies.) 55, 56, 57, Figs. 262-272, 804-806. A wrought or cast iron angle plate or knee on the outside corner, to strengthen and protect the frame. There are usually three corner plates, upper, lower and middle. Very commonly

a push pole corner iron or push block, 191, Figs. 262-272, is cast upon the lower corner plate.

2. (Pullman End Framing.) An angle iron applied to the corner of a stick of timber (the deck end plate) to keep it from abrasion and to strengthen it.

Corner Post. 43, Figs. 262-272; 61, Figs. 599-619. The upright stick or piece of metal which forms the corner of the frame of a car body.

Corner Post Pocket. Figs. 713-714. See **Pocket.**

Corner Post and Brace Pocket. Figs. 715-716.

Corner Post Grab Handle (Vestibule Fittings). Figs. 3954, 3986-3987.

Corner Post Knee Iron. 1. (Passenger Car End Framing.) A metal angle brace used to connect the foot of the corner angle post to the side sill.

2. (Vestibule.) An iron angle brace for the outside corner post of a vestibule resting upon the platform end sill.

Corner Post Pocket. 45, Figs. 262-272 and Fig. 713. See **Pocket.**

Corner Seat. A seat for the corner of a car, the back of which is not reversible. They are called left hand or right hand, according as the wall which forms the seat end is to the right or left of a person sitting in them.

Corner Seat End. A seat end bracket secured to the wall of a passenger car for supporting the outer end of a **Corner Seat**, which see.

Corner Urinal. So called in distinction from a side urinal.

Cornice. 94, Figs. 648-651. The moldings at the eaves of the roof outside of a car, and where the ceiling joins the sides and ends of the car inside. There is, therefore, an inside and outside cornice. See also **Deck Inside Cornice, Window Cornice,** etc.

Corning Brake Shoe. Fig. 5241. A brake shoe with a hard cast iron body chilled at the ends and having sof cast iron inserts.

Corridor (Sleeping and Compartment Cars). Figs. 216-217. A passage running at one side of a car from one door to the other, affording access to the compartments. All sleeping, dining and private cars have longer or shorter corridors to pass the staterooms, smoking compartments, etc.

Corridor Carriage (British). Figs. 6464-6465, etc. A passenger vehicle having a passage from end to end along one side, the various compartments having doors which open into this passage. Used on many through trains. See also **Carriage.**

Corrugated Key (Yale Lock, which see).

Corrugated Metal Car Roof (Freight Cars). Figs. 2164-2167. A roof consisting of iron, steel or zinc plates usually covered with boards, and resting on roof strips on top of the rafters and carlines. See also **Car Roof.**

Corrugated Moldings. See **Waved Moldings.**

Corrugated Rubber Floor Mat. So called in distinction from perforated rubber floor mats.

Corrugated Yale Lock. See **Yale Lock.**

Corticine. A form of floor covering much like **Linoleum,** which see, composed of linseed oil, prepared by a special process, mixed with ground cork and placed upon a strong backing of water-proof canvas.

Counter Boring. An enlargement or other alteration of form, for a certain portion of its length, of a hole bored in any substance.

Counterbrace. 37, Figs. 262-272; 51 and 165, Figs. 599-619. In freight car building, the inclined member of the body side framing inserted in the panel between the body bolster and the end sill.

In passenger car framing the timber framed into the top of the side sill near the needlebeam and supporting the compression beam brace into which it is also framed. See **Body Counterbrace** and **Body Brace.**

Counterbrace Rod. 37a, Figs. 262-272. An inclined rod which acts as a counterbrace. See above and also **Body Counterbrace Rod.**

Counterbrace Rod Plate Washers. 34b, Figs. 262-272, etc. Washers that rest upon the plate and receive the end of the counterbrace rod.

Coupler. That which couples. In relation to cars the term usually designates the appliances for coupling or connecting cars together. The word is more appropriately applied to the automatic car coupler, which performs the act of coupling itself. The term is sometimes used to designate the coupling of steam pipes between cars, but this is unfortunate, as it seems desirable to maintain the distinction already established. To apply the term coupling to an M. C. B. automatic coupler would be an innovation, and it would seem equally so to call a steam hose coupling a coupler. See **Automatic Car Couplers.**

Couplers, Automatic. For M. C. B. Rules for Interchange of Traffic with regard to couplers see **Draw-Bar and Attachments,** and **Interchange of Traffic.**

Couplers, Automatic Air and Steam. See **Automatic Coupling.**

Coupler, Electric. Fig. 6361. A device attached to the end of a car including insulated metallic contacts for the connection of electric circuits between cars, generally used for connection of trail car lighting, heating or signal circuits to the motor car. See **Control System.**

Coupler Follower Plates. Figs. 968-970.

Coupler Gages. Fig. 5579. Gages adopted by the M. C. B. Association in 1891 to preserve the contour line for couplers. These gages, as revised in 1904, may be obtained from Pratt & Whitney Company, Hartford, Conn.

Coupler Guide. Figs. 965-967.

Coupler Gaskets (Gold Steam Coupler). Figs. 2810-2813.

Coupler Horn. The projecting lug cast on the head of the coupler which bears on the face of the end sill or dead block when the draft gear is closed solid in comparison.

Coupler Jumper. Fig. 6361. Two coupler plugs connected by an insulated flexible cable. See **Control System.**

Coupler Latch (Gold Steam Coupler). Fig. 2808. A catch to lock the steam hose couplers together and prevent accidental parting in rounding sharp curves.

Coupler Plug. Fig. 6361. A movable coupler designed to engage and connect to coupler socket. See **Control System.**

Coupler Stirrup. Figs. 949-951. See **Drawbar Centering Device.**

Coupler Shanks. Figs. 1658-1705.

Coupler Socket. Fig. 6361. A fixed electric coupler. See **Control System.**

Couplet (of Springs). Fig. 5382. Two **Elliptic Springs,** which see, placed side by side, to act as one spring. Three springs united in this way form a triplet, four a quadruplet, five a quintuplet, six a sextuplet.

Coupling. "That which couples or connects, as a hook,

chain or bar."—Webster. A coupling link was called simply a coupling. See **Coupler.** See

Basin Coupling.
Bell Cord Coupling.
Berth Curtain Rod Coupling.
Brake Hose Clutch Coupling.
Brake Hose Coupling.
Clutch Coupling.
Coupling Link.
Head Board Coupling.
Hose Coupling.
Pipe Coupling.
Reducing Pipe Coupling.
Screw Coupling (British).
Steam Hose Coupling.

Coupling Bar. See **Brake Lever Coupling Bar.**

Coupling Bar Pin (Brake Gear). A pin for the **Brake Lever Coupling Bar,** which see.

Coupling Case. See **Brake Hose Coupling Case.**

Coupling Chain or **Chain Coupling Link.** A three-link chain used in coupling to **Draw Hooks,** which see.

Coupling Hose. More commonly brake hose.

Coupling Link. A wrought iron link or open bar by which freight cars are coupled together by coupling pins. Chain coupling links are used with draw hooks. In consequence of the danger to trainmen attending the use of coupling links, and legislation forbidding their use after January 1, 1898, automatic car couplers have almost entirely replaced them. See **Car Coupler.**

2. (British.) A link forming part of the wagon coupling or draw chain. The open ended link connected to the draw hook or draw bar is the coupling shackle. The intermediate links are sometimes termed the short links, and the end link the long link. A single long link is often used instead of three short intermediate links.

Coupling Pin. A round bar of iron with which a coupling link is connected to a drawbar.

Coupling Pin Chain. A small chain attached to the car by a suitable eye to prevent the coupling pin from being lost.

Coupling Screw (British). A right and left handed screw used in a **Screw Coupling,** which see.

Coupling Shackle (British). The end link of the coupling which is secured by a pin to the shank of the **Draw Hook,** which see.

Coupling Sleeve (Kirby's Door Lock). K, Fig. 2480.

Cover. See

Drum Cover.
Journal Box Cover.
Man Hole Cover.
Molding Joint Cover.
Urinal Cover.
Window Molding Joint Cover.

Cover Plate. 1. A face plate of a steel-tired wheel is a disk connecting the tire and hub.

2. In metal underframes for cars a plate which is riveted to the flanges of the center sills to give them additional vertical strength as a box girder. The plate riveted to the top flanges is called a top cover plate and one riveted to the bottom flanges a bottom cover plate.

Cover Strip. 1. (Refrigerator Car.) Metal plates covering a gutter in the floor.

2. A strip of metal, or sometimes wood, to cover a joint in the roof sheets. 3, Figs. 2098-2103.

Covered Wagon (British). Figs. 6541, etc. A roofed vehicle used for conveying freight liable to be stolen or to be damaged by damp. It has side doors which can be locked, and occasionally doors in the roof so that the contents can be readily hoisted. As a rule, **Tarpaulins,** which see, and open cars are used in England.

Crabs or **Tongs** (Pile Driver Car). See **Tongs.** Also called rail clips or rail clamps. A pair of loose bent iron bars fastened at the top with a ring and intended to firmly clamp to the under side of the rail head when an upward pull is applied to the ring. They are used to anchor a pile driver car, steam shovel or wrecking crane, to the rails and prevent them from overturning when a heavy load is being lifted.

Crane. See **Pile Driver Car, Derrick, Wrecking Crane.**

Crane Post. The post of a crane, which corresponds to the mast of a derrick.

Crank. 1. "Literally, a bend or turn; hence an iron axis with a part bent like an elbow, for producing a horizontal or perpendicular motion by means of a rotary motion or the contrary."—Webster. See **Bell Crank.**

2. (Of a Derrick or Crane.) The L-shaped handle by which the driving gear is actuated.

3. (Of a Lever Hand Car.) 6, Figs. 6207-6209. The **Bell Crank,** which see, of a hand car, 23, is at the upper end of the connecting rod, the crank at the lower end.

Crank Shaft (Lever Hand Cars). 6, Figs. 6207-6209. A short wrought iron shaft to which a crank of a hand car is attached, which is turned by suitable levers and is connected by gear wheels with one of the axles of the car.

Crank Shaft Bearings (Hand Car). 5, Figs. 6207-6209.

"Creco" Automatic Slack Adjuster. Figs. 1173-1182.

"Creco" Brake Beam. Figs. 5083-5086.

"Creco" Brake Beam Head. Figs. 5150-5151.

"Creco" Brake Jaw. Figs. 5229-5234.

"Creco" Roller Side Bearings. Figs. 5349-5356.

Crescent Angle Band Saw. Figs. 6824-6825.

Crib Rail (British). A longitudinal piece of timber secured to the upper part of the outer side of the sole bar and supporting the body of the vehicle.

Cricket Iron. A **Seat Stand,** which see.

Cripple Post (Street Cars). A post of an end window, where the window is not of the full width, between the door post and corner post.

Cross Bar (Swing Link Hanger). The iron bar supporting the cross bar casting which carries the spring plank. Also called mandrel pin and lower swing hanger pivot.

Cross Bar Casting or **Spring Plank Carrier** (Swing Link Hanger). See **Cross Bar.**

Cross Beam. A transverse floor timber placed upon the sills to support the inclined floor of a coal or ore car.

Cross Bearer (British). American equivalent, cross tie timber, needlebeam, and sometimes cross bearer. A transverse member of the underframe, placed between the ends of the vehicle. It serves to transfer the weight of the body and lading to the sole bars, and keep the latter apart. Also called cross bar or transom.

Cross Frame King Post or **Truss Block.** See **Cross Frame Truss.**

Cross Frame Tie Bolt. A **Sill Tie Rod,** which see.

Cross Frame Tie Timber. 22, Figs. 262-272, etc.; 26, Figs. 599-613, 617-619. A transverse timber bolted to the under side of the longitudinal sills and floor timbers of a car body between the bolsters, and to which the body king or queen posts, or truss blocks, are attached when truss rods are used under a car body. More commonly, **Cross Tie Timber,** which see.

The term **Needlebeam** (which see), taken from bridge engineering, is also used. Other names are body transom, cross bearer, cross berth, etc.

Cross Frame Truss. 26t, Figs. 645-647 and Figs. 624-626. A truss for a needlebeam or cross tie timber. The various parts, king post, truss rod, truss rod washer, etc., are shown.

Cross Frame Truss Rod. See above.

Cross Tie Rod. A **Sill Tie Rod,** which see.

Cross Tie Timber. 22, Figs. 262-272; 26, Figs. 599-619. A transverse member of the underframe of the car put in between the bolsters, serving to tie the sills together and also as a support or bearing for the truss rod queen posts. A **Needlebeam,** which see.

Cross Tie Timber Truss Rod. 26t, Figs. 599-619. An iron truss rod under the cross tie timber, serving to strengthen it.

Cross Tie Timber Truss Rod Queen Post. 26b, Figs. 599-619. A **Queen Post,** which see, for the cross tie timber truss rod.

Cross Timber Hopper Ends. In a wooden hopper car, a transverse floor timber framed between the intermediate sills, to which the lower end of the inclined floor is spiked and to which the outer hopper doors are hung. The ends of the draft timbers are bolted to it, and the short center sills abut against it.

Crosshead (Westinghouse Brake). 6, Fig. 1257. A forked casting attached to the outside end of a piston rod, to which the brake levers are connected.

Crown Lamp Shade. Fig. 3566. See **Lamp Shade.**

Crown Molding (Street Cars). A molding on the inside, above the deck sash and tacked to the deck posts and carlines.

Crown Piece (Street Cars). A curved timber framed across the ends of the platform sills and serving as a bumper beam or platform end sill.

Crown Piece Corner Iron (Street Cars). A strap iron that protects the corner of the crown piece.

Crown Ring (Pintsch Lamp). 314, Figs. 3208-3224.

Cuff Rack. Fig. 3315. For lavatories.

Cup. 1. "A small vessel used commonly to drink out of, but the name is also given to vessels of like shape used for other purposes."—Webster. See **Candle Holder Cup. Oil Cup. Drain Cup.**

Cup Holders or **Tumbler Holder.** Fig. 3667. A stand or rack for holding a drinking cup.

Cup Hook. Fig. 3755.

Cup Side Bearing. A side bearing for truck bolsters with a receptacle for holding oil and waste. Little used.

Cup Washer. Fig. 777. A **Socket Washer,** which see.

Cupboard Bolt. Fig. 2399. See **Door Bolt.**

Cupboard Catch or **Flush Bolt.** Fig. 2399. A very indefinite term for a light spring catch nearly or quite flush with the surface to which it is attached. It has a beveled bolt which snaps shut.

Cupboard Latch. Fig. 2399.

Curled Hair. Hair from the tails or manes of cattle, horses, etc., which is first spun into ropes, then wound into coils, and either steeped or boiled in water. After this the coil is dried and the hair unwound, which leaves it in a curly and elastic state, suited for stuffing cushions, etc.

Current Director (Car Heating). Fig. 2893. A device for controlling the flow of steam or hot water in the pipes, working on the principle of an injector.

Curtain. 17, Figs. 2201-2206. A cloth hanging in front of or around any space or object, as a window or sleeping-car berth, and which may be contracted or spread at will. The term, however, is usually restricted to loosely hung drapery, suspended on a curtain rod by curtain hooks or rings, in distinction from a shade, which is flat and rolls up. Curtains in cars are chiefly used for sleeping-car berths (**Berth Curtains,** which see) and for the sides of open street cars. Window curtains are used in dining, parlor and private cars. Except in the saloons, blinds have been abandoned, and window shades are in almost universal use on steam railroads. Blinds are still in general use in street cars.

Curtain (Buhoup Vestibule). 11, Figs. 2215-2263.

Curtain Bearing (Buhoup Vestibule). 20, 20a and 21, Figs. 2215-2263.

Curtain Brackets (Hartshorn and McKay). Fig. 4684. One bracket has a circular hole and the other a rectangular.

Curtain Cord Hooks. Figs. 3750-3754.

Curtain Fixtures. Fig. 4665.

Curtain Hooks (Sleeping Berths). Fig. 3750.

Curtain Plate (Buhoup Vestibule). 8 and 9, Figs. 2215-2263.

Curtain Rings. Figs. 3728-3731. See **Curtain.**

Curtain Rod. Fig. 3736. A bar to carry a curtain hung upon rings and sliding freely along the rod.

Curtain Rod Bracket. Figs. 3714-3716.

Curtain Rod Bushing. Figs. 3732-3733. A socket or bushing for the end of a curtain rod as it abuts against a wall or partition.

Curtain Rod Folding Bracket (Sleeping Car). 15, Figs. 2201-2202. A bracket for a curtain rod in a sleeping car which may be folded into the upper berth in such a manner that it is out of sight when the upper berth is shut up. See **Folding Curtain Rod Bracket.**

Curtain Roller (Buhoup Vestibule). 10, Figs. 2215-2263.

Curtain Roller Plug (Buhoup Vestibule). 45, Figs. 2215-2263.

Curtain Socket (Buhoup Vestibule). 23, Figs. 2215-2263.

Curtain Spring (Buhoup Vestibule). 44, Figs. 2215-2263.

Curtain Spring Plug (Buhoup Vestibule). 52 and 53, Figs. 2215-2263.

Curtis Turbo-Generator (Electric Car Lighting). Fig. 3421. A Curtis steam turbine of small size is direct-connected to a generator for furnishing electric current to light trains. The turbo-generator may be mounted in the baggage car or on top of the locomotive boiler and it receives steam from the locomotive.

Curved Seat Stop. Figs. 4228-4234, 4274. See **Seat Arm Stop.**

Cushion. Figs. 4166-4172. Cushions used in passenger car upholstery are of the box type, being built upon and connected with a wooden framework (cushion frame). See **Seat Cushion.**

Cushion Back Rail (British). In a carriage, a small transverse bar which confines the back edge of the seat cushion.

Cushion Frame. A wooden frame to which the seat springs and upholstery of a car seat are attached.

Cuspidor. Fig. 2672. A vessel to receive discharges of spittle, and having a wide rim so that if it is upset its contents will not be spilled. It is the substitute for a spittoon, Figs. 2536-2537, from which it differs only in form.

Cut-Off Saw (Woodworking Machinery). Figs. 6795, 6815. A revolving circular steel disc with teeth cut in its circumference, mounted on a spindle or arbor in a slot in a movable table. The saw teeth have not so great a set as a rip saw and make a

narrower cut. Such a machine is used for cutting wood across the grain, hence the name.

Cut-Out. A switch or fuse in a branch electric circuit or loop, used to disconnect the branch circuit from the main circuit.

Cut-Out Cock. Fig. 1281. See **Brake Cut-Out Cock.**

Cylinder. 1. A chamber or vessel whose ends are circular, and with straight parallel sides, as the cylinder of a steam engine. The cylinders used in connection with cars and locomotives are made of cast iron, and have pistons fitted so as to work air tight in them. Cylinders used in brake apparatus are shown in Figs. 1257-1267.

2. A name sometimes given to the fire pot of a stove or heater, as in Fig. 2697.

3. (Yale Lock.) Fig. 2590.

Cylinder Body (Westinghouse Brake). 2, Fig. 1159. The main central portion closed by the cylinder heads.

Cylinder Cap (Triple Valve). 14, Fig. 1234.

Cylinder Cap Gasket (Triple Valves). 23, Fig. 1233.

Cylinder Head. A metal cover for the end of a cylinder, held on by cylinder bolts or cylinder studs. The cylinder head through which the piston passes is commonly termed the back cylinder head, and the other the front cylinder head, corresponding to locomotive practice. See **Cylinder.**

Cylinder Levers. Fig. 811. Two levers which are connected together by a tie rod attached near their centers. One end of one lever is attached to the crosshead of the brake cylinder, and the corresponding end of the other is attached to a bracket on the brake cylinder head at the opposite end of the cylinder. The other ends of the levers are connected with the floating levers by rods.

Cylinder Lever Bracket (Air Brakes). A T-shaped piece of iron bolted to the front cylinder head, to which one of the brake levers is attached.

Cylinder Lever Guide. Figs. 865-866. A guide or support for the cylinder lever. It is usually made of an iron rod bent to a U-shape and bolted to the under side of the center sills.

Cylinder Lever Support (Air Brakes). wrought iron bar bolted to one of the center sills, on which the ends of the cylinder levers rest.

Cylindrical Gages. Gages made for measuring the size of cylinders and cylindrical holes, often called Whitworth gages. They consist of steel cylinders and rings hardened and ground very accurately to standard sizes. These fit into each other. The first is used for measuring the size of holes, and the last for measuring the outside of cylindrical objects, and they are called internal and external cylindrical gages. They are generally used as standards alone, from which other tools and gages are made of the proper size.

Cylindrical Stove. See **Stove.**

D

Dairy Car. Fig. 16. A refrigerator car used exclusively for carrying butter, cheese, milk and other dairy products.

Damascus Brake Beam. Figs. 5130-5132.

Damper. See **Stove Pipe Damper.** A valve in the stove pipe or in the bottom of a stove for regulating the draft.

Dash Guard (Street Cars). A plate attached to the platform railing to prevent mud or snow from being thrown upon the platform. Called a dash board and a dasher.

Dash Guard Straps (Street Cars). Small clips by which a dash guard is fastened to the platform posts. Also called dasher post clip.

Dasher or **Dashboard.** See **Dash Guard.**

Dasher Post (Street Cars). A post supported by the crown piece which carries the dasher and the platform rail. Called on steam cars a platform railing post.

Dasher Rail (Street Cars). A metal railing, usually brass, above the dasher. A platform rail.

Dasher Rail Cap (Street Cars). A rounded wood or metal cap bolted to the dasher rail for decoration and to prevent injuries.

Davis Pressed Steel Journal Box Lid. Fig. 5316.

Davis Steel Wheel. Figs. 5420-5421.

Davis Solid Truss Brake Beam. Figs. 5182-5187.

Day Coach. Figs. 131-146, 599-604. A common term for an ordinary passenger car in distinction from sleeping cars. It ought in strictness to include parlor cars, but in general does not. It is often termed a **Coach** simply, which see.

Dayton Draft Gear. Figs. 1464-1467.

Dayton Freight Car Door Lock. Figs. 1371-1372. See **Door Hasp.**

Dead Air Space (Insulation of Refrigerator Car). Air spaces which have no communication with the atmospheric air outside, so there can be no free circulation or change of air as there is in a free air space.

Dead Block. A single wooden block or stick of timber attached to the end sill of freight cars to protect persons between the cars from injury, by preventing the cars from coming together in case the drawbar or its attachments should give way. They are called dead blocks from the fact that they are blocks which subserve no functions in the construction of the car proper. See **Buffer Block.**

Dead Lever (of Brake Gear). The one of a pair of truck brake levers to which the brake connecting rod is not attached. The upper end of the dead lever is confined within a dead lever guide, or brake lever stop, which latter is provided with pins to adjust the end of the brake lever as the brake shoes wear. The lever to which the power is first applied through the brake connecting rod is termed the live lever.

Dead Lever Guide or **Brake Lever Stop** (Brake Gear). Figs. 4856-4858. See above.

Dead Lock. Fig. 2500. A lock in which the bolt is thrown each way by the key, and not in one direction by a spring, as with a spring lock or night latch.

Dead Padlock. A padlock in which neither the lock, bolt, nor hasp has a spring, but the former is thrown each way by the key, and the hasp must be opened by the hand.

Dead Wood. A **Dead Block,** which see.

Deadening or **Deafening.** The filling placed between the floor and the deafening ceiling of a passenger car to serve as a non-conductor to heat and noise. **Mineral Wool,** which see, is sometimes used for deadening, but commonly shavings, when anything at all is used. An intermediate floor (between the sills) and deafening ceiling (under the sills) is used in refrigerator cars.

Deafening Ceiling. 28, Figs. 648-651. Boarding on the under side of the floor timbers of a passenger car to exclude or deaden the noise of the car. When cut and inserted between the sills it is called a

deafening floor, but quite as often, though improperly, a deafening ceiling. See **Deadening.**

Deafening Floor. See **Deafening Ceiling.**

Deck. 102, Figs. 599-619. A term applied to the roof of a passenger car by analogy from the deck of a ship. The term is not applied in general use, however, to freight cars. The deck of passenger cars is subdivided into the upper deck (also called **Clear Story,** which see), and lower deck, the roof at the side of the clear story; but in designating parts which belong to the clear story alone, and which are not repeated in the lower deck, the term deck alone is used.

Since the issuing of the first edition of this work the use of the term deck instead of clear story in compound words seems to have become practically universal among manufacturers of furnishings and in far more general use than any other among car builders.

Deck Beam. 1. A beam in the form of an inverted T with a round knob on the upper end, used in some forms of steel car construction. The brake beams (Fig. 5179) is a deck beam.

2. Transverse beams extending across a car from side rail to side rail to which the deck planks are spiked.

Deck Bottom Rail. 112, Figs. 648-651. A horizontal timber running lengthwise of a car, fastened to the rafters and carlines of the main roof, or to the deck sill, which forms the base for the deck posts. The term is sometimes applied to the deck sill.

Deck Bridging. Bridging or blocking used in the upper deck or clear story. See **Bridging.**

Deck Carline or **Upper Deck Carline.** 118, Figs. 599-619. A timber which extends from side to side of the upper deck, and supports the roof boards. Corresponding parts in the lower deck are generally called rafters.

Deck Collar (Heaters). A sheet metal ring to line the smoke pipe opening through the roof, having a double sheet metal tube to leave an air space as a heat guard, and a flange on the outside to exclude rain.

Deck Eaves Molding or **Upper Deck Eaves Molding.** 119, Figs. 599-619. A molding under the outside edge of the upper deck.

Deck End Panel. 116, Figs. 648-651. A narrow panel in the end of the upper deck. It is frequently used as a ventilator.

Deck End Plate. A member that fulfills the same office for a clear story that the body plate does for the body. See **End Plate.**

Deck End Sill. 260, Figs. 645-647; 113, Figs. 648-651. A horizontal timber connecting the ends of the deck sills, and forming the base for the end of the upper deck.

Deck End Ventilator. See **Deck End Panel.**

Deck End Ventilator Hood (Street Cars). A projecting screen, placed over the aperture of an end ventilator, to exclude snow and rain. Also called upper deck hood.

Deck Inside Cornice. 120, Figs. 648-651. A molding which fills the interior angle where the upper deck joins the deck side.

Deck Lamp (Pintsch System). Figs. 3189-3198. A lamp which is fastened to the deck or ceiling of the car without any drop. An ornamental ring surrounds the rim of the bowl, which projects through the deck. Electric, Fig. 3511.

Deck Plate. 117, Figs. 599-619; 121, Figs. 652-656. A horizontal timber on top of the deck posts or mullions to which the deck carlines are attached. Also called a deck top rail.

Deck Post. 115, Figs. 599-619. An upright piece of wood which connects the deck plate with the deck bottom rail.

Deck Sash. 144, Figs. 599-619. A glazed sash in the sides of the upper deck. See **Sash.**

Deck Sash Catch. Figs. 4444-4448. A hook giving a simpler equivalent for a deck sash latch.

Deck Sash Double Ratchet. Fig. 4523. A special form of deck sash pivot plate, used with spring ratchets.

Deck Sash Flush Catch. A deck sash latch mortised into the sash rail flush with the sash.

Deck Sash Latch. Figs. 4444-4480. A spring bolt attached to a deck sash, which engages with a deck sash latch keeper or strike plate. See **Keeper.**

Deck Sash Latch Keeper. Fig. 4509. See above.

Deck Sash Lintel. See **Lintel.**

Deck Sash Opener. Figs. 4444-4455. A lever attached to a revolving rod by which a deck sash is held in any desired position. A great variety of forms exist, including many patented devices. See engravings. A pull hook, Figs. 4459-4462, 4497-4501, is sometimes called a deck sash opener, but a more elaborate contrivance is generally meant.

Deck Sash, Outer. 144a, Figs. 652-656. A deck sash which carries the screen, and prevents the admission of dust and cinders.

Deck Sash Pivot. Figs. 4464-4480. A metal stud or spindle attached to a suitable flange by which it is fastened to a deck sash, and on which the latter turns. A variety of forms exist, including several patented devices, as Monitor, Figs. 4521-4522, Morgan, Figs. 4505-4508, etc., to render the sash readily removable and adjustable.

Deck Sash Pivot Plate. Figs. 4467-4468. A plate attached to the window casing, with a hole or eye in which a deck sash pivot works. Sometimes they are provided with springs to prevent the sash from rattling.

Deck Sash Pull. Figs. 4459-4462. A screw ring attached to a deck sash to open and close it. Made either with screw or with flange.

Deck Sash Quadrant. Figs. 4514, 4520. A curved bar or plate of metal used as a guide or stop to control the movement of a deck sash. Little used.

Deck Sash Quadrant Clip. Fig. 4514. A guide strap embracing a deck sash quadrant.

Deck Sash Ratchet Plate. Figs. 4505-4508. A part usually attached to the side of the car, but sometimes to the sash, carrying a ratchet in which the ratchet catch engages.

Deck Sash Socket. Fig. 4518. A hook attached to a peculiar form of deck sash pivot. See engravings.

Deck Sash Spring Pivot. A **Deck Sash Pivot,** which see, provided with a spring to make the sash removable.

Deck Screen Bottom Rail. A rail running the entire length of the clear story, and closing the space between the bottom of the screen and the roof.

Deck Screen Post. 144p, Figs. 648-651. An upright stick forming the side pieces of a frame to hold a wire screen put on outside of the deck windows to exclude dust and cinders.

Deck Side. The entire part, consisting of a plate, rail, posts, and panels, or sashes, which forms the side which occupies the vertical space between the lower and upper deck.

Deck Side Ventilator. Fig. 4444. This term is used to designate the sash or valves and their attachments for opening and closing the aperture.

Deck Sill. 111, Figs. 599-619. A horizontal timber attached to the inner ends of the rafters, or short carlines, on which the deck side rests.

Deck Sill Bottom Molding. 114a, Figs. 652-656.

Deck Sill Facing. 114, Figs. 648-651. Thin boards or moldings attached to the inside of a deck sill, for ornament. Sometimes the bunk apron serves this purpose in sleeping cars. See 7, Figs. 2201-2206.

Deck Sill Sub-Facing. 114a, Figs. 648-651. A thin board under the **Deck Sill Facing**, which see.

Deck Soffit Board. 121s, Figs. 648-651. A board on the under side of the overhanging cornice of an upper deck.

Deck Top Rail. 117, Figs. 652-656. A **Deck Plate**, which see.

Deck Ventilator. 130a, Figs. 599-619. See **Deck End Ventilator, Deck Side Ventilator.** The deck sashes are frequently hung and operated as deck side ventilators as by the continuous deck sash opener.

Deck Window. 144, Figs. 599-619. A **Window**, which see, in the upper deck. More commonly a deck sash.

Deck Window Screen. S, Figs. 648-651 and 36, Figs. 2201-2206. An outside sash with a screen over it to exclude dust and cinders.

Deflecting Plate (Pintsch Lamp). 346, Figs. 3208-3224.

Deflecting Plate and Chimney (Pintsch Lamp). 288a, Figs. 3208-3224.

Deflector. (For Windows.) Fig. 4655. A piece of thin board attached to the jamb of the window and left projecting two or three inches beyond and at right angles to the car. When the car is in motion it deflects the cinders and dust from the window, and also produces an exhaust draft. Also called a window dust guard.

Deflector Springs (of Ventilators). Springs controlling the movement of the deflectors.

Derrick Car. Fig. 248. A strong platform car which carries a derrick crane which is used for removing wrecked cars and engines, erecting bridges, or handling any heavy objects. Also called **wrecking car.** They are distinguished as **hand or steam derrick cars**, according to the power used.

Destination Board Bracket (British). A small shelf of cast or wrought iron secured to the upper part of the outside of the body, in order to carry a wooden board or enameled metal plate, giving the destination of a train. It is almost universally used on all British carriages, and carried throughout the entire trip.

Detachable Cylinder Lever Bracket. See **Cylinder Lever Bracket.**

Detachable Globe Holder. A globe holder arranged so that a lamp globe can readily be attached or removed. Many lamps have the globes fixed or plastered.

Detaching Slot (Deck Sash Ratchet). A slot in the ratchet plate to facilitate removal of the sash.

Detective Wire (for Seals). Fig. 4092. A flat twisted wire or other equivalent device to prevent the seal being stripped from the wire without destroying one or both.

Diagonal (British). American equivalent (used chiefly in street cars), diagonal floor timber. A member of the underframe. One end butts against the rear side of the transverse end member of the underframe (the head stock), and the other end butts against an intermediate transverse member of the underframe (the cross bearer) near its center. The diagonals take the strain off the side buffers, and distribute it so as to prevent distortion of the underframe. See **End Sill Diagonal Brace.**

Diagonal Floor Timbers. Floor timbers which are placed in a diagonal position to the sills. Used chiefly on street cars.

Diagonal Roof Strap (Street Cars). A band of hoop iron placed diagonally on the top of the roof boards to stiffen the roof.

Diameter Testing Gage (for Car Wheels). A gage for testing the diameter of wheels and axles. Sometime, an M. C. B. standard.

Diamond Arch Bar Truck. Figs. 4693, 4698-4699.

Diamond Brake Beam. Figs. 5093-5095. A trussed beam using a heavy rectangular bar for compression member and an iron rod for tension.

Diamond "S" Brake Shoe. Figs. 5239-5240, 5251. A brake shoe with cast iron body and expanded metal inserts.

Diamond Truck. A car truck with iron side frames consisting of two or more **Arch Bars**, which see, and a pedestal tie bar. The spaces between the arch bars are diamond shaped, hence the name. The journal boxes are rigidly bolted to the side frames. The cross members of the truck, bolster, spring plank, etc., are either of wood or metal, or of both wood and metal combined. Metal transoms, bolsters and spring planks are in general use and increasing in favor.

At the Master Car Builders' Convention (1884) it was voted that this form should be the type used in preparing designs for a standard freight car truck, to have a 5-ft. wheel base, channel bar transoms, and either **Swing** or **Rigid Bolster**, which see. It is the type in almost universal use for freight cars, and the rigid bolster is applied to nearly all new construction. The swing bolster truck remains a standard on a few important roads that have a large traffic in live stock.

Diaphragm. 1. A thin wall or partition.

2. (Valves.) Some valves are regulated by diaphragms or diaphragm plates, to which are attached springs, nuts, stems, etc., whose names explain themselves. These diaphragms all operate on the same principle. They are spring plates, which guide the rod and, assisted by spiral springs, cause the attached valves to seat or unseat at a fixed pressure.

3. (Of a Vestibule.) Fig. 2299. A piece of rubber, ducking or canvas in folds attached to the diaphragm face plate and platform inclosure to exclude the dust and cinders, and at the same time to allow the face plates free movement laterally and longitudinally in the Gould vestibules, and longitudinally only in the Pullman vestibules.

Diaphragm Face Plates. See **Diaphragm, Vestibules, Pullman Vestibule.**

Dictionary of Terms (Master Car Builders). At the Fifth Annual Convention, at Richmond, Va., in 1872 (see page 18 of the report of that meeting), 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 use of the same."

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." Subsequent editions of this book have been published in 1884, 1895, 1903 and 1906.

Dining Car. Figs. 143-144, 147-148, 221-224, 607-611, 6460-6463. A car provided with a kitchen and cooking appliances and arrangements for serving meals.

Dining Car Chair. Figs. 4159-4161.

Dining Car Range. Figs. 3633. See **Range.**

Dipper (Steam Shovel). 1, Figs, 596-598. Also called bucket or shovel. The heavy iron scoop or bucket which is filled with earth at each movement of the machine.

Dipper Bail (Steam Shovel). 5, Figs. 596-598. The link fastened to the top of the dipper and to the dipper block.

Dipper Block (Steam Shovel). 5, Figs. 596-598. The block at the point of the boom around which passes the hoisting chain.

Dipper Teeth (Steam Shovel). 2, Figs. 596-598. Heavy iron cutters or teeth projecting from the dipper to break the earth.

Direct Steam Heating Systems. Fig. 2784, etc. A system of car heating in which the steam from the locomotive is carried directly to the radiators or heating pipes. The term is used to distinguish the system from those in which the steam is employed to heat the water which circulates in the radiators or heating pipes, usually in connection with the Baker heater. See **Consolidated, Gold's** and **Safety Systems of Car Heating.**

Discharge Pipe (Air Compressor). Also called reservoir pipe. A pipe by which the compressed air is conveyed from the air compressor to the main air reservoir.

Discharge Valve. 1. (Of Car Signal Valve.) The valve in the attachment called the car signal valve. The whole device is also sometimes so called.

2. (Of Air Compressor.) 2, Figs. 1221-1224. The valve through which the air as compressed passes to the main reservoir.

Dished Cap Ventilator. Fig. 4422. See **Ventilators.**

Distance Between the Backs of the Flanges of Car Wheels. (M. C. B. Standard.) The standard distance between the backs of flanges of car wheels is 4 feet 5⅜ inches.

In 1885 it was decided by letter ballot that in fitting wheels on axles a variation of ⅛ inch each way from the standard distance of 4 feet 5⅜ inches between flanges would be allowed, making the maximum distance 4 feet 5½ inches and the minimum distance 4 feet 5¼ inches. See **Check Gage.**

Distance Block. A short, thick piece of wood placed between two or more objects to keep them apart, or to preserve an interval of space between them, as floor timber distance block, truck bolster distance block, etc.

Distance Piece. A metallic block to keep two objects a certain distance apart.

Distributing Table (Postal Car). A table upon which the mail bags are emptied of their contents, and from which they are distributed to the various boxes or pouches.

Distributing Table Hinge. Fig. 2465. A strap hinge for the table on which mail is sorted in postal cars.

Ditching Car. A car provided with derricks and scoops for excavating the ditches of cuts by the power of a locomotive.

Dividing Attachment (Vacuum Brake). Fig. 6790. A device to regulate the application of the brakes to either the locomotive or train, or both. See **Ejector.**

Division Arm (Twin Seats). The middle seat arm between the two seats.

Dog. 1. A general term in mechanics for all devices which bite or take hold of or give motion to other parts. See **Ratchet Dog.**

2. (For Pawl of Winding Shaft.) A disk or button eccentrically pivoted in such a way as to hold the ratchet wheel pawl of a winding shaft in its place. The pawl itself of a ratchet gear is also sometimes termed the dog in other forms of ratchet gear where no dog to hold the pawl is necessary.

3. A **Brake Pawl Dog,** which see. A very similar part to that defined above.

Dohlin Automatic Car Door Fastener. Fig. 1374.

Dome. A clear story or upper deck is sometimes erroneously called a dome. See also **Tank Dome.**

Dome Head (Tank Car). 109, Figs. 545-549. The top of the **Tank Dome,** which see.

"Dome" Lamp Shade. Fig. 3564. A **Lamp Shade** (which see) of curved or ogee outline.

Door. Figs. 1326-1412. A frame of boards or plates of metal for closing a doorway. See **Door Frame** for names of parts. See also,

Ash Pit Door.	**Lamp Case Door.**
Double Door.	**Overhung Door.**
Double Fire Door.	**Platform Trap Door.**
Draft Door.	**Roof Door.**
Feed Door.	**Sliding Door.**
Fire Door.	**Smoke Box Door.**
Grain Door.	**Underhung Door.**
Grated Door.	**Ventilator Door.**

Door Bolt. Figs. 2386-2398. A metal bar attached to a slide and fastened to a door so as to hold it shut from the inside. They are either round, or barrel, or square. A square neck door bolt is one with an angle or shoulder in it. Flush door bolts are gained in so as to be flush with the surface, Figs. 2396-2398. A cupboard catch is a form of door bolt having a beveled latch and actuated by a spring; but bolts so formed are commonly termed **Latches,** which see.

Door Bolt Bracket. 72, Figs. 1399-1401. An iron eye attached to the body of the car into which the door bolt or bar is forced to hold the door in a closed position.

Door Bolt Keeper. 72, Figs. 1399-1401; Figs. 2386-2395, etc. A catch attached to a door frame, in which the bolt engages.

Door Bottom Rail. 5, Figs. 1329-1337. See **Door Frame.**

Door Bottom Ventilator Rail (British). A strip of wood running horizontally and supporting a sliding ventilator.

Door Brace (Freight Car Doors). 69, Figs. 262-272. A diagonal piece of timber framed into the door frame to stiffen the door.

Door Butt. A **Butt Hinge,** which see.

Door Button. "A small piece of wood or metal swiveled by a screw through the middle, and used as a fastening for a door or gate."—Knight. They are often attached by a rivet or pin to a metal door button plate, which is fastened on with screws. Sometimes the button is an eccentric disk.

Door Cap (Freight Car Doors). A horizontal board across the top of the door.

Door Case. 1. The frame which incloses or surrounds the sides and top of a door. The separate parts are

the **Door Jambs** or **Door Posts, Door Sill** and **Door Lintel**, which see.

2. A partition at the end of a street car which incloses a sliding door when open.

Door Case Intermediate Rail (Street Cars). A rail of a door case above the window.

Door Case Panel (Street Cars). A panel in a partition which incloses the sliding door. There are two—the top panel and the seat panel.

Door Case Sash (Street Cars). A window sash in the partition which incloses a sliding door. It opens on hinges and is placed opposite to another in the end of the car inside of the door.

Door Case Seat panel. See **Door Case Panel.**

Door Case Top Panel. See **Door Case Panel.** In some cases a mirror is used in place of a panel.

Door Case Top Rail. A stick parallel with the **Door Lintel**, which see.

Door Center Girth (Freight Car Doors). A horizontal board across the middle of the door. A middle door rail, except that it is not framed into the door, but simply nailed on.

Door Chafing Plate (Vestibule Fittings). Fig. 3965.

Door Chafing Scroll (Vestibule Doors). Fig. 3952.

Door Chafing Strip. Fig. 925.

Door Chain Bolt. A device which permits a door to be opened a short distance, yet not far enough to gain admission.

Door Check (Blount). Fig. 2652. A combined door spring and hydraulic check, which automatically controls the motion of a door. The check consists of a metallic piston moving in a metallic cylinder against a non-freezing liquid, its motion being controlled by a regulating valve which may be set to give any desired action to the door to prevent slamming and noise. (Russwin) Fig. 2653.

Door Fastener. Figs. 787-789.

Door Fence Rail (British). A horizontal piece of wood forming, on the outside of the door, the bottom of the window aperture. It is reinforced with a band of brass or iron against which the window sash bears when it is closed.

British carriage windows drop down to open, like an omnibus or street car window.

Door Frame. Figs. 1327-1331. The structure in which the panels of a door are fitted. It is composed, as is also a window sash, of the stiles, or upright pieces at the sides; the mullions, or central upright pieces; the bottom rail; the lock, or central rail, and the top rail. The **Door Case**, which see, surrounds it.

Door Friction Roller. Figs. 2564-2662. See **Sliding Door Friction Roller, Car Door Hanger.**

Door Fulcrum (Grain Door). J, Figs. 1399-1401.

Door Glass Frame Stop Rail (British). In a carriage, a small horizontal piece of wood in the lower part of the door against which the window drops when opened. See **Door Fence Rail.**

Door Guards (Baggage and Freight Car Sliding Doors). 23, Figs. 1329-1337. Strips of wood which inclose the space occupied by the door when open to keep the freight from interfering with its movement.

Door Guard Band (Street Cars.) A metal band fastened crosswise on the middle door rail to protect the door from being chafed. Also called a sliding door strip.

Door Guard Rod. Figs. 3977, 3992. See **Vestibule Door Rod.**

Door Guide Bracket. Figs. 795-797. An iron bracket or support for the door guide or rail in which the door is supported.

Door Guide Plate. Figs. 929-931.

Door Handle. 1. (Freight Cars.) Figs. 759-760. A U-shaped iron bar attached to the door, sometimes horizontally and sometimes vertically. A **Sliding Door Handle**, which see, is for passenger cars.

2. (British.) Serves the purpose of an American door knob. An L-shaped brass bar attached to the outer end of a door spindle, and conveniently shaped to be grasped by the hand, so that the door can be opened by a person either inside or outside the carriage.

3. (Passenger Cars.) Handles for sliding doors. Figs. 2413-2435.

Door Hanger. 68, Figs. 262-272; 21, Figs. 1329-1337 and Figs. 2654-2658, 1384-1385. A hook-shaped piece of metal by which a sliding door is suspended at its top, and which slides on an iron track at the top of the door. For freight cars they are usually made of wrought iron, but sometimes of cast iron, or friction rollers, or sheaves, on which the door rolls. The name of the more elaborate forms of door hangers for use in passenger cars is commonly extended into **Car Door Hanger**, which see. See also **Anti-Friction Car Door Hanger.**

Door Hanger Sheave. Figs. 781-782. See **Sheave.**

Door Hasp. 73, Figs. 262-272, and Figs. 774-776 and 1371-1372. A metal clasp attached to car doors, by which they are fastened to a staple on the body of the car. Used chiefly on freight car doors, secured with a pin or bolt. They are now made of malleable iron and the pin fixed so it cannot be lost. Padlocks are rarely used on freight cars.

Door Hasp Staple. Figs. 733-734, 1375-1376. A ring or U-shaped staple over which the slotted part of the door hasp fits and through which the door pin is passed.

Door Hinge. 1 See **Hinge.**

2. (British.) Three brass hinges, upper, middle and lower, securing the door to the body. These hinges generally differ slightly to allow for the curvature or fall-under of the door.

Door Holder. Figs. 2628-2638. A device for holding a door open or shut. They are also called door stops, as they are also intended to check momentum of the door when swung open violently. See **Lamp Case Door Holder, Sliding Door Holder.**

Door Holder Catch or **Door Holder Stop.** Figs. 2628-2646. A metal bracket attached to the floor (floor stop) or side (partition stop) of a car, with which a door holder engages, to hold a door open.

Door Hook. Figs. 2409-2410, 2496-2497. A **Sliding Door Holder**, which see.

Door Jamb. 1, Figs. 1329-1337. The side piece or post of a door case. Also called door post. Not to be confused with the stiles of the door itself.

Door Knob. Figs. 2503-2557, etc. A ball attached to the end of the spindle of a door latch to take hold of in moving the latch or opening the door. The knob is often made in various peculiar forms, as T door knob, Fig. 2482.

Door Latch. Figs. 2411-2425. An attachment to a door to hold it shut. See **Latch.** A door latch is often made in combination with a lock, having a separate bolt and key to secure or fasten the door from the outside, as in Figs. 2572-2582, etc.

Door Latch Arbor. A **Door Latch Spindle**, which see.

Door Latch Bolt. See **Latch.**

Door Latch Hook. Figs. 2411-2427. The part of a

sliding door latch which engages with the keeper and holds the door shut.

Door Latch Keeper. Figs. 2399-2402, 2411-2427. Also called **Strike Plate,** which see.

Door Latch Rose or Escutcheon. Figs. 2483-2487. A plate fastened to a door as a guard or bearing for the spindle. A rose is frequently called a rosette. See **Escutcheon.**

Door Latch Rose (Kirby's Door Lock). E and F, Figs. 2480-2481.

Door Latch Spindle. B, Figs. 2480-2481. A small metal shaft to which the door handle or knob is attached, and by which the latch is turned.

Door Latch Spring. A spring which acts on the latch hook or bolt and causes it to engage with its keeper; usually made of a flat piece of steel.

Door Light (British). In a carriage, the window in the door, which in British carriages is lowered to open it like an omnibus or street car window.

Door Light Bottom Sash Rail or **Glass Frame Bottom Sash Rail** (British). The bottom part of the door window framing.

Door Light Stile or **Glass Frame Stile** (British). The upright members of the window framing.

Door Lintel. 99, Figs. 599-619. The horizontal part of a door casing above the door. It is usually of wood, but in passenger cars it is sometimes made of a thin shell of cast iron. See **Door Frame.**

Door Lock. Figs. 1371-1380, 2413-2584. See **Lock.** A **Latch,** which see, is usually combined with a passenger car door lock.

Door Lock Bolt. See **Lock.**

Door Lock Keeper or **Nosing.** See **Keeper.**

Door Mullion. 2, Figs. 1329-1337. A vertical bar of wood between the panels of a door. See **Door Frame, Door Window Mullion.**

Door Name Plate. A metal plate on the inside of a passenger car door with the name of the builder inscribed on it. The name is now more commonly painted on.

Door Notice Plates. Figs. 2611-2627. See **Saloon Door Plates.**

Door Ornament (Vestibule Doors). Figs. 3985, 3596.

Door Panel. 151, Figs. 599-619; 10 and 11, Figs. 1329-1337. "A piece of board whose edges are inserted into the groove of a thicker surrounding frame of a door."—Webster. They are distinguished as lower, middle and upper. Any panel, but especially the lower, is sometimes cut up into two twin panels by a door mullion, as in Figs. 1329-1331.

Door Panel Batten (British). American equivalent, furring. In a carriage, a piece which stiffens the door panel, which is pinned to it.

Door Pillar or **Door Stile** (British). American equivalent, **Door Stile,** which see. The outer sides of the stiles are beveled in a peculiar manner, so as to shut tight, and the inner sides are grooved to allow the movement of the window.

Door Pin (Freight Car Doors). A pin used to fasten a hasp to a staple. Leaden seals are sometimes attached thereto.

Door Pin Chain. 75, Figs. 305-321. A metal chain by which a door pin is attached to a car.

Door Plate. Figs. 2611-2627. A notice plate. See **Door Name Plate.**

Door Post or **Door Jamb.** 44, Figs. 262-272; 62, Figs. 599-619. A vertical post which forms the side of a doorway.

Door Post Plate. Fig. 922. A metal plate laid over the door post to protect it from damage.

Door Post Pocket. 44, Figs. 262-272, and Figs. 710-712, 722-724. See **Pocket.**

Door Pull. Figs. 2440-2441. A D-shaped handle attached to a door to take hold of in opening or closing it.

Door Rail. Figs. 1329-1337. A horizontal member or bar of the framing of a door. The upper one, 4, is called the top rail; the lower one, 5, the bottom rail; 6, the middle or lock rail; 7, the parting rail.

Door Rail Bracket (Car Doors). A bracket to carry a top door rail, serving as a guide for the door. See **Door Track Bracket.**

Door Roller. Figs. 2655-2662. Also called a door sheave. The term door roller is applied to a flat tread wheel pivoted in a bracket and attached to the bottom of a door to roll upon a flat surface rather than a narrow track.

Door Sash. 12 and 13, Figs. 1329-1337. A wooden frame, containing one or more panes of glass, placed in a door. In some cases one of these sashes is made to slide, so that it can be opened for ventilation. They are distinguished as lower and upper door sash. The lower sash is commonly movable for ventilation and held open by a door sash lift or bolt entering into a door sash plate.

Door Sash Bolt. Fig. 4583. A metal pin attached to a sliding door sash to hold it in any desired position.

Door Sash Plate. Fig. 4591. See above.

Door Sheave or **Sliding Door Sheave.** Figs. 2655-2662. A small wheel on which a sliding door rolls. It is usually placed at the top of the door, and sometimes at the bottom also. It is carried in a door sheave holder. A grooved casting called a door shoe or door slide is sometimes used as a substitute on freight car doors, especially when the load does not rest upon the lower door track. See also **Door Roller.**

Door Sheave Transom (Street Cars). A long narrow panel which is hinged and with a catch so that access may be had to the car door sheaves and track.

Door Shoe. 70, Figs. 262-272, and N, Figs. 1399-1406. See **Door Sheave.**

Door Sill. 64, Figs. 262-272; 17, Figs. 652-636. A cross piece attached to the floor on the under side of a door opening. In car construction the term is usually applied to an iron plate used under passenger car doors, and occasionally freight car doors, as Figs. 857-858.

Door Sill Plate (British). American equivalent, door sill or door sill plate. A roughened brass wearing piece placed in the doorway entrance.

Door Slide. See **Door Sheave.**

Door Spindle. Figs. 2480-2481. The bar passing through the door which carries the door knobs.

Door Spring. Fig. 2647. An attachment to make doors self-closing.

Door Stile. 150, Figs. 599-619; 8, Figs. 1329-1337. One of the two upright pieces on the outer edges of a **Door Frame,** which see.

Door Stop. Figs. 793-794, 2639-2646. 1. A peg or block against which a passenger car door strikes when opened, often provided with a rubber cushion, especially for swinging doors. Door holders, which both stop the door and retain it, are often called door stops, as Figs. 2504-2515.

2. (Freight Car Sliding Doors.) 71, Figs, 262-272; 77, Figs. 305-321. Blocks or strips of wood or iron to restrain excessive motion. They are distinguished as closed door stop and open door stop.

Door Threshold Plate. Figs. 923-924; 178, Figs. 652-656. A plate on the threshold of the door.

Door Track. 65, 66, Figs. 262-272. A metal bar or guide which supports a sliding door, and upon which it moves, or by which it is held in its place. They are either top door tracks or bottom door tracks. The former usually carry the weight of freight car doors, which are hung thereon by door hangers. The lower track serves only as a guide for the door shoes.

Door Track Bracket. 67, Figs. 262-272. An iron or wooden block fastened to the side of a freight car, to which a door track is attached, or which holds a sliding door in its place. See also, **Door Rail Bracket.**

Door Wedge (Security Car Door). Figs. 826-827. An iron wedge on the side of the car to force the door out tight against the door brackets when closed.

Door Wedge and Clasp. Fig. 4033. A postal car furnishing.

Door Wedge Guide Plate (Security Car Door). Figs. 705-706. A casting in which the door wedge is held.

Door Window Mullion. A middle upright bar in the door window frame. See **Door Frame.**

Doorway. The passage or opening formed by a door casing, which is closed by a door.

Dope. A mixture of waste, oil, and grease, for journal box packing, which is not fluid.

Double-Acting Spring Hinge. Figs. 2471-2472. A device to permit a door to open either way and also to make it self-closing. They are from 2½ to 7 inches in length of flange, 4 inches being the most usual. They consist in their original form of a hinge on a hinge, the two opening in opposite directions. The "Utility" double-acting hinge is much like an ordinary butt hinge, the tendency to restore the door to its normal position when opened in either directions being caused by a spring.

Double Board Roof. See **Car Roof.** The upper layer of grooved boards is sometimes laid with the grooves under, so as to form a kind of tube between the two layers.

Double Body Bolster. Figs. 1147-1163. A body bolster for passenger cars mounted on six-wheel trucks, which is made with two transoms. They are either built up out of iron plates and bars as in Figs. 1147-1149, or cast in steel in one piece as in Figs. 1150-1163.

Double Brace Pocket. Figs. 727-728. See **Pocket.**

Double Chair. Figs. 4111, 4136, 4137, 4160. A twin car seat.

Double Circuit System of **Car Heating** (Consolidated). Fig. 2878. One form of the **Multiple Circuit System,** which see.

Double Coil Draft Spring. Figs. 894-895. See **Draft Spring.**

Double Coil Jet System (Gold's Car Heating System). Fig. 2788. A system of car heating which combines the drum or jacket features with the jet or commingler system of injecting steam into the hot water circulation. The steam is first sent through the inner or steam coil of the double coil in the Baker heater, and then through an annulus, into the circulating pipe. The jet is so directed as to aid the circulation in the pipes. It is claimed to be noiseless.

Double Coil Nest Spring. A **Spiral Spring,** which see, with another inside of it.

Double Deck Stock Car. Figs. 354-355. One with two floors, or stories, one above the other, for carrying sheep, hogs, etc. The intermediate floor is called the upper floor or double deck.

Double Door. 1. A door made in two parts. These are sometimes fastened together by hinges, so as to fold back on each other, Fig. 1332, and sometimes each part is hinged to one of the door posts. Sliding doors are also sometimes made in two parts.

2. (Fruit Car.) Doors in pairs, one inside the other, as in refrigerator cars, etc., are also called double doors.

Double Elliptic Spring. Figs. 5382-5383. See **Elliptic Spring.**

Double Lip Retaining Ring. (Steel Tired Wheels.) Figs. 5400-5401. One of the common methods of attaching a steel tire to the body of the wheel.

Double Lipped Washer. Figs. 729-730.

Double Pressure Retaining Valve. See **Pressure Retaining Valve.**

Double Pipe Clip. Fig. 2754. An iron band made with two bends for holding two pipes (as heater pipes) in their place. See **Clip.**

Double Plate Wheel. Fig. 5440. A cast iron car wheel, the rim and hub of which are united by two cast iron plates or disks. Wheels in which the double plates extend only part way between the hub and rim, the connection being made by a single plate, are often called double plate wheels. See **Car Wheel, Wheel, Washburn Wheel.**

Double Ratchet (Morgan's Deck Sash Pivot). Fig. 4505. A pair of radially ribbed disks which engage with each other in any position, there being no separate dog or ratchet bolt.

Double Sash Spring. See **Sash Spring.**

Double Sliding Door Gear. Fig. 2654.

Double Strap Hanger (Bell Cord). See **Bell Cord Hanger.**

Double Track Snow Plow. Fig. 249. A push plow which plows the snow to one side of a track only, so as not to crowd it upon the other parallel track.

Double Transom Truck. Figs. 4741. A four-wheel passenger truck with two bolsters, designed to give the same easy-riding qualities as the six-wheel truck.

Double Truck Center Bolster. Fig. 5066.

Double Washer. A washer that answers for two bolts. See **Twin Washer.**

Double Window Blind. The usual form of window blind. They are made in two parts so as to require less height when raised. See **Window Blind.**

Double Window Blind Lift. Figs. 4565, etc. See **Win-**

Double Window Blind Lift. Figs. 4565, etc. See **Win-**

Dovetail. "A flaring tenon adapted to fit into a mortise having receding sides so as to prevent the withdrawal of the tenon in the directions to which it will be exposed to strain."—Knight. There are many forms of dovetail joints.

Draft Bar Slide or **Drawbar Slide** (Street Cars). A curved iron bar or sector hung from the crown piece which supports the coupler end of the drawbar and over which it swings.

Draft Beam. Figs. 697-701, 1551. Gould malleable iron draft beam. A substitute for draft timbers and stops, being cast in one piece and bolted on the inside of the center sills.

Draft Bolt (Buhoup 3-Stem Coupler). Figs. 1010-1011; 648, Figs. 1886-1935. A draft spring bolt.

Draft Door (Baker Heater). Fig. 2679. A door in the smoke flue base, automatically opened and closed by the fire regulator, and by which the fire is regulated.

Draft Gear. Figs. 1413-1582, 1848-2097. A term used to designate the apparatus used under a car to dissipate the shocks due to coupling and to provide an elastic resistance in pulling the car. Strictly speaking, the term draft gear includes only the springs or friction blocks and other parts enclosed within the coupler yoke. Draft gear and attachments include the entire apparatus by which a car is drawn with the exception of the coupler or drawbar. Some makers furnish the complete gears including springs, follower plates, check plates, yoke, etc. Others only the special castings or parts required, without springs, bolts or other parts which are more or less standard. See **Friction Draft Gear.**

Draft Gear Cheek Casting. A malleable iron casting which incloses the thimbles or followers and carries the thrust to the draft sills and draft timbers, to which it is bolted.

Draft Gear Tie Rod. 139. Figs. 341-344. A rod which connects an end sill or platform end timber with a body bolster or drawbar cross timber to tie them together. The term is sometimes applied to the continuous draft rods that run from one drawbar to the one at the other end of the car.

Draft Regulator. See **Fire Regulator.**

Draft Rod. (Continuous Draw Gear). Fig. 921. A rod which unites two drawbars at opposite ends of a car, and relieves the draft timber attachments from strain.

Draft Sills. 26, Figs. 262-272. More commonly, **Draft Timbers,** which see. The center sills which transmit the draft stresses from end to end of the car are sometimes termed the draft sills. When metal draft members are used the term draft sill is almost universally applied.

Draft Spring. Figs. 819, 894-895. 1. A spring attached to a **Coupler** or **Drawbar,** which see, to give elasticity. They are usually so arranged by means of follower plates at each end as to resist either tension or compression. The usual size for draft springs is 7 or 8 inches in diameter and 8 inches in length, double coil spiral springs. They have a capacity of from 19,000 lbs. to 30,000 lbs.

2. (British.) A long half-elliptic spring reaching almost entirely across the car. See Fig. 6733.

Draft Spring Cradle Plate (British). A longitudinal plate in the underframe, which supports the draft spring.

Draft Spring Pocket. A **Drawbar Spring Pocket,** which see.

Draft Spring Stop. A metal sleeve or thimble in the center of a spiral draft spring to resist excessive compression. Not to be confused with a **Drawbar Stop,** which see.

Draft Spring Thimble. Figs. 747-748. A projection riveted to the follower plates and fitting inside the draft spring to hold it in place.

Draft Timbers. 26, Figs. 262-272, etc.; 31, Figs. 599-619. A pair of timbers, carrying the drawbar attachments, placed below the center sills, and usually extending from the platform end timber of passenger cars, or the end sill of freight cars, to the body bolster. In passenger cars these timbers are usually the principal supports of the platform. See **Platform Sills** and **Platform Short Sills.** The draft timber in a tip car is also termed a car perch.

Draft Timber Pocket. A casting attached to the body bolster or center sills of a car to receive the end of a draft timber.

Draft Timber Tie Bar. A transverse iron bar attached to the under sides of a pair of draft timbers to tie them together.

Drain Cock. Fig. 1284. A **Reservoir Drain Cock,** which see.

Drain Cup or **Drip Cup** (Air Brake). A globular receptacle under a triple valve to collect water of condensation.

Drain Plug (Brake Cylinder). 14, Figs. 1267-1268. (Triple Valve.) 26, Figs. 1233-1234.

Drain Valve (Car Heating). Figs. 2968-2969. A valve for draining off the water condensed in the steam pipes where an automatic trap is not used.

Drain Valve Extension Handle (Steam Heating). Figs. 2977-2978.

Drake & Weir's Car Roof. Fig. 1986. See **Car Roofs.**

Drapery Curtains. C, Fig. 2204.

Drawbar. 1. (Link and Pin). An open-mouthed bar at the end of a car, in which the coupling links enter and are secured by a coupling pin. They are provided with a **Draft Spring,** which see, to give elasticity to the connection between the cars. Drawbars are made either of cast, malleable, or wrought iron, or cast steel, and in respect to their form are either (1) bolt or spindle drawbars, in which the draw spring is attached by a bolt passing through its center; or (2) spring pocket or strap drawbars, in which the draw spring is inclosed within a yoke surrounding it. The solid head is a wrought iron drawbar forged in one piece instead of having a drawbar face plate riveted on. The drawbar is frequently called draw head, especially cast-iron drawbars. With certain coal cars a cheap form of drawbar, called a draw hook, is used. In England this style is almost universal, in combination with plain links, in freight car service, and with a **Screw Coupling,** which see, for passenger cars. The drawbar of the Miller couplers is also very frequently called a coupling hook. See below.

2. The word drawbar is used indiscriminately to designate both the old link and pin drawbar and the modern automatic car coupler. There has been an effort to confine the name drawbar to the old link and pin type, but in the proceedings of the M. C. B. Association, in speaking of the height of drawbars, the term is manifestly applied to the M. C. B. standard automatic coupler. The general adoption of the word to mean the old link and pin drawbar is hardly desirable, if it were possible, for the link and pin drawbar is a thing of the past. The standard height of passenger car drawbars adopted in 1890 by the M. C. B. Association is 35 inches from the top of the rail to center of drawbar, where the car is light. The standard height of drawbar for freight cars from level of top of rails to center of drawbar is 34½ inches, adopted in 1893, with no greater variation than 3 inches, minimum height 31½ inches. See **Automatic Car Coupler, Coupler** and **Car Coupler.**

Drawbars, Adjusting Height of (M. C. B. Standard). In 1896 it was decided that in adjusting the height of couplers to meet the requirements of the United States law fixing the height from the top of rail to center of coupler for standard gage cars in interstate traffic, cars should be adjusted when empty, as far as possible. In order to justify a bill for work done under the Rules of Interchange an empty car should be adjusted to 34½ inches, or within ¼ inch thereof, and when it is necessary to alter a loaded car it should be adjusted to 33½

inches, or within ¼ inch thereof, or as near as possible to such height as will bring it to 34½ inches when the car is unloaded.

In 1901 this was changed from Recommended Practice to Standard, as a result of letter ballot.

Drawbar Attachment (M. C. B. Recommended Practice). See **Attachment of Couplers to Cars.**

Drawbar Bolt. An iron bolt or spindle which connects a drawbar to a draft spring and follower plates, passing through the center of the spring. A tail bolt. See **Drawbar.**

Drawbar Carry Iron. 25 and 201, Figs. 262-272, 1044; Figs. 863-864. Often contracted to carry iron or carrier iron. A U-shaped iron strap bolted to the under side of the end sill and supporting the outer end of the drawbar. Also called **Stirrup,** which see.

In 1908 a Recommended Practice was adopted to use a U-shaped carrier iron for brake shaft bow for new cars, so that the half-yoke now largely used would not be extended to new cars.

Drawbar Centering Devices. Figs. 949-951, 1949-1958. A number of devices are shown, all of which take the place of a drawbar carry iron, and are designed to keep the coupler in the center line of draft while allowing it to move from side to side in rounding curves.

Drawbar Follower Guide. Figs. 890-891.

Drawbar Follower Plate. Figs. 850-852, 968-970. Two iron plates which bear against each end of a draft spring and transmit the tension and compression on the drawbar to the draft springs and to the draft timbers.

Drawbar Follower Stop. Figs. 735-737. A casting bolted or riveted to the sills or draft timbers to act as a stop to the motion of the follower.

Drawbar Friction Plate (Street Cars). A cast-iron plate through which the drawbar passes, attached to the platform end timber or crown piece, to protect it from abrasion.

Drawbar Guide. Cast-iron lugs, or wrought plates, bearing against the sides of draft timbers over the drawbar to carry iron, to resist lateral strains and protect the draft timbers from wear. In 1905 the M. C. B. Association adopted a Recommended Practice that the total side clearance of the coupler should be 2½ in.

Drawbar Pocket. A **Drawbar Spring Pocket,** which see.

Drawbar Pocket Guide. Figs. 790-792. A casting bolted to the draft timbers and serving as a guide or chafing plate for the **Drawbar Spring Pocket,** which see.

Drawbar Safety Lug. A horn on the upper side of a drawbar to bear against the end sill or a single dead block on the end sill, to relieve the draft spring and attachments from excessive buffing strain.

Drawbar Sector (Center Draft Draw Gear). A guide or support for the drawbar, shaped like an arc of a circle, fastened underneath the platform.

Drawbar Spindle or **Stem.** The iron drawbar bolt which passes through the center of the draw spring and follower plates. A tail bolt.

Drawbar Spring Pocket. Figs. 954-955. The space at the back end of a spring pocket or strap drawbar which receives the draft springs and follower plates.

Drawbar Stem. A **Drawbar Bolt** or **Tail Bolt,** which see.

Drawbar Stirrup. A **Drawbar Carry Iron,** which see.

Drawbar Stop. A casting which limits the movements of the drawbar followers, bolted to the draft timbers. The castings for the drawbar stop are sometimes made long enough to bear against the body bolster, or a filling block is interposed between it and the drawbar, thus relieving lugs and bolts of strain.

Drawbar Yoke. Figs. 858-859. The yoke or strap pocket that incloses the draft spring and is bolted to the end of the drawbar is called a yoke. In 1905 the M. C. B. Association adopted as Recommended Practice the design of yoke shown in Fig. 5779. See **Attachment of Couplers to Cars.**

Draw Chain (British). See **Wagon Coupling.**

Draw Head. The head of an M. C. B. coupler, exclusive of the knuckle, knuckle pin and lock. See also **Drawbar Head.**

Draw-Off Cock (Baker Heater). Fig. 2767. A cock attached to the pipe, R, for emptying the pipes. It is a **Combination Cock,** which see.

Draw Spring. See **Draft Spring.**

Draw Timbers. See **Draft Timbers.**

Drawer Pull. Fig. 3775. A wooden or metal attachment on a drawer to take hold of in pulling it out. In postal cars they are combined with label holders. Fig. 4038.

Drawing Room. A small room or compartment in a drawing room car. See **State Room.**

Drawing Room Car. A term at one time applied to **Parlor Cars,** which see, but now usually restricted to certain types of sleeping cars which have one or more separate compartments or drawing rooms containing a double-berth section and a sofa or lounge, in addition to which they are usually supplied with a private toilet. (Electric Cars.) Figs. 6227-6228.

Dressing Room. Another name for a saloon, especially one provided with wash bowl and toilet facilities. The ladies' saloon of sleeping and parlor cars is commonly so fitted.

Drilling. A term used for **Switching,** which see, or making up trains. Regulating is another term sometimes used. The British term for this is marshaling or shunting.

Drip Coupling or **Basin Coupling** (Wash Basin). Figs. 3644-3645. The connection of the waste pipe or drip pipe with the basin.

Drip Cup (Air Brake). A receptacle inserted in the brake pipe of each car to receive water condensing therein. A drain cup.

Drip Dish or **Drip Pan** (Refrigerator Car). A dish or pan at one corner or end of the car for receiving the water from the melting ice, usually permitting it to escape by a **Trap,** which see.

Drip Tray. Fig. 4065. An enameled piece of sheet iron placed directly under the seat of a closet, and over the bowl.

Driving Chain (Steam Shovel). A pitch chain, used to make the steam shovel self-propelling, by engaging with the pitch gear attached to one of the axles.

Driving Gear (Lever Hand Car). 4, 5, Figs. 6207-6209. It consists of the spur wheel, or gear wheel, and pinion.

Drop (of Lamp). The drop of a center lamp is its extreme length, measured from the ceiling to the lowest part of the lamp.

Drop Bottom. See **Drop Door.**

Drop Bottom Gondola Car. Figs. 37-38, 376-378, 392-410, 416-427. A car so constructed that its contents can be readily unloaded through the bottom by means of drop doors.

A distinction is sometimes made between hop-

per bottom cars, which will discharge nearly all their contents without assistance, on opening the drop doors, and a drop bottom car, which will not do this.

Drop Door. 61, Figs. 428-451 and Figs. 964-980. A door at the bottom of a drop bottom or hopper bottom car for unloading it quickly by allowing the load to fall through the opening. Drop doors are usually, if not invariably, in pairs, and are supported by a drop door chain wound upon a winding shaft. A drop door beam extends across the car above the winding shaft to assist in supporting it and to stiffen the car. The subject of drop doors has received a great deal of attention of inventors, and numerous designs and devices have been patented, yet the original drop door with winding shaft and chain is in very general use.

Drop Door Beam. See Above.

Drop Door Chain. 64, Figs. 428-431. An iron chain attached to the **Winding Shaft** and the **Drop Doors**, which see. Also termed hopper chain.

Drop Door Chain Ring. 65. Figs. 474-500. An iron ring to which are fastened the single chain passing around the door winding shaft and the two chains which are attached to eye bolts in each of the double drop doors.

Drop Door Eye Bolt. 63, Figs. 474-500. An iron bolt with an eye in the upper end which is fastened to a drop door near the edge away from the hinge and to which is secured the drop door chain.

Drop Door Gear. Figs. 1050-1076.

Drop Door Hinge. 62, Figs. 428-431. The straps of iron which support one side of the drop door and from which it hangs when dropped.

Drop End (for Gondola Cars). Figs. 39, 960-963. The end planks are tied together by heavy iron straps forming an end door and are hinged at the bottom so that they may be dropped to the floor of the car when loading long lumber, rails, etc.

Drop Forging. One made under a hammer which is raised by power and drops by gravity with the use of a die.

Drop Letter Box Plate. Fig. 4020. A **Letter Drop**, which see.

Drop Table. A table hinged to the wall so as to drop against it out of the way when desired.

Drop Test Machine (M. C. B. Recommended Practice). Fig. 6024. In 1900 the drop testing machine was modified, and a further modification made in 1901, 1903 and 1904.

Drum. 1. "A cylinder over which a belt or band passes.

2. "A chamber of a cylindrical form used in heaters, stoves and flues. It is hollow and thin, and generally forms a mere casing, but in some cases, as steam drums, is adapted to stand considerable pressure."—Knight. See **Circulating Drum** or **Expansion Drum** (Baker Heater).

3. (Hoisting Gear.) The main cylinder upon which the hoisting rope is rolled up. The spur wheel is carried on the same shaft.

Drum Controller, Electric. Fig. 6406.

Drum Cover. 1. (Baker Heater.) Fig. 2675. A sheet iron covering for the circulating drum on the outside of the car.

Drum Shaft (of a Derrick or Crane). The shaft on which the winding drum is carried.

Drum Support (Baker Heater). A bracket on the roof to hold the circulating drum.

Drum Systems of Car Heating. This method of heating employs a hot water circulation within the car, to which a Baker or other similar heater is attached. To provide a means for maintaining heat in the car when steam from the locomotive is used, a drum is employed to transfer the heat of the steam to the water of circulation. Simple forms of drums consist simply of a cylinder or pipe within another pipe of larger cross section, provision being made for the unequal expansion of the pipes, and outlet and inlet orifices being provided for the circulation of the steam and water.

Another type is the coil drum or coil jacket, which generally consists of a large sized pipe or casting capped at both ends. In this drum is placed a coil of copper pipe, which coil is made a part of the hot water circuit within the car. Steam from the locomotive is admitted to this drum around the copper coil, through which heat is imparted to the water of circulation. That part of the circuit above this drum becoming relatively lighter than the water of the circuit, a movement of the circulating medium is produced, creating a steady flow up through the coil. The amount of heat communicated to the circulating medium depends upon the surface of the coil and upon its conductive power to heat. A pressure of from 10 to 20 pounds of steam is carried in the drum.

Dry Closet. Figs. 4045-4048, 4050. A closet, so called in distinction from a water closet, which is not flushed with water.

Duck. A cotton fabric, lighter and finer than canvas, for use in car upholstery. It is usually manufactured in rolls 18, 24 and 40 inches wide and about 40 yards long. Roofing duck (used for street car roofs) is manufactured of many different widths up to 12 feet, so as to entirely cover the roof when desired.

Dudgeon's Hydraulic Jack. Figs. 3878-3885, 3891. A jack with a base and head and two cylinders, one cylinder sliding within another. To the inner one (which is termed the ram) is attached the head, having a socket to receive the lever which operates the force pump in the lower end of the ram; the remaining space is the reservoir containing the liquid, which when forced into the lower chamber causes the ram to rise, and to lower when allowed to return through the lower valve and back passages, which are operated by the same lever.

Duff Ratchet Screw Jack. Figs. 3873 and 3876.

Dummy Coupling. Fig. 1288. A casting of the same shape as a hose coupling, attached to the car, into which the coupling may be hooked and prevent dirt and debris getting in the brake pipe, as well as to prevent the coupling being damaged when hanging down.

Dump Car. A term used to designate both **Drop Bottom, Side Dump** and **Tip Cars**, which see.

Duner Water Closet. Figs. 4050, 4053.

Dunham Drop Door Gear. Figs. 1065-1072.

Duplex Air Gage (Air Brake). Figs. 1278-1279. A gage to register simultaneously on the same dial the main reservoir pressure and brake pipe pressure. For this purpose a red hand for the reservoir and black hand for brake pipe pressures are provided.

Duplex Ventilator. Fig. 4424. See **Ventilators.**

Duplicate Elliptic Spring. A **Double Elliptic Spring**, which see.

Dust Arrester (of Pintsch Gas Pressure Regulator). A cavity closed at each end by a perforated plate to

prevent dust entering to clog the regulating valve.

Dust Collar. A grooved wrought iron ring, sometimes but not generally placed on a car axle between the hub of the wheel and the journal to receive and hold a dust guard.

Dust Guard. Figs. 5299-5300, 5307-5308, 4968-4975. A thin piece of wood, leather, felt, asbestos or vulcanized fiber inserted in the dust guard chamber at the back of a journal box, and fitting closely around the dust guard bearing of the axle. It is to exclude dust and prevent the escape of oil and waste. Sometimes called axle packing or box packing.

Dust Guard Bearing (Axle). See above.

Dust Guard Chamber (Journal Box). See above.

Dust Guard Spring Holder. Fig. 4658. See **Window Dust Guard** or **Deflector.**

Dutchman. A block or wedge of wood driven into a crevice to hide the consequences of bad fitting in construction. A kind of shim.

Dynamo (Electric Car Lighting). Figs. 3368-3369, 3402-3418, 3427-3429. The machine for generating an electric current, driven by a belt from the car axle or by an engine or steam turbine mounted in the baggage car.

Dynamometer Car. Figs. 261, 593-595. A car built somewhat after the style of a caboose in which is mounted apparatus for observing and recording the drawbar pull of locomotives or trains. The draw gear is of special design, intended to be attached in some one of a number of ways to the recording devices in the car, but in other respects the car closely resembles a caboose. Sleeping quarters are usually provided for the observers.

E

Ear. A general name for projections to which handles or other exterior parts are attached, but more especially applicable to projections intended for movable attachments. See **Ear Bail,** below.

Ear Bail (Lanterns). Fig. 3618. An attachment formed of wire connected with the wire guard, to which the bail is attached instead of to the body of the lantern.

Earthen Hopper. Fig. 4056.

Eastman Heater Car. See **Heater Car.**

Eaves Fascia Board. 1. (Freight Cars.) 91, Figs. 262-272. A plain board connecting the sheathing with the roof.

2. (Passenger Cars.) 93, Figs. 625-656. A projecting board on the outside of the lower deck, immediately under the eaves, which comes below and under the eaves molding.

Eaves Molding. 1. (Freight Cars.) A plain strip sometimes used outside an **Eaves Fascia Board,** which see.

2. (Passenger Cars.) 93, Figs. 599-619. An ornamental finish to the exterior angle of the lower deck, outside of and above the eaves fascia board. A similar deck eaves molding is used for the upper deck.

Eccentric Pivot Plate (for Seat Arms). A seat arm pivot plate, made eccentric only to get room for screw holes. The eccentricity has no functional purpose.

Eckert Iron Water Closet. Fig. 4049.

Edward's Automatic Window Sash Balance. Figs 4660-4664.

Edward's Vestibule Trap Door. Figs. 2264-2271. A trap door mechanism for wide vestibules by which the door is forced up when the catch is released by a spring in the hinge. The catch is operated by a foot latch extending up into the vestibule. By pressing down on the latch the catch is released, and further pressure forces the door up out of the frame in case it sticks and the spring will not operate it.

Egg-Shaped Stove. A stove resembling an egg in form. It is commonly known simply as a cast iron stove, and is very largely used for cabooses, etc., where appearance is not important.

Eight-Wheel Car. The standard type of American rolling stock, consisting of a car body carried upon two **Trucks** or **Car Trucks** (which see) of four wheels each. Sleeping, parlor and dining cars are usually twelve-wheeled.

Ejector. Fig. 6790. An appliance for operating a vacuum brake by exhausting or "ejecting" air. It consists essentially of a pipe placed in the center of a surrounding shell or casing, with an annular opening, between the pipe and the casing. When the current of steam is admitted at the lower end and escapes at the upper end, the air in the casing is drawn out through the annular opening by the current of the escaping steam. The space is connected by a pipe with the appliances on the cars for operating the brakes. Suitable valves are also used in connection with the ejector to shut off and admit steam and air. A muffler is used to render noiseless the escaping steam. It consists simply of a box of small round balls, like shot, through which the steam must pass to escape. In the latest type a combination ejector is used having two ejector pipes, one a small one, which is kept in action continuously to maintain the vacuum in the brake pipe, and a large one for use in quickly releasing the brakes after a stop.

Elastic Fiber Journal Packing. A compound, principally of cocoanut fiber mixed with jute, to serve as a substitute for waste. It is lighter, cheaper, and claimed to be more effective.

Elastic Wheel. Any car wheel in which some elastic material is interposed between the tire and the wheel center or hub to resist the concussions. Different substances have been used, such as paper, wood, india rubber, oakum, etc., but such wheels are not now in extended use. In Great Britain teak wood centers are still used.

Elbow. Figs. 2771, 2778, 3069. A short L-shaped cast iron tube for uniting the ends of two pipes, generally at right angles to each other.

Elbow Catch.

Elbow Rail (British). In a carriage, a part of the body framing running horizontally along the sides at about the height of the elbow of a passenger in a sitting position.

Elbow Rest (British). See **Arm Rest, Side Arm Rest.**

Electric Bulbs. Figs. 3165-3172.

Electric Car. An **Electric Motor Car,** which see.

Electric Car Heating Apparatus (Consolidated and Gold's). Figs. 3013-3041. Both of these systems take current from the motor circuit and pass it through resistance coils placed under the seats or alongside the car. These coils or heaters are shown in Figs. 3013-3023 and 3029-3038. Regulating switches serve to control the heat output. Plans of wiring the cars are shown in Figs. 3024-3026.

Electric Car Lighting. Figs. 3365-3548. There are a number of distinct systems of electric car lighting in limited use. These are the **Axle Light System,**

which see; the storage battery system, using batteries charged to last the entire run of the car or train; the auxiliary electric installations in the baggage car using live steam from the locomotive to drive a reciprocating engine or steam turbine which is connected to a dynamo supplying all the lights in the train. This latter system is in use on the limited trains between New York and Chicago and on some other trains in this country. The axle light system, which allows the independent operation of each car, is rapidly coming into use.

Electric Heater. See **Electric Car Heating.**

Electric Lamps. Figs. 3490-3548.

Electric Motor. Figs. 6290-6318, 6273-6375. A machine for transforming electric energy into mechanical motion; as applied to the propulsion of cars, it consists of a rotating armature within an enclosed steel magnet frame usually of a box shape. The whole is mounted on the truck and motion transmitted to the car by means of a pinion on the armature shaft and a gear on the car axle. All standard railway motors are series wound and operate at a voltage of from 500 to 600.

Electric Motor Car. Figs. 6245-6254, 6286-6289. A car which is propelled by an electric motor, which is carried on the axle and truck and is geared to the axle and wheels.

Electric Pump Governor. Figs. 1241-1247, 1298-1299. 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; these limits are usually 95 and 80 pounds for automatic brake service and 65 and 50 pounds for straight-air brake equipments. Its function is to maintain the air pressure in the main reservoir within the limits specified.

Electric Shovel. Fig. 253. A power shovel operated by electric motor winches instead of steam hoisting engines. Similar in every other respect to a **Steam Shovel,** which see.

Electric Snow Sweeper. Figs. 6256-6257.

Electric Motor Truck. Figs. 6433-6459.

Electric Train Line Coupler (Electric Car Lighting). Fig. 3398. A device somewhat like a steam or air brake hose coupler which is used to connect the electric light circuits on adjoining cars. It is placed under the platform floor and is coupled by hand, but it uncouples automatically in case the train parts.

Electric Traveling Crane. Fig. 6855.

Electrolier. Fig. 3592. A chandelier of electric lights.

Elevated Car. Fig. 6220. An electric motor car for use on elevated railways in large cities.

Ell. Fig. 2771. See **Elbow.**

Elliptic Spring. Figs. 5372-5383. A spring of elliptical form made of two sets of parallel steel plates of constantly decreasing length. Such springs are generally used for bolster springs for passenger cars. Their use in freight service has been practically abandoned in favor of spiral springs. Half elliptic springs are for locomotive springs. In Great Britain they are almost the only bearing springs used, and are also used as **Draw Springs** and **Buffing Springs,** which see.

The set of elliptic springs is the total amount of bend or compression of which the spring is capable. The arch differs from half the set by the amount of the thickness of the spring band. The connection between the two halves of the elliptic spring at its extremities is termed the scroll. Elliptic springs in service are termed double or duplicate, triplets or triplicate, quadruple, quintuple, sextuple, etc., according to the number of springs used side by side and connected by a single eye bolt so as to constitute practically one spring. In passenger car service elliptic springs are usually triplicates, quadruples or quintuples. The length of the spring is the distance from center to center of scrolls when unloaded; and the height, the height over all unloaded.

Emergency Candle Lamp. Fig. 3585. See **Candle Lamp.**

Emergency Knuckles. Figs. 1796-1797.

Emergency Tool Box. T, Figs. 648-651. See **Tool Box.**

Emergency Valve (General Electric). Figs. 1311-1314.

Emergency Valve (Triple Valve). 10, Fig. 1233. See **Triple Valve.**

Emergency Valve Nut (Triple Valve). 28, Fig. 1233.

Emergency Valve Piston (Triple Valve). 8, Fig. 1233.

Emergency Valve Piston Packing Ring (Triple Valve). 30, Figs. 1130-1131.

Emergency Valve Seat (Triple Valve). 9, Fig. 1233.

Emigrant Sleeping Car. A cheaply finished car, in other respects similar to ordinary sleepers, for the use of emigrants. Now used chiefly on the long runs west of Chicago, and to some extent used for ordinary travel, especially by parties of excursionists. See **Tourist Sleeping Car.**

Empire Deck. A form of roof extensively used in passenger car construction in which the lower deck is curved and the upper deck is also curved. Double deck sash, usually half elliptic, as shown in Figs. 4162-4163 are used and the upper deck is vaulted over each deck window.

End Arch Rail (British). American equivalent, end plate. A piece of timber run across the upper portion of the end of the body, its upper side being cut to the curve of the roof which it supports.

End Ascending Step (British). See **Ascending Rail.**

End Belt Rail. 50, Figs. 262-272. (Freight Car.) A timber running across the end of a car body about midway between the sills and plate, and with the side belt rail forming a continuous girth around the car except across the doors. It is usually the top of the inside lining and is framed into the posts and braces. See **End Girth.**

End Belt Rail Truss Rod. 51, Figs. 262-272. An iron rod parallel to and alongside of the end belt rail to keep the posts drawn tight and close against the end belt rail.

End Board (British). American equivalent, end plank. A plank in the end of a "goods wagon" or gondola car.

End Brace. 35, Figs. 262-272, etc.; 51, Figs. 648-651. See **Body Brace.**

End Brace Pocket. 35, Figs. 262-272, etc. See **Pocket.**

End Brace Rod. 34, Figs. 262-272. See **Brace Rod.**

End Carline. A **Carline,** which see, at the end of a car body. See also **End Plate, Platform Roof End Carline.**

End Chute Plank. The planking of an inclined floor of a car which discharges its load longitudinally from the end toward the middle of a car, or vice versa. See **End Slope.**

End Compression Beam (Passenger Car Framing). A timber directly above the sills over the body bolster against which the compression beam brace and the end counterbrace abut. The compression beam

proper is situated at the middle of the car directly under the window sills. The end compression beam is sometimes omitted.

End Counterbrace (Passenger Car Framing). More commonly, simply counterbrace. A brace in the side of a car body, between its ends and the body bolster. See **Counterbrace.**

End Door (Box Cars). 1. A door frequently applied to afford means for the insertion of long pieces of freight or lumber that cannot be entered by the main side doors.

2. (Refrigerator Cars.) 61e, Figs. 305-321.

End Doors (Passenger Car). Figs. 1326-1328, 1334. The door in the end of the car.

End Door Locks. Figs. 2503-2539, etc. See **Locks.**

End Door Sash Bolt. Fig. 4583, etc. See **Sash Bolt.**

End Door Sash Lift. Fig. 4588. See **Sash Lift.**

End Frame (of a Car Body). Figs. 691-693. The frame which forms the end of a car body. It includes the posts, braces, end rail, end girth, etc.

End Fascia Board. 90, Figs. 262-272. A plain board on the end of a car covering the upper ends of the sheathing boards and extending to the roof line.

End Girth. 50, Figs. 262-272, 341-344. A girth in the end of a box car. An end belt rail.

End Girth Tie Rod. A rod extending across the end of a freight car body along the end girth, from one corner post to the other. An end belt rail tie rod.

End Grab Iron. See **Grab Iron.**

End Half Longitudinal (British). American equivalent, intermediate sill. A part of the underframing extending from the cross bearer to the headstock.

End Hook (Bell Cord). Fig. 2310. A hook sometimes used on the ends of passenger cars, high up under the platform roof, for fastening the end of the bell cord to.

End Lamp Iron (British). American equivalent, tail light holder. A wrought iron holder secured to the sole bar or the end of the body in order to carry one of the colored signal or tail lamps, denoting the last vehicle of the train. See also **Side Lamp Iron.**

End Muntin (British). See **End Stanchion.**

End Panel. 1. A panel at the end and on the outside of a passenger or street car below the window. In street cars distinguished as lower and upper, both under the window. In passenger cars distinguished as end window panel, alongside of the window, and end panel, below it.

2. (British.) A panel in the outside end of the body of a carriage, extending from the arch rail to the bottom end piece.

End Piece (Wooden Truck Frame). 17, Figs. 4771-4777 and Figs. 4788-4795. A transverse timber or bar of iron by which the ends of the two wheel pieces of a truck frame are connected together. A crooked end piece is one cut away on top to clear the draw gear. The inside end piece is the one nearest the center of the car, in distinction from the outside end piece. They are frequently designated as the front and back end piece.

End Piece Corner Plate (Passenger Trucks). 130, Figs. 4771-4777 and Figs. 4888-4890. See **Truck Frame Corner Plate.**

End Piece Plate. Fig. 4829. A top and bottom plate for the end piece of a passenger truck. Also side plates bolted to the end piece to further stiffen it. Figs. 4837 and 4841.

End Pillar (British). An upright post in the end of the car body.

End Plank (of a Gondola Car). The planks in the end of the car body. They are often hinged to the car floor so as to drop down upon it, when they are called drop ends.

End Plate. 48, Figs. 262-272, etc. A timber across the end and tops of the end posts of a car body which is fastened to the two side plates. It is usually made of the proper form to serve as an end carline.

End Plate Strengthening Angle. An angle iron bolted or lag-screwed to the top of the end plate between the side plates to strengthen the end plate and the connection between the sides.

End Play. 1. (Of an Axle.) The movement, or space left for movement, endwise.

2. (Of a Truck Bolster.) Usually called lateral motion. See **Swing Bolster.**

End Post. 1. (Box Cars.) 42b, Figs. 262-272. The vertical members in the end body framing between the corner posts.

2. (Hopper Cars.) 47, Figs. 474-477. A vertical support for the overhang of the hopper floor, resting on the end sill. Ladder rounds are usually secured to the two end posts in the center.

End Post Reinforcement. Figs. 1045-1047.

End Post. An upright post in the end framing of a car body. See **Vestibule End Post.**

End Rafter. A term erroneously applied to the **End Carlines,** which see.

End Rail. 1. See **Wainscot End Rail** (Lower and Upper).

2. (British.) A part of the body framing running horizontally across the end of the vehicle. See **Side Rail.**

End Roof Panel. The panel above the end door and below the clear story.

End Scroll Iron (British). A wrought iron support for the spring link adjusting screw. The upper face is attached to the under side of the sole bar, and the lower part is bored horizontally for the adjusting screw. It is placed near the end of the vehicle, and hence differs somewhat in pattern from the ordinary scroll iron.

End Seat Panel (Street Car). An inside panel at the end of a longitudinal or side seat. See **Panel.**

End Sill. 2, Figs. 262-272, 599-619. The transverse member of the underframe of a car framed across the ends of all the longitudinal sills. In wooden underframe cars a heavy timber approximately square in cross-section and in steel underframe cars either a channel or a pressed plate. If the sill projects out beyond the end sheating of the body it is known as an outside end sill. If it is framed flush with the sheating it is usually termed an inside end sill. In passenger cars the end sill comes directly under the end door, the **Platform** (which see) with its various parts usually being a separate construction. The British equivalent is **Head Stock.**

End Sill and Plate Tie Rod. 54, Figs. 648-651. A tie rod joining the end sill with the end plate.

End Sill Brackets (of Steel Frame Cars). L-shaped angle plates used to connect the longitudinal sills and the end sill. In bridge building such plates are termed brackets. When of triangular section they are termed **Gussets,** which see.

End Sill Diagonal Brace. 195, Figs. 262-272; 11, Figs. 496-500. A horizontal brace extending from the corners of the end sill diagonally back to or beyond the bolster at the center sills.

End Sill Flitch Planks. The planks or sticks of timber

which are placed on the sides or between the flitch plates, and are part of a composite end sill.

End Sill Flitch Plates. The iron or steel plates sandwiched between the wood members of a composite end sill.

End Sill Plate. Figs. 996-997. An iron or steel plate bolted on the face of the end sill of some passenger cars to give added strength.

End Sill Stiffening Angle (Pullman Anti-Telescoping Device). A ⅜x3x4-inch angle riveted or bolted to the end sill stiffening plate and to the end sill on the inside. The inner body truss rods pass through it, the end sill and the truss rod washer plate.

End Sill Stiffening Plate (Pullman Anti-Telescoping Device). A ⅝-inch iron plate, about 20 inches wide in the middle by 12 inches at the ends, bolted on on the under side of the end sill and to the under side of the center, intermediate, and side sills.

End Sill Tie Rod. 10a, Figs. 496-500. An iron rod passing through the end sill and the bolster to tie the two together.

End Slope (Hopper Car). C, Figs. 428-431; 27a, Figs. 474-500. The sloping floor from the end of the car to the hopper door. See **Side Slope** and **Hopper Slope.**

End Stanchion or **End Muntin** (British). An upright bar or post at the end of a wagon, stiffening the end against shocks in switching.

End Step (Journal Box). A metal block inserted upon the inside of the lid to take up the end thrust of the axle where no collar is used. See **Stop Key Journal Bearing.**

End Timber. See **Platform End Timber** or **Buffer Beam**; also **End Sill.**

End Train Pipe Valve (Steam Heating). Figs. 2826-2843, 2886-2887, 2889. A valve in the train steam pipe at the end of the car by which the entire car may be cut out. Usually operated by an extension handle extending up to the platform or out to the side of the car.

End Truss Plank. See **Truss Plank.**

End Ventilator. An aperture for the admission or escape of air at the end of a car, usually placed over the windows. See also **Deck End Ventilator.**

End Ventilator Opener. See **Deck Sash Opener.**

End Wainscot Panel. See **Wainscot Panel.**

End Window Panel. A panel at the end and on the outside of a passenger car along side the window, in distinction from the end panel proper, which is below the window. See **Panel.**

Equalizer. 1. A short term for an **Equalizing Bar,** which see.

2. (Pullman Vestibule.) A bar in the hood of a platform which equalizes the pressure of the two upper face plate springs and keeps the opposing face plates together in contact, so as to maintain frictional contact and exclude dust and smoke.

Equalizer Block. See **Brake Equalizer Block.**

Equalizer Connecting Chain (Pullman Vestibules). Three links of a chain connecting the upper ends of the vertical equalizing levers with the ends of the horizontal equalizing lever.

Equalizer Spring. 79, Figs. 4771-4777. A spring which rests on an equalizing bar and carries the weight of a car. Single or double coil spiral springs are generally used for this purpose. Rubber and volute springs are out of use.

Equalizer Spring Block (Passenger Trucks). 76, Figs. 4780-4783. A casting bolted to the wheel piece which rests on the equalizer spring cap.

Equalizer Spring Cap. 72, Figs. 4771-4777, and Figs. 4802-4804. A casting on top of the spring, which bears against the under side of the wheel piece and holds the spring in its place.

Equalizer Spring Seat. 73, Figs. 4771-4777 and Figs. 4805-4807. A casting which sets on an equalizing bar and on which the spring rests. See **Spring Plate.**

Equalizer Strap. See **Brake Equalizer Strap.**

Equalizing Bar (Passenger Car Trucks). 71, Figs. 4771-4777; Figs. 4825-4826, etc. Commonly abbreviated into equalizer. A wrought iron bar which bears on top of the journal boxes and extends longitudinally from one to the other. Equalizer springs rest on it between the two boxes. It is used to transfer part of the weight on one axle to the other, and thus equalize it on both; hence its name.

Equalizing Bar Pedestal (Four-Wheel Caboose Cars). A casting serving to give a fulcrum to the center of a lever, called an equalizing lever which distributes the weight of the car evenly on the two axles.

Equalizing Bar Seat. The surface on top of a journal box on which an equalizer rests. See **Equalizer.**

Equalizing Brake Lever. A **Floating Lever,** which see. The center brake lever is also, with little propriety, so called.

Equalizing Lever. An **Equalizing Bar,** which see. A floating brake lever is also called an equalizing lever.

Escutcheon. 1. Figs. 2503-2551, etc. A plate or guard for a keyhole of a lock. Similar plates for the holes through which door knob spindles pass are also called escutcheons, but more commonly rose or rosette. An escutcheon plate is often attached to an escutcheon to cover the key hole.

2. (Yale Lock.) A revolving post provided with holes to carry the pins, which act as tumblers. When the key with corrugated edge is inserted each of these tumblers is raised so that the joint comes exactly at the edge of the escutcheon, thus permitting revolution.

Escutcheon Plate. See **Escutcheon.**

Examination of Car Inspectors. In 1902 the following rules for examination of car inspectors were adopted as a Recommended Practice of the M. C. B. Association:

Requirements:

One year at oiling cars.

Two years at car repairing.

Age limit for new men, thirty years.

Age limit for promoted men, forty years.

Vision, 20-20 in one eye and not less than 20-40 in the other, without glasses.

Method of Testing—Acuity of Vision.—The test card should be hung in a good light and the party to be examined should, if possible, be seated with his back to the window. Each eye should be examined separately, using, for the purpose, of excluding one eye, a folded handkerchief. The lowest line that can be read should be determined by exposing only one letter at a time through a hole cut in a strip of cardboard. In making out the report in each case, the visual acuity of each eye should be denoted by a fraction of which the numerator represents the number of feet at which the applicant is seated from the card, while the denominator represents the number of feet at which the lowest line which can be read should be read. Thus, if at 20 feet he reads the line marked 20 feet, his vision

is 20-20 or 1, which is the normal standard. If at the same distance he only can read the line marked 70 feet, his vision is 20-70. If at 20 feet he reads the 15-foot line, the vision is 20-15, or more than normal. If a room 20 feet long cannot be used, a testing distance of 15 or 10 feet should be employed, in which case normal vision would be represented by 15-15 or 10-10, respectively, and lower grades of vision by such fractions as 15-20, 10-70 and so on.

Field of Vision.—Test should be made my having the applicant and examiner stand about three feet apart, each with one eye shut, looking each other steadily in the eye. The examiner should then bring his hand in from the edge of the field toward the center of the space between them, until the applicant sees it coming. This should be done from different directions, up, down and from each side. The applicant should see the hand coming about as soon as the examiner does. If not, this should be noted on the report.

Hearing.—Test should be made in a quiet room. First, the examiner should hold the watch opposite the ear to be examined not less than 48 inches distant, then gradually approach the ear until the applicant hears the tick, the stop being used to satisfy the examiner that the applicant is not deceiving. The distance at which the applicant hears the watch should be noted in inches. The normal ear should hear the tick of the watch at 48 inches. Then the hearing power will be denoted by a fraction whose numerator represents the number of inches at which the watch is heard. Thus, if he hears the watch at 48 inches, his hearing is 48-48, or normal. If he hears it at only 10 inches distant, his hearing is 10-48, and so on.

Color.—The committee does not think it essential that inspectors should be rejected on account of imperfect color sense. It is, however, believed that inspectors should be tested as to their color sense so that they, as well as their employer, may know their condition in this respect.

Educational.—The applicant should be able to write a legible hand in English, and also to read manuscript matter as well as printed matter.

Car Knowledge.—The inspectors should be able to name each part of the car in general use, in preference using M. C. B. dictionary terms.

M. C. B. Rules.—Inspectors must pass a satisfactory examination on M. C. B. Rules, answering seventy-five per cent of the questions submitted. These questions should be of about the following character:

1. What are the Master Car Builders' Rules?
2. What is the object of the M. C. B. Rules?
3. What is the underlying idea or principle of these rules?
4. When is a company, operating the cars of another company, responsible for defects of such cars?
5. When a company is thus responsible, what should it do?
6. What care should be given to foreign cars by the company hauling them?
7. What cars must be accepted in interchange?
8. What is a defect card and how is it used?
9. Under what conditions is a road obliged to accept a car which is carded for defects for which the owner is not responsible?
10. What are the defects of wheels and axles for which owners and delivering companies are responsible?
11. Describe the form and use of the M. C. B. wheel gage.
12. What are the rules which apply to the cleaning of triple valves and cylinders?
13. What does the limit of height of drawbars mean?
14. When a company is obliged to make improper repairs, what must it do to call attention to such repairs?
15. What does the term unfair usage mean?
16. What are the rules regarding splicing sills?
17. What is the purpose of the repair card?
18. How do these rules apply to switching roads?
19. Are switching roads allowed to render bills against owners direct for repairs of any other than those named in Section 23 of Rule 5?

Excelsior Car Roof. Figs. 2112-2120. See **Car Roof.**

Excelsior Galvanized Car Roof. Figs. 2117-2120. See **Car Roof.**

Exhaust Muffler (Westinghouse Traction Brake). A device for subduing the sound of air discharging to the atmosphere during operation of the brakes

Exhaust Ventilator (for Closet Hoppers). See **Bell's Exhaust Hopper Ventilator.**

Expanded Metal. A perforated metal screen which is made by slotting a sheet of sheet iron or steel and then drawing it out so that the slots form diamond-shaped holes in the plate. It is largely used in composite concrete construction as a binder, in the "Diamond S" brake shoe (Fig. 5251), and for lockers and for window guards (Figs. 4018-4019).

Expansion Drum (Baker and other Heaters). Fig. 2873. A **Circulating Drum,** which see.

Express Car. Figs. 204-205. A car for carrying light packages of freight for express companies on passenger trains. Also see **Combination Baggage Car.**

The express business was originated in 1839 by William F. Harnden, who traveled for some time as a messenger between New York and Boston; but it was not for a long time thereafter that it grew to sufficient dimensions to require separate cars. Alvin Adams, founder of the Adams Express Company, began business in 1840. At present complete trains of express cars are occasionally rerequired.

The car shown in Figs. 204-205 is fitted with ice tanks and insulation for carrying perishable goods.

Extension Bracket. Figs. 822-823. See **Running Board Bracket.**

Extension Pillar (Pintsch Lamp). Fig. 3091.

Extension Pillar Lock (Pintsch Lamp). 304, Figs. 3017-3033.

Extension Platforms. Figs. 2264-2279.

Extension Reach (Logging Cars). The reach is a long bar connecting the two trucks. The extension reach is adjustable.

Extension Reach End (Logging Cars). A strap for the end of the extension reach.

External Cylinder Gage. A steel ring with a cylindrical hole, which is very accurately made of a precise size, and used as a standard of measurement for the diameters of solid cylindrical objects.

External Screw Gage. A steel ring with a very accurate screw thread in the inside for testing screw threads. See **Internal Screw Gage.**

Extra Transom (Passenger Trucks). 20a, Figs. 4771-

4777 and Figs. 4786-4787. An extra or auxiliary timber placed alongside the transom to further strengthen the truck frame.

Eye. "A small hole or aperture."—Webster. See

Berth Brace Eye. **Check Chain Eye.**
Body Check Chain Eye. **Lamp Case Eye.**
Brake Beam Adjusting Hanger Eye. **Switching Eye.**
Truck Check Chain Eye.
Bull's-Eye.

Eye Bolt. "A bolt having an eye or loop at one end for the reception of a ring, hook or rope, as may be required."—Knight. See **Bolt**; also

Brake Beam Eye Bolt. **Drop Door Eye Bolt.**
Brake Safety Chain Eye Bolt. **Lock Eye Bolt.**
Lock Chain Eye Bolt.

Eye Bolt Link Hanger. A special form of **Swing Hanger**, which see, having a very short link attached to an eye bolt passing through the transoms.

Eyelet. 1. Fig. 2663. "A short metallic tube, the ends of which are flanged over against the object through which it passes. Used as a bushing or reinforcement for holes."—Knight. In metallic eyelets of the usual form the two halves which when compressed together form the eyelet are known as grommets. See **Carpet Eyelets.**

2. (Window Shade). A slot in the window shade leather to fit over the sash lift to hold the shade fast.

Eyelet Nail. Fig. 2666. A wire nail with turned knob for use with carpet eyelets.

F

Fabrikoid. An artificial leather made by coating a cloth fabric with a secret compound which gives it the texture and appearance of leather.

Face (of Rim of Car Wheel). The vertical surface of the outside of the rim.

Face Plate. 1. A metal plate by which any object is covered so as to protect it from wear or abrasion.

2. (Steel Tired Wheels.) Fig. 5402, etc. The plates connecting the tire and hub, and bolted to each. They are distinguished as front and back face plates.

Face Plate. See **Vestibules.**

Face Plate Buffer. A buffer plate to which a vestibule face plate is attached. See **Vestibule.**

Face Plate Buffing Stem (Pullman Vestibule). See **Face Plate Piston.**

Face Plate Piston (Pullman Vestibule). A face plate buffing stem corresponding to the side buffer stem, beneath the platform floor. The end is contained in a face plate piston guide.

Face Plate Piston Guide. See above.

Facing. "A covering in front for ornament."—Webster.

Fagoted Axle. See **Axle, Car Axle.**

Fall (Hoisting Tackle). That part of the rope to which power is applied.

Fall and Tackle. Another name for **Block and Tackle**, which see.

Falling Door or **Flap Door** (British). In a gondola car, a door opening downward and outward, the hinges being on the lower side.

Falling Door Latch (British). A latch which automatically secures the falling door when elevated into a closed position.

Fall Under or **Turn Under** (British). The distance which the bottom of the body curves in from a vertical line let fall from the sides or ends.

Fare Register (Street Cars). A mechanism with a clock face and index or with a numbering dial which shows the number of fares collected and registered. For every fare collected, the conducter is expected to record it by pulling a cord or turning a rod connected with the register. The register is attached to a fare register block which is fastened to the car frame.

Farlow Draft Gear Attachments. Figs. 1520-1531.

Fascia Board. See **Eaves Fascia Board.**

Fascia Molding (British). See **Wrought Molding.**

Fast Berth Hinge. Fig. 4355. See **Berth Hinge.**

Fast Joint Butt Hinge. Fig. 2461. See **Hinge.** So called in distinction from a loose joint butt hinge or loose pin butt hinge.

Fastener. That which fastens or secures one thing to another. See

Berth Safety Rope Fastener. **Sash Fastener.**
Lamp Fastener. **Tire Fastener.**
Window Fastener.

Faucet. Figs. 3653-3659. A synonymous term with **Cock**, which see for fuller definition.

Faucet Alcove. A **Water Alcove**, which see.

"F. B. C." Arch Bar Nut and Lock. Fig. 3854.

Feasible Drop Brake Staff. Figs. 5203-5204. See **Brake Shaft.**

Feed Door (Baker Heater). Fig. 2682. A door for closing the aperture giving access to the fire pot or (in base burners) the magazine. See also **Fire Door.**

Feed Tube (Lamp). 31, Figs. 3585-3601. The tube connecting the reservoir with the burner. The standard by which the entire lamp is supported passes through it.

Feed Valve. Also called reducing valve, slide valve feed valve and slide valve reducing valve.

1. (Westinghouse Traction Brake.) A valve which automatically maintains the pressure of air supplied through the brake valve to the automatic brake system. It may be attached either to the brake valve or placed in the piping between the main reservoir and the brake valve.

2. (Train Air Signal.) See **Reducing Valve.**

Felt Edge (Car Seats). A device for building up the edges of car seat cushions. It is simply a roll of felt stitched in such a manner as to fit over a cleat; and when tacked down it forms an even elastic face to the cushion.

Female Center Plate. The body and truck center plates are sometimes called male and female plates, respectively. See **Center Plate.**

Female Gage. An **External Gage**, which see.

Fender Board. A board at the end of passenger car steps to prevent mud and dirt from being thrown on them by the wheels. More commonly, string board. The splash board, if used, goes on the back side of the steps.

Fender Rail (Street Car Bodies). A longitudinal exterior wooden strip or rail, between the belt rail and the sill, and to which an iron strip called a fender guard is attached to protect the panels from contact with other vehicles.

Fern Rack. Fig. 3681. See **Flower Rack.**

Ferry Push Car. A very long platform car used for pushing or pulling other cars on or off a ferry boat when the latter is approached by an incline too steep for locomotives, so that the latter can push or pull the cars without running on the incline.

Fiber Packing. See **Elastic Fiber Journal Packing, Patent Waste.**

Field Coils. Fig. 6293. Coils of insulated copper wire

or ribbon surrounding the iron poles of the railway motor field magnet. Standard motors have four poles. Current passing through these coils produces the magnetic flux in which the armature rotates.

Fillet. A small light molding, more generally termed beads. See **Molding.**

Filling Funnel (Baker Heater). Figs. 2734, 2763. A funnel attached to the combination cock for filling the circulating drum with brine.

Filling Piece. Any piece of timber which has no other structural purpose than to close a gap.

Filling Spider (Pressed Steel Bolster). Figs. 763-764 A casting made with a central body and projecting arms to serve as a filling piece to keep the plates of the bolster the proper distance apart.

Filling Valve (Pintsch System). Figs. 3044 and 3108. This valve is a soft metallic seated valve of peculiar construction. Is handled with key No. 45 (Fig. 3093) and is a left-handed valve. It is placed on each side of a car, bolted to an iron bracket, Fig. 3045, by bolts, Fig. 3066. The pipe connection (1¼ in.) is made to a connection piece, Fig. 3055, which is slipped through the bracket from the outside and screwed to the pipe. The filling valve is then bolted back against this flange connection piece, a lead and rubber gasket forming the tight joint. The valve has a sheet iron cover, Fig. 3043, secured to it by four screws.

Finger Guard (Brake Beams). Fig. 5197. A projecting rod or finger which prevents the brake beam from being excessively displaced laterally by bearing on the inside of the wheel. A wheel guard.

Finished Upper Seat Back Rail (Street Cars). The topmost rail or molding of a longitudinal seat back.

Finishing Varnish (Painting). An elastic (oily) varnish applied in two coats. The first is allowed at least 24 hours to dry. The second and fuller coat of the same varnish is then applied and allowed 24 hours to dry. A first-class job can be turned out in 10 days. Additional time between coats will give additional safety. See **Painting.**

Fire Box or Fire Pot (Baker Heater). Fig. 2697, etc. The inside cast iron cylinder which contains the fire. It is cast in one piece and contains the coil. Also called fire chamber, fire box, furnace, and sometimes cylinder.

Fire Extinguisher. Fig. 3849. See **Babcock Fire Extinguisher.**

Fire Grate and **Fire Grate Support.** See **Grate** and **Grate Support.**

Fire Proof Heaters (Baker). 1. Single Coil. Figs. 2676-2695. A Baker heater having a single coil, 30 feet in length, or a double coil, in a flexible steel, jointless, fireproof safe, with no apertures large enough to permit the escape of live coals. This inner fire pot or safe is enclosed in a flexible steel outside casing, with asbestos sheets between the safe and casing, and between the ash pit bottom and sheet iron bottom; a safety plate covers the feed chute at the top, and a cinder-proof door effectually closes the ash pit at the bottom. The smoke pipe and smoke flue base may be destroyed and leave the fire pot practically fireproof.

2. Two Coil. Figs. 2696-2716.

Fire Regulator and Pressure Indicator (Baker Heater). Fig. 2547. The device is attached to the hot water circulating pipes at a point a little above the coils, and is somewhat like the old ball and lever safety valve, the ball or weight in this case being the draft door. The fire regulator bowl consists of two concave plates bolted together, with a corrugated steel diaphragm and two copper duplicates, top and bottom, between (for preservation). On this set of diaphragms rests a piston connected with a lever, on one end of which hangs the counter draft damper in the base of the smoke flue. On the front end of this lever is the spiral adjusting spring, and the figures denoting the pressure within the heater. The "adjusting spring" is to be hooked into the hole at the figures denoting the pressure and consequent temperature desired.

First-Class Car. The ordinary American day coach used by the great bulk of short trip passengers. So called to distinguish it, on the one hand, from those of an inferior grade, as emigrant and (rarely) second-class cars, and on the other hand from sleeping and parlor cars, in which an extra charge, in addition to the ordinary fare, is made, and which are the true American first-class cars.

First-Class Carriage (British). Fig. 6480. Nearest American equivalent, parlor or drawing-room car. A coach for passengers paying the highest rate of fare. It is divided into four or more compartments, each about 7 feet cube, and seating six or eight passengers.

Fish Van (British). Fig. 6596. A covered vehicle adapted to run on passenger trains, and fitted to carry fresh fish in crates or boxes. When without a roof it is termed a fish truck.

Fixed Brake Lever. More commonly, dead lever. A brake lever, the upper end of which is fastened to a brake lever stop or dead lever guide.

Fixed Hanger (Bell Cord). Fig. 2365. See **Bell Cord Hanger.**

Fixed Ratchet (Morgan's Deck Sash Pivot). Fig. 4505 The piece attached to the side of the window frame with which the sash ratchet engages, the latter being pressed against it by a spring.

Fixed or Stationary Freight Car Lock. Fig. 1371. A lock which is attached to the side of a car. The bolt or hasp is fastened to the door.

Flag (for Train Signals). The standard size of flags adopted by the American Railway Association is 16 x 16 inches, and the colors indicate their purpose as follows: Red signifies danger and is a signal to stop; green signifies caution and is a signal to go slowly; white signifies safety and is a signal to go on; blue denotes that car inspectors are at work under or about the train or car, and that it cannot be moved or coupled to until the blue signal is removed by the car inspectors. In the night time lanterns with colored glass globes are used instead of flags, and the colored lights have the same meaning as the colored flags.

Flag Holder (for Corner Post of Passenger Car). Figs. 938 and 3615. A cast or malleable iron receptacle for a signal flag staff. It has a lug cast on it which engages into a flag holder plate attached to the corner post.

Flag Holder Plate. See above.

Flange. 1. (Of Bell Cord Guides, etc.) Fig. 2332. A projecting rim for attaching the part to any surface by wood screws.

2. (Of a Car Wheel.) A projecting edge or rim on the periphery for keeping it on the rail. The inside edge of the flange which connects with the tread of the wheel is termed the throat, and the

extreme outer point the toe of the flange. Worn flanges having flat vertical surfaces extending more than 1 inch from tread of wheel, or 1 inch thick or less, are a cause for rejection under the rules for interchange of traffic. See **Wheels.** The standard distances fixed by the Master Car Builders' Association, from outside of flange to inside of tread is 4 feet 5⅜ inches, with ¾-inch variation either way. See **Interchange of Traffic.** See **Flange Thickness Gage.**

Flange Brake Shoes. Figs. 5250-5253. **Brake Shoes,** which see, bearing not only on the tread of the wheel but on the flanges as well. Used only on passenger cars and locomotive driving wheels.

Flange Fittings (Pintsch System). Figs. 3056-3060. Special fittings required for the Pintsch system are all flanged and made of brass, the flanges held together by screws. The joints are made tight by the use of special lead and rubber washers.

Flange Thickness Gage (M. C. B. Standard). Figs. 5602-5603. A gage for determining the correctness of the thickness of wheel flanges. The dimensions shown in the engravings are those adopted by the M. C. B. Association.

Flanger. See **Snow Flanger.**

Flap Door (British). See **Falling Door.**

Flashing (Plumbing). "A lap joint used in sheet metal roofing, where the edges of the sheets meet on a projecting ridge. A strip of lead leading the drip of a wall into a gutter."—Knight. Hence, extended to mean any strip of sheet metal of an L section used to make a water-tight joint.

Flat Car. Figs. 26-30, 360-375. A car, the body of which consists simply of a platform, which is not inclosed on the sides or top. The floor is usually of wood, but some cars have been built with steel underframe and steel floor. If sides are added it becomes a gondola car. See **Car** and **Freight Car.**

Flat Door Bolt. Fig. 2262. See **Door Bolt.**

Flax Fiber. See **Linofelt Flax Fiber Insulation.**

Flexible Top Seat Cushions. A seat cushion, the top of which is in detached parts so that one part can yield without carrying down the other.

Flitch Plates. An iron or steel plate sandwiched between pieces of wood and bolted together to give the member which they comprise greater strength. Also called sandwich plates.

Floating Connecting Rod (Foundation Brake Gear). A rod which connects a cylinder lever with a floating lever.

Floating Lever (Westinghouse Freight Brake). A lever, one end of which is fastened to the fulcrum bracket, the other end connected to the live truck lever, and the middle to the cylinder lever, to which latter is connected the push rod.

Floating Lever Bracket. A bracket bolted to the underframe of a car to carry the floating lever of the brake gear.

Floating Lever Connecting Rod (Brake Gear). More properly a **Cylinder Lever Tie Rod,** which see.

Floating Lever Hanger. Fig. 993. A square bracket or hanger supporting the **Floating Lever,** which see.

Floor. 1. "That part of a building or room on which we walk; the bottom or lower part, consisting, in modern houses, of boards, planks or pavement.

2. "A platform of boards or planks laid on timbers, as in a bridge or car; any similar platform."—Webster.

3. 27, Figs. 262-272, 648-651, etc. The boards or plates which cover the sills of a car. In passenger cars the floor consists of two, and sometimes three, courses of boards, called respectively the flooring, intermediate floor and deafening ceiling, the latter being on the under side of the sills. An intermediate or upper floor, 28, Figs. 352-355, more commonly called the double deck, is used in stock cars for carrying sheep and hogs. Hopper bottom cars have an inclined floor, subdivided into inclined end floor and side floor when both are used.

Floor Beam. A **Sill,** which see.

Floor Frame. The main frame of a car body underneath the floor, including the sills, body bolsters, needlebeams, etc. The underframe.

Floor Furnishings. Figs. 2663-2675.

Floor Mat. Figs. 2670-2671. A texture or structure of hemp, cocoa fiber, rattan, india rubber, wood or other material laid on the floor of a car for passengers to clean their boots and shoes on. Mats are placed on the floors of street cars to take up the dust and dirt. See **Rubber Floor Mat,** which is either perforated or corrugated.

Floor Nailing Strip. 6. Figs. 645-647. Narrow strips of wood or blocking put in between the sills of a passenger car to which the floor boards are nailed.

Floor Pipe (for Closet Hoppers). A pipe passing through the floor of the car only, with which the hopper proper is connected.

Floor Plate. See **Center Pin Floor Plate.**

Floor Stop (for Door Holder). A catch for a door holder attached to the floor, in distinction from a partition stop attached to the wall or partition. See **Door Holder.**

Floor Strip. The strips that make the grated floor frames of a street car.

Floor Timbers. 1, 3, 4, Figs. 262-272, 599-619, etc. The main timbers in the frame of a car body underneath the floor, and on which the latter rests. They are chiefly the sills (side, center, and intermediate) and the end sills. They are a part of the underframe. See also **Diagonal Floor Timber, Inclined Floor Timber, Transverse Floor Timber.**

Floor Timber Braces. 7, Figs. 648-651. Diagonal timbers let into the sills under the floor to stiffen the floor frame laterally.

Floor Timber Distance Block. A short transverse piece of timber placed between adjoining floor timbers and sills to stiffen them, the whole being fastened together with bolts in connection with a cross frame tie bolt. In steel frame cars tie plates are riveted across the top of the sills to serve the same purpose. See **Bridging.**

Flooring. Tongued and grooved boards of which a passenger car floor is made. The floor of freight cars is commonly two-inch planking. (M. C. B. Standard.) Figs. 5749-5756.

Flower Rack. Fig. 3681. A cast ornamental shelf to hold a pot of ferns or flowers in a dining car.

Flue (Pintsch Lamp). 312, 321, Figs. 3208-3224.

Flue Post (Pintsch Lamp). 546, Figs. 3208-3224.

Flush Bolt. Figs. 2396-2398. A bolt attached to a slide which is let into a door, sash or window, so as to be flush with its surface. A spring flush bolt is commonly called a cupboard catch. Figs. 2399-2402.

Flush Bolt Keeper. Fig. 2400. A plate which is attached to a door, sash or window frame, and has a suitable hole, in which a flush bolt engages. When for spring bolts, as in the engraving, they are also called strike plates.

Flush Catch. Figs. 2399-2402.

Flush Handle. Figs. 2437-2439. A handle for a lock

or latch which is placed in a recess, as of a door, sash or berth, and which does not project beyond the surface of the object to which it is attached.

Flush Sash Lift. Fig. 4633. A metal plate with a recess, to take hold of, which is let into a sash so as to be flush with its surface.

Folding Arm Rest or **Elbow Rest** (British). A wooden support for the elbow, upholstered on both the upper and lower sides and fitted with a spring hinge, so that it can be turned up to lie flat against the back of the seat in order to allow a passenger to lie down at full length on the seat.

Folding Curtain Rod Bracket. 15, Figs. 2201-2206. See **Curtain Rod Folding Bracket.**

Folding Door. Figs. 1200, 1206-1208. A door made in two or more sections hinged together to close by folding up.

Folding Lavatory. Fig. 3688. A device for the staterooms of sleeping, private and business cars, which can be folded out of the way and out of sight.

Folding Platform Tail Gate. Figs. 4013-4017. A gate for the end door or face plate door of a vestibule.

Folding Wash Stand. Fig. 3688. A lavatory for the staterooms of compartment sleepers.

Follower. A very common abbreviation for a **Follower Plate,** which see.

Follower Bolt. A piston follower bolt. See **Piston.**

Follower Lug. A **Drawbar Stop,** which see.

Follower Plate. See **Drawbar Follower Plate. Piston Follower Plate.** The word "plate" is frequently omitted from these names.

Foot Board. 1. (Freight Cars.) See **Brake Step.**

2. (British.) (Upper and Lower) American equivalent (Street Cars), longitudinal step. Two continuous steps running along the sides of a carriage or brake van, the upper a short distance below the doors and slightly above the level of the highest station platform; the lower about 18 inches from the rail level. They form steps and prevent any person falling between the train and the platform.

Foot Board Bracket. See **Brake Step Bracket.**

Foot Bracket. Figs. 974-976.

Foot Plate (Buhoup 3-Stem Coupler). 655, Figs. 1886-1935. A cast iron wearing plate on the upper side of the passenger platform end rail. In platforms taking vestibules a sliding foot plate is attached to the buffer plate and works or slides back and forth in a foot plate housing.

Foot Plate Bolt (Buhoup 3-Stem Coupler). 660, Figs. 1886-1935.

Foot Plate Housing. 139, Figs. 1886-1935, and 100, Figs. 2215-2263. See above.

Foot Plate Stop (Buhoup 3-Stem Coupler). 665, Figs. 1886-1935.

Foot Rail. A horizontal wooden bar underneath a car seat for the passengers who occupy the next seat to rest their feet on. These fixed foot rails are often called foot rests, but such use is confusing, since the term **Foot Rest,** which see, is applied to many forms of adjustable foot rests. See **Side Foot Rest.**

Foot Rest. Any movable support for the feet of passengers, especially two horizontal wooden bars underneath a car seat, and attached to two iron rockers, called foot rest carriers, pivoted in the center so that it can be adjusted to a comfortable position for the passengers occupying the next seat, or moved out of the way if desired. Another style is an adjustable foot rest sliding in a grooved channel. A portable stuffed carpet foot rest is usually termed an ottoman or hassock.

Foot Rest Carriers. See above.

Foot Rest Rod Bracket. Figs. 3758-3759.

Forefoot Sheave (Steam Shovel). 34, Figs. 596-598. A fixed pulley located below the floor under the boom foot sheave about which the hoisting chain runs before being carried to the hoisting drum.

Foreign Car. Any car not belonging to the particular railway on which it is running, including **Line Cars,** which see. By the established rules for interchange of traffic all such cars are, or are supposed to be, inspected before entering on the lines of a foreign corporation, and "if an accepted foreign car is injured upon a road it shall be repaired by and at the expense of the company in possession thereof as promptly as it repairs its own cars." The cost thereof is sometimes charged to the owner of the car and sometimes not, according to an elaborate system of rules adopted by the M. C. B. Association, revised annually. See **Interchange of Traffic.**

Forney Seats. See **Scarritt Seats.**

Forsyth Buffing Device. Figs. 1975-1981.

Forsyth Curtain Fixtures. Figs. 4665-4671.

Forsyth "Safety" Deck Sash Ratchet. Figs. 4481-4490.

Foundation Brake Gear. The levers, rods, brake beams, etc., by which the piston rod of the brake cylinder is connected to the brake shoes in such a manner that when air pressure forces the piston out the brake shoes are forced against the wheels. See below and **Brake Beam Data.**

Foundation Brake Gear, for Passenger Service (M. C. B. Recommended Practice). In 1903 the schedules for high speed foundation brake gear as shown in Figs. 6028-6176 were adopted as Recommended Practice. In preparing these schedules the following fundamentals of design were adopted:

FUNDAMENTALS.

Following are the fundametals of the design:

Braking power to be 90 per cent. of the light weight of the car.

Equalized pressure in brake cylinder, 60 pounds per square inch.

Maximum pressure in brake cylinder, 85 pounds per square inch.

Maximum stress in levers, 23,000 pounds per square inch.

Maximum stress in rods, except jaws, 15,000 pounds per square inch; no rod to be less than ⅞ inch in diameter.

Maximum stress in jaws, 10,000 pounds per square inch.

Maximum shear on pins, 10,000 pounds per square inch.

Diameter of pins to provide a bearing value not to exceed 23,000 pounds per square inch.

The reduction of stresses in rods, levers and jaws due to friction of the foundation brake, and the reduction of braking power due to the same cause and to the action of release springs should be neglected, because it is considered to be too difficult to determine their value even with a fair degree of accuracy.

SIX-WHEEL TRUCKS.

Schedule "A-1," Figs. 6028-6067, is for cars weighing 80,000 to 100,000 pounds and having six-wheel trucks, and schedule "A" is for cars weighing 100,000 to 137,000 pounds and having six-wheel trucks: the difference between these schedules is

that a 16-inch brake cylinder is to be used for schedule "A" and a 14-inch brake cylinder is to be used for schedule "A-1," otherwise they are the same. The location of the fulcrum hole in the cylinder lever is made to vary by quarters of the inch to suit the weight of the cars, but only one fulcrum hole shall be drilled in each lever.

With schedule "A" there should be used a brake suitable for a load of 28,000 pounds, and with schedule "A-1" there should be used a brake beam suitable for a load of 22,000 pounds imposed at the middle of the beam.

FOUR-WHEEL TRUCKS.

Schedule "B-1," Figs. 6071-6100, is for cars weighing 50,000 to 70,000 pounds and having four-wheel trucks, and schedule "B" is for cars weighing from 70,000 to 90,000 pounds and having four-wheel trucks, the differences between the two being that a 14-inch brake cylinder is to be used with schedule "B," cars weighing 70,000 to 90,000 pounds, and a 12-inch brake cylinder is to be used with schedule "B-1," cars weighing 50,000 to 70,000 pounds; also that with schedule "B" there should be used a brake beam suitable for a load at the middle of 28,000 pounds, the same as for schedule "A," and with schedule "B-1" there should be used a brake beam suitable for a load at the middle of 22,000 pounds, the same as for schedule "A-1."

The proper braking power for the weight of car is obtained by the location of fulcrum hole in the cylinder lever.

Schedule "C," Figs. 6102-6176 was designed for cars weighing 50,000 pounds and less and equipped with four-wheel trucks. A 10-inch brake cylinder is to be used with this schedule and a brake beam suitable for a load at the middle of 15,000 pounds.

DESIGNATION OF RODS AND LEVERS.

On the drawings, the locations of levers and rods are designated by letters; the first letter in the designation distinguishes between body and truck. The second letter distinguishes between the levers and the connections. The figure following the second letter is the distinctive number for the lever or connection; and following this figure is the schedule letter to which the lever or connection belongs. Thus B-C2-B means body connection number two (second from cylinder piston rod), of schedule "B"; also T-L2-B would mean truck lever number two for schedule "B."

STENCILING LIGHT WEIGHT OF CAR.

The committee recommends, that the light-weight of car be stenciled on each car. The cross frame tie, when exposed, furnishes a convenient place on which to show the weight, but when this place is not available some other means should be provided. In addition to this the length of the cylinder end of the cylinder lever should be shown so that no calculation would be necessary to determine the proper cylinder lever for the car.

MARKING LEVERS.

It may be found desirable by some railway companies to mark each lever in a manner to indicate the schedule to which each belongs and the location of each in the brake rigging, and if this is done it is suggested that the marking be the same as indicated on the drawings.

TABLE I.

Schedule Designation.	Light Weights of Cars. (Lbs.)	Type of Truck.	Size of Brake Cylinder.	Maximum Load at Middle of Brake Beam
A.	100,000 to 137,000	6-wheel	16 inches	28,000 lbs.
A-1.	80,000 to 100,000	6-wheel	14 inches	22,000 lbs.
B.	70,000 to 90,000	4-wheel	14 inches	28,000 lbs.
B-1.	50,000 to 70,000	4-wheel	12 inches	22,000 lbs.
C.	50,000 and less	4-wheel	10 inches	15,200 lbs.

There have been brought together in Table I the distinctive data of each schedule so that by referring to the table there can be found quickly the correct schedule for any particular car.

Fount. See **Lamp Fount.**

Fountain Car Washer. Fig. 3847. A car washer which has a stream of water passing through the brush at the will of the operator.

Four-Arm Lamps. Figs. 3208, etc. See **Pintsch Lamps.**

Four-Wheel Trucks. Fig. 4695.

Fox Pressed Steel Car Truck. Figs. 4697, 4714-4716. A truck, the frame of which is wrought and hydraulic forged of steel plate consisting of few pieces which are all riveted together. It is a pedestal truck with journal box springs, and transoms, but no bolster or spring plank.

Frame. 1. The outline or skeleton upon which a structure is built up. In a car the framing is usually supposed to mean the side frame, and distinguished from the floor or underframe, unless otherwise so expressed.

2. (Of a Door, Ventilator, Window Sash Mirror, etc.) The rectangular or curbed border surrounding or inclosing it. See

Berth Spring Frame.	**End Frame.**
Continuous Truck Frame.	**Lever Frame.**
Cushion Frame.	**Match Striker Frame.**
Door Frame.	**Mirror Frame.**

Franklin Institute System of Screw Threads. The **Sellers System of Screw Threads,** which see, is often called the Franklin Institute system because the former was first proposed in a report to, and was recommended by, the Franklin Institute.

Free Air Space (Refrigerator Car Insulation). An air space which has free communication with the outside air so that the air it contains can circulate and be replaced by fresh air.

Freight Car. Figs. 1-83, 262-549. A general term used to designate all kinds of cars which carry goods, merchandise, produce, minerals, etc., to distinguish them from those which carry passengers. British term, wagon. For varieties of freight cars see **Car.**

Freight Car Lock. Fig 1371. A lock for fastening the doors of freight cars. The usual freight car lock is simply a hasp, staple, pin and seal, but stationary or fixed freight car door locks are in increasing use.

Freight Truck. A two-wheeled vehicle, universally used

about stations for loading and unloading freight. A baggage barrow is much the same. Baggage barrows and freight trucks are both sometimes designated as freight or baggage barrow trucks.

Fresnel Lantern. A lamp inclosed in a cylindrical **Fresnel Lens**, which see. They are more used in marine than in railroad service.

Fresnel Lens. A lens formed of concentric rings of glass or other transparent substances, one or both sides of which are bounded by spherical surfaces. The object of making a lens in this form is to reduce its thickness in the center, and thus lessen the liability of having flaws and impurities in the glass, and also to reduce the absorption and aberration of the rays which pass through it. Such lenses are also made of a hollow, cylindrical form, and used to inclose signal lamps. The outside of the glass is formed of successive rings, the external surfaces of which are bounded by spherical surfaces.

What is known to the trade as a semaphore lens is a Fresnel lens with the inner surface concave.

Friction Block. See **Swing Hanger Friction Block** and **Friction Plate.**

Friction Draft Gear. Any form of **Draft Gear**, which see, which makes use of friction for absorbing and dissipating the energy of buffing and tension shocks transmitted through the couplers.

Friction Plate. 1. Fig. 4810. (Passenger Truck.) See **Bolster Chafing Plate.** 2. The body and truck side bearings are sometimes called friction plates. 3. The plate screwed to the wall to protect the wood work from chafing by the seat back arms when the seat back is tilted. See **Chafing Plate.**

Friction Roller. A wheel or pulley interposed between a sliding object and the surface on which it slides to diminish the friction. See **Car Door Hanger, Sliding Door Friction Roller.**

Frieze. That portion of a passenger or street car body on the outside, between the cornice or eaves of the roof and the tops of the windows. The letter board occupies this space.

Frieze Ventilator. See **Ventilator.**

Frieze Ventilator Plate.. A perforated metal plate placed on the outside of a frieze ventilator to exclude rain and cinders from the car.

Front Face Plate (Steel Tired Wheels). See **Face Plate.**

Front Seat Bottom Rail (Street Cars). See **Seat Bottom Rail.**

Frost Dry Carburetor System of Car Lighting. D, Figs. 648-651. The light in this system is produced by burning at the lamps a gas generated in the carburetors, which are placed on top of the car. The gas is simply air carrying a certain amount of gasolene vapor. The air is taken from the air brake system; the gasolene, absorbed by wicking, is contained in the carburetors, and the object of the details of this system is to bring these two elements together and thus produce a gas. The supply of air is taken from the auxiliary reservoir and enters the air tank after passing through the combined dust guard and check valve. This valve frees from dirt the air which passes through it and acts as a check to retain the supply of air stored in the tank at such times as the pressure is withdrawn from the brake system. The air tank also serves as a storage reservoir, and its capacity is such that, when charged to the pressure ordinarily carried in the air brake system, the air contained therein will sustain the lights several hours after the car is detached from the train. A tank valve placed at each end of the tank controls the retention of air. The air pipe conducts the air to the saloon, where the air gage indicates the pressure in the air tank, and the closet valve directly controls the supply of air to the carburetors. From the closet valve the air passes through the regulator, where it is reduced in pressure to 1½ pounds, which pressure is practically constant on all parts of the system beyond this point. The course of the air next taken is through the mercurial check valve and the roof pipe to the carburetors. After entering the carburetors, the air moves slowly through a spiral passage, sixty feet in length, packed solidly with cotton wicking saturated with gasolene, and absorbs sufficient of the volatile oil to produce the desired gas which is consumed by the lamp directly beneath. This system was at one time in general use on the Pennsylvania, Norfolk & Western, and several other prominent roads.

Fruit Car. Figs. 21, 341-344, etc. A car of special design for the carrying of fruit and other perishable products requiring ventilation. The ventilators are so arranged that they can be opened and closed while the car is in motion, so that there may be a constant stream of fresh air passing through the car. Ice is not used generally, but it is used in cars carrying fruits from California to eastern markets.

Fulcrum. "In mechanics, that by which a lever is sustained, or the point about which it moves."—Webster. See **Brake Lever Fulcrum.**

Fulcrum Hanger Carriers. Figs. 4891-4892. A cast bracket which is bolted to the iron transom of a six-wheel truck to carry the brake lever hanger bridge. The brake lever connection rod is sometimes called a brake lever fulcrum, hence the name.

Funnel. 1. "A vessel for conveying fluids into close vessels; a kind of inverted hollow cone with a pipe; a tunnel."—Webster. See **Filling Funnel.**

Furnishings. A term designating the smaller fixtures, hardware, etc., which are usually applied to cars after they shall have left the paint shop. The engravings are very nearly alphabetical in their arrangement and a complete list is given in the index to engravings.

Furniture Car. Figs. 3, 273-276, 287-290. An extra large box car. The dimensions given in the engravings are not unusual. More particularly designed for carrying furniture or other light freight which is bulky.

Furring. Pieces of wood placed in a wall or other positions to nail something to, as a panel or molding. The term is also applied to angle blocks glued or nailed in the inside angles of wood work, where strength and stiffness are required. See **Blocking** and **Furring Brace Blocks.** See **Panel Furring.**

Furring Blocks. 59b, Figs. 645-647. See **Blocking** and above.

Furring Brace Blocks. Blocks of triangular cross section glued in the angles between the sheathing and furring to give it greater stiffness.

Fuse. A wire strip or bar of fusible metal or alloy placed in series with an electric circuit and designed to melt and open the circuit when the current exceeds a predetermined value. It performs a function similar to that of a circuit breaker.

Fuse Box. A support for fuses, containing contacts for readily attaching the same, and usually provided with magnetic blow-out.

Fusee. The cone or conical part of a watch or clock, round which is wound the chain or cord. It is a very ancient mechanical contrivance, and is made of a cone form in order to equalize the power of the spring, the leverage of the cord increasing as the resistance of the spring increases and vice versa. See **Berth Spring Fusee.**

Fusee or **Fuse.** A tube, casing, rope or ribbon filled or saturated with a slow burning composition, as niter, sulphur, etc., and used primarily for firing blasts. They are also made to give warnings to approaching trains. They are carried on a train and dropped or placed upon the track at night to warn other trains following that a train has passed that point within a short time before. Trains meeting a fusee burning on the track are required to stop and wait until it has burned out.

G

Gage. 1. (Of Track.) The distance in the clear between the heads of the rails of a railway; 4 ft. 8½ in. is the standard gage; if greater than this by more than ½ in., a broad gage; if smaller, a narrow gage. Wide gage usually means a minor and irregular or exceptional enlargement of a given fixed gage, in distinction from tight gage, a corresponding contraction.

2. A tool or instrument used as a standard of measurement of pressure or size. See

Air Gage.	**Screw Pitch Gage.**
Cylindrical Gage.	**Screw Thread Gage.**
Pressure Gage.	**Whitworth Gage,** etc.
Screw Gage.	

Gage for Worn Couplers (M. C. B. Standard). In 1899 the coupler committee recommended a form of gage to define the contour lines more fully when worn. This gage was adopted as Recommended Practice. In 1904, the committee on M. C. B. couplers recommended a modification of the wheel defect gage, which would make a more satisfactory worn coupler limit gage. This was adopted as Recommended Practice by letter ballot. Further modified in 1905 and adopted as Standard. See Fig. 5573.

Gagger. A **Chaplet,** which see.

Gain. "In architecture, a beveling shoulder, a lapping of timbers, or the cut that is made for receiving a timber."—Webster. In car work the term generally means a notching of one piece of timber into another. Boxing is almost a synonymous term. The timbers are boxed out in order to gain them into each other. A **Mortise,** which see, is usually deeper and does not extend clear across the stick.

Galvanized Iron. Sheet iron covered with sal ammoniac, after first cleaning it in a bath of dilute acid and then coated with zinc by immersing it in a bath of the liquid metal. An amalgam of 11.5 zinc and 1 mercury is sometimes used. It is usually made in sheets about 2 feet wide by 6 to 9 feet long, and its thickness is measured by its number, wire gage (W. G.). See **Kalamined Iron.**

Ganet Air Brake. A system of air brakes for electric and cable cars, in which the air is compressed by a compressor operated from the axle of the car by an eccentric. The apparatus includes (1) an air pump, or compressor to furnish the compressed air; (2) an eccentric and connecting rod to work the piston of the air compressor; (3) a controlling valve, by which the brakes are applied and released; (4) a jam cylinder, or brake cylinder, to move the brake levers; (5) a main reservoir, and (6) an auxiliary reservoir.

Garnish Rail (British). A horizontal piece of ornamental wood curved on the upper surface and placed on the inner side of the mouth of the slot into which the movable window falls. It carries the **Glass String Roller,** which see.

Gas Arm. A **Gas Way Tube,** which see.

Gas Broiler and Utensils. Figs. 3626-3632. A small cook stove heated by Pintsch gas for use on parlor and sleeping cars in preparing light meals.

Gas Burner. Fig. 3098. "The jet piece of a gas lighting apparatus, at which the gas issues and combustion takes place."—Knight. A system of gas burning has been in use on the Pennsylvania Railroad by compressing ordinary city gas. Another and more elaborate system is the **Pintsch,** which see, Figs. 2875-3059. Acetylene gas is now being successfully employed in train lighting.

Gas Lamps. See **Pintsch Lamps.**

Gas Pipe. See **Pipe.**

Gas Pipe Fittings. Fig. 3052. See **Pipe Fittings.**

Gas-Way (Pintsch Lamp). 327, Figs. 3208-3224.

Gas-Way Tube (Pintsch Lamp). 309, Figs. 3208-3224.

Gasket. Figs. 3003-3006. A thin sheet of rubber, cloth or sheet metal put in a joint between two pieces of metal to prevent leakage.

Gasolene Motor Car. 206, 6261-6263.

Gate. 1. See **Platform Gate.**

2. (Of a Casting Mold.) The opening through which the melted metal is poured. Also called ingate.

Gauze. See **Wire Gauze.**

Gear. 1. In mechanics the term is used to designate a combination of appliances for effecting some result as valve gear. See **Brake Gear, Draw Gear, Swing Motion Gear.**

2. Wheels are said to be in gear when they have cogs interlocking.

Gear Wheel. 5. Figs. 6207-6209. Any cogged wheel is a gear wheel, but the term is usually restricted to the larger one of two cog wheels in gear, the lesser one being called the pinion. The gear wheel is also called a spur wheel.

Gelatinized Fiber. Another name for **Vulcanized Fiber,** which see.

Gem Door Spring. Fig. 2647.

General Electric Air Brake Apparatus. Figs. 1295-1314. A system of air brakes for electric street and interurban cars differing only in minor details from the Westinghouse air brake.

General Electric Company's Electric Motor (for Street Cars). Fig. 6318.

General Service Car.

Generator (Electric Car Lighting). See **Dynamo.**

Generator Coils (Heaters, Baker's, Gold's, etc.). Figs. 2688, 2710, 2723. Wrought iron pipe coiled into a variety of spiral shapes, as shown in the figures, and put into the fire pot of a heater, to heat the water they contain and create a circulation through the hot water pipes of the car. Among the different types is the expanding generator coil, Fig. 2722, in which the diameter of the pipe increases as the heated water ascends in it.

Generator Regulator. An automatic electrical device for controlling the action or output of the axle driven generator. As it is desirable to arrange the generator to become operative or generate its full voltage at a low speed, provision must be made for

taking care of the output of the generator when it runs at very high speed. Generator regulators are generally designed to control the field of the axle generator, weakening it at high speeds and strengthening it at low speeds. They are made in various ways, the three principal types being rheostatic type; contacting type and counter electro motive force type. The rheostatic type consists of a rheostat of some form in the shunt field circuit of the generator. The resistance of this rheostat is generally varied by means of some motive power device such as a solenoid or small motor. The action of the motive power device is controlled by the electrical conditions that obtain in the system. The contacting type employs a fixed resistance in the field circuit of the generator, which is intermittently cut in and out, depending upon the conditions. In fact, such a regulator acts substantially like a rheostatic device and accomplishes the same purpose. The counter electro motive force type consists of a small motor-driven generator which generates counter electro motive force or back pressure in the field circuit of the main generator. The counter electro motive force is controlled in the same manner as the operating device of the rheostatic or contacting types of regulator and it accomplishes the same end.

Gib (for Journal Bearings). A **Journal Bearing Key,** which see.

Gib and Key. A fastening to connect a bar and strap together by a slot common to both, in which an E-shaped gib with a beveled back is first inserted and then driven fast by a taper key.

Gibbs Berth Lamp. Figs. 4385-4388.

Gibson Tire Fastening. Figs. 5389-5399. One of the earliest applications of the principle of securing a tire to a wheel by means of clips instead of bolts, studs or rivets.

Gilman-Brown Emergency Knuckle. Fig. 1797. A knuckle designed to be used in cases where loss or breakage of the lock or knuckle would cause delay. The knuckle has a long tail, which projects back through the head and bears against the walls of the shank. It may be inserted for temporary use in almost any make of coupler.

Gimlet Pointed Screw. The common **Wood Screw,** which see, of carpentry and joiner work, having its screw cut to a point like a gimlet, so that it can force its own way into wood.

Girder. "In architecture, the principal piece of timber in a floor. Its ends are usually framed into the summers, or breast summers, and the joists are framed into it at one end. In buildings entirely of timber the girder is fastened by tenons into the posts."—Webster.

"The term girder is restricted to beams subject to transverse strain, and exerting a vertical pressure merely on their points of support."—Stoney. The term is almost synonymous with truss. Thus, engineers speak of a "Howe truss," a "Pratt truss," a "Warren girder" and a "lattice girder." The distinction is that a truss consists of separate parts held together by pins, or even simply by pressure, which may be taken down and re-erected; whereas a girder is a single solid structure, either all one solid piece (rolled girder), or of plates riveted together (plate girder), or of combined plates and riveted lattice work (lattice girder).

Girth. 49, Figs. 262-272. A belt rail. A long horizontal piece of wood on the side of a box car body fitted to the posts and braces so as to embrace them, placed about half way between the floor and the roof. The end girth is a similar stick across the end of the car. The inside lining reaches up to the girth.

Girth Tie Rod. A **Belt Rail Tie Rod,** which see. A horizontal iron rod extending from the door post to the corner post along the girth of a freight car and intended to tie the two posts together.

Gland. A cover of a stuffing box, as for a piston rod, etc. See **Stuffing Box.**

Glass. See **Window Glass, Cut Glass, Sand Blast.**

Glass String or **Glass Strap** (British). A leather strap by which the window in the door of a carriage is raised or lowered. The strap is pierced with a number of holes, which fit a small brass or ivory knob placed on the door immediately under the **Glass String Roller,** which see.

Glass String Roller (British). in a carriage, an ornamental roller attached to the upper edge of the garnish rail in a door. The leather strap (glass string) by which the window is raised and lowered passes over this roller.

Glass Water Gage. A gage consisting essentially of a vertical glass tube connected at the top and bottom with a boiler so as to make the height of water therein visible.

Globe (of Pintsch Gas Lamp). Fig. 3140, etc. A globe of hemispherical form, admitting air only from the top. It is an almost universal type of car lamp globe in Europe.

A glass bowl. See **Lamp Globe.**

Globe Chimney. Fig. 3568. A **Lamp Globe Chimney,** which see.

Globe Holder. 7, Figs. 3585-3601. Any contrivance for holding a globe on a lamp. Usually it consists of a metal ring at the base of the globe, on which the latter rests, and to which it is fastened with springs, screws, or by the pressure of the globe chimney on top, when the latter is adjustable.

"Globe" Lamp Shade. See **Lamp Shade.**

Globe Valve (Car Heating). Figs. 2963-2965.

"Globe" Ventilator. Figs. 3326, 4430-4433. A ventilator of spherical form, with annular openings which produce an induced exhaust current in whatever direction a current of air strikes against it. They are made erect and horizontal.

Glue. A preparation from the hoofs, horns and hides of animals, washed in lime water, boiled, skimmed, strained, evaporated, cooled in molds, cut into slices and dried upon nets. If good, it is a hard cake, of a dark but almost transparent color, free from black or cloudy spots and with little or no smell. Inferior glue made from bones will almost entirely dissolve in cold water; other kinds are contaminated with lime. Glue is better for re-melting. The strength of glue for common work is increased by adding a little common chalk.

Glue Size. One pound of glue in a gallon of water. Double size has about twice this quantity of glue. Patent size is a kind of gelatine.

Gold's System of Car Heating. Figs. 2784-2789. Several systems of car heating, designated as the direct steam system; storage system; hot water circulation system. The special parts such as traps, temperature regulator, coupler, train pipe valves, etc., are shown in Figs. 2790-2877. Electric heaters and switches are shown in Figs. 3013-3041.

Gold's Universal Straight Port Steam Coupler. Figs. 2790-2792, 2798.

Gondola Car. Figs. 35-56, 376-427. A car with sides, but without a top covering, for the transportation of freight in bulk. They are sometimes distinguished as high side and low side, drop bottom and hopper bottom. Cars with inclined floors and entirely self-clearing are more properly called **Hopper Cars**, which see. Gondola cars are sometimes made with drop ends for loading lumber.

Gong. A **Signal Bell**, which see.

Goodman Wrecking Hook. Figs. 1775-1776.

Goodwin Car. Figs. 92, 536-542. A center and side dumping car used for the transportation of all classes of bulk freight. The Class G car, shown in Figs. 536-538, is operated by compressed air and the aprons are arranged so that the load may be dumped fast or slow over any part of the track. The Class P P C, Figs. 539-541, and Class S P, Fig. 542, cars for coal and ore are dumped by hand winches and not by compressed air.

Goods Wagon (British). Figs. 6541-6544. American equivalent, freight car. The general name for vehicles used in transporting merchandise, as distinguished from a passenger carriage.

Gould Blind End Vestibule and Draft Gear. A modification of the vestibule for passenger cars to suit blind-end baggage and express cars. The buffer springs are placed back of the end sill of the car, no platform end sill being used.

Gould Buffer and Platform. Figs. 2059-2067. A platform, draft gear and buffer for passenger cars using a three-stem buffer. Largely used on the Vanderbilt lines.

Gould Car Coupler (Freight). Fig. 1593. (Pasenger.) Figs. 1828-1829.

Gould Draft Gear (Freight). Figs. 1546-1563. (Passenger.) Figs. 2059-2074.

Gould Drawbar Centering Device. Figs. 2085-2086.

Gould Electric Car Lighting Apparatus. Fig 3443. A system of car lighting from electricity generated by a dynamo connected by a belt to the axle. The dynamo has connected to it an automatic governor switch which throws the current into the system when the predetermined speed is reached and which controls the voltage output as the speed increases. When the lights are not turned on and the car is running, the current generated is used to charge the storage batteries, from which current is taken when the car is at rest. The current is deflected from the lamps or batteries without noticeable flickering. The whole system is controlled automatically and requires little attention.

Gould Friction Draft Gear. Figs. 2059-2072.

Gould Journal Box. Figs. 5280-5281.

Gould Platform. See **Gould Buffer and Platform.**

Gould Spring Buffer. (Passenger.) Figs. 2073-2074. A yielding buffer block attached to the end sill of freight or stub-end express cars.

Gould Vestibule. Figs. 2059-2066, and 2294-2296.

Governor (Air Brake). Figs. 1241-1247, 1298-1299. See **Electric Pump Governor.**

Grab Irons. 60, Figs. 262-272, etc. Also termed corner handles, or ladder handles, and hand holds. The handles attached to freight cars for the use of trainmen in boarding the cars. They are often more definitely specified as roof, side or end grab iron.

For Standard of M. C. B. Association with regard to hand holds or grab irons see **Protection of Trainmen.**

The grab irons or hand holds shown in Fig. 5637 are in the positions recommended.

The term handle, though often used to designate these attachments, is not strictly appropriate to such a part, nor is it so widely in use as grab iron. Similar parts on passenger cars are called **Hand Rails**, which see.

Graduated Spring. Figs. 5378-5379. A form of compound spring in which only a certain number of the individual spirals come into action with a light load and the others only under a heavy load. Another method of accomplishing the same end, graduating the resistance of the spring to the load placed upon it, is the use of the keg-shaped or spool-shaped spring. Under a load the part of larger diameter closes first and that of smaller diameter is much stiffer. Graduated springs have formerly been constructed by combining rubber and spiral springs, but they are now out of use. Graduated springs have been superseded by single and double nest coil springs of equal length, and few, if any, are being applied to new construction.

Graduating Spring (Triple Valve). 22, Fig. 1233. A spiral spring which acts against a collar on the graduating stem to restrain the triple valve piston from moving beyond service position when a gradual brake pipe reduction is made, but which is compressed by the piston when a sudden brake pipe reduction is made.

Graduating Stem (Triple Valve). 21, Fig. 1233. See **Graduating Spring.**

Graduating Stem Nut (Triple Valve). 20, Fig. 1233.

Graduating Valve (Triple Valve). A device attached to the piston stem by a pin and its movements are controlled by the piston. Its office is to open and close the service port in the slide valve, feeding air from the auxiliary reservoir to the brake cylinder when a service application of the brakes is made.

Graduating Valve (Car Heating). Figs. 2885, 2888, 2970-2971. A valve constructed so as to open slowly and designed to give better regulation of the temperature of the car after a car is heated.

Grain Car. A box car with tight inside grain doors. Nearly all box cars are provided with them.

Grain Door. Fig. 1402. A close fitting movable door on the inside of a box car by which the lower part of the door opening is closed when the car is loaded with grain, to prevent the latter from leaking out. Such doors are usually made so that they can be thrown over on one side of the doorway or suspended from the roof, and thus be out of the way when they are not used.

Grain Door Flap. The upper part of a grain door. Hinged horizontally with the door proper.

Grain Door Rod. K, Fig. 1402. An iron rod attached to the door posts on the inside of a box car, to which a grain door is fastened or hinged. The door and rod are generally arranged so that the former can be moved to one side and out of the way when the car is not loaded with grain. In other styles the door slides upon the rod to the roof and is there suspended.

Grate (Baker Heater). Fig. 2690. A frame of iron bars for holding coals in a stove, fireplace, etc. It is usually capable of a sliding or rocking motion, or both, to clear away ashes and clinkers.

Grate Shaker (Baker Heater). Fig. 2689. An iron bar which can be attached to a grate to move it in shaking the fire.

Grate Support (Baker Heater). Fig. 2692. A crowfoot-

shaped bracket, fastened to the sides of the ash pit to carry the fire grate.

Grated Door. 61, Figs. 341-344. A door consisting of a wooden frame with iron or wooden bars, used on cars for carrying fruit, live stock, etc.

Grating. A perforated or slatted covering for an opening. See

Ice Box Grating (Refrigerator Cars).	**Ventilator Grating** (Fruit Car).
Clinker Grating.	**Window Grating.**

Gravel Car. A car for carrying gravel; usually either a dump car or a flat car, the latter most used. They are often fitted with a central rail, over which a ballast plow, drawn by the locomotive after detaching it from the cars, works to unload the cars. Sometimes a hoisting plant is mounted upon one of the cars, for moving the plow.

Gravity Relief Trap (Gold's Steam Coupler). Figs. 2795-2797. An auxiliary trap, automatic in its action, which is closed by the escape of steam and held closed by the steam pressure. When the pressure is removed the weight of the valve stem tips the valve and allows the escape of the water of condensation. The pressure under which it closes is dependent on the weight of the valve stem.

Grease Axle Box (British). Figs. 6760-6767. An axle box which is lubricated from above by a grease composed of tallow, soda, and water, which is solid at ordinary temperatures and melts should the box get warm. This form is being superseded by the **Oil Axle Box,** which see.

Grease Box. A **Journal Box,** which see.

Grease Chamber (British). A cavity above the journal bearing which contains the lubricating material in a **Grease Axle Box,** which see.

Greenlee Bros. Woodworking Machinery. Figs. 6808-6821.

Griffin Chilled Cast Iron Car Wheels. Fig. 5460.

Grille (Interior Decoration). Fig. 3791. Generally a piece of wrought work in wood or metal for decoration. Used in the place of panels, over doorways and in bulkheads and sometimes employed as brackets.

Grip Nuts. Figs. 3850-3852.

Grommet. 33, Figs. 2655. "A ring formed with spliced rope (Nautical)." The separate parts of any metallic eyelet are known as grommets. The two grommets, when compressed together (with a setting die), form the eyelet.

Ground Glass. Glass the surface of which has been roughened by mechanical or chemical process so as to break up the light passing through it and destroy its transparency. Several processes exist; by the wheel, sand blast, rotating with pebbles, or by fluoric acid. The sand blast is at present most commonly used.

Group Spring. A spiral car spring formed of a number of separate springs, single or nested, united together by a common pair of spring plates. It is called a double, or two-group, a three-group, four-group spring, etc., according to the number of separate springs.

Guard. 1. That which protects. See

Dash Guard.	**Fender Guard.**
Door Guard.	**Heat Guard.**
Draw Timber Guard.	**Mirror Guard.**
Dust Guard.	**Window Guard.**

2. (British.) American equivalent, conductor. A railway official traveling with and having charge of a railway train. He unites the functions of a conductor, baggage master, express agent, and brakeman, but seldom collects or nips tickets, and never issues them or receives fares. An assistant guard is sometimes, but not always, carried.

3. (For Lanterns.) The exterior wire cover surrounding the globe and protecting it from accident. They are termed either single, double, or triple guard, according to the number of horizontal wires.

Guard Lining Strips. Horizontal bars or strips which are placed in a car to keep freight from a door, ice box, ventilator, etc. When placed vertically, as they usually are, they are termed guard posts.

Guard Posts (Fruit Car). A row of posts standing inside of the ventilators and serving as a fender for the load packed within so as to prevent obstruction to the ventilators.

Guard Rail and Frog Wing Gage. Fig. 5601. The guard rail and frog wing gage shown were adopted as standard in 1894, to define the dimensions of track to which M. C. B. standard wheel and flange gages gave been made to conform. Modified in 1907.

Guard's Van (British). Fig. 6512. Nearest American equivalent, baggage car. See **Brake Van.**

Gudgeon. The bearing portion of a shaft, especially an upright wooden shaft. A rude journal bearing for slow motion. See **Screw Coupling Nut and Gudgeon.**

Guide. "That which leads or conducts."—Webster. See

Bell Cord Guide.	**Drawbar Guide.**
Bell Strap Guide.	**Glass Plate Guide.**
Brake Lever Guide.	**Journal Box Guide.**
Brake Rod Guide.	**Stop Bar Guide.**
Dead Lever Guide.	**Strap Hanger Guide.**

Guide Bar. 1. See **Bolster Guide Bar** or **Column.**

Guide Bracket. Figs. 795-797. See **Door Guide Bracket.**

Guide Casting. A strip or plate or metal screwed to the wall or arm rest of a seat for the striker arms to rub against to save the wood. Called also a **Friction Plate,** which see.

Guide Rail. A **Door Track,** which see.

Gun Shaped Lamp Chimney. Fig. 3575. See **Lamp Chimney.**

Gurring Piece (Snow Plow). Probably from gurr, a fort, hence a piece built out to protect or fortify a structure. In a snow plow, timbers bolted to the posts to build out and give shape to the sides.

Gusset Plate. 192, Figs. 262-272, etc. A flat plate used to rivet two parts of a metal underframe together by riveting through each member and the plate or to stiffen a joint between two pieces which are riveted together by angle plates, in which case the gusset plate is riveted to the flanges of the adjoining pieces.

Guy. A rope used as a stay.

Guy Rings (of a Derrick or Crane). Rings attached to the head block at the top of the mast to which guy ropes may be attached.

H

Hair. See **Curled Hair.**

Hair Felt (Refrigerator Car). D, Figs. 305-321. A heavy non-conductor of heat made of hair placed between the inner and outer linings to prevent absorption of heat.

Hale & Kilburn Car Seats and Upholstery. Figs. 4093-4111, 4166-4179.

Half Elliptic Spring. See **Spring, Elliptic Spring.**

Hammer (Pile Driver Car). The heavy weight (4,000 to 4,500 lbs.) by which piles are driven. It falls between the leaders and is provided with a hammer eye or clevis, to which the shears of the hoisting rope or hammer rope are attached. In Great Britain called a tup.

Hammock (Sleeping Car Berth.) 52. Figs. 2201-2202. A light small hammock of twine, in which to put wearing apparel in a sleeping car berth. One is furnished to each berth.

Hand Car. Figs. 6193, 6196, 6203, etc. A small and light car arranged with cranks or levers and gearing so that it can be propelled by hand by persons riding on the car. One of these cars is provided for each section of 3 to 6 miles of track. Hand cars for regular section service weigh from 450 to 600 lbs., generally about 500 lbs.

Hand Car Lever or **Propelling Lever.** 19. Figs. 6207-6209.

Hand Car Truss Rod. 26. Figs. 6207-6209. A transverse or longitudinal rod by which the floor frame of a hand car is trussed.

Hand Car Wheel. A light wheel for hand cars, with cast iron rim and hub and wrought iron spokes, or with a wooden center or made of one piece of pressed steel as Figs. 6215-6217.

Hand Holds (M. C. B. Standard). Figs. 877-878, 5637. See **Grab Irons**, also **Protection of Trainmen.**

Hand Brake Connection. Figs. 873-874.

Hand Pole (Street Cars). A wooden rod carried on hand rail of box and stock cars.
which pole are hung hand pole straps for people to cling to, who are required to stand. See **Pole Straps.**

Hand Rail. 1. A bar or rail to take hold of with the hand, as the body hand rail of passenger car platforms, door hand rail, inside hand rail and step hand rail of street cars, and roof hand rail or brake hand rail of box and stock cars.

2. (Tank Cars.) 121. Figs, 545-549. An iron pipe supported on hand rail posts on the outside of the running board, for trainmen to hold on to in passing over cars.

Hand Rail Brace (Freight Car Roofs). See **Roof Hand Rail.**

Hand Rail Bracket (Postal Cars). Fig. 3769.

Hand Rail Post (Tank Car). 122, Figs. 545-549. A vertical support for the **Hand Rail**, which see. They are usually bolted to the side sills.

Hand Straps (Street and Suburban Cars). Fig. 3777. Straps attached to the inside hand rail for passengers to hold on by. Generally made in the form of a double loop.

Hand Wheel. A **Brake Wheel**, which see.

Handle. "That part of anything by which it is held in the hand. A haft. As the handle of a knife or other instrument."—Worcester. They are designated by the name of the part or thing to which they are a handle, as ash pit door handle, etc.

Handle Clamp Bolt (Motorman's Brake Valve). 8. Figs. 1225-1226.

Handle Latch Spring (Motorman's Brake Valve). 13. Figs. 1225-1226. A spring carrying a latch or dog to hold the handle in any desired position.

Hanger. 1. "That by which a thing is suspended."—Webster.

2. "A means for supporting shafting of machinery."—Knight. See

Bell Cord Hanger.	Push Rod Hanger.
Berth Curtain Rod Hanger.	Rocker Bearing Timber Hanger.
Brake Beam Adjusting Hanger.	Safety Hanger.
Brake Hanger.	Spring Hanger.
Door Hanger.	Step Hanger.
Link Hanger.	Strap Hanger.
Parallel Brake Hanger.	Swing Hanger.
Pipe Hanger.	Swing Link Hanger.
	T Hanger.

Hanger Link. A **Swing Hanger**, which see.

Hanging Boards or **Meat Timbers** (Refrigerator Car). Transverse bars, resting usually on bogus plates, to which the load of meat is suspended from hooks.

Hanging Door Sheave. Fig. 2655. See **Car Door-Hanger.**

Hard Hair. A quality of curled hair which is very stiff or rigid. See **Curled Hair.**

Harrison Dust Guard. Fig. 5322.

Harrison Lubricator. Fig. 5315.

Hart Convertible Car. Fig. 88. A car which can readily be converted from a standard gondola car with flat bottom to a center dumping hopper car for ballast or a car with hinged sides for use with an unloading plow.

Hart Deck Sash Pivot and Ratchet Catch. A device for regulating the opening of deck sashes, the special feature of which is the undulating rack, enabling the sash to be easily moved by the hands and yet holding it fixed when released in any one of several different positions.

Hartshorn Shade Roller. Fig. 4681. See **Shade Roller.** An ingenious device to hold window shades at any desired point by means of centrifugal pawls which fly out and do not check the revolution of the roller while in rapid motion, but engage with and hold it at any point otherwise. The McKay shade roller is somewhat similar, but uses a cam instead of a pawl.

Harvey Friction Draft Spring. Figs. 1468-1469.

Hasp. The bar which fits over a staple and is fastened thereon by passing the shackle of a padlock through the staple, or by a pin. The other end of the hasp is attached by a pin or another staple to the door. See **Door Hasp, Head Board Coupling Hasp, Shackle.**

Hat Hook. Fig. 3808, etc. A metal hook for hanging hats on.

Hat Post. Fig. 3831, etc. An upright metal pin for hanging hats on. These are used chiefly in sleeping and parlor cars, and they are invariably combined with a hook and technically called hat post and hook.

Hat Rack. A **Basket Rack**, which see.

Hay Car. A box car for carrying baled hay; usually made with larger bodies and doors than ordinary box freight cars.

Head. See

Brake Head.	Draw Head.
Buffer Head.	Drawbar Head.
Cylinder Head.	Piston Head.
Dome Head.	Tank Head.

Head Block. 1. (Of a Derrick or Crane.) The casting carried at the top of the mast to which the boom hoe rods, tension rods and guy rings, etc., are attached. It usually revolves upon a head block pin.

2. (Of a Switch.) The long timber to which the switch stand or its equivalent is fastened, and on which the ends of the switch rails bear.

3. See **Tank Head Block.**

Head Board. 9, Figs. 2201-2202. A light partition which separates one berth in a sleeping car from that next to it. It is stowed away by day in the pocket between the upper berth, when closed up, and the roof. It is secured in place at the back and front by head board bolts entering at the back into a bushing, fixed to the top of the stationary seat back and along the upper inside edge by a head board coupling, entering into a head board coupling keeper. The head board bolt for the front corner of the head board is of peculiar construction, designed to avoid all interruption of a flush surface by day, while still giving a secure attachment.

Head Board Bolt. Figs. 4335, 4341-4342, etc.; 54, Figs. 2201-2202. See above.

Hat Board Bolt Bushing. Figs. 4332-4334. See above.

Head Board Coupling. Figs. 4337-4338. A metal hasp and keeper by which a head board is fastened to the side of the car.

Head Board Coupling Hasp. See above.

Head Board Coupling Keeper. Fig. 4002. See above.

Head Board Fastener. Figs. 4338-4339.

Head Board Pocket. 32, Figs. 2201-2203. A pocket which closes up flush with the head board surface, but opens at night, by releasing a head board rack catch so as to afford a receptacle for clothing or parcels. This form of head board pocket has been superseded by a pocket made by folding up the upholstered head rest, as shown in 32, Fig. 2201.

Head End System. A system of electrically lighting a complete railway train from a single generating plant, located either on the locomotive, tender or on one of the cars of the train. Head end generators may be steam or axle-driven. If located on the locomotive, they are driven by steam. If located on the tender or on one of the cars, they may be axle-driven or steam-driven. Axle-driven head end generators must be automatically regulated, and steam-driven generators should be automatically regulated, although very little attention is, as a rule, given to the subject of regulation. The head end generator is connected to the train line system of the train by a suitable set of connections, and current is supplied to each car through the taps to the train lines. In the head end system it is not essential to equip each car with a storage battery, although it is generally advisable, for when so equipped the train can be broken up and separated into its units without destroying the continuity of the light on any car.

Head Lining. A painted canvas or prepared lining with which the ceilings of passenger cars are covered. The painting on head linings is intended to be of an ornamental character. When of wood the head lining is called ceiling. The duck for head lining comes in any width up to 12 feet. Head lining is sometimes cut up into panels, but a paneled ceiling is usually understood to be a wood ceiling, which is largely supplanting canvas head linings.

Head Lining Nail. A nail with a large button-shaped head especially made for fastening head linings to the ceilings of cars.

Head Piece (Street Cars). A body end plate.

Head Rest. 32, Figs. 2201-2202. In a first class carriage and sleeping car a fixed vertical projection from the back of the seat, thickly padded with horse hair and covered with broadcloth or leather. It serves to support the side or back of the head of a passenger. That at the end of the seat is a head rest, but it is also called a seat head end or end head rest, 14 Figs. 2201-2202.

Head Roll (of a Seat). Fig. 4107. A padded projection at the top of a seat or chair back, which is to support the head. It is cylindrical and extends the full width of the seat.

Headstock (British). American equivalent, end sill. The transverse end member of the **Underframe**, which see. It is pierced transversely in the center for the drawgear, and the buffing gear is carried near the ends.

Headstock and Diagonal Knee (British). A wrought iron knee connecting the head stock to the diagonal and the sole bar, and thus binding three of the four main members of the underframe together.

Headstock Cap (British). A cast iron cap fitting the end of the headstock in order to prevent its splitting, and to prevent any access of water to the end grain of the wood. A wrought iron strap is sometimes used.

Heat Guard. A sheet metal covering for the woodwork of a passenger car, to protect it from the heat of a stove. It is nailed to the side and ends of the car, and sometimes surrounds the stove, as the conical Russia iron guard of the Baker heater.

Heater. 1. Figs. 2676-2783. Any apparatus for warming a car, room, or building by convection; that is, by conveying hot water, steam, or warmed air into or through the apartments. The term generally refers to any arrangements for warming apartments other than stoves, which heat by direct radiation. There have been many varieties in use, but the one remaining and which has the field practically to itself is the Baker heater. There are numerous heating systems, but they, for the most part, use Baker heaters in connection with their apparatus. Nearly all the systems use heaters which circulate hot water. They are usually placed in a small closet called the heater room. In emigrant cars cook stoves are used for heating.

2. (For Lamps or Lanterns.) A metallic attachment passing around and above the flame or otherwise immediately adjacent to it, by which heat is conveyed to the oil in the reservoir below, to prevent freezing, or, in some cases to assist combustion by heating or volatilizing the oil.

Heater Car. One constructed for carrying fruits, vegetables, and other perishable products in winter. They are heated by special forms of mineral oil lamps, the supply to which is automatically controlled by the expansion and contraction of metallic rods. They are principally in use for the transportation of potatoes and other vegetables.

Heater Coil. Fig. 2742. A **Generator Coil**, which see.

Heater Pipe Casing. Q, Fig. 2204. A wooden or iron shelf over a heater pipe in a passenger car to prevent the feet of passengers from coming in contact with the hot pipes. The casing also forms a foot rest.

Heater Room. A small closet, cased with sheet metal interior heat guards, to contain the heater and prevent all direct radiation. All heaters proper are placed in some equivalent for such rooms.

Height of Couplers (M. C. B. Standard). The standard height of couplers for passenger equipment cars is 35 inches from top of rail when car is light. Adopted in 1890.

The standard height of couplers for freight cars, measured perpendicularly from the level of the tops of rails to center of couplers, adopted in 1893, is

34½ inches, with no greater variation allowable than 3 inches, minimum height 31½ inches. By center of coupler is meant the horizontal line through the center of the coupler shank.

Helper. A term used to designate either an assistant engine for trains, or a horse to help street cars up grades.

Hercules Brake Beam. Figs. 5120-5125, 5190.

Heywood Bros. & Wakefield Car Seats. Fig. 4113, etc

High Back Seat. Fig. 4107, etc. A class of seats with extra high back and frequently a head roll or head rest.

High Side Gondola Car. Figs. 51, 57. A gondola car with extra high sides and ends for carrying coal or minerals.

High-Seated Wagon (British). Fig. 6545. A four-wheeled gondola car, with sides about 4 feet high. Used chiefly for bulky freight, wheat, potatoes, sacks and bales. See **Wagon.**

High Speed Brake (Westinghouse). Figs. 1216-1218. Brake attachments essentially the same as the ordinary quick acting brake, with a pressure reducing valve, Fig. 1250. The auxiliary reservoir pressure is increased from 70 lbs. to 110 lbs. and on emergency applications a pressure of about 85 lbs. is obtained in the brake cylinder. This high pressure is slowly bled off through the reducing valve to 60 lbs. when subsequent operations of release and recharging take place, as in the ordinary quick acting brake. For cars not equipped with reducing valves a safety valve, Fig. 1256, is required.

Hillman Lock Turnbuckle. Fig. 3859.

Hinge. Fig. 2442. "A hook or joint on which a door, gate, etc., turns."—Webster. They are provided with a tube-like knuckle through which the **Hinge Pin,** which see, passes. See

Ball-Bearing Butt Hinge.	Drop Door Hinge.
Butt Hinge.	Manhole Hinge.
Door Hinge.	Seat Hinge.
Double Acting Hinge.	Sofa Hinge.
	Stop Bar Hinge.

The common door hinge is usually a butt or butt hinge, the varieties of which are the acorn butt, a large ornamental hinge, **Blake Butt,** which see, and the hopper butt, so called from its pointed form. The parliament hinge is a sort of T-shaped butt hinge to afford more room for screws. It is little used except for ornamental purposes. The strap hinge is a common form of rough hinge for heavy doors, but it is sometimes made very elaborate and ornamental, Fig. 2458. A T-hinge is a combination of the butt and strap hinge, one-half being of each form. Butt hinges are either fast joint, loose joint or loose pin. A double acting hinge is one which permits the door to swing either way.

Hinge Pin. Fig. 2443, etc. The pin passing through the knuckle of a hinge and holding the two parts together. A loose joint butt hinge has the pin fast in the lower half of the knuckle and projecting upward, so that the other half is held on only by gravity. The hinge pin in the best hinges screws into the knuckle.

Hinge Plate Washer (British). A long wrought iron washer taking all the bolts securing the main part of the hinge to the door.

Hinson Draft Gear (Freight). Figs. 1567-1579; (Passenger), Figs. 1982-1990.

Hinson Emergency Knuckle. Fig. 1796.

Hitchcock Combination Hot and Cold Water Faucet. Fig. 3658.

Hodge Brake. An arrangement invented by Nehemiah Hodge, patented in 1849, for operating the brakes on each truck of a car simultaneously, and equalizing the pressure on all the wheels. The brake may have one or two levers on each truck. Underneath the car body are two levers, called Hodge or floating levers, with movable fulcrums in their centers, which are connected together by a rod. One end of each of these levers is connected by a rod and chain to the brake shaft, and the other end of the floating lever is connected by a rod with the long arm of a brake lever on a truck.

Hog Chain "(Shipbuilding). A chain in the nature of a tension rod passing from stern of a vessel, and over posts nearer amidships; designed to prevent the vessel from dropping at the ends."—Knight.

Hence applied to certain forms of trusses in car construction. A hog chain is an inverted truss rod, and usually so called when applied in connection with and in similar form to a body truss rod, the object of a truss rod being to prevent a beam from sinking in the middle, and of a hog chain to prevent sinking at the ends when supported at the middle. Also called an overhang truss rod.

Hog Chain Queen Post. 221, Figs. 599-619. See above. The struts over which the hog chain passes.

Hog Chain Rod (of a Passenger Car). See above. More properly a continuous counterbrace rod or an overhang truss rod.

Hoisting Block (of a Derrick or Crane). The main block at the lower end of the hoisting chains carrying the sheave hook, or hoisting hook, to which the load is attached. See **Block.**

Hoisting Block Clevis. A clevis carried at the top of a hoisting block to which the fixed end of the hoisting chain is attached. In some cases it is attached to a clevis at the upper end of the boom. See **Clevis.**

Hoisting Chain (of a Derrick, Steam Shovel or Crane), 18, Figs. 596-598. The chain attached to the hoisting drum at one end and to the hoisting block or boom clevis at the other, by which the loads are raised.

Hoisting Chain Sheave. A pulley placed in some wrecking cars at the foot of the mast, when the hoisting gear is at some distance from it. The term is equally applicable to the mast sheave and boom sheave at the top of those parts of a derrick, but the latter are generally otherwise distinguished.

Hoisting Drum (Steam Shovel). 20, Figs. 596-598. The barrel about which is wound the chain cable attached to the dipper block.

Hoisting Engine (Steam Shovel). 21, Figs. 596-598. The engine geared to the hoisting drum.

Hoisting Gear (Steam Shovel). 19, Figs. 596-598. The gear wheel on the hoisting drum.

Hoisting Hook. See **Sheave Hook.** See also **Hoisting Block.**

Holder. "Something by which a thing is held."—Webster. A great variety of parts which serve this purpose are so called, as door holder, lamp holder, etc., which take their names from the thing which they hold.

Holder Valve (Pintsch System). Figs. 3048, 3109.

Hollow Chisel Mortiser. See **Mortiser.**

Hollow Piston Rod (Freight and Tender Brakes). A brake cylinder piston rod which is hollow to receive the **Push Rod** or **Push Bar,** which see.

Hollow Spoke Wheel. See **Car Wheel** and **Wheel.**

Hood. 1. See **Platform Hood, Ventilator Hood.** A

roof apron which is attached to both platform roofs and platform hoods is sometimes called a hood.

2. (Heater.) More properly a ventilator or wind scoop. A horizontal tube or covering on the outside of a car, and on top of the cold air pipe, so as to give the latter a T-shape. The air is admitted to the pipe through the ends of the hood, which are covered with wire netting to exclude cinders. It has a valve which is moved by the current of air so as to admit it whichever way the car runs.

3. (For Urinal.) More properly ventilator cap.

Hood Brace (Buhoup Vestibule). 129, Figs. 2215-2263.

Hood Brace Brackets (Buhoup Vestibule.) 125-128, Figs. 2215-2263.

Hood Support (Street Cars). A platform end post.

Hook. See

Bell Cord End Hook.
Berth Catch Hook.
Berth Curtain Hook.
Body Check Chain Hook.
Ceiling Hook.
Check Chain Hook.
Coat and Hat Hook.
Coat Hook.
Coupling Hook.
Door Hook.
Door Latch Hook.
Drawbar Coupling Hook.
Draw Hook.
Hat Hook.
Hat Post and Hook.
Lamp Case Hook.
Pouch Hook.
Seal Hook.
Stake Hook.
Table Hook.
Table Leg Hook.
Truck Check Chain Hook.
Window Curtain Hook.

Hoop (for Oil Lamps). A ferrule with an interior thread into which the burner screws.

Hoopstick (British). See **Roofstick.**

Hopper. 1. (Passenger Cars.) Fig. 4054. A closet hopper, water, or soil hopper.

2. (Freight Cars.) See **Hopper Bottom Car.**

Hopper-Bottom Gondola Car. Figs. 57-58, 456-462. A car having one or more hoppers built in the floor which slope toward the center from all sides and which are closed by hopper doors. Most of the load can be discharged by gravity on opening the doors. Distinguished from **Hopper Cars,** which see, by the fact that at least a part of the floor is level whereas in a hopper car the floor slopes toward the center for its entire length and all the load can be discharged by gravity. See **Gondola Car, Drop-Bottom Gondola Car.**

Hopper Butt Hinge. Fig. 2456. A hinge so named from its pointed form.

Hopper Car. Figs. 67-70, 463-512. A car with the floor sloping from the ends and sides to one or more hoppers in the center and which will discharge its entire load by gravity through the hopper doors.

Hopper Carry Irons. A **Hopper Supporting Strap,** which see.

Hopper Chain. See **Drop Door Chain.**

Hopper Door (Hopper Cars). 61, Figs. 474-500. See **Drop Door.**

Hopper Door Locking Pawl. 106, Figs. 474-477. In a hopper door gear, the catch which when thrown into engagement with the toggle arms, prevents the arms from moving from the closed position and opening the hopper doors.

Hopper Door Toggle Arm (Hopper Cars). 104, Figs. 474-500. A link in the drop door mechanism which is fastened to the door and forces it shut when the toggle link is forced down.

Hopper Door Toggle Link (Hopper Cars). 105, Figs. 474-500. The arm in the drop door mechanism which forces down the toggle arms when the winding shaft is revolved and closes the doors.

Hopper Ore Car. Figs. 496-512. See **Hopper Car.**

Hopper Plates. The metal sheets constituting the bottom of a hopper bottom car. Also termed **inclined floor** or **hopper slope.**

Hopper Siding. The planking that forms the side of a box hopper.

Hopper Slope (Hopper Car). 27c, Figs. 428-431. That part of the floor which slopes from the center of the car to both hopper doors. See **Side Slope** and **End Slope.**

Hopper Stayrods. Inclined rods passing through the center sill and to the hopper supporting strap at the hinged end of the doors to prevent the hopper from sagging in the middle.

Hopper Support (Hopper Cars). 45, Figs. 474-500. An angle riveted to the ridge of the hopper at the center and the top of the side sheet, forming a support for the hopper. It serves the same purpose as the **Hopper Supporting Strap,** which see.

Hopper Supporting Strap. A heavy U-shaped iron strap bent to the shape of the hopper of a gondola car, and with the ends bolted to the side sills. Its office is to support the hopper, and it is usually applied at the end of the inclined floor, and in the middle of the hopper at which point the doors are hinged.

Hopper Ventilator. See **Bell's Exhaust Hopper Ventilator.**

Horizontal Brake Shaft. 95, Figs. 267-268. A brake shaft usually at the end of a car body, the position of which is horizontal instead of vertical, so that it can be applied from below. When used it is commonly in combination with a long brake shaft of the ordinary kind at the other end of the car. It is for use in grain elevators, tunnels and in city yards, chiefly on the Pennsylvania Railroad.

Horizontal Brake Shaft Chain. 104, Figs. 267-268. A chain attached to a brake rod at the end of a car and running over a pulley to a horizontal shaft on which it is wound.

Horizontal Telegraph Cock or **Faucet.** See **Faucet.**

Hornplate (British). The name given to the part of a locomotive or tender which on other railroad vehicles is termed **Axle Guard** (American, pedestal), which see

Horse Box (British.) A four-wheeled covered vehicle adapted to run on passenger trains. It is fitted with large side doors and mangers, and is divided into three stalls by movable padded partitions.

Horse Car. 1. Figs. 114-117, 201, 620, 622. A box car or express car fitted up with stalls especially for carrying horses. Some horse cars are very elaborate.

2. **Street Cars,** which see, drawn by horses, are very frequently called horse cars.

Horse Hook or **Towing Hook** (British). Nearest American equivalent, roping staple. An iron hook attached to the sole bar and forming an attachment for a rope by which the vehicle can be drawn. Horses are largely used for switching in England.

Horse Shoe Seal. Fig. 4085. A cast-in wire and lead seal.

Hose. Flexible tubing, made of leather, canvas, or india rubber, for conveying water, air, or other fluids. See also **Brake Hose, Coupling Hose.**

Hose Bracket. See **Brake Hose Bracket.**

Hose Protector (Flexible). Fig. 1323.

Hose Chain. Fig. 2811. A light chain to hold up the steam hose when uncoupled and prevent its dropping to the track.

Hose Clamp. Fig. 1291. A clamp to bind the hose to the hose nipple and coupling.

Hose Connection. Figs. 1324-1325.

Hose Couplings. See **Brake Hose Couplings.**

Hose Nipple. See **Brake Hose Nipple.**

Hospital Car. Figs. 245-246. A car fitted up with all the appliances of a hospital for use in treating injuries caused by railroad accidents. Such cars are usually kept in large yards and are used for temporary treatment of injured employees. In case of a wreck the car is sent out with the wrecking crew to the scene of the accident.

Hot Water Heater. See **Baker Heater.**

Hot Water Pipes. P, Fig. 2204. Pipes running alongside of a car under the seats, which contain hot water, and by which the car is heated. They are usually naked iron pipes, and the car is heated by convection as well as radiation. Between the seats the pipes on the side of the car have a hot water guard rail running along over and above them.

House Car. An occasional term for a **Box Car,** which see.

Housing Box. A **Journal Box,** which see.

Howard's Railway Water Closet. Figs. 4042-4043. A device the essential feature of which is the connection between the seat lid and the pan and service measure, by which no water is carried to the pan except on opening the lid.

Hub (of a Car Wheel). The central portion into which the axle is fitted. It is usually cylindrical in form and projects beyond the disks or spokes of the wheel on each side. In Great Britain termed the boss.

Hub Bolts (Steel-Tired Wheels). Bolts fastening the face plates to the hub.

Huntoon Brake Beam. Figs. 5143-5148, 5152-5155.

Hydraulic Jack. Figs. 3890-3891. A tool or machine in which the power is exerted by means of the pressure of some liquid acting against a piston or plunger, for raising heavy weights, like a car. The head and interior tube or ram form a reservoir, from which the fluid flows to the pump, and to which it is returned in lowering. From the pump it is forced, by the downward stroke of the piston, past the lower valve into the cylinder, and, this being closed at the bottom, the ram rises. The lever, which is made with a projection on one edge, slips into a socket at the side of the head. This socket passes through an arm on the interior of the head, and to this is fastened the piston of the pump. The claw attachment is a third tube, which screws into the head, below the ram collar and outside of the cylinder, at the lower end of which is a claw projecting out at one side. They are rated so that one man can raise the weight for which they are designed. The speed of lifting is inversely proportionate to the amount lifted. Ten tons can be lifted one foot in about a minute and a half. See **Dudgeon's Hydraulic Jacks** and **Watson & Stillman's Hydraulic Jacks, Joyce-Cridland's Hydraulic Jacks.**

Hydraulic Pressed Car Candles. Candles made of paraffin by hydraulic pressure. See **Candles.**

Hydrostatic Buffer. A platform and buffing apparatus designed by Mr. A. G. Leonard and first applied to the Empire State Express between New York and Buffalo. It consists of a buffer plate extending the full width of the platform end sills, with two side, two intermediate and one center buffer stems. These center stems are backed up by springs, as is usual in other buffing apparatus, and in addition the center and side stems are enlarged at their ends and fitted so as to act as pistons in buffer stem cylinders. The two side and center cylinders are filled with a liquid and they are connected with suitable piping. The drawbar has attached to it a pressure bar, which is also fitted to a cylinder which has pipe connection with the center and side buffer stems. The effect of this arrangement is to equalize the pressure upon the buffer plate. If one side buffer stem receives more than its proportion of the thrust the fluid conveys the hydrostatic pressure to the other side and center and tends to equalize it. When the drawbar is drawn out the pressure bar piston forces the fluid from its cylinder into the buffer stem cylinders and forces out the buffer plate, insuring contact at all times between the buffer plates. Folding steps are required, since the buffing apparatus takes up the full width of the platform.

I

I-Beam. A general term applied by makers to any form of rolled iron or steel having an I cross-section. The top and bottom parts are termed the flanges, and the middle the web. The usual dimensions are given by the total height from out to out, and vary from 3 to 15 inches or more. When one of the flanges is simply a round bar it is termed a deck beam. I-beams are used for center and intermediate sills, also for body and truck bolsters.

Ice Car. A car for transporting ice, usually constructed with double roofs, floors and sides, filled in with sawdust or other non-conducting substance.

Ice Pan (Refrigerator Cars). The receptacle for carrying ice, especially roof ice pans, in distinction from ice racks, at the ends of the car.

Inclined Floor (Coal Cars). 27, 27a, 27b, 27c, Figs. 474-500. Subdivided into inclined end floor and inclined side floor, the latter not always used.

Inclined Floor Timbers (Hopper Car). The wooden sills to which the inclined floor of a coal car is nailed.

Inclined Plane Car. A passenger street car which is drawn by a wire rope on a steep inclined plane. The car is so arranged that the floor will be level when the wheels are on the incline, by making the wheels at one end larger than at the other, or by raising up one end of the car body.

Independent Pneumatic Tools. Figs. 6897-6904.

India Rubber. A gum which exudes from a tropical tree growing in the East and West Indies, Mexico, South America, etc. It is prepared for use by vulcanizing with a greater or less proportion of sulphur, according to the stiffness required.

India Rubber Body Cushion or **Attock's Body Block** (British). A piece of rubber about 6 inches by 3 inches by 1 inch thick, interposed between the body and the underframe, serving to deaden noise and vibration and permit a free circulation of air to the floor timbers.

India Rubber Floor Mat. Fig. 2670. See **Floor Mat.** They are either perforated or corrugated.

Ingate. "The aperture in a casting mold at which the melted metal enters."—Knight. Often called a gate.

Ingersoll-Rand Pneumatic Tools. Figs. 6909-6913.

Injector. A large hood or wind scoop on the roof of the car to catch the air and force it through the various pipes into the car. Corresponding parts

are called hoods, jacks, ventilators, ventilator jacks, wind scoops, etc.

Inlet Valve (Steam Heating). Figs. 2899, 2966-2967. The valve controlling the inflow of steam to the heater pipes.

Inner Intermediate Sills. 3, Figs. 262-272. Those two intermediate sills next to the center sills. See **Intermediate Sills** and **Outer Intermediate Sills.**

Inner Lamp Ring (British). An ornamental or wooden ring in the inner surface of the roof surrounding the aperture for the **Roof Lamp**, which see.

Inside Body Corner Knee (British). American equivalent, sill knee iron or corner plate, which latter is used outside instead of inside. A wrought iron knee placed in a horizontal plane securing the end and side of the body together.

Inside Casing (British). Boards in the inside of the body attached to the framing of the sides and ends. Also called inside lining.

Inside Casing (Baker Heater). Fig. 2725. Sheet iron or steel plate bent and riveted into the shape of a frustum of a cone, which forms the top of the fire pot.

Inside Ceiling (Refrigerator Car). K, and 53e, Figs. 305-321. The inside layer of light boards in the roof of the car.

Inside Cornice (Passenger Car Interiors). 94, Figs. 648-651. A molding which fills the angle where the roof joins the side of the car.

Inside Cornice Fascia Board. 95, Figs. 648-651. A projecting board which forms a molding or ornament under the inside cornice. The sub-fascia board lies under it. The arrangement of these details, however, is frequently varied.

Inside Cornice Sub-Fascia Board. Z, Fig. 2204. See above.

Inside Deck Cornice. 120, Figs. 648-651.

Inside End Piece (Truck Frame). Figs. 4788-4790. The end piece which is nearest to the center of the car. It is usually straight, while the outer one is cut away on top so as to make room for the draft rigging.

Inside Frieze Panel (Street Cars). A panel on the inside over a window. See **Panel.**

Inside Hand Rail (Vestibule Fittings). Fig. 3951.

Inside Hung Brakes. Fig. 5072. Brake attachments for trucks in which the brake shoes and beams are between the wheels. When attached on the outside they are **Outside Hung Brakes,** which see.

Inside Lining. 1. 53, Figs. 262-263; 53b and A, Figs. 305-321; 97, Figs. 648-651. The boarding which is nailed to the insides of the posts of freight, baggage and other cars. In box cars it extends half way up only, to the girth. Inside lining becomes sometimes inside sheathing when it is carried up to the roof, and is the only sheathing for the car, the frame being left exposed.

2. (British.) See **Inside Casing.**

Inside Lining Cap. A **Girth** or **Belt Rail,** which see.

Inside Lining Stud. A vertical strip or post extending from the side sill to the girth to serve as a "nailer" for the inside lining.

Inside Roof. 86c, Figs. 262-272. A light board roof under the main roof and separated from it by the purlins.

Inside Wheel Piece Plate. 12, Figs. 4705-4713, 4771-4777. See **Wheel Piece.**

Inside Window Panel. 89, Figs. 648-651; 10, Figs. 2201-2202. A panel inside of a passenger car between the windows.

Inside Window Sill. 78, Figs. 648-651, etc. A horizontal piece of wood under the window on the inside.

Inside Window Stop. A wooden strip attached to a window post on the inside of a window blind or an inner sash of a double window. It forms a groove in which the blind or window sash slides. Also called window casing. Sometimes the window molding forms a stop on the inside.

Inspection Car. 1. A car used for inspecting track of a railway. In inspecting the track it is pushed in front of a locomotive.

2. Fig. 6196. A hand car used for very much the same purpose. Three-wheeled hand cars are also used by roadmasters for inspection. See **Hand Car.**

3. Fig. 6191, etc. A small car propelled by gasolene with seats for from four to six persons.

Instruction Car (Air Brake). Figs. 244, 258-260. A car maintained by the Westinghouse Air Brake Co. and by some railroads to send out over the line in charge of experts, and with a full equipment of air brake apparatus, for the purpose of instructing employees required to operate or inspect air brakes as to their construction, operation and proper maintenance. The same end is accomplished by some roads by establishing instruction shops or schools at certain points along the road and requiring employees to attend the same.

Insulating Paper (Refrigerator Cars). B, Figs. 305-321. A heavy tar paper placed between the linings to aid the insulation of the contents of the car from heat.

Interchange of Traffic, Rules for.

The following code of rules governing the condition of, and repairs to freight cars offered in interchange traffic has been adopted by the Master Car Builders' Association. It is revised from year to year. The rules here given are the latest revision, 1908.

These rules make car owners responsible for, and therefore chargeable with, the repairs to their cars necessitated by ordinary wear and tear in fair service, so that defect cards will not be required for any defects thus arising.

Railroad companies handling cars are responsible for damage done to any car by unfair usage, derailment or accident, and for improper repairs made by them, and they should make proper repairs at their own expense, or issue defect card covering all such damage or improper repairs.

All inspection of freight or passenger cars for interchange will be made in accordance with the following rules:

CARE OF FOREIGN FREIGHT CARS.

RULE 1. Each railway company shall give to foreign cars, while on its line, the same care as to oiling, packing, inspection and adjusting brakes that it gives to its own cars.

INTERCHANGING FREIGHT CARS.

RULE 2. Cars offered in interchange must be accepted if in safe and serviceable condition, the receiving road to be the judge in cases not provided for in Rules 3 to 56, inclusive.

In case cars are rejected by the receiving road and returned to the delivering company, all the defects objected to must be designated on a return card 3½ x 8 inches, of the following form, filled in with ink or black indelible pencil, and placed on the car adjacent to the destination card:

RETURN CARD.

..... Car No. .....
from ..... Ry.,
to ..... Ry.
for the following defects: .....
.....
.....
.....
.....
.....
Inspector.

INSTRUCTIONS FOR INSPECTORS.

USE OF DEFECT CARD.

RULE 3. Defect cards shall be 3½ inches by 8 inches, and of the form shown below. They should be printed in red ink on both sides, and shall be filled in on both sides with ink or black indelible pencil. The cards must plainly specify in full each item for which charges are authorized, indicating on which end of the car the defects exist. The end of the car upon which the brake staff is located shall be known as "B" end, and the opposite end shall be known as "A" end. Where there are two brake staffs on same car, the end toward which the cylinder push rod travels shall be known as "B" end.

NOTE.—Fill in defects on both sides with ink or black indelible pencil. Attach this card with four tacks on outside face of intermediate sill, between cross-tie timbers.

M. C. B. DEFECT CARD
(*Name of Road.*)

Date.....

Car specified below will be received at any point on this company's line with the following defects:

.....
.....
.....

Car No..... Initials.....

Inspector at.....

RULE 4. Defect cards shall not be required for defects for which owners are responsible, except for missing material on cars offered in interchange, as provided for in Rules 27, 32, 35 and 42; neither shall they be required of the delivering road for improper repairs that were not made by it with the exception of the cases provided for in Rules 29, 34, 43, 44 and 45.

RULE 5. If a car has defects for which the owners are not responsible, but which do not render it unsafe to run, nor unsafe to trainmen, nor to any lading suitable to the car, the receiving road may require that a defect card be securely attached to the car with four tacks, preferably on the outside face of intermediate sill, between cross-tie timbers on wooden cars; and on steel cars to cardboard located either on cross-tie under car or on inside of side sill at end of car.

RULE 6. Duplicate defect cards shall be furnished for lost or illegible cards.

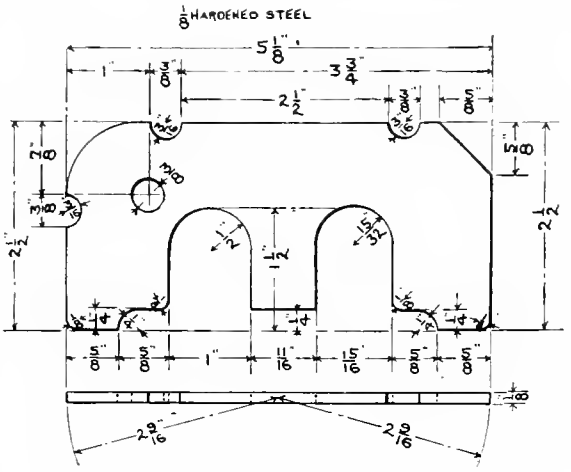
WHEELS.

Owners responsible.

DEFECTS OF WHEELS WHICH JUSTIFY RENEWAL.

RULE 7. Shelled out: wheels with defective treads on account of pieces shelling out; if the spots are over 2½ inches, or are so numerous as to endanger the safety of the wheel.

RULE 8. Seams ½ inch long or over at a distance of ½ inch or less from the throat of the flange, or seams 3 or more inches long, if such seams are within the limits of 3¾ inches, as shown on Fig. 5.



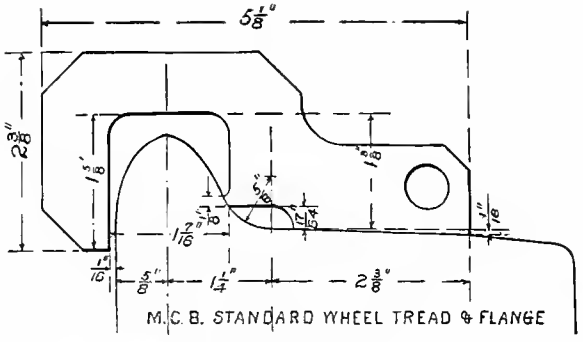
Wheel Defect and Worn Coupler Limit Gage.
Fig. 1.

RULE 9. Worn through chill: when the worn spot exceeds 2½ inches in length. Care must be taken to distinguish this defect from flat spots caused by sliding wheels.

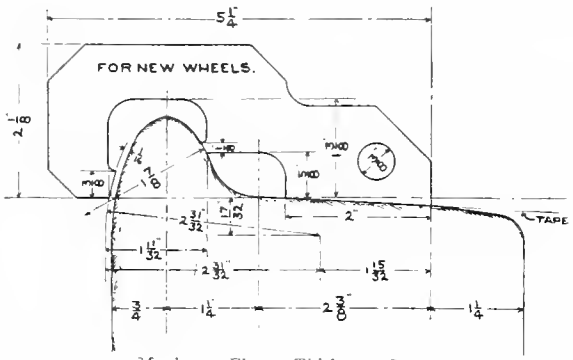
RULE 10. Worn flange: cast wheels under cars of less than 80,000 pounds capacity, with flanges having flat vertical surfaces extending more than 1 inch from tread, or flange 1⅜ inch thick or less, gaged at a point ⅜ inch above tread. Wheels under cars of 80,000 pounds capacity or over, with flanges having flat vertical surfaces extending more than ⅞ inch from tread, or flange less than 1 inch thick, gaged at a point ⅜ inch above tread. (See Figs. 4 and 4a.)

Worn flange: steel and steel-tired wheels with flanges having flat vertical surfaces extending more than one inch from tread, or flange 1⅜ inch thick or less. (See Figs. 4 and 4a.

RULE 11. Thick flange: flange over 1⅞ inches thick for cast iron wheels, standard of 1903, 1904, 1905 and 1906. (See Fig. 2), or flange over 1⅜ inches thick for cast iron wheels having increased flange and tread, standard of 1907. (See Fig. 2a.)



Maximum Flange Thickness Gage.
Fig. 2.



Maximum Flange Thickness Gage.
Fig. 2a.

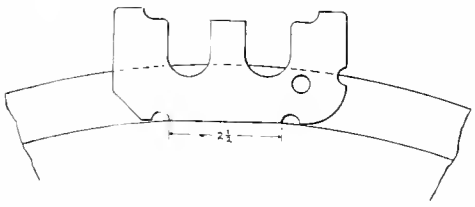


Fig. 3. Method of Gaging Shelled and Flat Spots.

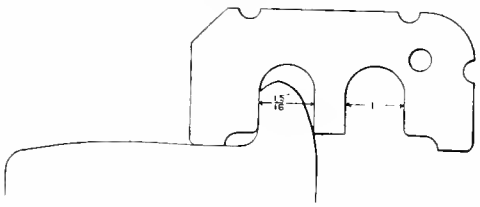


Fig. 4. Method of Gaging Worn Flanges.

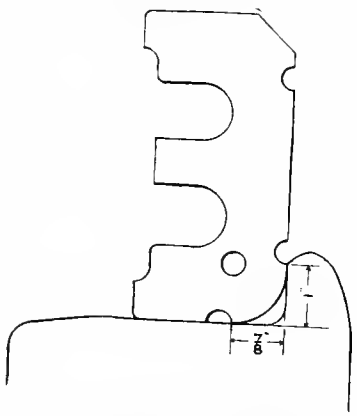


Fig. 4a. Method of Gaging Worn Flanges.

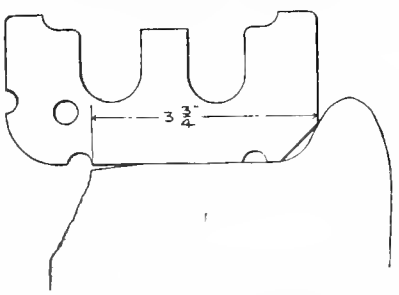


Fig. 5. Method of Gaging Chipped Rims.

Rule 12. Tread worn hollow: if the tread is worn sufficiently hollow to render the flange or rim liable to breakage.

Rule 13. Burst: if the wheel is cracked from the wheel fit, outward, by pressure from the axle.

Rule 14. Cracked or broken flange, caused by seams, worn through chill or worn flange. See also Rules 20 and 21.

Rule 15. Broken or chipped rim, caused by defective casting, if the tread, measured from the flange at a point $\frac{5}{8}$ inch above tread, is less than $3\frac{3}{4}$ inches in width. (See Fig. 5.) See also Rules 20 and 21.

Rule 16. Cracked tread, cracked plate, one or more cracked brackets, or broken in pieces under fair usage. See also Rule 20.

Steel or steel tired wheels loose, broken or cracked hubs, plates, bolts, retaining ring or tire under fair usage.

Rule 17. Wheels loose or out of gage. (See Fig. 6.)

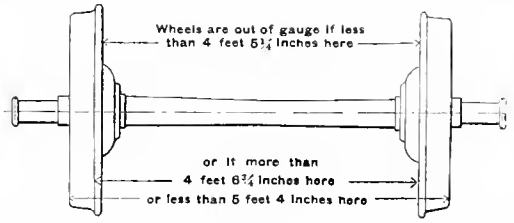


Fig. 6.
Measurements to be made at the same height on the wheels as the center of the axle.

For wheels cast prior to the M. C. B. Standard tread and flange adopted in 1907.

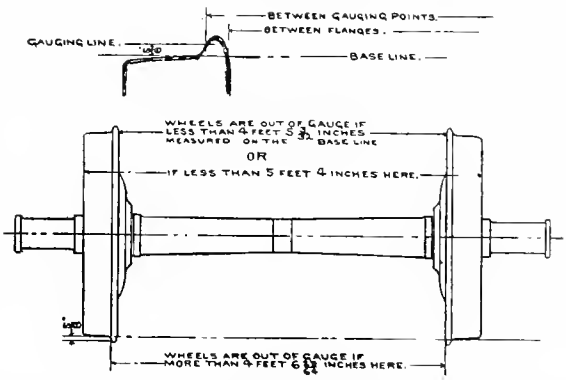


Fig. 6a.
Measurements to be made at the same height on the wheels as the center of the axle.
(For wheels cast after January 1, 1908.)

Rule 18. Chipped flange: if chip is on the opposite side from throat of flange and exceeds $1\frac{1}{2}$ inches in length and $\frac{1}{2}$ inch in width, or if it extends $\frac{1}{8}$ inch past the center of flange.

Delivering Company responsible.

Rule 19. Flat sliding: if the spot caused by sliding is $2\frac{1}{2}$ inches or over in length. (Care should be taken to distinguish this defect from worn through chill.)

Rule 20. Broken flange, except as in Rule 14; chipped flange, if chip is on throat side of flange, and exceeds $1\frac{1}{2}$ inches in length and $\frac{1}{2}$ inch in width, or if it extends $\frac{1}{8}$ inch past the center of flange; broken rim, if not caused by defective casting, if the tread, measured from the flange at a point $\frac{5}{8}$ inch above tread, is less than $3\frac{3}{4}$ inches in width (see Fig. 5), or any breakage caused by unfair usage, derailment or accident.

Rule 21. The determination of flat spots, worn flanges and chipped treads shall be made by a gage as shown in Fig. 1. The determination of thick flanges

shall be made by a gage as shown applied to M. C. B. standard wheel tread and flange in Fig. 2 and 2a.

The following engravings of the wheel defect gage, Fig. 1, show the method of using it:

Axles.

DEFECTS OF AXLES WHICH JUSTIFY RENEWAL.

Owners responsible.

RULE 22. Axles broken, or having seamy or pitted journals, fillets in back shoulder worn out, or with collars broken or worn to ¼ inch or less, under fair usage.

RULE 23. Axles less than the following prescribed limits:

FOR CARS MARKED WITH "CAPACITY."

Capacity of car.	Journal.	Wheel seat.	Center.
100,000	5 inches.	6¾ inches.	5⅞ inches.
80,000	4½ "	6¼ "	5 5/16 "
70,000	4 "	5⅝ "	4⅞ "
60,000	3¾ "	5 "	4⅜ "
50,000	3½ "	4¾ "	4⅛ "
40,000	3¼ "	4⅝ "	3⅞ "
30,000	3 "	4¼ "	3½ "

FOR CARS MARKED "MAXIMUM WEIGHT."

Maximum weight.	Journal.	Wheel seat.	Center.
161,000	5 inches.	6¾ inches.	5⅞ inches.
132,000	4½ "	6¼ "	5⅜ "
112,000	4¼ "	6 "	5¼ "
95,000	3¾ "	5½ "	4¾ "
79,000	3½ "	5¼ "	4⅝ "
66,000	3¼ "	4⅞ "	4¼ "
58,000	3 "	4¾ "	4⅛ "

All cars to have their light weight and capacity or their light weight and maximum weight stenciled on them.

Delivering Company responsible.

RULE 24. Cut journals, axles bent or axles rendered unsafe by unfair usage, derailment or accident.

Trucks.

PARTS OF TRUCKS WHICH JUSTIFY REPAIRS IF OWNERS ARE RESPONSIBLE, OR REPAIRS OR CARDING IF DELIVERING COMPANY IS RESPONSIBLE.

Owners responsible.

RULE 25. Defective, missing or worn-out parts of trucks not elsewhere provided for, which have failed under fair usage, or if any part of the truck frame or attachments is less than 2½ inches above the top of the rail.

Delivering Company responsible.

RULE 26. Damage of any kind to the truck due to unfair usage, derailment or accident.

RULE 27. Material missing from trucks of cars offered in interchange.

RULE 28. Journal bearings and journal box bolts which require renewal by reason of change of wheels or axles for which the delivering company is responsible, regardless of the previous condition of the bearings.

RULE 29. Cars equipped with steel or steel-tired wheels and so stenciled, if found with cast-iron wheels.

Brakes.

PARTS OF BRAKES WHICH JUSTIFY REPAIRS.

Owners responsible.

RULE 30. Damage to interior portion of cylinder or triple valve, leaky pipes, account of seams, air hose burst from air pressure, torn air hose and defective missing or worn-out parts of brakes not elsewhere provided for, which have failed under fair usage; except burst or torn air hose, burst or leaky pipes, account of seams, or missing material on cars offered in interchange.

RULE 31. Cylinder or triple valves of air-brake cars not cleaned, oiled and tested within twelve months and the date of last cleaning, oiling and testing, preferably marked on the brake cylinder or auxiliary reservoir, or if same is not readily visible, in a convenient location at release rod, with white paint.

Owners' responsibility qualified.

RULE 32. If the car has air-signal or steam pipes the hose, pipes and couplings on the car are at owner's risk, unless the car is stenciled that it is so equipped.

Owners responsible.

RULE 33. Cars equipped with air-brake hose other than M. C. B. standard and hose applied without swelled end and not conforming to M. C. B. standard hose on and after June 1, 1909, except cars offered in interchange, where delivering company is responsible.

Delivering Company responsible.

RULE 34. If 1-inch hose and fittings are found on 1¼-inch train pipe.

RULE 35. Missing air-brake hose, missing or damaged air-brake pipe, fittings, angle cocks, cut-out cocks, cylinders, reservoirs, triple valves, release valves, pressure-retaining valves or any parts of these items; also pressure-retaining valve and pipe when damage to car denotes rough usage.

RULE 36. Damage to any part of the brake apparatus caused by unfair usage, derailment or accident.

RULE 37. All freight cars offered in interchange must be equipped with air brakes. On and after September 1, 1909, M. C. B. standard 1¼-inch train line shall be used.

Bodies.

PARTS OF BODIES WHICH JUSTIFY REPAIRS IF OWNERS ARE RESPONSIBLE, OR REPAIRS OR CARDING IF DELIVERING COMPANY IS RESPONSIBLE.

Owners responsible.

RULE 38. Locks, side doors, end doors, roof doors, grain doors and all inside or concealed parts of cars missing or damaged under unfair usage, and failure or loss under fair usage of any part of the body of the car, except as provided for in Rules 42 and 87.

ALL CARS NOT ORIGINALLY EQUIPPED WITH RETAINING VALVES.

RULE 39. Cars not within the limits of standard height for couplers, 31½ inches to 34½ inches for standard gage cars.

RULE 40. Steps, ladders, handholds or running boards in bad order or insecurely fastened, or absence of grabirons or handholds as required by law. Handholds or grabirons must be of wrought iron or steel and secured by bolts, rivets or lag screws.

Delivery Company responsible.

RULE 41. Damage of any kind to the body of the car due to unfair usage, derailment or accident; also temporary advertisements tacked, glued, pasted or varnished on cars. Any card or poster which bears the name of a manufacturer or shipper printed on same will be considered as an advertisement.

RULE 42. Material missing from body of cars offered in interchange, except locks, grain doors and all inside or concealed parts of car.

RULE 43. M. C. B. couplers not equipped with steel or wrought-iron knuckles.

RULE 44. Cars intended to be equipped with metal brake beams and so stenciled, if found with wooden brake beams.

RULE 45. Cars equipped with M. C. B. couplers having pocket rear-end attachment and so stenciled, if found with stem or spindle attachments instead of pocket.

RULE 46. Uncoupling attachments of M. C. B. couplers offered in interchange must be made operative before moving from interchange points.

IMPROPER REPAIRS.

Company making repairs responsible.

RULE 47. Any company making improper repairs is solely responsible to the owners, with the exception of the cases provided for in Rules 29, 34, 43, 44 and 45, and also in case it should be necessary to replace stem or spindle with pocket attachment.

RULE 48. The company making such improper repairs shall place upon the car, at the time and place that the work is done, an M. C. B. defect card, which card shall state the wrong material used.

COMBINATIONS OF DAMAGES WHICH DENOTE UNFAIR USAGE IF OCCURRING AT THE SAME END OF CAR.

RULE 49. Damage to coupler, accompanied by damage to either combined front and back coupler stop, draft timber or its substitute, or end sill.

RULE 50. Damaged coupler pocket accompanied by damage to either draft timber or its substitute, or end sill.

RULE 51. Damaged combined front and back coupler stop accompanied by damage to either coupler or end sill.

RULE 52. Damaged draft timber or its substitute, accompanied by damage to either coupler, coupler pocket, or to end sill.

RULE 53. Damaged end sill, accompanied by damage to either coupler, coupler pocket, combined front and back coupler stop, draft timber or its substitute or longitudinal sill.

RULE 54. Damaged longitudinal sill, accompanied by damage to end sill.

RULE 55. Damaged longitudinal sills, if necessitating replacement or splicing of more than two sills.

RULE 56. Damaged corner and end posts, if necessitating the replacement of, or repairs to, more than two end or two corner posts at one end, or more than one end and one corner post at same end of car.

The word "coupler" in the above Rules 49 to 53, inclusive, means the coupler body or knuckle, open knuckles excepted.

An American continuous draft key and rod shall not enter into a combination of defects denoting unfair usage.

It will be assumed that a missing coupler and attachments are damaged unless shown to the contrary. This only refers to cases where the coupler if broken would enter into the combination of defects.

INSTRUCTIONS TO REPAIR MEN.

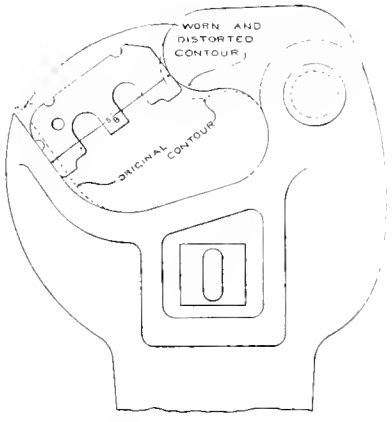
RULE 57. Any car having defects which render it unsafe to run, unsafe to trainmen, or to any lading suitable to the car, may be repaired.

RULE 58. Repairs to foreign cars shall be promptly made, and the work shall conform in detail to the original construction, and with the quality of material originally used, except as provided for in Rules 59 and 62. Malleable iron, M. C. B. standards, may be substituted for gray iron, M. C. B. standards, but the net cost to car owner in such cases must be no greater than if the original kind and weight of material had been applied. Gray iron, M. C. B. standards, may be substituted in place of malleable, M. C. B. standards, but in such cases the debits and credits must be for what is actually applied and removed. Repair cards and stubs must state kind of material applied and removed.

RULE 59. In repairing damaged cars, M. C. B. standards may be used when of dimensions that do not impair the strength of the cars, in lieu of the parts formings its original construction. In making repairs, cast iron brake shoes may be replaced with reinforced brake shoes. When using materials for repairs to foreign cars for which the Master Car Builders' Association has adopted specifications as a standard, the materials must comply with the requirements of these specifications.

RULE 60. In making repairs for which owners are responsible, wheels other than 33-inch may be replaced with 33-inch wheels, if practicable. If changes are necessary in order to bring the car to proper height, the cost of so doing shall also be chargeable to the car owner.

RULE 61. Couplers of the vertical plane type other than M. C. B. replaced with M. C. B. standard, the expense of alterations thus necessitated shall be chargeable to car owners. Couplers that exceed the distance of 5⅛ inches between point of knuckle and guard arm measured perpendicularly to guard arm must be repaired. See drawing.



RULE 62. When M. C. B. couplers of another make are placed upon a car, the uncoupling arrangements shall be made operative at the expense of the company making the repairs. Malleable iron couplers, open knuckles and malleable or steel backed filled journal bearings shall not be used in repairs of foreign cars.

RULE 63. When M. C. B. couplers, knuckles, metal brake beams, wheels or axles are replaced under conditions which make them chargeable to the owner, it must be plainly stated on the repair card and stub whether the material is new or second-hand.

The cards and stubs must state whether solid or filled journal bearings are applied or removed; also, length of bearing. In the case of couplers applied and removed, they shall state the make and kind of material in couplers and the size of shank. In the case of knuckles, they must state whether open or closed knuckles are removed and applied. In the case of brake shoes removed and applied, they shall state the kind of shoe.

RULE 64. Any company finding cars not within the limits of standard height for couplers may make repairs and charge to owners. Cars should be adjusted in height when empty, as far as possible, and in order to justify a bill for this work under the Rules of Interchange an empty car measuring 32½ inches or less should be adjusted to 34½ inches, or within ¼ inch

thereof, and when it is necessary to alter a loaded car it should be adjusted to 33½ inches, or within ¼ inch thereof, or as nearly as possible to such height as will bring it to 34½ inches when the car is unloaded, the height to be measured from top of the rails to the center line of the coupler shank.

RULE 65. Draft timbers must not be spliced. All longitudinal sills may be spliced once, with the exception of center sills, which may be spliced at both ends. Not more than two adjacent sills may be spliced at the same end of car.

The splice may be located either side of body bolster, but the nearest point of any splice must not be within 12 inches of same, excepting center sills, which must be spliced between body bolster and cross-tie timbers and not within 24 inches of either.

Longitudinal sills other than center sills where less than 12 inches in depth, the plan shown in Fig. 8 is to be followed. When the sills are 12 inches or more in depth the plan shown in Fig. 9 is to be followed. When center sills are spliced the plan shown in Fig. 9a is to be followed.

The size of horizontal or cross bolts shown in Fig. 9a should be ⅝ inch.

Sills of foreign cars shall be spliced in accordance with the standard form of splice shown above. Cars delivered in interchange with the form of splice shown in Fig. 9b will be acceptable.

Steel sills may be spliced in the most convenient location in accordance with Figs. A, B and C. Adjacent steel sills may be spliced.

RULE 66. Wheels on the same axle must be of the same circumference.

RULE 67. New wheels must not be mated with second-hand wheels.

RULE 68. Prick punching or shimming the wheel fit must not be allowed.

RULE 69. The wheel seats of foreign axles must not be reduced more than 1/16 inch to fit the wheels, and in no case must they be reduced below the limits given in Rule 23.

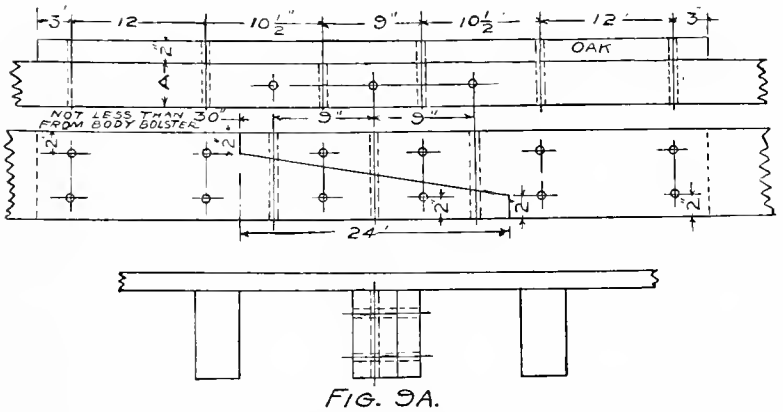
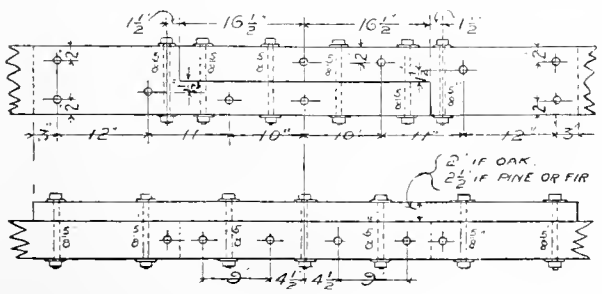


FIG. 9A.

The size of horizontal or cross bolts to be ⅝ inches.



RULE 70. Any company repairing foreign cars with wrong material, and not in compliance with the Rules 57 to 70, inclusive, shall be liable to the owners for the cost of changing such car to the original standard, or to the requirements of these rules, except that companies applying axles smaller than the limits given in Rule 23 shall not be held responsible for improper repairs if the car is not stenciled showing the capacity of the car.

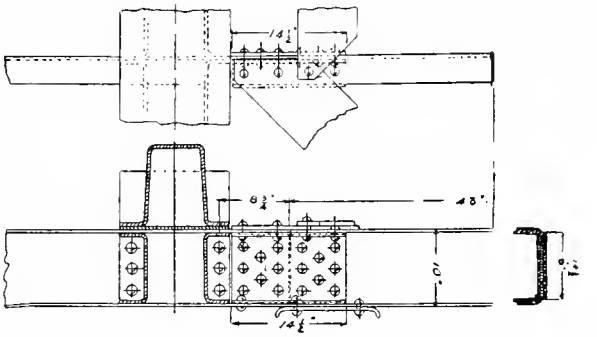


FIG. A.

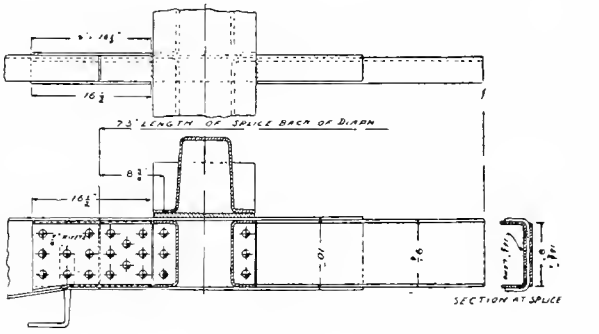


FIG. B.

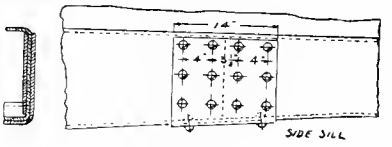


FIG. C.

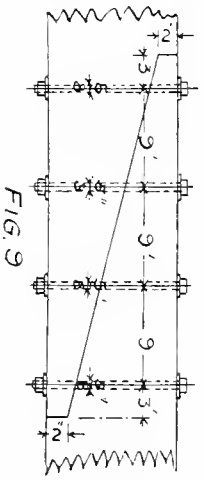


FIG. 9

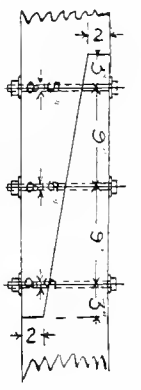


FIG 8

RULE 71. In replacing air-brake hose on foreign cars for which bills are made, new hose must be used.

Air-brake hose applied to foreign cars shall be considered wrong repairs unless they are made in accordance with the M. C. B. specifications and are so labeled.

RULE 72. If the weight of a car is found to vary more than 500 pounds from the light weight stenciled on the car, or if the light weight is obliterated, a rail-

road company having the car in its possession may weigh and restencil the car, making a charge for each car weighed and so reported. The railroad company making the bill shall notify the owner, giving the date and point at which the reweighing was done.

RULE 73. Cars undergoing extraordinary repairs, such as sills, resheathing, roofing, etc., must be reweighed and restenciled by the company having the car in its possession at its own expense, and the owner notified.

RULE 74. When second-hand axles are applied under conditions which make them chargeable to the owners the diameters of the wheel seats, and center must not be less than, and the diameter of the journal must be $\frac{1}{8}$ inch greater than the limiting diameters given in Rule 23. If cars are marked with the word "Capacity," the first set of limits must be followed. If cars are marked "Maximum Weight," the second set of limits must be followed.

RULE 775. When two or more cars chained together, or any cars which require switch chains to handle them, are delivered at an interchange point, the receiving road shall deliver to the delivering road at the time, an equivalent number of switch chains of the same size as the chains so used on the cars delivered, or, in lieu thereof, furnish a defect car for such chains.

L. USE OF REPAIR CARD.

RULE 76. When repairs of any kind are made to foreign cars a repair card shall be securely attached outside face of intermediate sill between cross-tie timbers. This card shall specify fully the repairs made, and reason for same, the date and place where made, and name of road making repairs; also show location of parts repaired or renewed. The end of car on which brake staff is located shall be known as "B" end, and the opposite end as "A" end. Where there are two brake staffs on the car, the end toward which the cylinder push rod travels shall be known as "B" end. The card shall be provided with a stub, which will duplicate information on the card and stubs must be forwarded with the bill.

If no bill is to be rendered, the repair card stub must be forwarded on or before the twentieth day of each month, with the words "no bill" written across the face of the repair card stub. In case it is not the intention to render bill, the words "no bill" shall be written across the face of the repair card.

RULE 77. The repair card shall be $3\frac{1}{2}$ by 8 inches, and the stub $3\frac{1}{2}$ by 4 inches. The card shall be printed on both sides in black ink, and shall be filled in on both sides with ink or black indelible pencil, and be of the following form:

RULE 78. Any road making partial repairs of defects on a car which are covered by defect cards will have the defects repaired crossed off the original card with ink or indelible pencil and card placed back on car. A copy of the card accompanying the bill with the defects which were not repaired crossed off will be sufficient authority to bill.

RULE 79. Duplicate repair cards shall be furnished for lost or illegible cards.

INSTRUCTIONS FOR BILLING.

RULE 80. Bills may be rendered for work done under Rule 57, except in cases where owners are not responsible and the car bears no defect card covering the defects repaired, stating upon the bill the date and place where the repairs were made; the repair card stub or defect card to accompany the bill.

RULE 81. Car owners may require receipt of repair card or stub before payment of bill for repairs.

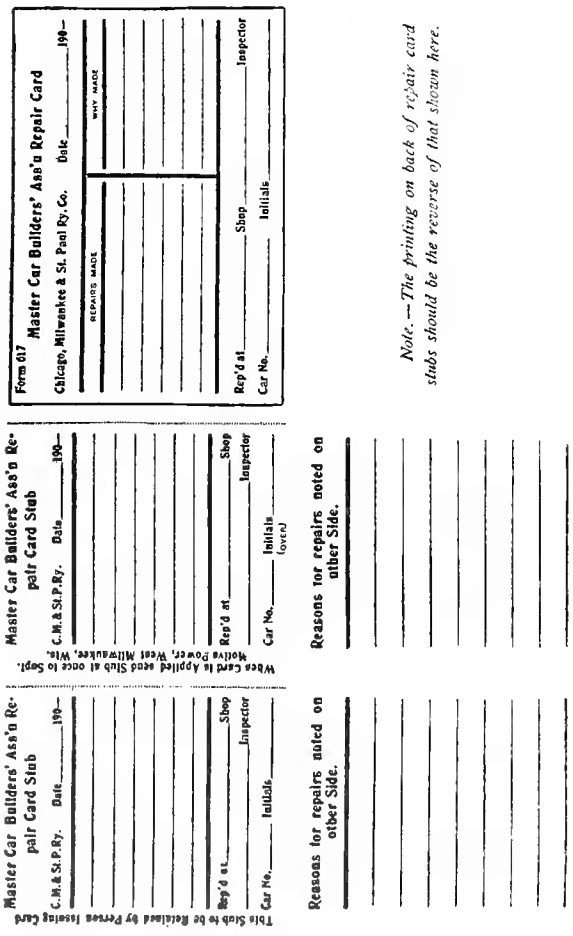
RULE 82. For repairs made on defect cards, the card must accompany the bill as voucher for the work done, but no bill shall be rendered for repairs which have not been made.

RULE 83. When improper repairs of owner's defects have been made and bill rendered, the owner may counter-bill against the company making the wrong repairs for the cost of changing the car to the original standard, or to the requirements of Rules 57 to 79, inclusive, if the work is done.

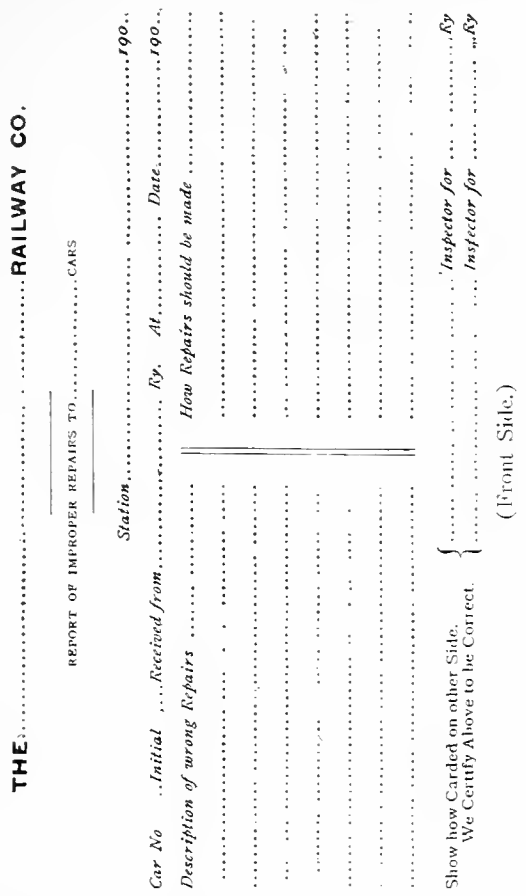
RULE 84. When improper repairs of defects for which owners are not responsible are made, the owner may make bill against the company making the improper repairs for the cost of changing the car to the original standard, or to the requirements of Rules 57 to 79, inclusive, if the work is done.

RULE 85. The evidence of a joint inspector or the joint evidence of two persons, one representing the owner of the car, and the other representing the delivering road, that the repairs are not proper, shall be final. A joint evidence card shall be used for this purpose, which shall describe and show location of parts repaired or renewed. The end of the car on which the brake staff is located shall be known as "B" end, and the opposite end as "A" end. Where there are two brake staffs on the car, the end toward which the cylinder push rod travels shall be known as "B" end. This card shall be of the following form:

23



RULE 86. The joint evidence card, accompanied by a proper repair card, upon which a bill has been made, shall be used as authority for rendering bill, but if unaccompanied by such repair card, the joint evidence card shall be sent to the company against which the evidence has been presented, and it shall furnish a defect card covering the wrong repairs if it made them.



THE.....RAILWAY CO.

REPORT OF IMPROPER REPAIRS TO.....CARS

Station.....190..

Car No ..Initial ...Received from.....Ry. At.....Date.....190..

Description of wrong Repairs ..... How Repairs should be made .....

Show how Carded on other Side.
We Certify Above to be Correct. } ..... Inspector for ..... Ry
..... Inspector for ..... Ry

(Front Side.)

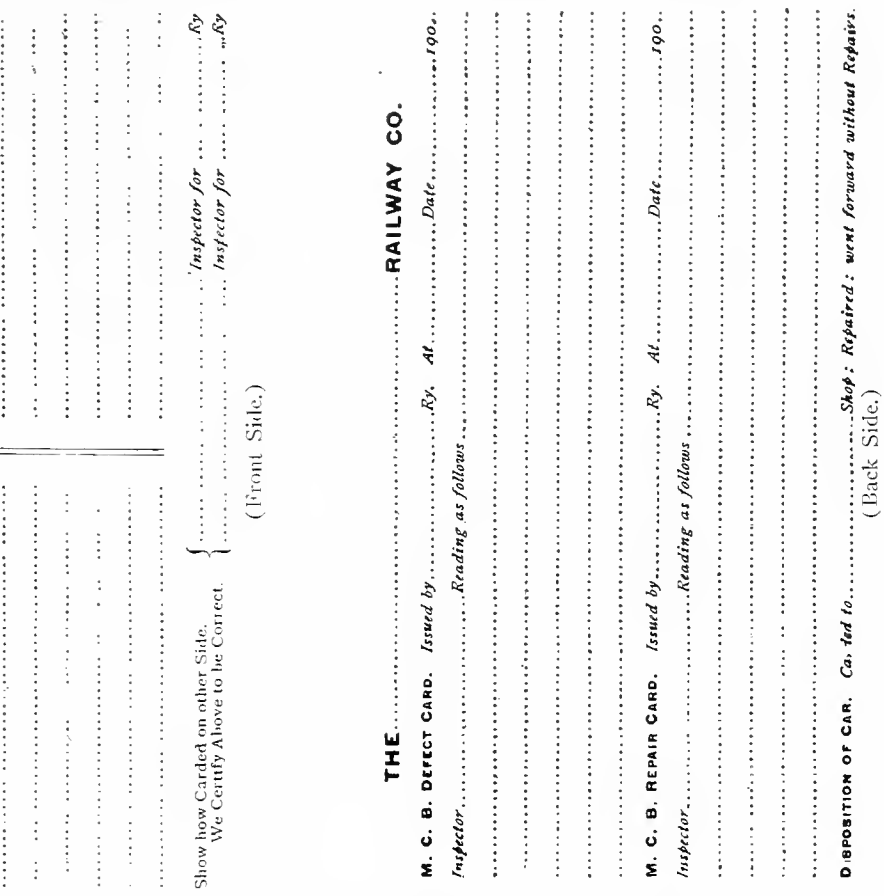
RULE 87. Bills may be rendered against car owners for the labor only of replacing couplers, brake beams (including their attachments, such as shoes, heads, key bolts, brake pins, jaws and hangers), brake levers, lever guides, top and bottom brake rods that have been lost on the line of the company making the repairs. Coupler springs, followers and yokes may be included in the above, providing they have been lost with the couplers.

RULE 88. In making bills under these rules, the information necessary for the car department should be embodied on the forms shown, whether the same is made as a bill or a statement to accompany a bill.

RULE 89. Bills rendered for wheels and axles shall be in accordance with the following schedule of prices for material, with the proper debits and credits:

	New.	Second band.	Scrap.
One 36-inch cast-iron wheel	$10.50	$7.75	$5.25
One 33-inch cast-iron wheel	9.00	7.00	4.75
One 33-inch steel or steel-tired wheel	23.00	17.25	5.00
One axle, 100,000 lbs	21.50	11.75	7.75
One axle, 80,000 lbs	17.75	10.00	6.50
One axle, 60,000 lbs	14.00	7.75	5.25
One axle, 50,000 lbs. (or under)	11.50	6.25	4.25

and with an additional charge for all labor for each pair of wheels and axles removed from all arch bar trucks of $1.75, and from all solid pedestal trucks of $2.00. If new wheels and axles are substituted for second-hand wheels and axles, proper charges and credits shall be allowed, although such substitution be made on account of only one loose or defective wheel, or a defective axle, with the following exceptions: In case the owner of a car removes a damaged wheel or axle, no charge shall be made for any difference in value between the parts used and those removed that are not damaged.



THE.....RAILWAY CO.

M. C. B. DEFECT CARD. Issued by.....Ry. At.....Date.....190..

Inspector..... Reading as follows .....

M. C. B. REPAIR CARD. Issued by.....Ry. At.....Date.....190..

Inspector..... Reading as follows .....

DISPOSITION OF CAR. Carded to.....Shop: Repaired: went forward without Repairs.

(Back Side.)

Removing, turning and replacing a pair of stel or steel-tired wheels: 3.25 for pedestal type of truck and 3.00 for archbar truck.

Loss of service metal from steel or steel-tired wheels for defects for which the delivering company is responsible, to be charged for at the rate of 1.50 per 1-16 inch thickness of tread or tire.

RULE 90. If car owner elects on account of improper repairs to remove M. C. B. standard axles suitable to the capacity of the car, he shall make charge for second-hand axles and allow credit for second-hand axles if they are in good order. Axles removed below the journal limit of 100,000 pounds, 80,000 pounds, 60,000 pounds and 40,000 pounds capacity to be credited as scrap when removed.

RULE 91. Bills for wheel and axle work must make specific mention of each axle and wheel removed or applied.

RULE 92. Bills which do not embody all the information called for by the headings of the columns may be declined until made to conform to the requirements of the rule. If no marks are found on wheels or axles removed, a notation to that effect must be made on face of bill.

RULE 93. In noting on bills the cause of removal of wheels and axles, the terms used in Rules 7 to 24, inclusive, shall be used, and the dimensions of the defect or variation from the prescribed limits should be carefully specified.

RULE 94. Bills for repairs made under these rules and for material furnished shall be in conformity with schedules of prices and credits for the articles enumerated below:

Material.	8-Inch.	10-Inch.
Air-brake Equipment:		
Air-brake hose, 1¼ inch, complete with fittings applied to car, charge	$2.00	$2.00
Air-brake hose, 1¼ inch, credit for fittings for same	.80	.80
Angle cock, plain handle	1.50	1.50
Angle cock, self-locking handle	1.80	1.80
Angle cock handle	.08	.08
Auxiliary reservoir	2.75	6.25
Cut-out cock	1.30	1.30
Cut-out cock handle	.07	.07
Cylinder, body	2.00	3.50
" piston and rod	1.00	1.50
" piston follower	.08	.25
" piston packing leather	.60	1.00
" " " " expander	.05	.06
" piston release spring	.50	.50
" non-pressure head	.60	1.25
" gasket	.06	.08
Gasket, air-hose coupling	.04	.04
Pipe, nipple on end of train pipe	.12	.12
Pressure retaining valve, 2 position	1.00	1.00
Pressure-retaining valve, 3 position	2.25	2.25
Release valve	.60	.60
Release valve handle	.08	.10
Release rod	.10	.10
Spring cotter pins for key bolts and brake pins, each applied	.02	.02
Train pipe air strainer (1¼ inch)	.60	.60
Triple check valve case	.90	.90
Triple cylinder cap (drain cup)	.75	.75
" " " " gasket	.40	.40
" emergency valve	.60	.60
" " " seat	.55	.55
" " " piston	.50	.50
" " " rubber seat	.05	.05
" " check valve	.25	.25
" " " spring	.02	.02
" " " case gasket	.10	.10
" graduating spring	.05	.05
" " stem	.15	.15
" " " nut	.20	.20
" " valve	.05	.05
" piston and ring	2.00	2.00
" " ring (only)	.25	.25
" slide valve	.75	.75

.....Company,

Address.....

To.....Railroad Company, Dr

For Wheels and Axles put under.....Cars, Month of.....190

Date and Place.	Wheels and Axles Removed. Initial, Kind and Number of Car.	Maker.	Date Cast.	No. on Wheel or Axle	Cause of Removal.	Shop Marks on Wheels and Axles.	Wheels or Axles Applied. Maker.	Date Cast.	No. on Wheel or Axle	New or Second Hand.	Shop Marks on Wheels and Axles.	Material Net Charge.	Labor Charge	Total Net Charge.

Date.....190 Received payment, $.....

Material.	8-Inch.	10-Inch.
Triple slide valve spring	$0.03	$0.03
" valve strainer	.05	.05
" " gasket	.20	.20
Bolts, nuts and forgings, finished.....per lb.	.03	¾c.
Brake shoes applied; no credit for scrap	.30	....
Material.	Charge.	Credit.
Brake shoe, reinforced back, applied, no credit for scrap	$0.40	....
Brake shoe key, applied; no credit for scrap	.05	....
Castings, rough iron.....per lb.	.02	½c.
" " malleable "	.03½	½c.
" " steel "	.04½	¾c.
Chain "	.05	$0.01
Coupler, M. C. B., complete, new, steel, 5 by 5 shank	8.75	....
Coupler, M. C. B., complete, new, steel, 5 by 7 shank	9.50	....

STATEMENT OF REPAIRS MADE PER M. C. B. RULES TO .....CARS .....RAILWAY CO.

BY..... DURING.....190...

Repairs made Date	Repairs made Place	CAR Initials	CAR Number	DESCRIPTION OF PARTS REPAIRED	Value of Mechanic's Material	IRON Cast Lbs.	IRON Wrot. Lbs.	IRON Mall. Lbs.	BRASS Filled Lbs.	BRASS Solid Lbs.	Chain Lbs.	Lumber Feet	Spring Lbs.	Labor Hours	CREDIT FOR SCRAP Cast Lbs.	Wrot. and Steel Lbs.	Mall. Lbs.	Steel Springs and Chains Lbs.	Solid Brass Lbs.	Filled Brass Lbs.
														200.						
				QUANTITY. PRICE. VALUE.															Total. Less for Scrap. Net Charge.	

Material.	8-Inch.	10-Inch.
Coupler body, one, new, steel, 5 by 5 shank	6.50	1.05
Coupler body, one, malleable, 5 by 5 shank	....	.90
Coupler body, one, new, steel, 5 by 7 shank	7.75	1.15
Coupler body, one, malleable, 5 by 7 shank	....	1.00
Coupler knuckle, one, new, open	....	.40
Coupler knuckle, one, new, solid	2.00	.45
Coupler knuckle pin, one, new	.25	.05
Coupler lock, one, new	.40	.06
Other individual malleable, wrought or steel parts, per lb.	.04	....
Door, for end of box or stock car, wooden, each, applied; no credit for scrap	1.95	....
Door, for end of box or stock car, ventilated (wooden frame with iron rods), each, applied; no credit for scrap	3.30	....
Door, for side of box or stock car, wooden, each, applied; no credit for scrap	3.65	....
Door, for side of box or stock car, ventilated (wooden frame with iron rods), each, applied; no credit for scrap	5.50	....
Door, for side of carriage, automobile or furniture car, wooden, each, applied; no credit for scrap	5.00	....
Door, for side of stock car, with iron rods, each, applied; no credit for scrap	4.40	....
Door, for roof of coke car, wooden, each, applied; no credit for scrap	2.45	....
Door, for roof of stock car, wooden, each, applied; no credit for scrap	.85	....
Half door, for side of box or stock car, each, applied; no credit for scrap	2.50	....
Half door, for end of furniture or carriage car, each, applied; no credit for scrap	3.00	....
Hatch cover, for roof of refrigerator car, wooden, each, applied; no credit for scrap	1.50	....
Hatch plub, for refrigerator car, wooden, each, applied; no credit for scrap	1.50	....

Material.	8-Inch.	10-Inch.
Iron, galvanized ..... per lb.	$0.04	....
Journal bearings, brass or bronze, lined or unlined, per lb., applied	.20	.15
Journal bearings, filled brass or bronze shell, per lb., applied	.15	.11
The weight charged for new journal bearings for 7-inch journals and over but not 8 inches long, shall be 10 pounds; for scrap bearings, 6 pounds. The weight charged for new journal bearings for journals 8 inches long and less than 9 inches long shall be 13 pounds; for scrap bearings, 8 pounds. For new journal bearings for journals 9 inches long or over, but not 10 inches, 20 pounds; for scrap bearings, 12 pounds. For new journal bearings for 100,000-pound capacity cars (5½ by 10 inches) the weight shall be 25 lbs.; for scrap bearings, 15 pounds.		
Journal bearings, cast steel or malleable iron back, credit for scrap, per pound	....	.04
Labor, per hour	.24	....
Lumber—yellow, white and Norway pine, poplar, oak, hickory and elm, dressed and framed, per ft. B. M., required to make the part	.03½	....
Nails ..... per lb.	.03	....
Paint, lead, freight car, mixed ..... "	.15	....
Paint, mineral, freight car, mixed ..... "	.05	....
Pipe, ⅜-inch, per foot	.03	....
" 1-inch, "	.05	....
" 1¼-inch, "	.07	....
Steel for springs, rough ..... per lb.	.05	¾c.
" helical springs ..... "	.03½	.01
" pressed and sheet ..... "	.03½	½c.

Rule 95. Not more than one pound of mineral paint can be charged for 15 square feet of surface covered, and not more than one pound of lead paint of 12 square feet of surface covered. No charge to be made for lettering.

Rule 96. Whenever scrap credits are allowable, the weights of scrap credited shall be equal to the weights of the new metal applied, except as otherwise provided in the rules, and except in the case of scrap M. C. B. couplers, and parts of same, and material applied on defect cards, in which cases the weight and kind of metal removed shall be credited.

Rule 97. In the application of structural steel, it should be charged out at the current market price plus the necessary labor for drilling, etc.; credit should be at prices quoted above for similar metal.

Rule 98. Bills shall not be rendered for amounts less than 25 cents in aggregate, but charges for items less than 25 cents may be held until they amount to that sum, provided said aggregate is rendered within 6 days. No bill shall be returned for correction on account of error for less than 100 cents in aggregate of bill, but said bill shall be passed for payment at once, and the alleged error brought to the attention of the road rendering the same within sixty days from date of bill. The receiving road shall at once issue a letter of authority for counter bill to cover the acknowledged error, said letter to be attached to the bill as authority.

No bills shall be returned for correction on account of wrong car numbers, but road rendering bill should be communicated with by letter, and if, after investigation, it is found to be a fact that wrong car number has been given, correct number shall be furnished or credit covering amount of charge allowed on next month's bill.

When necessary to return bills for correction, all defect cards and repair cards stubs should be detached except those covering repairs to cars, the charge for which there may be some question as to its correctness.

Rule 99. All companies rendering bill should consolidate all charges against any one company into one monthly bill.

Rule 100. Journal bearings having a lining ⅜ inch thick or thicker, shall be charged as filled journal bearings, and not as lined journal bearings.

Rule 101. In rendering bills for owner's defects, the following should be observed:

No credit for scrap and no charge for labor shall be allowed in renewing brake shoes.

Rule 102. When M. C. B. coupler parts or metal brake beams are replaced, good second-hand material may be used, but they must be charged at 75 per cent of the prices when new. The credits for similar parts released from service in good condition must also be 75 per cent. of the prices when new.

Rule 103. Manufactured articles not included in the above list must be charged at current market prices, without freight charges.

Rule 104. No percentage to be added to either material or labor.

Rule 105. Bills for the following work, to make cars conform to United States laws and to conform to the requirements of Rule 64, must be rendered within 60 days after the work is done, and must state the height of the car before and after altering:

Altering height of one end of one car, net	$1.25
Putting on one handhold or grabiron, net	.25

Rule 106. The following table shows the number of hours which may be charged for labor in doing the various items of work enumerated, which includes all work necessary to complete each item of repairs, except in so far as labor is already included in charges for materials:

	Ordinary Cars.		Refrigerator Cars.	
	Hrs.	Charge for Labor.	Hrs.	Charge for Labor.
Advertisements, temporary, tacked on cars, removing, per car	..	$0.50	..	$0.50
Advertisements, temporary, pasted, glued or varnished on cars, removing, per car.	..	1.00	..	1.00
American continuous draft rods, one rod, welding	2	.48	2	.48
Arch bars, 1 or 2, replaced on same side of truck	3	.72	3	.72
Arch bar, upper or lower, or both, blacksmith ship labor, repairing	2	.48	2	.48
Axle, bent, straightening	4	.96	4	.96
Bolster, body, composite, one, replaced...	10	2.40	12	2.88
Bolster, body, plain metal or wood, one, replaced	8	1.92	10	2.40
Bolster, body, plain metal or wood, one, replaced when one or more defective sills are replaced	2	.48	2	.48
Bolster, composite, one, replaced when one or more defective sills are replaced.	4	.96	4	.96
Bolster truck, one, replaced	10	2.40	10	2.40
Bolster truck, one, and one spring plank in same truck, replaced	12	2.88	12	2.88
Brake beam, one, replaced	2	.48	2	.48
Brake beam, one, metal, blacksmith labor repairing	2	.48	2	.48
Brake beam, wooden truss, repairing....	1	.24	1	.24
Brake hanger, repaired and replaced.....	1	.24	1	.24
Brake shoe, applied on authority of defect card, when brake beam is not replaced..	½	.12	½	.12
Buffer blocks, cast-iron, each, replacing..	1	.24	1	.24
Carlin, one, replaced	3	.72	..	....
Carrier iron bolts, three or less, at one end of car, applied	2	.48	2	.48
Carrier iron bolts, all at one end of car, applied	3	.72	3	.72
Carrier iron bolts, 4 inches long or less, each	¼	.06	¼	.06
Center pin head applied, empty car.....	½	.12	½	.12
" " " " loaded car.....	3	.72	3	.72
Center pin head applied, empty car, and putting same end on center.....	1½	.36	1½	.36
Center pin head applied, loaded car, and putting same end on center.....	5	1.20	5	1.20
Center pin key applied, empty car, including placing same end on center, if necessary	1½	.36	1½	.36
Center pin key applied, loaded car, including placing same end on center, if necessary	2½	.60	2½	.60
Center plates, one or two, at same end, replacing	3	.72	3	.72
Center plate bolts, where same do not pass through draft timber, one or more, or all at same end.....	3	.72	3	.72
Center plate bolt or bolts and center plate replacing on one end of car.....	3	.72	3	.72
Column bolts, one or more, replaced in same truck	2	.48	2	.48
Corner iron, one, replaced.....	1	.24	1	.24
Corner post, one, replaced, empty car....	3	.72	6	1.44
Corner post, one, replaced, loaded car....	4	.96	6	1.44
Coupler with stem attachments, coupler springs, one or more follower plates, American continuous draft key, American continuous draft rods, one or more coupler stops, renewing or replacing any or all, at same end of car, at same time.	3	.72	3	.72
Coupler, with pocket attachments, coupler spring, one or more follower plates, one or more coupler stops, coupler pocket, coupler pocket rivets, renewing or replacing any or all, at same end of car at				

	Ordinary Cars. Hrs.	Ordinary Cars. Charge for Labor.	Refrigerator Cars. Hrs.	Refrigerator Cars. Charge for Labor.
same time	4	.96	4	.96
Coupler stop bolts, lug strap bolts or draft timber cross-tie bolts, 5 or less, at same end of car, when coupler is not replaced, each	½	.12	½	.12
Coupler stop bolts, lug strap bolts or draft timber cross-tie bolts, 6 or more, at same end of car, when coupler is not replaced	3	.72	3	.72
Cross-tie timber, one, replaced	3	.72	3	.72
Cross-tie timber, one, replaced when one or more defective sills are replaced	1	.24	1	.24
Dead block, wooden, replacing at one end of car	3	.72	3	.72
Door, end, old, rehanging	½	.12	..	....
Door, side, old, rehanging	1	.24	1	.24
Door post, one, replaced, empty car	3	.72	6	1.44
Door post, one, replaced, loaded car	4	.96	6	1.44
Draft timber, one, replaced	7	1.68	7	1.68
Draft timbers, two, on same end, replaced	10	2.40	11	2.64
Draft timber, one, renewed, when upper center plate bolts pass through rear end of draft timbers	10	2.40	10	2.40
Draft timber, two, renewed, when upper center plate bolts pass through rear end of draft timbers	13	3.12	14	3.36
Draft timber, one, renewed, when its center sill is renewed or spliced at same end of car	2	.48	2	.48
Draft timber, one, renewed, when its opposite center sill at same end of car is renewed or spliced	3	.72	3	.72
Draft timber bolts complete, at one end of car, replacing	3	.72	3	.72
Draft timber bolts, or carrier iron bolts, either or both, three or less, at one one end of car, replacing	2	.48	2	.48
Draft timber bolts, or carrier iron bolts, either or both, four or more, at one end of car, replacing	3	.72	3	.72
Draft timber bolts, when same do not pass through upper center plate, three or less.	2	.48	2	.48
Draft timber bolts, when same do not pass through upper center plate, four or more	3	.72	3	.72
Draft timber bolts, when one or more of the bolts pass through the center plate, add (No additional charge to be made in this case, if one or more or all of the center plate bolts at same end of car are renewed.)	3	.72	3	.72
Draft timber bolts, four or more at one end of car, replacing	2	.72	3	.72
End plank, one, renewed on gondola car—				
without angle irons	2	.48	..	....
with angle irons, bolted	3	.72	..	....
with angle irons, riveted	5	1.20	..	....
End planks, two, renewed on same end—				
without angle irons	2½	.60	..	....
with angle irons, bolted	3½	.84	..	....
with angle irons, riveted	5½	1.32	..	....
End planks, three, renewed on same end—				
without angle irons	3	.72	..	....
with angle irons, bolted	4	.96	..	....
with angle irons, riveted	6	1.44	..	....
End planks, four, renewed on same end—				
without angle irons	3½	.84	..	....
with angle irons, bolted	4½	1.08	..	....
with angle irons, riveted	6½	1.56	..	....
End plate, one, replaced	12	2.88	14	3.36
End post, one, replaced, empty car	3	.72	6	1.44
End post, one, replaced, loaded car	4	.96	6	1.44
Journal box, one, replaced	2	.48	2	.48
Journal boxes, two, on same axle, replaced	3	.72	3	.72
Journal box, one or two, replaced on same axle, solid pedestal truck	4	.96	4	.96
Journal boxes, three or four, replaced, same truck, solid pedestal truck	5	1.20	5	1.20
Journal box bolt, one or two, replaced, same box	1	.24	1	.24
Journals, truing up one or two, on same axle	2	.48	2	.48
Platform plank, one, replaced	1	.24	1	.24
Relasing rod for M. C. B. coupler, one, replaced	½	.12	½	.12
Roof boards, single, including removing and replacing running board, per lineal foot	..	.07	..	.07
Roof boards, double board roof, including removing and replacing running board, per lineal foot	..	.09	..	.09
Running board, complete, applied	6	1.44	6	1.44
Spring plank, one, replaced	10	2.40	10	2.40
Side plank, one, renewed on gondola car—				
without angle irons	4	.96	..	....
with angle irons, bolted	7	1.68	..	....
with angle irons, riveted	8	1.92	..	....
Side planks, two, renewed on same side—				
without angle irons	5½	1.32	..	....
Side planks, two—				
with angle irons, bolted	8	1.92	..	....
with angle irons, riveted	9	2.16	..	....
Side planks, three, renewed on same side—				
without angle irons	7	1.68	..	....
with angle irons, bolted	9	2.16	..	....
with angle irons, riveted	10	2.40	..	....
Side planks, four, renewed on same side—				
without angle irons	8½	2.04	..	....
with angle irons, bolted	10	2.40	..	....
with angle irons, riveted	11	2.64	..	....
Side plate, one, applied	25	6.00	35	8.40
Side plate, one, spliced	8	1.92	15	3.60
Side post, one, replaced	3	.72	6	1.44
Siding, removed and replaced, per lineal foot	..	.15	..	.15
Siding, removed and replaced, where nails are set and holes puttied	..	....	..	.20
SILLS:				
1 center sill, spliced	16	3.84	20	4.80
2 center sills, spliced	22	5.28	26	6.24
1 center sill, replaced	35	8.40	47	11.28
2 center sills, replaced	41	9.84	68	16.32
1 end sill under siding, replaced	15	3.60	15	3.60
1 end sill outside siding, replaced	7	1.68	7	1.68
1 end sill under siding, replaced when one or more defective sills have been replaced	3	.72	3	.72
1 end sill under siding, renewed, when one or more defective sills have been spliced	10	2.40	10	2.40
1 end sill outside siding, replaced when one or more defective sills have been replaced	2	.48	2	.48
1 end sill, outside siding, renewed, when one or more defective sills have been spliced	3	.72	3	.72
1 intermediate sill, replaced	32	7.68	43	10.32
2 " sills, "	38	9.12	59	11.16
3 " " "	44	10.56	69	16.56
4 " " "	50	12.00	79	18.96
1 inter. sill and 1 center sill replaced	41	9.84	63	15.12
1 " " " 2 " sills "	47	11.28	84	20.16
2 " sills " 1 " sill "	46	11.04	73	17.52
2 " " " 2 " sills "	58	12.72	94	22.56
3 " " " 1 " sill "	51	12.24	83	19.92
3 " " " 2 " sills "	63	15.12	104	24.96
4 " " " 1 " sill "	63	15.12	93	22.32
4 " " " 2 " sills "	68	16.32	114	27.36
1 intermediate sill, spliced	11	2.64	14	3.36
1 side sill and 1 center sill replaced	51	12.24	68	16.32
1 " " " 2 " sills "	56	13.44	89	21.36
2 " sills " 1 " sill "	71	17.04	89	21.36
2 " " " 2 " sills "	74	17.76	110	26.40
1 " sill spliced	12	2.88	15	3.60
1 " sill replaced	25	6.00	44	10.56
2 " sills "	40	9.60	65	15.60
1 " sill and 1 inter. sill replaced	47	11.28	63	15.12
1 " " " 2 " sills "	53	12.72	73	17.52
1 " " " 3 " " "	59	14.16	83	19.92
1 " " " 4 " " "	65	15.60	93	22.32
2 " sills " 1 " sill "	61	14.64	84	20.10
2 " " " 2 " sills "	67	16.08	94	22.56
2 " " " 3 " " "	73	17.52	104	24.96
2 " " " 4 " " "	79	18.96	114	27.36
1 " 1 inter. and 1 center sill replaced.	56	13.44	84	20.16
2 " 1 " " 1 " " "	77	18.48	105	25.20
1 " 2 " " 1 " " "	61	14.64	94	22.56
2 " 2 " " 1 " " "	79	18.96	115	27.60
1 " 3 " " 1 " " "	66	15.84	104	24.96
2 " 3 " " 1 " " "	84	20.16	125	30.00
1 " 4 " " 1 " " "	71	17.04	114	27.36
2 " 4 " " 1 " " "	89	21.36	135	32.40
1 " 1 " " 2 " sills "	61	14.64	105	25.20
2 " 1 " " 2 " " "	79	18.96	126	30.24
1 " 2 " " 2 " " "	66	15.84	115	27.60
1 " 3 " " 2 " " "	72	17.28	125	30.00
1 " 4 " " 2 " " "	77	18.48	135	32.40
2 " 2 " " 2 " " "	84	20.16	136	32.64
2 " 3 " " 2 " " "	89	21.36	146	35.04
2 " 4 " " 2 " " "	94	22.56	156	37.44
Each side or inter. sill spliced, when longitudinal sills have to be replaced, or when other sills are spliced at same end.	3	.72	3	.72
1 center sill, spliced, when intermediate or side sills have to be replaced	8	1.92	9	2.16
1 center sill, spliced, when other center sill has to be replaced	6	1.44	7	1.68
Stakes, end, on gondola cars, applied, each.	1½	.36	..	....
Stakes, side, on gondola cars, applied, each	1½	.36	..	....
Truck springs, one, or all in same truck, replacing	2	.48	2	.48
Truck transom, one, wood, replaced	10	2.40	10	2.40
Truck transoms, two, wood, replaced in same truck	12	2.88	12	2.88
Weighing and restenciling car, per Rule 72	1¼	.30	1¼	.30
When necessary to remove load to replace body center plate, bolt or bolts, one or two draft timbers, or draft timber bolts, at one end of car	3	.72	3	.72

REPAIRS OF STEEL CARS.

All rivets, 10 cents per rivet, which covers removal and replacing of rivets, including removing, fitting, punching or drilling holes when applying patches or splices and replacing damaged parts, not to include straightening or repairing.

Straightening or repairing parts removed from damaged car, 50 cents per 100 pounds.

Straightening or repairing parts in place in damaged car; also any parts that require straightening, repairing or renewing, not included on rivet basis, 24 cents per hour.

Credit for scrap material removed from cars constructed of pressed or structural steel, ½ cent per pound.

RULE 107. No charge to be made for labor of re-

placing or applying M. C. B. knuckles, knuckle pins, locking pins, clevises, clevis pins, lift chains, brake shoes or brake-shoe keys, except on the authority of a defect card.

No charge to be made for adjusting brakes.

RULE 108. When it is necessary to apply an M. C. B. coupler complete, on account of a broken or missing knuckle, the usual labor charge for replacing a coupler can be made.

RULE 109. No additional labor to be charged for applying center pins or friction rollers or for putting car on center, when center-plate bolts or center plates are renewed on same end of car.

RULE 110. No additional labor to be charged for renewing dead block or platform plank in end sill at same end is renewed or replaced.

RULE 111. No additional labor to be charged for replacing or renewing coupler when one or both draft timbers are replaced or renewed at the same end of car at the same time.

When one or more carrier iron bolts are replaced, where coupler at same end of car is removed and replaced for any other reason, the regular labor charge should be reduced one hour.

RULE 112. The following table shows the labor charges allowable for air-brake repair work. The letters "R. & R." mean "removed and replaced."

	Cents.
Air hose, R. & R.	3
Angle cock, R. & R.	7
Angle cock handle, R. & R.	4
Angle cock, grinding in	28
Check valve case, spring, gasket, or all, R. & R.	10

DETAILS.	Cents.
Disconnecting union	3
Check valve case (two cap screws)	2
Emergency valve seat	5
Total	10

Coupler, dummy, R. & R. (1 lag screw)	1
Cut-out cock, R. & R.	9

DETAILS.	Cents.
1 union disconnected	3
2 pipe connections	6
Total	9

Cut-out cock handle, R. & R.	4
Cylinder, R. & R.	30

DETAILS.	Cents.
Push rod (1 connecting pin)	3
Clamping piston (1 cap screw)	2
Cylinder head, R. & R. (4 nuts ½ inch, 1 cent each)	4
Disconnecting cylinder from reservoir (7 nuts, ½ inch, 1 cent each)	7
Reclamping cylinder piston (1 cap screw)	2
Removing cylinder from car (6 nuts, ⅝ inch, 2 cents each)	12
Total	30

Cylinder and reservoir, R. & R.	41

DETAILS.	Cents.
Removing push rod (1 connecting pin)	3
Removing cylinder head (4 nuts, ½ inch, 1 cent each)	4
Removing cylinder from car (6 nuts, ⅝ inch, 2 cents each)	12
Removing reservoir from car (2 nuts, ⅝ inch, 2 cents each)	4
Removing release rods (2 spring cotters)	4
Removing release valve	2
Removing two plugs	2
Removing triple (2 nuts, ⅝ inch, 2 cents each)	4
Disconnecting train pipe union	3
Disconnecting retaining pipe unions	3
Total	41

Cylinder and reservoir, tightening when loose (8 nuts 1c each)	8
Cylinder cleaned, oiled, tested and stenciled	33

DETAILS.	Cents.
Removing push rod (1 connecting pin)	3
Clamping piston (1 cap screw)	2
Removing cylinder head (4 nuts, ½ inch, 1 cent each)	4
Cleaning, testing and stenciling	24
Total	33

Cylinder release spring, R. & R.	11

DETAILS.	Cents.
Removing push rod (1 connecting pin)	3
Clamping cylinder piston (1 cap screw)	2
Removing cylinder head (4 nuts, ½ inch, 1 cent each)	4
Reclamping cylinder head (1 cap screw)	2
Total	11

Cylinder gasket, R. & R.	25

DETAILS.	Cents.
Disconnecting triple union	3
Disconnecting retaining pipe union	3
Disconnecting reservoir block (2 nuts, ⅝ inch, 2 cents each)	4
Disconnecting reservoir from cylinder (7 nuts, ½ inch, 1 cent each)	7
Removing push rod (1 connecting pin)	5
Clamping cyinder piston	1
Removing release rods (2 spring cotters)	4
Total	25

Emergency check valve, grinding in	10
Emergency valve piston, R. & R.	10

DETAILS.	Cents.
Disconnecting union	3
Removing check valve case (2 cap screws)	2
Removing emergency valve seat	5
Total	10

Emergency valve seat, R. & R. (see E. V. piston)	10
Emergency valve, rubber seat, R. & R.	10

DETAILS.	Cents.
Disconnecting union	3
Removing check valve case (2 cap screws)	2
Removing riveted pin	4
Removing emergency valve nut	1
Total	10

Cylinder piston packing, R. & R.	13

DETAILS.	Cents.
Removing push rod (1 connecting pin)	3
Clamping cylinder piston (1 cap screw)	2
Removing cylinder head (4 nuts, ½ inch, 1 cent each)	4
Removing leather packing (4 nuts, ½ inch, 1 cent each)	4
Total	13

Cylinder piston, R. & R.	15

DETAILS.	Cents.
Removing push rod (1 connecting pin)	3
Clamping cylinder piston (1 cap screw)	2
Removing cylinder head (4 nuts, ½ inch, 1 cent each)	4
Removing leather packing (4 nuts, ½ inch, 1 cent each)	4
Reclamping cylinder piston (1 cap screw)	2
Total	15

Gasket, coupling, R. & R.	2
Graduating nut, stem, spring or all, R. & R.	2
Oil plugs, R. & R., each	2
Packing leather expander, R. & R. (see cylinder piston)	6
Pipe, train or branch, R. & R., for each connection made	3
Push rod, R. & R. (1 connecting pin)	3
Release valve, R. & R.	6

DETAILS.	Cents.
Disconnecting release rod (2 spring cotters)	4
Disconnecting release valve	2
Total	6

Release valve, removed, repaired and replaced (R. & R., 4c)	9
Release valve rod, removed, repaired and replaced	3

DETAILS.	Cents.
1 spring cotter	2
Removing staple	1
Total	3

Reservoir, R. & R. 29

DETAILS.	Cents.
Removing from car (2 nuts, ⅝ inch, 2 cents each)	4
Disconnecting from cylinder (7 nuts, ½ inch, 1 cent each)	7
Removing release rods (2 spring cotters)	4
Removing release valve	2
Removing two plugs	2
Removing triple valve (2 nuts, ⅝ inch, 2 cents each)	4
Disconnecting union	3
Disconnecting union, retaining pipe	3
Total	29

Removing cylinder cap (3 nuts, ½ inch, 1c each) 3
Removing slide valve (3 nuts, ½ inch, 1c each) 3
Repairing retaining valve (R. & R., 5c) 10
Retaining valve, R. & R. (2 lag screws, 2c; valve, 3c) 5
Slide valve, removed, ground in and replaced 33
Slide valve spring, R. & R. 6

DETAILS.	Cents.
Cylinder cap (3 cap screws)	2
Removing riveted pin	4
Total	6

Strainer, R. & R. (disconnecting union) 3
Triple cylinder cap, R. & R. (3 nuts, ½ inch, 1c each) 3
Triple cylinder cap gasket, R. & R. (3 nuts, ½ inch, 1c each) 3
Triple piston packing ring, fitted 17
Triple valve, removed, cleaned, oiled, tested and stenciled 40

DETAILS.	Cents.
Train pipe union disconnected	3
Retaining pipe union disconnected	3
Removing tripe (2 nuts, ⅝ inch, 2 cents each)	4
Check valve case (2 cap screws)	2
Emergency valve seat	5
Cylinder cap (3 bolts)	3
Cleaning, testing and stenciling	20
Total	40

Triple valve gasket, R. & R. 10

DETAILS.	Cents.
Disconnecting branch pipe union	3
Disconnecting retaining pipe union	3
Removing triple (2 nuts, ⅝ inch, 2 cents each)	4
Total	10

Unions disconnected and connected 3

The following basic units were used in determining the details of prices given above. These units are not to be used in rendering bills, but may be used in the determination of cost of other combinations of air brake repairs not above mentioned.

	Cents.
Cap screws or studs or bolts, R. & R., one or more	2
Cylinder cleaning, testing and stenciling	24
Emergency valve seat, R. & R.	5
Graduating steam nut, R. & R.	2
Lag or wood screws, R. & R., each	1
Nuts tightened when loose, each	1
Nuts, ½ inch or less, R. & R., 1 or 2 on same bolt	1
Nuts, ⅝ inch or over, R. & R., 1 or 2 on same bolt	2
Pins connecting R. & R. (including split key)	5
Pins riveted, R. & R., each	4
Plugs, oil, R. & R., each	1
Spring cotters, R. & R., each	2
Staples, R. & R., each	1
Testing air (after repairs)	5
Threads on pipe, cutting, per coupling	5
Train or branch pipe, disconnected and connected, or only connected, each connection	3
Triple valve, cleaning, testing and stenciling	20
Union disconnected and connected	3

RULE 113. The settlement prices of new eight-wheel cars shall be as follows, with an addition of $27.50 for each car equipped with 8-inch air-brake equipment and $35 for 10-inch air-brake equipment. The road destroying a car with air brakes may elect to return the air-brake apparatus, including such attachments as are usually furnished by the air-brake manufacturer, complete and in good condition:

BODIES.

Wood.

Box car, eight-wheel, 40 feet long or over	$440.00
Box car, eight-wheel, 36 feet long or over, but under 40 feet	385.00
Box car, eight-wheel, 34 feet long or over, but under 36 feet long	360.00
Box car, eight-wheel, 32 feet long or over, but under 34 feet long	330.00
Box car, eight-wheel, under 32 feet long	265.00
Box car, ventilated, eight-wheel, 40 feet long or over	470.00
Box car, ventilated, eight-wheel, 36 feet long, but under 40 feet	415.00
Box car, ventilated, eight-wheel, 34 feet long, but under 36 feet	385.00
Flat car, eight-wheel, plain, 40 feet long or over	200.00
Flat car, eight-wheel, plain, 32 feet long or over, but under 40 feet	155.00
Flat car, eight-wheel, plain, under 32 feet long	110.00
Gondola car, eight-wheel, drop-bottom, 40 tons capacity or over	330.00
Gondola car, eight-wheel, drop-bottom, 30 tons capacity or over, but under 40 tons	300.00
Gondola car, eight-wheel, drop-bottom, 25 tons capacity or over, but under 30 tons	275.00
Gondola car, eight-wheel, drop-bottom, 20 tons capacity or under	200.00
Gondola car, eight-wheel, hopper-bottom, 50 tons capacity	440.00
Gondola car, eight-wheel, hopper-bottom, 40 tons capacity or over, but under 50 tons	360.00
Gondola car, eight-wheel, hopper-bottom, 30 tons capacity or over, but under 40 tons	330.00
Gondola car, eight-wheel, hopper-bottom, 25 tons capacity or over, but under 30 tons	290.00
Gondola car, eight-wheel, hopper-bottom, 20 tons capacity or less	220.00
Gondola car, eight-wheel, plain, 50 tons capacity and over	350.00
Gondola car, eight-wheel, plain, 40 tons capacity, but under 50 tons	300.00
Gondola car, eight-wheel, plain, 30 tons capacity, but under 40 tons	275.00
Gondola car, eight-wheel, plain, 25 tons capacity, but under 30 tons	250.00
Gondola car, eight-wheel, plain, under 25 tons	140.00
Stock car, eight-wheel, 34 feet long or over	330.00
Stock car, eight-wheel, 32 feet long or over, but under 34 feet	300.00
Stock car, eight-wheel, under 32 feet long	265.00

The lengths of cars above mentioned refer to the lengths over the end sills.

In the case of double-deck stock cars, $25 may be added to the prices given above for stock cars.

Where the capacity of the car is 60,000 pounds or over, 10 per cent. should be added to the above prices for the car bodies.

When cars of 60,000 pounds capacity or over and so

stenciled, have trucks with journals 4 inches or over in diameter when new, $40 per car shall be added to the figure as given above for the values of car bodies, when equipped with metal bolsters.

When cars are equipped with metal center sills, $40 shall be added to the values of bodies for cost of such metal sills.

Steel.

Box car, wooden body, metal underframe, eight-wheel, 50 tons capacity, 38 feet 6 inches or over, over end sills	825.00
Box car, wooden body, metal underframe, eight-wheel, less than 50 tons capacity, 36 feet long or over	740.00
Flat car, wooden floor, metal underframe, eight-wheel, 50 tons capacity, 40 feet over end sills	770.00
Flat car, wooden floor, metal underframe, eight-wheel, 40 tons capacity, 40 feet over end sills	590.00
Flat car, wooden floor, metal underframe, eight-wheel, 40 tons or over, but under 50 tons, 34 feet long over end sills, but under 40 feet	510.00
Gondola car, all metal, eight-wheel, hopper bottom, 50 tons capacity, 33 feet over end sills	825.00
Gondola car, all metal, eight-wheel, drop bottom, 50 tons capacity, 40 feet over end sills	815.00
Gondola car, all metal, eight-wheel, plain, 50 tons capacity, 40 feet over end sills	790.00
Gondola car, wooden body, metal underframe, eight-wheel, flat bottom, 40 feet over end sills	790.00
Gondola car, wooden body, metal underframe, eight-wheel, hopper-bottom, 32 feet over end sills, but under 40 feet	650.00
Stock-car, eight-wheel, wooden body, metal underframe, less than 50 tons capacity, 36 feet long or over	715.00

TRUCKS.

50,000 lbs. capacity, with metal transoms and wooden bolster, per pair	$215.00
60,000 lbs. capacity or under, with wooden bolster, per pair	215.00
60,000 lbs. capacity, but under 80,000 lbs., all metal, per pair	315.00
80,000 lbs. capacity, but under 100,000 lbs., all metal, per pair	400.00
100,000 lbs. capacity or over, all metal, per pair	425.00

Prices include brake beams complete, truck levers, dead lever guides and bottom connection rods.

For trucks with steel or steel-tired wheels an additional allowance of $112 per car shall be made.

All trucks in service of 60,000 pounds capacity or over, which consist entirely of metal, with the exception of the spring plank, shall be known hereafter as all-metal trucks.

Rule 114. In the case of wooden car bodies the depreciation due to age shall be figured at 6 per cent. per annum upon the yearly depreciated value of such car bodies.

In the case of all-steel car bodies the depreciation shall be figured at 5 per cent per annum.

In the case of car bodies with steel underframes the depreciation shall be figured at 5½ per cent per annum, with the exception of steel underframe flat cars having wooden floors, which shall be figured at 5 per cent per annum.

The depreciation on trucks other than all-metal shall be figured at 6 per cent per annum.

The depreciation on all-metal trucks shall be figured at 5 per cent per annum.

Allowances for depreciation shall in no case exceed 60 per cent of the value new.

The amounts $27.50 and $35.00 for air brakes shall not be subject to any depreciation.

Rule 115. The bodies of refrigerator cars, stock cars prmanently fitted for stall shipments, tank cars, except the tanks, and other freight cars, designed for special purposes, not referred to above, shall be settled for at the present cost price, as may be agreed to by the parties in interest, less the deduction for depreciation due to age, which shall be on the same basis as for freight equipment.

In the case of cars equipped with racks for carrying coke and for other such purposes, and also stock cars, other than those permanently fitted for stall shipments, with feeding and watering attachments, the actual cost of these equipments shall be added to the standard settlement price for such cars.

Rule 116. In rendering bills, cars shall be treated as belonging to companies or individuals whose name or initials they bear, except in case of Line Cars where the equipment list of the general officers of the Line designates a party to make settlement.

Rule 117. Switching roads will only be allowed to render bills against car owners for the following defects repaired by them: Roof lost on account of decay or faulty construction, wornout brasses, broken truck springs, truck transoms, arch bars, draft-timber bolts, column bolts, truck hangers, truck hansom truss rods, truck bolters, truck bolster truss rods, oil boxes, spring planks, truck hanger pins, side bearings and center plate, center plate bolts, center pins, followers, American continuous rods or keys, draft springs, couplers, knuckles and drawbar pockets and rivets, defective wheels as specified in Rules 7 to 18, inclusive, defective axles as described in Rules 22 and 23, worn-out parts of brakes as prescribed in Rule 30, cars not within the limits of standard height for couplers, as per Rule 39, safety appliances as prescribed by Rule 40, and grain doors and all inside or concealed parts of bodies of cars missing or damaged under fair usage as prescribed in Rule 38, provided the damage has not been caused by derailment or rough usage. They will be allowed to render bills direct against car owners on all car owners' defects on cars received by them from a railroad company, provided they procure joint evidence from the delivering road that such car owners' defect existed when the car was delivered by the railway company, joint evidence to accompany the bill against the car owner.

Rule 118. A switching road is a corporation doing the major part of its business on a switching charge.

Rule 119. Bills may be rendered against car owners for the cost of applying temporary running boards and hand rails to make cars safe for trainmen.

Destroyed Cars and the Return of Trucks.

Rule 120. The company on whose line the bodies or trucks are destroyed shall report the fact to the owner immediately after their destruction, and shall have its option whether to rebuild or settle for the same.

Rule 121. If the company on whose lines the car is destroyed elects to rebuild either body or trucks, or both, the original plan of construction must be followed, and the original kind and qualities of materials used. The rebuilding must be completed within 60 days from the original date of damage or destruction.

In such cases no allowance shall be made for betterments.

Rule 122. If only the body of a car is destroyed, and the company destroying it elects to return the trucks, they shall be put in good order, or accompanied by a defect card, covering all defects or improper repairs made by them for which owners are not responsible, and forwarded, within 60 days, free of freight or other charges, to the nearest point on the line of the company owning or operating the car, and the number, line and class of car destroyed shall be stenciled or painted on each truck so returned.

Rule 123. The company on whose line the body or trucks of a car are seriously damaged, but not destroyed, may notify the owner and ask an appraisement on the damage done to the car as a basis for the disposal of the damaged car.

Rule 124. For the mutual advantage of railway companies interested, the settlement for a car owned or controlled by a railway company, when damaged or destroyed upon a private track, shall be assumed by the railway company delivering the car upon such tracks.

Sending Home Worn-out and Damaged Cars.

Rule 125. A car unsafe to load on account of general worn-out condition, due to age or decay, shall be reported to its owner, who must be advised of all existing defects. If the owner elects to have it sent home, he shall furnish two home cards, noting upon them existing defects and the route over which the car is to be returned to its owner. If the route coincides with that over which the car passed to the point where it became unserviceable, no liability shall be incurred as between the owner and the road handling the car, either for freight charges in handling the car or for car service during this movement.

Such cards shall be attached to each side of the body of the car. They shall be 3½ by 8 inches, and of the form shown below. They shall be printed on both sides, and shall be filled in on both sides with ink or black indelible pencil:

FROM
..... R. R.
TO
..... R. R.
VIA
.....
.....
Car No .....Initials .....
To be shopped for .....
.....
.....
.....
(Head of Car Department.)

Rule 126. A car which is safe to run, but unsafe to load on account of serious damage caused by wreck or accident, shall be reported to the owners for appraisement and disposition, and disposed of as provided in Rule 125, if the owner so elects.

Rule 127. In case of cars of private ownership sent home on account of general worn-out condition due to age or decay, such cars shall be entitled to as many miles of homeward movement, free of charge to owners, as they may have been handled over said line under load, and no mileage to be paid to owners by roads handling. If the haul necessary to get cars home is in excess of such loaded mileage, said excess will be billed against the owner at regular freight rates and the owner notified.

Rule 128. Private line cars sent home to owners on account of being wrecked or damaged in accident shall be regularly billed home free of charge to owners and owners notified, providing such homeward movement passes over roads which have handled the cars loaded, previous to their homeward empty movement; otherwise the damaged cars to travel home empty, free of charge and free of mileage according to home route; or, if owners prefer to have them billed home via direct line, then charges to accrue to such line over which cars were not entitled to free movement.

Furnishing Materials.

Rule 129. Companies shall promptly furnish to each other upon requisition, and forward free over their own road, material for repairs of their cars damaged upon foreign lines, excepting that the company having car in its possession at the time shall provide from its own stock the following:

Lumber, forgings, hardware stock, paint, hairfelt, piping, air-brake material and all M. C. B. standard material.

Requisitions for such material shall specify that same is for repairs of cars, giving car number and initial of such car, together with pattern number or other data to enable correct filling of requisition.

Conditions of Acceptance of this Code.

Rule 130. Any car owner or railway company may become a party to this Code of Rules by giving notice through one of its general officers to the Secretary of the Master Car Builders' Association.

Railroad companies becoming subscribers to this Code of Rules must have a representative member in the Master Car Builders' Association.

Rule 131. Any car owner or railway company that is a party to this Code of Rules shall be bound by same through its successive revisions, until one of its general officers files with the Secretary of the Master Car Builders' Association its notification of withdrawal.

Rule 132. Acceptance or rejection of this Code of Rules must be as a whole, and no exception to an individual rule or rules shall be valid.

Settlement of Disputes.

Rule 133. In order to settle disputes arising under the rules, and to facilitate the revision of the rules at the annual conventions of the Association, an Arbitration Committee of five representative members shall be appointed annually by the Executive Committee; three members of this committee to constitute a quorum.

In case of any dispute or question arising under the rules between the subscribers to said rules, the same may be submitted to this committee through the secretary, in abstract jointly, said abstract setting forth the point or points at issue, and each party's interpretation of the rules upon which its claim is based, clearly and concisely, not exceeding three typewritten pages of letter size, single space, which shall be signed by both parties to the dispute. Should one of the parties refuse or fail to furnish the necessary information, the committee shall use its judgment as to whether, with the information furnished, it can properly give its opinion. The decisions of the committee shall be final and binding upon the parties concerned. This committee shall report its decisions to the Association, and its report shall be incorporated in the annual report of proceedings of the Association.

Revision of this Code of Rules.

Rule 134. The Arbitration Committee shall ask for suggestions of changes, amendments and additions to these rules prior to each annual convention, which it shall consider, and it shall report its recommendations to the succeeding annual convention.

Rule 135. In the revision of these rules by the Asso-

ciation, a two-thirds vote shall be necessary for adoption.

Rule 136. Voting powers shall be the same as prescribed in the Constitution of the Master Car Builders' Association on matters pertaining to the adoption of standards and the expenditure of money.

Rule 137. This Code of Rules shall be introduced for the discussion and revision at one session of the Master Car Builders' Association convention each year.

Rule 138. This Code of Rules shall take effect September 1, 1908.

Passenger Equipment.

1. Each railway company shall give to foreign cars, while on its line, the same care as to oiling, packing and inspection that it gives its own cars, except in case of cars on which work is done under special agreement existing between the company owning the cars and the Road operating the same.

2. The expenses of maintenance of passenger equipment operated in interchange or line service, shall be divided into three classes, namely:

(a) Owner's defects.

(b) Delivering company's defects.

(c) Line expenses proratable against the roads comprising the lines on a mileage basis.

3. (a) Owner's defects are those due to ordinary wear and tear.

(b) Delivering company's defects are those due to unfair usage, derailment or accident. Delivering company is solely responsible to car owners for any improper repairs made by them.

(c) Line expenses shall consist of the expense of terminal cleaning, lubrication (oil, waste, tallow and labor), lighting (oil, wicks, chimneys, burners, shades, gas, candles and broken glass).

4. The railway making the repairs for the defects not proratable against the line is privileged to bill the car owner for these repairs, unless there is evidence to indicate that the damage was occasioned by unfair handling on the part of the delivering company.

5. Information as to mileage made by cars must be furnished promptly on request of owners by railways over which cars are run.

6. Only one journal bearing per journal may be charged per trip.

7. No labor charge shall be made for applying brake shoes, journal bearings, hose (air, steam or signal) or for icing, filling lamps, gassing tanks or coaling cars.

8. No credit to be allowed for scrap brake shoes removed.

Note.—Steel back brake shoes not to be removed if one one-half (½) inch thick; gray iron shoes not to be removed if over three-quarter (¾) inch thick.

9. Loss of metal from tires of steel-tired wheels, caused by flat sliding, is chargeable to the company on whose road the damage occurs.

Note.—Loss of service metal from steel-tired wheels as a result of sliding to be measured from point where slide begins. One-sixteenth (1/16) inch of metal to be allowed for flat spots under two and one-half (2½) inches long and one-eighth (⅛) inch of metal to be allowed for flat spots two and one-half (2½) to three and one-half (3½) inches in length, both inclusive.

10. (a) Axles broken under fair usage or having journals one-half (½) inch or more under the standard for car (except for three and three-quarters by seven (3¾ by 7) which will be condemned at three and one-half (3½) inches) may be renewed at the expense of the car owner. Size of journal should be stenciled on truck.

(b) Cut journals, axles bent or broken or rendered unsafe by unfair usage, derailment or accident, shall be renewed at the expense of the railway on whose line the damage occurs.

(c) Where necessary to true up axles in cases of cut journals, where the journal is reduced below the limit as prescribed in Rule 10a, axle must be changed at the expense of company cutting journal.

Charge for car heating to be 15 cents per day per car.

11. Cars lying at stations for over forty-eight hours, expense of heating to be borne by railway in whose possession cars may be.

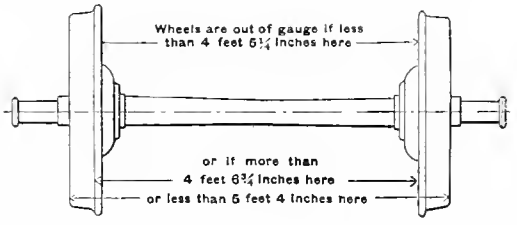
12. (a) Brakes must be in perfect working order. Cylinders and triple valves must have been cleaned and oiled within six (6) months, and in case of cars equipped with high speed brakes, triple and high-speed valves must be cleaned every three (3) months and date of last cleaning and oiling stenciled on brake cylinder and triple valve with white paint.

(b) The adjustment of piston travel based on not less than seventy (70) pounds initial pressure must not be less than five (5) inches nor more than eight (8) inches.

Defects in Wheels—Owners Responsible.

13. (a) Loose wheels.

(b) Variation from gage if less than 4 feet 5¼ inches inside of wheel at flange, or, if more than 4 feet 6¾ inches outside of flange or less than 5 feet 4 inches outside of tread.



Wheels—Cast-iron.

14. (a) Shelled out; wheels with defective treads on account of pieces shelling out; if the spots are over one (1) inch or so numerous as to endanger the safety of the wheel.

(b) Tread worn hollow; if tread is worn hollow ⅛ inch or over.

(c) Worn flanges; flanges having flat vertical surfaces extending more than ¾ inch from tread, or, flanges less than 1⅛ inches thick.

(d) Burst; if wheel is cracked from wheel fit outward by pressure from axle.

(e) Flange, rim, tread, plate brackets or any other part of wheel, either cracked, chipped or broken under fair usage.

Wheels—Steel-tired.

15. (a) Loose, broken or cracked hubs, plates, bolts, retaining ring or tire, occurring under fair usage.

(b) Worn flange or tire; with flange less than 1⅛ inches thick or having flat vertical spot extending more than ¾ inch from tread, or with tire thinner than shown in Figs. 1, 2, 3, 4, 5 and 6.

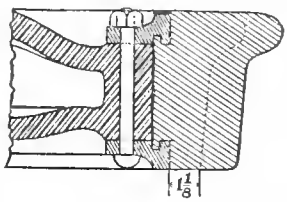


Fig. 1.

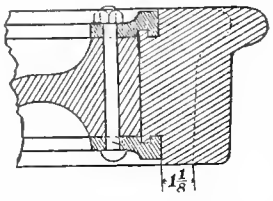


Fig. 2.

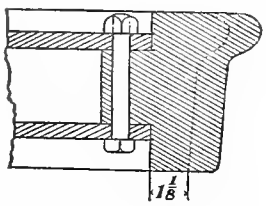


Fig. 3.

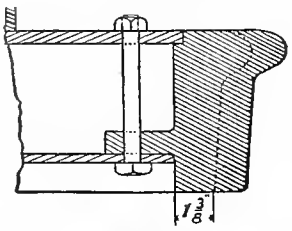
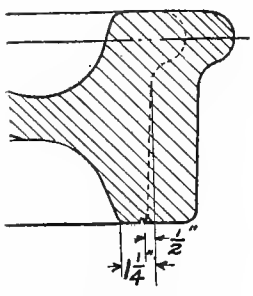
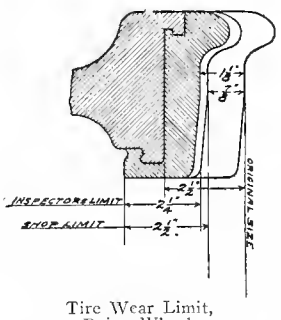


Fig. 4.



Rolled Steel Wheel.
Fig. 5.



Tire Wear Limit,
Boise Wheel.
Fig. 6.

DELIVERING COMPANY RESPONSIBLE.

16. Flat spots; if flat spots, caused by sliding, exceed one inch in length.

17. (a) If a car is transferred from service of one railway to that of another, the receiving road shall issue gas certificate authorizing the delivering road to bill against it for the number of atmospheres of gas and number of holders at the time car was received.

(Name of Road.)

GAS CERTIFICATE.

.....
Car Number ..... Initial .....
Number of Atmospheres .....
Number of Holders .....
Size of Holders .....
..... Station, ... 190
..... Inspector.

(b) Cars in interchange requiring holders to be filled, the receiving road shall be charged for the quantity of gas supplied.

(c) For cars stored in shops for repairs the company having car in its possession shall be responsible to the delivering company for the gas in holders. This will apply to sleeping-car companies when cars are in their possession and out of service.

(d) Private or other cars, except regular line cars, when offered in interchange equipped with steam hose couplings that will not couple with the standard on the receiving line must be changed by receiving company; the hose removed to accompany car or be returned to delivering company.

18. The depreciation of all passenger equipment cars due to age shall be figured at 3 per cent per annum upon the yearly depreciated value of same, to continue not to exceed 50 per cent of its original value. The above method of depreciation applies equally to either bodies or trucks of such cars. No depreciation shall be allowed on the value of air brakes.

19. This code of rules is to apply to all equipment interchanged in passenger trains.

20. Bills for line charges shall be made and rendered monthly and prices for materials and labor shall be in accordance with accompanying schedule.

21. Air-brake hose applied subsequent to September 1, 1906, must be made in accordance with M. C. B. specifications and so labeled.

22. This Code of Rules shall take effect September 1, 1908.

LIST OF PRICES FOR MAINTENANCE OF PASSENGER EQUIPMENT IN INTERCHANGE.

		New.	S. H.	Scrap.
1	Axles, 5 by 9 inches	$17.75	$10.00	$6.50
	Axles, 4¼ x 8 inches	14.00	7.75	5.25
	Axles, 3¾ by 7 inches	11.50	6.25	4.25
2	Burners, round wick, each			.50
3	Burners, dual wicks, each			.30
4	Bell or signal cord and couplings, per car			.75
5	Bearings, journal, applied, per lb			.20
6	Bearings, journal, credit for scrap bearing one-half weight of new bearing, per lb			.15
7	Bolts, nets and forgings, per lb			.03
8	Bolts, nuts and forgings, credit, per lb			.00¾
9	Bowls, opal, gas, 9-inch, each			.50
10	Chimneys, round wick, each			.11
11	Chimneys, dual wick, each			.06
12	Candles, per lb			.15
13	Coal (including labor), per ton			6.00
14	Chain, per lb			.05
15	Chain, credit, per lb			.01
16	Cleaning parlor and sleeping cars, exclusive of bedding, per car			1.35
17	Cleaning vestibuled passenger and combination cars, each.			.85
18	Cleaning common passenger and combination cars, each...			.50
19	Cleaning vestibuled baggage and mail cars, each			.50
20	Cleaning common baggage and mail cars, each			.30
21	Taking out carpets, seats, draperies, etc., from parlor and sleeping cars and beating them, per car			1.00
22	Taking out and beating cushions and backs of seats of passenger cars, either vestibuled or common, per car.. (No additional charge for cleaning trucks of parlor or sleeping cars.)			.65
23	Domes, gas, each			.50
24	Diamond S. brake shoes, applied, each, no credit for scrap.			.50
25	Gas, Pintsch, per receiver			.85
26	Globes, gas, 4-inch, each			.50
27	Globes, opal gas, each			.50
28	Glass, per light			At Cost.
29	Glass, setting, per light			.25
30	Hose, air-brake or signal, complete with fittings, applied to car, each:			
	1-inch air signal			1.75
	1¼-inch air-brake			2.00
31	Hose, air-brake or signal, credit for fittings			.80
32	Hose, 1½-inch straight port, steam, complete with fittings, applied to car			6.50
	1-inch			5.00
33	Hose, 1½-inch steam, credit for fittings			5.25
	1-inch			4.00
34	Ice (including labor), per cwt			.30
35	Iron, cast, per lb			.02
36	Iron, cast, credit, per lb			.00⅛
37	Iron, malleable, per lb			.03½
38	Iron, malleable, credit, per lb			.00½
39	Labor, on lubrication, per hour			.24
40	Labor, on repairs, per hour			.30
41	Lumber, oak, pine, hickory, poplar and elm, per ft			.03½
42	Oil, Galena, car, per gal			.22
43	Oil, Galena, coach, per gal			.35
44	Oil, illuminating, American roads to charge, per gal			.11
45	Oil, illuminating, Canadian roads to charge, per gal			.16
46	Shades, acme lamp, each			.45
47	Shades, common lamp, each			.25
48	Steel, spring (not springs), per lb			.05
49	Steel, spring, credit, per lb			.00¾
50	Steel castings, per lb			.04½
51	Steel castings, credit, per lb			.00¾
52	Tallow, per lb			.06
53	Waste, woolen, per lb			.12½
54	Waste, cotton, per lb			.06
55	Wicks, round, each			.02
56	Wicks, dual, each			.00½

		New.	S. H.	Scrap.
57	Wheels, cast, 36-inch	$10.50	$7.75	$5.25
58	Wheels, cast, 33-inch	9.00	7.00	4.75
59	Wheels, new, steel			Cost.
60	Loss of metal from steel-tired wheels, $2.00 per 1-16 inch.			
61	Labor changing, per pair			$2.00
62	Removing, turning and replacing steel-tired wheels			7.00
63	Steel-tired, cost of retiring to be cost with the addition of freight charges.			

Intermediate Brake Lever Fulcrum. Figs. 841-842. A fulcrum for the intermediate brake lever, attached to the sills of the car body.

Intermediate Cross Tie Timber. 26a, Figs. 599-619. A timber framed across the longitudinal sills about half way between the cross tie timbers and the body bolster.

Intermediate Floor (Passenger Cars). A floor consisting of boards placed between the sills and between the deafening ceiling, or under floor, and the upper or main floor. Its purpose is to exclude noise and cold. The tendency is to use no other deadening material in car floors.

Intermediate Lever. (Air Brake). Fig. 926.

Intermediate Lining (Refrigerator Car). Same as **Blind Lining**, which see.

Intermediate Sills. 3 and 3a, Figs. 262--272, 599-619. The main longitudinal members of the underframe between the side sills and the center sills.

Internal Cylindrical Gage. A very accurately made solid steel cylinder, used as a standard of measurement of cylindrical holes.

Internal Screw Gage. A solid steel cylinder with a screw thread on it, for testing the diameter of female screws.

Interurban Electric Car. Fig. 6245.

Inverted Arch Bar (Truck Side Frames). 15, Figs. 6281-6285. A wrought iron or steel bar which rests on top of the journal boxes with the **Arch Bar**, which see, on top of it. Also sometimes called the middle or lower arch bar, as in logging cars. See **Center Bearing Inverted Arch Bar** (Six Wheel Trucks), 67, Figs. 4780-4783.

Inverted Body Queen Post. A post in the side of a car body which supports the inverted body truss rod or overhang truss rod.

Inverted Body Truss Rod. A truss rod used as a **Hog Chain**, which see, to prevent the ends of a car body from sagging. It rests on two queen posts on top of the sill and is attached to the latter at each end, bearing against an inverted truss rod plate. An overhang truss rod.

Iron. See.

Carry Iron.
Cricket Iron.
Knee Iron.
Pull Iron or **Switching Iron** or **Roping Staple.**
Safety Beam Iron.
Step Iron.
Truck Frame Knee Iron.
Truss Rod Iron.

Italian Hemp Bell Cord. See **Bell Cord.**

J

Jack. Fig. 3866, etc. See **Jack Screw. Hydraulic Jack. Lamp Jack. Ratchet Jack. Screw Jack. Stove Pipe Jack. Ventilator Jack. Independent Pump Jack.** Fig. 6914. **Smoke Jack.**

Jack Arms (Steam Shovel). 29, Figs. 596-598. Heavy beams with jack screws at the ends which are put out on each side of the shovel at the forward bolster and which serve to keep the car body from overturning when the outer ends are firmly supported on blocking.

Jack Screw. Figs. 3870-3871. 1. A tool machine for lifting or raising heavy weights. It consists of one or more screws, turned by a lever and working in a case, which rests upon the floor or ground, as shown in the figure.

Jacks take various names from their forms, sizes and shapes, and are designated as bell base, broad base, claw, and low, and also from the uses for which they are designed, as journal box jacks, traversing jacks, track jacks, etc. See **Hydraulic Jack.**

2. (Pile Driver Car and Steam Shovel.) 30, Figs. 596-598. A jack screw working on a jack screw pin or jack arms attached to the body, for relieving the springs of the cars from action and making the platform a rigid body. Tongs or crabs attached to the track are used to prevent the car body from rising upward when on the jack screws. Another device for this same purpose is a bolster jack screw.

Jackets for Steam Heating (Safety's). Figs. 2951-2960. The figures show in detail the construction of the single jackets and double jackets. The inner or the water circulation pipes are of brass or copper, and therefore most efficient conductors of heat. Leakage of steam from steam spaces past the water pipes is prevented by packed glands shown.

Jacquemin Grain Door. Fig. 1409-1412.

Jamb (of a Door). The door post on each side of the door proper.

Janney Coupler, (Freight). Figs. 1608-1615, 1715-1720. (Passenger), Figs. 1812-1819.

Janney, R. E., Coupler. Figs. 1583-1588.

Janney "X" Coupler. Figs. 1715-1720.

Janney-Miller Coupler. A modification of the Janney coupler, so as to enable it to be rapidly changed into an equivalent of the Miller coupler, thus enabling cars provided with it to be run in connection with either Janney or Miller draw gear. The principal changes to effect this end were as follows:

A joint was made in the barrel of the ordinary Janney coupler to provide for the removal of the head when it was desired to change to the Miller. There was added the part called the center buffer yoke, in order to provide a connection between the center buffer spring and center buffer when used as a Miller coupler, the same springs being used, whether in use as a Janey or as a Miller coupler.

A spiral spring called the side spring, with its bracket and clevis, was added to give the necessary side resistance to the Miller hook. The platform lever was lengthened for the purpose of conforming to the difference in heights between the Janney catch lever and the chain by means of which the Miller hook is moved in uncoupling, the same lever serving for either draw gear. Followers and guides were provided and placed back of the center buffer spring to form a better base for that spring when used in connection with the Miller buffer. The Miller stop was added to the Janney platform. After a little practice the change from the Miller to the Janney gear was made in from two to five minutes. Superseded almost entirely by more modern platform equipments using only M. C. B. couplers.

Jaw. A **Pedestal Jaw,** which see.

Jaw Bit. A bar extending across the mouth of a pedestal jaw underneath a journal box and bolted to the horns of the pedestal.

Jaw Bolt. A bolt with a U-shaped split head, perforated to carry a pin. Used largely as a brake lever fulcrum on brake beams.

Jaw Spring. A **Journal Spring**, which see.

Jennings Refrigerator. Figs. 332-338. A system of refrigeration in which the ice tanks and interior fittings of the car are collapsible and readily folded out of the way when ice is not required, increasing the capacity of the car.

Jib (of a Derrick or Crane). More properly **Boom**, which see.

Joint Bolt. Fig. 4209. A bolt used for fastening two timbers when the end of one joins the side of another. The lug bolt is another form for the same purpose.

Joint Cover. See **Window Molding Joint Cover.**

Joint Strip (of Winslow Roof). 1, Figs. 1998-2008. A strip of wood with rabbeted grooves for inserting the corrugated roof sheets. A cover strip is a U-shaped strip of metal for uniting flat roof sheets.

Jones Car Door. Figs. 1369-1370.

Journal. The part of an axle or shaft on which the journal bearing rests. A gudgeon is a rough form of journal, usually of wood with an iron strap around it, as for the mast of a derrick, or crane. The journals of bodies of irregular shape, like cannon or leaders of pile-driver cars, are more commonly designated **Trunnions**, which see. See below.

Journal Bearing. Fig. 5328. A block of metal, usually some kind of **Brass** or **Bronze**, which see, in contact with a journal, on which the load rests. In car construction the term when unqualified means a car axle journal bearing. A standard form has been adopted by the Master Car Builders' Association, but its composition is not specified. The Hopkins or lead-lined journal bearing is one coated on the inside with a thin sheet of lead to make it self-fitting on the journal. Babbitt metal in some of its many forms is used for car journal bearings occasionally, and almost universally for the bearings of machinery. In order that the journal bearing may be more easily removable, and to distribute the load more equally, a journal bearing key, also called a wedge, is used to hold the journal bearing in place. The term "wedge" is in very common use, perhaps more common than the name here given.

Journal Bearing and Wedge Gages (M. C. B. Standard). Figs. 5713-5731, 5732-5743.

In 1900 gages for journal bearings and wedges for journals 5 by 9 inches and 5½ by 10 inches were adopted as standard.

In 1903 gages for journal bearings and wedges for journals 3¾ by 7 inches and 4¼ by 8 inches were advanced from Recommended Practice to Standard.

Journal Bearing Key or Wedge (M. C. B. Standard). Figs. 5472-5476, 5494-5498. See **Journal Bearing.**

Journal Bearing Stop Key. A journal bearing key with a projection to which a stop plate is attached to restrain lateral play, so that a collar on the axle may be dispensed with. Now little used.

Journal Box. 3, Figs. 4771-4777; Figs. 5254-5320. A cast iron box or case which incloses the journal of a car axle, the journal bearing and key, and which holds the packing for lubricating the journal. Also called an axle box, car box, grease box, housing box, oil box, and pedestal box. British, usually axle box.

All car journal boxes are outside bearing. In certain larry or push cars, and also in locomotive trucks, inside bearing journal boxes are used. To dispense with the need of a collar on the axle, various devices, like the stop key and stop journal bearings, have been introduced, but they are now seldom used.

Journal Boxes and Details (M. C. B. Standard). Figs. 5466-5471. (For Journals, 3¾ by 7 inches.)

The journal box and details as shown in these drawings were adopted as standards of the Association, in 1893, and revised in 1894 and 1896. The revision made in 1894 consisted in correcting the drawing at the top of the journal box, and in leaving off the lugs at sides of arch bars. Also in changing the wedge and bearing so as to make the latter flat on top instead of curved, as theretofore, and in curving the top of the wedge, thus making this construction similar in general arrangement to the standard forms for the 4¼ by 8-inch journal box. The revision made in 1896 consisted in the elimination of the dust guard, and the addition of notes providing that any suitable dust guard might be used, and that a rivet or nut might be used instead of the cotter, if preferred, in the hinge pin of the lid. Also in the addition of notes concerning the lid spring and the wedge. At the same time the side lugs on the brass were increased so as to measure 1⅛ inches long instead of 1 inch long as they were formerly. In 1899 the size of bolt hole was increased from 1 inch to 1⅛ inches. In 1905 the addition of a rib ⅜ inch deep on the back face of the lid immediately within the inside of the oil box was adopted.

In 1908 a dimension of ⅞ inch was shown, it being the distance from the center line of bolt hole to inside bearing face of lid.

(For Journals, 4¼ by 8 inches.) Figs. 5488-5493.

The journal box and details as shown in these drawings were adopted as standards of the Association in 1893, and revised in 1896.

The revision made in 1896 consisted in the elimination of the dust guard; also, in removing the arch bar seat lugs and making the arch bar seat 4½ inches wide. Also, in the addition of notes providing that any suitable dust guard might be used, and that a rivet or nut might be used, instead of a cotter, if preferred, in the hinge pin of the lid. Also, in the addition of notes concerning the lid spring and the wedge. At the same time the side lugs on the brass were increased so as to measure 1⅛ inches long instead of ¾ inch long as they were formerly. The revision in 1901 consisted in cutting out entirely the inner dust guard wall at the top. In 1905 the addition of a rib ⅜ inch deep on the back face of the lid immediately within the inside of the oil box was adopted. In 1908, the inside dust guard was restored at the top and joined to the inside side wall with an opening of 2¾ inches radius, the center being located one inch above the horizontal center line of the box. In 1908 the distance from center line of box to edge of wedge stop was increased from 4⅝ inches to 4⅞ inches to allow ⅛ inch clearance between wedge and stop.

(For Journals, 5 by 9 inches.) Fig. 5615.

The journal box and details shown in these drawings were adopted as recommended practice in 1896. In 1898 they were adopted as standards of

the Association. In 1900 the opening at the back end of box, corresponding with the dust guard, was increased from 3⅛ inches to 3⅜ inches radius, making the opening 6¾ inches wide instead of 6⅜ inches, the height remaining unchanged. The revision in 1901 consisted of cutting out entirely the inner dust guard wall at the top. In 1902 the wedge stop lugs were increased in size and extended laterally to the sides of box. In 1905 the addition of a rib ⅜ inch deep on the back face of the lid immediately within the inside of the oil box was adopted. In 1907 the inside dust guard was restored at the top and joined to the inside side wall with a 3-inch radius, with the center located 1 inch above the horizontal center line of the box. The opening in the outside wall was enlarged at the side and struck with a 4-inch radius all around. The distance from the center of the box to the inside of the lug for the journal bearing key located in the top wall of the box was increased to 5⅛ inches. The width of the inside side lugs for the journal bearings was decreased to 2⅝ inches. In 1908 the center of box from which the lower half of the circle is struck was raised ¼ inch, increasing the depth to 1⅝ inches.

(For Journals, 5½ by 10 inches.) Figs. 5621-5626.

The journal box and details shown in these drawings were adopted as standard in 1900. In 1901 the inner dust guard wall at the top was cut out entirely to avoid all danger of the journal bearings striking the wall of the box at the rear. In 1902 the wedge stop lugs were extended laterally to the sides of box. In 1903 the radius of the dust guard opening was changed to 3⅝ inches, and the diameter to 7¼ inches to allow proper play for the wheel fit. In 1905 the addition of a rib ⅜ inch deep on the back face of the lid immediately within the inside of the oil box was adopted. In 1907 the inside dust guard was restored at the top and joined to the inside side wall with a 3-inch radius located 1½ inches above the horizontal center line of the box. The opening in the outside back wall was enlarged at the side and struck with two 4-inch radii, the lower one-half having its center line on the center line of box, the center of the upper one-half being ⅛ inch above the center line of the box. The distance from center of the box to the inside of the lug for the journal box key was increased to 5⅛ inches. The width of the inside side lugs for journal bearings was decreased to 2⅝ inches. In 1908 the distance from center line of box to face of wedge stop was increased from 5⅛ inches to 5¾ inches, thus allowing ⅛ inch clearance between wedge and stop. In 1908 the note reading "the total lateral [extreme positions of axle] equals ⅜ inch," was eliminated.

(For Passenger Car Journals, 4¼ by 8 inches.) Figs. 5685-5693. In 1898 a Recommended Practice was adopted for passenger car journal box and contained parts for journals 4¼ by 8 inches, and was formerly shown on Sheet M. C. B.—G. In 1901 this was changed to Standard.

(For Passenger Car Journals, 5 by 9 inches.) Figs. 5803-5805. (Recommended Practice.) This design was adopted as Recommended Practice in 1903.

Journal Box Bolts. The bolts on either side of the journal box which secure it between the arch bar and the pedestal tie bar.

Journal Box Cover or Lid. 4. Figs. 4771-4777. A door or lid covering an aperture on the outside of a journal box, by means of which oil and packing are supplied and journal bearings are inserted or removed. Such covers are made of cast iron, malleable iron, pressed steel, and sometimes of wood. They are usually closed by a spring.

Journal Box Cover Bolt. A bolt used to fasten covers which have no hinge to the box. Two of these are usually employed to each cover. A gasket of canvas, rubber or leather is used to make a tight joint. Journal box covers are, however, now almost invariably held on by hinges and springs or some arrangement of lugs or grooved joints.

Journal Box Cover Hinge Pin. Fig. 5479.

Journal Box Cover Spring. A flat spring to hold the lid in place.

Journal Box Guides. Iron bars or blocks placed one on each side of the journal boxes of some metal frame trucks in which journal springs are used. These irons, while holding the box in place longitudinally and transversely, allow it to have a vertical motion between them. When a pair of these guides is cast in one piece it is called a **Pedestal,** which see.

Journal Box Jacks. Fig. 3869. A low jack specially designed to set under journal boxes, and take the weight off the journal, so that brasses can be removed.

Journal Box Lid. 4. Figs. 4771-4777; Fig. 5477. The iron or steel lid or cover which closes the opening in the end of a journal box through which oil and waste for the journal packing is inserted.

Journal Brass. A **Journal Bearing,** which see.

Journal Packing. Waste, wool, or other fibrous material saturated with oil or grease, with which a journal box is filled to lubricate the journal. Various forms of patent packing have also been introduced.

Journal Spring. A spring supporting part of the weight of a car which is placed directly over the journal, and which usually rests on the journal box under the truck frame. Such springs are sometimes placed above the truck frame and supported by straps, and the weight of the car is transmitted to the journal box by a vertical pin or stirrup. **Equalizer Springs,** which see, accomplish the same end in six-wheel trucks as journal springs, and more effectually.

Jumper. (Electric.) Fig. 6362.

Jute. A course fiber raised in India for making gunny bags, matting, ropes, etc. It has been recently used for making journal packing by a patented process.

Joyce-Cridland Double-Movement Jack. Fig. 3887.

K

Kalamined Iron. Sheet iron, coated with an alloy of zinc, lead, tin and nickel in the proportion of 29 lbs. of tin, 50 to 75 lbs. of zinc, 100 lbs. of lead, and three to six ounces of nickel. The alloy melts at a lower temperature than common zinc, and is claimed to give a more durable compound as well as a thinner and more adhesive coating. Galvanized iron is sheet iron coated in the same way with pure zinc.

Kalamazoo Hand Cars. Fig. 6196, etc.

Karbolith. A composition cement, used for flooring in street cars and in buildings.

Keeper. "A ring, strap, pocket, or the like device for detaining an object; as

1. "A jam nut.
2. "The box on a door jamb into which the bolt of a lock protrudes when shut, as Figs. 2252-2261.

When the keeper is for a beveled latch bolt, which is moved by contact with it, it is more commonly called a strike plate, as Fig. 2261. They are also further designated by the name of the lock or latch which they accompany.

3. "The latch of a hook, which prevents its accidental disengagement."—Knight.

Kewanee Brake Beam. Figs. 5091-5092. A steel brake beam of rectangular cross section, and a bar for a truss rod, which is bent around the ends of the beam proper.

Keg Shaped Spiral Spring. A spiral spring, the form of which resembles a keg or cask. Its object is to obtain a **Graduated Spring,** which see.

Kensington Journal Box. Figs. 5291-5298.

Kelso Coupler. Figs. 1706-1714.

Keratol. An artificial leather used for curtains and upholstering. It is made by coating a cloth fabric with a compound which gives it the appearance of leather.

Key. 1. "In a general sense, a fastener; that which fastens; as a piece of wood in a frame of a building."—Webster. Hence a pin inserted in a hole in a bolt, and used to secure the bolt or its nut. A **Split Key,** which see, is a special form.

2. "An instrument for opening or shutting a lock by pushing the bolt one way or the other."—Webster. See **Lock** and **Bit.**

3. A block over the top of a journal bearing, called in full **Journal Bearing Key,** which see. This part is also very commonly called a wedge.

4. A beveled bar used with a gib to form a **Gib and Key,** which see. See also **King Bolt Key.**

5. (For Lamps and Valves of Pintsch Gas Apparatus.) A substitute for the ordinary cocks of gas fixtures to prevent unauthorized tampering.

Key Bolt. A bolt slotted near the end to receive a key, which takes the place of a nut.

Key Hole Escutcheons. See **Escutcheons.**

Key Hole Plate. An **Escutcheon** or **Escutcheon Plate,** which see.

Key Pin (of a Lock). The pivot on which the key turns when inserted in the lock.

Key Ring Tire Fastening. A mode of securing the tire to the wheel, composed of two rings, one of U-section and the other nearly rectangular. The former ring holds the tire and wheel together, and the latter ring holds the former in place, filling up the groove in the tire. When both rings are in place the outer lip of the groove in the tire is slightly hammered over, thus gripping the second or key ring, and retaining it in place. See also **Tire Fastening.**

Keystone Car Seal. Figs. 4085-4086.

Kicking Coil. A coil of wire consisting of about ten turns wound on a wooden core; it is located in the feed circuit between the lightning arrester and controller, and acts as an inductive resistance to the passage of lightning discharge through the apparatus. See **Lightning Arrester.**

King Automatic Platform Extension. Figs. 2276-2279.

King Bolt or **Center Pin.** 18, Figs. 262-272; Figs. 813-814. A large bolt which passes through the truck and body bolsters and center plates of a car body and the center of a track. It is accessible from the floor of the car by removing the king bolt plate. The truck is supposed to swivel on the king bolt, but in reality the two center plates normally carry all the strain. In some wrecking cars the king bolt is provided with keys to bind the truck to the car so that they cannot be separated from each other.

King Bolt Key. Figs. 881-883. See above.

King Bolt Ring. Fig. 883.

King Bolt Plate. See above.

King-Lawson Dump Car. Figs. 93-94. A dump car with a box or body which may be tipped to either side by compressed air and the load dumped.

King Post (of a Truss). A single post or distance piece between a truss rod and the chord of a truss or beam. If two such posts are used they are called queen posts. In car construction king posts are made in two ways—one adjustable, so that they may be lengthened or shortened, and the other without adjustment. Also see

Brake Beam King Post. **Truck Bolster King Post.**
Cross Frame King Post.

Kirby's Car Door Lock. Fig. 2480. A device to give a lock extra strength and durability and to dispense with the use of screws for fastening on the door knobs.

Kirby's Seat Lock. Fig. 4188.

Kitchen (Dining Car). A large compartment at one end of the car provided with all the facilities of a well-organized kitchen. Officers' and other private cars are commonly provided with a kitchen smaller than in dining cars, and usually at the extreme end

Kitchen Car. Fig. 236. A combined day coach and dining car for use on trains where a regular dining car could not be profitably run. Sometimes called a cafe coach.

Knee Iron. An L-shaped or angle iron casting or forging which is fastened to the corner where two timbers are joined to strengthen the joint. See **Sill Knee Joint, Truck Knee Iron.**

Knob. See **Berth Safety Rope Knob, Door Knob, Window Curtain Knob.**

Knob Escutcheon. A **Door Latch Rose,** which see.

Knob Sash Lift. See **Sash Lift.**

Knob Shank. A **Door Latch Spindle,** which see.

Knuckle. 1. (M. C. B. Couplers.) The rotating coupling hook by means of which coupling is effected when the knuckle is locked by the catch or lock. It must conform to certain contour lines adopted by the M. C. B. Association in 1888 and shown in Fig. 5579.

2. (Of a Hinge.) Fig. 2442, etc. The central tubular projections which carry the hinge pin. The term is of wide and general application in mechanics to many similar parts.

Knuckles, Specifications. (M. C. B. Standard.)

In 1904, specifications were adopted as Recommended Practice for separate knuckles, and in 1907 advanced to standard, as follows:

The knuckles furnished under this specification must be made of steel in accordance with the best foundry methods, and must not be painted.

1. Knuckles will be subject to the inspection and test of the above-named company as to their general condition and strength. The tests and inspection will be made at the place of manufacture, where assistance and labor necessary to make satisfactory and prompt inspection and shipment must be furnished free by the manufacturer. The testing machine and gages approved by the M. C. B. Association must be used in the test and inspection of knuckles.

2, Knuckles will be ordered as far as practicable in lots of 100; for each 100 ordered the manufacturer shall furnish 102, and in the event of addi-

tional knuckles being required to carry out the prescribed tests, they shall be furnished free of cost by the manufacturers.

3. Knuckles must be accurately made to gages furnished by the manufacturer. These gages must govern all dimensions representing fitting surfaces, thereby insuring absolute interchangeability without machining.

4. Knuckles shall not be accepted if distorted by improperly matched flasks or any other defects due to molding. They must be free from injurious shrinkage cracks, flaws, checks, sand, sand holes or blow holes. The holes for pivot pins in knuckles should be drilled, or, if cored, must be roached out, and must not be more than 1-16 inch larger than 1⅝-inch diameter pivot pin. The holes must be parallel to the face of the knuckle, and at right angles to the axis of knuckle. As many knuckles as possible must be cast from the same heat of steel. All parts must be well annealed throughout.

5. The pulling and contact faces of knuckle must be clean and smooth.

6. Each knuckle must bear a serial number and the manufacturer's name or identification mark legibly cast or stamped at some point where it will not be worn off.

7. Every knuckle made to comply with these specifications must have a slightly raised plate or flat surface cast upon the head in plain view, where it will not be subject to wear. After a lot of knuckles have successfully passed the inspection and tests prescribed below the letters M. C. B. must be legibly stamped upon the plate on each knuckle; this mark to be evidence that the knuckle is an M. C. B. standard.

INSPECTION.

The knuckles, after having been thoroughly inspected by the manufacturer to see that they meet the requirements as to interchangeability, soundness and dimensions of parts, etc., herein specified, should be arranged in lots of 102, and, where possible, care should be taken to put all knuckles of the same heat number or numbers in the same lot or lots. The inspector shall then inspect and gage each knuckle as to its compliance with drawing sizes, and for surface defects and proper contour lines. Any irregularities or swollen parts on the working or bearing faces must be ground or chipped off before the knuckles are accepted.

After this inspection the inspector shall select two knuckles taken at random from the lot or lots as provided for above, and subject one of them to Test No. 1 and the other to Test No. 2, hereafter specified. If one of these knuckles fails to stand prescribed Test No. 1, but, before failing, stands a sufficient number of blows to make retest admissible, another knuckle shall be taken from the same lot from which the first knuckles were taken. If it stands the test, that lot of knuckles shall be accepted as far as Test No. 1 is concerned; otherwise that lot of knuckles shall be rejected and another lot substituted and tested in the same way.

The other knuckle selected by the inspector shall be subjected to Test No. 2. If this knuckle fails to stand prescribed Test No. 2, hereafter specified, but, before failing, stands a sufficient number of blows to make a retest admissible, another knuckle shall be taken from the same lot from which the first knuckles were taken. If it stands the test, that lot of knuckles shall be accepted; otherwise that lot of knuckles shall be rejected and another lot substituted and tested in the same way.

PHYSICAL TEST.

Test No. 1. Striking Test.

The striking test back block and knuckle supports are placed in the housing against the back and sides, the knuckle dropped in between the supports and held by inserting the pin through the holes in the knuckle supports. The knuckle is then adjusted by means of liners between the back block and the knuckle supports, and between the knuckle supports and the housing. The striking block is then placed in the housing casting resting upon the knuckle. A fitting piece made to suit the type of knuckle is slipped in position between the tail and housing casting so that the striking face of the knuckle is in a horizontal position.

Blows to be struck on striking block through which they are transmitted to knuckle.

Three blows of 1,640 pounds falling four (4) feet.

Three blows of 1,640 pounds falling eight (8) feet.

The knuckle shall be considered as having failed to stand this test if it is broken before it has received three blows at 4 feet and three blows at 8 feet, or if any cracks appear more than 1 inch long or open more than 1-16 inch. Should the knuckle before failing stand three blows at 4 feet and one blow at 8 feet, another knuckle shall be provided and tested as per Section 7 governing retest.

Test No. 2. Jerk Test.

The jerk test back block and knuckle supports are placed in the housing against the back and sides, the knuckle dropped in between the supports and held by inserting the pin through the hole in the knuckle supports. The knuckle is then adjusted by means of liners between the back block and the knuckle supports, and between the knuckle supports and the housing. The striking block is then inserted resting on the inner face of the knuckle, and a block of suitable size inserted between the tail of the knuckle and striking block so that the striking face of the knuckle is in a horizontal position.

If preferred by manufacturers, an old coupler and lock of the same kind, in which the knuckle fits properly, and which may be suitably reinforced in order to endure as many tests as possible, may be used in place of supporting casting for this test.

Blows to be struck on the striking block through which they are transmitted to the knuckle.

Three blows of 1,640 pounds falling three (3) feet.

Two blows of 1,640 pounds falling six (6) feet.

The knuckle shall be considered as having failed to stand this test if it is broken before it has received three blows at 3 feet and two blows at 6 feet, or if any cracks appear more than 1 inch long or open more than 1-16 inch. Should the knuckle before failing stand three blows at 3 feet, another knuckle shall be provided and tested as per Section 7 governing retest.

Recommended Practice.—In 1905, as a result of letter ballot, the following Recommended Practice was adopted:

That the use of a knuckle-throwing device, which will throw the knuckle completely open and operate under all conditions of wear and service is favored by this Association.

Knuckle, Automatic Coupler, Contour Line and Limit Gages. See **Automatic Car Coupler.**

Knuckle Joint. "A joint in which a projection on each leg or leaf of a device is inserted between corresponding recesses in the other, the two being connected by a pin or pivot on which they mutually turn. The legs of dividers and the leaves of door hinges are examples of true knuckle joints. The term, however, has been somewhat commonly restricted to compound or universal joints designed to act in any direction."—Knight.

Knuckle Lock (Automatic Couplers). The block which drops into position when the knuckle closes and holds it in place, preventing uncoupling.

Knuckle Opener (Automatic Couplers). The device which throws the knuckle open when the lock is lifted so that a coupling can be made. With couplers not having a knuckle opener it is necessary to go in between the cars and pull the knuckle open by hand after the lock has been lifted.

Knuckle Pin (M. C. B. Coupler). 88, Figs. 1608-1615. The steel pin holding the knuckle in the jaws of the coupler. Also called **Pivot Pin**, which see.

Knuckle Pin Plate (Buhoup 3-Stem Coupler. 1600, Figs. 1886-1935.

Knuckle Pivot Pin (Specifications, M. C. B. Recommended Practice). In 1907 the following specifications for Knuckle Pivot Pins were adopted as Recommended Practice:

"All knuckle pivot pins ordered under the specifications must be made from open-hearth steel properly forged and then annealed, and must not be painted.

"1. Knuckle pivot pins will be subject to the inspection and test of the above-named company as to their general condition and strength. The test and inspection will be preferably made at the place of manufacture where assistance and labor necessary to make satisfactory and prompt inspection and shipment must be furnished free by the manufacturer. The testing machine, approved by the M. C. B. Association, must be used in the test of knuckle pivot pins.

"2. Knuckle pivot pins will be ordered as far as practicable in lots of 500; for each lot ordered the manufacturer shall furnish three extra pins, and in the event of additional pins being required to carry out the prescribed tests, they shall be furnished free of cost by the manufacturer.

"3. All pins must be of such size as will enter the plus end and will not enter the minus end of a limit gage for 1⅝-inch round iron as prescribed in M. C. B. Recommended Practice under 'Limit Gages for Round Iron,' and must not vary more than ⅛ inch above or below the proper length. The lower end of the pin must be cut off square and have at least ¼-inch level or chamfer. The cotter-pin hole to be properly drilled for ⅜ inch cotter. The head must be well formed, and pins which are not straight and true and those which have blisters or surface defects of any kind will be rejected.

INSPECTION.

"Knuckle pivot pins, after having been thoroughly inspected by the manufacturer to see that they meet the requirements as to interchangeability, soundness, dimensions of parts, etc., herein specified, should be arranged in lots of 500. The inspector shall then inspect and gage each pin as to its compliance with drawing sizes and for surface defects.

"After this inspection the inspector shall select three pins taken at random from each lot or lots, as provided for above, and subject them to the cross-bending drop test as hereafter specified. If one of the pins fails to stand the test prescribed below, and the other two pass, three more pins shall be selected at random from the same lot from which the first pins were taken; if all three of these pins stand the prescribed test, the lot of pins shall be accepted, otherwise that lot of pins shall be rejected, and another lot substituted and tested in the same way. If two or more pins fail to stand the test, originally, the lot represented will be rejected without further consideration.

PHYSICAL TEST.

"The cross-bending test will be made in standard M. C. B. drop-testing machine, the pins resting on rounded supports, held rigidly 10 inches center to center, to be subjected to a blow by the weight falling a height of three feet. The blow of the weight should be transmitted to the specimen by a block having a round lower edge resting on the specimen. The radius of all these round edges is to be ¾ inch. All pins are to be tested cold, and must not show any cracks or fractures. The bend must be directly under the nose of the plunger. Pins will be rejected if they break, or crack, or show a deflection less than 15 degrees or greater than 35 degrees."

Krupp Steel-Tired Car Wheels. Figs. 5422-5427.

L

Label Holder (Postal Car). Figs. 4022, 4032, 4038. Made both single and double. Sometimes combined with a drawer pull.

Lace (British). See **Broad Lace, Pasting Lace, Seaming Lace.**

Ladder. 59, Figs. 262-272. Bars of wood or iron attached to the side or end of a box car so as to form steps by which persons may climb to and from the top of the car.

The individual bars, whether of wood or iron, and whether round or square, are termed ladder rounds. They are sometimes made with **Ladder Side Rails**, which see. The handles alongside of the ladder are termed grab irons, or hand holds, or sometimes corner handles; that placed on the roof near the ladder, the roof grab iron or ladder hand rail. See **Protection of Trainmen.**

Ladder Handle. 60, Figs. 262-272. A **Roof Grab Iron or Hand Hold**, which see.

Ladder Hinge. Fig. 2470.

Ladder Rod. An iron ladder round.

Ladder Round. 59, Figs. 262-272; Figs. 815-816. See **Ladder.** The lower round of the ladder, by recommendation of the Master Car Builders' Association, should be a bent ladder round, as a safeguard against the slipping of the foot in swinging around the corner of a car.

Ladder Side Rails. The wooden vertical side pieces to which wooden or iron ladder rounds are attached.

La Flare Spring Insulation. Figs. 1393-1401. A system of insulation for refrigerator car doors, in which the openings are securely sealed against the outside air by strips pressed against the door by springs set in the posts.

Lag Screw. An iron bolt with a square or hexagonal head, and with a wood screw thread cut on it, intended to screw into wood. Lag screws are round under the head, so that they can be turned after they enter the wood. British equivalent, **Coach Screw**, which see.

Lambrequin. Fig. 4060. A cloth or drapery fastened over the upper part of a window. It covers the rod and rings or roller of the window curtains. The lambrequin has been replaced by **Valances**, which see.

Laminated Buffing Spring (British). A half elliptic spring. See **Plate Buffing** and **Draft Spring.**

Lamp. Fig. 3173, etc. "A vessel for the combustion of fluid inflammable bodies for the purpose of producing light."—Webster. The chief forms of lamps now used are for burning gas and mineral oil or petroleum, though candle lamps are used in cases of emergency, as also oil lamps for lard oil, for panel lights, lanterns, etc. Car lamps are distinguished as side lamps and center lamps, the latter now usually consisting of two or more distinct lamps, forming a chandelier. In Great Britain roof lamps, inserted from the roof of the car, are exclusively used. Lamps are also distinguished as adjustable globe, loose globe and plastered or fixed globe, the latter being a form in which the lamp is removed from below and the globe cannot be taken off. Many modern lamps are constructed upon the **Tornado** or **Hurricane** principle, which see, to avoid the effects of draft. Postal car lamps or chandeliers are a special class, in which every means possible is used to obtain a powerful light. See also **Acme Lamp, Alcove Lamp, Gas Lamps, Signal Lamp, Tail Lamp,** etc.

Lamp Alcove. A metal casing or lining for a recess in the side of a car to contain an **Alcove Lamp,** which see.

Lamp Arms. 4, Figs. 3585-3601. Rods by which a lamp is attached to the ceiling of a car. Some lamp arms have bracket angles to support the shade, and are then called bracket arms.

Lamp Bottom. 20, Figs. 3585-3601. The lower portion of a lamp which is removable. Contains the wick, burner and oil.

Lamp Bracket. Figs. 3602-3614. See **Side Lamp Bracket.**

Lamp Burner. 8, Figs. 3585-3601. That portion of a lamp by which the opening on the top of the reservoir is closed, which holds the wick, and by which the latter is adjusted. The **Acme Burners,** which see, are favorites for car service where a brilliant light is wanted, but many forms are used. The name burner is also applied to the tip of a gas light in the Pintsch gas system.

Lamp Burner (British). The wick holder in the **Roof Lamp,** which see.

Lamp Canopy. Fig. 3159. A large and elaborate **Smoke Bell,** which see.

Lamp Case (Street Cars). 1. A box over the end windows in which a lamp is placed. It has a glazed door on the inside and usually colored glass on the outside as a signal to designate the line to which the car belongs. It is fastened by a lamp case hook and eye.

2. (British.) A cylindrical sheet of iron for the protection of the **Roof Lamp,** which see.

Lamp Case Base or **Packing** (British). A wooden packing piece secured to the roof boards and presenting a level face for the lamp case. See also **Roof Lamp.**

Lamp Case Chimney (Street Cars). A metal pipe through which the smoke and gases escape from a lamp case, very similar to a **Lamp Jack,** which see.

Lamp Case Door (Street Cars). See **Lamp Case.**

Lamp Case Door Holder. A kind of hook attached to the roof to hold the lamp case door in place.

Lamp Case Eye. See **Lamp Case.**

Lamp Case Hook. See **Lamp Case.**

Lamp Chimney. 10, Figs. 3585-3601. A glass tube which incloses the flame of a lamp, conducts away the smoke and gases and produces the necessary draft.

Figs. 3568-3576 give what are known as the standard types, for the names of which see engravings.

Lamp Chimney Bracket. 12, Figs. 3585-3601. A projecting metal arm attached to the side of a car and carrying a chimney holder, by which a lamp chimney is held in place.

Lamp Chimney Holder. 11, Figs. 3585-3601. See above.

Lamp Chimney Reflector. 15, Figs. 3585-3601. Usually it has a hole in the center in which the chimney is inserted.

Lamp Cover or **Lamp Protector** (British). American equivalent, lamp jack. A sheet iron cover hinged to the lamp case and secured by a spring catch to protect the lamp from rain, while it allows the smoke to escape through the room. See also **Roof Lamp.**

Lamp Cover Spring Catch (British). See above.

Lamp Fount. The receptacle for the oil burned in a lamp. Also called lamp reservoir.

Lamp Glass (British). In a carriage, a hemispherical glass globe of unusual thickness, which surrounds the burner of a **Roof Lamp,** which see.

Lamp Globe. Figs. 3121-3131; 28, Figs. 3585-3601. A glass or porcelain case or vessel inclosing or surrounding the flame of a lamp or candle, and intended to protect the latter from wind. Lamp globes are approximately globular in form, in distinction from a lamp shade, which flares at the bottom, but are often made of different shapes, as round, pear-shaped, egg-shaped, melon-shaped, double cone-shaped, etc.

Lamp Globe Chimney. 3, Figs. 3585-3601. A metal tube attached to the top of a lamp globe for conducting away the smoke. A shade cap is an equivalent device for a lamp shade.

Lamp Holder. See **Side Lamp Holder.**

Lamp Hoop. A ring with an interior screw thread for attaching to cheap oil lamps to receive the burner.

Lamp Iron (British). American equivalent, tail light holder, or signal light holder. See **End Lamp Iron** and **Side Lamp Iron.**

Lamp House Hinge. Figs. 2466-2467, 2469.

Lamp Jack. A cap or covering over a lamp vent on the outside of a car to exclude rain and prevent downward currents of air. Also see **Lamp Case Chimney.**

Lamp Key (Pintsch Gas). Fig. 3094. A substitute for the ordinary cock of gas fixtures, used to prevent unauthorized tampering with the burners.

Lamp Panel. A small switchboard placed generally in some locker of the car, upon which is mounted switches for controlling the lamps and ventilating fans.

Lamp Plug (British). A sylindrical piece of wood secured to the lamp case by a chain, and used to block up the lamp aperture in the roof when the lamp is not in its place. See **Roof Lamp.**

Lamp Plug Stand (British). A cast iron stand on which the lamp plug rests when the **Roof Lamp,** which see, is in use. Its object is to prevent the lamp plug bumping on the roof of the carriage when the train is moving.

Lamp Reflector. 14, Figs. 3585-3601. See also **Alcove Lamp Reflector.**

Lamp Regulator. An automatic electrical device for maintaining constant voltage upon the lamps or, more popularly expressed, a device for insuring the constant brilliancy or candle power of the lamps. The lamp regulator is usually mounted underneath the car body where the heat which is dissipated in it may be easily taken care of and radiated. The lamp regulator may be of the rheostatic or counter electro motive force type. As a rheostatic device it varies resistance in series with all the lamps, responding to variations in lamp voltage and having a tendency toward maintaining constant lamp voltage. If it is of the counter electro motive force type, it acts in the same way as far as the lamps are concerned, but varies a counter electro motive force in series with the lamps instead of varying a resistance. In either case, the lamp regulator is governed by an auxiliary relay or equivalent device, generally placed inside of the car with the other electrical apparatus.

Lamp Regulator Vibrator or Relay. An automatic and very sensitive electrical device for controlling the action of the lamp regulator. Such device must be very sensitive in operation and robust enough in construction to withstand railway service. It is generally enclosed for protection against dust and accident, but when once adjusted should not require attention for long periods.

Lamp Reservoir. 6, Figs. 3585-3601. The portion of a lamp which holds the oil. Also called lamp fount.

Lamp Ring. 5, Figs. 3585-3601. A metal ring at the base of a lamp to which the lamp bottom or reservoir and lamp globe are attached. In center lamps the ring is supported by the lamp arms.

Lamp Screw. A more elaborate **Lamp Hoop,** which see, with a flange.

Lamp Shade. 8, Figs. 3585-3601. A conical shaped reflector placed over a lamp to reflect the light downward.

Figs. 3564-3567 and 3577-3579 give what are known as standard forms, the dimensions of which, in inches, are as shown in the figures.

Lamp Socket. Figs 6324-6327, 3604. A socket or dovetail joint to which a lamp or flag is attached at the corner of a car. They are flat, inclined, angular or projecting, as may be desired.

Lamp Stay. 1, Figs. 3585-3601. A horizontal bar, usually reaching from side to side of the clear story, by which a car lamp is steadied, and also made more ornamental.

Lamp Switch. A switch for controlling the lamp circuit of the car and which, by opening or closing, turns off or throws on all of the lights. This switch is generally mounted on or near the lamp panel.

Lamp Vent. An opening in the roof, through which the gases from a lamp escape.

Lantern. Figs. 3620-3625. A portable lamp, the flame in which is protected from wind and rain by glass, usually in the form of a globe surrounded by wires, called guards. According to the number of these wires the lantern is called single, double or triple guard. The conductor's lantern is one with a large bail, so as to be carried on the arm, leaving both hands free. It is usually provided with a reflector above. Inspector's lanterns are generally arranged to give blue light. See **Lens, Signal Lamp.**

Lantern and Flag Holder. A device for displaying signals on rear of trains. See **Flag Holder.** The novelty is the convenience of attachment for either a lamp or flag.

Larry. See **Lorry.**

Latch. Figs. 2411-2427, etc. The primary sense of this word is—to catch, to close, stop, or make fast; hence, an attachment to a door, window, etc., to hold it open or shut, is called a latch. The ordinary distinction between a latch and a lock is that a lock is closed and opened with a separate key, and usually has a square bolt; whereas, a latch has no separate key, and usually has a beveled bolt which snaps shut automatically by contact with the keeper or strike plate. The most exact distinction between a latch and lock seems to be the form of the bolt, and not the use or disuse of a key. See **Sash Lock.** Latches named from the use which they subserve are the following, which see:

Berth Latch.
Deck Sash Latch.
Safety Berth Latch.
Saloon Latch.
Sliding Door Latch or **Lift Latch.**
Spring Door Latch.

A sliding door latch, or lift latch, Figs. 2411-2412, has a beveled hook instead of a beveled bolt, but operates upon substantially the same principle. Nearly all forms of latches are spring latches. A night latch is a large and carefully made form of an ordinary latch, which can be opened from the surface by a key. A cupboard latch is any form of small latch. A rim latch, like a rim lock, is one attached simply to the inside of the door, in distinction from a mortise or rabbeted latch (both rarely used), which is boxed into the door.

Latch Bolt Facing (Kirby's Door Lock). Q, Figs. 2480-2481.

Latch Pull (Kirby's Door Lock). J, Figs. 2480-2481.

Lateral Motion. A movement sidewise, more particularly meaning, as generally used, a side or swing motion of the bolster of a swing motion truck, in distinction from the end play of an axle under the journal. A lateral motion spring, which is slipped over a lateral moton spring pin, is sometimes used to check the lateral movement of such spring bolsters, but this end is more commonly accomplished by splaying the swing hangers outward.

Lateral Motion Spring. See above.

Lateral Motion Spring Pin. See above.

Lateral Play. Side motion of any part of a car or machinery; the space left to permit of such side motion. See **Lateral Motion** (of a Truck Bolster), **End Play** (of an Axle).

Lathe (Wood-Working Machinery). Fig. 6794, etc. A machine with a fixed spindle and a revolving spindle in which a piece of wood is inserted and rapidly revolved. A hand chisel is used to remove the wood and produce a stick of cylindrical dimensions.

Latrobe Coupler. Figs. 1648-1657.

Lavatory. A room provided with washbowl, towels, combs, brushes, etc., in which passengers may make their toilet. Parlor and sleeping cars are provided with separate lavatories for men and women, which are separated from the saloons. The best and most modern coaches have a lavatory. See **Wash Room.** A saloon is sometimes termed a lavatory.

Lavatory Carriage (British). Figs. 64, 86, etc. A passenger vehicle in which two or more compartments have access to a small lavatory, urinal, etc. See also **Carriage.**

Laycock's "Easy Push Over" Car Seat. Figs. 4138-4158.

Lead Car Seal. Figs. 4072-4092. Lead seals are either in the form of rivets or buttons. Both are in common use. See **Car Seal.**

Lead Rivet Car Seal. Figs. 4072-4092. See **Car Seal.**

Lead Seal. Figs. 4072-4092. See **Car Seal, Lead Car Seal.**

Lead-Lined Journal Bearing. A journal bearing which has its inner surface covered with a thin layer of lead, so that it may fit itself to the journal as soon as subjected to wear. Such bearings are often called Hopkins journal bearings. A variety of other bearings are more or less similar, but a greater quantity of lead or babbitt metal is frequently used.

Leader (of Pile-Driver Car). The long vertical timbers serving to guide the **Hammer,** which see, in its fall. The leaders swing upon leader trunnions, carried on the leader trunnion pedestal. They are stiffened at some point midway of their length by top stringers, leader braces, and commonly by pilasters at the outside, which latter serve to support the top stringers. They are connected at the top by a leader cap and at the bottom by a leader cross piece, the latter attached at the side in such a manner as not to interfere with the fall of the hammer.

Leader Brace (Pile Driver Car). See above.

Leader Brace Pocket (Pile Driver Car). See above.

Leader Cap (Pile Driver Car). A cross piece connecting the two leaders at the top and carrying the main sheave and pile hoisting sheave of the hoisting gear.

Leader Cross Piece. See **Leader.**

Leader Stay. An oblique diagonal brace, attached at the upper end to the top stringers, serving to stiffen the leaders.

Leader Trunnion. See **Leader** and **Trunnion.**

Leakage Groove (of Westinghouse Brake Cylinder). A small passage past the brake piston to prevent application of the brakes by trifling leakages of air.

Leather. The hide of some animal, usually cattle, which has had the hair removed and been subjected to a toughening and hardening process called tanning. See **Piston Packing Leather, Packing Leather, Window Shade Leather, Solid Leather Nails.**

Leather Bell Cord. See **Bell Cord.**

Leatheroid. A substance somewhat resembling leather, and somewhat similar to **Vulcanized Fiber,** which see, in its general character and appearance. It is made by treating paper with sulphate of zinc.

Leather Seat. A **Dust Guard Bearing,** which see.

Leg. See **Seat Leg.**

Leg Iron (British). See **Step Iron.**

Leg Rest (Reclining Seats). A bracketed and adjustable shelf, which may be used on a chair seat to support the limbs when the seat or chair is in a reclining position. It is adjusted by a leg rest ratchet and leg rest pivot casting, or by a leg rest slide fitting in a leg rest socket casting.

Length (of Elliptic Springs). The distance from center to center of scrolls when the spring is unloaded.

Lens. An optical instrument for conveying rays of light upon a fixed path or fixed point. Lenses for lanterns consist of three types—bull's eye, a double convex or plano convex lens; semaphore (a mere modification of the Fresnel), and the Fresnel proper, the latter rarely used.

Leonard Hydrostatic Buffer. See **Hydrostatic Buffer.**

Letter Board (Passenger Car Exteriors). 91, Figs. 599-619. A horizontal board under the cornice, extending the whole length, on which the name of the company to which the car belongs is usually painted. The letter board occupies the frieze of the car, and is often so called.

Letter Box Lid (Postal Cars). Figs. 4020-4021.

Letter Case Label Holders (Postal Cars.) Figs. 4022, 4041.

Letter Drop (Postal Cars). Figs. 4020-4021. A plate with a spring flap for receiving letters for the post. A letter box lid.

Lettering (of Freight Cars). Fig. 6177. In 1893 the M. C. B. Association adopted a Recommended Practice for Marking Fast Freight Line Cars, as shown in Fig. 6177. It was resolved:

"1st. The half of side of car on which the doors do not slide to show the name of the 'Fast Freight Line,' spelled out in full, and the car number in the Fast Freight Line series immediately below it. In the name panel and within 2 ft. of the sill shall appear, in letters not over 4 in. high, the name of the railroad company owning or contributing the car, and between the same and the sill shall appear the light weight of the car, with such other information as it is found advisable to give in connection with the same.

"2d. Side doors to bear the initials of the road to which the car belongs, or the name of the line on which the car is used, together with the number of the car.

"3d. The ends to show the initials of the 'Fast Freight Line,' with the car number in the Fast Freight Line series, and the light weight just below them; no other marks will appear on ends of car.

"4th. The half of sides of cars on which the doors do slide to be reserved for advertising symbols or trade marks, where used. The use of profuse lettering in this panel is to be discouraged, however, and it is recommended that only the simplest trade marks or advertising signs should be used; the capacity of the car to appear near the sill in this same panel."

Lever. "In mechanics, a bar of metal, wood or other substance, turning on a support called a fulcrum." —Webster. See

Brake Lever.
Brake Equalizing Lever.
Cylinder Lever.
Dead Lever.
Door Shaft Lever.
Eccentric Lever.
Floating Lever.
Hand Car Lever or **Propelling Lever.**
Live Lever.
Platform Lever.
Release Lever.
Uncoupling Lever.

Lever Faucet. Fig. 3653. A self-closing faucet, shut by a spring and opened by the movement of a handle or lever. Also called telegraph faucet. They are called vertical or horizontal according to the direction of the pipe or opening into which they are fastened.

Lever Frame (Hand Car). 17, 18, Figs. 6207-6209. A wooden frame shaped somewhat like a letter A, on top of a hand car, which supports the lever shaft and lever.

Lever Frame Cap (Hand Car). 18, Figs. 6207-6209. A short horizontal piece of timber, to which the lever journal bearings are fastened.

Lever Frame Post (Hand Car). 17, Figs. 6207-6209.

Lever Frame Tie Rod (Hand Car). 25, Figs. 6207-6209. A vertical rod by which the lever frame cap is bolted to the floor frame.

Lever Guard. A guide on the platform rail for the platform uncoupling lever.

Lever Guide. See above and **Brake Lever Guide.**

Lever Hand Car. Figs. 6207-6209. The common style of **Hand Car**, which see, worked by levers connected to cranks. These levers are usually placed horizontally, but sometimes they are vertical. Double lever hand cars, to avoid danger of trouble with the dead center, have been in use. See **Hand Cars.**

Lever Handle (Buhoup 3-Stem Coupler). 152, Figs. 1886-1935.

Lever Hinge Bracket (Buhoup 3-Stem Coupler). 148, Figs. 1886-1935.

Lever Pin Hole Gage (M. C. B. Standard). Fig. 5707. In 1907 a gage having limited diameters of brake lever pin holes was adopted as standard. See **Gage.**

Lever Shaft. (Hand Car.) 21, Figs. 6207-6209. A short iron shaft to which the propelling levers are attached.

Lever Shaft Bearings (Hand Car). 22, Figs. 6207-6209.

Lift. A finger hold attached to windows and window blinds to take hold of in raising or lowering them. See **Sash Lift, Window Blind Lift.**

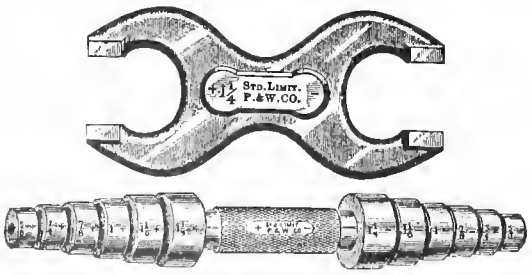
Lift Latch or Sliding Door Latch. Fig. 2411, etc. A lock, the latch of which is lifted by turning the knob instead of drawing it backward.

Lift Latch Lock. "A lock in which the latch is pivoted and lifted free of the keeper, passing through a notch in the box instead of being simply retracted." —Knight.

Lightning Arrester. Figs. 6363-6365. A device for protecting the electrical apparatus from damage by lightning. It usually consists of an air gap in series with a non-inductive resistance connected between power circuit and ground. The gap serves as an easier path to ground for high voltage discharge than through the electrical apparatus. The gap is provided with a magnetic blowout that extinguishes the arc after discharge.

Lignomur. A decorative head lining made from strawboard or paper, with figures stamped or embossed upon it. The figures are usually light colored, while the background is darker. It is glued to a thin narrow matched ceiling or may be applied directly to an old veneered ceiling.

Limit Gage. A term applied to many forms of gages which are used for determining whether pieces do not exceed or fall below a certain specified range of dimension. In 1893 limit gage and diameters for round iron were adopted as a Recommended Practice by the M. C. B. Association; these had formerly been standard of the Association. Limit gages, such as shown herewith, for 1¼-inch iron, are recommended for use in procuring round iron to take the Seller's standard screw threads; round iron used to be of such size as will enter the large or + end of the gage intended for that size, in any way, and also of such size as will not enter the small or — end in any way.



The limiting diameters for certain nominal sizes of iron, together with the maximum variation allowable by such use of these gages, are given in the following table:

Sizes of Limit Gages for Round Iron.

Nominal diameter of iron. Inches.	Large size + end. Inches.	Small size — end. Inches.	Total variation Inches.
¼	.2550	.2450	.010
5/16	.3180	.3070	.011
3/8	.3810	.3690	.012
7/16	.4440	.4310	.013
½	.5070	.4930	.014
9/16	.5700	.5550	.015
5/8	.6330	.6170	.016
¾	.7585	.7415	.017
7/8	.8840	.8660	.018
1	1.0095	.9905	.019
1⅛	1.1350	1.1150	.020
1¼	1.2605	1.2395	.021

Lincrusta Walton. A decorative material for walls and ceilings, having something of the appearance and toughness of leather. It is made from the residuum of boiled linseed oil mixed with sawdust. Designs of any form are pressed upon it and it is furnished in a great variety of colors. It is attached to walls, generally with paste or glue, like wall paper, but is waterproof and very flexible.

Lind Drop Door Gear. Figs. 1073-1076.

Lindstrom Ratchet Brake Handle. Fig. 4002. A brake handle for wide vestibules intended to work in a small arc of a circle. It is attached to the end panel of the vestibule, and when not in use is pushed against the wall.

Line Car. Fig. 17, etc. A short term to designate cars belonging to the various fast freight lines which run over several roads between the leading shipping points east and west. The number of these lines is large, and at the present time they are nearly all owned by associations of the roads themselves and not by private individuals. Their object is to make it possible to issue through bills of lading and to avoid breaking bulk, as well as to obtain greater despatch.

At the seventeenth M. C. B. Convention, Chicago, 1883, the following resolutions were adopted:

"Whereas, It is a common practice to store line cars on side tracks during summer months or dull times away from home, after they have been in severe service; and,

"Whereas, Many of the cars after being so stored are found to be more or less out of proper condition so that they need more or less repairs, and when put into service cause much detention to traffic and many transfers;

"Be it resolved, therefore, That it is the sense of this meeting that all line cars owned by foreign companies should be returned to their owners instead of being stored on foreign tracks, and that a competent man should be detailed to inspect the stored cars and to arrange to have the necessary repairs made during the time such cars are out of service."

For standard lettering of line cars, Fig. 6177, see **Lettering.**

Liner Blocks (Coupler). Blocks of cast or malleable iron bolted to the top and bottom of the tail end of the coupler or drawbar. They are now usually cast integral with the coupler shank. For different sizes of liner blocks see Fig. 1658.

Lining. See **End Lining, Head Lining, Inside Lining, Feed Door Lining.** Inner, outer and intermediate linings of refrigerator cars are those partitions or

layers of boards intermediate between the inside lining and the sheathing, which usually consist of ¼ or ⅜ in. stuff, the purpose of which is to make dead air spaces for insulating the contents of the car. (M. C. B. Standard.)

Lining Strips. Wooden or metal strips put on the inside of freight or baggage cars to protect the inside of the car from being injured by freight or baggage. Lining strips serve very much the same purpose as inside lining.

Lining Studs. 54, Figs. 305-321. Vertical studs placed between the posts and over or under the braces, and to which the lining is nailed.

Link. 1. "A short connecting piece, of circular or other equivalent shape; as one of the oval rings for divisions of a chain."—Knight.

2. (Coupling Links.) A short bar with an eye at each end for connecting two things together or for supporting one from another. When used alone the term in railroad service always means a **Coupling Link**, which see.

Link and Pin Coupler. An old type of drawbar by which cars were connected together by a link and a pin. There were a great variety of shapes and devices, but they have now been almost entirely replaced by the M. C. B. automatic coupler.

Link Hanger. 46, Figs. 4361-4369, 4467-4574. A **Swing Hanger**, which see, in the form of a link.

Link Hanger Eye Bolt. A bolt passing through the truck transoms, from which a short swing hanger is suspended.

Link Pin. A **Coupling Pin**, which see.

Linofelt Flax Fiber Insulation. Figs. 2199-2200. A quilt ½ in. in thickness, made of degummed and batted flax fibres stitched between two sheets of ninety-pound Lino Neponset waterproof insulating paper. Flax fibre is chemically prepared, and clean and odorless. The paper is stitched to the fibre with a good quality of thread, the rows of stitches not more than five inches apart, edges bound with paper to prevent fraying. Linofelt weighs .42 lbs. per square foot, and is furnished in rolls and pieces of various dimensions to conform to the ideas of the car builder.

Linoleum. A form of floor covering manufactured from linseed oil, prepared by a special process, mixed with ground cork and backed with canvas. Another floor covering of substantially the same nature as linoleum is known as corticine.

Lintel. 90 and 99, Figs. 648-651. The horizontal part of a door or window frame above the sash. See **Deck Sash Lintel.**

Lip. See **Retaining Lip** (Steel Tired Wheels).

Lip Lamp Chimney. One with an indented ring near the bottom, for use with screw lamp burners.

Live Lever. 92, Figs 4771-4777. The one of a pair of brake levers to which the brake power is first applied is sometimes given this title, the other lever being termed the dead lever.

Loading Gage (British). American equivalent, **Clearance**, which see. The limiting dimensions of carriages or wagons as to height and width, in order that they may clear tunnels, bridges, station platforms, etc. The dimensions are, roughly, 9 ft. in width and 12 ft. in height.

Loading Long Materials, Rules For (M. C. B. Standard.) Figs. 5806-5938. In 1893 a Recommended Practice was adopted for loading logs and poles on cars and for racking cars for loading bark, and in 1896 extended rules governing the loading of lumber and timber on open cars were adopted, replacing the former practice, heretofore shown on Sheet B, with the exception of racking cars for loading bark. At the same time rules governing the loading of long structural material, rails, plates, girders, etc., were adopted.

In 1897 some modifications of these rules were adopted, with slight changes in the illustrations also. In 1898 still further slight changes were made in the text and in some of the drawings, and a new section was added containing rules for loading large logs, pipe and stone on open cars. In 1900 a further modification was made in both text and illustrations. Further revised in 1904 and 1905.

Further revisions were made in 1904, 1905 and 1906. In 1908 a standard was adopted. A separate pamphlet is issued by the M. C. B. Association containing these rules which are too voluminous to be included here. Copies may be had by applying to the Secretary, Old Colony Building, Chicago, Ill.

Lock. 1. Figs. 5749-5756. Generally, a fastening of any kind operated by a key. Specifically, one having a dead bolt as distinguished from one having a spring latch bolt, the latter being technically termed a latch. A rim lock is one applied to the surface of a door. A mortise lock is one designed to be mortised into the edge of a door. A rabbeted lock is one with an offset front to conform in shape to a rabbeted door. A dead lock is one in which a bolt is moved by a key and not a spring. A latch is a lock with a spring bolt. A night latch is a lock with a spring bolt operated from the outside only by a key and from the inside usually by a knob. A padlock is a detached lock provided with a shackle adapted for engagement with a hasp or staple. According to their uses, locks are divided into berth locks, door locks, freight car locks, grain door locks, seat locks, sliding door locks, etc. See also **Sash Lock.** Freight car locks are usually seal locks. See **Car Seal.** The **Yale Lock**, which see, is a special, secure type largely used.

2. (M. C. B. Automatic Coupler.) The catch which drops in front of the knuckle horn and holds it shut, thus locking the couplers together.

Lock Case. The outside or covering part of a lock, more especially a padlock.

Lock Chain. A chain by which a padlock is fastened to a car.

Lock Keeper. Figs. 2411-2589. The box on a door jamb into which the bolt of a lock protrudes when shut. See **Keeper.**

Lock Lifter. (Automatic Coupler.) The part of the mechanism inside the coupler head in some types of M. C. B. couplers which is moved by the uncoupling rod and in moving lifts the knuckle lock so that the knuckle can open.

Lock Nut. Fig. 3062. The outer one of a pair of nuts on one bolt, which, by screwing up separately to a tight bearing, locks the inner one. A large number of special forms of lock nuts and nut locks, which serve the same purpose, are in use which are not strictly included under the above definition. One of these is shown in Figs. 3855-3856.

Lock Seal. A piece of glass, lead or paper, which forms a seal for a lock, so that the latter cannot be opened without its being known. See **Car Seal.**

Lock Set (Automatic Couplers). A feature of most M. C. B. couplers whereby the knuckle lock when lifted is held in a raised position until the knuckle

is opened, when it allows the lock to drop back into position for automatically coupling when the cars are brought together.

Lock Washer. Fig. 3853.

Locker. A small compartment or closet for storage. A closet is usually the same height as the room and a locker is of less height. Lockers are frequently attached under cars.

Locomotive Crane. A self-propelling car, with a steam crane, mounted upon it, which crane has three independent motions, viz., that of hoisting, slewing or rotating and raising of the boom. See **Wrecking Crane.**

Locomotive Valve (Steam Heating). Figs. 2972-2974. The valve on the locomotive which admits live steam to the train line. See **Starting Valve.**

Lodging Car. A passenger or box car fitted up with sleeping accommodations for men at work on the line of a road. More commonly called boarding car.

Logging Cars. Figs. 102-106. A special variety of light and strong cars used for getting out lumber, running usually on cheap logging railroads. They consist of a pair of four-wheel trucks, a heavy center sill or sills and two **Bolsters** or **Bunks,** which see, on which the logs are laid. They are often without brakes and automatic couplers are seldom used.

Long Brake Shaft. 94, Figs. 262-272. One which extends up above the top of a car so that brakes can be applied by a person on the roof.

Long Flat Car. A flat car of extra length for long timbers, piling, etc. A barrel car is an example, shown racked in Fig. 25.

Long Seat End. A vertical frame of wood or iron which combines a seat end and seat stand together, supports the end of the car seat and also forms the arm seat end. A short seat end is a seat end proper, which is supported on a separate stand.

Longitudinal Rising Timber. See **Rising Timber.**

Longitudinal Seat (Street and Suburban Cars). A seat which extends lengthwise of a car.

Longitudinal Step. 1. A board which extends along the side of an open car, or a car with doors on the side, used as a step in getting on or off the car or for passing from one end of the car to the other.

2. (British.) See **Foot Board.**

Longitudinal Step Bracket. A hanging support to carry a longitudinal step. See above.

Longitudinal Tie Rod (British). Corresponds in part to an American truss rod. A long bolt binding the timbers of the underframe together longitudinally. It is generally horizontal, and if inclined slopes downward to the ends of the vehicle to prevent them from sagging or drooping. In British eight-wheel vehicles truss rods are used, but in four-wheel vehicles the ends are more likely to sag than the center.

Lookout (Freight Caboose). 174, Figs. 577-588. A small cupola or upper deck in the roof to afford opportunity for display of signal lights and to enable train hands to keep a better lookout on the train.

Lookout Signal Lamp (Caboose Cars). 141, Figs. 577-588. A lamp mounted on the rear of the lookout to indicate the class or the position of the train to which the caboose is attached. Also called **Tail Lamp,** which see.

Loose Berth Hinge. Fig. 4349. A berth hinge, the two parts of which are detachable. It enters into a loose berth hinge bushing or plate. See **Berth Hinge.**

Loose Globe. See **Lamp Globe.**

Loose Globe Lamp. A lamp or lantern in which the globe is attached to the frame by springs, screws or catches, so that it can be easily removed.

Loose Joint Butt Hinge. Fig. 2453. A **Butt Hinge,** which see, permitting the door to be lifted off its hinges when desired.

Loose Pin Butt Hinge. Figs. 2443-2445. A **Butt Hinge,** which see, having a removable hinge pin.

Lorry or Larry. Fig. 6213, etc. Push cars used in construction for moving rails, ties, etc. Often made with only a half bearing for the journals so that the frame can be removed from the wheels at any time.

Low Sided Wagon (British). Fig. 6549. A freight car with sides and ends about 9 in. high. It has generally no doors, and is used chiefly for conveying pig iron and similar loads.

Low Truck. Trucks constructed so as to bring the floor nearer to the rails; mainly used in construction service. They are commonly constructed so as to bring the floor about 3 ft. 2 in. or 3 ft. 6 in. from the rail, instead of about 4 ft.

Lower Arch Bar. The **Inverted Arch Bar,** which see. See **Arch Bar.**

Lower Berth (Sleeping Cars). 1, Figs. 2201-2202. The bed nearest the floor made up by pulling out the seats and dropping down the seat backs. The mattress for it is carried by day in the pocket formed by the upper berth. See **Berth.**

Lower Berth Stop Bar. 49, Figs. 2201-2202. See **Stop Bar.**

Lower Brake Rod. 97, Figs. 4771-4773. A rod which connects the two brake beams or levers of outer hung brakes. When two levers are used the rod is attached to each lever. It is sometimes supported in case of accident by a lower brake rod carrier. With inner hung brakes the substitute for the lower brake rod becomes a part in compression and is called the brake lever coupling bar.

Lower Brake Shaft Bearing. 97, Figs. 262-272 and Figs. 772-773. An eye or support for a vertical brake shaft, near the lower end. The support at the lower end is called the brake shift step. The lower bearing is above the step.

Lower Chord (of a Truss). The lower outside member. In the side trussing of a freight or passenger car the side sill is the lower chord.

(The distinction between a lower chord and a truss rod is not very clear. A chord is usually so called only in a truss having both vertical and inclined members. A mere trussed beam is not a truss in usual technical usage.)

Lower Corner Plate. Figs. 903-904; 57, Figs. 262-272. See **Corner Plate.** A push block, or push pole corner iron, is usually the lower corner plate. 191, Figs. 262-272.

Lower Deck. 102, Figs. 648-651. The main roof of a passenger car on each side of the clear story or upper deck.

Lower Deck Ceiling (Sleeping Cars). 22, Figs. 2201-2206. The inside finish of the lower deck which forms the top finish for the upper berth.

Lower Diaphragm (Pintsch Lamp). 286, Figs. 3208-3224.

Lower Door Hinge (British). See **Door Hinge.** This hinge is made with a longer butt than the others, to allow for the curvature or fall under the door.

Lower Door Panel. 10, Figs. 1329-1337.

Lower Door Sash. 13, Figs. 1329-1337. The lower section of a door sash, which is made in two parts. This is commonly movable, the other fixed.

Lower Foot Board (British). American equivalent, platform step. A board running nearly the whole length of the carriage, and situated about 20 in. from the ground.

Lower Seat Back Rail (Street Cars). Also called a seat back bottom rail. See **Upper Seat Back Rail.**

Lower Swing Hanger Pivot. 48, Figs. 4705-4713. A bar by which a spring plank is attached to the lower end of a **Swing Hanger,** which see.

Lower Thimble (Pintsch Lamp). 290, 290a, Figs. 3208-3224.

Lower Wainscot Rail (Passenger Car Interiors). 74, Figs. 648-651; D, Fig. 2204. A longitudinal rail immediately above the truss plank. The upper wainscot rail comes directly below the window.

Lower Window Blind. The lower section of a window blind which is made in two parts, as is usually the case.

Lower Window Blind Lift. Fig. 4545. The lifts for lower blinds differ from those for a single blind in having a lug which engages with the upper blind when the lower one is raised up half way, and thus the upper one is raised with the lower one. See **Window Blind Lift.**

Lubricator. Fig. 5315. An instrument used for applying a lubricant to a journal or other moving part. Also called oiler.

Lug. A projecting stud or ear to afford a bearing or point of attachment. See **Follower Plate Lug.**

Lug Bolt. A **Strap Bolt,** which see, with a lug turned up at one end to enter a mortise in the timber and in part to relieve the attaching bolts from strain.

Lumber. Timber of all kinds sawed into merchantable form, but more particularly such as is not sawed into boards. The term, however, is often used in the broad sense.

Lumber Car. A car of extra length, more particularly intended for carrying long timbers. Box and stock cars frequently have end doors to facilitate the loading of lumber. Gondola cars, with flat bottoms and drop doors, are largely used for lumber.

Lumber Lorry. See **Lorry Car.**

Lunch Counter Car. Fig. 229. A baggage car fitted up with a lunch counter for serving light meals on excursion trains.

M

McCord Journal Box and Dust Guard. Figs. 5299-5305.

McCord Friction Draft Gear. Figs. 1484-1496.

McCord Spring Dampener. Fig. 5370.

McKay's Curtain Brackets. Figs. 4682-4685. A form of bracket for holding the various forms of spring roller curtains, one bracket having a rectangular hole and the other a circular. A variety of patterns are made besides those shown. The McKay and Hartshorn shade roller accomplish the same end in much the same way, but the McKay works with a cam, while the Hartshorn works with a pawl. See **Shade Roller.**

Machine Bolt. A bolt with a metal thread cut on it, and with a square or hexagonal head, especially if turned or finished. The word bolt, unqualified, usually means a machine bolt.

Magazine (Base Burning Stove). A general term for a receptacle for coal before it reaches the fire-pot proper, usually situated directly above the latter.

Magazine Coil Heater. Fig. 2749.

Mail Car. A car for carrying mail. More properly a postal car. Figs. 190, 194-197, 623-629. Mail cars are sometimes defined as those used only for carrying mail bags and not for distributing mail matter, but the distinction is not always observed. Distributing mail cars are, however, always called **Postal Cars,** which see. See also **Combination Baggage Car.**

Mail Car Lamp. Figs. 3586 and 3588. See **Postal Car Lamp.**

Mail Catcher or **Collector.** Fig. 4034. A contrivance consisting of a bent iron bar attached to the door of a postal car for taking up or "catching" mail bags while the train is in motion. The British system of collecting mail bags is different from the American, and relies upon the use of nets. The leather bag is fastened by a spring to an iron bar in the car, and when the exchanging station is near the bar is turned out, the bag hanging suspended. At the same time the catching apparatus, consisting of a net attached to a bar, is put out. The bag from the car is caught in the net attached to a stationary post, and the bag for the car caught in the car in a similar manner. The American plan has been copied in Australia and India.

Mail Catcher Socket or **Mail Collector Socket.** The brackets or sockets on either side of the postal door which hold the collector.

Mail Van (British). A vehicle adapted to run on passenger trains and fitted with apparatus for sorting and conveying letters, and generally with apparatus for taking up and dropping mail bags while the train is running at full speed. A mail van in which letters can be posted and letters are postmarked is termed a traveling post-office. When fitted only for conveying mail bags and not for sorting it is termed mail van tender. Every projecting piece of either wood or metal is carefully padded to prevent injury to the post-office officials in collisions, etc.

Main Carline (Freight Cars). A carline stronger than the ordinary carlines, so as to support the roof and tie the two plates together.

Main Cock (Pintsch Gas Lighting). Figs. 3050, 3104. A cock usually placed in the saloon for the control of the low pressure supply. It regulates all the burners at once, in addition to which there are separate cocks to each. 25, 25b, 25c, Fig. 2608, are respectively for ¼ in., ⅜ in. and ½ in. pipe, and are used in all classes of cars, according to the size of main low-pressure pipe required. 25c (1½ in.) is in most general use. (Acetylene Lighting, Fig. 3287.)

Main Cock Covers (Pintsch System). Nos. 135, 135C, Fig. 3051. For main cocks, Nos. 25, 25B, 25C, Fig. 3050. They are of cast iron, with hinged lid to fit over the key shaft of cock. Are to be screwed to side of car or to bulkhead.

Main Floor (Refrigerator Car). G, Figs. 305-321. The top layer of boards in the floor of the car. See **Floor.**

Main Pipe (Air Brake). The brake pipe.

Main Rafter. A **Main Carline,** which see.

Main Reservoir (Air Brake). A cylindrical boiler plate tank, carried on the locomotive, or motor car, to hold a supply of compressed air. So called in distinction from the auxiliary reservoirs under each car.

Major Coupler. Figs. 1743-1756.

Male Center Plate. The body center plate is sometimes called a male center plate. See **Center Plate.**

Malleable Iron. Cast iron which has been annealed and the brittleness greatly decreased by packing the castings in iron pots containing forge scale, hematite ore or some other oxide of iron and subjecting them to a continued red heat for from four to six days. They are then allowed to cool slowly. The change which takes place is internal, and while little or no carbon is removed its physical condition is changed from graphitic to amorphous or cement carbon and the iron is rendered less brittle. Malleable castings can be bent within moderate limits, but are not truly malleable like wrought iron. Many parts used in car work are made of it, including couplers, brake levers, journal boxes and almost all small castings.

Mandrel. 1. (For Lathes.) A shaft serving as a temporary axis for objects to be turned.

2. (Foundry.) A plug around which a body of metal is cast.

Mandrel Pin or **Cross Bar** (Swing Link Hanger.) The bar which supports the spring plank. See **Swing Hanger.**

Manhole (Tank Car). 110, Figs. 545-549. An opening in a boiler or tank through which a man can creep to the inside. The tanks for tank cars always have manholes on top.

Manhole Cover. 111, Figs. 545-549. A plate or lid to close a manhole.

Manhole Cover Chain. A chain with which a manhole cover is fastened to a tank to prevent it from falling off the tank when the manhole is opened.

Manhole Hinge. A hinge by which a manhole cover is attached to the manhole ring.

Manhole Ladder (Tank Cars). 103, Figs. 545-549. An iron ladder extending down into the tank under the manhole to allow workmen to descend into the tank through the manhole for purposes of cleaning or inspection.

Manhole Ladder Brace (Tank Cars). 104, Figs. 545-549. A wrought iron piece attached to the inside of the tank and to the manhole ladder to keep the latter in a vertical position.

Manhole Ring. A metal ring riveted around a manhole, and which forms a seat for the cover.

Mansell Retaining Ring. Figs. 5406-5411. A mode of connecting steel tires to the wheel centers by a ring of an approximate L or U cross-section, which secures the tire to the wheel, so that every part of the tire is securely held, into however many pieces it may be ruptured. This ring is almost universally used in English passenger service.

Mansfield Deck Sash Opener. Figs. 4444-4446. One of the numerous styles of deck sash openers, the peculiarity in which consists in the manner of connecting each end of each deck sash to an opener in such manner that either the front end or the back end of the window may be thrown open, producing draft either into or out of the car, at discretion.

Marking Cars (M. C. B. Standard). Figs. 5744-5748. See **Lettering.**

Marshaling (British). American equivalent, switching or drilling. Arranging the cars of a freight train in proper station order.

Mason Safety Tread. Figs. 2282-2285.

Mast. 1. (Of a Derrick or Crane). The main upright member against which the boom abuts.

2. (Of Brake Gear.) A **Brake Shaft**, which see.

Mast Packet (Derrick or Wrecking Car). A heavy casting under the car floor serving as a socket for supporting the mast of a derrick to hold it upright.

Mast Sheave or **Pulley** (of a Derrick or Crane). A sheave or pulley wheel placed at the top of the mast.

M. C. B. Reports. In 1893 a standard size of 6 inches by 9 inches was adopted for M. C. B. Reports.

In 1894 a standard size for Pamphlets, Catalogues, Specifications and publications of that nature was adopted, as follows:

For postal card circulars, 3¾ inches by 6⅛ inches

For pamphlets and trade catalogues { 3½ in. by 6 in. / 6 in by 9 in. / 9 in. by 12 in.

For specification and letter paper, 8¼ inches by 10¾ inches. In connection with these standards it was decided that a standard practice should be to have the proper standard dimensions, and the word "standard" printed on the upper left-hand corner of title page or cover whenever practicable.

Master Car Builders' Standards and Recommended Practice. A variety of standard details for cars, or recommendations in respect to them, which have been adopted and promulgated by the Master Car Builders' Association, and are separately described in this volume. By a letter ballot, cast in 1893, the standards of the Association prevailing at that date were modified—

First—By abolishing certain standards because they had either become obsolete or nearly so, or because they were simply forms of gages for shop use to produce certain other standard forms, and it was believed that such gages were not essential as standards of the Association, and it had been ascertained that they were not generally used.

The old standards thus abolished were:

Wheel diameter testing gage.
Wheel flange and journal gage.
Wheel bore testing gage.
Wheel boring, use of six dogs.
Journal length and diameter gage.
Journal shoulder and centering gage.
Journal distance gage.
Guard rail gage. (Made standard again in 1894.)
Attachments and dimensions of drawbars.
Train pipe fitting for steam heat.

Second—By ordering that the three items formerly printed at the end of the standards, namely:

Storage of line cars on foreign roads,
Dictionary of terms,
Entertainments,

be printed with the proceedings as heretofore, but not among the standards.

Third—By dividing the remaining standards into:

(a) Standards of the Association.
(b) Recommended Practice, as follows:

(a) Standards:

Journal Box and Details, Journals, 3¾ in. x 7 in. Fig. 5466.
Journal Box and Details, Journals, 4¼ in. x 8 in. Figs. 5488, 5694.
Journal Box and Details, Journals, 5 in. x 9 in. Fig. 5615.
Journal Box and Details, Journals, 5½ in. x 10 in. Fig. 5621.
Journal Bearing and Wedge Gages, Journals, 3¾ in. x 7 in., 4¼ in. x 8 in., 5 in. x 9 in. and 5½ in. x 10 in. Figs. 5713, 5732.
Axles. Fig. 5510.

Form of Wheel Tread and Flange. Fig. 5518.
Wheel Circumference Measure. Fig. 5514.
Brake Head and Shoe. Fig. 5519.
Specifications for Brake Shoes. See **Brake Shoes, Specifications for.**
Brake Beam. Fig. 5710.
Air Brakes.—General Arrangement and Details. Figs. 5527, 5562.
Pedestal for Journal, 3¾ in. x 7 in. Fig. 5566.
Automatic Coupler. Fig. 5580.
Contour Line and Limit Gages for Automatic Coupler. Fig. 5579.
Gage for Worn Couplers. Fig. 5573.
Specifications for M. C. B. Automatic Couplers See **Automatic Car Coupler Specifications.**
Terms and Gaging Points for Wheels and Track. Fig. 5598.
Guard Rail and Frog Wind Gage. Fig. 5601.
Distance Between Backs of Flanges of Car Wheels, which see.
Standard Reference Gage for Mounting and Inspecting Wheels and Wheel Check Gage. Fig. 5599.
Wheel Flange Thickness Gage. Fig. 5602.
Height of Couplers, which see.
Screw Threads, Bolt Heads and **Nuts,** which see.
Uniformity of Section for Car Sills. See **Sills.**
Square Bolt Heads, which see.
M. C. B. Reports, Pamphlets, Specifications, Catalogues, etc. See **M. C. B. Reports.**
Sliding, Flooring, Roofing and Lining. Fig. 5749.
Arch Bars and Column Bolt for 80,000-lbs. Capacity Cars. Fig. 5697.
Adjusting Height of Couplers. See **Height of Couplers.**
Stenciling Cars. See **Stenciling.**
Passenger Car Pedestal for Journal 4¼ in. x 8 in. Fig. 5685.
Passenger Car Journal Box and Contained Parts for Journal 4¼ in. x 8 in. Fig. 5694.
Air Brake Repair Card, which see.
Protection of Trainmen. Figs. 5635, 5637.
Label for Air Brake Hose. See **Air Brake Hose.**
Wheel Defect Gage. Fig. 5599.
Center Plates. Fig. 5711.
Pipe Unions, which see.
Specifications for Air Brake Hose. See **Brake Hose Specifications.**
Brake Head Gage. Fig. 5706.
Brake Beam Gage. Fig. 5708.
Lever Pin Hole Gage. Fig. 5707.
Limit Gage for Remounting Cast Iron Wheels. Fig. 6068.

(b) Recommended Practice:

Specifications for 33-inch Cast Iron Wheels. See **Wheels.**
Specifications for Iron Axles. See **Axles.**
Specifications for Steel Axles. See **Axles.**
Limit Gages for Round Iron. See **Limit Gages.**
Check Chains, which see.
Marking Cars. See **Lettering.**
Air Brake and Train Air Signal Instructions.
Platform Safety Chains, which see.
Marking Fast Freight Line Cars. Fig. 6177.
Attachment of Couplers to Cars. Fig. 5779.
Uncoupling Attachments for M. C. B. Couplers. Fig. 5785.
Safety Chains for Freight Cars. Figs. 5766-5785.
Minimum Thickness for Steel Tires. Fig. 5766.
Rules for Loading Long Materials on Cars. Fig. 5806, etc.
Mounting Wheels, which see.
Air Brake Appliances. See **Air Brakes.**
Air Brake Tests, which see.
Box Car Side and End Door Fixtures. Fig. 5961.
Springs and Spring Cars for Freight Trucks. Fig. 6010.
Collection of Salt Water Drippings. Fig. 5776.
Twist Gage for New Couplers. Fig. 5579.
Steam Air Line Connections, which see.
Signal Lamp Brackets and Sockets. Fig. 5951.
Pedestal and Journal Box for Passenger Cars, Journals 5 in. x 9 in. Figs. 5805, 5685.
Framing for Box Cars. Fig. 6021.
Drop Test Machine. Fig. 6024.
Inside Dimensions of Box Cars. See **Box Car Dimensions.**
Height and Width of Cars. See **Box Car Dimensions.**
Cast Iron Wheels. Figs. 6070, etc. See **Wheels.**
High Speed Foundation Brake Gear. Fig. 6028. See **Foundation Brake Gear.**
Tank Cars, which see.
Permanent Stake Pockets. See **Stake Pockets.**
Temporary Stake Pockets. See **Stake Pocket.**
Knuckles, which see.
Splicing Center Sills. Fig. 5953. See **Splice.**
Safety Chains. Fig. 5785.
Rules for Examination of Car Inspectors. See **Examination.**
Cleaning Air Brakes, which see.

These Standards and this Recommended Practice are given under their respective heads in these pages as modified by letter ballot on these or other subjects, and revised up to 1905.

New drawings of the Standards and Recommended Practice have been made on sheets of uniform size, and lithographed and printed on transparent paper so that blue prints may be taken from them; such sheets are for sale by the Secretary of the M. C. B. Association, Old Colony Building, Chicago, Ill., in connection with pamphlets containing explanatory text as given in the Proceedings. See **Standards, Recommended Practice.**

Master Controller. Fig. 6357. See **Control System.**

Master Key. Fig. 2607. A key which commands many locks of a certain set, the keys of which are not interchangeable through the hollow rollers, coupling the middle ring of rollers to the outside rings each to each, which insures their keeping in line and working together.

Mat. Figs. 2539-2540. See **Floor Mat.**

Match Box Holder. Figs. 4394, 4407.

Match Lighter. Figs. 3486, 4392-4393, 4064. A **Match Striker,** which see.

Match Safe. Fig. 4395.

Match Striker. Figs. 4392-4393. A metal plate with a rough surface.

Match Striker Frame. A metal frame for holding a piece of sand or emery paper on which to strike matches.

Mattress (Sleeping Cars). D, E. Fig. 2202, etc. In sleeping cars both mattresses are stowed away by day above the upper berth.

Meat Timbers (Refrigerator Car). The vertical and horizontal timbers inside the refrigerating chamber on which the meat is suspended. They are usually independent of the framework of the car and fastened to it with coach screws.

Melrose Coupler. Figs. 1766-1775.

Metal Screw Thread. A form of screw thread used when both the male and female screws are made of metal. Metal threads are made of the same size as the spaces between them, whereas the spaces between wood screw threads are made wider than the projections. See also **Sellers System of Screw Threads.**

Mica Chimney (Pintsch Lamp). Fig. 3110. A chimney for use on all center lamps, being placed immediately above the ring reflector, allowing a portion of the light to be directed toward the roof of the Car. See **Pintsch Lamps.**

Micrometer Gage. A general term for any form of gage giving very minute and exact measurements. There are several varieties; the most common is one with an accurate screw thread and an index to give the number of revolutions and fractions thereof.

Middle Brake Shaft Bearing. Figs. 783-784. An iron casting with an eye, bolted to the end of the car about half way up and serving as a bearing for the brake shaft.

Middle Corner Plate. Figs. 804-806, 836-838; 56, Figs. 262-272. See **Corner Plate.**

Middle Door Panel. 11, Figs. 1197-1199. See **Door Panel.**

Middle Door Rail. 148, Figs. 599-619. A horizontal bar in a door frame intermediate between the top and bottom rails. See **Door Frame.**

Middle Longitudinal (British). American equivalent, intermediate sill. A part of the underframing supporting the body or floor, and in many cases transmitting the buffing and the draft strains.

Middle of Axle. The portion of a car axle between the two sloping necks which come next to the wheel seat. See **Axle, Car Axle.**

Middle Safety Beam (Six-Wheel Trucks). A beam attached to the two transoms to hold the center axle in case of breakage.

Middle Transoms (Six-Wheel Trucks). 21, Figs. 4780-4783. The two cross pieces nearest the center, in distinction from the two outside transoms. They are sometimes made of iron to allow the two swinging spring beams to be connected to each other by the bolster bridge.

Mighty Midget Heater (Baker's). Figs. 2736-2748. A small heater for cars.

Milk Car. Figs. 325-328. A car built like a refrigerator car and intended for carrying fresh milk in cans. They are usually equipped to be run in passenger trains and like the car shown in the illustrations, often have much the appearance of an ordinary baggage or express car.

Milk Base Check (Pintsch Lamp). Fig. 3089.

Miller Coupler. Figs. 1840-1847. A form of automatic coupler for passenger cars largely in use before the general adoption of the M. C. B. type of vertical plane coupler. It consisted of a shank and a head with a fixed projection or hook which engaged with a corresponding hook when cars were brought together, by side displacement of the drawbars. To uncouple, one or both of the drawbars were pulled to one side by an uncoupling lever and chain operated from the platform. A strong spring kept the drawbars normally in the center line of draft.

Mine Car. Fig. 98a. A small car for carrying minerals in mines, usually four-wheeled, and provided with a dumping device by which the load may be quickly and completely discharged.

Miner Drawbar Centering Device. Figs. 2091-2092.

Miner Draft Gear (Freight). Figs. 1407-1519. (Passenger.) Figs. 1871-1885.

Miner Gravity Side Bearing. Fig. 5341.

Miner Metallic Running Board Saddle. Figs. 2156-2159.

Miner Roller Side Bearing. Fig. 5340.

Mineral Wool. A substance having much the appearance, which its name implies, manufactured from the slag of iron furnaces by throwing against it while in the molten state a strong blast of air. It is used for deadening in passenger cars and also largely as a non-conductor for coating steam pipes and boilers.

Minimum Thickness of Steel Tires. In 1894 a Recommended Practice was adopted for minimum thickness for steel tires of car wheels, to be 1 inch, to be measured normal to the tread and radial to the curved portions of the flange through the thinnest part within 4¼ inches from the back of the flange; the thickness from the latter point to the outer edge of tread to be not less than ½ inch at thinnest part, as shown in Fig. 5766.

A further practice was adopted of cutting a small groove, as shown in the outer face of all tires when wheels are new, at a radius ¼ inch less than that of the tread of tire when worn to the prescribed limit, to facilitate inspection.

Mirror (for Wash Rooms of Sleeping Cars). A looking-glass.

Mirror Frame. Fig. 3796. A frame for a looking-glass.

Mirror Frame Spring. A mirror sash holder.

Mirror Guard (Wash Rooms, etc., of Sleeping Cars). A fender of various forms to protect mirrors. Uusually nickel-plated bars across the face, and a tray for towels or brush and comb at the bottom of the mirror.

Mirror Sash. A frame of a mirror which covers a lamp alcove in the side of a car. It slides up and down like a window sash.

Molding. Figs. 678-690. 1. "A mode or ornamentation by grooved or swelling bands or forms, following the line of the object."—Knight. Small moldings are often termed beads and also fillets. A cove molding is one of concave section. There are a great variety of other special technical terms for different forms of moldings. Moldings are either straight or **Waved,** which see. See also

Deck Eaves Molding. **Window Cove Molding.**
Eaves Molding. **Window Molding.**
Platform Hood Molding. **Window Sill Molding.**

2. (For Car Seats.) Fig. 4197. Also called seat back bands or seat molding. A metal band to finish the edge of the seat back. Plush or leather covered strips are also used.

Molding Joint Cover. A piece of wood or metal in some ornamental form for covering the joints of two pieces of molding. See **Window Molding Joint Cover.**

Monitor Body and Truck Bolsters. Figs. 1121-1124, 1141, 5013-5015.

Monitor Deck Sash Pivot and Ratchet Catch. Figs. 4521-4522. A device for regulating the opening of deck sashes by means of a small fixed ratchet plate in which a ratchet bolt engages, holding the sash

fixed in any one of four different positions. See **Deck Sash Pivot.**

Monitor Top. A **Clear Story** or **Upper Deck,** which see.

"Monarch Solid" Brake Beam. Figs. 5098-5099.

Monogram Hose Bracket. Figs. 1315-1322. See **Brake Hose Bracket.**

Monogram Safety Vent Valve. Fig. 3861.

Moore Ventilator. Fig. 4423. See **Ventilator.**

Morgan's Automatic Deck Sash Pivot. Figs. 4505-4508. A device for regulating the openings of deck sashes, the essential feature of which is the use of a double circular undulating ratchet, one attached to the sash and the other to a fixed part of the car, the two ratchets being pressed together by springs so as to admit of easy motion of the sash by hand at the same time that it is held in any position when released.

Mortise Lock. Fig. 2510. "A lock adapted to be inserted into a mortise in the edge of a door, so as only to expose the selvage or edge plate."—Knight. See **Lock.**

Mortiser (Wood Working Machinery). Figs. 6796, 6806, 6809. A tool for cutting a rectangular hole or mortise in a stick of wood. It usually consists of a boring bit revolving inside of a hollow square chisel which has a reciprocating motion. The bit forms a round hole which the chisel enlarges to a rectangular hole. A chain mortiser uses a chain cutter instead of a hollow chisel.

Moskowitz System of Electric Car Lighting. Figs. 3042-3420. This is a complete electric car lighting system, utilizing the rotation of the car axle for driving dynamos. The dynamo is mounted on the truck, suspended over the outside of end sill and vertically cushioned to protect it from jars and vibrations of truck, and driven from the car axle. The polarity changer is part of the dynamo, and is operated from end of armature shaft. This device operates by gravity, within less than one revolution of the car wheel, and is withdrawn by centrifugal force, after rectifying polarity of dynamo. The automatic controller controls the dynamo, electro-magnetically, causing it to generate a predetermined output of current under all speed variations. It also automatically closes the generator circuit when dynamo is in operation, and opens it when it is under speed or out of operation. The complete system of wiring, including battery and protective devices is in the individual light circuits, which are automatically short-circuited when the battery is supplying the lamp, so that there will be approximately no difference in voltage, whether there are one or more circuits in use, thus permitting the dynamo to feed the lamps and charge the battery at the same time, irrespective of the number of lamp circuits in use.

Motor. See **Electric Motor.**

Motor Car. Figs. 206-210, 639-644. See also **Electric Motor Car.**

Motor-Driven Air Compressor (Air Brake). Figs. 1221-1224, 1296-1297. An air compressor driven by a motor for use on electric cars. See **Air Pump and Motor.**

Motor Inspection Car. Figs. 6187, 6190, etc. A small four wheel car with seats, propelled by a gasoline engine similar to an automobile. They are light and fast, having a speed of 30 or 40 miles an hour, and are in increasing use in place of hand cars for inspection purposes.

Motorman's Brake Valve. Figs. 1225-1232, 1300. See **Brake Valve.**

Motorman's Cab Door Lock. Figs. 2436-2439. A flush handle lock for the swinging door forming the motorman's cab on electric motor cars. It has a spring catch and a key bolt and permits the door to be locked in three positions.

Mould. See **Molding.**

Mounting Wheels. In 1896 it was decided by letter ballot that a gage for determining the center of the axle between centers of journals be used, and that all axles be carefully centered between centers of journals prior to mounting, and that a gage for locating the wheels equidistant from the center of the axle, as thus determined and shown in Fig. 5600, should be used in mounting wheels.

In 1902 this gage was made a standard of the Association.

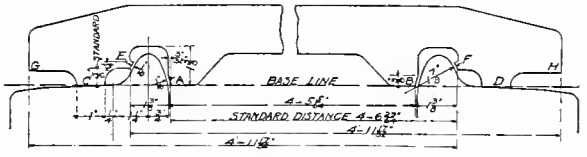
In 1897 the Recommended Practice for mounting wheels was modified by letter ballot by the omission of that part providing, among other things, that wheels with flanges worn to a thickness of 1⅛ inches or less should not be remounted, and the substitution therefor of the following:

First—That wheels with flanges worn to a thickness of 1⅛ inches or less shall not be remounted.

Second—That the thickness of flanges of wheels fitted on the same axle should be equal and should never vary more than ⅛ inch.

Third—That in mounting wheels, new or second-hand, the standard wheel check gage should be used in the following manner:

After one wheel is pressed into position place the stop "A" or "B" of the check gage against the



inside of the flange of the wheel with the thinner flange with the corresponding tread stop "C" or "D" against the tread of the wheel. Press the other wheel on the axle until the opposite tread stop comes in contact with the tread with the corresponding gage point "E" or "F" in contact with the outside of the thicker flange.

Movable Foot Rest (Car Seats). More properly, simply **Foot Rest,** which see, in distinction from fixed foot rails under the seats.

Muck Bar. "Bar iron which has passed once through the rolls. It is usually cut into lengths, piled, and rerolled."—Knight. Certain grades of iron axles are made directly from muck bars and contain no scrap. See **Axle.**

Muffler Exhaust. See **Exhaust Muffler.**

Muffler (Vacuum Brake). A device to render noiseless the emission of steam at the ejector when brakes are applied. It is simply a lot of beads or shot, through the interstices of which the steam forces its way.

Muley Axle. An axle without collars.

Mullion. A slender bar between panes of glass or panel work. See **Door Mullion.** 2, Figs. 1329-1337. **Window Blind Mullion.**

Multiple Circuit Drum System (Consolidated Car Heating Co.). Fig. 2878. A system of car heating by circulating hot water heated by steam from the locomotive by means of a drum, placed longi-

tudinally beneath the floor of the car, as shown. The piping in the car is connected from this drum in a number of circuits so that there is a quick flow of water through the different circuits and all parts of the apparatus are run at practically the same temperature. Its time of circulation is about one-sixth of the time of circulation of a heater in which piping is arranged in series.

The advantages claimed for multiple circuits are: 1, a low pressure of steam; 2, no limit, practically, to amount of heating surface that can be supplied; 3, a more uniform heat is supplied to all parts of car; 4, short circuit of hot water circulation.

The circulating system, as shown, is also connected with a fireproof heater, which may be used when steam is not available, and in those States where the law permits a stove or heater.

Multiple Control Switch. Fig. 6409. See **Westinghouse Unit Switch System of Control, Control System.**

Multiple Nut Fastener. Fig. 3863.

Muntin. A corruption of the word mullion, chiefly used in Great Britain. See **End Stanchion** or **End Muntin.**

Murphy's American Car Roof. Fig. 2170. An outside metallic roof.

Murphy's Improved Winslow Car Roof. Fig. 2169.

N

Nail. "A small pointed piece of metal, usually with a head, to be driven into a board or other piece of timber, and serving to fasten it to the other timber."—Webster.

The common nails of commerce are divided into cut nails, and clinch nails, and wire nails. They are distinguished in size by the number of pennies, as 10d., 20d., etc., nails. See also **Panel Pin** (British).

Nail Strip. 194 and 194a, Figs. 262-272. A strip of wood laid over a metal underframe and bolted to it, to which are nailed the floor boards.

Nailing Strip Bracket. 193, Figs. 262-272. A bracket secured to the sills to hold in place the **Nailing Strip,** which see.

Nailing Strip Cross Ties. 196, Figs. 262-272. Light members of a metal underframe extending across the sills for the purpose of supporting the nailing strips.

Name Panel. A panel usually of elliptical form, on the outside of a passenger car body below the windows, on which the name or number of the car is painted.

Name Plate. See **Door Name Plate** and **Notice Plates.**

Narragansett Car (Electric). Figs. 6273-6274. A type of long double truck open car having a peculiar Z bar side sill construction which gives a double side step or running board without decreasing the width of the car body with a given clearance limit.

Narrow Gage. The distance in the clear between the heads of the rails of a railroad when less than 4 ft. 8½ in. See **Gage.**

National Brake Lever Jaw. Figs. 5221-5223. A malleable iron substitute for the forged jaws on brake lever connections.

National Centering Yoke. Figs. 2087-2088.

National Coach Wheel. Figs. 5396-5401.

National Coupler (Freight). Figs. 1594-1598. (Passenger), Figs. 1830-1847.

National Dead Lever Guide. Fig. 5223. A malleable iron guide for the dead lever similar in shape and dimensions to the usual form of wrought iron.

National Equalizing Wedge. Figs. 5258-5269. A journal box wedge having a spherical surface cast on the top side which tends to constantly equalize the pressure on the journal bearing.

National Hollow Brake Beam. Figs. 5087-5090. A brake beam consisting of a hollow tube 2 or 2½ ins. in diameter, trussed by a rod passing through cast end pieces and over a king post, through which the brake lever passes.

National Journal Box. Figs. 5254-5269.

National Platform and Draft Gear (Passenger Cars). Figs. 1849-1925.

National Push Rod End. Fig. 5224. A malleable iron jaw for the end of the brake cylinder push rod.

National Safety Freight Door Lock. Figs. 1375-1380. A lock for freight car doors designed to prevent the opening of the door without breaking the seal by removing the hasp staple. The staple plate and seal pin are riveted together so that the pin cannot be lost.

National Safety Brake Lever. Fig. 5218.

National Steel Trap Door. Figs. 2272-2275.

National Window and **Curtain Fixtures.** Figs. 4651-4654.

"N. B." Hose Connection. Figs. 1324-1325.

Necked Door Bolt. Fig. 2389. See **Door Bolt.**

Neck of Axle. The sloping portion of a car axle just inside of the hub of the wheel.

Needlebeam. 22, Figs. 262-272, 1048-1049. A term adapted from bridge engineering applied to the transverse members of the underframe of a car between the body bolsters which support the truss rod queen posts. There are usually two, but in long passenger cars sometimes four are used, the two nearest the bolsters serving only to tie the longitudinal sills together. The terms cross frame tie timber, cross tie timber or cross tie, body transom, cross bearer and needlebeam are all applied to these members of the underframe, of which cross tie timber or cross tie seem most precisely descriptive of their function.

Needlebeam End Plate. Figs. 942-943.

Nest Spring. A spiral spring with one or more coils of springs inside of it. See **Spiral Spring.**

Netting. Fig. 3921. See **Basket Rack Netting.**

Newbold System of Electric Car Lighting. Figs. 3365-3370. A system of electric car lighting using a dynamo mounted on the truck frame and driven by a belt from one of the axles. An automatic regulator mounted in the car maintains a constant voltage on the lights in the car and a normal charging rate on the storage batteries at all times regardless of the speed of the train. The regulator can be adjusted to deliver any predetermined amount of current up to 80 amperes. An essential part of the system is a storage battery which is charged while the train is running and automatically discharged to maintain the lighting current when the speed of the train drops to a point where the dynamo will not supply current at the proper voltage.

New York Air Brake. Air brake apparatus sold by the New York Air Brake Company. The devices sold accomplish much the same ends as the Westinghouse equipment. The apparatus will work in the same train with Westinghouse equipment.

Night Latch. Fig. 2566, etc. A spring door lock which requires a key to be opened from the outside, but which can be opened from the inside without one. A spring door lock. See **Latch.**

"Ninety-Six" Brake Beam. Figs. 5096-5097.

Nipple. 1. In mechanics, "a small rounded perforated protuberance, as the nipple of a gun."—Knight. It

is often used, however, in a more general sense. 2. (Pipe Fittings.) Figs. 2773, 2846-2848. A short wrought iron pipe with a screw thread cut on each end, used for connecting couplings, tees, etc., together or with some other object, as a tank or heater. See **Brake Hose Nipple.**

Non-Pressure Head (Brake Cylinder). The cover for the end of the brake cylinder opposite to that having air pressure against it. It has an opening in the center for the piston rod.

Nosing. 1. (Of a Lock.) A **Keeper,** which see. 2. (Of Steps.) The part of a tread board which projects beyond the riser, hence the metallic moldings used to protect that part of the tread board. The nosings should be distinguished from the step facings.

Notice Plate. Fig. 2611. Varieties are the platform notice plate, saloon notice plate, etc. See **Name Plate.**

Nozzle. See **Tank Nozzle.**

Number Panel. See **Name Panel.** Now rarely used on modern cars. The number is simply painted on between horizontal bars of striping.

Nut. "A small block of metal or wood containing a concave or female screw."—Webster. Nuts take their name from the bolts, rods or other parts to which they are attached. They are usually either square or hexagonal. A spanner nut is one with eight or more sides. They are usually more truly couplings than nuts, properly so called, which screw on a bolt or rod. See **Screw Threads.**

O

Oakette. An artificial leather used for curtains and upholstering. It is made by coating a cloth fabric with a compound which gives it the appearance of leather.

Observation End of a Car. Fig. 157. A car, one end of which is fitted with an extended platform and large windows, from both of which pessengers may get a view of the country, and especially of the track and structures. They are coupled at the end of the train and the observation end is a feature of many officers' cars.

Observation Platform Railing. Figs. 4000-4001.

Observation Sleeping Car. Figs. 179-181, 217. A sleeping car with an **Observation End,** which see.

Officers' Car. A car for the private use of the higher officers, directors, etc., of railways in traveling over their lines. They are usually provided with kitchens. They are sometimes very elaborate and costly—sometimes merely business cars. A pay car is a special variety, found on nearly all roads from 300 to 600 miles long. See also **Private Car.**

Offset Butt Hinge. Fig. 2462.

Oil Axle Box (British). Figs. 6768-6784. A journal box in which oil is used instead of grease as a lubricant. See **Axle Box** and **Grease Axle Box.**

Oil Box. A **Journal Box,** which see.

Oil Car. A car made especially for the transportation of mineral oil. Some oil cars are built for carrying barrels of refined oil. Crude oil and refined oil are usually carried in **Tank Cars,** which see, Figs. 123, 130 and 545, 576, or in combination box and tank cars.

Oil Cellar. A cavity in the lower part of some exceptional forms of journal boxes for collecting the oil and dirt which run off the axle at the dust guard. The oil cellar is below the space occupied by the axle packing.

Oil Lamp. Figs. 3544-3553, 3581-3601. A lamp for burning oil.

Oliver Dump Cars. Figs. 95b-96.

Opal Dome (Pintsch Gas Lighting). Fig. 3122. May be used on any center lamp.

Opal Globe (Pintsch Gas Lighting). 102, Fig. 3133. It is for use on bracket lamps of all descriptions.

Open Door Stop. 71. Figs. 262-272 and Figs. 793-794. A block of iron or wood fastened to the side of a freight car to prevent a sliding door from sliding too far when opened.

Open Extension Car. An open car with curtained sides for short suburban runs to summer resorts.

Open Plate Wheel (Street Cars). Fig. 5460. A light cast iron single plate wheel, with openings cast in the plate between the ribs. See **Wheel, Car Wheel.**

Open Return Bend (Pipe Fittings). Fig. 2779. A short cast or malleable iron U-shaped tube for uniting two parallel pipes. It differs from a close return bend, Fig. 2780, in having the arms separated from each other.

Open Wagon (British). Fig. 5645. American equivalent, four-wheeled gondola car. A vehicle with sides and ends from 6 in. to 5 ft. high, and having no roof; suitable for the conveyance of freight. A **Tarpaulin,** which see, is used to protect the freight from the weather. See also **Wagon.**

Opener. See **Deck Sash Opener, Ventilator Opener.**

Operating Valve (Westinghouse Traction Brake). Fig. 1225. See **Brake Valve.**

Ore Car. Figs. 71-74, 496-512. A hopper car made especially for carrying iron or other ores. Gondola cars, which are sometimes lined with sheet iron, and drop-bottom and tip cars are also used for this purpose. They are shorter than the ordinary hopper car, with a steeper incline to the hopper to permit ready dumping of the load. See **Goodwin Car.**

Ormolu. Literally, found gold. A style of bronzing metallic surfaces.

Ornamental Carlines. A recent innovation of breaking up the interior of a car into sections by very heavy, prominent and highly decorated compound carlines.

Ostermann Drop Brake Mast. Figs. 5207-5208. See **Brake Shaft.**

Ottoman. A carpet-covered movable cushion serving as a foot rest.

Outer Double Floor or **Floor Under Lining** (British). American equivalent, deafening ceiling. In a carriage, planking attached to the under side of the framing and floor of the body. The space between it and the true floor is generally filled with sawdust.

Outer Intermediate Sill. 3a, Figs. 262-272, 599-619. A term applied to the two intermediate sills next to the side-sills, to distinguish them from the two intermediate sills adjacent to the center sills, which are the inner intermediate sills.

Outside Body Truss Rod. When two or more truss rods are used under each side of a car body those farthest from the center are called outside body truss rods, in distinction from the inside truss rods.

Outside Casing (Heaters). Fig. 2719. An outside shell made of Russia iron or sheet steel and bent and riveted into the form of a cylinder or a frustum of a cone.

Outside Corner Plate (British). A plate placed outside of the body, securing the side and ends together; made a continuous plate, or in several knees, each 2½ in. deep.

Outside Cornice (British). See **Side Gutter.**

Outside End Piece (of Wooden Truck Frame). Figs.

4793-4795. The cross piece nearest the end of the car, in distinction from the inside end piece.

Outside End Sill. A type of box car framing in which the end sill projects outside the sheathing, forming a narrow platform at the ends of the car. It is not the general practice.

Outside Hung Brake. Fig. 5074. Brake shoes and beams attached to the outside of the wheels of a truck. They are sometimes hung from the car body, but usually the truck frame is extended and the brakes are hung from it. When hung between the wheels it is an inside hung brake.

Outside Middle Corner Plate. Figs. 804-806. See **Corner Plate.**

Outside Panel. 67, Figs. 599-619. A panel in the outside of a passenger or street car under the windows. Those between the windows are called outside window panels. Above the windows comes the frieze, or letter board. Street cars have lower outside panels, below the outside panels proper. In standard car construction outside paneling between and below the windows has been superseded by sheathing.

Outside Sills. The side sills. See **Sills.**

Outside Transoms (Six-Wheel Trucks). 22, Figs. 4780-4783. The two transoms farthest from the center of the truck, in distinction from the middle transoms.

Outside Wheel Bars (Steel Six-Wheel Truck). A steel substitute for wooden wheel pieces.

Outside Wheel Piece Plate. 11, Figs. 4705-4713, 4771-4777. An iron plate fastened to the outside of a wheel piece to strengthen it. There are two when any are used, outside and inside. They are usual on six-wheel trucks, and frequently used on four-wheel trucks.

Outside Window Panel. 68, Figs. 599-619. See **Outside Panel.**

Outside Window Sill. 77, Figs. 599-619. A horizontal piece of wood or iron under a window on the outside of a car, and on which the sash rests.

Outside Window Stop. A wooden strip attached to a window post on the outside of a sash to hold the latter in its place. Often called a **Bead,** which see.

Overhang (of a Roof). The projection beyond the sides.

Overhang (of a Car Body). That part of a car body between the body bolster and end, and which is not supported by the body truss rods.

Overhang Brace Rod (Passenger Car Framing). 167 and 220, Figs. 599-619. A truss rod extending over the side sills and between the sheathing and wainscoting. Its office is to sustain and stiffen that part of the underframe which overhangs at the ends and outside the bolsters. Usually it passes from the end of the side sill diagonally up to the belt rail and over a queen post, called the overhang brace rod strut, and then along close under the belt rail to the other end of the car and down to the end of the side sill. Frequently they extend diagonally down on both sides of the overhang brace rod strut (which then becomes a king post), and diagonally through the sill. The overhang brace rod strut stands upon the sill directly over the body bolster. It is sometimes called an inverted truss rod, a continuous body brace rod, body chain rod, and a hog chain rod.

Overhang Brace Rod Strut. 221, Figs. 599-619 and Figs. 908-910. A vertical cast or wrought iron strut seated upon the side sill directly over the body bolster, and acting as a king post or queen post for the overhang brace rod. See **Overhang Brace Rod.**

Overhang Truss. Shown in Fig. 614. An inverted truss, forged or cast, the office of which is to support and stiffen the overhang ends of a passenger car underframe. It is used only in very long and heavy cars, and is intended as an auxiliary to the overhang truss rod. Its use is confined to long passenger and sleeping cars.

Overhead Equalizer Spring (Pullman Vestibule). A face plate buffer spring is a more appropriate term, as it corresponds to the side stem buffer spring of a platform equipment. It affords the spring pressure on the face plate stem, which is attached near the top of the face plate, and keeps it forced out.

Overhead Lining (Refrigerator Cars). 53e, 53f, 53g, Figs. 305-321. See **Ceiling, Inside Ceiling.**

Overhung Door. A sliding door which is hung from or supported on a rail above the door. If the door is supported by a rail below it is called an underhung door. Overhung doors are almost universal for freight cars. See **Door Hanger, Car Door Hanger.**

P

"P. and S." Car Seats. Figs. 4116-4119. A car seat patented by Pottier & Stymus and made by Heywood Bros. & Wakefield.

Package Rack (Passenger Cars). Fig. 3921. A small rack analogous to basket racks.

Packing. Journal Packing, which see.

Packing Blocks. Rectangular blocks gained into the center sills and draft timbers, and serving the purpose of connecting them firmly together longitudinally. The term is borrowed from bridgework, in which the form of packing block is very common. They are called key blocks.

Packing Expander (Westinghouse Brake). 8, Fig. 1262. A spring wire ring for spreading out the leather packing of the brake piston so as to make it fit air-tight. See **Piston Packing Expander.**

Packing Gland. See **Piston Rod.**

Packing Leather. 1. (Of Journal Boxes.) A dust guard is sometimes called packing leather.

2. (Westinghouse Brake). 7, Fig. 1262. A ring of leather used in connection with brake cylinder pistons to make an air-tight pump. When so used it is always accompanied with a packing leather expander. A packing leather for a piston rod is called a cup leather, and is compressed by a piston spring. See **Piston Packing Leather.**

Packing Ring. 1. (Triple Valve). 5, Fig. 1234. A circular metallic ring of variable rectangular cross-section which is placed in grooves in the edge of the piston to make it air-tight in the cylinder. The rings are turned slightly larger than the cylinder and cut apart diagonally at one point so that when compressed they will tend to spring open.

2. (Hose Coupling). An india rubber ring in a coupling case which makes a tight joint between the two parts of the coupling.

Padlock. Figs. 2549-2599. A loose lock having a semicircular shackle jointed at one end so that it can be opened, the other end of the link being locked when desired by the entrance of the sliding bolt into it. Such locks are used to secure a hasp or the like on a staple or similar device by passing the link through the staple. A spring padlock is one which snaps shut and locks by pressure only. A dead padlock has no springs.

Paige Steel Tired Wheel. Figs. 5390-5393. A type of steel tired wheel, the hub and skeleton (wheel center) being in one piece, and the tire secured thereto by front and back face plates, hub bolts and tire bolts. It has no retaining ring, although the company does make a wheel with the tire fastened by retaining rings.

Painting (of Passenger Cars) consists usually of the priming, rough stuff or scraping filling coats, color coats and varnishing. The care and expense devoted to the process and the order and number of the various coats are often varied, but the following is among the most approved processes, and the order of the coats and the time required for each to dry are about as follows:

	Hours.
Priming with drier	24
Scraping filling coat (2 coats)	48
Color coats (3 coats)	72
Color and varnish	24
Striping	24
Finishing varnish (2 coats)	48
Total 10 days, or hours	240

A process known as "Murphy's A, B, C System" is also used, A being a liquid used for priming or first coat on new wood; B a liquid heavier in body than A, which is used for the second and third coat. C is a still heavier liquid, applied over B, and when thoroughly dry and hard is rubbed down to a smooth surface with water and black pumice stone, leaving the surface ready for the color coat.

Other systems are the "lead and oil" and the "M. J. S.," the former being a very old method and the latter a very simple method, consisting simply of a priming or filling coat, followed by a surface coat that is rubbed down with pumice stone or sandpaper, preparatory to the color coat.

Pair of Trucks. A pair of trucks means two truck frames, each with two or more pairs of wheels, etc., complete for an entire car, and does not mean one truck frame with wheels and axles for one end of a car only.

Pair of Wheels. This term is used to designate two car wheels fitted on one axle, including the axle.

Palace Car. An extravagant term used to designate sleeping, parlor and chair cars, which are fitted up with more than the ordinary amount of ornament and elaborate finish and furniture.

Palace Stock Car. An extravagant general term applied to cars designed for carrying stock with less injury and greater comfort than the common stock car. Cars built after the plans of so-called palace stock cars are in general use, and are shown in Fig. 111. They are provided with apparatus for feeding and watering, and those for very valuable stock have separate stalls partitioned off.

Pan. 1. (Refrigerating Cars). The ice pan.

2. (Howard's Water Closet). Fig. 4042. The basin forming the bottom of the bowl so constructed that it is only brought into position and filled with water on raising the lid.

Panel. Figs. 678-690. 1. A board inserted in the space left between the stiles and rails of a frame or between moldings. Sometimes metal plates are used for this purpose. Door panels in passenger cars are usually only the middle and lower or twin door panels. The upper door panel is usually of glass. Window panels come between the windows, and are distinguished as outside and inside. Wainscot panels come below the windows, between the upper and lower wainscot rails. Other interior panels are deck side panels and end panels, the latter sometimes called ventilator panel, and the end roof panel over the door. The exterior panels are the end panel below the windows and the end window panel alongside of the window. A name panel is now quite obsolete. In street cars additional panels to those above named are an upper end panel, which also sometimes occurs in passenger cars; a lower outside panel or concave below the outside panels proper; inside frieze panels, end seat panels and door case seat panels and top panels.

2. (Of a Truss.) The space between two vertical posts or braces and the two chords of a truss.

3. (British.) In a carriage, the outside sheathing of a body. Teak and mahogany are generally used for this purpose in England, and sheet iron on the Continent of Europe.

Panel Ceiling. Properly, any form of ceiling divided up into panels, but in popular custom used as synonymous with wood ceiling, which is always divided into panels, in distinction from a head lining of canvas, lignomur, etc.

Panel Furring. 59, Figs. 645-647. Horizontal bars or strips of wood between the posts of a passenger car, and to which the outside panels are nailed. When a strip is made continuous and extends from one end of the car to the other, and is notched into the posts, it is called a panel rail. Window panel furring is included in the general term, and is that coming between the window posts.

Panel Lamp. An **Alcove Lamp,** which see.

Panel Bin (British). A small, headless nail of copper, brass or iron, used to secure the outside sheathing (panel) of a passenger car to the framing of the body.

Panel Rail. 66, Figs. 648-651. See **Panel Furring** or **Sheathing Furring.**

Panel Strip. A narrow piece of wood or metal with which the joint between two panels, or a panel and a post, on the outside of a car, is covered.

Panel Washer. The washers of the transverse floor timber tie rod of a street car.

Pantagraph. Fig. 6407.

Pantasote. A substitute for leather, and in extensive use for upholstering and decorating cars and steamships. The material was first made by R. P. Bradley, a chemist, and the ingredients are a secret. That it contains rubber or any animal substance is denied. It is made by sheeting two or more pieces of cloth or canvas together, with the warp running in different directions, to give strength. The sheet making the leather side is passed between heavy rollers many times, and each time it receives a very thin coat of pantasote material, and this is kept up until the cloth or canvas is literally saturated and coated. The color is added to the pantasote material and is incorporated into the fabric. It is very like leather, and is not readily distinguished from it.

Paper Case Casting. Fig. 4037. A cast side or bracket frame for a paper case in a postal car.

Paper Holders. Figs. 4061-4062. (Which take rolls of closet paper.) See **Paper Hook.**

Paper Hook (for Saloons). Figs. 4063-4064. A hook for carrying closet paper in sheets. A carrier or holder for perforated continuous roll paper is in increasing use. Figs. 4061-4062.

Paper Seal Holder. A style of seal holder (of which

several patterns exist) in which a sheet of paper or printed label is used to protect the lock against unauthorized opening. The paper is usually protected by glass.

Paper Wheel. More properly, **Allen Paper Wheel**, which see. Fig. 5402. A car wheel with a steel tire and a center formed of compressed paper held between two iron face plates. It is in limited use. The compressed paper can be turned and polished like wood.

Parallel Brake Hanger. See **Brake Beam Adjusting Hanger.**

Parcel Net (British). American equivalent, basket rack. In a carriage, a netting placed tranversely above the seats for the purpose of carrying light baggage, parcels, etc. The front edge is attached to a wooden bar called the parcel net rod, which is supported by a bracket.

Parcel Net Bracket (British). See above.

Parcel Net Rod (British). See above.

Parcel Rack. See **Basket Rack.**

Parcel Van (British). American equivalent express car. A closed vehicle adapted to run on passenger trains and to carry parcels and packages, rather than passengers' baggage. Such business in England is done by the railroad companies themselves, and not by separate corporations.

Parliament Hinge. Fig. 2446. See **Hinge.**

Parlor Car. Figs. 153-154, 158-159, 219, 225, 228. A luxurious car for day travel having revolving seats, smoking compartment and other conveniences on which an extra fare is charged. They are operated on many roads by the Pullman Company and are often referred to as Pullman cars. The term chair car is also sometimes used, but incorrectly, as a chair car is properly a day coach with reclining seats, on which no extra fare is charged.

Parlor Car Chairs. Figs. 4093-4100, etc. The most common type of chair for parlor cars is a simple arm chair revolving on a pivot which enters a fixed pedestal.

Parlor Car Window. Figs. 2204-2205.

Parting Bead or Parting Strip. A long, thin piece of wood which acts as a distance piece between two objects, as a window and a window blind. See **Sash Parting Strip.**

Parting Rail (of Door Frame). 7, Figs. 1329-1337. A vertical rail between the bottom and middle or middle and top rails of a door or partition, dividing a panel into twin panels.

Partition (British). A vertical division dividing the interior of the body into separate compartments, generally extending completely across the vehicle from side to side, and from floor to roof, but occasionally made to extend only some four or five feet from the floor, leaving a clear space between the top and the roof. This practice is, however, going out of favor.

Partition Stop (for Door Holder). Figs. 2630-2631. So called in distinction from a floor stop, with which a door holder engages.

Passageway Curtain (Vestibule Fittings). Fig. 3956.

Passenger Car or Coach. Figs. 160, 599-619; (Framing), Figs. 599-647; (Interior Finish), Fig. 657; (Cross-Sections), Fig. 649-656. Literally, a car used for carrying passengers, but in popular practice restricted to ordinary vehicles for day travel, in distinction from sleeping cars and sometimes in distinction from the more luxurious **Parlor Cars**, or **Chair Cars**, which see, as well. Passenger cars are also very commonly termed day coaches or first-class coaches. Second-class coaches are very rarely run, although there are numbers of emigrant cars. A smoking car is usually attached to all trains, and holders of second-class tickets or tickets bought at reduced rates are often required to ride in the smoking car. See **Car, Coach.**

Passenger Car Truck. Fig. 4740. A truck for carrying a passenger car body. Such trucks usually have two sets of springs—bolster springs under the truck bolster and equalizer springs attached to the outside frames. They always have swing bolsters. The wooden truck frames are usually reinforced with iron plates, especially six-wheel trucks, which latter are almost always used for sleeping and parlor cars. All-steel passenger car trucks are coming into general use and several designs are shown in the illustrations. Other passenger cars usually have four-wheel trucks. See **Truck, Car Truck.**

Pasting Lace (British). An ornamental woolen fabric, made in bands about ½ inch wide, and used to finish and cover the seams and points in upholstering against the woodwork of a carriage round the quarter lights and front seat rail, and to form borders to the broad lace above the back squabs. It is fastened by tacks driven in the tape edge, the main part being then turned over to hide the tacks, and passed in position. See also **Seaming Lace.**

Pawl (for Brake Ratchet Wheel). 103, Figs. 213-223. "A pivoted bar adapted to fall into the notches or teeth of a wheel as it rotates in one direction, and to restrain it from back motion. Used in windlasses, capstans and similar machinery."—Knight.

In most of the English dictionaries ratchet is given as another name for pawl, but this is believed to be incorrect, according to present practice. See **Ratchet Wheel.**

Pawl Weight. Figs. 779-780.

Pedal Alarm Gong (Street Cars). A large bell, sounded by striking a stem, connected by a lever with the clapper, to warn teams and persons of the car's approach.

Pedestal. 1. 172, Figs. 585-586; 5, Figs. 4771-4777. A casting of somewhat the form of an inverted letter U, bolted to the wheel piece of a truck frame to hold the journal box in its place, while permitting a vertical movement. The two projections of a pedestal are called pedestal horns, and the space between them a jaw, which is closed at the bottom by a **Jaw Bit**, which see. In Great Britain pedestals are called axle guards on cars and horn plates on locomotives, and are there made of wrought iron.

2. (Revolving Chairs.) The stand by which the chair is supported; consists of three portions—base, column and seat frame.

Pedestal (M. C. B. Standard).

(For Journals 3¾ in. x 7 in.). Figs. 5566-5569. The pedestal shown was recommended in 1874. Again approved as standard in 1881. Also approved by the Master Mechanics' Association in the same year. Again adopted as standard in 1893. Weight, 141 pounds.

(For Journals 4¼ in. x 8 in.) Figs. 5694-5696. In 1898 a Recommended Practice was adopted for passenger car pedestal for journal box with 4¼ by 8-inch journal. In 1901, as a result of letter ballot, this was changed to standard.

(For Journal 5 in. x 9 in.) (M. C. B. Recommended Practice). Figs. 5939-5943. The pedestal and journal box were adopted as Recommended

Practice in 1903. The journal box was revised in 1908.

Pedestal Box. A **Journal Box,** which see.

Pedestal Brace. A diagonal bar or rod staying the lower end of a pedestal longitudinally. It is often combined into one piece with a pedestal tie bar to form a pedestal brace tie bar.

Pedestal Brace Tie Bar. A pedestal brace and a pedestal tie bar combined in one piece. See above.

Pedestal Horns. See **Pedestal.**

Pedestal Jaw. It is closed at the bottom by a jaw bit. See **Pedestal.**

Pedestal Spring. A **Journal Spring,** which see.

Pedestal Stay Rod. 7, Figs. 4771-4777; 167, Figs. 585-588; Figs. 4827-4828. 1. A transverse rod connecting the pedestal tie bars on each side of a truck, so as to prevent them from spreading apart.

2. A similar rod connecting the pedestal tie bars on four-wheel caboose cars.

Pedestal Tie Bar. 168, Figs. 585-588; 6, Figs. 4771-4774, and Figs. 4827-4828. An iron bar or rod bolted to the bottom of two or more pedestals on the same side of a truck or car, thus holding or tying them together. The pedestal tie bar is used to get a low truck. Sometimes it is given a half turn for additional stiffness. It is also sometimes combined with a pedestal brace to form a **Pedestal Brace Tie Bar,** which see.

Pedestal Timber. 1. (Four-Wheel Cabooses.) 169, Figs. 585-588. A longitudinal timber sometimes used on four-wheeled cars, which is placed under the floor or alongside the sill and to which the pedestals are bolted.

2. 10, Figs. 4771-4777. A term sometimes used to designate the **Wheel Piece** of trucks, which see.

Pedestal Trucks. Figs. 4714, etc. Trucks so called because the journal boxes are held in jaws or pedestals which are an integral part of the truck frame as distinguished from trucks using pedestals bolted to the truck frames.

"Penn" Body and Truck Bolsters. Figs. 1137-1138.

Pennsylvania Brake Beams. Figs. 5178-5181.

Perch. Another name for the draw timbers of a tip car, on which the floor is not directly built The name comes from the perch of wagons connecting the front and hind running gear.

Perfected Horse Car. See **Horse Car.**

Perfected Heater (Baker's). Figs. 2717-2735.

Perfection Car Seal or **Shackle.** Fig. 4090.

Perforated Rubber Floor Mat. Fig. 2671. Another style is the corrugated rubber floor mat.

Perforated Veneer. A form of seat covering which consists of three, and sometimes four, layers of wood veneering, glued together and perforated with holes for ornament and ventilation.

Pet Cock. Fig. 2766.

Phosphate Car. Figs. 10, 63.

Phosphor Bronze. "A term applied to an alloy of bronze or brass, or to a triple alloy of copper, tin and zinc, which has been given special purity and excellence by skilful fluxing with phosphorus. It is supposed that the presence of phosphorus gives the tin a crytalline character which enables it to alloy more completely and strongly with the copper. Whether for this reason or not, the phosphor bronzes, when skilfully made, are greatly superior to unphosphorated alloys."—Thurston.

Piece. See

Center Piece.	**End Piece.**
Distance Piece.	**Wheel Piece.**

Pilaster. 1. (Architecture.) "A square pier, like a flat column built against a wall, and having cap and base."—Knight.

2. (Car Construction.) Any stick or timber fastened against another piece to serve merely as the supporting block or a cross piece.

3. (Sleeping Car.) An ornamental finish to the window posts on the inside of the car. 11, Figs. 2201-2202.

Pile Driver Car. Figs. 256 and 589-592. A class of cars, one of which at least is kept upon most large railways, the details of which vary, but which are similar to the type shown. The essential features of a pile driver car are the swinging platform, or upper platform, carrying the cabin and framework upon which the leaders and hoisting engine and the accompanying gear are carried. The swinging platform is to enable piles to be driven at a considerable distance from the rails on either side. To enable the cabin to be swung through a wider arc, adjustable wings are fixed to the side of the car, which are removed when not required for use by the crane. The leaders are usually long enough to take a 35 to 40 ft. pile and swing upon leader trunnions, so that the leaders may be dropped back upon the roof of the cabin for transportation over the road. The hammers weigh from 4,000 to 5,000 pounds.

Pile Hoisting Sheave (Pile Driver Car). A wheel placed at the side of the main sheave, for use in hoisting piles. It projects a little further forward than the other, so as to swing the pile more easily clear of the leaders.

Pillar. 1. "A kind of irregular column.

2. "A supporter; that which sustains or upholds; that on which some superstructure rests."—Webster. See **Transom Pillar.**

Pillar (Pintsch Lamp). Fig. 3091. (Acetylene Lamp.) Fig 3291.

Pillar Crane. A style of crane used on wrecking cars, having the mast supported from below, either by a mast pocket or a base plate. See **Derrick.**

Pillow Box (Sleeping Cars). 19, Figs. 2201-2202. The space under the seat in which pillows are stored when the berth is not made up.

Pin. "A peg or bolt of wood or metal having many uses."—Knight. In railway service the word, when used alone, commonly means a coupling pin. See also

Center Pin.	**Journal Box Cover Hinge Pin.**
Door Pin.	**Platform Lever Pin.**
Lateral Motion Spring Pin.	

Pinion. 1. The smaller cog wheel of two wheels in gear.

2. (Hand Car.) 4, Figs. 6207-6209. A small gear wheel attached to the axle of the car, into which the larger wheel on the crank shaft gears.

3. Pinion is sometimes incorrectly used in the sense of a small pivot pin or journal.

Pintle. "A pivot pin, such as that of a hinge. The king bolt of a wagon."—Knight.

Pintsch Gas Burner. Fig. 3098. Used on all Pintsch lamps other than the bracket lamps. It consists of a small lava tip of the "fish-tail" type, held in a special brass pillar. Its consumption is about ⅝ cubic ft. per hour. A larger burner of the same type is usually employed on bracket lamps. Its consumption is about 1 cubic ft. per hour.

Pintsch Gas Lamp. Figs. 3173-3224. A lamp for burning gas, the essential features of which are the closed globe at the bottom, the white porcelain reflector above the flames near the top of the globe, and the peculiar method of supplying air.

Various forms of cutter lamps are made, all on the regenerative principle, the inlet air being highly heated before reaching the flames, thereby producing extreme whiteness and steadiness of light.

Some of these lamps are supported by four ornamental arms, Figs. 3201-3208, etc., one of which forms the gasway. In all, the interior of the lamp is so constructed that a portion of the light is reflected outward and upward toward the roof of the car, illuminating the same.

In all standard center lamps, Figs. 3209-3211, air is admitted to the lamp immediately above the upper dome, 101. Passing thence through the orifice in chimney, 313, it comes in contact with the sheet iron flues, 312, and in its downward passage becomes highly heated. It then issues into a space within the dome, 101, between the dome and the mica chimney, 109, and continuing its course is by the diaphragm, 315, deflected and constrained to pass close to the mica chimney, where it is still further heated. It now passes outward between diaphragm, 315, and the ring reflector, 110, and through the orifices near the outer rim of this reflector into the bowl and to the flames. In its tortuous course the effect of drafts against the lamp is entirely nullified.

The products of combustion escape directly through the annular space between mica chimney, 109, and the cup reflector, 111. Thence by flues, 312, out through the crown at the top of the lamp, in the case of the four-arm lamps, and through the flues, 333.

In vestibule lamps, two or four-flame, Fig. 3214, air is admitted to the annular space between the parts of ventilating chimney, 324, through the shielded opening above the roof, immediately below the ventilator. Becoming heated in its downward passage, it passes through the diaphragm, 323, and through the orifices in the body, 320, to the flames, The products of combustion escape through the flues, 321, and the chimney, 324, to the outside air. Any excess of air over and above what is required for proper combustion of the gas will also be carried off by the ventilating chimney, which the air reaches from the space above the body by means of the passage around the outside of the chimney, 321.

Bracket lights, wall lamps for express cars and vestibule lamps, Figs. 3173-3188, are supplied in various designs and forms.

The burner is of the "fish-tail" type, and from one to six are used in each lamp or light, four being the number generally adopted. See **Pintsch Gas Burners.** Consumption of gas is at the rate of about ⅝ cubic ft. per hour for each burner enclosed in a lamp, or 1 cubic ft. per hour for single open burners.

Pintsch Gas Lamps (Method of Securing and Connecting). (Four-Arm Lamps.) Fig. 3208. The arms are secured by means of nipples, 26, passing through the roof; a water-tight joint around the nipples on the roof being made by bedding putty close around the nipple, with a rubber washer, 24, above the putty, and the iron washer, 23, above the rubber. The lock nuts, 27, are then put on and forced down until the excess putty is forced out and the arm drawn firmly up to its place. The gas arm nipple is then supplied with the reducing ell, 28, the three blank arms with caps, 29. The ell, 28, is then connected with the ¼-in. pipe to the flange tee, 16c, on the roof line. The roof around the smoke bell is protected with a tin thimble, large enough to give a ½-in. air space around the smoke bell flue. The upper end of this thimble is made of proper size to receive the ventilator, 204.

Pintsch Mantle Lamps. Figs. 3243-3275. An improvement on the standard Pintsch gas lamp whereby the same gas is burned with an incandescent mantle enclosed in a bulb, Figs. 3247-3248. The candle power of the lamps is greatly increased with the same consumption of gas. No change is necessary in the piping of the car, but the regulator is adjusted to give a higher pressure in the car piping. The form of lamp used is very similar to the standard Pintsch gas lamp.

Pintsch Pillar. 230, Fig. 3213 and Fig. 3091. Used on bracket lamps below the burner. Where no globe holder is used, mill check, 231, Fig. 3089, is placed immediately below the pillar.

Pintsch System of Gas Lighting. Figs. 3042-3275. A system of car lighting which burns gas taken from a storage tank, where it is carried under a pressure of 150 lbs., or less, per square inch. The system is well and favorably known. The gas is an oil gas, made from crude petroleum or similar oils, and is able to withstand a high degree of compression without undue loss of luminosity. The pressure of 150 lbs. of the receiver tank is automatically reduced by the Pintsch regulator (Fig. 3055) to a uniform pressure at the burners of about ½ oz., regardless of the pressure in the gas receiver. Works for the supply of the gas are now established in all the large cities.

The arrangement of the apparatus is shown in Fig. 3042. The receiver or gas holder, A, suspended beneath the car floor, is connected by a system of extra heavy ¼-in. pipes, with soldered joints and special fittings, to the regulartor, R. The charging of the receiver is effected (from either side of the car) by means of hose, connecting the charging lines from the gas station with the filling valves, F (Fig. 3044). The gage, G, communicating with the high pressure pipes connecting the various parts of the apparatus below the car, serves the double purpose of registering the amount of pressure in the receiver at any time and of showing the amount of gas consumed in lighting the car for any given period.

From the regulator, R, the gas (with its pressure reduced to about ½ oz. per sq. in.) passes upward through the car toward the roof. At some convenient point, as in a saloon or locker, a main cock (No. 25c, Fig. 3050) is placed as shown, whereby the flow of gas to the lamps is controlled.

A ½-inch pipe is run along the roof, with ⅜-inch branches to each lamp or bracket. These branches are made by means of special flanged tees (No. 16c,

Fig. 3060). Where ⅛-inch connections are necessary passing downward from the ½-inch low pressure line on the roof to brackets or vestibule lamps, the flanged elbow or angle fitting (No. 17A, Fig. 3059, is used.

For lamps and methods of suspending and connecting them see **Pintsch Gas Lamps** and Figs. 3173-3224.

Pintsch Washers. Fig. 3087, etc. These washers are of lead and rubber, in three sizes, and are always used in pairs. The rubber is always placed first on the fitting, the lead outside with the collar inward. When pressure is brought upon the washer, the lead collar protects the inner edge of the rubber, and the body of the lead washer protects the outside surface of the rubber, and the rib protects the outer edge of rubber. The rubber is entirely enclosed in metal, and protected from the action of the gas, which would otherwise destroy it. The scored surfaces of the flanges entering into the soft lead make a perfectly tight joint. These washers are used on all classes of flanged fittings, whether high or low pressure.

Pipe. "A tube for conveyance of water, air, or other fluids."—Knight. The wrought iron pipes used for conveying gas, steam, etc., and commonly called gas pipe, are usually meant by compound words beginning with pipe, as below. See

Brake Cylinder Pipe.	**Signal Pipe.**
Brake Pipe.	**Smoke Pipe.**
Conductors' Valve Discharge Pipe.	**Steam Pipe.**
	Stove Pipe.
Conductors' Valve Pipe.	**Supply Pipe.**
Discharge Pipe.	**Tripple Valve Branch Pipe.**
Hot Water Pipe.	

Pipe Bushing. Fig. 2762. See **Bushing.**

Pipe Clamp. Figs. 854-855 and 1193-1198. A clamp for the air brake pipe or train pipe under the car.

Pipe Clamp Bracket. Figs. 892-893, 935-937. See **Bracket.**

Pipe Clip or **Strap.** Fig. 2753, etc. An iron band for fastening a pipe against or to some other object. They are usually single, but sometimes double, for two or more pipes. See **Clip.**

Pipe Coupling. Fig. 2776. A short cast iron tube with a thread cut on the inside at each end, which is screwed on the ends of two pipes and used for uniting them together, or uniting one pipe with another object, as a cock or valve. In some couplings the thread at one end is right hand and the other left hand, but generally they are both right hand threads.

Pipe Fittings. Fig. 2771, etc. The connections for systems of wrought iron gas, water, and steam pipes. The more usual pipe fittings are bushings, elbows, tees, return bends (close or open), reducers, couplings, nipples, plugs, clips, etc.

Pipe Hanger. Figs. 856-857, 962-964. A hanger for the air brake pipe or train pipe.

Pipe Patents. Figs. 1470-1476.

Pipe Reducer. See **Pipe Fittings.** Bushings, tees and couplings may be and are all so made as to serve as reducers.

Pipe Shield (Steam Heating). Fig. 2823. A metal covering over the radiator pipes to protect surrounding parts or passengers' clothes from the heat of the pipes.

Pipe Support or **Strap** (Steam Heating). Figs. 2753-2757. A cast iron stand screwed to the floor, with a receptacle at the top to receive and hold a pipe.

Pipe Turnbuckle. See **Turnbuckle.**

DIMENSIONS FOR STANDARD PIPE UNIONS.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
⅛-inch	375	270	105	59	63	78	80	85	89	1 05	26	⅛	27	2225	08	5625	⅛	59	615	006	05
¼ "	496	364	.132	76	80	96	98	1 05	1 09	1 29	.33	1/4	18	2625	10	6925	¼	76	76	006	06
⅜ "	630	.494	.136	90	95	1 11	1 13	1 20	1 24	1 45	.34	⅜	18	2825	11	7325	⅜	90	905	006	07
½ "	.783	.623	.160	1 16	1 21	1 38	1 40	1 49	1 54	1.78	.40	½	14	3025	.12	8225	½	1 03	1 20	006	08
¾ "	992	824	.168	1 38	1 43	1 61	1 63	1 72	1.77	2 02	.42	¾	14	3225	13	8725	¾	1 24	1 43	007	09
1 "	1 246	1 048	.198	1.74	1 79	1 98	2 01	2 13	2 19	2.49	.49	1	11	3625	.15	1 0025	1	1 565	1 76	007	10
1¼ "	1 592	1 380	.212	2 12	2 18	2 37	2 40	2 52	2 58	2.90	.53	1 1/4	11	3825	16	1 0725	9	1 91	2 15	007	11
1½ "	1 831	1 610	.221	2 40	2 46	2 66	2 69	2 81	2 87	3.20	.55	1 1/2	11	4025	17	1 1225	1 0	2 18	2 40	007	13
2 "	2 306	2 067	.239	2 89	2 95	3 16	3 19	3 31	3 38	3 74	.60	2	11	4225	18	1 2025	1 1	2 66	2 90	008	14
2½ "	2 775	2 468	.307	3 39	3 45	3 67	3 70	3 86	3 93	4 39	.77	2 1/2	8	5225	23	1 3525	1 2	3 16	3 41	008	16
3 "	3 401	3 067	.334	4 07	4 13	4.36	4 40	4 56	4 63	5 13	.84	3	8	5625	.25	1 6525	1 3	3 81	4 08	008	18
3½ "	3 901	3 548	.353	4 61	4 68	4 91	4 95	5 11	5 19	5 72	.88	3 1/2	8	6025	27	1 7525	1 4	4 31	4 63	008	20
4 "	4.4	4 026	.374	5.15	5 22	5 47	5 51	5 67	5.75	6.31	.94	4	8	.6225	28	1 8425	1 5	4 81	5 19	008	22

DESCRIPTION ACCOMPANYING TABLE OF MALLEABLE PIPE UNIONS

NUMBERS AT THE HEAD OF THE COLUMNS ABOVE ARE THOSE GIVEN IN THE DIMENSION LINES ON TABLE A

Column No. 1 in table represents the nominal diameter of pipe.
Column No. 2 represents diameter of pipe at one-half the height of full thread nearest solid section of pipe.
Column No. 3 represents the internal diameter of the pipe.
Column No. 4 represents the difference between columns Nos. 2 and 3, and is equal to twice the thickness of metal in pipe measured from inside line to one-half the height of thread, as specified before.
Column No. 5 represents the outside diameter of end of pipe union and is taken as *No. 2 plus twice No. 4*, plus an arbitrary increment.
Column No. 6 is equal to No. 5 plus an increment varying from .02 to .07 of an inch. This increment was allowed for the purpose of being able to slip the nut over upper swivel end of union.
Column No. 7 is No. 6 plus an amount varying between .15 and .25. This lip created is considerably in excess of what exists on present pipe unions for the reason that we find the surface between the lip and the corresponding part of nut is often damaged, and the bearing surface, when the full strength of the man is used on the wrench, is sufficient. We assume that a man would pull about 30 pounds on a wrench, with a possibility of using less force on pipes of small diameters. For that reason we made a variation in the width of lip, which lip, theoretically, would be uniform for all sizes of pipe. The nut itself has been strengthened to prevent the lip from deflecting upward.
Column No. 8 is No. 7, plus an increment varying from .02 to .04 of an inch.
Column No. 9 is No. 8, plus twice the height of the thread.
Column No. 10 is No. 9, plus an increment varying between .04 and .08 of an inch.
Column No. 11 is No. 10, plus one and one-half times No. 4.
Column No. 12 is two and one-half times No. 4 and was figured especially for bearing surface, so that the thread would not wear away too rapidly when the nut is occasionally removed.
Column No. 13 has been assumed arbitrarily, but in all cases is greater than the length of full thread on standard pipe.
Column No. 14 represents the number of threads per inch in length of nut. This thread, we believe should be United States Standard form and not sharp thread.
Column No. 15 is taken arbitrarily, but is based on the probable requirements of manufacturers for tapping out the nut.
Column No. 16 is three-fourths of No. 4.
Column No. 17 represents the full height of nut, and is equal to No. 12, plus No. 15, plus No. 16.
Column No. 18 is the amount of projection outside of nut.
Column No. 19 is No. 2, plus No. 4 plus an arbitrary increment.
Column No. 20 is No. 7, less No. 16, with slight modifications.
Column No. 21 represents the clearance at several points, as indicated on print.
Column No. 22 is assumed arbitrarily

Pipe Unions (M. C. B. Standard). In 1903 the dimensions for pipe unions shown in the accompanying table were adopted as standard.

In 1908 the following specifications were adopted:

That all wrought iron pipe for car work be threaded with a standard total taper of ¾ inch in one foot, and that all pipe fittings be tapped to suit the standard pipe thread with a total taper of ¾ inch in one foot, so that the thread on pipe and fittings will be uniform and taper-tight.

Pipe Screw Threads. Screw threads used for connecting wrought iron pipes together. Such screws are cut "tapered"; that is, the end of the pipe, or the inside of the coupling where the thread is cut, forms part of a cone, so that in screwing up the pipe a tight joint can be made. Pipe threads are of a V-shape, sharp at the top and bottom, and their sides stand at the angle of 60° to each other. The following is the number of threads per inch for pipes of different sizes. The size is given by the inside diameter, but the actual bore of the smaller sizes is considerably larger than the nominal. The exterior diameter of ordinary gas pipe is from .27 to .37 inches greater than the inside diameter.

American Standard System of Pipe Threads.

Size of pipe.	Outside diameter. Ins.	Inside diameter. Ins.	Inside diam. Extra strong. Ins.	Inside diam. Double extra strong. Ins.	Threads per inch.	Whitworth's thread.
⅜ in.	.405	.27	.205		27	28
¼ "	.54	.364	.294		18	19
⅜ "	.675	.494	.421		18	19
½ "	.84	.623	.542	.244	14	14
¾ "	1.05	.824	.736	.422	14	14
1 "	1.315	1.048	.915	.587	11½	11
1¼ "	1.66	1.38	1.272	.884	11½	11
1½ "	1.9	1.611	1.494	1.088	11½	11
2 "	2.375	2.067	1.933	1.491	11½	11
2½ "	2.875	2.468	2.315	1.755	8	
3 "	3.5	3.067	2.892	2.284	8	
3½ "	4.	3.548	3.358	2.716	8	
4 "	4.5	4.026	3.818	3.136	8	
4½ "	5.	4.508			8	
5 "	5.563	5.045			8	
6 "	6.625	6.065			8	
7 "	7.625	7.023			8	
8 "	8.625	7.982			8	
9 "	9.688	9.001			8	
10 "	10.075	10.019			8	

(The European standard is the Whitworth pipe thread, which is quite different.)

Taper of Thread ¾ in. per foot.

Piston. A metal disk with packing, etc., made to fit air-tight and work back and forth in a cylinder. Those shown in this volume are chiefly used in connection with air brakes, Figs. 1221-1224, etc., to which more detailed reference seems unnecessary. The piston consists of a piston head, attached to a piston rod. The piston follower or follower plate lies at the back of the piston head, inclosing between them the piston packing rings, or (in the Westinghouse air brake cylinders) the piston packing leather, which latter is provided with a packing leather expander. The follower plate is secured to the piston with follower bolts. All these parts are essentially the same in all the various cylinders shown, and for distinctness should be designated with the name of the cylinder in which they work.

Piston Packing Expander (Air Brake). 8, Figs. 1275-1276. A spring wire ring for spreading out the leather packing of the piston so as to make it air-tight.

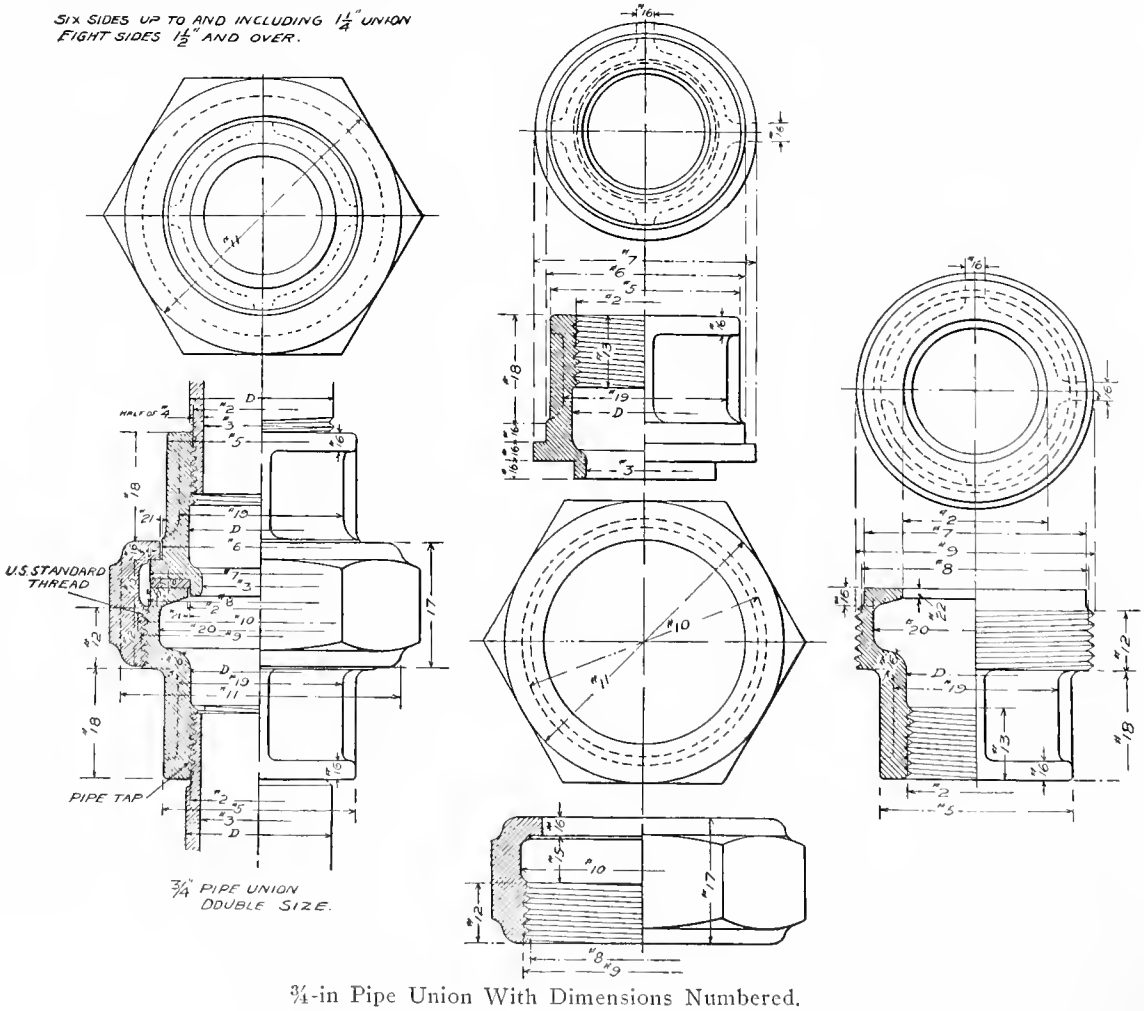
Piston Packing Leather (Air Brake). 7, Figs. 1267-1268, 1275-1276. A circular ring of leather used as a substitute for **Piston Packing Rings**, which see, pressed into the cylinder so as to have an L-section, which is attached to and surrounds the piston and bears against the inside surface of the cylinder being pressed against it by a round steel rod called the piston packing expander.

Piston Packing Ring. See **Packing Ring.**

Piston Rod (Brake Cylinder).

1. A rod attached to the piston of a passenger brake cylinder, by which the pressure against the piston is transmitted to the brake levers and shoes.

2. A tube attached to the piston of freight and traction brake cylinders to act as a guide to the piston as it is forced outward by the air pressure. In this case a **Push Rod**, which see, is attached to



¾-in Pipe Union With Dimensions Numbered.

the levers and is inclosed by the tube. The push rod transmits the pressure on the piston to the levers and brake shoes, while it allows an application of the brakes by hand without pulling out the piston.

Piston Stem (Buhoup Vestibule). 54, Figs. 2215-2263.

Piston Stem Bracket (Buhoup Vestibule). 119, Figs. 2215-2263.

Piston Stem Ferrule (Buhoup Vestibule). 156, Figs. 2215-2263.

Piston Stem Guide (Buhoup Vestibule). 120, Figs. 2215-2263.

Piston Stem Spring (Buhoup Vestibule). 154, Figs. 2215-2263.

Piston Stem Washer (Buhoup Vestibule). 155, Figs. 2215-2263.

Piston Travel (Air Brakes). The amount of movement of the piston when forced outward as the brakes are applied. Running piston travel is the piston travel obtained when the car is in motion and is always greater than the travel obtained when the car is at rest, due to the fact that the slack or lost motion in trucks and brake gear as well as the elasticity of the car body is more easily taken up by the brake shoe pressure when the car is in motion. False travel is that due to some unevenness of the track or to some cause which occasions a momentary change.

Piston Travel Indicator. A graduated scale abutting against the piston of a brake cylinder and passing through the end of the cylinder so that it can be seen. It shows the maximum movement of the piston since it was last adjusted. Seldom used.

Pit. See **Ash Pit.**

Pitch. 1. (Of a Screw.) The advance made by the thread in one complete revolution, usually expressed by the number of threads in a given space, as (in U. S. and Great Britain) an inch.

(Of a Roof.) The ratio of the rise of a roof to the horizontal distance covered.

Pitching Roof. A roof formed of one or more inclined plane surfaces. When the pitch becomes steep, the term is used to distinguish a roof formed of plane surfaces from one formed of curved or arched surfaces.

Pitt Coupler. Figs. 1721-1729.

Pivot. 1. "A pin or short shaft on which anything turns."—Webster. Seat arm pivots are inaccurately called rivets. See

Deck Sash Pivot.
Lower Swing Hanger Pivot.
Monitor Deck Sash Pivot.
Seat Arm Pivot.
Upper Berth Rest Pivot.
Upper Swing Hanger Pivot.
Ventilator Pivot.

2. (Of Car Door Fastener.) The pin on which the hasp turns.

2. (Monitor Deck Sash Pivot). The pin held in place by a spring upon which the desk sash turns.

Pivot Bearing. 49, Figs. 4705-4713. See **Swing Hanger Pivot Bearing** (Passenger Car Trucks).

Pivot Pin (M. C. B. Coupler). Another name for the **Knuckle Pin,** which see. So called from the fact that the knuckle when opening swings about the pin as pivot. For specifications see **Automatic Car Couplers.**

Pivot Plate. See **Seat Arm Pivot Plate, Ventilator Pivot Plate.**

Pivot Pin Testing Machine (M. C. B. Recommended Practice): Fig. 6024. In 1907 a design of apparatus for testing knuckle pivot pins was adopted as Recommended Practice.

Pivot Spring (Monitor Deck Sash Pivot). The spring retaining the pivot in its proper place after the sash has been placed in position.

Pivoted Seat or **Seat Cushion.** A seat commonly called an "opera seat," with the cushion pivoted so that it may be raised to permit easy access. Sometimes used in dining cars.

Pivoted Seat Back Arm. Fig. 4272.

Plain Triple Valve (Air Brake). Fig. 1235. A triple valve which has no provision for making emergency applications. See **Triple Valve.**

Planer (Wood Working Machinery). Figs. 6793, 6802, 6831. A machine with a sliding bed plate or more often a series of rollers and one or more rotating cylinders carrying knives for reducing the thickness of boards and giving them a smooth surface. Often combined with other cutters to produce tongued and grooved boards or matched lumber. A sizer is a heavy planer which removes wood from all four sides of a stick and is used for reducing heavy timbers to the required size.

Planished Iron. One of the attempted substitutes for Russia iron. One of many processes consists of the formation of an oxidized surface on each sheet over and above the surface secured in ordinary working. The oxidized surface is then reconverted into metallic iron, which will enter readily into combination with an oxidizing agent applied throughout. The surface thus given to the sheet is fixed by planishing or hammering until the desired polish is secured.

Plank. "A broad piece of sawed timber, differing from a board only in being thicker. In America, broad pieces of sawed timber, which are not more than an inch or an inch and a quarter thick are called boards; like pieces from an inch and a half to three or four inches thick are called planks."—Webster. See **Spring Plank, Truss Plank.**

Plank Car Roof. More commonly **Single Board Car Roof,** which see. See also **Car Roof.**

Planted Molding or **Bead Molding** (British). American equivalent, panel strip molding, or bead molding. In a carriage, a small molding which is pinned on the body, and is not worked out of the solid on the post or rail, as is a **Wrought Molding,** which see.

Plastered Lamp. A lamp with a fixed globe which is fastened to a lamp frame with plaster of Paris.

Plate. 1. (Architecture.) "A piece of timber which supports the ends of the rafters."—Webster.

2. (Car Building.) 46, Figs. 262-272; 98, Figs 599-619. A horizontal piece of timber on top of the posts of a car body supporting the roof carlines or rafters. Also sometimes called side plate, in distinction from an **End Plate,** which see, which is a similar stick across the end of the car. A deck plate is used to cap the deck posts of an upper deck. **Main Carlines,** which see, are sometimes called tie plates. In refrigerator cars **Bogus Plates** (which see) are used.

Plate (of a Cast Car Wheel). The central portion connecting the hub and tread, sometimes single plate, sometimes double plate. The plate is stiffened by brackets. See **Car Wheel** and **Face Plate** (Steel Tired Wheel).

Plate or **Laminated Buffing and Draw Spring** (British). Fig. 6733. A large half elliptic spring which spans the distance between the two buffer rods and takes

the buffing strains. It is also connected in the center to the drawbar and takes the draft strain.

Plate Facing. An inside cornice fascia board.

Plate Rod (Freight Cars). 47, Figs. 262-272. A horizontal metal rod which passes across the car through the two side plates to tie them together.

Plate Washer. Usually a wrought iron cut washer, in distinction from a cast washer, but also used to designate many forms of large washers or plates serving as double or triple washers. See **Washer.**

Plate Wheel. Fig. 5428. A car wheel of which the center portion is formed of a disk or plate instead of spokes. Varieties are the single, double, open and combination plate wheel. See **Wheel** and **Car Wheel.**

Platform (Passenger and Caboose Cars). 1. 31, Figs. 577-588; 34, Figs. 599-619, 617-619, and vestibules, Fig. 2207. A floor at the end of a car, supported by projecting timbers below the car body, to facilitate ingress and egress. On freight cars they are not common, except on cabooses, but narrow platforms are sometimes added for convenience of train men. See also **Gould, Buhoup, Pullman** and **Standard Platforms** or **Vestibules,** containing certain special modifications of the platform, which have greatly added to its strength and security.

2. (Pile Driver Car.) See **Swinging Platform.**

Platform Car. Fig. 26. A flat car. If provided with sides, it becomes a gondola car.

Platform Chain. A chain connecting the inner platform railings, posts and rails, closing the passageway between the platforms of two cars coupled together. It is used only on the rear end of the last car, and the front end of the first car when the first car is a passenger car.

Platform End Bracket. K, Figs. 648-651. An ornamental casting attached under the platform roof on each side of the vestibule face plate on narrow vestibule cars.

Platform End Hand Rails, Panels and **Brackets.** Fig. 3996.

Platform End Post or **Corner Post** (Street Cars). A hollow iron post standing upon the platform end sill and helping to support the platform hood.

Platform End Sill. 38, Figs. 599-619. The transverse end piece of the platform framing.

Platform End Timber or **Buffer Beam.** 38, Figs. 599-619, 612-619, 648-651. A cross timber at the outer end of a car platform. A platform end sill.

Platform Floor. 34, Figs. 599-619. The layer of boards over the platform sills.

Platform Foot Plate. See **Foot Plate.**

Platform Gate. Fig. 4012. A gate used to close the entrance to a platform, in general use only for private cars, suburban cars or street cars.

Platform Gate Panel. Fig. 3995.

Platform Hood. 107, Figs. 599-619. A cover or canopy attached to the end of a car body, covering the platform. It is made of either wood or sheet iron. When it consists of an extension of the main roof of a car it is called a platform roof, but when it is a separate part, and fastened to the car body, as is usually the case on street cars, it is called a platform hood. A roof apron is a vertical finish of sheet iron to either a platform hood or platform roof.

Platform Hood Bow. 108, Figs. 645-647. A bent wooden or iron piece which forms the outer edge of a platform hood, to which the platform hood carlines are fastened.

Platform Hood Bracket. A bracket or knee iron to connect the hood to the corner post.

Platform Hood Carlines. Transverse timbers which support the roof of a wooden platform hood.

Platform Hood Ceiling. See **Platform Hood Side Piece.**

Platform Hood Knee. An L-shaped piece of wrought iron by which a platform hood is fastened to the car body.

Platform Hood Molding (Street Car). A small wooden molding to cover the nails with which the roofing canvas is fastened around the edge. It corresponds to a roof molding.

Platform Hood Post. 109, Figs. 648-651. An upright iron bar or rod attached either to the platform or platform railing, to support a platform hood.

Platform Hood Shoulder Carline (Street Car). A hood carline that lies adjacent to and against the end plate in a street car.

Platform Hood Side Piece. The side piece to which the ceiling is attached.

Platform Knee or **Platform Timber** (Street Car). A longitudinal piece bolted to the underframe and extending out under the platform to support it. Corresponds to the platform sill of a coach.

Platform Lever. A lever corresponding to the Miller uncoupling lever, actuating the pull rod which operates the catch lever for uncoupling the M. C. B. types of passenger car couplers.

Platform Lever Pin. The pin on which the platform lever pivots.

Platform Notice Plate. Figs. 2611-2623.

Platform Plate or **Buffer.** A steel angle plate bolted to the buffer stems and overlapping the platform end sill. When in contact with the like plate of another car, it makes a continuous floor between them. Being pivoted at the platform end sill, it adjusts itself to all curves of the road. The platform plate also acts as a buffer, and is sometimes so called. See **Vestibule.**

Platform Post. 39, Figs. 648-651. See below.

Platform Rail. 41, Figs. 648-651. A wrought iron bar fastened to the tops of the platform posts, forming a railing on the end of a car platform. On steam cars an opening is left in the middle of the railing to allow persons to pass from one car to another. The railing is therefore made in two parts, and two platform rails are used. On street cars no such passengerway is left, and the rail is in one piece. The outside ends of the platform rails of steam cars are usually carried down to the end timber, so as to form the outside post. On street cars the outside end is attached to an ordinary post.

Platform Railing. Fig. 3988, etc. An inclosure consisting of iron or brass posts and rails on the end of a platform of a car to prevent persons from falling off. See above.

Platform Railing Chain. A chain connecting the two sections of the platform rails of a passenger car. Commonly used in service on the rear platform of the rear car only.

Platform Railing Post. 39, Figs. 648-651. An iron or brass pipe supporting the **Platform Rail,** which see.

Platform Roof. 103, Figs. 599-619. That portion of a car roof which projects over the platform. See **Platform Hood.**

Platform Roof Carline. 104, Figs. 599-619. See **Carline.** A carline supporting the platform roof.

Platform Roof End Carline. 105, Figs. 599-619. See **Carline.** The carline at the extreme end of the platform roof.

Platform Safety Gate. A gate to close the entrance on one side of a street car, to prevent passengers from getting on or off on the side of the double track. See also **Platform Gate.**

Platform Safety Chain. Figs. 982-985. See **Brake Safety Chain.**

Platform Short Sills. 37, Figs. 599-619. Short longitudinal pieces of timber, not extending under the car proper, which are framed into and bolted to the end sills and platform end timbers of a passenger or street car to sustain the floor of the platform. The longer timbers which extend under the body of the car proper are called platform sills.

Platform Sills. 35, Figs. 599-619. Pieces of timber attached to the bottom of a car frame at each end, and projecting beyond the end of the car to support the platform. They extend usually from the platform end timbers to the bolster, or, in street cars, to one of the transverse floor timbers. See above.

Platform Steps. 30, Figs. 577-588; 45, Figs. 599-619. The stairs at each corner of a passenger or street car which afford the means of ingress and egress. Forms of steps have been introduced, but they are not in general use, which are folding or extensible, being dropped down into position when the car is stationary, and removed or elevated when the train starts. In modern passenger cars the platform steps consist of usually three and sometimes four separate steps below the platform. The steps being of wood, are often called box steps. On street cars, one step only is used, and it is commonly made of plain iron. See **Vestibule.**

Platform Sub-Sill (Street Cars). An end sub-sill, to which the platform is hung; it makes part of the riser of the step from the platform into the car.

Platform Tail Gate. Fig. 4016.

Platform Tie Rods. Horizontal rods which pass through the platform end timber and end sill or body bolster, for the purpose of holding them and the other portions of the frame of the car securely together.

Platform Timber. See **Platform Sill.**

Platform Timber Band (Street Cars). A band made of plate iron, which covers and embraces the outer end of a platform end timber. Called also a buffer band.

Platform Timber or **Platform Sill Camp.** A U-shaped iron clamp or bolt, with which a platform sill is fastened to the end sill of a street car.

Platform Trap Door. 1. Fig. 2266. A door which covers the space occupied by the steps, and thus extends the platform out to the side of the car. It is used on officers' or other private cars, and invariably with the Pullman extended vestible.

2. A door used in cabooses to serve the purpose of a water closet.

Play. See **End Play, Lateral Motion.**

Plow. See **Snow Plow.**

Plug (Pipe Fittings). Fig 2761. A short, solid metal cylinder, with a screw on the outside and a square or hexagonal end to take hold of with a wrench, screwed into the end of a pipe or hole in a plate, to close the opening. See also **Basin Plug.**

Plumbago. Graphite; one of the form of pure carbon from which pencils, etc., are manufactured. When pulverized, plumbago is an excellent lubricant, especially under heavy loads, and plumbago oils, prepared so as to hold the plumbago in permanent suspension, are among the most efficient of all lubricants.

Plush. "A species of shaggy cloth or stuff with a velvet nap on one side, composed regularly of a woof, of a single thread and a double warp; the one, wool of two threads twisted, the other of goat's or camel's hair. But some plushes are made wholly of worsted, others wholly of hair."—Webster. Plush is used in car building chiefly as a covering for upholstered seats, for which it is almost invariably used.

Pneumatic Tools. Figs. 6884-6913.

Pocket. 1. (Sleeping Car.) 32, Figs. 2201-2204. A receptacle for the clothing and small baggage of occupants of sleeping berths. They are known as the head board pocket for the lower berth and upper berth pocket. It is formed by turning the head rest up, as shown in Fig. 2201.

2. Any object having a cavity or opening which forms a receptacle to hold anything in its place. The main pockets of a car are the body post, corner post and right and left hand body brace pockets, which are castings fastened to the upper side of the sill and the under side of the plate, to serve instead of mortises to receive the posts and braces. Brace pockets are distinguished as right or left hand, according to the inclination of their top to a person standing facing the car. Double brace pockets, to receive two braces inclining in opposite directions, are also made, often with a receptacle in the middle for a post. A post pocket is a receptacle for the posts, door post or corner post. A stake pocket of a flat or gondola car shuld be distinguished from a post pocket, it being bolted to the outside on the side of the side sill. See also **Drawbar Spring Pocket.**

Pocket Guide. Figs. 790-792. See **Drawbar Pocket Guide.**

Pocket Hinge. Fig. 2463. See **Hinge.**

Pocket Strap or **Yoke** (Drawbar Attachment). The U-shaped strap or yoke that incloses the draft spring and follower plates. See **Yoke.**

Polarity Changer (Car Lighting). Figs. 3404-3412.

Pole or **Hand Straps.** Fig. 3777. Straps to which people who are required to stand may cling and keep from falling as the car starts and stops. See **Hand Pole.**

Pole or **Hand Strap Brackets.** Fig. 3771. For supporting the pole in street cars from which the straps are suspended. See above.

Pole Changer. An automatic device for preserving the polarity of an axle generator. It is made generally in one of three types; rotating, mechanical or electrical type. The rotating type employs the principle of shifting the brushes of the generator automatically when the direction of rotation changes through an angle equal to the pole pitch; that is, the angle between two poles of the generator. If it is a two-pole machine, the brushes must be shifted 180 degs.; if a four-pole machine 90 degs. The latter is the general arrangement. The rotating type employs no switches or contacts that might interfere with the continuity of the armature circuit, and it permits the brushes taking a "lead," advantages not possessed by the other types which necessarily employ fixed brushes. The mechanical type consists of a reversing switch operated mechanically by the rotation of the armature shaft in one direction or the other. When the armature rotates in one direction the switch is automatically

closed to make proper connections under these conditions and vice versa. The electrical type consists of a reversing switch, generally operated by solenoids, the entire mechanism being placed inside of the car with the other electrical apparatus. This reversing switch is automatically thrown one way or the other, depending upon the direction of the rotation of the generator armature.

Poling Car. See **Push Pole Car.**

Pop Safety Valve. A valve set with a spring so as to open suddenly with a wide opening at a fixed pressure; hence the name.

Port. An opening in a valve for the passage of steam or air.

Posson Reinforcing Frame. Fig. 2097.

Post (of a Truss). A piece of timber or metal set upright and intended to support something else, as the posts of a house; the posts of a door; the posts of a gate; the post of a fence; the posts of a bridge. See

Body Post.	**Hand Rail Post.**
Body Queen Post.	**Hat Post.**
Brake Beam. King Post.	**Lever Frame Post.**
	Platform Hood Post.
Corner Post.	**Platform Post.**
Deck Post.	**Queen Post.**
Door Post.	**Window Post.**

Post Cross Bar (Open Street Car). A bar or plank connecting the posts at the ends of a transverse seat. They are under the seat.

Post Office Car. See **Postal Car.**

Post Parting Strip. See **Sash Parting Strip.**

Post Plate (Bouhoup Vestible). Fig. 922; 12, N. P., Figs. 2215-2263.

Post Pocket. Figs. 707-709; 719-721; 42a, Figs. 262-272. An iron casting which is attached to the top of the sill of a car to receive and hold a post in distinction from a stake pocket which is bolted to the outside of the side sill. Such pockets are commonly used with box and stock cars. See **Pocket.**

Postal Car. Figs. 190, 194-197, 241-242, 623-629. A car for carrying mail matter, and fitted up with boxes and other conveniences for assorting and distributing it. Nearly all mail matter is now assorted en route.

A distinction has been attempted between mail cars, used solely for carrying mails and distributing postal cars, but the distinction is not well observed, and so-called mail cars, except as compartments in combination baggage cars on minor lines, are little used. The word mail is invariably used in speaking of a combination baggage and mail car.

The railway post office is an English invention, separate postal cars having been used as early as 1837. The present American postal car service was introduced by George B. Armstrong in 1864, and the first postal cars were run between Chicago and Clinton, Ia., and at about the same time between Washington and New York. Postal cars are owned by the railroad companies, but when in use are under the exclusive control of the post office authorities. They are usually built after plans and specifications approved by the Superintendent of Railway Mail Service, in whose district they are to run.

Postal Car Chandelier. See **Chandelier.** A variety of postal car lamps and chandeliers have been introduced with the object of giving a brilliant light when and as desired. Pintsch gas lamps and oil lamps with the Acme burner are in special favor.

Postal Car Furnishings. Fig. 4018.

Postal Car Side Lamp. Fig. 3586.

Pot. See **Fire Box** or **Fire Pot.**

Pouch Hook (Postal Cars). Figs. 4021, 4035-4035a. Hooks used for suspending mail bags while assorting the mails. They are usually strung loosely upon a rod, and are distinguished as square eye or round eye, according to the section of the rod. Some forms are permanently attached to the side of the car.

Pouch Rack. A rack built of standards and horizontal rods to which the pouch hooks are attached and which support the pouches or bags while mail is being distributed into them.

Poultry Car. Figs. 23-24. A car specially designed to carry live poultry. The car is provided with arrangements for feeding, watering, and by removing intermediate floors may be arranged to carry geese and turkeys instead of chickens.

Pratt Dump Car. Figs. 532-535. A side dump car for carrying coal. The side planks are hinged on a shaft running the length of the car, and so arranged that the lower plank may be raised and the upper swung down, opening the whole side of the car.

Pratt & Whitney Wheel Gage. Figs. 6922-6930.

Press. See **Seal Press.**

Pressure Bar (Gould Buffing Apparatus). A stiff iron bar of a cross-shaped (+) cross section, which connects the drawbar to the buffer spring, so that the draft spring reinforces the buffing spring and the buffing spring takes up part of the pull on the drawbar, thus relieving the draft spring. The pressure bar also forces out the buffer stem and plate when the drawbar is pulled out, thus maintaining a continuous platform between the cars.

Pressure Gage (Pintsch Gas Lighting). Fig. 3049. A gage usually placed in the saloon. It registers atmospheres or pounds and atmospheres, for convenience in computing the volume of gas in the tank.

Pressure Head (Brake Cylinder). The head that covers the end of the brake cylinder into which air pressure is admitted when the brakes are applied.

Pressure Regulator (Gold's Car Heating). Fig. 2815. A valve designed to regulate the delivery pressure of steam. It depends entirely upon the elasticity of springs, the pressure of which can be gaged or regulated by screw studs that bear upon one end of the springs. In the Gold pressure regulator there is a spring on each side of the valve.

Pressure Regulator (Pintsch Gas Lighting Apparatus). R, Fig. 3042 and Fig. 3044. The valve by which the pressure of the compressed gas is reduced for consumption. The pressure regulator is one complete fixture, adjusted by the maker. Names of the principal interior parts are diaphragm, diaphragm connecting rod, diaphragm lever, regulating valve and dust arrester.

Pressure Retaining Valve (Westinghouse Brake). Figs. 1148-1150. A device by means of which a certain part of the brake cylinder pressure may be retained to aid in retarding the acceleration of a train in descending long grades while the brake pipe pressure is increased after one application to recharge the auxiliary reservoirs. It is controlled by a small handle, the position of which causes it to operate or not, as desired. There are four different types, the ordinary, Fig. 1253, the vestibule, Fig. 1255, the double pressure, Fig. 1254, and the driver brake. The first two types may be made to retain 0 or 15

lbs.; the third to retain 0, 15 or 30 lbs. or 0, 25 and 50 lbs.; the fourth to retain 0, 15 lbs or all cylinder pressure. In descending grades the handle is turned to the proper position to retain the desired pressure, while on the level the handle is turned to allow the air to escape to the atmosphere. Also called retaining valve.

Priming (Painting). The first coat in car painting. Usually a pure thin oil put on hot, at about 150° F. or less. A thin drier, of red lead or borate of manganese, is used with it. The next coat is the scraping filling coat or **Rough Stuff**, which see. See also **Painting.**

Private Car. Figs. 169, 172, 211, 6231. A handsomely finished car for the exclusive use of an officer of a railroad or other person, containing all the comforts and conveniences of a house. They are usually built with an observation end and are frequently called **Officers' Cars**, which see.

2. (Freight Cars.) Cars owned by companies other than the railways are termed private line cars or sometimes simply private cars.

Private Lock (British). A door lock universal in passenger service, which can only be operated by a tapered rectangular hardened steel key, which is carried by all passenger trainmen, and most habitual travelers. One key will open any private lock.

Produce Car. Figs. 15, 309, 312; details, 313. A modified form of refrigerator car, provided with ventilators and ice boxes, for the transportation of fruit, vegetables and perishable produce.

Profile Carline. A **Carline**, which see, extending from one plate to the other, bent to conform to the shape of the clear story. They are, of necessity, always **Compound Carlines**, which see.

Propelling Chain (Steam Shovel). 28, Figs. 596-598. A heavy chain passing over a sprocket on an axle of the truck and a sprocket geared to the winding drum. By revolving the winding drum sprocket the shovel is made to move forward or back on the track by its own power.

Propelling Gear (Steam Shovel). 27, Figs. 596-598. The gears which turn from the main winding drum when the propelling chain is to be operated.

Propelling Lever or **Hand Car Lever** (Lever Hand Car). 19, Figs. 6207-6209. The main lever, to which power is applied.

Protection Cap. A lamp jack.

"Protection" Cuspidor. Fig. 2674. One with a large mat fastened to it to prevent overturning. See **Cuspidor.**

Protection Dry Closet. Figs. 4045-4046.

Protection of Trainmen. (M. C. B. Standard.) Figs. 5635-5636, 5637-5684. In 1893 a Recommended Practice was adopted to protect trainmen from accident, under the subheads as given. In 1896 some changes were made, especially in regard to handholds, and by the elimination of various details from drawing. In 1902 it was changed to Standard.

In 1905 the drawings were revised to more clearly define the location of safety appliances on cars. Also, the lower round of the end ladder with wooden rails was made straight instead of having an offset.

In 1906 the position of the brake shaft and location of roof handholes were modified.

In 1907 a sheet was devised entirely to illustrating these standards.

Position of Brake Shafts.—The brake shaft to be placed on what is the left-hand corner of the car when a person is standing on the track facing the end of the car. The ratchet wheel to be fastened to the brake shaft and brake pawl to be fastened to a suitable casting attached to the roof or attached to the brake shelf. The center of the brake shaft to be about 20 inches from the middle of the car.

Running Boards.—The ends of the running boards of box cars to be made to project over the ends of the cars, and properly supported. The running board shall be made not less than 18 inches wide.

Steps.—Two good substantial steps, to be made of wrought iron, about ½ by 1½ inches section to be fastened, one to each side sill, next to the corner of the car to which the ladder is attached on cars having ladders, and to diagonally opposite corners on all other cars. The steps to be about 12 inches long, measured horizontally between the sides, and the tread to be about 8 inches below the bottom of the sill. The side of the step next to the corner of the car to be as near to the end of the car as is practicable. Each side of the step to be fastened to the sill with two ½-inch bolts and nuts or two rivets, not less than ½-inch in diameter.

Ladders.—Each box and stock car should have two iron or wooden ladders with not less than five steps to each ladder; steps, if of iron, to be not less than ⅝ inch diameter; if of wood, to be not less than 1½ by 2 inches, and to be made of hardwood; the steps to be not less than 2½ inches from side or end of car; each car to have the handhold on the roof directly over the ladder and running parallel with the side or end of car on which the ladder is located; these handholds to be placed not less than 2 inches nor more than 18 inches from the edge of the car and of a length suitable to the construction of the car.

When iron ladders are used and placed on ends of car, the bottom step to have a guard or projection to prevent men from slipping when swinging around the end of car to get on the step.

Handholds.—Box and stock cars constructed with projecting end sills with end ladders should be provided with a horizontal grabiron or handhold about 24 inches long on side of car over each step, located not less than 18 inches nor over 30 inches above center line of coupler. The end ladder should be located on lefthand side of end of car and one horizontal grabiron or handhold, about 24 inches long, on right-hand side of end of car not less than 18 inches nor over 30 inches above center line of coupler, the lower rung of ladder being a suitable grabiron for opposite side of end of car, as shown.

Box and stock cars constructed with projecting end sills with side ladders located over steps; the lower rung of such ladders is an effective grab. They should also be provided with two horizontal end grabirons or handholds, about 24 inches long, located on each side of end of car not less than 18 inches nor over 30 inches above the center line of coupler, as shown.

Box and stock cars not constructed with projecting end sills, and which have end ladders, should be provided with horizontal grabiron or handhold about 24 inches long on side of car over each step, located not less than 18 inches nor over 30 inches above center line of coupler. The end ladder should be located on left-hand side of end of car

and one horizontal grabiron or handhold about 24 inches long on right-hand side of end of car not less than 18 inches nor over 30 inches above center line of coupler, the lower rung of ladder being a suitable grab for that side of end of car, as shown. End ladders constructed without side frames should have the lower rung provided with a guard to prevent the foot from slipping off.

On box and stock cars not constructed with projecting end sills, and which have side ladders located over steps, the lower rung of such ladder is an effective grab. They should also be provided with two horizontal grabirons or handholds about 24 inches long, located on each side of end of car not less than 18 inches nor over 30 inches above center line of coupler, as shown.

All other classes of house cars, such as refrigerators, furniture cars, etc., if constructed with projecting end sills, are to have ladders, sill steps and handholds as described for box and stock cars, and as shown. If not constructed with projecting end sills, they are to have ladders, sill steps and handholds, as described for box and stock cars, and as shown.

All gondolas with drop ends to be provided with horizontal grabirons of handholds on sides of car over each step, about 24 inches long, located as high as possible, but not less than 18 inches nor more than 30 inches above center line of coupler, or with vertical grabiron or handhold over steps on the sides of car about 24 inches long, the lower end to be placed about 6 inches above the floor of the car, and two grabirons or handholds placed under the sill at the end of car as near the face as will insure a good safe fastening, the outside end of it to be in line with the inside face of the side sill, and to be about 18 inches long, with a space not less than 2 inches nor more than 3 inches between it and the end sill, as shown. If preferred, the end handholds may be placed on the face of the end sill, as shown in the alternate illustration.

All fixed-end gondolas should be equipped with a vertical grabiron or handhold over steps on the sides of the car, about 24 inches long, the lower end to be placed about 6 inches above the floor of the car, or with a suitable number of horizontal grabirons or handholds, about 24 inches long, over each step, and two horizontal grabirons or handholds on each end of car, about 24 inches long, about 4 inches from the outside of car and not less than 18 inches nor over 30 inches above center line of coupler; exception to be made where the car is provided with a brake step, in which case the bracket of the brake step can be used as a grabiron on that side of end of car, as shown. It is also recommended that where the side of a gondola car is too high for a man standing on the step to reach the top, there should be one additional vertical grabiron or handhold placed on left side of end of car, extending from within 4 inches of the top, to be about 18 inches long, as shown.

Tank cars should be provided with horizontal grabirons or handholds, about 24 inches long, on sides over steps; cars provided with safety railings on sides do not require side grabirons or handholds, but all cars should be provided with two end grabirons or handholds, about 18 inches long, located on under side of end sill, the same as for drop-end gondolas, as shown. If preferred, the end handholds may be placed on the face of the end sill, as shown in the alternate illustration.

All flat cars to be provided with horizontal grabirons or handholds, about 24 inches long, over steps near end of cars, where coupler unlocking rod is located, and two end grabirons or handholds, about 18 inches long, placed under the sill as near the face as will insure a good safe fastening, the same as for drop-end gondolas, and as shown. If preferred, the end handhold may be placed on the face of the end sill, as shown in the alternate illustration.

Cars of other types of construction not covered specifically in foregoing paragraphs of this section and not shown by the drawings may be deemed of special construction, but shall have the complement of grabirons or handholds, steps and ladders, as is required for cars of the nearest approximate type, and such handholds shall be considered as required by the rules of interchange.

Rivets not less than ½ inch diameter may be used when grabirons or handholds are applied on steel cars.

All handholds should have a clearance behind them of not more than three inches nor less than two inches.

All handholds should be made of iron not less than ⅝ inch diameter; handholds on the sides and ends of cars should be about 24 inches long in the clear, except end sill handholds, which may be from 18 to 24 inches long, provided, also, that the coupler unlocking rod, if properly located and having not more than three inches nor less than two inches clearance between it and the car, will be a suitable end sill grabiron or handhold.

Pull. "A catch or lip upon a drawer, door or window, by which it is pulled open."—Knight. See

Deck Sash Pull. **Seat Pull.**
Door Pull. **Window Blind Pull.**
Drawer Pull.

Pull Hook or **Deck Sash Opener.** Fig. 4456. A shaft with a small hook on the top for opening deck sashes. Also called ventilator staff.

Pull Iron. A roping staple. A U-bolt passing through the side sill for the purpose of attaching ropes in switching. A push pole corner iron is a lower corner plate with a socket cast or forged thereon, and in which the end of a pole is inserted for pushing or pulling the car.

Pull Ring. Fig. 4456. A metal ring with a screw attached, by which it is fastened to any object, as a sash, drawer, etc., to take hold of in opening it. Chiefly used for deck sashes.

Pull Rod. 1. The rod connecting the uncoupling lever with the catch lever on a passenger car platform; also called an uncoupling rod.

2. (British Brake Gear.) Any rod transmitting tension when the brake is applied.

Pull Rod Carry Iron. A carry iron for an uncoupling rod.

Pulley. "A wheel with a grooved, flat or slightly convex rim, adapted to receive a cord or band which runs over it. Its function is to transmit power or change the direction of motion."—Knight. A sheave is a pulley wheel in a block, but sheave and pulley are used as almost synonymous terms. See **Sheave.** See also **Bell Cord Pulley, Berth Chain Pulley.**

Pullman Car. A name strictly applicable only to cars operated by the Pullman Company, but in common

usage frequently applied to "palace" sleeping, parlor or drawing-room cars built after the same designs as those adopted by the Pullman Company, the Pullman cars having been the first of this class introduced on a large scale and in modern style of finish, and being much more in use than any other class of parlor or palace cars. Included among Pullman cars are sleeping cars, parlor or drawing-room cars, dinning cars and combination cars. Late designs differ from the earlier designs in the use of a "buffet," etc., and in being finished in much less ornamental fashion than the former styles prevalent.

The plans of Pullman cars are shown in Figs. 211-212, etc. Interiors, Fig. 142, etc. Framing, Figs. 645-647. Sleeping car berth, Figs. 2201-2203. Vestibules, Figs. 2207-2210. Trucks, Fig. 4771.

Pullman Passenger Car Trucks. Fig. 4771. Nearly, if not all, Pullman cars are equipped with six-wheeled trucks, similar to the illustration.

Pullman System of Water Supply. Figs. 3696-3702. This system of water supply under air pressure replaces the old method of using pumps for raising water for wash purposes in sleeping cars. The system consists of forcing water into the wash bowls by air pressure taken from the brake system as applied to cars. When the auxiliary air brake reservoir is filled with air to a pressure of 60 lbs., an air governor admits air through a drip cut into an air tank, 36 inches long by 22 inches in diameter. This is a storage tank for use when cars are disconnected from the engine. The pressure carried is about 75 lbs. From this tank the air passes through a reducing valve (set for 22 lbs. pressure) into the water tank. At the end and center of the tank is a special three-way valve. This valve performs the triple service of admitting water and air, and also allowing the air to escape when the tank is filled with water. The valve is operated from inside the car by a stem, marked, to which is attached a pinion and gear. The air before passing into the water tank passes through a check valve, which is to prevent the water in the tank from backing into the air pipes; the water being forced out of the tank passes through a strainer or screen. The strainer is cleaned by a valve, which when opened allows water to pass over the screen in such a manner as to thoroughly wash it. After passing through another valve the water enters the car and is led by pipes to the different washstands and closets. One pipe passes to the heater and the water goes through a check valve, and a shut-off valve, when it enters the copper coil which encircles the fire magazine. The hot water passes by gravity to a tank, which has a connecting pipe back to the coil. Through these pipes there is a constant circulation from the heater, which keeps the water hot. A connection is made from the top of this tank to the various washstands and bath tub where hot water is required. At each end of the car a fire hose is placed, which can be used at a moment's notice, under the tank pressure. At the top of tank is a safety valve. The water tank is insulated to prevent the water freezing in cold weather. This insulating box contains about 20 ft. of heater pipe, which is connected with the heating pipes of the car.

Pullman Wide Vestibule. Figs. 2207-2210. A vestibule which incloses and utilizes the whole of the platform of a car. It is provided with equalizing devices above and below and employs the same frictional resistance to prevent lateral oscillation as the earlier type. The improvements are chiefly confined to the platform inclosure. Windows are introduced at the end of the car in this construction, which permit of better ventilation. The platform may be utilized, the steps being covered with trap doors, so that the entire area of the platform is available. A single door may be used at the sides and avoid the double folding doors of the other pattern.

The peculiarities of the Pullman vestibule are explained under **Vestibules,** which see. The frictional resistance of the diaphragm face plates to oscillation under opposing spring pressure is accomplished by an ingenious mechanism. The plate equalizer is intended to keep the upper part of the face plate thrust out and adjusted to its companion plate. The two sides are equalized at the top by the face plate equalizing lever, and at the bottom by a platform equalizer.

Pump (Wash Rooms). A **Basin Pump,** which see.

Pump Governor (Westinghouse Traction Brake). See **Electric Pump Governor.**

Purlin. 83, Figs. 262-263. A longitudinal piece of timber over the rafters, extending from one end of the car roof to the other, to which the roof boards are fastened. Sometimes called a roof strip, but the latter more correctly applies to strips sometimes used above the purlins.

Push Baggage Car. A light lorry car, used at stations for moving baggage or freight from one train to another.

Push Bar (Gould Vestibule). A **Pressure Bar,** which see.

Push Bar (Westinghouse Brake). Usually called push rod. A compression bar which butts up against the piston of a brake cylinder, being guided by a hollow piston rod in such manner as to transmit the pressure of the piston when the air brake is used, but to simply move away from the piston, without moving the latter, when brakes are applied by hand.

Push Block. See **Push Pole Corner Plate.**

Push Car or Lorry Car. Figs. 6212-6214. A four-wheeled car, also called larry car, used to carry materials and tools, moved or pushed by hand. Also see **Ferry Push Car.**

Push Pole. A pole or wrought iron tube which is used as a strut to span diagonally the distance between the corners of a locomotive and a car, standing on two parallel tracks, and which is used to push such car without switching the locomotive onto the same track that the car occupies.

Push Pole Car. A flat car with a push pole attached to the side sill so that it can be used in "poling" cars. The pole of former days has become a wrought iron tube, and one end is pivoted to the side sill of the car. A post and lever is attached to the pivoted end so it can be swung out over the side track by the operator, who stands upon the push pole car. See **Push Pole.**

Push Pole Corner Plate or Iron. 191, Figs. 262-272. A plate for inserting poles or bars in switching to enable the car to be moved from the side by an engine on a parallel track. It is usually a cavity cast upon the lower corner plate, and not a separate attachment. A **Roping Staple,** which see, serves the same purpose for the use of a rope.

Push Rod (Westinghouse Freight and Traction Brakes). Figs. 869-870. A round steel bar which transmits the air pressure against the piston of the brake cylinder to the levers and to the brake shoes. It

has a crosshead formed on one end by which it is attached to the cylinder lever. It is guided by the hollow piston rod (Figs. 1275-1276) and transmits the pressure when the air brake is used. When hand brakes are used it simply moves away from the piston without moving it.

Pushover Seat. Figs. 6415-6418.

Putty. A mixture of linseed oil with whiting, which latter is chalk finely pulverized. Water is sometimes added in adulteration, causing the putty to stick to the fingers, and making it hard and brittle when dry. Panel putty, used for filling nail holes in car work is an extra quality made from whiting, white lead in oil, japan or varnish, and a small quantity of turpentine. The whiting is used merely to prevent the white lead from sticking to the fingers, and no more than necessary for this purpose is required. This putty forms a hard cement, which does not shrink. When dry it can be rubbed down with pumice stone or dusted with sandpaper. Glycerine putty is made of good thick glycerine and white lead or litharge. It hardens in 15 to 45 minutes, and stands water and acids.

Pyramidal Hopper Bottom. Figs. 41, 50, etc. See **Hopper Bottom.**

Q

Quadrant. A piece of metal curved in the form of the arc of a circle. See **Sector.** See also **Deck Sash Quadrant.**

Quadrant (Steam Shovel). 16, Figs. 596-598. The casting for holding the operating levers.

Quadrant Levers (Steam Shovel). 17, Figs. 596-598. The handles mounted on the quadrant which control the various movements of the shovel.

Quadruplet (of Elliptic Springs). Figs. 5376-5377. Four springs side by side acting as one.

Quarter Light or **Side Light** (British). American equivalent, window. In a carriage, the window in the body as distinguished from the windows in the doors. The quarter lights, in British practice, are always fixed, but on the continent of Europe they are invariably made to fall or open, and this is also the case with the vehicles made in Great Britain and exported to warm climates.

Quarter Light Molding or **Glass Frame Stile** (British). The upright member of the fixed window framing. The glass is generally fitted direct to the body, a strip of rubber being interposed, and the molding screwed on outside, keeping the whole in position.

Quarter Light Panel (British). A panel on the outside of the body, placed above the window. Other exterior panels are quarter panel, waist panel, and bottom side panel. Interior panels are the partition panel, inside top light panel and roof panels.

Quarter Light Pillar (British). A part of the body framing of a carriage. A vertical post forming one side of the window aperture.

Quartette (Elliptic Spring). Alsa called **Quadruplet,** which see.

Queen Post (of a Truss). Figs. 753-755, 979-984. One of a pair of vertical posts against which the truss rod bears. When one post only is used, it is called a **King Post,** which see. Such posts are used for the body truss rods under car bodies and occasionally trucks. See **Body Queen Post, Inverted Body Queen Post.**

Queen Post Stay. A bar attached to a queen post to stay it laterally. See **Body Queen Post Stay.**

Quick Action Air Brake (Westinghouse). Fig. 1207, etc. A system now almost universally used equipped with quick-acting triple valves to permit the rapid successive application of brakes throughout the train. See **Westinghouse Air Brake.**

Quick Action Triple Valve (Westinghouse Air Brake). Fig. 1233. See **Triple Valve.**

Quintuplet (of Elliptic Springs). Five springs side by side acting as one. Figs. 5374-5375.

R

"R. A." Vestibule Roller Curtain. Figs. 2300-2303.

Rabbet. "A rectangular groove made longitudinally along the edge of one piece to receive the edge of another. It is common in paneling, and in door frames for the door to shut into."—Knight. Rabbet is a corruption of the word rebate.

Rabbeted Lock. "A kind of lock whose face plate is sunk within a rabbet cut in the edge of a door."—Knight. See **Lock.**

Rack. 1. "A frame for receiving various articles."—Webster. See **Basket Rack, Brush and Comb Rack, Card Rack, Towel Rack.**

2. "In machinery, a rectilineal sliding piece, with teeth cut on its edge for working with a wheel."—Brande. A **Ratchet,** which see.

Rack Catch (for Head Board of a Sleeping Car Berth). A small cupboard catch to hold the headboard pocket closed.

Radial Draft Bar (Street Cars). A draw bar pivoted so that it may be swung oblique to the car length over a drawbar sector. A center draft drawbar is an example of a radial draft bar. See **Van Dorn Radial Draft Gear.**

Radiator. Baker and other steam and hot water heaters. Figs. 2769-2770. A piece of iron pipe bent into a U-shape under the seats of a car, through which the hot water or steam circulates.

Radiator Stand (Baker and Other Heaters). Figs. 2758-2764. A support for a radiator.

Rafter. A timber to support the roof of a car, which extends part way across the top, either from the plate to the ridge of the roof, or to the base of the deck side only, as 101, Figs. 599-619, etc. When such timbers extend all the way across they are called carlines. See **Main Rafter.**

Rail. "The horizontal part in any piece of framing or paneling."—Webster.

Rail Motor Car. A car for the transportation of passengers which generates its own motive power either by a steam engine mounted on one of the trucks, a gasolene engine or a gasolene engine and generator supplying current to electric motors mounted on the trucks. They are now growing in favor for branch line use. Figs. 206-210.

Rail Roof Molding (Street Car). A roof deck sill molding. Its use is to make a tight joint between the roof boards and deck sill, or upper deck bottom rail.

Railing. "A series of rails; a fence."—Webster. See **Platform Railing.**

Railing Chain. See **Platform Railing Chain.**

Railway Car. See **Car.**

Railway Lantern. Fig. 3620. A lantern used in large numbers by trainmen and other employees of railroads. A variety of patterns exist and are shown.

Raised Roof. An **Upper Deck** or **Clear Story,** which see.

Ralston Drop-Bottom Car. Figs. 81, 83, 416-420. A car with a flat floor made up entirely of drop doors, hinged at the center which will discharge its entire load on opening the doors.

Ralston Steel Underframe. Fig. 1033. A steel underframe consisting essentially of two built-up bolsters and a heavy box girder center sill made up of channels and top and bottom cover plates. It may be applied to old wooden cars by removing the wooden center sills and bolsters but allowing the old side and intermediate sills to remain. See also Figs. 1012-1018, 1024-1026.

Ranges and Cook Stoves. Fig. 3633. A range is a fixed and more elaborate cook stove attached to the wall, and, in houses, usually built in with brick so as to need no stovepipe to connect with the chimney.

Ratchet. A serrated edge like that of a saw, sometimes straight and sometimes on a wheel, into which a pawl engages, for producing or (more commonly) restraining motion. See **Brake Ratchet Wheel, Winding Shaft Ratchet Wheel.** An undulating ratchet is one having no sharp edges, so that the ratchet catch will slide over them without removal on the application of force, as in deck sash pivots. Figs. 4505-4508. See also **Deck Sash Pivot,** Figs. 4505-4508, for various forms of ratchets and attached parts used in connection therewith.

Ratchet Bolt (Kirby's Door Lock). M, Figs. 2480-2481.

Ratchet Burner (for Lard Oil). One in which the wick is moved up and down by a pointed wheel engaging in it, like mineral oil burners.

Ratchet Jacks. Figs. 3873, 3875.

Ratchet Wheel. A wheel with teeth like a saw cut into the outer edge to engage with a **Pawl,** which see, which prevents the wheel from being turned in one direction while allowing it to turn in the opposite direction. See **Brake Ratchet Wheel, Winding Shaft Ratchet Wheel.**

Rattan Seats and Seating (Canvas Lined). Fig. 4121,

Rave. A vertical side piece to the frame of a wagon body or other vehicle. The term is applied to such parts on handcars (the raves being also called seat risers), but not to other railroad cars, although literally applicable, for instance, to the sides of a gondola car.

Reach. See **Extension Reach.**

Rear Sheath (Security Car Door). Figs. 916-918.

Rebate. "In architecture, a groove or channel sunk on the edge of a piece of timber."—Webster. Usually written **Rabbet,** which see.

Receiver (Pintsch System). Fig. 3407. A cylindrical steel tank, with riveted and soldered seams, adapted to receive and retain gas at high pressures. The sizes vary in diameter from 16½ inches to 20½ inches, and in length from 6 feet 1 inch to 9 feet 6 inches. According to requirements, cars are equipped with from one to four receivers, connected by ¼ inch high pressure piping, etc. See **Pintsch System of Gas Lighting.**

Receiver Filling Valve (Pintsch Gas Lighting). F, Fig. 3042; Fig. 3044. A valve of peculiar construction for the admission of the compressed gas to the receiver, so that it can be transmitted to the regulator for consumption.

Reclining Chair. Figs. 4111, etc. A chair the back of which can be inclined to almost any angle, and which is provided with leg and foot rests.

Recommended Practice (M. C. B.). Fig. 5767, etc. "Those forms, parts, constructions, units, measurements or systems which are conducive of sound contruction, good practice and safe operation, but which do not affect either interchangeability of parts or interchangeability of cars as a whole." See **Master Car Builders' Standards.**

Recording Bell (Street Cars). A bell attached to a bell punch or other instrument on which the conductor records the fares collected, to indicate that fact to the passengers.

Reducer (Pipe Fittings). Fig. 2777. A means of decreasing the diameter of the pipe used. They are either **Bushings, Couplings** or **T's,** which see.

Reducing Pipe Coupling. Fig. 2777, etc. See **Reducer.**

Reducing Tee or **T** (Pipe Fittings). See also **Reducer** and **T.** A pipe fitting having three openings, one of which is smaller or larger than the other two.

Reducing Valve. Figs. 1248-1252. 1. (Train Air Signal Apparatus.) A valve for reducing the pressure of air admitted to the train signal pipes below that maintained in the brake pipes and main reservoir. In the train air signal apparatus a pressure of from 40 to 45 lbs. is used.

2. (Air Brake.) See **Feed Valve.**

3. High-Speed Brake.) See **Automatic Reducing Valve.**

Reference Gage for Mounting Wheels (M. C. B. Standard). Fig. 5600. In 1896 a new standard reference gage for mounting and inspecting wheels was adopted by letter ballot to take the place of the check gage for mounting wheels, and the gage for distance between wheels, formerly used. At the same date a standard check gage was adopted.

Reflectors (Pintsch Lamps). Figs. 3111-3114.

Refrigerator (of a Refrigerator Car). The chamber, constituting the main body of the car, in which the paying load is placed.

Refrigerator Car. Figs. 12-22, 243, 305, 319-328; details, Figs. 313-318, 329-340. A car for carrying perishable articles, especially meat, constructed with compartments in which ice is carried, and with double floor, sides and roof, to keep the ice from melting. A great variety of types have been designed, but they can all be reduced to four general classes, viz., those which use ice and salt, or ice only, for refrigerating, and those which carry ice overhead in ice pans or in the ends of the cars in ice racks or tubes. The most important difference of all in refrigerator cars, the difference in the character of the circulation and dryness of air, is not touched by the classification, nor can it be gone into. The temperature aimed at is about 40 degrees F., or 8 degrees above freezing. Many of the older cars were mere air-tight boxes, without any circulation whatever, with the effect that an unnecessarily low temperature was required in one part of the car to keep all cool enough. The principal difference in the external appearance of refrigerator cars, as may be seen, is their greater height and width. Refrigerator cars using salt use 12 pounds for each 100 lbs. of ice.

Refrigerator Car Doors. Fig. 1393.

Refrigerator Door Hinge. Fig. 2468.

Refrigerator Express Car. Figs. 204-205-328. A car that does not differ from a regular baggage and express car, except that it is insulated and iced to maintain a low temperature, and in which are carried perishable goods.

Register. Fig. 4494. An aperture for the passage of air, provided with suitable valves, doors and sliding or revolving plates, by which the aperture is opened or closed. See **Ventilator Register.**

Register Face. A grating with which the opening of a

register is covered. It is usually of some ornamental pattern.

Regulating. An unusual term for switching, or the act of moving cars from one track to another in making up or separating trains. Also called drilling, or, in Great Britain, marshaling, or, less correctly, shunting.

Regulating Valve (Pintsch Gas Pressure Regulator). See **Pressure Regulator.**

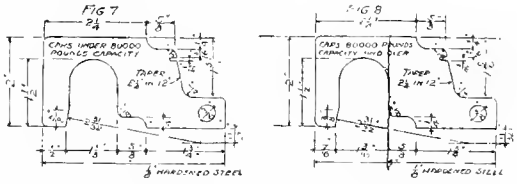
Regulator (Pintsch System of Gas Lighting). Fig. 3054. An automatic regulator which receives the gas from the receiver at its inlet at any pressure from 1 to 300 lbs. and automatically reduces it to an outlet pressure of ½ oz. It is screwed to a board, having a recess 12¾ ins. diameter and ⅜ in. deep to receive the upper surface of the regulator, this board being held against the under side of the car floor by straps and suitable lag screws. The regulator is sealed and is guaranteed by the makers for 5 years, if returned intact and seal unbroken.

Regulator. See **Fire Regulator,** Fig. 2678, **Pressure Regulator.**

Regulator (Electric Car Lighting). Figs. 3419, 3434-3436. The device for controlling the generator output and maintaining constant voltage on the lamp circuits. It is a form of automatic rheostat.

Regulator Straps (Pintsch System). Fig. 3073. An iron strap used to secure the regulator to the under side of the car. One is passed across each end of the board carrying the regulator, and is lag-screwed to the board and to the car sills.

Remounting Wheels. In 1907 limit gages for use at shops when inspecting second-hand wheels for remounting were adopted as Recommended Practice. They are shown herewith.



Release Cock. More properly **Release Valve,** which see.

Release Spring. 1. (Passenger Car Trucks). 91, Figs. 4954-4956 and Figs. 4771-4777. A spring attached to the end piece of a truck for the purpose of throwing the brakes out of contact with the wheels. The name is also applied to any spring used to throw the brake off from the wheels.

2. (Westinghouse Brake.) 9, Figs. 1275-1276. A spiral spring which acts so as to move the brake piston inward, and thus release the brakes from the wheels after the compressed air is allowed to escape from the cylinders. It was formerly carried outside the brake cylinder by a release spring bracket, etc., but is now placed inside the cylinder.

Release Valve (Air Brake). More properly an auxiliary reservoir bleeding valve. A cock attached to the auxiliary reservoir for permitting the air pressure to be reduced therein, when the locomotive is detached or when the apparatus is out of order, so as to release or "bleed" the brakes.

Release Valve Rod. Figs. 861-862. A rod extending from the release valve on the auxiliary reservoir to the side of the car to operate the release valve.

Release Valve Rod Guide. Figs. 843-844. A small iron eye attached below the sills as a guide for the **Release Valve Rod,** which see.

Reliance Truck Bolster. Figs. 5053.

Replacer. Figs. 3864-3865.

Republic Friction Draft Gear. Fig. 1533.

Reservoir. 1. (Air Brake.) Main reservoirs of large capacity are placed under all motor cars having air compressors. Auxiliary reservoirs, Figs. 1276-1274, are placed under all cars equipped with automatic air brakes. In freight service a cast iron auxiliary reservoir, Figs. 1275-1276, is connected directly with the brake cylinder and triple valve.

2. See **Lamp Reservoir** or **Lamp Fount.**

3. (Pintsch Gas Lighting Apparatus.) See **Receiver.**

Reservoir Drain Cock (Air Brake). Fig. 1284. A cock for emptying the reservoir of any water condensed from the compressed air.

Reservoir Pipe (Air Brake). Also called air pipe and discharge pipe. The pipe conveying the air from the air pump to the reservoir.

Reservoir Plate. Figs. 910-912.

Rest. That which supports something or on which it rests. See

Arm Rest.	**Stake Rest.**
Berth Rest.	**Upper Berth Rest.**
Foot Rest.	**Window Blind Rest.**
Side Foot Rest.	**Window Sash Rest**
Side Rest (Tip Car).	(Street Cars).

Retaining Ring (for Wheel Tires). Fig. 5396, etc. A ring securing the tire to the wheel. See **Mansell Retaining Ring** and **Tire Fastening.**

Retaining Valve. See **Pressure Retaining Valve.**

Return Bend (Pipe Fittings). Figs. 2772-2780. A short cast iron U-shaped tube for uniting the ends of two wrought iron pipes. They are called close return bends, or open return bends, according as the section of the pipe is kept a distinct circle at all points. The close return bend has simply a partition dividing the two parts for a short distance.

Return Tag. A tag attached to cars, usually by slipping it on to the shackle of the seal, and used as an evidence of the due arrival of the car, or as a direction to what point the car itself is to be returned.

Reversible Car Seat. Fig. 4105. A name sometimes applied to the common form of car seat in which the back only reverses, but more properly applied to a seat in which the seat is moved and not the seat back only, what was the seat becoming the seat back, and vice versa.

Revolving Chair. Fig. 4093. See **Parlor Car Chair.**

Rex Sanitary Water Closet. Fig. 4044.

Rheostat. Fig. 6340. A resistance used in connection with the controller for limiting the current taken by the motors during acceleration. Usually consists of a number of iron grids or strips of iron ribbon properly connected together and packed in a substantial frame, the whole being mounted on the under side of the car flooring.

Rib (of a Cast Iron Wheel). A bracket. See **Wheel Rib, Car Wheel.**

Richards Panel Back Seats. Figs. 4159-4165. A car seat made with a loose panel in the back, pivoted and supported by springs set in the seat back frame. The panel pushes back and accommodates itself to the occupant's back, making a very comfortable chair. This principle is used on parlor car chairs in all Pullman cars, as shown in Fig. 4164.

Ridge. See **Roof Ridge.**

Ridge Clamp. The grooved stick on top of the boarding of a pitched roof directly over the ridge pole. In the Winslow car roof they are called simply **Roof Strips,** which see.

Ridge Pole. 84, Figs. 262-272. A longitudinal timber in

the center of a roof, supported by the carlines or rafters on which the roof boards rest. In some cases the rafters are framed into the ridge pole, and in some cases the ridge pole is grooved to receive the roof sheets.

Ridge Timber. A timber which caps the intersection of two inclined floors meeting in the center of the car, as in side dump or ore cars. If the inclined floors were the two sides of a gable roof the ridge timber would then become a ridge pole.

Right and Left Screw. A pair of screw threads cut turning in opposite directions, so that a common nut or pipe coupling tapped with similar threads will, according to the direction in which it is turned, draw the two rods nearer together or press them farther apart.

Rigid Bolster Truck. Fig. 4698, etc. A car truck with a bolster which has no **Lateral** or **Swing Motion**, which see. See also **Bolster** and **Truck Bolster.**

Rigid Caster (for Tables). Fig. 4279. See **Caster.** A "rigid caster" is a mere socket and not properly a caster at all, except from being used in the same manner as a finish for legs of tables and chairs.

Rim. 1. (Of a Car Wheel.) That portion of a car wheel outside of the plate. The face of the rim is the outside vertical edge or face.

2. (Of a Wrought Iron Wheel.) The wrought iron ring which is welded to the outer ends of the spokes and surrounded by the tire.

Rim Latch. Figs. 2590-2591. A latch which is attached to the inside of a door and is not let into it.

Rim Lock. Fig. 2503. "A lock having an exterior metallic case which projects from the face of the door, differing thus from a mortise lock."—Knight.

Ring. 1. See

Lamp Ring.
Manhole Ring.
Mansell Retaining Ring.
Packing Ring.
Pull Ring.
Slewing Ring.
Stove Pipe Ring.
Window Curtain Ring.

2. (Baker Heater.) Figs. 2683, 2691. A cast iron ring attached to the smoke top to stiffen it and hold the feed door. Also an ash pit ring.

Ring Curtain Fixture. Fig. 4667.

Rip Saw. (Wood-Working Machinery.) Figs. 6803, 6829. A circular saw used for cutting boards in the direction of the grain of the wood. See **Cut-off Saw.**

Riser. 3, Figs. 3684-3686. A piece of marble or metal set on edge around about the wash bowls to prevent water from running against the walls. See **Step Riser, Seat Riser.**

Rising Timber. A timber placed upon another parallel or transverse timber to get greater height.

Rivet. "A pin of iron or other metal, with a head drawn through a piece of timber or metal, and the point bent or spread and beaten down fast to prevent it being drawn out, or a pin or bolt clinched at both ends."—Webster. The **Seat Arm Pivot**, which see, Fig. 4210, is usually in the trade termed a rivet, but incorrectly.

Rivet Fastening (British). As applied to railroad wheels, the oldest and most defective mode of securing the tire to the wheel. Little used. See **Tire Fastening.**

Rivet Seal. A seal with a lead rivet, which is closed by a die. See **Car Seal.**

Robertson Box Car Roof. Figs. 2189-2198. An inside roof for standard box cars, constructed entirely of **asbestos protected metal**, which see. The metal sheets extend from within a grooved recess in the ridge pole to the outer edge of the fascia, having flanges on each side turned up one inch and butting closely together. These upturned edges or flanges fit into a grooved strip of the same material which fits snugly over them and is held in place by a grooved intermediate carlin or wood rafter. This grooved rafter is tenoned at one end and fits into a mortised recess in the ridge pole in such manner as to be absolutely firm yet flexible. The opposite or outer end of the grooved rafter is secured by means of screws or bolts to the eaves plate. This form of joint between the roofing sheets is absolutely weathertight and at the same time provides for all oscillation or working of the car frame, without breaking down or deteriorating.

Each sheet is further secured by a malleable iron clip, interposed between the fascia and the frieze. This clip is held in place by screws and provides space for the free circulation of air and water. The roof sheathing is applied over the intermediate purlins in the usual manner. The ridge joint formed by the abutting ends of the roof sheathing boards may be covered under the running board saddles by a strip of asbestos protected metal, secured to the sheathing by nails.

Rocker (Tip Car). A crescent-shaped casting bolted to the rocker timbers of the car body on which the body rests and rolls when the body is tipped.

Rocker Bearing (Tip Car). The iron cap for the rocker bearing timber to support the rocker.

Rocker Bearing Timber (Tip Car). A horizontal timber at the end of the car, on which the rocker bearing rests.

Rocker Bearing Timber Hangers (Tip Car). Vertical timbers or iron bars framed and bolted to the end piece, to which the rocker bearing timbers are fastened.

Rocker Car Seat. A seat having the bottom adjustable so as to give it an inclination toward the seat back in all cases, on whichever side the seat back may be placed. All modern car seats have mechanism by which this inclination is automatically given to the seat when the back is reversed or swung back. See **Car Seat.**

Rocker Casting (Car Seats). A casting forming a part of the cushion carrier or stand, which is moved back and forth by the seat back arms, and moves the cushion forward, as well as giving it some inclination toward the back.

Rocker Side Bearing (Trucks). A device somewhat similar to the **Roller Side Bearing**, which see. Instead of rollers, elliptical rockers are used, which tend to offer a gradually increasing resistance to the lateral motion of the bolster and tend to return it to its normal position at all times.

Rocker Timbers (Tip Car). See **Rocker.**

Rocking Bar (Heaters). A horizontal bar which supports the grate, and on which the latter is attached by a pivot in the center so that it can be turned horizontally and thus shake down the ashes.

Rock Plank. A **Truss Plank**, which see.

Rod. In car building this term generally means a slender bar of iron with a nut on each end, in distinction from a bolt which has a head on one end and a nut on the other. Very long bolts, however, are often called rods. Rods in general take their name from the parts with which they are connected or the use which they serve.

Rod Hanger (Bell Cord). Fig 2371, etc. See **Bell Cord Hanger.**

Rodger Ballast Car and Distributing Plow. Figs. 64-68. A hopper-bottom car with bottom doors by which crushed stone or gravel ballast can be distributed between the rails, and a flat car with a plow attached beneath it, by which the ballast is leveled and plowed out over the ends of the ties and cleaned from the rails. See **Hart Convertible Car.**

Roe Ventilator. Fig. 4425. See **Ventilators.**

Rolled Axle. An axle made of rolled iron. See **Axle, Car Axle.**

Roller. 1. "That which rolls; that which turns on its own axis, particularly a cylinder of wood, stone, metal, etc."—Webster.

2. (Window Shades.) Fig. 4681. The cylinder on which the shade is rolled up, containing within it the springs which actuate it. See **Hartshorn** and **McKay Shade Roller.**

Roller Side Bearing Truck. Fig 4700. A lateral motion diamond truck the frame of which is very like a swing motion truck (Fig. 4705), with a rigid spring plank. Lateral motion is given to the truck bolster by placing it upon cylindrical rollers resting upon the spring caps. The spring cap and bolster bearing plate are concaved, so that the motion of the rollers is restrained and the truck bolster given stability. See **Rocker Side Bearing** (Truck).

Roller Side Bearings, Body and Truck. Fig. 4340, etc. See **Anti-Friction Side Bearings.**

Roof. Fig. 2098, etc. "The cover or upper part of a house or other building, consisting of rafters covered with boards, shingles, or tiles, with a side or sides sloping from the ridge for the purpose of carrying off the water that falls in rain or snow." —Webster. The roof of passenger cars is in two parts, commonly called the **Upper** and **Lower Deck,** which see. See **Car Roof;** also

Arched Roof.	**Pitching Roof.**
"A" Car Roof	**Platform Roof.**
Corrugated Metal Car Roof.	**Single Board Roof.**
	Winslow Roof.
Double Board Roof.	

Roof Apron. 106, Figs. 599-619. A vertical or inclined metal or wooden screen attached to the end of a passenger car roof to prevent cinders, rain, or snow from being driven on to the platform and into the doorway.

Roof Ascending Rail (British). See **Ascending Rail.**

Roof Boards. 1. 86, Figs. 262-272; 102, Figs. 599-619. The boards which form a covering of a roof. They run longitudinally on passenger cars and usually transversely on freight cars. See **Car Roof.**

2. (British.) The planking forming the roof. It invariably runs longitudinally.

Roof Brace (of a Center Lamp or Chandelier). Diagonal stays passing from the lamp to the roof. Vertical supporting stays are known as lamp arms, with or without a large center stay.

Roof Commode Handle (British). See **Ascending Rail.**

Roof Corner Casting (Passenger Cars). A cast iron molding for the corners of platform roofs. They are made rights and lefts, and are specified as for a person standing and facing the end of the car.

Roof Cover Strips (Single Board Roofs). A metallic U-shaped strip used to cover the joints of the roof sheets. See **Roof Strip.**

Roof Door (Refrigerator Cars). 61r, Figs. 305-321. The cover for the opening in the roof of the car over the ice boxes.

Roof Hand Hold. Figs. 839-840. See **Roof Grab Iron.**

Roof Hand Rail. A hand rail usually made of gas pipe in front of the brake wheel, designed to protect the brakeman when applying the brakes. It is stiffened by a hand rail brace. The whole arrangement is designed to take the place of the brake step, which has been disapproved of by vote of the M. C. B. Association. See **Brake Step.**

Roof Grab Iron (Box and Stock Cars). 60, Figs. 262-272, 305-321, etc. A hand hold. An iron bar fastened to the roof to be grasped when ascending the ladder at the end of the car. Also called ladder handle. See **Grab Iron.**

Roof Lamp (British). A lamp used to illuminate the inside of a carriage or other covered vehicle. A circular hole, about 8 in. in diameter, is cut through the roof, and the roof lamp placed in this aperture from the outside, the glass and burner when in position being a little below the inner surface of the roof, and entirely inaccessible from within. This form of lamp is wastful of oil, yields a dim and uncertain light, is costly to handle and the glass is constantly broken. It is therefore being superseded in Germany and Great Britain by the Pintsch and similar methods of using compressed oil gas and by electric train lighting.

Roof Landing. A small platform built on the roof of a trolley car on which inspectors step in climbing upon the roof to inspect the trolley. In freight cars it is called a roof step.

Roof Light. A **Deck Sash,** which see.

Roof Panel (End). The panel over the door of a passenger car.

Roof Ridge (Freight Cars). The intersection of the two plane surfaces forming a pitching roof.

Roof Running Board. 87, Figs. 262-272, etc. See **Running Board.**

Roof Running Board Bracket. 89, Figs. 262-272, etc. See **Running Board Bracket.**

Roof Running Board Extension. 88, Figs. 262-272, etc. See **Running Board Extension.**

Roof Sheets. Metallic sheets, sometimes corrugated and sometimes not, for covering freight car roofs. Their joints are sometimes closed by a roof cover strip, and sometimes the edges fit into grooves in wooden carlines or joint strips. See **Car Roof.**

Roof Step (Freight Car Roofs). A horizontal board which extends sidewise from the running board to near the side of the car above the ladder, its object being to give a secure foothold and protect the roof from wear. It is not much in use.

Roof Stick or **Hoop Stick** (British). American equivalent, carline. A piece of timber which supports the planking of the roof, and is either bent or cut to the curve of the roof.

Roof Strips. 1. Used quite frequently, but somewhat confusedly, to designate a **Purlin,** which see.

2. (Passenger Cars.) Narrow wooden strips attached as stiffeners to the under side of the carlines of the lower deck.

3. (Winslow and Other Car Roofs.) Fig. 2110. A longitudinal wooden strip on top of the metal roof sheets to which the roof boards are attached. The central roof strip is called in other roofs a ridge clamp. Sometimes at the ridge a single ridge clamp is used.

Roof Thimble (Pintsch Lamp). 291, Figs. 3208-3224

Roof Ventilator.. A **Ventilator,** which see, in the roof of a car.

Roofing (M. C. B. Standard). Figs. 5749-5756.

Roofing Canvas. A heavy cotton cloth or duck for covering the outside of the roofs of cars, chiefly used on street cars.

In Great Britain it is universally used for all cars with roofs. It is bedded on fresh thick white lead or **Smudge**, which see, and then receives several coats of the same paint.

Roofing Duck. The trade name for the cloth used for head linings, manufactured in any width up to 12 ft. It is lighter than roofing canvas.

Rope. "A large string or line composed of several strands twisted together."—Webster. See **Berth Safety Rope, Berth Spring Rope.**

Roping Staple. 58, Figs. 262-272. A U-bolt secured to the side sill near the end of a car into which the hook of a switching rope may be caught, so that a switching locomotive may pull cars on side tracks while it is on the main track, or vice versa.

Rose. Fig. 2484. See **Door Latch Rose.** Sometimes called a rosette.

Rotary Snow Shovel. See **Snow Shovel.**

Rotary Valve (Motorman's Brake Valve, etc.). Figs. 1225-1226. The main valve which rotates when the handle is turned.

Rotary Valve Key (Motorman's Brake Valve, etc.). 14, Figs. 1225-1226.

Rough Stuff or **Scraping Filling Coat** (Painting). The next coat after the **Priming**, which see. Its purpose is not to protect, but to level the surface of the wood. Therefore, none of it is left on the higher portions of the surface, but used merely to fill the hollows to a level with these. The surface is scraped to an even plane level with the highest level of the bare wood. After 24 hours to dry, a second coat is put on, scraped down to the level of the highest portions of the bare wood. After a second 24 hours to dry, the car is sand papered or rubbed down, pumice stoned, and is ready for the **Color Coats**, which see. See also **Painting.** A common material for this coat is 6 lbs. keg white lead, 7 lbs. whiting, mixed thick with coat japan and ground in a paint mill. This mixture is thinned with turpentine, so as to be thin enough to work easily, and so thick as not to run. It is put on with a leveler or scraper, often made of an old saw blade.

Round (of a ladder). 59, Figs. 262-272, 815-816. The horizontal bars on which the foot rests. They are called rounds, whether of wood or iron, and whether round or square. See **Ladder Rounds.**

Rubber Floor Mat. Fig. 2671. There are two leading styles, corrugated rubber and perforated rubber.

Rubber Gasket. See **Gasket.**

Rubber Spring. A car spring made of india rubber. They are rarely used, it having been found difficult to secure uniform quality, and the cost of a really good quality being higher than steel spiral springs of equal efficiency and durability. The same is true of the various rubber and steel compound springs. Rubber springs are in occasional use on platform safety chains for passenger equipment, and in Great Britain they are used for draft and buffing springs.

Rubber Tread (for Step). Fig. 977. An india rubber covering fastened to a step, or threshold plate, of a car to prevent persons from slipping when ascending or descending the steps.

Rubberoid Car Roof. Figs. 2151-2155. A composition material intended to be laid between the inside and outside board roofs.

Rules for Interchange. See **Interchange of Traffic.**

Runners (Foundry). Apertures which connect the ingate of a mold for cast metals with spaces to be filled with molten metal.

Running Board. 1. 87, Figs. 262-272, etc. A plane surface, made usually of boards, for trainmen to walk or run on. It is placed on the roof of box or stock cars and at the side of tank cars. Gondola and flat cars usually have none.

2. (Tank Car.) 119, Figs. 545-549. The only substitute for a car floor.

Running Board Blocking. 86a, Figs. 305-321. Angular wooden blocks, the acute angle of which is the same as the slope of the car roof. Inserted under the running boards to level them up and to give them a bearing on the roof boards over the carlines.

Running Board Bracket. 1. 89, Figs. 262-272 and Figs. 822-823. Wrought iron supports bolted to the end of a box or stock car to carry the **Running Board Extension**, which see.

2. (Tank Car.) Cast iron knees attached to the main sills of a tank car, and projecting outward to support the running board.

Running Board Extension. 88, Figs. 262-272. The part which extends beyond the end of the car body so as to bring the ends of the running boards on adjoining cars nearer together to facilitate the passage of trainmen from one car to another. See **Running Board.**

Running Board Extension Bracket. Figs 822. A bracket to support the **Running Board Extension**, which see.

Russell Snow Plows. Fig. 249.

Russia Iron. A form of sheet iron manufactured in Russia the exact process for making which has heretofore been kept secret, but which consists essentially in forming a chemical compound of iron upon its surface at the same time that it is highly polished, so that it is not likely to rust. Modern substitutes for this iron are also known as **Planished Iron**, which see.

Russwin Liquid Door Check. Fig. 2653.

S

Saddle. "A seat or pad to be placed on the back of an animal to support the rider or the load."—Knight. Hence, a block or plate which acts as a bearing or support for a rod, beam, etc., in construction, is called a saddle. See **Body Truss Rod Saddle, Truss Rod Saddle, Bolster Truss Rod Saddle.**

Safety Appliances. (M. C. B. Standards). Figs. 5637-5684. See **Protection to Trainmen.** In 1893 a Recommended Practice was adopted on safety appliances under the subheads as given. In 1896 some changes were made, especially in regard to handholds, and by the elimination of various details from drawing. In 1902 it was changed to Standard.

In 1905 the drawings were revised to more clearly define the location of safety appliances on cars. Also, the lower round of the end ladder with wooden rails was made straight instead of having an offset.

In 1906 the position of the brake shaft and location of roof handholds were modified.

In 1907 a set of drawings were devoted entirely to illustrating these standards.

In 1908 a thorough revision was made of both text and drawings in order to make their meaning and intent clear and adaptable to all existing types

of car equipment, and to be capable of but one interpretation.

FREIGHT TRAIN CARS.

Preface. Cars of construction not covered specifically in the following sections, relative to handholds, sill steps and ladders, and not shown by the drawings, shall be considered as of special construction but shall have the same complement of handholds, sill steps and ladders as are required for cars of the nearest approximate type.

BRAKE SHAFTS.

Brake-shaft location. (1) The brake shaft to be located on the end of car, preferably to the left of the centre thereof, when facing the end of car.

On open-end cars. (2) On cars without fixed ends the location of brake shafts to be suitable to the car construction and operation.

Ratchet wheel. (3) The ratchet wheel to be secured from turning on the brake shaft.

Brake pawl. (4) The brake pawl to be fastened to a suitable casting or plate attached to the car body or brake step.

Running boards.

RUNNING BOARDS.

Width on house cars. (1) Box and other house cars to be provided with running boards on roof, not less than 18 inches wide.

Width on tank cars. (2) Longitudinal running boards on tank cars used in connection with safety railings to be not less than 10 inches. Running boards will not be required on tank cars having floors.

Projection. (3.) The ends of all running boards which project more than four inches over the edge of roof of ends of cars to be properly supported.

Sill steps.

SILL STEPS.

Number and location. (1) One substantial sill step to be secured to each side of car at the lower right-hand corner, this being the corner on the right, when facing the side of car. The side of the sill step next to the corner to be as near as practicable to the end of the car.

Dimensions. (2) Sill steps to be made of wrought iron or steel about ½ by 1½ inches cross sectional area or equivalent.

Width. (3) Sill steps to be about 12 inches long between the sides, measured horizontally at the tread.

Height from rail. (4) The lower treads of sill steps to be about 24 inches and not more than 32 inches above the rail, the clear depth of sill steps to be not less than 6 inches.

Deep steps. (5) Sill steps exceeding 18 inches in depth to have an additional tread above the lower tread, and such sill steps to be laterally braced.

Fastenings. (6) Each side of sill steps on cars to be securely fastened by means of lag screws, bolts and rivets.

Ladders.

LADDERS.

Number. (1) Box and other house cars, and all cars the top of which cannot be reached from sill steps or platform end sills, shall have two wrought iron wooden ladders.

Location. (2) Ladders to be located at diagonal corners, on right-hand end of sides of cars or left-hand side of ends of cars. When cars have platform end sills, ladders may be located near center of ends of cars. High side gondola cars with fixed ends having brake staff platform at one end of car should have ladders and sill steps on both sides at same end of car.

Dimensions. (3) Ladder treads of wrought iron or steel, to be of ⅝ inch nominal diameter; or of hardwood, to be nominally 1½ by 2 inches, about 16 inches clear length.

Spacing. (4) The spacing of treads of ladders to be about 18 inches.

Clearance. (5) All ladder treads shall have a minimum clearance around them of 2 inches, nominal clearance 2½ inches.

Footguard. (6) When wrought iron or steel ladders without sides are placed on ends of cars with non-projecting end sills, the bottom treads to have a guard or upward projection at inside ends.

Tank-car ladders. (7) Tank cars having running boards to be provided with suitable ladders to give access to the running boards; the ladders to be located on right-hand end of sides of cars or left-hand side of ends of cars when running boards are continuous around the car. If running boards are not continuous, ladders to be so located as to give access to each end of each running board. Treads of ladders to be spaced about 18 inches apart.

Handholds.

HANDHOLDS.

Roof handholds. (1) Box and other house cars shall have handholds on roofs, in line with each ladder, running parallel with the ladder treads.

(2) Roof handholds to be placed not less than 2 inches nor more than 18 inches from the edge of the roof and the length to be not less than 10 inches in the clear, unless the construction of the car will not permit.

Box, etc. Side handholds. (3) *Box and other house cars with end ladders* to be provided with a horizontal or vertical handhold, 16 inches in the clear or longer, on each side of each car over sill step; if horizontal side handholds are used they shall be located not more than 30 inches above center line of coupler.

End handholds. (4) Each end of car to be provided with two horizontal handholds, not less than 12 inches, and preferably 16 inches in the clear, or longer, located not over 30 inches above center line of coupler, or placed under the end sill as near the face as will insure a good, safe fastening, or, if preferred, may be placed on the face of end sill. The coupler unlocking rod, the tread of the ladder or any suitably located part of the car which does not exceed two inches on each side or in diameter, and has the proper clearance, will be considered a suitable end handhold.

Box, etc. Side handholds. (6) *Box and other house cars having side ladders* located over sill step, a tread of such ladder, not over 30 inches above center line of coupler, is an effective handhold.

End handholds. (7) Each end of car to be provided with two horizontal handholds, not less than 12 inches, and preferably 16 inches

in the clear, or longer, located not over 30 inches above center line of coupler or placed under the end sill as near the face as will insure a good, safe fastening, or, if preferred, may be placed on the face of end sill. The coupler unlocking rod, or any suitably located part of the car which does not exceed two inches on each side or in diameter, and has the proper clearance, will be considered a suitable end handhold.

Gondola cars drop ends. Side handholds.

(9) *Gondola cars with drop ends* to be provided with a horizontal or vertical handhold on each side of each car over sill steps, with as much clear length as the car construction will permit, provided same need not exceed 16 inches; and

(10) If horizontal side handholds are used they shall be located not more than 30 inches above center line of coupler.

End handholds.

(11) Gondola cars with drop ends to be provided with two end handholds not less than 12 inches, and preferably 16 inches in the clear, or longer, at each end of car, placed under the end sills as near the face as will insure a good, safe fastening, and as shown.

Drawing reference.

(12) If preferred, the end handholds may be placed on the face of end sills, as shown on the alternate illustration.

(13) The coupler unlocking rod when properly located and having proper clearance around it under all conditions, including projecting loads, will be a suitable end handhold.

Gondola cars. Fixed ends. Side handholds.

(14) *Gondola cars with fixed ends* to be provided with a horizontal or vertical handhold, on each side of each car over sill steps, with as much clear length as car construction will permit, provided handholds need not exceed 16 inches in length; and

(15) If horizontal handholds are used they shall be located not more than 30 inches above center line of coupler.

Top-end handholds.

(16) Gondola cars without projecting end sills, having ladders located on sides, to have one vertical or horizontal handhold at upper corner of left-hand side of brake end of car.

Side handholds high cars.

(17) Vertical handhold to extend downward from about 4 inches from top of car; horizontal handhold located about 6 inches from top of car.

End handholds.

(18) Each end of each car to be provided with two horizontal handholds not less than 12 inches, and preferably 16 inches in the clear, or longer, located not over 30 inches above the center line of coupler or placed under the end sill as near the face as will insure a good, safe fastening, or, if preferred, may be placed on the face of the end sill. The coupler unlocking rod, when properly located, and having proper clearance around it, is a suitable end handhold.

Brake-step bracket as handhold.

(19) Exception to be made when the car is provided with a brake step, in which case the bracket of the brake step, if of suitable height, may be used as a handhold on that side of the end of the car, as shown.

(20) The arrangement without brake step is shown.

(21) High cars with vertical end handholds are shown.

(22) High cars with horizontal side handholds are shown.

Tank-car safety railings.

(23) *All tank cars* to have a safety railing for each running board, not less than 30 inches and not more than 5 feet above platform or above running board. Hand railing may be on the outside of running board, secured to side frame, or may be on the inside of running board, secured to tank or tank bands; or, in case of there being one overhead running board, the hand railing may be secured to top of tank, or tank bands.

Tank-head-top handhold.

(24) Tank cars with end platforms and without hand railings extending around the ends of the tank to have a horizontal handhold of as much length in the clear as the diameter of the tank will permit, secured to each head and located not less than 30 inches and not more than 5 feet above platforms.

Side handholds.

(25) Tank cars to be provided with a horizontal or vertical handhold, 16 inches in the clear or longer, on each side of each car over sill steps. Tank cars having safety railings secured to the tank to be provided with an additional vertical handhold attached to the tank.

Safety-railing posts as handholds.

(26) Tank cars provided with side safety railings, supported by posts which are not more than 2 inches on each side or 2 inches in diameter; the posts are suitable side handholds if located over sill steps.

End handholds.

(27) Tank cars to be provided with two horizontal end handholds, not less than 12 inches, and preferably 16 inches in the clear, or longer, located not over 30 inches above the center line of coupler, and,

(28) If preferred, the end handholds may be placed on the face of the end sills or under the end sills as near the face as will insure a good, safe fastening. The coupler unlocking rod, when properly located and having proper clearance around it, is a suitable end handhold.

(29) Tank cars with side platform and hand railings secured to side frame to have handholds, as shown.

(30) Tank cars without end sills, the end handholds may be secured to tank heads, or to end running boards on car so equipped, as shown.

(31) Tank cars without through side sills but having running boards and safety railing secured to tank or tank bands to have handholds, as shown.

Flat cars. Side handholds.

(32) *Flat cars* to be provided with a horizontal handhold on each side of each car over sill steps, with as much clear length as the car construction will permit, provided same need not exceed 16 inches.

End handholes and drawing references.

(33) Flat cars to be provided with two end handholds not less than 12 inches, and preferably 16 inches in the clear, at each end of car; placed under the end sills as near the face as will insure a good, safe fastening, and as shown, or,

(34) If preferred, the end handholds may be placed on the face of the end sills, as shown on the alternate illustration, or,

Coupler-unlocking rod as end handhold.

(35) The coupler unlocking rod, when properly located and having proper clearance around it under all conditions, including projecting loads, will be a suitable end handhold.

Hopper-car side handholds.

(36) *Hopper cars* to be provided with horizontal or vertical handholds on each side of each car over sill steps, with as much clear length as the car construction will permit, provided handholds need not exceed 16 inches length in the clear.

(37) If horizontal handholds are used, they shall be located not more than 30 inches above center line of coupler.

High cars.

(38) Hopper cars without platform end sills, having ladders located on sides, to have one vertical or horizontal handhold at upper corner of left-hand side of brake end of car;

(39) Vertical handhold to extend downward from about 4 inches from top of car; horizontal handhold located about 6 inches from top of car.

End handholds.

(40) Each end of hopper cars to be provided with two horizontal handholds not less than 12 inches, and preferably 16 inches in the clear, or longer, located not over 30 inches above center line of coupler, or placed under the end sill as near the face as will insure a good, safe fastening, or, if preferred, may be placed on the face of end sill. The coupler unlocking rod, or a tread of ladder, when properly located and having proper clearance around it, is a suitable end handhold.

Brake-step bracket as handhold.

(41) Exception to be made when the car is provided with a brake step, in which case the bracket of the brake step, if of suitable height, may be used as a handhold on that side of the end of car.

CABOOSE CARS.

Caboose cars. With platforms.

(43) *Caboose cars* having end platforms, the platform railings and posts will be effective handholds.

Without platforms.

(44) Caboose cars not having end platforms to be equipped with side and end handholds, same as described for box and other house cars.

Side-door handholds and steps.

(45) Caboose cars having side doors, to have vertical handholds on each door post and suitable steps below doorway.

Curved handholds.

(46) Curved hand railings located so as to facilitate catching caboose cars under motion, will be considered as suitable handholds.

HANDHOLD AND LADDER TREAD FASTENINGS, DIMENSIONS AND CLEARANCES.

Through bolts.

(1) All handholds and ladder treads applied on wood to be secured by through bolts or lag screws.

Bolt description.

(2) When bolts are used, they should be not less than ½ inch diameter, with nuts on the outside wherever possible, and riveted over.

Lag screws.

(3) When lag screws are used, they should be not less than ½ inch diameter, 3 inches long, and screwed full length into the wood.

Rivets.

(4) When rivets are used, they should be not less than ½ inch diameter.

Clearance.

(5) All handholds and ladder treads shall have a minimum clearance around them of 2 inches, nominal clearance 2½ inches.

Material.

(6) All handholds and ladder treads made of wrought iron or steel to be of ⅝ inch nominal diameter, or larger.

Coupler unlocking-rod.

(7) The coupler unlocking rod, if properly located and having minimum clearance of 2 inches around it will be a suitable end handhold.

Brake-step bracket used as a handhold.

(8) Brake step brackets, if properly located and not more than 30 inches above center line of coupler, will be suitable end handholds.

PASSENGER TRAIN CARS.

Railings as handholds.

(1) *Passenger train cars having open end platforms*, platform steps, and platform railings, the railings will be effective handholds.

Wide vestibule side handholds.

(2) *Passenger train cars having wide vestibules*, the side door posts to be equipped with vertical handholds of 16 inches clear length or longer.

Wide vestibule end handholds.

(3) *Passenger train cars having wide vestibules* also to be equipped with end handholds, one on each side of each end of car, with about 16 inches clear length, attached to under side of platform end sill or face of vestibule; but the body of any handhold should not project beyond vestibule face more than 1 inch.

Non-platform corner handholds.

(4) *Passenger train cars not equipped with platforms* to have at each corner of each car a vertical handhold of 16 inches clear length, or longer.

Steps.

(5) *Passenger train cars with projecting end sills* to have a metal sill step under each corner with tread not higher than 32 inches from the rail.

Hand-railing.

(6) *Passenger train cars with projecting end sills* to have end hand railings extending across the ends of the cars, except within end doorways or vestibules, located a suitable height above top of end sills.

End handholds.

(7) *All passenger train cars, excepting open platform cars*, to be equipped with end handholds, one on each side of each end of car, about 16 inches clear length, attached to the end of car on face, or under side of end of car as near the face as will insure a good, safe fastening.

Step dimensions.

(8) Metal sill steps on passenger train cars to be not less than ½ by 1½ inches cross sectional area or equivalent, and to be securely fastened to the car.

(9) Handholds on passenger train cars to be made of metal of ⅝ inch nominal diameter, and to be securely fastened to the car.

(10) *Passenger train cars without end platforms, but with side doors,* to have vertical handholds and suitable steps below doorway.

Safety Beam (Passenger Car Trucks). 51, Figs. 4771-4777. A longitudinal timber connecting the end piece and transom above the axles and inside of each wheel piece. Iron straps (axle safety bearings) are attached to the beam and pass under the axles so as to hold them in position in case of a breakage of axles or wheels on either side. An additional middle safety beam is sometimes used on six-wheel trucks.

Safety Beam Block. A block fastened to the under side of a safety beam and to which a safety strap is attached. It is put there to bring the safety beam nearer to the axle, and is usually cut out so as to conform to the shape of the latter.

Safety Beam Iron. 60, Figs. 4780-4783. A wrought iron bar or casting bolted to the transom (six-wheel truck), by which the middle safety beam is attached to the transoms.

Safety Beam Tie Rod. 59, Figs. 4771-4777. A longitudinal rod alongside a safety beam, tying the end piece and transom together. A safety beam truss rod sometimes serves as a substitute and equivalent.

Safety Bearing.. See **Axle Safety Bearing** for safety beam, above.

Safety Berth Latch. A device by which it is made impossible for the berth to shut itself automatically in case of accidental overturning of the cars. These devices enable the **Berth Safety Rope,** which see, to be dispensed with.

Safety Car Heating & Lighting Co.'s Acetylene Lamps. Figs. 1641-3203.

Safety Car Heating & Lighting Co.'s System of Steam Heating.. Figs. 2922-3011. (Standard Systems.) The fundamental principle of these systems is the replacing of the heat of the Baker heater fire, by the heat of the steam from the engine, applied by means of jackets on portions of the circulation piping, but in all cases leaving the Baker heater system in such condition that a fire or steam can be used, separately, or in conjunction, without its being necessary to alter or adjust any valves or other devices whatsoever. These systems are all closed circulation, the seal of the Baker heater being unbroken, and, therefore, there is no reduction of the water in the pipes, and no danger of burning out the coil. Salt water may be used and is recommended.

Details of the various applications to single and double circulation are given in Figs. 2924-2932. The water circulation being heated at from three to six different points (instead of one point, as when fire is used in the Baker heater) it produces more rapid and more equable heating of the car. See **Coil Jacket System.**

A system of direct steam heating is shown in Fig. 2933.

The **Thermo Jet System** is shown in Figs. 2942-2945.

Safety Chain. 1. See **Brake Safety Chain** (for brake beams). **Safety Coupling Chain** (for draw gear), Fig. 5769.

2. (British.) American equivalent, safety coupling chain. An additional coupling chain provided at one end with a hook, and intended to hold the train together should the main coupling part. Two are secured at each end of the vehicle, one on each side of the main coupling. Also called side chain.

Safety Chain Eye. Fig. 944. An iron eye with a broad base bolted to the under side of the side sills of a passenger car to receive the hook on the end of a **Truck Safety Chain,** which see. More commonly **Body Check Chain Eye,** which see.

Safety Chain Eye Bolt or **Strap Bolt.** See **Brake Safety Chain Eye Bolt.**

Safety Chains, Freight Car (M. C. B. Recommended Practice, as to location of). Fig. 5769.

Safety Coupling Chain (Passenger Car Platforms). Figs. 982-985. 1. A chain attached to the platform end timber and hooked to an eye in the platform of an adjoining car or tender so as to prevent the train from being separated in case the couplers should be detached. They are necessarily used in pairs, an eye and a chain with hook being attached to opposite sides of the same platform.

2. (M. C. B. Recommended Practice.) In 1893 a Recommended Practice was adopted for location and details of platform safety chains for passenger equipment cars. In 1896 this was modified as follows: Platform safety chains for passenger equipment cars to be located 14½ inches each side of center; to be suitably attached to under side of platform timbers, and to be of such length that when extended horizontally the chain with hook shall measure 12¾ inches from face of end timber to bearing point of hook, and the chain with eye shall measure 2¾ inches from face of end timber to bearing point of eye. The hook shall not be more than 1¼ inches thick transversely, and the eye shall not be less than 1½ inches wide, or less than 4 inches long in its opening. When facing end of car the chain fitted with hook shall be on the left-hand side, and the chain fitted with eye on the right-hand side.

In 1894 a Recommended Practice was adopted for safety chains for freight cars, when such chains are used. The use of safety chains on freight cars was not recommended, but when they are used on cars for special services a location is recommended as shown in Figs. 5769-5771.

In 1904 a Recommended Practice for safety chains for steel cars was adopted, Figs. 5772-5775.

In 1905 the two designs of temporary safety chains for cars carrying double loads, shown in Figs. 5799-5802, were adopted as Recommended Practice.

Safety's Direct Steam System. Fig. 2933. This depends for its efficiency upon the close regulation of steam supply possible with the special inlet valve, 603A. This valve has a Jenkins Seat, and is so constructed that the first full turn of the hand-wheel only opens the valve enough to give 1-100 sq. in. area of the inlet port. It can be adjusted by the wheel so as to give any desired inlet area from that point to the full area of 1 inch pipe. By this means the flow of steam to the radiator pipes (and therefore the car temperature) can be closely regulated.

Safety Gate. See **Platform Gate.**

Safety Guard (for Spring Plank). Figs. 4849-4850. An iron strap attached to the truck transoms and passing under the spring plank to hold up the latter in case of accidental breaking of the link hangers. More properly **Spring Plank Safety Strap,** which see.

Safety Hanger. See above, also **Brake Safety Chain, Brake Safety Strap, Safety Hanger** (for Lower Brake Rod).

Safety Hanger (for Lower Brake Rod). A metal loop or eye attached to a truck and through which the lower broke rod passes. It is intended to prevent the brake rod from falling on the track in case it or its connections should break.

Safety Latches. See **Safety Berth Latch.**

Safety Plate (Baker Fireproof Heaters). Figs. 2693-2694, 2712. An iron plate which covers the hole in the partition between the fire pot and the base of the smoke flue. Its office is to prevent the ignited coals from falling out if the heater be overturned. It is operated by a safety plate handle, the safety plate sliding between safety plate guides, Fig. 2712. The safety plate is held closed by a safety plate spring, Fig. 2694, bearing upon the safety plate handle.

Safety Plate and Gas Preventor (Baker's Mighty Midget Heater). Fig. 2743. This is a cover for the fire pot with an upturned flange, and is fitted to the top, Fig. 2745. It has an upturned flange along its hinged axis which deflects the cool air that enters when the door is opened, and prevents its mixing with the gases which escape from the fire pot through the holes in the top, Fig. 2614. The gases remaining hot pass up through the smoke flue and do not escape into the car.

Safety Plate Guide. See **Safety Plate.**

Safety Plate Handle. See **Safety Plate.**

Safety Plate Spring. See **Safety Plate.**

Safety Rod (Postal Cars). A rod suspended from overhead, over the pouch racks, within easy reach, to serve as a handhold or grabiron in case of derailment, etc. Certain fittings, Fig. 4025, are used to fasten it to the roof or sides of the car; they are the safety rod brackets, bushings and T joints.

Safety Rope (for Sleeping Car Berths). 26, Figs. 2201-2206. More properly **Berth Safety Rope,** which see. See also **Safety Berth Latch.**

Safety Step Treads. Fig. 2285. Rubber or metal coverings for step treads which prevent the foot from slipping.

Safety Straight Port Coupler. Fig. 2998. A straight port steam hose coupler used on all equipments of the Safety Car Heating & Lighting Co.

Safety Strap. See **Axle Safety Strap, Brake Safety Strap, Spring Plank Safety Strap.**

Safety Valve. 1. (Baker Heater.) Figs. 2759-2760. A valve formed of an india rubber ball, with which an opening on top of the circulating drum is closed. When the pressure in the drum exceeds the elasticity of the rubber ball the latter permits the steam or hot water to escape, and thus relieve the former. This safety valve is often replaced by a safety vent or bushing, Fig. 2737. The latter is simply a cast iron cap, the top of which is cut out so that if the pressure in the pipes becomes too high the top will blow out and relieve it. A new cap must be supplied whenever the pressure exceeds the limit and the head of the safety vent is blown out.

2. (Consolidatd Heating Appratus.) Fig. 2892.

3. (Westinghouse High Speed Brake.) Fig. 1256. An improved type of relief valve applied to the brake cylinders of such cars in a train as are not equipped with a high speed reducing valve, to relieve the brakes from excessive pressure.

4. (Westinghouse Traction Brake.) The same valve applied to main reservoirs to prevent an excessive accumulation of air pressure in case the electric pump governor should fail to act.

Safety Valve Ball (Baker Heater). See **Safety Valve.**

Safety Valve Body. 2, Fig. 1256.

Safety Vent and Bushing. See **Safety Valve.**

Safety Vent Valve. Fig. 3861.

St. Louis Car Seats. Fig. 4128.

Saloon. 1. "A lofty, spacious apartment."—Worcester.

2. The main room in a compartment car (rarely used).

3. One of the smaller subdivisions or staterooms of a sleeping or parlor car.

4. A retiring room, furnished with urinal and closet hopper, or soil hopper; and in the more luxurious cars with a water closet. The saloon is commonly also provided with washing facilities. Other terms are lavatory, closet, toilet, etc.

Saloon Door Plate or **Notice Plate.** Figs. 2621-2627.

Saloon Furnishings. Fig. 4042.

Saloon Handle. Figs. 4057-4060. See **Urinal Handle.**

Saloon Hopper. Figs. 4054-4056. See **Closet Hopper.** Also called soil hopper.

Saloon Latch. Figs. 2585-2587. A latch for saloon doors, which consists of a spring bolt, usually with a stop on the inside, which locks the bolt fast, or with a separate bolt for fastening the door from the inside. See below.

Saloon Lock. Figs. 2553-2554. The same as a saloon latch, with provision for locking the door from the outside. Saloon latches without locking facilities are rarely used.

Saloon Paper Hook. Figs. 4063-4064. See **Paper Hook.**

Saloon Plate. See **Notice Plate.**

Saloon Roof. In most of the modern cars the saloon is entirely roofed over so as to be distinct from the body of the car. Sometimes the partitions are carried up to the roof of the car.

Saloon Seat. The wooden seat over a closet hopper.

Saloon Stop Latch. See **Saloon Latch.**

Saloon Ventilating Jack. See **Ventilator.**

Samson Dry Closet. Figs. 4051-4056.

Sand Blast Process. 1. A process of cutting glass by blowing sand upon it with a strong blast of air. The glass is covered with paper or other elastic surface, which it is found the sand does not cut at all while rapidly cutting away the glass itself. The process was invented by observing the action of sand blown by the wind upon the rocks in the western plains of the United States, and is now largely used in place of wheel cutting.

2. The same principle is used in larger machines for cleaning the rust and old paint from steel cars, bridges, etc., before repainting. Such a machine is shown in Fig 6010.

Sand Box (Street Cars). A box placed under the seats containing grit for sanding the tracks. It is provided with a spout and valve, operated by a lever, connecting rod and lever holder.

Sand Plank. 43, Figs. 4705-4713, 4771-4777. A common name for spring plank.

Sander (Wood Working Machinery). Fig. 6800. A machine used to finish the rough surface of boards by the use of sand or similar abrasive. The abrasive is spread in a thin layer over sheets of paper covered with glue and these sheets when dry are mounted on horizontal rollers over a movable bed or table. The rolls are rapidly revolved and the board is run under them.

Sandwich Plates. See **Flitch Plates, Body Bolster Flitch Plates.**

Sash. The frame of a window or blind, in which the glass or slats are set, but commonly used, especially in compound words, as a substitute for window, which means the window and sash complete.

The various members used in framing a sash are the same as a **Door Frame**, which see. See

Deck Sash.	**Mirror Sash.**
Door Case Window Sash.	**Swinging Sash.**
Door Light (British).	**Upper Door Sash.**
Door Sash.	**Ventilator Sash.**
Lower Door Sash.	**Window Blind Sash.**
	Window Sash.

Sash Balance. Figs. 4642-4671. A spring or weight, with or without a cord, so connected to a sash as to counterbalance its weight and make it easy to raise or lower. There are numerous devices of this kind, the O. M. Edwards, Caldwell, National and Grip Nut Co.'s being illustrated.

Sash Bar Lift. Figs. 4639-4641. A sash lift having a projecting bar sufficiently large to be grasped by the entire hand. Chiefly used for heavy double windows, in parlor cars, etc.

Sash Fastener. A **Sash Lock**, which see.

Sash Holder. See **Sash Lock.**

Sash Lift. 43, Figs. 2201-2202; Figs. 4613-4641. A metal finger hold attached to the bottom rail of a window sash for raising and lowering it. They are sometimes let in flush, and so called (Fig. 4633), but usually attached on the outside. Sometimes, but rarely, the sash lift is a mere knob, and so called. A **Window Blind Lift**, Figs. 4545-4572, which see, is a somewhat similar device. See **Bar Lift, End Door Sash Lift.**

Sash Lock. Figs. 4597-4612. A spring bolt attached to a window sash, or (rarely) a window blind, provided with thumb lever (sash lock trigger), to withdraw the bolt with by one hand, while the sash is lifted by the other. Both hands must thus be used. To accomplish this end less awkwardly sash balances, Figs. 4642-4664, have been adopted. See also **Deck Sash Latch.**

In the common form of sash lock, Fig. 4599, the sash lock bolt, 1, is pressed outward by the sash lock spring, 2, and moved inward when desired by the sash lock trigger, 3. The bolt enters into a sash lock bushing, Fig. 4575, let into the parting strip or other part of the window casing. In place of the bushing sash lock stops, Figs. 4573-4582, or sash lock plates, fastened upon the outside of the window casing, or let in flush, are sometimes used, and occasionally a sash lock rack, Figs. 4591-4594. A sash lock lower stop is often added at the bottom to hold the sash shut and prevent it from being opened from the outside.

Sash Lock Bolt. 1, Fig. 4599. See above.

Sash Lock Bushing. Figs. 4531-4532. See above.

Sash Lock Lower Stop. See above and **Sash Lock Stop.**

Sash Lock Plate. Figs. 4591-4593. A sash lock stop. See below.

Sash Lock Rack. Figs. 4594-4595.

Sash Lock Spring. 2, Fig. 4599. See **Sash Lock.**

Sash Lock Stop. Figs. 4573-4582. There are two kinds of stops, upper stops for holding the window open, and lower stops to hold it shut. Sash lock bushings, plates, or racks, are substitutes and equivalents for sash lock stops. See **Sash Lock.**

Sash Lock Trigger. 3, Fig. 4599. See **Sash Lock.**

Sash Opener. Figs. 4444-4463. A contrivance, as a lever or rod, for opening a window, used chiefly for the deck sashes, which are out of reach. See **Deck Sash Opener.**

Sash Parting Strip. A strip of wood attached to the window post of a passenger car which acts as a distance piece between two sashes and against which the latter slide. Also called **Bead** and **Parting Bead**, which see.

Sash Pivot. Figs. 4464-4473. A metal pin or pivot attached to a sash on which the latter turns. The term almost always means a deck sash pivot.

Sash Pull. Figs. 4456-4462. See **Deck Sash Pull.**

Sash Pull Hook. Figs. 4497-4501. See **Pull Hook.**

Sash Rail. A horizontal bar in the outside frame of a window or blind. See **Window Blind Rail.**

Sash Rest (Street Cars). See **Window Sash Rest.**

Sash Spring. Figs. 4527-4529. A metal spring attached to the edge of the stile of a window or blind sash to prevent it from rattling. They are made of various forms. A single window sash spring consists of a metal plate, like Fig. 4529, attached to the sash at one end. A double window sash spring is a metal plate fastened in its center to the sash. Another is of a spiral form, spiral window sash springs, let into the sash.

Scantling (Carpentry). "Lumber under 5 inches square used for studs, braces, ties, etc. It is expressed in terms of its transverse dimensions."—Knight. An upright scantling is termed a stud.

Scarf. "A joint uniting two pieces of timber endwise. The ends of each are beveled off and projections are sometimes made in the one corresponding to concavities in the other, or a corresponding concavity in each receives a jiggle" (or packing block).—Knight. It is technically known as a ship splice, prescribed by the rules for interchange of traffic for splicing any broken sills but the center sills. See **Interchange of Traffic** for the splice recommended for sills.

Scarritt-Comstock Car Seats. Figs. 4122-4133. Seats made by the Scarritt Car Seat Works under the Forney patents. The feature of the Forney seat is the seat back arms and the tilting of the cushion and inclinations of the back given by these arms. This is fully shown in the figures. Another feature of these seats is the adjustable foot rest, which permits luggage to be set under it out of the way.

Scheme Rod (Postal Cars). A rod supported upon the scheme rod bracket, and carrying the scheme or schedule of the proper distribution of mail matter for the various post offices used in distributing mail.

Schroyer Uncoupling Apparatus. Figs. 1794-1795.

Schoen Steel Wheel. Figs. 5414-5419.

Screen (for Heater Room Doors, Wash Room Panels, etc.). A perforated plate of sheet metal, usually jappaned, used as an ornamental finish.

Screen (Deck Window). A wire netting extending the entire length of the clear story outside the deck sash to exclude cinders. It is usually a very fine wire netting, 64 meshes to the inch.

Screw. "A cylinder surrounded by a spiral ridge or groove, every part of which forms an equal angle with the axis of the cylinder, so that if developed on a plane surface it would be an inclined plane. It is considered as one of the mechanical powers."—Knight. When used alone the term commonly means a wood screw, having a slotted head and gimlet point, for driving in with a screw driver. Machine screws are similar, except that they have no gimlet point and have a metal screw thread. They are used for uniting metallic parts. All ordinary forms of bolts have screw threads cut on them, but are not commonly called screws. A special form of wood screw is a lag screw, which is a large sized screw with a head like a bolt, so

that it may be inserted with a wrench instead of a screw driver. Figs. 3075-3080. See **Screw Thread.**

Screw Coupling (British.) The means by which passenger train vehicles are coupled together. On the Continent it is used for both passenger and freight cars. It comprises a right and left-handed screw provided with a hinged weighted handle, which always hangs downward, so that it has no tendency to unscrew and slacken the coupling, and two nuts with gudgeons taking in the eyes of U-shaped coupling links or shackles. The screw coupling may be either loose, or one shackle may be attached to the drawbar.

Screw Coupling Nut, and Gudgeons (British). See above.

Screw Coupling Weighted Lever (British). See above.

Screw Gages. Instruments for measuring the diameter or size of screws. They are of two kinds: external, for measuring male screws, and internal, for measuring female screws. See also **Screw Pitch Gage, Screw Thread Gage.**

Screw Jack. Figs. 3870-3871. A jack, the power of which depends upon a screw, turned by a lever. There are several such jacks in use, the bell base, ratchet screw jack, the differential screw jack, which has two screws, one working within the other, and the Chapman screw jack, which has a capstan head, into which a bar may be inserted.

Sellers' or Franklin Institute system, and that all the members of the Association are urged to abandon entirely the use of over or undersize screws.."

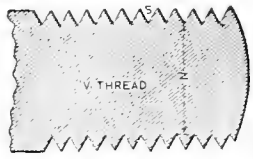


Fig. 11.

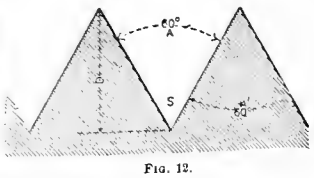


Fig. 12.

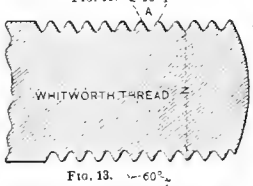


Fig. 13.

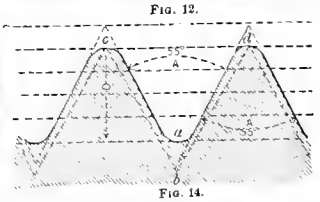


Fig. 14.

Fig. 15.

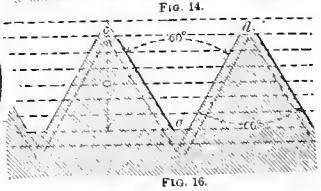
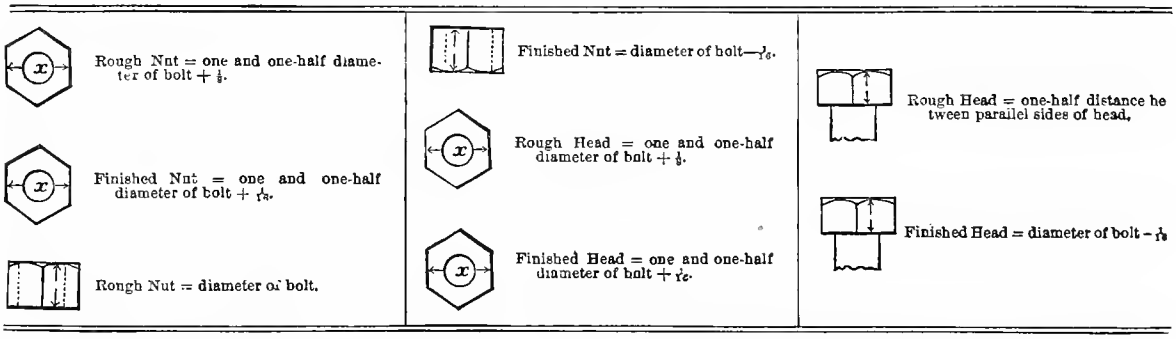


Fig. 16.

The Sellers' or Franklin Institute system of screw threads, bolt heads and nuts is the standard of the Association, and repeated action of the

PROPORTIONS FOR SELLERS' STANDARD NUTS AND BOLTS



NOTE — In 1899 the following dimeosions for square bolt heads were adopted as recommended practice: The side of the head shall be ooe and one-half times the diameter of the bolt, and the thickness of the head shall be one-half the side of the head. See Recommended Practice. In 1900 these dimensions were adopted as standard.

Screw Pitch Gage. "A gage for determining the number of threads to the inch on screws and taps. It consists of a number of toothed plates turning on a common pivot, so that the serrated edge of each may be applied to the screw until one is found which corresponds therewith. The figures stamped on the plate indicate the number of threads to the inch."—Knight. In the ordinary single thread screw the pitch is indicated by the number of threads to an inch.

Screw Thread. The groove, or the material between the grooves, which is cut on the outside surface of a cylinder to form a male screw, or on the inside surface of a cylindrical hole to form a nut or female screw. **Metal Screw Threads** and **Wood Screw Threads,** which see, are of different form. **Pipe Screw Threads,** which see, are usually V-shaped, but all other threads in common use for ordinary purposes are made by the Whitworth or Sellers' standard screw threads, the former being the European and the latter the American standard.

At the M. C. B. Convention, 1882, it was "Resolved that this Association deprecates the use of screws larger or smaller in diameter by a small fraction of an inch than the sizes specified for the

Association has deprecated the use of any other system, and encouraged the careful maintenance of these standards.

A set of gages for standard screw threads and a standard inch scale, 2 feet long, are held in the office of the Secretary for reference.

Mr. Sellers, who proposed this system of screw threads described it in an essay before the Franklin Institute of Philadelphia, April 21, 1864, as follows:

"The proportions for the proposed thread and its comparative relation to the sharp and rounded threads will be readily understood from the diagrams, Figs. 11-16. The angle of the proposed thread is fixed at 60 degrees, the same as the sharp thread, it being more readily obtained than 55 degrees, and more in accordance with the general practice in this country. Divide the pitch, or, which is the same thing, the side of the thread into eight equal parts, take off one part from the top and fill in one part in the bottom of the thread, then the flat top and bottom will equal one-eighth of the pitch; the wearing surface will be three-quarters of the pitch, and the diameter of

PROPORTIONS FOR SELLERS' STANDARD SCREW-THREADS, NUTS AND BOLTS.

Screw-Threads.				Nuts.				Bolt Heads			
Diameter of screw	Threads per inch.	Diameter at root of thread.	Width of flat.	Short diameter rough.	Short diameter finish.	Thickness rough.	Thickness finish.	Short diameter rough.	Short diameter finish.	Thickness rough.	Thickness finish.
$\frac{1}{4}$	20	.185	.0062	$\frac{1}{2}$	$\frac{7}{16}$	$\frac{1}{4}$	$\frac{3}{16}$	$\frac{1}{2}$	$\frac{7}{16}$	$\frac{1}{4}$	$\frac{3}{16}$
$\frac{5}{16}$	18	.240	.0074	$\frac{19}{32}$	$\frac{17}{32}$	$\frac{5}{16}$	$\frac{1}{4}$	$\frac{19}{32}$	$\frac{17}{32}$	$\frac{19}{64}$	$\frac{1}{4}$
$\frac{3}{8}$	16	.294	.0078	$\frac{11}{16}$	$\frac{5}{8}$	$\frac{3}{8}$	$\frac{5}{16}$	$\frac{11}{16}$	$\frac{5}{8}$	$\frac{11}{32}$	$\frac{5}{16}$
$\frac{7}{16}$	14	.344	.0089	$\frac{25}{32}$	$\frac{23}{32}$	$\frac{7}{16}$	$\frac{3}{8}$	$\frac{25}{32}$	$\frac{23}{32}$	$\frac{25}{64}$	$\frac{3}{8}$
$\frac{1}{2}$	13	.400	.0096	$\frac{7}{8}$	$\frac{13}{16}$	$\frac{1}{2}$	$\frac{7}{16}$	$\frac{7}{8}$	$\frac{13}{16}$	$\frac{7}{16}$	$\frac{7}{16}$
$\frac{9}{16}$	12	.454	.0104	$\frac{31}{32}$	$\frac{29}{32}$	$\frac{9}{16}$	$\frac{1}{2}$	$\frac{31}{32}$	$\frac{29}{32}$	$\frac{31}{64}$	$\frac{1}{2}$
$\frac{5}{8}$	11	.507	.0113	$1\frac{1}{16}$	1	$\frac{5}{8}$	$\frac{9}{16}$	$1\frac{1}{16}$	1	$\frac{17}{32}$	$\frac{9}{16}$
$\frac{3}{4}$	10	.620	.0125	$1\frac{1}{4}$	$1\frac{3}{16}$	$\frac{3}{4}$	$\frac{11}{16}$	$1\frac{1}{4}$	$1\frac{3}{16}$	$\frac{5}{8}$	$\frac{11}{16}$
$\frac{7}{8}$	9	.731	.0138	$1\frac{7}{16}$	$1\frac{3}{8}$	$\frac{7}{8}$	$\frac{13}{16}$	$1\frac{7}{16}$	$1\frac{3}{8}$	$\frac{23}{32}$	$\frac{13}{16}$
1	8	.837	.0156	$1\frac{5}{8}$	$1\frac{9}{16}$	1	$\frac{15}{16}$	$1\frac{5}{8}$	$1\frac{9}{16}$	$\frac{13}{16}$	$\frac{15}{16}$
$1\frac{1}{8}$	7	.940	.0178	$1\frac{13}{16}$	$1\frac{3}{4}$	$1\frac{1}{8}$	$1\frac{1}{16}$	$1\frac{13}{16}$	$1\frac{3}{4}$	$\frac{29}{32}$	$1\frac{1}{16}$
$1\frac{1}{4}$	7	1.065	.0178	2	$1\frac{15}{16}$	$1\frac{1}{4}$	$1\frac{3}{16}$	2	$1\frac{15}{16}$	1	$1\frac{3}{16}$
$1\frac{3}{8}$	6	1.160	.0208	$2\frac{3}{16}$	$2\frac{1}{8}$	$1\frac{3}{8}$	$1\frac{5}{16}$	$2\frac{3}{16}$	$2\frac{1}{8}$	$1\frac{3}{32}$	$1\frac{5}{16}$
$1\frac{1}{2}$	6	1.284	.0208	$2\frac{3}{8}$	$2\frac{5}{16}$	$1\frac{1}{2}$	$1\frac{7}{16}$	$2\frac{3}{8}$	$2\frac{5}{16}$	$1\frac{3}{16}$	$1\frac{7}{16}$
$1\frac{5}{8}$	$5\frac{1}{2}$	1 389	.0227	$2\frac{9}{16}$	$2\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{9}{16}$	$2\frac{9}{16}$	$2\frac{1}{2}$	$1\frac{9}{32}$	$1\frac{9}{16}$
$1\frac{3}{4}$	5	1.491	.0250	$2\frac{3}{4}$	$2\frac{11}{16}$	$1\frac{3}{4}$	$1\frac{11}{16}$	$2\frac{3}{4}$	$2\frac{11}{16}$	$1\frac{3}{4}$	$1\frac{11}{16}$
$1\frac{7}{8}$	5	1.616	.0250	$2\frac{13}{16}$	$2\frac{7}{8}$	$1\frac{7}{8}$	$1\frac{13}{16}$	$2\frac{13}{16}$	$2\frac{7}{8}$	$1\frac{13}{32}$	$1\frac{13}{16}$
2	$4\frac{1}{2}$	1.712	.0277	$3\frac{1}{8}$	$3\frac{1}{16}$	2	$1\frac{15}{16}$	$3\frac{1}{8}$	$3\frac{1}{16}$	$1\frac{29}{32}$	$1\frac{15}{16}$

screw at bottom of the thread will be expressed by the formula:

$$\text{Diameter} = \frac{1{,}299}{\text{Number of threads per inch}}$$

The tables are reprinted from Mr. Sellers' essay; they give the proportions of his standard screw threads, nuts and bolt heads.

The Sellers' or Franklin Institute System is also called the United States Standard System.

Screw Thread Gage. A steel plate with notches in the edge of the precise form of screw threads, used for giving the proper form to the edges of screw cutting tools. See **Sellers' Screw Thread** and **Screw Threads.**

Screw Top (Bell Cord Hangers). Fig. 2365. A simple form of **Bell Cord Hanger Bracket,** which see.

Scribing. The fitting of the edge of a piece of timber or metal to another more or less irregular surface. Scribing is usually done by marking a parallel line to the surface which it is designed to fit by a pair of compasses or with a scribe awl.

Scroll Iron (British). A wrought iron forging, carrying a vertical spring link adjusting screw. The upper face is attached to the under side of the sole bar, and the lower part is bored horizontally for the adjusting screw. In general use on passenger carriages.

Scrubber and Condenser (Adlake System). Fig. 3346.

Scutcheon (of a Lock). Properly, **Escutcheon,** which see.

Seals. Figs. 4072-4092. See **Car Seals.** See also **Lead Seal, Lock Seal, Rivet Seal.**

Seal Lock (Freight Car). Figs. 4072-4092. A lock in which a seal made of glass, paper, or other material is inserted in the lock in such a manner as to cover the bolt or the key hole. The lock canot be opened without breaking the seal. See **Car Seal.**

Seal Press. Figs. 4078-4079. A pair of levers arranged like a pair of pincers, with two dies in which lead car seals are compressed on the wire to which they are attached, leaving an impression on the lead so that if the seals are removed or defaced it can be known. Similar seal presses are used for eylet shackles.

Seal Wires. Figs. 4074-4077, etc. Several strands of fine wire twisted together like a rope, or single bars of twisted flat wire, by which leaden seals are attached to car doors. There are various special forms, called detective wires, as Fig. 4087, etc., to prevent stripping the seal.

Seal Wire Opening (Car Door Fastener). A hole for inserting the shackle of a seal.

Sealed Jet (Gold's Car Heating). Fig. 2868. The essential part of the apparatus shown in Fig. 2788. Live steam is brought directly into contact with the circulating water and heats it, at the same time forcing the circulation.

Seaming Lace (British). An ornamental woolen fabric made in bands about ½ inch wide, and used to cover the seams and joints in the upholstery of a carriage. It is sewn to any textile fabric and has two tape edges and is wrapped round a piece of seaming cord which is stitched inside. It differs from **Pasting Lace,** which see.

Seat. 1. "That on which one sits."—Webster.

2. "That flat portion of a chair or sofa to support the person."—Knight. See **Car Seat,** special forms, which also see, being:

Corner Seat.	Reversible Seat.
Hale and Kilburn Seats.	Revolving Chair.
Heywood Bros. & Wakefield Seats.	Richards Panel Back Seats.
Longitudinal Seat.	Scarritt-Comstock Seats.
Parlor Car Chairs.	Side Seat.
Pushover Seat.	Slat Seat.
Rattan Seat.	Slideover Seat.
See also Saloon Seat.	Walkover Seat.
	Wheeler Seats, etc.

3. In Mechanics: "The part on which another thing rests, as a valve seat."—Knight. See

Axle Seat.	Leather Seat.
Bolster Spring Seat.	Spring Seat.
Equalizer Spring Seat.	Tank Valve Seat.
Equalizing Bar Seat.	Wheel Seat.

4. (For Hand Car.) A horizontal board placed

lengthwise over the wheels above a rave for the occupants to sit on.

Seat Arm. Figs. 4268-4271. An arm by which the back of a seat is attached to the seat end or to the side of the car. Such arms are usually attached by a pivot, so that the seat back can be reversed. Sometimes called striker arm, seat back arm, and also seat back reversing arms.

This term is also used to designate the portion of a seat end (more properly called seat end arm) which supports the arm of a person sitting in the seat, and sometimes, incorrectly, to designate a **Seat Arm Cap,** Figs. 4189-4193, which see.

Seat Arm Cap. Figs. 4189-4193. A piece of metal shaped to the form of the seat arm and screwed to the top to take the wear and as an ornament.

Seat Arm Pivot. Figs. 4245-4246. A metal pivot by which a seat arm of a reversible seat is attached to a seat end or the side of a car. In some cases the pivot is made in one piece with the seat arm plate, which is attached to the seat end. The two combined then become a **Seat Arm Pivot Plate,** which see. A seat arm pivot is sometimes called in the trade a seat arm rivet.

Seat Arm Pivot Plate. Figs. 4247-4248; 4253-4261. See above.

Seat Arm Plate. Figs. 4247-4261. A plate fastened to a seat end with a hole in the corner, which receives and holds a seat arm pivot. In some cases the pivot is made in one piece with the plate. The part formed by combining the two is then called a **Seat Arm Pivot Plate,** which see, sometimes a seat arm pivot plate or washer and a bolt is used.

Seat Arm Rest Bracket. Figs. 4185-4187. A bracket to be screwed to the wall to carry a wood arm rest.

Seat Arm Rivets. Figs. 4210-4215.

Seat Arm Stop. Figs. 4228-4234, etc. A metal lug or bracket attached to a seat end, and sometimes to the side of the car, on which the seat arm rests. Seat stops are either attached to a long plate (curved or straight seat stop), as in Figs. 4228-4234, etc., or as in round seat stops, Figs. 4241-4244, etc., and have a flange entirely surrounding them, by which they are attached to the seat arm or side of the car. They are also called seat stops.

Seat Arm Thimbles. Figs. 4194-4195.

Seat Arm Washer. Figs. 4219-4222. A small washer for the head of a screw, by which a seat arm is fastened to a seat end. Now little used.

Seat Back. That part of an ordinary American car seat which forms a support for the back. It has an arm, called the seat back arm, attached to it, by which it is attached to the seat ends with a seat arm pivot, so that it can be swung over so as to face the other way. In some syles the seat back arm is pivoted below the seat cushion and the seat back swings over the cushion so that both sides are used alternately. See **Seat.** On some suburban cars, and usually on street cars, longitudinal seats are used, with the backs against the side of the car.

Seat Back Arm. A **Seat Arm,** which see.

Seat Back Arm Lock. See **Seat Lock.**

Seat Back Arm Pivot. 1. Pivot seat arm. Fig. 4272. The swinging joint or seat back pivot in the seat arm.

2. A **Seat Arm Pivot,** which see.

Seat Back Band. Figs. 4174-4175, 4197-4208. A **Seat Back Molding,** which see.

Seat Back Board (Street Cars). A board placed between the two seat back rails of a longitudinal seat. Usually made in the form of a raised panel so as to make a comfortable rest for the back. A seat back.

Seat Back Bottom Rail. See **Back Seat Bottom Rail.** Also called a lower seat back rail.

Seat Back Corners. Figs. 4286-4287. A metallic corner piece to screw to the backs of seats and protect the upholstery from wear.

Seat Back Curved Stop. Figs. 4228-4234. A **Seat Back Stop,** which see, of a curved form, resembling somewhat a letter S.

Seat Back Molding. Figs. 4197-4208. A wood or (usually) metal band or molding fastened around the edge of a seat back to give it a finish and protect it from wear.

Seat Back Pivot Plate. Fig. 4110. The plate bearing a seat arm pivot fastened to the seat back.

Seat Back Rail (Street Cars). Two narrow rails, upper and lower, which form the top and bottom of a longitudinal seat enclosing the seat back board between them.

Seat Back Reversing Arms. Fig. 4110. A seat back arm of a car seat.

Seat Back Round Stop. Figs. 4241-4244. A round **Seat Stop,** which see.

Seat Back Slats. Narrow strips of wood used to form a back seat; used chiefly for seats which are not upholstered.

Seat Back Spring. A weak spring placed in the upholstering in the back of a seat. Usually called simply back spring.

Seat Back Stop. See **Seat Stop.**

Seat Bearing Cross Bar (Longitudinal Seat of Street Car). The bearing bar transverse to the seat and resting upon the seat leg and the back seat rail.

Seat Board (British). In a carriage, the support for the seat sofa springs. These springs are tied down, and a piece of canvas is stretched tightly over them, the cushion resting on this canvas.

Seat Bottom (Street Cars). The boards or floor in a seat frame on which a cushion rests, or on which persons sit when no cushion is used. It is attached to the back and front seat bottom rails.

Seat Bottom Cross Bar. A filling piece shaped like the seat bottom, to which the slats are screwed. It rests upon or over the seat bearing cross bar.

Seat Bottom Rail. See above.

Seat Bracket (Hand Car). A wrought iron knee which supports the seat.

Seat Corner. Figs. 4267, 4287. A metal corner plate to protect the wood corner from abrasion.

Seat Cove. The rail that takes the place of the back seat bottom slat.

Seat Cover (Street Car). A piece of tapestry or seat covering with which the bare seat is often covered.

Seat Cover Guard Rail. A strip of wood tacked to the flap of the seat cover to keep it straight.

Seat Cushion. 1. Figs. 4093-4184. A soft pad or pillow on which passengers sit. Two kinds of cushions are used on cars; a squab cushion, which is a loose pad and is now little used, and box cushion, which is a cushion built upon a cushion frame, with springs, etc. See **Back Squab** (British).

A great variety of forms of seat cushions exist, the leading ones of which are shown. Special forms are, as respects material, woven wire, rattan or cane, canvas-lined; as respects mode of construction, flexible top, elliptic, broad band elliptic, spiral elliptic, spring edge, sectional, drop-down frame, etc., etc.

2. (British.) American equivalent, squab cush-

ion. In a first-class carriage, a flat, loose squab cushion, about four inches thick, covered with broadcloth on one side and leather on the other, and stuffed with curled horsehair. It is reversible, and often so called.

Seat Division (Longitudinal Seats). A bar of wood or metal to separate the space occupied by a passenger from that adjoining it.

Seat End. 123, Figs. 648-651, and 13, Figs. 2201-2202. A frame of wood or metal at the end of a car seat which supports the arm of the occupant and to which the seat back arm is attached. Seat ends are designated as long or short, according to whether they extend entirely to the floor or are supported upon a seat stand. They are also designated as aisle seat ends, or wall seat ends, and, for corner seats, as left-hand or right-hand seat ends.

Seat End Arm. The portion of a seat end which supports the arm of a person sitting in the seat. An arm rest.

Seat End Cross Rail. The end rail between posts of a wood seat end.

Seat End Panel Rib (Open Street Car). A piece of furring to which the seat end panel of an open car is fastened.

Seat End Rest. The end posts or upright members of a wood seat frame.

Seat Front (Street Car). The rave or seat riser.

Seat Front Panel (Street Car). The panel beneath the seat.

Seat Front Rail. A rail fastened to the ends of the seat bearing cross bar and running along at the top of the seat front and under the front seat rail.

Seat Head End. 14, Figs. 2201-2202. The upper part of the seat end projecting out beyond the head rest.

Seat Hinge (Sleeping Cars). Figs. 4285. A strap hinge used to connect a seat with the seat back. See also **Sofa Hinge.**

Seat Joint Bolt. Fig. 4209. A bolt for fastening a seat rail to aisle seat ends. It is also used at the wall ends.

Seat Leg (Longitudinal Seats). A wooden post which supports a front seat rail.

Seat Leg Plate. A metal plate with which the front of a seat end or leg is covered to protect it from injury.

Seat Lever (Howard's Water Closet). Fig. 4042. A lever projecting backward from the seat lid, to which the connecting rod is attached.

Seat Lid (Howard's Water Closet). Fig. 4042. A lid connected with the pan and service measure by the connecting rod in such a manner that on raising it the pan is brought up into position and about half a gallon of water is discharged from the service measure.

Seat Lock. Fig. 4223. A lock for holding the back of a seat so that its position cannot be reversed. Such locks are attached either to the seat end, seat back arm or seat back stop. A form for iron seat ends with a smaller escutcheon, not provided with screw holes, is sometimes distinctively called a barrel lock, although the term is almost equally applicable to any form of seat lock. Seat locks operate by pushing the key inward, turning it a little and then pulling on the key.

Seat Lock Bolt. Fig. 4223. The beveled bolt by which locking is effected.

Seat Lock Key. A key for a seat lock. Some work by pushing in and not turning. See **Seat Lock.**

Seat Pull (Sleping Cars). Figs. 4283-4284. A flush handle for pulling out the seat in making up the berth so as to drop the back and seat to the same level.

Seat Rail. One of a pair of wooden rails, front and back, resting on and attached to the seat end and to the side of the car, and which support a cushion frame or seat bottom.

Seat Rail Bracket or Socket. Figs. 4262. A support for a wooden seat rail. In iron seat ends it is frequently cast upon it.

Seat Rail Knee (British). A piece of wood secured to the door pillar and supporting the seat rail. It is generally slotted to receive a leather strap, restraining the undue opening of the door.

Seat Rail Support (British). A piece of hard wood supporting the seat and securing it to the side of the body of a carriage. It is often pierced for a leather strap limiting the opening of the door.

Seat Riser. 1. (Street Cars). A vertical board or front of a seat, extending from the seat rail to the floor; seldom used with reversible seats. A seat front.

2. (Hand Car.) A **Rave,** which see.

Seat Slat. A narrow strip of wood which forms part of a seat bottom, or seat back.

Seat Spring. Fig. 4166. A spiral or other metal spring used to give a seat elasticity. Spiral springs are the most common, the elliptic and spiral-elliptic having become nearly obsolete in new seats. A special form of seat springs called back springs, of little resistance, is used for seat backs. British seat springs are called sofa springs, and the back springs back squab sofa springs.

Seat Stand. 124, Figs. 648-651. A support, usually made of cast iron, on which an aisle seat end rests. Very commonly the seat stand and seat end are in one part, which is then called a long seat end.

Seat Stand Tie Rod. A rod connecting the aisle and wall seat stands of a Scarritt seat.

Seat Stop. See **Seat Arm Stop.**

Seat Tilting Leers. See **Parallel Rod.**

Seat Webbing. Fig. 4166. A form of coarse canvas used in upholstering car seats.

Seating. Fig. 4171. The plush or rattan-covered cloth which is commonly used to upholster car seats is also sometimes called seating.

Second Catch (of Car Door Fastener). A double hook or eye placed in the hasp of a car door lock in such manner that the door can, if desired, be locked, leaving a crack open for ventilation.

Second-Class Car. A plainly finished passenger car for carrying passengers who pay a lower rate of fare than first-class passengers do. Such cars are rarely used, the smoking car usually serving this purpose for the small number of so-called second-class (in reality, third-class) passengers. See **Coach, First-Class Car.**

Second-Class Carriage (British). A vehicle adapted to carry passengers paying an intermediate rate of fare, the fittings being less expensive and comfortable than in the first class. Each compartment measures about 6 feet in the length of the carriage, and seats 10 passengers. It is rapidly going out of use, so much so that several of the English roads have discontinued the running of second-class carriages. See also **Carriage.**

Section (of a Sleeping Car). Figs. 2201-2203. Two double berths, one above the other, making up into two seats facing each other by day. There are from 8 to 16 sections in a car, besides the staterooms.

Section Hand Car. See **Hand Car.**

Sectional Seat Cushion. One with spiral springs sep-

arately attached to narrow slats so that the seat can be made up or repaired in sections

Sector. In geometry: "A part of a circle included by an arc and the two radii drawn to its extremities."—Davies. Hence, any object whose shape is that of a part of a circle ought to be called a sector, but as a matter of fact, it is generally called a quadrant. See **Desk Sash Quadrant.**

Security Door Brackets. Fig. 1382-1383. A door bracket designed to prevent the opening of the door from the side or bottom without destroying the seal. They are bolted to the car body, and the bolt head is fitted into a socket in the bracket.

Self-Acting Ventilator. See **Ventilator.**

Self-Adjusting Brake Head. Fig. 5150.

Self-Clearing Car. Fig. 78.

Self-Closing Faucet or **Cock.** Fig. 3656. A faucet having a horizontal bar handle provided with a spring by which it is closed when released. **Telegraph Cocks,** which see, Fig. 3653, and also compression cocks, Fig. 3659, are also self-closing, but not distinctively so called.

Self-Locking or **Spring Padlock.** One which snaps, locked by pressure only, without using a key, in distinction from a dead padlock.

Sellers System of Screw Threads. A system of screw threads designed by William Sellers of Philadelphia. Often called Franklin Institute or United States Standard Thread. See **Screw Thread.**

Semaphore Lens. A trade name for a cheap modification of the Fresnel lens, the latter term being more generally restricted to those having the back a plane or nearly cylindrical surface.

Semi-Convertible Car. Figs. 6238, 6224-6225, 6278-6280. A modification of the convertible car in which only the sash raises into the roof, leaving the car open above the belt rail.

Service Measure (Howard's Water Closet). Figs. 3653-3654. An auxiliary tank holding about a half-gallon of water connected with the seat lid and water tank and discharging the water on raising the lid only.

Sessions-Standard Friction Draft Gear. Figs. 1440-1463. A form of friction draft gear in which the friction surfaces are triangular wedges forced together with gradually increasing pressure as they slide over each other.

Set (of Elliptic Springs). The amount of compression of which the spring is capable. The distance between the spring bands when unloaded. The arch is half the set, plus the thickness of the spring band.

Set of Springs. All the springs for carrying the weight of one car, not including draw springs. A set of bolster springs consists of the springs which are placed between the truck frames and carry the weight of the body only. A set of equalizing bar springs means all the springs for a car on the equalizing bars. A set of wheel or journal springs means all the springs which are placed directly over the journal boxes of one car.

Set of Wheels. This term means a number of wheels sufficient for one car. A set of wheels and axles means the requisite number of wheels fitted to axles complete for one car. A pair of wheels means two wheels already fitted to an axle, including the axle; but a set of wheels does not include the axles unless specified.

Set Screw or **Stud Fastening.** Fig. 2854. As applied to railroad wheels, a mode of securing the tire to the wheel which is becoming obsolete. See **Tire Fastening.**

Sewall Steam Coupler. Fig. 2908.

Sextuple (Elliptic Springs). Figs. 5372-5373. Six elliptic springs coupled together, side by side, to act as one.

Shackle. 1. (Of a Padlock.) A U-shaped bar which is passed through the staple in front of the hasp by which the padlock is used to lock the object. The inner end of the shackle is termed the heel, which is sometimes provided with the shackle spring to hold the shackle open or shut.

The shackle of cheap padlocks is attached to projecting ears, but in those of better quality the heel is entirely within the lock itself. The shackle is sometimes termed the hasp, but this usage is incorrect.

2. (Of Car Seals.) The wire or metal strip passing through the fastening to be sealed and closed together at the end. See **Car Seals.**

Shackle Bar. A **Coupling Link,** which see.

Shackle Guard (of a Padlock). A plate used in some padlocks lying immediately under the point of the shackle when locked in place, serving to exclude dirt and wet from the interior.

Shackle Lock (Car Door Fastener). A term used in distinction from the seal lock.

Shade. See **Lamp Shade, Window Shade.** Fig. 4665.

Shade Cap (of a Lamp). 33, Figs. 3585-3601. A vertical tube extending the shade upward and constituting in effect an extension of the chimney. A similar part for a lamp globe is called a globe chimney.

Shade Holder (Pintsch Lamp). 33, Figs. 3106a-3107.

Shaft. "That part of a machine to which motion is communicated by torsion."—Webster. See

Brake Shaft.
Crank Shaft.
Door Shaft.
Driving Shaft.
Drum Shaft.
Horizontal Brake Shaft.
Lever Shaft.
(Street Cars).
Winding Shaft.

Shade Roller (for Window Shades.) Fig. 4681. A device serving the purpose which its name implies, the only forms of which now in general use are the automatic forms, which hold the shade in any position when released by means of centrifugal pawls. The leading styles are the **Hartshorn Shade Roller** and the **McKay Shade Roller,** which see. The Hartshorn works with a pawl on the end, while the McKay has a cam.

Shaker. Fig. 2732. See **Grate Shaker.**

Shank (of a Coupler). That part of a coupler or drawbar between the draw head and tail end. The body of the coupler.

Shank (Kirby's Car Door Lock.) A, Fig. 2480. The spindle. See also **Buffer Shank.**

Shank Facing (Kirby's Door Lock). P, Figs. 2480-2481.

Sharon Coupler. (Freight). Figs. 1616-1629. (Passenger) Figs. 1798-1809.

Shear Beams (Snow Plow Framing). The timbers forming the inclined plane and parting ridge of a plow. They are placed in positions so that they resemble the knives of a pair of shears, hence the name.

Shears (of a Pile Driver Car). The tongs which grasp the **Hammer,** which see.

Sheath. See **Rear Sheath.**

Sheathing. 52, Figs. 262-272, and F, Figs. 305-321, also 70, Figs. 599-619. Boards which are tongued and grooved, and with which the sides of cars are covered. The sides of a gondola car are ordinarily termed side plank and end plank, and are much heavier than the sheathing of a box car. **Inside**

Lining, which see, is in addition to the ordinary outside sheathing. Formerly passenger cars were covered with panels, but it is now the universal practice to use sheathing. Figs. 1348-1354. (M. C. B. Standard.) Figs. 5749-5756.

Sheathing Furring. 59, Figs. 645-647. Pieces of wood, nailed, screwed or glued in a wall to nail the sheathing to, inserted where the distance between rails is so great as to require intermediate pieces to back up the sheathing. Corresponds to **Panel Furring**, which see.

Sheathing Rail. 66, Figs. 599-619. See **Panel Furring.** Sheathing rail, or sheathing furring, is the same as a panel rail or panel furring, the panelling having been superseded by sheathing.

Sheathing Strips. 69, Figs. 599-619. See **Panel Strips.**

Sheave. A wheel, roller or pulley, over which a cord or rope runs, or on which any object, as a door or window, rolls. Sheave is often used to designate a block or pulley, but more properly it designates simply the grooved wheel in the block. See **Pulley.**

Sheave Hook (Derrick Cars). The hook carried at the lower end of a hoisting block, to which the load is attached.

Sheave Pin or **Pintle.** The axle of a sheave. See **Pintle.**

Sheet Iron. Iron rolled thin and, in car work, usually galvanized. Its thickness is given by its number of wire gage. The standard sizes are 6 and 8 ft. long and 24, 26, 28 and 30 in. wide. It is, however, manufactured to order up to 10 ft. long and 44 in. wide. Sheet steel, galvanized or not, is now also largely manufactured.

Sheet Ring and Staple (British). A small wrought iron ring, to which are tied the cords attached to the edges of the tarpaulin protecting the contents of an open wagon from the rain.

Shield (Pintsch Lamp). 293, Figs. 3208-3224.

Shield (Buhoup Vestibule). 50, Figs. 2215-2263.

Shell. See **Berth Latch Shell.**

Shelled Out (Car Wheels). A term applied to wheels which become rough from circular pieces shelling out of the tread, leaving a rounded flat spot, deepest at the edge, with a raised center. The M. C. B. rules for **Interchange of Traffic**, which see, specify that no wheel shall be condemned for this fault unless the spots are over 2½ in. in length, or are so numerous as to endanger the safety of the wheel.

Shim. A thin piece of wood or metal used as a distance block to save more careful fitting. In track work shims are very largely used in order to remedy the heaving of the rails from frost. Shimming has been used in fitting on car wheels when the wheel seat of the axle was a little too small, but the M. C. B. rules for interchange of traffic forbid this. See **Interchange of Traffic** and **Wheels.**

Shipper Shaft (Steam Shovel). 7, Figs. 596-598. The shaft connected to the boom engine and geared to the ratchet beam.

Ship Splice. One of the many forms of splicing or scarfing broken pieces of timber. It is that selected for splicing broken car sills under the regulations for **Interchange of Traffic**, which see. See **Scarf.**

Shoe. A plate, block or piece of any material on or against which an object moves, usually to prevent the latter from being worn. See **Boom Shoe, Brake Shoe, Door Shoe.**

Short Seat End. A seat which does not extend below the seat or support it, but is supported upon a separate seat stand. See **Seat End.**

Short Plate Rod. Horizontal bolts passing through the plate bolt strip and the plate, serving to stiffen the latter horizontally. It is rarely used.

Short Sill or **Floor Timber.** An auxiliary longitudinal timber used in a car floor, but not extending its whole length.

The term short floor timber is also applied with questionable propriety to short auxiliary cross pieces used in freight car floors as distance blocks between the sills and not extending across the whole width of the floor. Corresponding timbers in passenger cars are termed floor timber distance blocks. See also **Bridging.**

Shot (Chilled Car Wheels). See **Cold Shot.**

Shovel. 1. (Steam Shovel.) Figs. 251-252, 254-255, 596-598. A car upon which is mounted a steam derrick frame so adjusted and connected with proper mechanism that it will scoop up bucketfuls of dirt and gravel and deposit them in a car or other conveyor.

2. (Snow Shovel.) See **Snow Plow.**

Shunting (British). The act of moving cars from one track to another, as in making up or separating trains. In this country usually called switching. **Marshaling**, which see, has a nearly similar meaning. Sometimes the word drilling or regulating is used.

Side Arm Rest or **Elbow Rest** (British). A wooden support for the elbow attached to the inner sides of a carriage beneath the windows, and padded with horsehair and covered with broadcloth or leather. See also **Folding Arm Rest.** In American cars a window ledge is made to serve the same purpose, but arm rests are general in sleeping cars.

Side Bearings. 16, Figs. 262-272; Fig. 5340, etc. Supports attached to the bolsters, body and truck, near their ends to prevent too much rolling or rocking of the car body on the center plate and to allow the truck to turn freely when the weight of the car is not evenly distributed on the center and the body is tilted over. Usually a plate or block of iron or steel is attached to the body bolster and a corresponding plate, block, roller or ball bearing on the truck bolster. The first is called the body side bearing in distinction from the second which is called the truck side bearing. They are also distinguished as upper and lower side bearings.

Side Bearing Bridge or **Arch Bar** (Six-Wheel Truck). 62, Figs. 4780-4783, and Fig. 4985. An iron bar, truss or wooden beam attached to the spring beam to support the truck side bearing.

Side Bearing Roller. See **Roller Side Bearing.**

Side Bearing Spring (Side Dump or Tip Car). Bearing springs, upon which the body bears at the side to steady the box and to receive the shock when the body is returned to its normal position after dumping.

Side Board. 1. (Dining Cars.) An ornamental receptacle for dishes, etc., usually placed so as to face the central compartment of the car. See **Buffet Car.**

2. (British). American equivalent, side plank. A planking constituting the sides of the car.

Side Body Brace. 33, Figs. 262-272, etc. Commonly, simply **Body Brace** or **Brace**, which see, except when the end braces are to be distinguished from them.

Side Body Brace Rod. 34, Figs. 262-272. See above.

Side Body Truss Rods. See **Side Truss Rod.**

Side Buffer Spring. See **Buffer Spring.**

Side Buffer Stem. See **Side Stem.**

Side Casting. See **Drawbar Side Casting.**

Side Chute Plank. The planking of an inclined floor which discharges its load transversely to the car, either toward or from the middle of the car.

Side Deck Lamp. A bracket lamp fastened above the windows and to the deck sill, or to the lower deck ceiling and the deck post.

Side Door (Suburban Car). Figs. 202-203.

Side Doors (Baggage Car). Figs. 1335-1337.

Side Dump Car. Fig. 52. A car so constructed that its contents may be discharged to one side of the track through side doors, either by having the floor inclined, or by tipping it sidewise. See **Dump Car, Goodwin Car,** and **Tip Car.**

Side Foot Rest (Passenger Cars). Q, Fig. 2204. A metal plate fastened to the truss plank between the seats for passengers to rest their feet on. Chiefly used over heater pipes as a guard to prevent the feet of passengers from coming in contact with the hot pipes. Also called shields.

Side Frame. 1. (Of a Car Body.) The frame which forms the whole side of a car body. It includes the posts, braces, plate, rail, girth, etc. See **Framing.**

2. (Of a Truck.) See **Truck Side Frame, Diamond Truck.**

Side Gutter or **Outside Cornice** (British). A piece of wood secured on the outside of the chicle at the angle of the roof to the sides. It is channeled on the top to catch the rain and to coney it to the ends of the vehicle to prevent it running down the sides.

Side Gutter Molding (British). A molding which is attached to the outer side of the side gutter in order to hide the heads of the bolts by which it is secured.

Side Lamp. 1. Figs. 3581, etc. A lamp attached to the side of a passenger car, in distinction from a center lamp, which hangs from the roof. They are usually made with brackets, by which they can be conveniently fastened.

2. (British.) American equivalent, side tail light. A colored signal lamp carried at the side of the last vehicle of a train. Two red side lamps and one red tail lamp are generally carried, arranged in the form of a triangle.

Side Lamp Braces. 18, Figs. 3585-3601. Diagonal bars attached to a side lamp and to the side of a car to steady the lamp.

Side Lamp Bracket. 17, Figs. 3585-3601. See **Side Lamp.**

Side Lamp Holder. 16, Figs. 3585-3601. A metal ring or bowl-shaped receptacle usually attached to a bracket to hold a lamp.

Side Lamp Iron (British). American equivalent, tail light holder, A wrought iron lamp holder secured to the outer side of the body to carry the colored **Side Lamp,** which see. See also **Signal Lamp.**

Side Motion Spring (Buhoup 3-Stem Coupler). 95, Figs. 1886-1935.

Side Nailing Strip. 194a, Figs. 262-272. A piece of wood bolted outside the side sills of steel underframe cars to which the ends of the floor planks and the bottom ends of the sheathing are nailed.

Side Nailing Strip Bracket. 193, Figs. 262-272. A metal support attached to the outside of the side sills of steel cars to carry the wooden nailing strips to which the ends of the floor planks and the bottom ends of the sheathing are nailed.

Side Piece (for Platform Hood). A thin block cut to the curve of the hood.

Side Plank. (Gondola Cars). 52, Figs. 383-387. The boards bolted to the stakes, constituting the sides of the car. They vary in height according to its capacity and are 2½ to 3 ins. thick. Those at the end of the car are termed end planks, and are sometimes hinged at the bottom so as to drop down inwardly onto the floor of the car.

Side Plank Tie Rod. A vertical rod passing through the side sill and side planking, and tying them together. A side plank tie strap fulfils the same office, but the planks are bolted or riveted to the strap, the end of the strap being forged round and threaded to take a nut.

Side Plank Tie Strap. See above.

Side Plate. 46, Figs. 262-272; 98, Figs. 648-651. More properly, simply plate. The longitudinal stick on top of the posts of the car body. So called as distinguished from the end plate.

Side Plate Stiffening Angle (Steel Cars). 41, Figs. 474-477. An angle iron riveted to the side plank or plate, and serving the same purpose as the stakes.

Side Post Strap Bolt. A strap bolt joining the post to the side sill.

Side Rail. A longitudinal timber extending along the top of a side frame of a coal or ore car. It rests upon posts and braces and connects with end rails, which go across the end of the car. It corresponds to the plate of a box car, but does not carry any rafters or carlines, as does a plate.

Side Rest (Tip Car). A block of wood or metal, or a spring, on top of the frame on which the body rests when tipped.

Side Seat. A longitudinal car seat, the back of which is against the side of a car. See **Car Seat.**

Side Sheet Angle Tie (Steel Cars). 44, Figs. 474-477. An angle secured to the top edge of the side sheets and running across the car, to prevent the sides from bulging. See **Bench Cap.**

Side Sills or **Outside Sills.** 1, Figs. 262-272, 599-619; 8, Figs. 6207-6209. The outside longitudinal members of the underframe. In some designs of steel cars the side sills are done away with entirely and the entire side of the car designed as a deep plate girder to carry most of the load to the bolsters.

Side Sill Flitch Plank. The two wood parts which enclose the flitch plate and make up a composite side sill.

Side Slope (Hopper Car). 27c, Figs. 428-431 and 27b, Figs. 474-500. That part of the floor which slopes from the side of the car to the hopper door. See **End Slope** and **Hopper Slope.**

Side Spring (Miller Hook). A spiral spring actuating the Miller hook laterally. The M. C. B. coupler, from its peculiar movement of the knuckle or coupling hook in coupling, requires no side play.

Side Stem (Buhoup 3-Stem Coupler). 998, Figs. 1886-1935.

Side Stem Bevel Washer (Buhoup 3-Stem Coupler). 608, Figs. 1886-1935.

Side Stem Bracket (Buhoup 3-Stem Coupler). 594, Figs. 1886-1935.

Side Stem Lug Washer (Buhoup 3-Stem Coupler). 607, Figs. 1886-1935.

Side Stem Pivot Pin (Buhoup 3-Stem Coupler). 586, Figs. 1886-1935.

Side Stem Spring (Buhoup 3-Stem Coupler). 602, Figs 1886-1935.

Side Step (Street Cars). A ledge usually made of a

wrought iron plate attached to the side of the plat form. Also called footboard.

Side Straps (Gondola Cars). The straps to which the end planks and sometimes also the side planks, are bolted. They are also called side plank tie straps.

Side Strut for Hopper Floor (Hopper Cars). An inclined strut or support for the hopper floor between the bolster and the end of the car, fastened to the corner of the end sill. See **Center Strut for Hopper Floor.**

Side Top Panel Rail (British). A part of the body framing running horizontally in the upper part of the side of a carriage.

Side Truss Rod or **Side Trussing.** A horizontal truss rod extending longitudinally along the sides and fastened to the end planks. Its office is to prevent the sides from bulging. Seldom used.

Side Truss Rod Bearings. The queen posts of the side truss rods.

Side Truss Rod Block. A block of wood or cast iron inserted in the corner at the junction of the side and end planking to guide the side truss rod.

Side Urinal. A urinal to fit against the flat side of a room, in distinction from a corner urinal. The latter is almost universal in car work.

Siding. 1. A side track.

2. See **Sheathing.**

Siding, Flooring, Roofing and Lining. (M. C. B. Standard.) In 1901 the following specifications were adopted as standard:

Flooring shall be of three kinds—square edged, dressed all over; ship-lapped, dressed all over; or tongued and grooved, dressed all over, in accordance with section shown in Figs. 5749-5756.

Siding, roofing and lining shall be of the section shown in Figs. 5749-5756.

In 1908 the dimensions of dressed flooring was increased ¼ inch. In 1908 a drawing was added showing details of flooring 2⅜ inches thick for use on cars for rough freight. In 1908 drawing was revised to show separate sections for roofing and lining.

Signal Bell (Street Cars). A saucer-shaped bell attached to each platform. They are rung by a clapper, to which a strap is attached which extends from one platform to the other.

Signal Bell Cord. See **Bell Cord** and **Bell Strap.**

Signal Bracket. Figs. 938-940.

Signal Branch Pipe. A pipe leading from the train air signal pipe to the car discharge valve.

Signal Car Discharge Valve. See **Car Discharge Valve.**

Signal Cord. See **Bell Cord.**

Signal Hose. See **Hose.**

Signal Hose Connection. See **N. B. Hose Connection.**

Signal Hose Coupling. See **Hose Coupling.**

Signal Lamp or **Signal Light.** Fig. 3617. A name applied to lanterns of extra power and quality of several kinds, but usually meaning those provided with semaphore or bull's-eye lenses, of which from one to four are used; whence the name single lens, double lens, etc. They are also called side tail lights, tail lights, operator's signal lights, etc.

Signal Lamp Bracket. 141a, Figs. 577-581. A bracket attached to the car body to hold the signal lamp.

Signal Lamp Brackets and Sockets. Figs. 938-940. (M. C. B. Recommended Practice). In 1903 a form of combination lamp holder and flag bracket shown in Fig. 5951 was adopted as Recommended Practice.

Signal Lens (Street Car). A lens in the clear story of colored glass, behind which a lamp is placed.

Signal Pipe (Train Air Signal Apparatus). A continuous pipe running from car to car through the train, substantially a duplicate of the brake pipe, but working with a much lower pressure of air. The signal pipe couplings are also substantially similar to brake pipe hose couplings, but are arranged so that they will not couple with the latter.

Signal Pipe Coupling (Train Air Signal Apparatus). See above.

Signal Pipe Cut-out Cock (Train Air Signal Apparatus). A cock placed at each end of every car for closing the signal pipe at the rear of the train.

Signal Reservoir (Train Air Signal Apparatus). See **Whistle Reservoir.**

Signal Strap (Street Cars). A **Bell Strap,** which see.

Signal Valve (Train Air Signal Apparatus). A valve attached to a branch from the signal pipe, which, on the opening of the car discharge valve in any car, and the consequent reduction of pressure in the signal pipe, permits the air to escape to blow the signal whistle. On motor cars this valve and whistle are placed in the cab at each end of the car.

Signal Whistle (Train Air Signal Apparatus). See **Signal Valve.**

Sill. 1. "Properly, the basis or foundation of a thing; appropriately, a piece of timber on which a building rests. The lowest timber in any structure, as the sills of a house, of a bridge, of a loom, and the like.

2. "The timber or stone at the foot of a door; the threshold.

3. "The timber or stone on which a window frame stands, or the lowest piece in a window frame."—Webster.

4. (Car Building.) The main longitudinal timbers, usually six, but sometimes eight in number, which are connected together transversely by the end sills, body bolsters, and cross tie timbers. Sills are divided into side sills, intermediate sills and center sills. A few cars, such as dump cars and tank cars, have but two sills, and others only four. For the splice for broken sills required by the regulations for the interchange of cars see **Interchange of Traffic.** See also

Deck End Sill.	**Platform Sill**
Deck Sill.	**Short Sill.**
End Sill.	**Platform Short Sill.**
Platform End Sill.	

5. The lower horizontal member of the frame surrounding a window or door. See **Door Sill, Window Sill.**

Sills (M. C. B. Standards). In 1899 the following finished sizes for sections of longitudinal car sills were adopted as standard of the Association:

For cars such as box, stock, flat, long gondolas, refrigerators, etc., 32 feet and over in length, but under 40 feet:

4″ x8″ 4″ x9″ 4″ x10″ 4½″x12″ 5″ x14″
4½″x8″ 4½″x9″ 4½″x10″ 5″ x12″
5″ x8″ 5″ x9″ 5″ x10″

For cars 40 feet long and over, such as furniture and special long gonolas:

4½″x8″ 4½″x9″ 5″ x10″ 6″ x12″ 6″ x14″
5″ x8″ 5″ x9″ 6″ x10″
6″ x9″

It is believed that the above recommendations afford a sufficient range of sizes to cover all requirements of design; they are good merchantable sizes, and if used as suggested car repairs will be greatly expedited, as there will be less delay in getting

special sizes of lumber, and requisitions for regular sizes can be filled more promptly, as lumbermen can saw in advance of orders, with a reasonable certainty of selling their stock.

Sill and Plank Rod. A rod passing through the sill and planking to tie them together securely. A side plank tie rod.

Sill and Plate Rod. 36, Figs. 262-272, etc.; 54, Figs. 599-619. A vertical iron rod which passes through the sill and plate of a car body frame and ties the two together. A **Brace Straining Rod,** which see, is a similar part for low passenger car trusses below the windows.

Sill and Plate Rod Washer. Fig. 830. A large rectangular **Washer,** which see, for the ends of the sill and plate rod.

Sill Corner Iron. Figs. 991-992.

Sill Knee Iron. 8, Figs. 599-619. An L-shaped or right-angled iron casting or forging bolted into the inside corner of a car frame to strengthen it.

Sill Splice. See **Ship Splice,** and **Interchange of Traffic.**

Sill Step (Freight Cars). 30, Figs. 262-272, etc., and Figs. 798-800. A U-shaped iron attached to the sill of a car, below the ladder, as a step for getting to or from the ladder. In 1893 the M. C. B. Association recommended "That two good substantial steps (sill steps), made of wrought iron, about ½ x 1½ in. section, be fastened, one to each side sill, next to the corner of the car to which the ladder is attached, on cars having ladders, and to diagonally opposite corners on all other cars. The steps to be not less than 12 inches long, measured horizontally between the sides, and the tread to be not less than 8 inches below the bottom of the sill. The side of the step next to the corner of the car to be as near to the end of the car as is practicable. Each side of the step to be fastened to the sill with two ½-inch bolts and nuts." In 1902 this recommended practice was adopted as standard. See **Protection of Trainmen.**

Sill Step Stay. A diagonal iron rod or bar attached to one of the sills and to a sill step to stiffen the latter. Not commonly required or used.

Sill Strap Bolt. 220, Figs. 262-272. A strap bolt, used to fasten the side and end sills together. When set into the sill is called a joint bolt.

Sill Tie Rod. 10, Figs. 383-387, etc.; 9, Figs. 599-619. A transverse iron tie rod in the floor of a car for holding the sills together.

Sill Timber Key. Figs. 785-786. A metal block let into a gained seat on the sills to relieve the sill bolts from shearing stresses.

Simplex Bolster. Figs. 1128-1129, 1135, 1143-1146, 5047-5048. A type of bolster, both body and truck, using flat iron plates for the top and bottom members, and a cast center filling piece. The ends are lapped over and riveted. In the truck bolster the top member is a channel, and a heavy malleable iron strut is used in the center.

Simonton Drop Door Gear (Drop Bottom and Hopper Cars). Figs. 1056-1064. A drop door mechanism in which two links are brought into a self-locking position when the doors are closed. The usual winding shaft is employed with a sheave over which the links are wound.

Single Board Car Roof (Freight Cars). A roof in which one layer of boards covered by some kind of sheet metal is used in place of double boards. All single board freight roofs use a sheet metal cover, either above or below the boards, but those only having sheet metal on top are commonly so called.

Simplex Coupler. Figs. 1589-1592.

Single Guard (for Lanterns). According to the number of horizontal wires surrounding the globe, lanterns are designated as single, double or triple guard.

Single Pipe Strap. Fig. 2756. A pipe Clip, which see.

Single Plate Wheel. A cast iron wheel, in which the hub and tire are united by only a single plate, which is strengthened usually by ribs, called brackets, or sometimes by corrugations. See **Wheel, Car Wheel.**

Single Screw Turnbuckle. A **Turnbuckle,** which see, shaped like the link of a chain with a screw at one end and a swivel at the other.

Single Window Blind. A blind which is made in one piece or section, and large enough for one window. They require a lower window, and hence are rarely used in the better grade of passenger cars unless made flexible. See **Window Blind.**

Single Window Blind Lift. See **Window Blind Lift.**

Sink (Dining Car). A shallow metallic box to receive and carry off dirty water.

Six-Wheel Truck. Fig. 4774; details, Fig. 4866, etc. Six-wheel trucks are the standard for sleeping, parlor and dining cars. They are sometimes, though rarely, built of iron or steel. See **Truck, Car Truck.**

Sizer (Wood Working Machinery). Fig. 6799. See **Planer.**

Skeleton (Steel Tired Wheels). Another term for the **Wheel Center** or **Central Filling Piece,** which see. The word skeleton is principally used when the wrought or cast wheel center consists of open bars.

Skew Back. 1. (Masonry.) The face on the edge of the abutment against which the arch proper abuts.

2. (Of a Truss.) A casting on the end of a truss or a trussed beam to which a truss rod is fastened. It is usually made in the form of a cap, and forms a bearing for the truss rod nuts.

3. (Car Building.) A **Truss Rod Washer,** which see.

Slab. 2, Figs. 3684-3686. See **Wash Stand Slab.**

Slack Adjuster. Figs. 1173-1182, 1187-1192, 1259. A device for automatically taking up the slack in the foundation brake gear when normal piston travel is exceeded.

Slanting Table Leg. One which abuts against a slanting table leg plate in the side of the car instead of standing vertically.

Slanting Table Leg Hook. Fig. 4408. See above.

Slat. A narrow piece of board or timber, such as Seat. **Back Slats, Seat Slats, Window Blind Slats,** which see.

Slat Cattle Car. A **Stock Car,** which see.

Slat Seat. A seat composed of narrow strips of wood. These are usually placed longitudinally on the seats with a space between them.

Slatted Floor. An open floor made of slats nailed to cross pieces with a space left between them so that air can circulate beneath and through between the slats.

Sleeper. 1. The ties or cross timbers on which the rails of a tramway are laid and spiked.

2. A misnomer for a sleeping car, since it is the passengers who sleep and not the car.

Sleeping Car. Figs. 174-178, 213-217, 605-606, 612-613. A car provided with fixed seats, arranged to face each other, which can be used for day travel and at night

can be made up into berths. Each pair of seats is called a section and the standard Pullman sleeping car contains 12 such sections which can be made up into upper and lower berths. The mattress and bedding are carried in a pocket under the deck, the bottom of the pocket being hinged to lower and form the upper berth, while the seat cushions and backs are arranged on the seat frame to form the lower berth. See Fig. 2201.

Most of the sleeping cars in the United States are owned and operated by the Pullman Company and hence are often referred to simply as Pullman cars. They are handsomely finished and upholstered.

Emigrant Sleeping Cars or **Tourist Sleeping Cars** resemble ordinary sleeping cars, but are without expensive upholstery. In Great Britain sleeping cars are in use on some through night trains, but they differ from the Pullman cars in being divided up into small compartments, each containing one lower berth, or sometimes two, but without upper berths. The berths are arranged across the car instead of lengthwise and for day travel are made up into a comfortable sofa seat.

The first sleeping car built in the United States was made in the shops of the Terre Haute, Alton & St. Louis Railroad by a mechanic named Woodruff. The coach provided seats for sixty passengers, which were convertible into flat berths. The patent was secured in 1856-1857. The next sleeping cars were two of the same kind run on the New York Central Railroad. Webster Wagner, founder of the Wagner Palace Car Company, built and patented four sleepers for the New York Central Railroad in 1858. The modern palace sleeping car was introduced by George M. Pullman, who built his first car in 1859. Some of the early Pullman cars had sixteen wheels instead of twelve. The first Wagner palace car was built in 1867. Both Wagner and Pullman paid royalties to Woodruff. See

Compartment Sleeping Car.
Lower Berth.
Observation Sleeping Car.
Sleeping Car Section.
Stateroom Sleeping Car.

Sleeping Car Section. Figs. 2201-2203, 4112. The space in a sleeping car occupied by two double seats in daytime and by two berths or beds at night. There are usually 12 sections in a car, in addition to a stateroom, smoking compartment, etc.

Sleet Cutter. Fig. 6346. A special trolley wheel having corrugated contact surfaces, used in place of a standard wheel during sleet storms. The corrugated surface breaks through the ice on the trolley wire and maintains electrical contact between the wheel and wire.

Sleeve (Kirby's Door Lock). C, Figs. 2480-2481.

Sleeve Collar (Kirby's Door Lock). D, Figs. 2480-2481.

Slewing Gear (or Pile Driver Car). The means for causing the swinging platform to revolve. It consists of a hand wheel and spur wheel, the latter engaging in the slewing rack fixed to the floor of the car.

Slewing Rack (of Pile Driver Car). See above.

Slewing Rings (of a Derrick). Rings attached to the upper end of the boom for attaching a rope by which to move or steady it when loaded.

Slide Valve (Triple Valve). 1. 20, Figs. 1225-1230; 3, Figs. 1233-1237. A plain slide valve, controlled in its motion by the piston, by means of which the air is admitted to, and exhausted from, the brake cylinder, applying and releasing the brake.

2. (Reducing Valve.) 8, Figs. 1248-1252.

Slide Valve Feed Valve. See **Feed Valve.**

Slide Valve Reducing Valve. See **Feed Valve.**

Slide Valve Spring. 1. (Triple Valve.) 18, Figs. 1225-1230; 6, Figs. 1233-1237.

2. (Reducing Valve.) 9, Figs. 1248-1252.

Sliding Bolt (of a Padlock). The bolt in the interior of the padlock which engages with the shackle, locking it to place. The forward end of the bolt is termed the bit. The movement of the sliding bolt is controlled by the sliding bolt spring.

Sliding Door. A door opened by sliding sideways instead of swinging on hinges. Such doors are almost universally used on freight cars; also on subway trains and tunnel cars. Figs. 1341-1342. They are hung by a hook called the door hanger, which slides on a top door track. See also **Car Door Hanger.** They are also in general use on baggage cars and street cars.

Sliding Door Bracket. A **Door Track Bracket,** which see.

Sliding Door Fixtures. Figs. 2407-2427, 2654-2662. See also **Car Door Hanger, Sliding Door Lock** and **Sliding Door Latch.**

Sliding Door Friction Roller. Fig. 2659. A small wheel attached to the top or bottom of a sliding door to make it run easily. It may or may not carry the weight of the door.

Sliding Door Handles. Figs. 2426-2427. See **Door Handles.**

Sliding Door Hasp and Staple (Mail Car). Figs. 2407-2408. See **Hasp and Staple.**

Sliding Door Holder or **Hook** (Street Cars). A metal hook by which a sliding door can be fastened on the inside.

Sliding Door Hook and Button (Baggage Car). Figs. 2409-2410.

Sliding Door Latch. Figs. 2411-2418. A latch made with a hook lifting vertically instead of a bolt sliding horizontally, for fastening sliding doors.

Sliding Door Latch Keeper. Figs. 2411-2420, etc. Also called a strike plate.

Sliding Door Lock. Figs. 2413-2427. A lock made especially for fastening sliding doors. Such locks usually have a hook which engages in a corresponding catch attached to the door post. The hook is secured in connection with the catch by means of a bolt, which is operated by a key.

Sliding Door Roller. Fig. 2659.

Sliding Door Sheave. See **Door Sheave.**

Sliding Door Track. See **Door Track.**

Slip Lamp Burner. A burner in which the chimney is held in place by springs or screws, and so constructed that the entire slotted cap to the burner may be removed at once by lifting, still carrying the chimney, without removing any spring.

Smith Car Door. Figs. 1359-1364.

Smith Heater. Fig. 2749.

Smoke Bell. Fig. 3554 and 13, Figs. 3585-3601. A cover or screen of glass, porcelain or metal, shaped somewhat like a bell, and placed over a lamp to protect the ceiling of a car or room. Large smoke bells are often called canopies.

Smoke Bell Bracket. A separate carrier for a smoke bell.

Smoke Bell Stem (of Lamps). A tube attached to the upper part of a smoke bell and serving to conduct

away the gases so as to bring the smoke bell lower and nearer to the lamp.

Smoke Flue. A smoke pipe.

Smoke Flue Base (Baker Heater). Fig. 2695-2696.

Smoke Jack. See **Lamp Jack, Stove Pipe Jack.**

Smoke Pipe (Heaters). The pipe by which the smoke is conducted to the outside of the car, usually called stove pipe, but the stove pipe of heaters is called a smoke pipe or smoke flue, to distinguish it from the air pipes.

Smoke Pipe Cap. A covering on top of the smoke pipe to exclude rain and wind. Also called jack.

Smoke Pipe Casing (Heaters). An outside pipe which incloses a smoke pipe, leaving a space between the two through which air is admitted from the top and is thus warmed.

Smoke Screen (Baker Heaters). Fig. 2687. A conical-shaped box, the front of which is the feed door and the bottom of which is the hole through which the coal enters the fire pot, and which is covered by the safety plate.

Smoke Top (Baker Heater). Fig. 2695, etc. The upper part of the heater, made of Russia iron, in a conical form.

Smoking Car. A car usually attached to all passenger trains immediately behind the baggage car, in which smoking is permitted; also, in general custom, the only one open to passengers with second-class tickets. **Buffet Smoking Cars,** which see, and some others, are more luxurious. **Combination Smoking and Baggage Cars,** which see, are also largely in use.

Smoking Carriage (British). A passenger vehicle in which smoking is allowed. The whole of a vehicle is seldom devoted to this purpose, separate compartments of each class being set apart for smoking in every train, as required by law. See also **Carriage.**

Smoking Room (Sleeping Cars). A compartment now almost universal in modern sleeping cars and parlor cars. It is generally kept for the free use of the passengers, and separate seats or berths are not sold in it.

Smudge (British). The scrapings and cleanings of paint pots collected and used to cover the outer side of the roof boards as a bed for the **Roofing Canvas,** which see.

Snatch Block. Properly a single block which has an opening (notch) in one cheek to receive the rope The snatch block is usually provided with a swivel hook. The term is also popularly applied to any form of single block provided with a hook, although more properly it applies to only one with an opening at the side for readily inserting or removing the rope.

Snow Plow. Fig. 249. "A machine operated like a plow, but on a larger scale, for clearing away the snow from railroads."—Webster. The parts of a snow plow corresponding with the plow share and mold board of an ordinary plow are mounted on running gear similar to that used for freight cars. Small snow plows are also attached to the cow-catchers of locomotives and regularly carried throughout the winter. See **Russell Snow Plow.**

Other machines, called the rotary steam shovel, and the Jull centrifugal snow excavator, operated in a manner altogether different from ordinary snow plows, are made and are in use on roads in mountainous districts where the snowfall is very great. They have found considerable favor in the Western States. The rotary steam snow shovel is a powerful machine, carried in a heavy frame, made of steel I and channel beams. A boiler and double cylinder engine of the locomotive type are carried, which are connected by heavy steel pinions to a bevel gear on a horizontal shaft.

Upon this shaft is mounted the rotary wheel, consisting of a series of 12 rotary shovels with automatic reversible cutting blades. This is rotated in a drum, or casing, having a square front which cuts the snow not reached by the knives to a width of 10 feet 6 inches or more if required.

The cutting blades slice the snow from the bank into the shovels, which, with the centrifugal force of the wheel, discharge the snow in a solid stream through a chute on top of the drum, to either side of the track desired, and to a distance of from one to two hundred feet. The speed of the wheel is from one to two hundred revolutions per minute. This machine is equipped with an ice pick and flanger—the former to protect it from derailment by snow and ice—the latter for cleaning the flange and rail every time it passes over the road. Coal and water for the rotary are carried in an ordinary locomotive tender, coupled to the rotary for this purpose. One standard locomotive is required to push this machine in any kind of snow.

The Jull centrifugal snow excavator has a "scoop" in front, 10 feet or more wide and 11 feet high, consisting of a square-shaped open front box, within which revolves the "snow cutter." This "snow cutter" consists of an inverted truncated cone, inclined downward and laterally, upon which are riveted four helical, sharp-edged cutting blades, which slice off the snow, gather it into the "scoop," and, by centrifugal force, discharge it to either side of the track separately, or to both sides at once, through openings in the "scoop." The diameter of the cone from the outer edge of one cutting blade to that of its opposite blade is, at the large or upper end, 10 feet, and at the small or lower end, 3 feet. The "snow cutter" is operated by an engine of locomotive design, having two cylinders, 18-inch diameter, 24-inch stroke. The excavator is equipped with separate flanger and ice cutters, which are controlled and operated by the pilot by means of compressed air, and it is equipped with Westinghouse air brake. Two hundred revolutions of the "snow cutter" are made to 175 revolutions of the engine. In actual service the number of revolutions of the "snow cutter" varies from 150 to 250 revolutions per minute, according to the difficulty of the work to be done.

Snow Flanger. A plate of iron or steel attached to a car or engine to scrape away snow and ice on the sides of the heads of the rails so as to make room for the flanges of the wheels. The term is sometimes applied to an adjustable plow fitted to a locomotive or car which extends low down onto the track and has a plate or tool for cutting and scraping the snow and ice from the rail.

Snow Scraper. A plate or bar of iron or steel attached to an engine or car to scrape away the snow and ice from the rails.

Soap Dish. Figs. 3662-3666.

Soap Holder. A soap dish attached to a partition like a bracket.

Socket. "Any hollow thing or place which receives and holds something else."—Webster. As the socket for a water cooler valve. See also

Berth Curtain Rod Bushing or Socket. Flag Holder Socket. Revolving Chair Stand Socket.

Socket Caster. Figs. 4279-4282. A fixed or rigid caster. Not properly a caster at all, except by custom of the trade. See **Caster.**

Socket Washer. Figs. 777-778. A large washer with a cavity to receive the head or nut of a bolt or rod so that is will not project beyond the surface of the wood to which it is attached. Also called cup washer.

Sofa (Sleeping Cars). A longitudinal seat which makes up by pulling out sidewise so as to drop the back. now used only in staterooms.

Sofa Spring (British). See **Back Squab Sofa Spring, Squab Sofa Spring.**

Sofa Arm Rest Bolt. Figs. 4302-4303.

Sofa Arm Rest Fixtures. Figs. 4297-4299.

Sofa Back Leg Socket. Figs. 4300-4301.

Sofa Back Pivot Hinge and Bushing. Figs. 4294-4295.

Sofa Bolt (Sleeping Cars). Fig. 4304. A sliding bolt used for holding a sofa in its place. It is operated from the front by a sofa pull working through a sofa crank. Sofas standing against the side of the cars are now little used, except in private cars.

Sofa Caster. Figs. 4279-4282. See **Caster.**

Sofa Furnishings. Figs. 4288-4304.

Sofa Hinge. Figs. 4288-4289. A hinge by which the seat and back of a sofa are fastened together so that they can be changed from a sofa to a bed. See **Seat Hinge.**

Sofa Leg Hook. Fig. 4307.

Sofa Rail End and Socket. Figs. 4314-4315.

Soffit Board. 121s, Figs. 648-651. A board which forms the under side or ceiling of some subordinate part or member of a building or a car, as of a staircase or cornice. See **Deck Soffit Board.**

Soil Hopper. Fig. 4054. See **Closet Hopper**

Sole Bar (British). American equivalent, side sill. One or two longitudinal bars which are the main members of the **Underframe**, which see. In British car construction the side sills are relatively more important than in America.

Sole Bar Angle Iron (British). An angle iron secured to the sole bar, to stiffen it. A plate is sometimes used instead of an angle iron.

Solenoid. A coil of insulated copper wire wound on a spool which, when the electric current flows through it, may draw or attract an iron rod, core or plunger into its interior. A modified form of electro magnet. Used as a means for operating regulators, switches and other electrical apparatus.

Solid Braided Bell Cord. Fig. 2321. See **Bell Cord.**

"Solid" Compressed End Brake Beam. Figs. 4822-4823.

Solid Draft Gear. Fig. 1536.

Solid Leather-Head Nails. Fig. 3781. A form of ornamental nail for finishing work, in which the head is of solid leather. The same principle is applied to the manufacture of solid leather buttons, also much used for decorative purposes.

Solid Wrought Iron Single-Spoke Wheel. A wheel in which the spokes, hub (boss) and rim are all welded together, each spoke consisting of one single bar. The tire is shrunk on.

Soule' Rawhide Lined Dust Guard. Fig. 5321.

Spacing Block (Pintsch Lamp). 292, Figs. 3208-3224.

Spanner. A wrench for uncoupling hose, etc., formed like the arc of a circle, with notches or lugs for engaging into dogs or grooves on a spanner nut. An ordinary wrench is termed a spanner in Great Britain.

Spanner Bar (Buhoup Vestibule). 6 and 94, Figs. 2215-2263.

Spanner Bar Bolt (Buhoup Vestibule). 111, Figs. 2215-2263. See also **Filling Spider.**

Spider (Pintsch Lamp). 302, Figs. 3208-3224.

Spider Plate or **Underframe Plate** (British). A flat horizontal wrought iron bar connecting two or more timbers of the underframe together, and being placed beneath them prevents one sinking below the others. It is often made with three or more arms radiating from a common center; hence its name.

Spindle (Kirby's Door Lock). B, Figs. 2480-2481.

Spiral Elliptic Seat Spring. A spring made of a thin band of steel wound in a spiral coil, the transverse section of which is elliptic.

Spiral Journal Bearing. Fig. 5328.

Spiral Sash Spring. See **Sash Spring.**

Spiral Seat Spring. The common form of **Seat Spring**, which see.

Spiral Spring. Fig. 6010. A spring made of a metal rod or bar coiled in the form of the thread of a screw, so that it can be compressed or expanded in the direction of the axis around which it is coiled. Most of the springs now in use in car work, except the bolster springs of passenger cars, are spiral springs. Volute springs, india rubber springs, compound or wool packed springs are quite obselete. Spiral springs are designated as single, double, triple or quadruple coil springs when nested one inside the other. Such springs are also called nest springs. Usually the single springs or nest springs are again combined into two group, four group, six group, etc., springs. Two to eight group springs are the most common. Graduated springs seem to have had their day, and are not often specified for new construction. The various springs in them come into action successively as the load increases, instead of all at once. Spiral springs are also designated according to the section of bar, as round bar, flat bar, square bar, half round bar, oval bar, edge rolled, etc., but nearly all springs are now made from round bar steel. Equal bar is a term applied to nest springs made from bars of such size that the resistance of the coil is proportioned to its diameter. Spiral springs are also designated according to their use, as equalizer springs, journal springs, pedestal springs, bolster springs (which latter are the main springs of a car), buffer springs, draft springs, etc.

Spiral Spring Cap. 75, Figs. 4771-4777; Fig. 6010. A casting or plate which forms a bearing for the top of a spiral spring, and which also holds it in its place. A seat is used at the other end, but both these parts in bolster springs are commonly called **Spring Plates**, which see.

Spittoon. Figs. 2667-2669. A vessel to receive the discharges of spittle and other abominations. A **Cuspidor**, which see, is the same thing in a different form.

Splash Board. A board attached in an inclined position covering up the back of passenger car steps. It serves much the same purpose as the risers of steps, and prevents mud and dirt being thrown on the steps. Not in general use.

Splasher (British). An iron plate attached to the floor above the wheels. Only used when the wheels are too large in diameter to clear the ordinary floor. Also called wheel cover or wheel plate.

Splice. 1. "The union of ropes by interweaving the strands."—Webster. Hence any appliance by which the ends of a rope, cord, beam or bar, are united. See **Bell Cord Splice.**

2. (For Car Sills.) See **Scarf Joint, Ship Splice.** According to the rules for the interchange of cars of the Master Car Builders' Association, the splice of a sill to be received must be 24 in. long. See **Interchange of Traffic.**

Splicing Center Sills. See **Center Sills.**

Split Key. Figs. 807-808. A form of pin which is self-fastening, consisting essentially of two parallel strips or bars of metal, which, when united, constitute one pin, but which tend to spring apart, so that the pin cannot be withdrawn without the use of considerable force.

Spoke. "One of the radial arms which connect the hub with the rim of a wheel."—Knight.

Spoke Wheel. Fig. 5392, etc. A wheel, the rim or tire of which is connected with the hub by spokes instead of one or more plates. These spokes are sometimes made of solid cast iron, in others they are cast hollow, and still others are made of wrought iron or cast steel.

Spool (of Hoisting Gear). The drums on which the hoisting rope or chain is wound.

Spring. Figs. 5368-5383, 6010-6020. Elliptic springs, Figs. 5372-5383. An elastic body to resist concussion. Springs are also used to produce motion in a reverse direction to that caused by some other applied force, as a brake spring and the spring of a door latch. The leading forms of springs are **Elliptic Springs** and **Spiral Springs,** which see. Spiral springs are designated according to the number combined together one within the other, as double coil, triple coil, etc.; or, if the springs are placed side by side, as two group, four group, six group, etc.; elliptic springs, according to the number united to work together as one spring, are designated as double or duplicate, triple or triplicate, quadruple, quintuple and sextuple. The main springs about a car are nearly all spiral springs, except that elliptic springs are almost exclusively used for the bolster springs of passenger cars.

The principal springs of a car supporting its weight are the bolster springs, also called bearing springs or body springs. Equalizing bar or equalizer springs are used in addition on passenger cars, as also sometimes journal springs. Side journal springs are used on street cars, and are sometimes key-shaped or spool-shaped. Tension communicated through the draw spring or springs.

In European practice bearing springs are semi-elliptical; buffing and draft springs are rubber, semi-elliptical, spiral or volute. The seat cushions and backs are supported by sofa springs. The tendency to-day of American practice is toward single and double coil, round bar springs for car work. For equalizer springs the universal practice is to use plain single and double coil, round bar spiral springs.

Springs and Spring Caps (M. C. B. Recommended Practice). Figs. 6010-6020. In 1898 detail designs of spring coils and caps were adopted as Recommended Practice.

In 1901 a committee presented revised drawings, with full details and specifications. They were submitted to letter ballot and adopted as Recommended Practice, and are shown in Figs. 6010-6013.

In 1901 designs, with full details and specifications for springs for 100,000-pound capacity cars, were presented, and as a result of letter ballot were adopted as Recommended Practice. See Figs. 6014-6017.

Spring Band (Elliptic Springs). A wrought iron strap which embraces the plates at the center.

Spring Blocks. 76, Figs. 4780-4783. Blocks to which the equalizer spring caps are attached. They are made right and left.

Spring Box (Buhoup 3-Stem Coupler). 961, Figs. 1886-1935.

Spring Box Holder (Buhoup 3-Stem Coupler). 932, Figs. 1886-1935.

Spring Cap. Figs. 5384-5389. A cup-shaped piece of cast or wrought iron for holding the top of a spring and against which the latter bears. They are further distinguished by the name of the spring, as bolster spring cap, etc. The spring seat comes below the spring, but both these parts are very commonly called spring plates, especially in large group springs.

Spring Controller. Figs. 5368-5369.

Spring Door Latch. Figs. 2585-2587, etc. A latch, the bolt of which is thrown into contact with a catch by a spring, and is disengaged by a knob or handle. Such latches are not arranged so as to be fastened with a key. See **Latch.**

Spring Door Lock. Figs. 2576-2577, etc. A lock usually called a night latch. See **Latch.**

Spring Edge (Car Upholstery). A term applied to a method of upholstery which protects the frame work entirely by springs, so that it is not felt by the occupant of the seat.

Spring Hanger (Elliptic Springs). 170, Figs. 585-588. A T-shaped bolt or an 8 or U-shaped iron strap which sustains the end of a semi-elliptic spring. The T-hanger is a bolt with a T-head passing through a slot in the spring, used in locomotives, but not on cars. The 8-shaped hanger is a wrought forging with holes at each end for two bolts.

Spring Hanger Iron or **Bracket** (Cabooses, etc.). 171, Figs. 585-588. A bent bar fastened to a pedestal timber or wheel piece, to which the spring hangers are attached.

Spring Hinge. Fig. 2741. See **Double-Acting Spring Hinge.**

Spring Link or **Spring Shackle** (British). American equivalent, spring hanger, a term also used in Great Britain. A link attached to the end of a laminated spring by which the weight is placed upon it.

Spring Link Adjusting Screw or **Tee Bolt** (British). An eye bolt by which the tension of the bearing spring, and, to some extent, the height of the car body above the rails can be regulated. Rarely used except in passenger service, where it is very general. A different style, having the bolt vertical, is the same as above, except that being vertical, it cannot put initial tension on the spring.

Spring Padlock. A padlock, the hasp of which can be locked by pressure only, without a key; so called in distinction from a dead padlock.

Spring Pin. See **Lateral Motion Spring Pin** (Passenger Car Trucks).

Spring Plank. 43, Figs. 4705-4713, 4771-4774, and Figs. 4791-4792, 5016-5018. A transverse timber underneath a truck bolster and on which the bolster springs rest. Also called sand plank or sand board. A **Spring Plank Safety Strap** or **Guard,** which see,

passes under the spring plank. In iron trucks, iron spring plank bars take the place of the wooden spring plank, and in other trucks they are very common. A swing spring plank is used in passenger and other **Swing Motion Trucks**, which see. In rigid bolster trucks the spring plank is bolted to the lower arch bar of the truck frame.

Spring Plank Bearing. 44, Figs. 4771-4774. A casting on which a spring plank rests, and which is supported by the lower swing hanger pivot. Also called cross-bar casting or spring plank carrier.

Spring Plank Safety Hanger. Figs. 4849-4850.

Spring Plank Safety Strap (Passenger Car Trucks). 45, Figs. 4771-4777, and Figs. 4849-4850. A U-shaped strap of iron attached to the transoms, and passing under the spring plank, so as to hold it up in case the swing hangers or their attachments should break.

Spring Plate. Fig. 4822. A common term for spring seats and caps, especially those of considerable size, as for bolster springs. They are often provided with spring plate lugs to hold the spring in place.

Spring Pocket (Strap Drawbar). See below.

Spring Pocket or **Strap Drawbar.** A drawbar with a rectangular strap or "pocket" at the back end, in which the draft spring is placed. So called in distinction from a tail bolt attachment. See **Yoke.** Practically all drawbars are now attached with a yoke or strap, and this form is the Recommended Practice of the M. C. B. Association.

Spring Seat. 74, Figs. 4705-4713, 4771-4774. A cup-shaped piece of cast or wrought iron, on which the bottom of a spring rests. See **Spring Cap, Spring Plate.**

They are further distinguished by the name of the spring for which they serve, as bolster spring seat, equalizer spring seat, etc.

Spring Shackle (British). See **Spring Link.**

Spring Stud (Street Cars). A round iron bar which rests on the top of the journal box or spring seat and passes through the center of a spiral spring. The upper end works in a guide and thus holds the spring in its place. A similar bar has been used on steam cars for transmitting the weight from the spring to the journal box.

Sprue (Foundry). The piece of metal which fills the gate or channel through which the metal is poured in making a casting. This piece is broken off when the casting is cooled. The gate iself is often called a sprue.

Sprue Hole. A gate of a mold for casting metals.

Spud. Figs. 3648-3649. A bushing or coupling by which the hole of a sink or water cooler drip is connected with the drain or drain pipe.

Spur Wheel. 1. (Hoisting Gear, etc.) Literally any cog wheel, but usally meaning the larger one of a pair of wheels in gear, in distinction from the pinion, which is the smaller one of the two.

2. (Lever Hand Car.) 5, Figs. 6207-6209.

Squab Cushion. One formed of a bag or case stuffed with curled hair or other elastic material, not attached to the seat, but simply laid upon it. Now little used, box cushions being preferred. See **Cushion.**

Square Bolt Heads (M. C. B. Standard). In 1899 the following dimensions for square bolt heads were adopted as Recommended Practice:

The side of the head shall be one and one-half times the diameter of the bolt, and the thickness of the head shall be one-half the side of the head.

In 1900 these dimensions were adopted as Standard.

Square Door Bolt. Fig. 2391. A door bolt made of a square and straight bar of metal. When the bolt has an offset it is termed a square neck door bolt, as in Fig. 2393.

Square End. A rectangular piece on the end of a shaft to which a crank or wrench can be applied; also termed winding arbor or crank pin.

Square Root Iron. A term applied by manufacturers to angle iron in which the corners are brought to a sharp angle and not rounded off. Square root iron is one form of angle iron, but is never meant when that term alone is used.

St. Louis Flush Car Door. Figs. 1367-1368.

Stake (Flat or Gondola Cars). 42, Figs. 383-387.

1. (Flat Cars.) A stick of wood attached to the outside of the sills by a **Stake Pocket** or **Stake Pocket Strap** and **Stake Bolt,** which see, to keep the load from falling off. They are sometimes attached by swiveling bolts, so that they can be dropped if desired along the side of the car.

2. (Gondola Cars.) A similar piece, attached by stake pockets to the sills and fastened to the side plank, usually on the outside, but sometimes on the inside, by bolts. In steel cars the stakes are formed of angles or pressed T shapes.

Stake Bolt (Gondola and Flat Cars). A bolt passing through the bottom end of the stakes, serving in connection with the **Stake Pocket Strap,** which see, in place of the ordinary form of stake pocket.

Stake Hook (Flat Cars). A hook on the side of a flat car to hold a swiveling stake in an upright position.

Stake Pocket (Gondola and Flat Cars). 39a, Figs. 360-363, etc. A cast iron receptacle attached to the side sills by U-bolts to receive the end of a stake which supports the side or confines the load, in the case of a flat car. A substitute is the **Stake Pocket Strap,** which see.

Stake Pockets (M. C. B. Recommended Practice).

In 1905, as a result of letter ballot, the following Recommended Practice was adopted regarding permanent stake pockets:

1. That the method of securing permanent stake pockets to cars of wooden construction be by U-bolts.

2. That the method of securing permanent stake pockets to cars of steel construction be by rivets or U-bolts.

3. That malleable iron be used in the manufacture of permanent stake pockets.

4. That stakes should be located to suit the construction of the car or the requirements of the service, but should not be placed further apart than 4 feet from center to center.

In 1905, as a result of the letter ballot, the following dimensions were adopted as Recommended Practice for temporary stake pockets:

For flat cars and gondola cars with sides less than 30 inches high, 4 inches wide by 5 inches deep.

For gondola cars with sides 30 inches and over, 4 inches wide by 4 inches deep.

Stake Pocket Strap or U-Bolt (Gondola, Flat and Stock Cars). A U-shaped bolt flattened at the side, and serving as a substitute for the ordinary form of stake pocket, when the stakes are intended as permanent attachments.

Stake Pocket U-Bolt. A U-bolt applied to a stake pocket that encloses three sides of the stake and

pocket and passes through the flange holes into the side sill, to which it is bolted.

Stake Rest (Flat Cars). A bracket or support on which a stake rests when turned down horizontally.

Stake Sleeve (Flat or Gondola Cars). A casting with a horn-shaped projection slipped over a stake to hold up the hinged side of a platform or gondola car.

Stanchion. 1. A prop or support.

2. (Nautical.) A term very generally, but not exclusively, used for posts with an eye in one end, which carries a rope.

3. (Car and Locomotive Work.) By analogy from nautical use, a metal post or hanger with an eye in one end, which holds a rod or other object, as a hand rail or curtain rod. The opposite end is usually fastened by a nut, or with a flange or lugs, which form a part of the stanchion.

Stand. "Something on which a thing rests or is laid." —Webster. See

Radiator Stand. **Seat Stand.**
Revolving Chair Stand.

Standard. 1. A name sometimes applied to the **Column** or **Bolster Guide Bar**, which see.

2. (Of M. C. B. Association.) A considerable list of standard details of cars, which have been adopted by the Master Car Builders' Association. See **Master Car Builders' Standards.**

In 1893, when the old standards of the Master Car Builders' Association were divided into two groups, the group which retained the name standard was defined as "Those forms, parts, constructions, units, measurements or system in which it is desirable to secure not only sound construction, good practice and safe operation, but which also promote quick and cheap repairs and consequent free interchange of cars."

The group termed Recommended Practice was defined as "Those forms, parts, construction, units, measurements or systems which are conducive of sound construction, good practice and safe operation, but which do not affect either interchangeability of parts or interchangeability of cars as a whole."

Standard Axles (M. C. B.). See **Axle.**

Standard Bolts and Nuts (Table). See **Sellers' Standard.**

Standard Car Axle (M. C. B.). See **Axle.**

Standard Car Coupler (Freight). Figs. 1599-1607; Passenger, Figs. 1820-1827.

Standard Check Gage for Mounting Wheels (M. C. B.). Adopted in 1894. See **Check Gage.**

Standard Dry Closet. Fig. 4067. See **Dry Closet.**

Standard Gage. The most common distance between the rails of railroads, which is throughout the world 4 ft. 8½ ins. See **Gage.** This gage originated from the use of an even 5 ft. gage, with outside flanges. As inside flanges came to be preferred, and had to run on the same rails (then with much narrower heads than now), the present standard was of necessity used.

Standard Journal Bearings and Wedges (M. C. B.) See **Journal Bearings.**

Standard Journal Boxes (M. C. B.)). See **Journal Boxes.**

Standard Pedestal (M. C. B.). See **Pedestal.**

Standard Ry. Eqpt. Pneumatic Tools. Figs. 6905-6907.

Standard Screw Threads (M. C. B.). See also **Sellers'** and **Whitworth.** See **Screw Threads.**

Standard Splice (M. C. B.). See **Interchange of Traffic.**

Standard Steel Platform. Fig. 1936. A platform construction for passenger cars, combining a draft gear and buffer plate mechanism. The platform sills are of I-beams, which are continuous back to the bolster. It is the standard construction on Pullman cars and on large numbers of other passenger cars.

Standard Steel Works' Steel Tired Wheels. Figs. 5428-5453.

Standard Wheel Gage (Between Backs of Flanges; M. C. B.). See **Wheel Gage.**

Standing or **Partition Pillar** (British). American equivalent, post. An upright piece in the body running its entire height. The term is not applied to the **Corner** or **Door Pillars,** which see.

Stanwood Safety Step Tread. Figs. 2280-2281.

Staple. Figs. 908-909, 1375-1376. A U-shaped piece of wrought iron pointed at the ends, to be driven into wood told hold a hasp, hook, pin, etc. The term is also applied to a wrought or cast iron keeper, which is screwed or bolted to the doorpost or frame, and over which a hasp fits.

Star Ventilator. Fig. 4427. See **Ventilator.**

Starting Valve (Gold Car Heating). Fig. 2819. A valve on the locomotive to admit steam to the train line.

Stasch Ventilator. Fig. 4426. See **Ventilator.**

Stateroom. Fig. 182. A compartment in sleeping and private cars, sometimes containing a stationary bed and in other designs the usual berths. Also termed **Drawing Room,** which see.

Stateroom Sleeping Car. Fig. 214. A sleeping car having one or more separate compartments or staterooms in addition to the standard sections or berths in the main part of the car. A drawing-room sleeping car has one or more separate compartments which are larger than a stateroom and have a lounge or sofa in addition to the two section seats which are made up into the berths. Drawing rooms usually have a private toilet room off.

Stationary Lock (Freight Cars). Fig. 1371. A lock permanently fixed to the door or side of the car, in distinction from padlocks, which are quite out of use on freight cars.

Stay. A beam, bar, rod, etc., by which two or more objects are connected together to prevent lateral deviations of one or both of them. See

Body Queen Post Stay. **Lamp Stay.**
Center Stay. **Sill Step Stay.**

Stay Rod. 1. A rod which acts as a stay. See **Pedestal Stay Rod,** 7, Figs. 4771-4777.

2. (Of a Derrick or Crane). See **Tension Rods.**

Steam and Air Line Connections (M. C. B. Recommended Practice). Figs. 5944-5947.

In 1903 the following specifications for steam and air line connections were adopted as Recommended Practice:

Two-inch steam train pipe; end train pipe valves; steam hose, 1⅝-inch inside diameter and of such length as to provide 31 inches from face of coupling gasket to end of hose nipple; 1½-inch steam hose couplings of dimensions to agree with those shown with gaskets having 1½-inch diameter opening, gaskets to be so constructed that the normal diameter of opening will always be maintained; couplings not provided with gravity traps; inlet valves to have reduced openings which should be as small as possible and maintain the volume of steam required by the radiating pipes for the severest weather conditions.

That the air brake and air signal hose should be 1 inch in diameter and 22 inches long.

Steam Car. A term used to designate ordinary railroad cars when it is desired to distinguish them from street cars.

Steam Drum (Car Heating Apparatus). Figs. 2894-2896. A part of every indirect steam heating system, being the covered coil or nest of tubes in which the circulating water is heated by the steam surrounding the pipes. Also called **Jacket**, which see.

Steam Gage (Steam Heating). Figs. 2975-2976, 2816-2817. A dial or gage for recording the pressure of steam in the steam pipes on a car or locomotive.

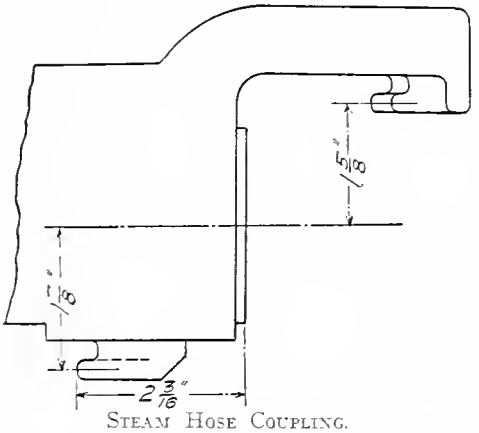
Steam Hammer. Figs. 6850-6851.

Steam Heating Apparatus. Fig. 2784, etc.

Steam Hose Couplers. Figs. 2776-2777.

Steam Pipe. The pipe under passenger cars corresponding to the brake pipe and connected with hose and couplings for conveying steam from the locomotive to heat the cars in the train.

Steam Shovel. Figs. 251-252, 254-255, 596-598. A shovel operated by steam hoisting engines mounted on a carbody. The shovel or dipper holds from 1 to 6 cu. yds. of dirt and is mounted on the end of a heavy beam which is carried by the boom. By manipulating the boom and the dipper beam with



STEAM HOSE COUPLING.
1½ in. full opening gasket.

blocks and tackle the shovel can be filled, raised, turned in the arc of a circle and emptied into a car standing on an adjacent track. Steam shovels are largely used in construction excavation and for loading ballast cars in gravel pits.

Steam Trap (Car Heating). Fig. 2849, etc. A device for catching and liberating the water of condensation in any steam pipe line. There are a large number of special forms made by each company which has a steam or hot water system.

Steel Back Brake Shoe. Fig. 5243. A brake shoe having a thin steel strip cast into the back of it which holds the parts together in case they break when the shoe is worn down thin.

Steel Doors. Figs. 1338-1347.

Steel Framing. Fig. 1043. See **Frame.**

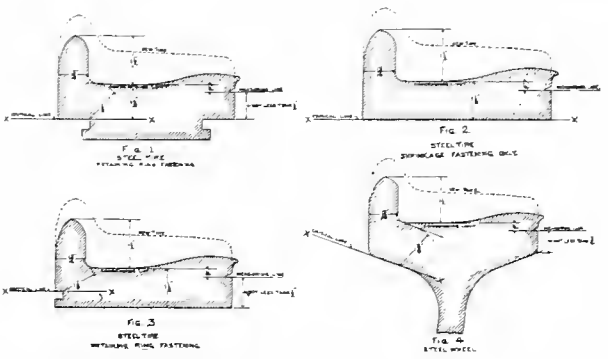
Steel Sash. Fig. 1351.

Steel Sheathing. Figs. 1348-1354. See **Sheathing.**

Steel Tire, Minimum Thickness (M. C. B. Recommended Practice). Fig. 5766. In 1894 a Recommended Practice was adopted for minimum thickness for steel tires of car wheels to be 1 in., to be measured normal to the tread and radial to the curved portions of the flange through the thinnest part within 4¼ ins. from the back of the flange; the thickness from the latter point to the outer edge of tread to be not less than ½ in. at thinnest part.

A further practice was adopted of cutting a small groove, as shown in the outer face of all tires when wheels are new, at a radius ¼ in. less than that of the tread of tire when worn to the prescribed limit, to facilitate inspection.

In 1909, as result of a letter ballot, it was recommended that the illustration showing the minimum



thickness of steel tires, be canceled, and that the four illustrations shown herewith be substituted therefor as Recommended Practice to govern the service operations of both steel and steel-tired wheels under both passenger and freight cars.

Steel Tired Wheel. Fig. 5390, etc. A wheel with a steel tire. In the **McKee-Fuller** and **Washburn Wheels**, which see, the tire is welded to the body or center of the wheel, which is made of cast iron. The term, unless otherwise stated, however, always means that the tire is shrunk on, bolted or fastened with retaining rings.

Stem. See **Buffer Stem, Graduating Stem, Smoke Bell Stem.** The rod to which a valve of any kind is attached is always called a stem.

Stenciling Cars (M. C. B. Standard). In 1896 it was decided:

That on all box cars standing more than twelve (12) feet from top of rail to eaves, the height and width at eaves be stenciled in 3-inch letters on side of car, as near the bottom as convenient.

That all classes of cars have size of coupler, style of rear attachments, kind of draft gear and style of brake beam stenciled in 2 or 3-inch letters on each side of car at opposite ends, or on each end of car directly above coupler, where design of car permits it. Where the kind of draft gear implies the style of rear attachments, the marking for the letter may be omitted.

That where the construction of the truck permits, trucks shall be stenciled on each side, giving the size of journal, and the letters "M. C. B." if the axle is M. C. B. standard axle. If the axle is not M. C. B. standard, use dimensions from center to center of journal in place of M. C. B. This stenciling to be in 1 or 2-inch letters, and to be put on end or side of bolster in Diamond trucks, and on side truck frame in center on pedestal type of trucks.

Initials of the road should also appear in letters 1 or 2 inches high on one side of bolster or transom of each truck.

In 1901 this was changed from Recommended Practice to Standard, as a result of letter ballot. Modified in 1906 by the elimination of fractional sizes of figures and letters. Modified in 1908.

(Recommended Practice). As a result of a special letter ballot in March, 1906, certain sized letters and numerals were adopted as Recommended

Practice for the uniform stenciling of cars, as follows:

1. That Roman letters and figures of the design shown herewith be used.

2. That the sizes of these letters and figures be confined to 1, 2, 3, 4, 7 and 9 inches.

3. That 7 and 9 inch letters or figures be used for the initials, names and numbers for the sides of cars, and 4-inch letters or figures for the lettering on the doors and ends of cars.

4. That for other car-body markings on sides and ends, such as capacity, couplers, brake beams, class of car, date built, outside and inside dimensions, and markings inside of car, 2 or 3 inch letters and figures be used, with the following exceptions:

(a) All weight marks to be 3 or 4 inch letters or figures.

(b) Trust marks, patent marks and other private marks should be 1-inch letters or figures.

5. That all marks on trucks be confined to 1 or 2 inch letters or figures.

6. That stenciling on air-brake cylinders or reservoirs be 1-inch letters or figures.

Step. 1. A ledge on a stair or round or rung of a ladder.

2. A footpiece for ascending to or descending from a car or for standing in certain places or positions. Passenger car steps are from their locality called platform steps, or from their material box steps. In freight cars a U-shaped iron, called the **Sill Step,** which see, is used, and a kind of platform on the roof, called the roof step. A small ledge on the end of a freight car near the top for a brakeman to stand on when applying brakes, called the brake step, is also used, but it is not recommended by the Master Car Builders' Association, but it is considered good practice on many roads. A bracket called a tank step is attached to the tanks of tank cars. Steps in stairs are connected by vertical risers.

Step Facings. A metallic facing for the step hanger.

Step Hanger. 48, Figs. 599-619. A vertical board or metal plate by which the steps are supported from the corner of a car and from the platform timber.

Step Iron (Platform Steps). A flat iron bar bent to conform to the shape of the steps and their risers, and to which they are fastened. It is bolted at the upper end to the platform sill.

2. (British.) Also called leg iron. A wrought iron forging attached to the sole bar, and supporting the upper and lower **Foot Boards,** which see.

Step Ladder (Sleeping Car). Figs. 4413-4415. A folding step ladder, for use in a sleeping car, to reach the lamps, upper berths, etc.

Step Ladder Hinge. Fig. 2470. See **Hinge.**

Step Moldings or Nosings. Figs. 3979-3980. A metallic facing or molding for the tread of steps.

Step Riser. The vertical portion of a step in stairs.

Step Stringer Nosings (Platform Steps). Figs. 2282, 3979.

Step Timber. A timber bolted to the end sill and platform end sill, to which the platform steps are hung.

Step Treads. Figs. 972-978. See **Tread Board.**

Step Tread Nosing (Platform Steps). Fig. 3973.

Sterns Car Range. Figs. 3633-3638.

Sterlingworth Brake Beam. Figs. 5100-5101. A brake beam made of deck or bulb iron shapes and not trussed.

Stile. 8, Figs. 1329-1337. The upright pieces on the outer edge of a door or sash, as door stile, sash stile, window blind stile, etc.

Stirrup. 1. A kind of ring or bent bar of iron resembling somewhat the stirrup of a saddle. A drawbar carry iron is sometimes called a stirrup.

2. (Buhoup 3-Stem Coupler.) 1111, Figs. 1886-1935. A drawbar carry iron.

Stock Car. Figs. 108-112, 345-355. A car made for transporting live stock, usually having a tight roof, but open grating sides and ends. Double-deck stock cars are built for carrying sheep and hogs, and modern stock cars are so designed that they can be used as double-deck cars if desired. In order to prevent suffering and injury to stock when carried, modern stock cars are provided with some of the devices that were formerly special to so-called palace stock cars. Stock cars are usually provided with at least the apparatus for feeding and watering.

Stop Bar (Sleeping Car). 49, Figs. 2201-2206. A bar to connect the two seats on which the seat bottoms may rest when drawn down to make up into beds. It rests upon a stop bar plate.

Stop Bar Guide. An attachment to hold a stop bar in place laterally.

Stop Bar Hinge. The hinge which enables the stop bar to swing horizontally.

Stop Bar Plate. See **Stop Bar.**

Stop Bead or Parting Strip. More properly sash parting strip. The strip dividing the groove for the window sash and the groove for the blind.

Stop Bolt (of Car Door Lock). An attachment for throwing a door latch out of gear.

Stop Cock. Figs. 2768, 3646-3647, 3657. A simple form of **Cock,** which see, having a body and a 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. See below.

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.

Stop Latch. A spring door latch with a stop bolt by which the latch can be fastened on one side so as not to act.

Stop Plate or Wedge (for Journal Box). A metal plate which forms an end bearing for the axle and checks its end motion. It is held in position either by flanges cast in the box, or by attaching it to the journal bearing or its key. Its object is to dispense with a collar. But little used.

Stop Wedge. A stop key. See **Stop Key Journal Bearing.**

Storage Battery (Electric Car Lighting). Figs. 3444-3489. An electro-chemical device, consisting of a number of cells, generally 16 or 32 in number, connected in series when used for car lighting purposes, each cell containing two groups of lead plates peculiarly constructed and prepared, immersed in dilute sulphuric acid, the function and properties of which are to receive and store electrical energy generated by the axle generator and to deliver said energy to the lighting circuit of the car as occasion may require. Storage batteries are carried in two boxes attached to the underside of the car body. The number of cells connected in series determines the voltage of the system. Approximately 2 volts per cell are realized from a storage battery. It has become customary to employ 16 cells connected in series for the so-called 30-volt system and 32 cells connected in series for the so-called 60-volt system. Lamps designed to be operated on either of these systems would be called 30 or 60-volt lamps as the case might be.

Storage Gas Tank (Commercial Acetylene Lighting). Fig. 3286. An iron tank 114 in. x 20 in. filled with asbestos discs saturated with **Acetone**, which see, into which acetylene gas is forced under pressure.

Storage Heaters (Car Heating). Figs. 2871-2872, 2874-2875. See **Storage System of Car Heating.**

Storage System of Car Heating. Figs. 2871-2872, 2874-2875. A direct system of car heating, in which the radiating pipes are enlarged and inclose a smaller pipe or tube which is filled with salt water or other heat-retaining substance, and which when heated continues to radiate heat after the steam is shut off. In the Gold storage heater the radiating pipe contains a fluted cylinder of terra cotta of the same extreme diameter as the inside diameter of the radiating pipe. These storage heaters are shown in detail in Figs. 2871-2875. See **Gold's Car Heating Systems.**

Stove. An apparatus made usually of iron, variously constructed, in which a fire is made for warming a room, house or car by direct radiation. When the warming is effected by convection, as with warm air, hot water, etc., the entire apparatus is called a heater. Stoves are out of use for heating passenger cars, but cast iron stoves are largely used for caboose cars.

A cook stove permanently fixed against the side of a room and directly connected with the chimney without the use of stove pipe, is called a range; used in dining cars, etc. Fig. 3633.

Stove Pipe. A tube, usually of sheet iron, for conveying the smoke from a stove or heater, and creating a draft. In heaters, commonly called **Smoke Pipe** or **Smoke Flue**, which see.

Stove Pipe Cap. A U-shaped piece of sheet iron fastened to the top of a stove pipe, serving as a rough form of **Jack**, which see.

Stove Pipe Damper. A circular disk in the stove pipe for regulating the draft.

Stove Pipe Jack. A covering or bonnet for the aperture of a stove pipe on the outside of a car. The term usually means a more elaborate structure than a stove pipe cap.

Stove Pipe Ring. A metal plate or ring attached to the ceiling of a passenger car around the opening through which the stove pipe passes from the inside to the outside of the car. It is used for ornament or to make a finish around the opening for the stove pipe.

Stove Ring. A **Stove Pipe Ring**, which see, or a ring for Russia iron casing of a Baker heater, Fig. 2720, etc.

"Straight-Air" (Air Brake). A term applied to the original form of the Westinghouse air brake, which is still used on engines and tenders and street cars. Fig. 125. See **Westinghouse Air Brake**; also **General Electric Air Brake.** Fig. 1295.

Strainer. See **Brake Pipe Strainer.**

Straining Rod. See **Brace Straining Rod.**

Strap Bolt or **Lug Bolt.** Figs. 919-920. A round bolt with a flat bar of iron 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 is attached to a piece of timber or other object by one or more separate bolts or screws.

Strap Brake (Hoisting Gear). A method of controlling the spools by an iron strap which is pressed down upon the spool by a treadle.

Strap Drawbar. A **Spring Pocket Drawbar**, which see.

Strap Hanger. Fig. 2355. See **Bell Cord Hanger.**

Strap Hinge. 1. A door hinge, the two parts of which are made longer than those of a butt hinge, and of a triangular shape.

2. (British.) In a freight car (goods wagon) a hinge in which the pin is welded to two flat bars at each end, and the main part of the hinge is turned while hot over the pin. The hinge has thus no loose part. The main part or strap is secured to the door, which it stiffens. The flat ends of the pin are bolted to the car.

Strap Washer or **Washer Plate.** A wrought iron strap which takes the heads of several bolts.

Street Cars. Figs. 6237-6240.

Street Car Wheel. Figs. 5460, etc. A light cast iron single plate or open plate wheel.

Streeter Brake Shoe. Fig. 5238. A brake shoe with hard white iron spiral inserts and cast iron body.

Streeter Journal Bearing. Figs. 4938-4939.

Strike Plate. Fig. 4311, The keeper for a beveled latch bolt against which it strikes, so as to snap shut automatically. See **Keeper**, which is a general term including and often used as a substitute for strike plate.

Striker Arm. A **Seat Arm**, which see. The terms striker arm, seat back arm and seat arm are used in the trade.

Striker Plate. See **Strike Plate.**

Striking Plate. See **Buffer Block Face Plate.**

String Board (Passenger Car Steps). A vertical board which supports the ends of the steps. A step hanger.

Stringer (Carpentry). 1. "A horizontal timber connecting posts in a frame, as a tie timber of a truss bridge; a horizontal tie in a floor framing."—Knight.

2. (Bridge Construction.) The principal longitudinal timbers at the base of the roadway or track structure, analogous to the sills of cars. Hence, this name is often given to the sills of a car.

Strut (of a Truss). A member subjected to a strain of compression. A vertical strut is usually called a post.

Stucki Radial Drawbar Controlling Device. Figs. 2083-2084.

Stud. 1. (Carpentry.) "A small piece of timber or joist inserted in the sills and beams between the posts to support the beams or other main timbers. The boards on the outside and the laths on the inside of a building are also nailed to the studs."—Webster. A vertical **Scantling**, which see.

2. (Car Construction.) 60. Figs. 599-619. A

short vertical wooden post in the side or end of a car between the window posts, or below the windows, extending from the side sills to the window sills.

3. A standing bolt, pin, boss or protuberance designed to hold an attached object in place, especially one formed of a headless bolt permanently screwed into a tapped hole in a casting or forging so as to become a part thereo.f

Sub-Carline (Refrigerator Car). O, Figs. 305-321. A strip of wood under the main carline, supporting the sub-roof. See **Carline.**

Sub-Center Sill. 6, Figs. 383-387. An extra sill bolted under the center sill and running the length of the car.

Sub-Floor (Refrigerator Car). H, Figs. 305-321. A layer of flooring boards under the main floor, and separated from it by an air space and hair felt.

Sub-Roof (Refrigerator Car). M, Figs. 305-321. The inside layer of boards of the roof proper, supported on sub-carlines.

Sub-Sill. 26a, Figs. 262-272. A sill or timber bolted under another sill to give it added strength. The draft sills of a car are frequenty so applied. See **Center Sub-Sill, Buffing Sub-Sill, Back-Stop Timber.**

Suburban Car. Figs. 202-203, 630-634, 571-573. A car specially designed for suburban passenger traffic.

Subway Car. Figs. 6218, etc. An electric motor car for use in subways in large cities.

Sugar Cane Car. Fig. 100.

Summer Street Car. See **Street Car.**

Summer Street Car Curtain. Fig. 4669. A cloth, usually made of heavy canvas, to inclose open cars and exclude rain or sunshine.

Supply Pipe. 1. (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 away from the compressor.

2. (Lavatory Fittings.) 9, 11 and 12, Figs. 3684-3686. Pipes which carry hot or cold water to the basin faucets.

Supply Valve (Steam Heating). Fig. 2820. A valve for regulating the supply of steam in the radiator pipes of the car.

Support. "That which upholds, sustains or keeps from falling, as a prop, a pillar, a foundation of any kind."—Webster. See **Cylinder Lever Support, Pipe Support.**

Surfacer (Wood Working Machinery). Fig. 6801.

Suspension. 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. The iron work and fittings which are attached to the car truck for supporting or suspending the axle generator and which include the belt tightening and alining devices.

Sway Brace. A term borrowed from the similar parts used in trestles to designate any form of diagonal bracing, but more especially timber planking spiked on the main timbers of a structure.

Sweeping Car or Sweeper. Fig. 6256. A car with rotary brooms for sweeping snow from the railroad track. The brooms are attached to a horizontal shaft which is connected by suitable gearing with the axles, and the brooms are thus made to revolve. Used in cities, and chiefly on electric roads.

Swing Back Car Seat. A car seat the back of which swings over the cushion, without reversing, top-to-bottom. It requires that both sides of the seat back be upholstered so that either side may be used. Such a seat back requires but one head roll.

Swing Beam. See **Swing Bolsters, Swing Spring Plank.**

Swing Bolster. A truck bolster (so called in distinction from a rigid bolster) which bears on springs that are supported by a transverse timber called a spring plank, which is suspended by hangers or links so that it can swing laterally to the truck. As the springs rest on this plank and they support the bolster, the latter can swing with the spring plank. The object of providing this swinging motion to the bolster is to prevent, as much as possible, lateral blows and shocks from being communicated to the car body, and, vice versa, to prevent the momentum of the car body from acting with its full force on the truck. All passenger car trucks are swing bolster.

Swing Bolster Spring. See **Lateral Motion Spring.**

Swing Cables (Steam Shovel). 22, Figs. 596-598. The wire ropes passing around the swinging circle and carried back to the swing gear and drum.

Swing Engine. (Steam Shovel). 24, Figs. 596-598. The engine geared to the swing drum and used to revolve the swinging circle.

Swing Figurehead (Steam Shovel). 25, Figs. 596-598. The fixed pulley or sheave about which one of the swing cables is passed to be lead back to the swing gear and drum.

Swing Gear (Steam Shovel). 23, Figs. 596-598. The gear and drum about which the swing cables are wound and which controls the movement of the swinging circle.

Swing Hangers. 46, Figs. 4705-4713, 4771-4775, and Fig. 4846. Bars or links attached at their upper ends to the transoms of a swing motion truck, by which the spring plank is suspended at their lower end so that it can swing laterally. Various forms are (1) solid bars with an eye at each end; (2) swing link hangers, made like a long link of a chain; (3) those made with a fork or clevis at one end and an eye at the other, Figs. 4543-4544, and used on passenger trucks; and (4) those made with a very short link attached to an eye bolt passing through the transom. These latter are called eye bolt link hangers. Also called bolster hanger.

Swing Hanger Friction Block. A casting or bearing of considerable diameter, on which the upper end of a swing link hanger rests. See also below.

Swing Hanger Friction Washer (Lower and Upper). A cast iron chafing block serving no other purpose than to take the wear. It is only occasionally used. A friction block is almost synonymous, but is usually a larger casting.

Swing Hanger Pivot (Lower and Upper). (Car Trucks). 47-48, Figs. 4705, 4713; 4771-4777. An iron bar by which a swing hanger is suspended, or which supports a spring plank. The lower swing hanger pivot is more commonly called a cross bar or mandrel pin or axle, Fig. 4922. The upper one is carried in a swing hanger pivot bearing attached to the transom.

Swing Hanger Pivot Bearing. 49, Figs. 4705-4713, 4771-4774, and Fig. 4893. See above.

Swing Hanger Shaft. A **Swing Hanger Pivot** or **Cross Bar**, which see.

Swing Links. See **Swing Hanger.**

Swing Link Hanger. 6, Figs. 4705-4713, 4771-4777, etc. A **Swing Hanger**, which see, made in the form of an open link.

Swing Motion. A term applied to an arrangement of hangers and other supports for the springs and

truck bolster which enables a car body to swing laterally on the truck. See **Swing Bolster, Swing Hanger.**

Swing Motion Spring. 1. A **Bolster Spring,** which see.
2. A lateral motion spring.

Swing Motion Truck. Figs. 4687-4688. A truck with a bolster and spring plank suspended on swing hangers so that they can swing laterally to the truck frame. Also called swing bolster truck in distinction from a rigid bolster truck. Most passenger trucks are swing motion trucks.

Swing Spring Plank. 43, Figs. 4705-4713, 4771-4777. A transverse timber underneath the bolster of a four-wheeled truck, or the spring beam of a six-wheeled truck, on which the bolster springs rest. A swing spring plank differs from an ordinary spring plank in being supported by hangers or links. See **Spring Plank.**

Swinging Circle or **Mast Wheel** (Steam Shovel). 10, Figs. 596-598. A large wheel at the foot of the mast or boom about which is wound a chain for revolving the boom.

Swinging Platform (Pile Driver Car). A platform carrying the entire pile driving gear in such manner that it can be swung about at right angles to the car so as to project for a considerable distance on either side. It swings upon a center plate, and its movements are controlled by the **Slewing Gear,** which see. A cabin is almost always built upon it, and the floor is constructed with sills and end sills corresponding to those usually used in a car floor. Removable wings are sometimes provided to support the swinging platform when swung out in this manner. See **Pile Driver Car.**

Swinging Sash. A window or blind sash which is hung and swings on hinges. See **Door Case Sash** (Street Cars). Otherwise rarely used.

Switching. The act of moving cars from one track to another by means of switches, as in making up or separating trains, and placing the cars on the tracks and in the places where there are needed. Also occasionally called drilling or regulating, and in Great Britain shunting or marshaling.

Switching Eye. More commonly **Push Pole Corner Iron** or **Push Block,** which see. A cast iron socket usually attached to the lower corner plate of a freight car, to which a push bar or push pole can be attached, to move the car by an engine on an adjoining track. A roping staple or pull iron is sometimes called a switching eye.

Swivel (of a Chain). A twisting link, consisting of a headed pin, entering into an eye or ring in an adjacent link. The object is to avoid kinking. Hence the term is applied to many forms of equivalent devices, consisting essentially of a ring surrounding a headed bolt in such manner as to permit rotation.

Symington Journal Box and Dust Guard. Figs. 5306-5314. A journal box with a machined joint on the lid and box and with a spring exerting its entire pressure in the center of the lid. The interior of the box is arranged to prevent settling and rolling of waste and to facilitate packing and maintenance.

T

T or **Tee** (Pipe Fittings). Figs. 2781-2782, 3053, 3056-3057. A T-shaped cast iron tube for uniting one pipe at right angles to two others in the same line. The pipes are screwed into the arms of the T. A **Reducing Tee,** which see, has the arms of different diameters.

T-Hanger. See **Spring Hanger.**

T-Hinge. Fig. 2460. A door hinge, one part of which is made like a strap hinge, and the other like a butt hinge, so that the shape of the whole resembles a letter T.

Table (Parlor and Sleeping Cars). 27, Figs. 2201-2202. A removable board attached to the side of the car by inserting a table hook fixed to the table into a table hook plate fixed to the side of the car. The inner end of the table is supported by a table leg, which is sometimes vertical and sometimes **Slanting,** which see. The tables of **Dining Cars,** which see, are permanently fastened to the floor and sides of the car. A drop table is used in the kitchens of dining cars.

Table Fastener. A latch by which a folding table is fastened up out of the way.

Table Furnishings. Figs. 4408-4410, 4411-4417.

Table Hinge. Fig. 2457. A hinge for a table.

Table Holder. Figs. 4408-4409. A special form of table hook. See **Table.**

Table Hook. 45, Figs. 2201-2202 and Figs. 4411-4417. See **Table.**

Table Leg Hook. Fig. 4408. A metal hook which is attached to a slanting table leg. It engages in a plate attached to the side of the car. See **Slanting Table Leg.**

Table Leg Hook Plate. See **Slanting Table Leg.**

Table Plate. 46, Figs. 2201-2202 and Fig. 4417. See **Table.**

Tag (Seal Lock). A loose label used chiefly in connection with seals. They are now often made of metal.

Tail Bolt. See **Drawbar Bolt.**

Tail Coupling (Alcove Faucet). Fig. 3642.

Tail Gate. Fig. 4016.

Tail Gate Sockets (Vestibule Fittings). Fig. 3957.

Tail Lamp or **Tail Light.** Fig. 3617. 1. A signal lamp attached to the rear of a train. They are always carried on the platform, usually in pairs, and very commonly also at the side of the car so as to be visible from the engine. They are often of two or more colors.

2. (British.) A colored signal lamp carried at the rear end of the last vehicle of a train. See also **Side Lamp.**

Tail Pin (Buhoup 3-Stem Coupler). Figs. 1010-1011; 574, Figs. 1883-1935.

Tank. 1. (Passenger Cars.) A water tank for the wash room.

2. (Gas Lighting Apparatus.) A, Fig. 3047. More properly **Receiver,** which see.

3. (Tank Car.) Figs. 123-130, 545-576. A boiler iron receptacle for oil, sometimes made of uniform diameter or straight, but generally made telescopic by slipping each successive ring inside the other, so as to bevel the tank toward the middle, to afford better drainage. It is held in place by tank bands, 107, fastened to tank band tie rods, F, on the top of a car to prevent the tank from turning. A tank dome, 108, is added at the top and tank heads, 106, are used to close the ends. The oil is drawn off through the tank valve, 114.

4. (Westinghouse Brake.) The main reservoir.

Tank Band. 107, Figs. 545-549. Wrought straps which pass around the tank of a tank car and hold it in place on the underframe. See **Tank.**

Tank Band Tie Rod. F, Figs. 545-549. See **Tank.**

Tank Car. Figs. 123-130, 545-576. A car provided with a large **Tank,** which see, for carrying oil, acids,

molasses, paraffine, and, in fact, all liquids transported in bulk. By far the greater number of tank cars are engaged in carrying crude and refined petroleum. Those used to carry the thicker oils, molasses and paraffine are fitted with steam pipes, by which the contents may be melted or warmed to hasten its discharge.

Tank Cars (M. C. B. Recommended Practice).

In 1903 a report was submitted embodying certain specifications for the repairs of old equipment and the construction of new equipment. These specifications were submitted to letter ballot and adopted as a Recommended Practice.

In 1906 these specifications were modified; also, in 1907. In 1908 a further revision was made.

The modified specifications are as follows:

Requirements for Tank Cars.

Tank cars offered for movement over the lines of a railroad must conform to the following general and detail specifications.

GENERAL SPECIFICATIONS.

DAMAGE BY FIRE.—Tanks which bear evidence of damage by fire must be withdrawn from transportation service.

TRUCKS SIZE OF AXLES.—Each truck must have a strength equal to or greater than the strength of the axles used.

Sizes of axles must conform to rule relating to axles in M. C. B. Rules of Interchange for Freight Cars, which have been modified as below, to make them applicable to tank cars:

TABLE I.

FOR TANK CARS MARKED LIMIT WEIGHT I.

Limit Weight I in lbs.	Journal.	Wheel Seat.	Center.
161,000	5 inches	6¾ inches	5⅞ inches
132,000	4½ "	6¼ "	5 5-16 "
112,000	4 "	5⅝ "	4⅞ "
95,000	3¾ "	5 "	4⅜ "
79,000	3½ "	4¾ "	4⅛ "
66,000	3¼ "	4⅝ "	3⅞ "
58,000	3 "	4¼ "	3½ "

TABLE II.

FOR TANK CARS MARKED LIMIT WEIGHT II.

Limit Weight II in lbs.	Journal.	Wheel Seat.	Center.
161,000	5 inches	6¾ inches	5⅞ inches
132,000	4½ "	6¼ "	5⅜ "
112,000	4¼ "	6 "	5¼ "
95,000	3¾ "	5½ "	4¾ "
79,000	3½ "	5¼ "	4⅝ "
66,000	3¼ "	4⅞ "	4¼ "
58,000	3 "	4¾ "	4⅛ "

All tank cars to have Limit Weight I or Limit Weight II stenciled on them.

AXLES.—New steel underframe tank cars built hereafter must have axles to meet requirements of Table No. 2 and car stenciled Limit Weight No. II.

Existing tank cars built prior to this date must have axles to at least meet requirements of Table No. 1, and preferably Table No. 2; and be stenciled "Limit Weight I" if the axles conform to Table No. 1, or "Limit Weight II" if the axles conform to Table No. 2. When all the axles under any car are changed to meet the requirements of Table No. 2 the stenciling must be changed from "Limit Weight I" to "Limit Weight II," to protect the tank owner when renewals of wheels or axles are made in repairs.

BRAKES.—Each car must be equipped with air brakes of a capacity equal to not less than 70 per cent. of the light weight of car, and at least one hand brake operating the brakes on both trucks.

SAFETY APPLIANCES.—Each end of car must be provided with the necessary steps, grabirons, etc., to comply with the requirements of the M. C. B. Association. Each tank car must be provided with substantial and adequate hand railing securely fastened and applied, as shown in the Standards of the M. C. B. Association. Where, from the construction of a car, a side hand railing is inadmissible and therefore involves an overhead running-board and high brake staff, each end of car must be provided with ladders to comply with the requirements of the M. C. B. Association.

PUSH-POLE POCKETS.—There shall be a push-pole pocket at every corner of the car. Where, from the construction of the car, the push-pole pockets cannot well be placed on the body, they must be applied to the trucks, so placed above the journal boxes that the push pole will push toward the center of the truck.

DOME YOKES, TANK STRAPS, ETC.—Tanks must be secured from turning on the underframes, either by center anchors riveted to the tank and underframe, or by means of dome yokes, and must also be secured to underframe by means of tank straps, two for tanks not more than 76 inches in diameter, and four for tanks of greater diameter. The center anchors may be made of two parts, sliding into each other, one riveted to the tank and one to the underframe. This sectional area of dome yokes and tank bands must at no place be less than three-quarters of a square inch, or 1 inch round iron upset to 1⅛ inches at threaded end. Cars having no underframe, with tank securely riveted to body bolsters, do not require dome yokes or tank bands

Explanation: A threaded end is 1⅛ inches in diameter or more, with a body consisting of a flat band by 2 by ⅜ inches or equivalent section, or round iron 1 inch in diameter will be accepted as meeting the requirements.

The dome yoke proper which passes around the dome may be a rod ¾ inch in diameter, or its equivalent, to which is secured the strap or rod which is fastened to the underframe. The sectional area of dome yoke strap must be the same as required for tank straps.

Where tanks are equipped with a greater number of tank bands than called for, the total sectional area of all bands will be considered as meeting the requirements if they equal the total sectional area of the rods specified.

Existing tank cars, which have the reqired number of tank bands and dome yokes, but where the 1-inch rod fastening the tank band to the underframe is not upset for the threaded portion to 1⅛ inches, will be accepted until such time that the cars go to the shop for repairs, when the threaded portion of such bands must be changed to 1⅛ inches or 1¼-inch rods used.

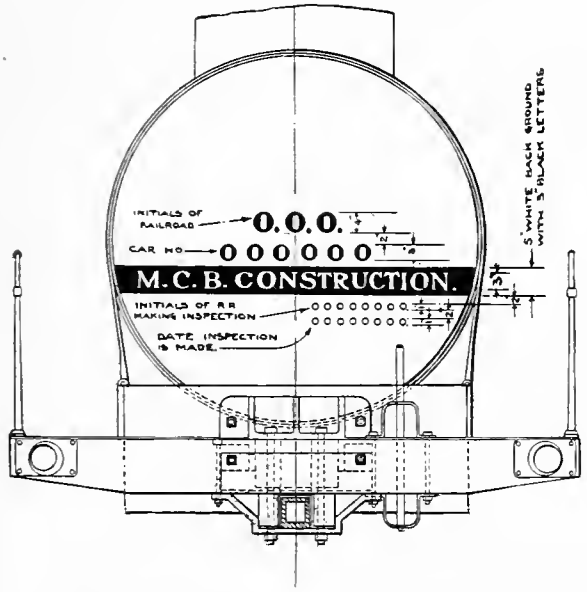
TEST.—Tanks must be carefully inspected and tested with cold water pressure at least once in ten years. The test for new tanks should be at sixty pounds per square inch and for old tanks at forty pounds per square inch, which they must stand without serious leak or evidence of distress. This inspection and test must be made by the tank-car owners, and all tanks must so be tested by January 1, 1908.

Tanks, when tested, must be stenciled with date and place where test was made, and by whom, as follows:

Tested (Date).....
Pressure (Pounds per square inch).....
At (Place) .....
By (Name of Firm).....

New Tanks.—New steel or iron tanks must be designed for a bursting pressure of not less than 240 pounds per square inch.

Inspection.—All tank cars at home on a railroad must be inspected by inspectors in the employ of that railroad company, and when such tank cars meet the requirements herein set forth, the legend shown below must be stenciled by the inspector on both tank heads, with the initials of the railway company making such inspection and the date the inspection is made. If foreign tank cars and individual tank cars at home on foreign lines stenciled with the legend "M. C. B. Construction" by a foreign road are offered for movement over another railroad and some of the details do not conform to the requirements of the tank-car circular, a report



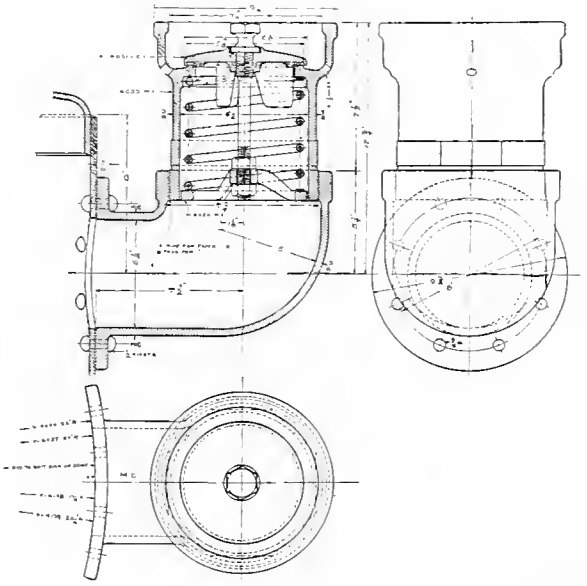
of same should be made through the proper officers to the official in charge of equipment and the car allowed to proceed until further notice.

APPLICATION OF SAFETY VALVES.

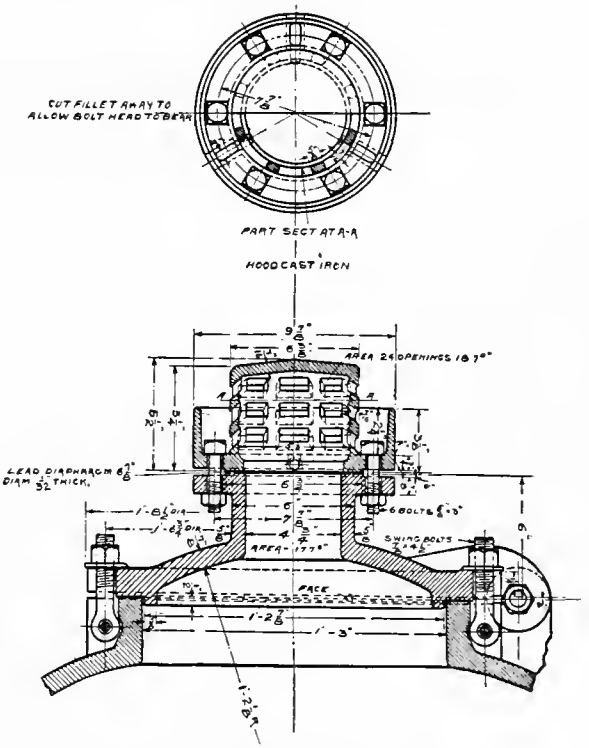
Five-inch Safety Valves.—All tanks carrying volatile or inflammable material, such as crude petroleum, fuel oil, benzene, naptha, kerosene, illuminating oils, petroleum products, turpentine, etc., must be equipped with five-inch safety valves of the recommended design; one valve for a capacity of 6,500 gallons or less, and two valves for a capacity of more than 6,500 gallons. Where tank cars carrying such products are subdivided into compartments, each compartment must be provided with a safety valve. Where only one valve is used, it must be set to open at a pressure of eight pounds per square inch; where two valves are used, only one must be set to open at a pressure of eight pounds per square inch, and the other at twelve pounds per square inch.

Safety Vents with Lead Disks.—Tank cars carrying volatile, non-inflammable products, such as gas liquor, ammonia liquor, etc., where the prevention of evaporation is essential, may be provided with vents depending on frangible lead disks for safety, which vents shall be of recommended design, as shown by cut below, the disks to be of a thickness that shall insure rupture at pressure not higher than twenty-five pounds per square inch.

Vent Hole or Small Valve.—Tank cars carrying non-inflammable or non-volatile material, such as sulphuric acid, vinegar, linseed oil, cotton-seed oil, lard oil, fish oil, tannery products, glucose, molasses, calcium chlorid, caustic soda, silicate of soda, etc., need not be provided with five-inch safety valves, but each tank must have a small open vent or valve, equal to not less than 2 inches in diameter.



In the case of such liquids as coal tar, containing volatile products where it is essential to avoid the escape of the vapor, either the frangible lead disk or standard safety valve may be used, otherwise one or more open vents equal in area to an



Old Tank Cars Having Wooden Underframes.

opening of not less than two inches in diameter will be acceptable.

Tank cars having wooden underframes, of railway or individual ownership, will be required to conform to the foregoing general specifications, and in addition, must be as strong as the construction covered by the following detailed specifications:

Center Sills.—If cars are not equipped with intermediate sills the underframe must have two center sills, each not less than 5 inches wide by 10 inches deep, or the equivalent in strength. If the car is equipped with intermediate sills, the center sills must not be less than 5 inches wide by 9 inches deep, or the equivalent in strength. Center sills must not be spaced more than 18 inches apart.

Center Sill Filling Timber.—Where draft timbers are underneath the center sills, the space between the center sills must be filled in with timbers not less in depth than center sills, extending from end sill to the center of nearest cross-bearer or cross-timber, provided the latter is located not less than 4 feet 6 inches from center of bolster. On cars where the draft arrangement is between center sills, the filler timber must be extended to the cross-tie timber when the cars go to shop for repairs to center sills. Center sills and filling timbers must be securely bolted together by means of ¾-inch bolts. On cars having center or intermediate sills not less than 10 inches wide by 10 inches deep, which may be made up of two 5 by 10-inch sills, bolted together, the filling timbers may be omitted.

End Sills.—End sills not reinforced by buffer blocks must not be less than 9 inches wide by 10 inches deep. End sills 6 inches wide by 12 inches deep, reinforced with buffer blocks not less than 6 inches wide by 10 inches deep and of sufficient length to overlap center sills, will be acceptable as a substitute for 9 by 10-inch end sills.

On existing cars, if buffer blocks are used for the purpose of reinforcing end sills which do not come within the specified requirements, the buffer blocks in no case must be less than 4 inches thick nor end sill less than 6 inches thick. The total strength of the end sill and buffer block must be equal to the strength of the construction specified.

Draft Timbers.—Draft timbers secured to inside of center sills and extending to cross-bearer or cross-timber will be accepted as a substitute for filling timbers referred to above. Where center sills are 9 inches wide by 10 inches deep, or over, and draft timbers are placed between same, they need not extend farther back than body bolster, provided they are adequately secured to center sills by means of seven ⅞-inch bolts or their equivalent, and butt against body bolster. Draft timbers located underneath the center sills must not be less than 4 inches wide by 8 inches deep, and each draft timber must be held to center sills, end sills and buffer block by means of seven or more ⅞-inch bolts, or six 1-inch bolts. Where an arrangement for supporting draft timbers is substituted for one or more bolts and the construction is of equal strength, the same will be acceptable. Draft timbers extending beyond bolster must be secured to center sills by additional bolts.

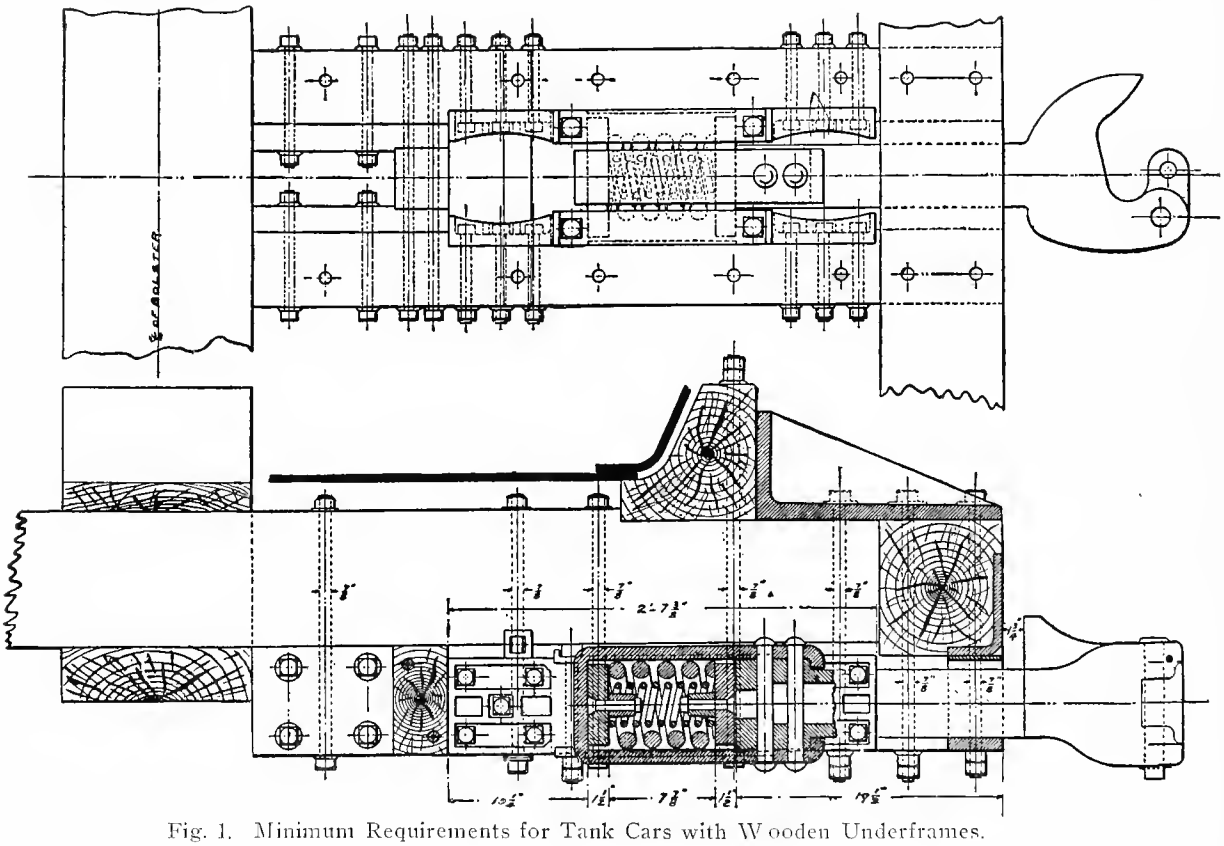


Fig. 1. Minimum Requirements for Tank Cars with Wooden Underframes.

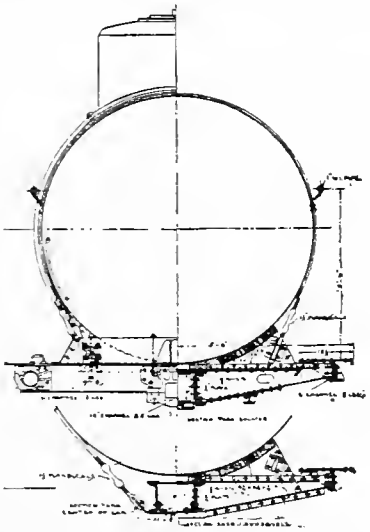
Draft Gear.—The draft gear and draft attachments must be at least as strong as the design shown in Fig. 1.

Cars should be provided with draft gear stops gained into draft timbers or heeled on end sills, filler timber or body bolster, and secured with five ¾-inch bolts; but cars having stops gained into

draft timbers or heeled on end sill, filler timber or body bolster secured with three ¾-inch bolts may be continued in service until such time as they go to shop for repairs, when five bolt stops must be provided.

In all cases, tail yokes or attachments of equal strength must be used. Tail bolts, tail straps or American continuous draft gear will not be accepted.

Head Blocks.—Head blocks must not be less than 10 inches wide unless reinforced by metal plates, and of sufficient depth to extend at least 6 inches above bottom of tank, and may be made of two pieces bolted together and bolted to underframe



by means of not less than four ⅞-inch vertical bolts. They must be cut out to suit curve of tank. The ends of each head block should, preferably, be tied to corresponding end of head block at the other end of the car by means of rods not less than 1 inch in diameter, with 1⅛-inch threaded ends, and each head block supported at center by means of a substantial casting securely bolted to end and center sills. Where the construction of the car does not permit of this fastening, the following may be substituted:

The ends of each head block tied to corresponding end of head block at the other end of car by rods not less than 1 inch in diameter, with 1⅛-inch threaded ends, and each head block secured by two stay rods 1 inch in diameter anchored to center sills;

Or, head block supported at center by means of a substantial casting securely bolted to end and center sills and two 1-inch rods passing diagonally through head block toward bolster and secured to underframe;

Or, head block secured by two stay rods 1⅜ inches in diameter anchored to center sills;

Or, head block secured by two stay rods 1 inch in diameter anchored to center sills and two 1-inch rods passing diagonally through head block toward bolster and secured to underframe.

Or, head block secured by two stay rods 1 inch in diameter anchored to center sills and two straps not less than ¾ inch thick and 3 inches wide passing over head blocks and securely fastened to underframe.

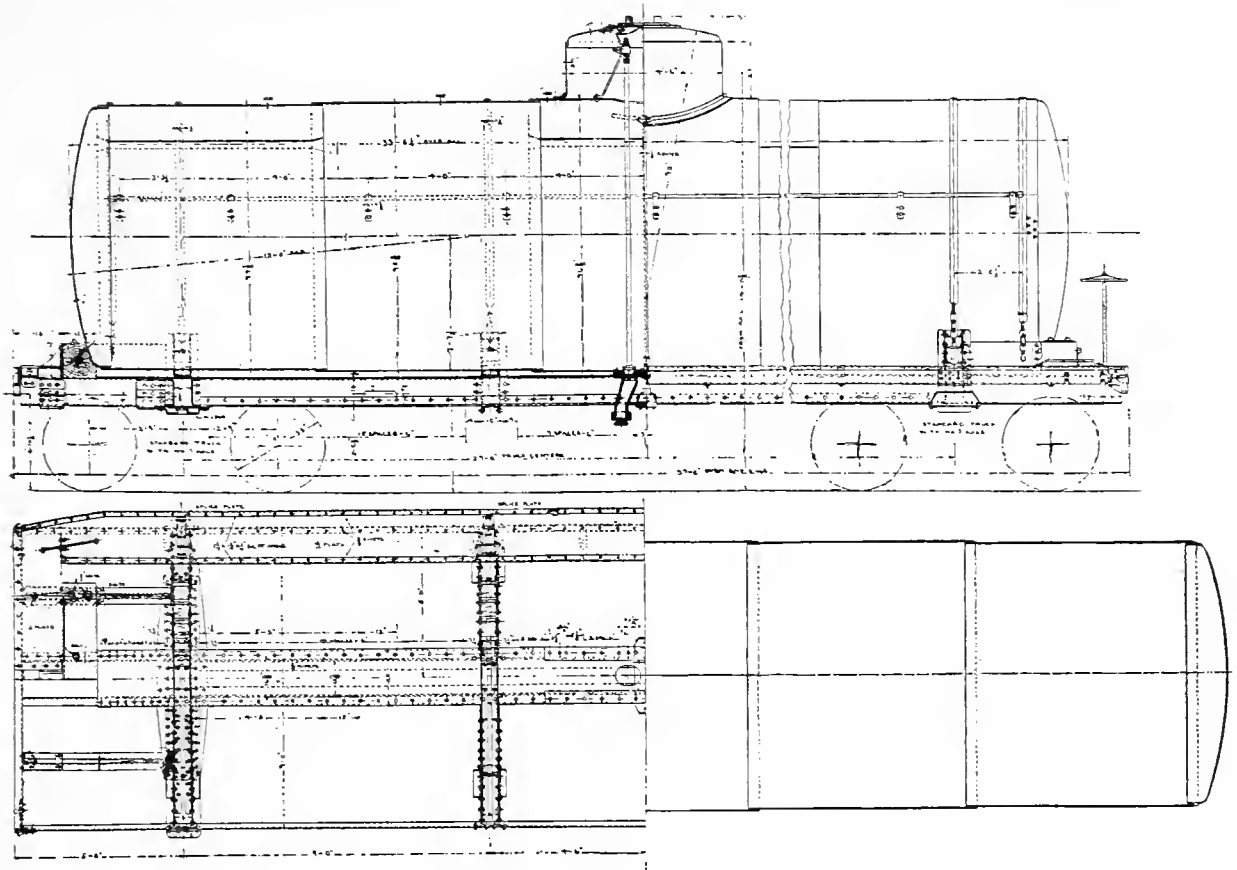


Fig. 2.

Dome Heads and Covers.—Where tank cars are fitted with cast-iron dome heads and covers not sufficiently strong to stand the necessary 40 pounds hydraulic test, they must be replaced by others of cast or pressed steel, or of malleable iron.

Tank Heads.—Tank heads less than 7-16 of an inch thick bearing evidence of damage from impact

with head blocks, should be reinforced at bottom by means of steel plate shoes ⅜ inch thick, riveted to head and shell.

NEW TANK CARS.

No tank cars built hereafter shall be accepted for transportation unless equipped with steel underframing or with reinforced shell. The design and construction of the car throughout must be at least as strong as that shown in attached Figs. 2 and 3.

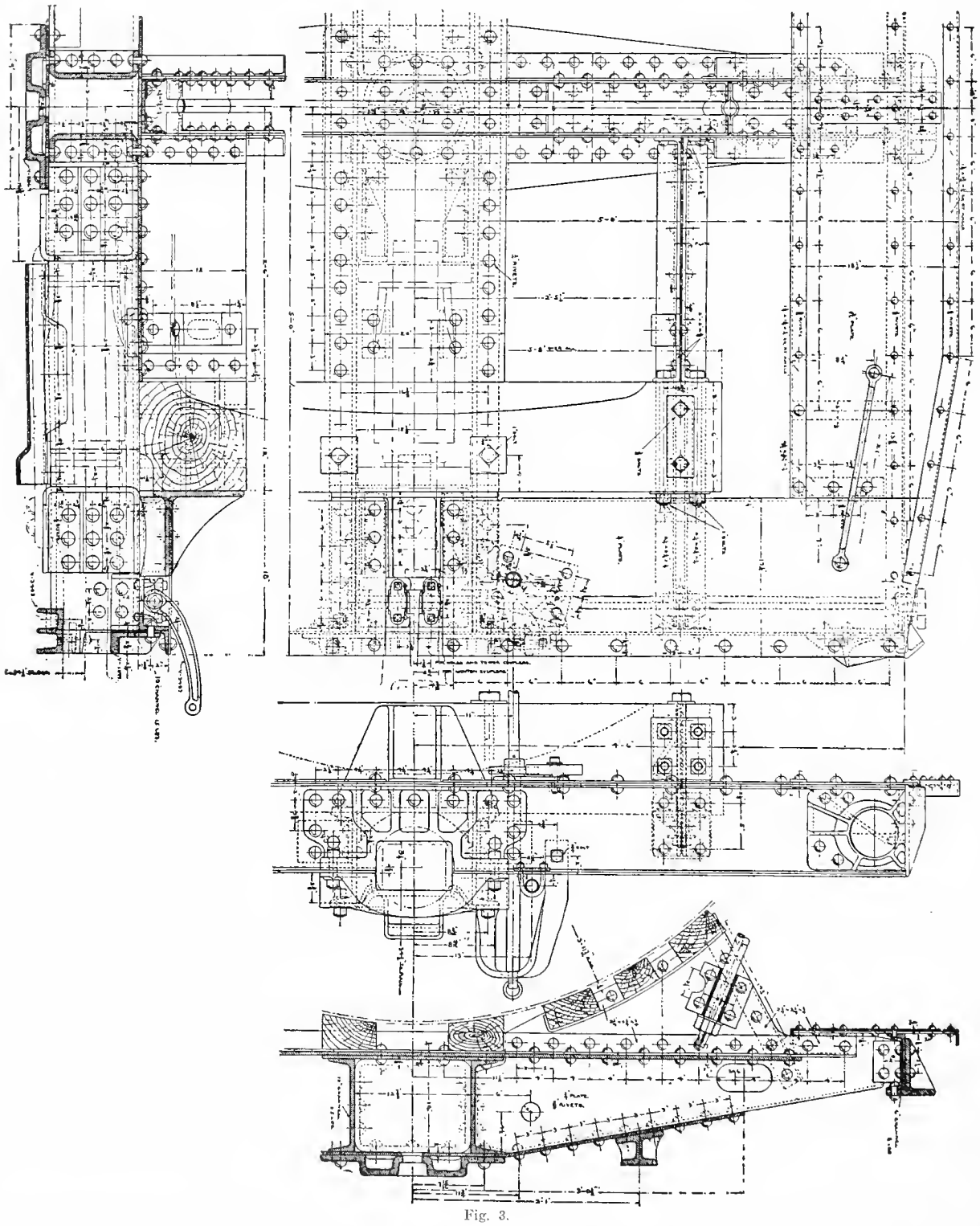


Fig. 3.

New tank cars must conform to the general specifications given in theforegoing in addition to the following detailed specifications:

CENTER SILLS.—The center sill construction of the underframe between bolsters, must have a sectional area of at least thirty square inches.

BOLSTERS; DRAFT GEAR.—Each car must be equipped with steel body and truck bolsters, steel couplers and a draft gear of approved design, having a capacity of at least 60,000 pounds. Tail bolts or straps must not be used.

TANK SEAMS.—All longitudinal and head seams must be double riveted. Where head blocks are not used, head seams need not be double riveted.

CARS WITHOUT UNDERFRAMES.—If the car has no underframe, the tank shell at bottom must be at least ⅝ inch thick, and all circumferential seams in

bottom sheet except head seams must be double riveted. The sectional area of the additional metal in bottom of tank shell must be at least 20 square inches.

LONGITUDINAL ANCHORAGE.—Particular attention must be given to the longitudinal anchorage of the tank which must be thoroughly substantial to prevent end shifting.

Steel underframe tank cars must have a longitudinal clearance for tank valve extension of not less than 2½ inches on each side of valve.

Wooden underframe tank cars must have as much longitudinal clearance for tank valve extension as the construction wil permit, with a minimum of six inches on each side.

DOME HEADS AND COVERS.—Dome heads and covers must be made of either cast or pressed steel or of malleable iron.

Tank Head Block. E. Figs. 545-549. A block securely bolted to the underframe transverse to the sills, at either end of the tank, to prevent any longitudinal motion of the tank with respect to the car. The block is shaped to fit the end of the tank.

Tank Nozzle. A short pipe used to empty the **Tank,** which see. It is usually cast in one piece with the **Tank Valve,** which see.

Tank Saddles. D, Figs. 545-549. Floor distance blocks placed between the sills and curved to the contour of the tank; they support the tank slabbing, which in turn carries the tank.

Tank Slabbing. C, Figs. 545-549. Longitudinal strips or filling pieces underneath the tank of a tank car, upon which the tank bears.

Tank Step (Tank Car). A metal shelf or bracket fastened to the tank to facilitate access to the top of the dome.

Tank Valve. 1. (Tank Car.) 114, Figs. 545-549. A valve attached to the bottom of the tank to draw off the contents.

2. (Water Cooler.) A valve used with water tanks which extend to the roof, and sometimes with other smaller fixed tanks, for enabling them to be completely drained when desired. Also called water cooler valve.

Tank Valve Gage. A metal inclosure, over the top of a tank valve, as a guide for it.

Tank Valve Rod. 117, Figs. 545-549. An iron rod for opening and closing a tank valve extending from the valve to the top of the dome.

Tank Valve Rod Bracket. 117c, Figs. 545-549. An iron brace in the tank valve having a threaded hole or bushing in it through which the tank valve rod screw passes.

Tank Valve Rod Screw. 117a, Figs. 545-549. The spiral screw thread on the upper end of the tank valve rod which passes through the tank valve rod bracket and which causes the valve to move up or down on the valve seat when the rod is turned.

Tank Waste Cock Spider. Fig. 3651.

Taper Charge Vibrator or **Relay.** An automatic and sensitive electrical device similar in construction to the battery voltage relay. It acts as an auxiliary regulator in connection with the generator regulator to taper the charging current of the generator after the voltage of the battery has reached a predetermined value, indicating that the latter is fully charged. Its action on the regulation differs from that of the battery voltage relay in that instead of abruptly cutting off the charging current it tapers the same, causing the charging current to decrease gradually to zero. The taper charge vibrator or relay gradually assumes control of the apparatus and finally regulates the axle generator as a constant potential machine.

Target Lamp. A **Signal Lamp,** which see, used for attaching to fixed targets or semaphore signals. No special form of signal lamp is required or used for this purpose except that they be powerful and well constructed lamps.

Tarpaulin or **Wagon Sheet** (British). A piece of stout, flexible waterproof painted canvas, measuring about 20x12 ft., used to protect the contents of open freight cars (wagons) from the weather. Cords fastened to its edges are tied to **Sheet Rings** (which see), by which it is firmly secured to the vehicle. It is largely used, as it saves much of the dead weight of a covered car, and gives good protection, except from theft.

Tassel Hook. See **Window Curtain Holder.** Tassels and tassel hooks are now rarely used.

Teak. An oily, hard and most durable wood, grown in India. Largely used for ship building or other purposes requiring strength and exceptional durability. It has an oily, odorous sap, shrinks little and does not corrode iron. Generally used for passenger car bodies in Great Britain and for wheels.

Teak Wood Center Wheel. A form of steel tired wheel, in which triangular blocks of teak wood are used to connect the hub to the tire, which latter is attached to the wood by Mansell retaining rings. This wheel is the standard for Great Britain passenger service, but it has been considered that it would not stand the dry American climate. See **Wheel, Car Wheel, Mansell Retaining Ring.**

Tee. See **T.**

Telegraph Cock or **Faucet.** Figs. 3653-3654. A self-closing cock, the lever of which resembles the key of a telegraph instrument. See **Lever Faucet.** When the water enters the cock horizontally they are called horizontal telegraph cocks, as Figs. 3292-3293. When it enters vertically they are called vertical telegraph cocks. See **Faucet.**

Temperature Regulator (Gold Steam Heating). Figs. 2818, 2821. A device for automatically controlling the supply of steam to maintain any desired temperature in the car.

Templet. "A gage, pattern or mold, commonly a thin plate or board, used as a guide to the form of the work to be executed."—Webster.

Tenon. The projecting end of a piece of timber fitted for insertion into a mortise by cutting away a portion on one or more sides. Sometimes the tenon is made cylindrical. Tenons are secured in their mortises by pins or by giving them a **Dove Tail,** which see.

Tenoning Machine or **Tenoner** (Wood-Working Machinery). Figs. 6804, 6808, 6821. A tool for cutting a **Tenon,** which see. The cutter is carried on a revolving head which can be moved up and down.

Tension Bar. Any bar subjected to a tensile strain. The upper member of an iron body bolster is called the tension bar.

Tension Member (of a Frame, Truss, Beam or Girder). Truss rods, brake rods, etc., are tension members in distinction from **Compression Members,** which see.

Tension Rod (of a Derrick or Crane). A horizontal stay connecting the top of the mast and boom. It is of fixed length in a crane and of adjustable length in a derrick. See **Derrick.**

Tension Rod Clevis (of a Derrick or Crane). A **Clevis**, which see, sometimes carried at the upper end of a boom, to which the tension rod connecting the boom and mast is attached.

Terra Cotta Storage Heater System (Gold's). Fig. 2871. A system of steam heating using direct steam, in which the radiators are large iron cylinders filled with terra cotta bricks. Steam is admitted into these cylinders and heats the bricks, which give off heat after the car is cut out at stations and other like points.

Texoderm. An artificial leather used for curtains and upholstering. It is made by coating a cloth fabric with a compound which gives it the appearance of leather.

Theater Seats (Dining Cars). An ordinary double car seat having two separate seat bottoms which can be raised up into a vertical position in the manner usual in theaters, in order to make the inner seats more easy of access.

Thermo-Jet System (Car Heating). Figs. 2942-2945.

Thermostatic Steam Trap (Car Heating). Fig. 2849, etc. A device to regulate the escape of steam in proportion to the condensation that has taken place. It consists of a cast iron shell or body with an inlet at the top and outlet at the bottom. In front of the inlet is a hollow brass diaphragm, partly filled with an expansive fluid, adjusted and kept in place by lugs round the sides of the trap body by a regulating spring, and the set screw. When cold the trap is always open, but as live steam is forced into the trap and comes in contact with the diaphragm, it immediately expands, and meeting the composition disc seat, closes the trap and prevents the waste of steam. As condensation proceeds and the water cools, the diaphragm gradually contracts and allows it to pass off through the outlet.

Thimble. 1. A bushing.

2. A sleeve or tube through which a bolt passes, and which may act as a distance piece. A thimble is usually round, but sometimes square, as smoke pipe thimble. See **Body Bolster Thimble.**

Third-Class Carriage (British). Figs. 6466-6487. A car which performs much the same functions as an American so-called first-class passenger car, since it carries 89½ per cent. of the passengers, but very dissimilar in arrangement, weight and size. It generally weighs about 20,000 lbs., and is carried on four or six wheels, divided into five compartments, and seats fifty passengers. The seats and backs are comfortably shaped and upholstered in rep, stuffed with horsehair. Sofa springs and carpets are usually omitted, but parcel nets and shades are provided. The comfort of this class of carriage has been very much improved of late years, but the interior finish is considerably inferior to that of ordinary American cars, the interior being generally painted and grained.

Third Rail Shoe or **Collector.** Figs. 6333, 6337-6339. A metallic sliding contact, usually of cast iron, mounted on the car truck, and insulated therefrom, for collecting current from an insulated third rail located alongside the running rails. Positive contact between shoe and rail is maintained by gravity or by a stiff spring. Four shoes are usually used for a double truck car, each being carried on a wooden beam, supported by the truck journal boxes.

Thread. See **Screw Thread.**

Three-Pipe Manifold. A pipe fitting forming a return bend for three pipes instead of two.

Threshold or **Threshold Plate.** 1. (Passenger Cars.) A **Door Sill**, which see.

2. (Of a Vestibule.) The plate which covers the buffer plate and connects it with the platform, forming an adjustable threshold for the end door, etc.

Throat (of a Car Wheel). The interior angle of a flange where it joins the thread of the wheel. See **Flange.**

Throat Piece (Snow Plow Framing) (Side, Center and Intermediate Throat Pieces.) The curved ribs connecting the inclined plane of the plow with the deck. Being curved they give a projection to the deck, which lessens the tendency of the snow to ride over the top of the plow.

Through Body Bolt (British). Nearest American equivalent, sill and plate rod. A bolt passing vertically through the body and securing the various parts of the sides or ends together.

Thumb Piece. A general term applied to many forms of lugs or projections for moving springs, catches, or other movable mechanical parts.

Thumb Screw. A screw with two projecting flat sided flanges adapted to be turned with the finger and thumb.

Tie. "A beam or rod which secures parts together and is subjected to a tensile strain. It is the opposite of a strut or straining piece, which acts to keep objects apart, and is subject to compressing force." —Knight.

Tie Bar. A bar which acts as a tie. See **Pedestal Tie Bar, Pedestal Brace Tie Bar, Transom Tie Bar.**

Tie Rod. A rod which acts as a tie. See

End Girth Tie Rod.
Girth Tie Rod.
Lever Frame Tie Rod.
Platform Tie Rod.
Safety Beam Tie Rod.
Sill Tie Rod.
Wheel Piece Tie Rod.

Tie Timber. See **Cross Tie Timber.**

Timber Key. Figs. 785-786. See **Sill Timber Key.**

Timber Wagon (British). A short four-wheeled flat car with a swiveling bolster, chains, posts, etc., adapted to carry timber in the log, which rests on two or three timber wagons coupled together.

Tin Car Roof. A roof consisting of a layer of boards resting on the rafters and running lengthwise to the car, covered with tin plates, the edges of which are soldered together. Used on passenger cars, and a somewhat similar roof of galvanized iron is the Excelsior galvanized car roof made for freight cars, Fig. 2117.

Tip. An ornamental knob on the end of a rod. More commonly called acorn. See **Basket Rack Tip, Berth Curtain Rod Tip.**

Tip Car. Fig. 97, etc. A car constructed so that its body can be tipped to allow its contents to slide out. Often also called a dump car. They are usually four-wheeled, rarely eight-wheeled. A style of four-wheeled tip car, which is slowly tipped by gearing, which winds a chain, has gained considerable favor on the Boston & Albany Railroad.

Cars which are tipped by compressed air have been introduced and received with considerable favor. The advantages secured by the use of air are that cars may all be dumped at once and the bodies restored to their normal positions; they may be dumped while in motion and they are all under the control of the man on the locomotive. The dumping and restoring of the car body is effected by two train pipes, provided with an auxiliary reservoir, and the dumping is effected in much the same

way that the brakes are applied under the Westinghouse system. Mine cars are frequently tip cars.

Tire. A heavy hoop or band of iron or (usually) steel forming the ring or periphery of a wheel to impart strength to it and to resist wear. In this country car wheels are generally cast iron, but steel-tired wheels are in general use for passenger service. They have been universal in European practice, and many devices for fastening them securely to the wheel have been devised. See **Tire Fastening.**

In Great Britain the word is usually spelled tyre. The name is supposed to come from the fact that iron bands were first used on wheels in the city of Tyre, Syria.

Tire Bolt. A screw bolt for holding a tire on a wheel center. When retaining rings are used the bolts pass through the rings and hold them and the center and tire together.

Tire Fastening. Figs. 5390-5413 show the principal methods. The Mansell fastening, shown in Fig. 5404, etc., is the mode of securing the tire to the wheel which becomes operative when the shrinkage of the tire alone is insufficient to prevent the latter leaving the wheel. The Mansell retaining rings, Fig. 5404, etc.; the bolted fastening, Fig. 5396, etc.; the Boles tire lock, Fig. 5412, etc., are quite common. See **Car Wheels** and **Wheels.**

Toe (of a Car Wheel Flange). The extreme outer point where the wheel has the largest diamter.

Toe Nail. A nail driven in obliquely to fasten the end of a board or other piece of timber to the surface of another. The stick so fastened is said to be toed, or toe nailed.

Toggle Arms (Hopper Doors). The two arms of a toggle joint, which form a strut between the two opposite hopper doors, holding them closed.

Toggle Joint. "An elbow joint; a joint between two bars articulating endwise, as the human knee."—Knight.

Toilet. Another name for a saloon.

Tongs or Crabs (Pile Driver and Wrecking Cars). A device for anchoring the body of the car to the track when in use. A jack screw is used in connection with the tongs to raise the body of the car, so as to bring a strain upon the tongs. See **Bolster Jack Screw,** which is a different device for the same purpose.

Tool Box. Figs. 119-121. A box very frequently placed under the body of a car, especially in caboose, derrick or wrecking cars, for carrying tools and supplies.

2. T, Figs. 648-651. A rectangular wooden box with a glass front, in which are kept tools to be used in case of accident. It usually contains an axe, a saw, a sledge and a bar. A ground glass front is sometimes used.

Tool Car. A box car arranged for carrying all kinds of tools, ropes, etc., which are used, in case of accident to trains on the road, in replacing or removing the cars or engines on or from the track. Such cars are often used when any heavy objects are to be moved, as is necessary in erecting bridges, etc.

Tool cars are often fitted up with sleeping berths for workmen. A tool car usually serves as a tender for every wrecking crane.

Top Arch Bar. More properly, simply **Arch Bar,** which see.

Top Chord (of a Truss). The upper outside member of a truss, especially one divided up into panels. The members of mere trussed beams are not commonly designated as chords.

Top Door Rail. 149, Figs 648-651, etc., and 4, Figs. 1329-1337. The uppermost horizontal bar or piece of a door frame.

Top Door Track. 65, Figs. 262-272, etc. See **Door Track.**

Top Light Rail (British). A part of the body framing of a carriage forming the top of the window opening.

Top Panel Batten (British). American equivalent, furring. A part of the body framing to stiffen the top panel, which is pinned to it.

Top Plate (Metal body Bolster). 1, Figs. 1128-1129 See **Body Bolster.**

Top Rail (of Door). See **Top Door Rail.**

Top Rail. A name applied sometimes to the plate of a street car.

Top Rail Filling Strip. See **Filling Piece.**

Top Reservoir Journal Box. A journal box having a reservoir for oil or grease above the journal, from which the oil flows to the journal. Rarely used in this country, but common in Europe, with either oil or some form of grease as a lubricant.

Top Side Bearing. A body side bearing. See **Side Bearing.**

Top Side Rail (Coal Car). The horizontal piece of timber which forms the top of the side. A similar part in roofed cars is called the plate.

Torch and Key (Pintsch System.) Fig. 3103. A special device combining the ordinary wax taper torch, and a key, fitted to handle the cock of any Pintsch lamp, as well as to open or close the globe of any lamp from the floor of the car.

Tornado Canopy Ventilator. Fig. 4421. See **Ventilators.**

Tornado Lamp. A general term applied to lamps which receive their supply of air through a long tube, usually connected with the supports or arms of the lamp, so as to check the effect of sudden gusts of wind. Hurricane lamp is another name for the same thing.

Torpedo. A cylindrical detonating cap provided with clips for folding under the head of the rail for the purpose of making a loud alarm as a signal on the passage of engines over them. The basis of the detonating compound is fulminate of mercury. The interior pieces of iron, to insure the explosion of the fulminate, are termed anvils. Some torpedoes have three anvils. A torpedo with spring clips has been introduced for attaching to the track from the rear end of a train in motion by means of a patented carrier to be held in the hands of the trainman, which insures that the torpedo will not escape except to clasp the head of the rail. The same device is also used to attach blue lights to the track, burning for a fixed length of time.

Torpedo Ventilator. Fig. 4429. See **Ventilator.**

Torsion-Proof Car Roofing. Figs. 2160-2183. A construction for freight car roofs with sheets sliding into sub-rafters.

Tourist Car. Fig. 218. 1. A car roughly built and furnished for the transportation of men alone, such as bodies of troops, parties of excursionists, emigrants, etc. Frequently they are flat or box cars furnished with roof sides, seats and doors. The emigrant sleeping car is now usually called a tourist car, the latter being preferred by those who patronize them.

2. A private car, one of several, of elaborate fin-

ish and luxurious appointments, chartered by excursionists who are making a tour of the country.

Tourist Sleeping Car. Fig. 218. A sleeping car plainly finished, sometimes upholstered in rattan, for accommodation of travelers who cannot afford the comforts of the luxurious standard sleeping car.

Towel Rack. Fig. 3670. A tray of rods for holding clean towels.

Towel Rod. Figs. 3740-3741. A rod with brackets or bushings at the ends upon which towels may be hung.

Towel Rod Brackets. Fig. 3707, etc. See **Towel Rod.**

Towel Roller Bracket. Figs. 3722-3724. A bracket for supporting a towel roller. There are two, the fixed end and loose end bracket. The principal supply of towels, however, is usually carried in a towel rack or hung on towel rods.

Tower Coupler (Freight). Figs. 1639-1647. (Passenger). Fig. 1639.

Track. 1. A rail or bar which forms a path on which anything, as a car door, runs. Sliding doors have usually two door tracks, bottom and top door track.

2. (Pile Driver Car.) A circular track upon which the rollers of the swinging platform travel. A rack is connected with it as a part of the slewing gear.

Track and Wheels, Terms and Gaging Points. Fig. 5598. See **Wheels and Track.**

Track Laying Car. 1. A low push car, primarily for carrying rails short distances in construction. They are frequently without a floor or platform and are provided with fixed rollers at the side for running the rails forward.

2. A platform car with a cantilever truss extending out from one end of the car over the track and on which rails may be run out and distributed on the ties.

Track Sweeper. Fig. 6256. A **Sweeping Car,** which see. For city use only.

Traction brake. See **Westinghouse Traction Brake.**

Train Air Signal Apparatus. Fig. 1220. A substitute for the bell cord arranged to give train signals by compressed air. A separate line of signal pipe, similar to the brake pipe, extends throughout the train, connected between the cars by hose and couplings. A car discharge valve, connected to this signal pipe, is located in each car and attached to the bell cord in such manner that pulling on the cord releases air from the signal pipe. In the cab on the engine or motor car is a signal valve, which is also connected with the main signal pipe and a small signal whistle. The supply of air is received from the main reservoir through a reducing valve, which maintains a pressure of about 45 lbs. per square inch in the signal apparatus.

When the car discharge valve is opened, by pulling on the cord, the diaphragm in the signal valve is operated so as to blow the whistle. Signals can be given in this way with rapidity and great certainty. If the train breaks in two the whistle is blown loudly for a considerable time.

Train Air Signal Stop Cock. A stop cock in the air signal pipe. There is one at each end of a car.

Train Brake Pipe. See **Brake Pipe.**

Train Car. A **Caboose Car,** which see.

Train Line Coupler. Figs. 3398-3401.

Train Lines. A system of heavy conductors, generally three in number, running the entire length of the car either over the roof or under the car body and terminating at each end of the car in a suitable connection device, located either above the vestibule opening or below the platform. Two of these conductors are tapped and connections carried down inside of the car where connection may be made with the electric lighting system of the car. The other conductor generally has no connection to it in the car. Its purpose is to act as an end feeder or equalizer when a head end generator is employed. The other two conductors or lines may be employed for tying together in parallel the lighting systems of the different cars, irrespective of whether a head end generator is used or not.

Train Line Jumper. A connection made generally at the rear end of the train on the end farthest from the head end generator connecting the conductor which is not tapped in the cars to one of the conductors that is tapped. The current is carried from the generator clear through to the end of the train and by means of the jumper brought back on one of the other wires. This arrangement of train lines, known as the equi-potential or return loop, insures uniform voltage at each of the cars, irrespective of the drop or loss that may take place in the conductors themselves.

Train Line Connector. A device for connecting the train lines of one car to those of another in such a manner as to insure the proper connection of the conductors of one car with those of another independently of sequence or end relations of the various cars; that is to say, the conductor must always join wire No. 1 of one car with wire No. 1 of the next car, etc., no matter whether the cars have been turned end for end or in what order they may stand in the train.

Train Pipe (Air Brake). See **Brake Pipe.** The latter and preferable name is brake pipe.

Train Signal Lamp. Fig 3617. A lamp attached to a car as a signal, usually to the last car on the train, and commonly called a tail light. See **Signal Lamp.** They are usually some form of lantern. Lanterns of ordinary form, but with red globes, are also used.

Train Signal Pipe. See **Signal Pipe.**

Transfer Table. A platform and section of track on wheels, its length being equal to the length of a car. Its chief use is to transfer cars from one section of a shop to another, connecting with parallel tracks and running transversely to them.

Transom. 1. Primarily, a cross piece.

2. (Carpentry.) A horizontal piece framed across a door or double light window. The term is also applied in the general sense of a cross piece in other ways.

3. (Trucks.) 20, Figs. 4771-4777 and Figs. 4784-4785. One of two horizontal cross beams attached to the side frames, between which the swing bolster is placed. They are usually made of wood, but recently they have been made of iron. See also **Middle Transom, Outside Transom.**

4. The body bolster is also sometimes called a transom or body transom, but incorrectly. The term body transom is more properly limited, when used at all, to the **Cross Tie Timber** or **Needlebeam,** which see.

5. A word frequently used in street car work as an adjective, for the word "deck," and meaning that the part belongs to the upper deck windows or to the clear story.

6. (British.) Commonly spelled Transome, which see.

Transom and End Piece Tie Rod. A rod extending through the transom and end piece to stiffen the truck frame.

Transom Bearing Block. A piece of wood or iron placed on top of a transom, under the attachment or bearing of a swing hanger, to raise it up higher.

Transom Casting. A casting attached to a truck frame, and to which the end of one or both of the transoms are fastened.

Transom or Bolster Chafing Plate. 27, Figs. 4771-4777. A plate attached to the side of a transom to prevent it from abrasion by the movement of the bolster. See **Friction Block.**

Transom Corner Plate (Passenger Trucks). 131, Figs. 4817-4819 and Figs. 4905-4907. See **Truck Frame Corner Plate.**

Transom Draft Gear. Figs. 1580-1582.

Transom Muntin or **Mullion.** See **Mullion.**

Transom Opener. Fig. 4118. A device for opening a transom over a door; very similar to a deck sash opener.

Transom Pillar (Diamond Trucks). A small casting acting as a distance piece between the transom and inverted arch bar.

Transom Plate. Figs. 4833-4836. Iron plates on both sides of wooden transoms of passenger trucks.

Transom Sash Stop. Fig. 4525.

Transom Tie Bar. 23, Figs. 4771-4777. A wrought iron bar bolted to a pair of transoms, sometimes above and sometimes below the center to hold them together.

Transom Truss Block. 25, Figs. 4771-4777. See **Transom Truss Rod.**

Transom Truss Rod. 24, Figs. 4771-4774. Fig. 4838. Transverse rods attached at their ends to the wheel pieces, which extend alongside the transoms and are inclined downward under a central transom truss block, so as to strengthen the transoms. Generally, two such rods are used with each truck. In the Pullman trucks a transom plate is used with a straight transom tie rod.

Transom Truss Rod Seat. A bearing for the transom truss rod on the under side of the transom. See **Corner Plate.**

Transom Truss Rod Washer. 26, Figs. 4771-4777; Figs. 4813-4814. See **Washer** and above.

Transom (British). A **Cross Tie Timber** or **Needle-beam,** which see. More commonly called cross bearer, which latter term is also in use in this country.

Transverse Floor Timbers (Street Cars). Timbers which extend across the car underneath the floor, and on which the floor boards rest. They are used only when there are two sills. Not to be confused with cross tie timbers, which are under the sills.

Transverse Floor Timber Plate. A wrought iron or steel plate to strengthen the transverse floor timber and act as a tie rod for the floor timber braces.

Transverse Rising Timber. See **Rising Timber.**

Transverse Tie Rod (British). American equivalent, sill tie rod. A long rod which serves to bind together the underframe transversely.

Trap. See **Steam Trap.**

Trap (for Refrigerator Car). An S-shaped pipe, largely used in all forms of plumbing work for permitting the exit of water, while preventing the entrance of air.

Trap Door. 1. A door in a floor or roof, closing flush therewith when shut. See also **Platform Trap Door.**

2. (Pullman Wide Vestibule.) Fig. 2266. A door which covers the platform steps and makes a continuous level floor for the full width of the car in a wide vestibule.

3. A door of a street car in the floor which gives access to the motor and gearing between it and the axle.

Trap Door Holder (Vestibule Fittings). Figs 3941-3942.

Trap Door Latch (Vestibule Fittings). Figs. 3966-3977.

Traversing Jack. Fig. 3888. A jack that can be moved horizontally on a bed or track while under its load.

Tread. 1. (Of a Step.) Figs. 977-978. The part on which the foot is placed. See **Tread Board, Rubber Tread.**

2. (Of a Car Wheel.) Fig. 5518. The exterior cylindrical surface of a car wheel inside of the flange which comes in contact with the rail. The usual width is about 4 in., measured from the throat or inside of the flange, and about 5½ in. out to out measurement, from outside of flange to outside of wheel. The standard section adopted by the M. C. B. Association in 1886 is shown in Fig. 5518.

Tread Board (of a Step). 46, Figs. 599-619. The horizontal part on which the foot is placed. Usually covered with rubber or metal safety treads to prevent slipping. See Figs. 977-978.

Triangular Washer. An iron plate or block, the cross section of which is triangular, and which forms a bearing for the nut or head of an inclined brace rod. Also called beveled washer, but the latter term is chiefly used when the angle between the two faces is small.

Tri-Compo or **Tri-Composite Carriage** (British). A composite coach in which separate compartments for first, second and third-class passengers are provided.

Trigger. See **Sash Lock Trigger.**

Trimming Cap. A **Seat Back Molding,** which see. Figs. 3862-3873.

Triple Body Dump Car. Fig. 101.

Triple Brake. Figs. 4805-4806. Brakes for a six-wheel truck.

Triple Coupling Link. A kind of chain used with the draw hooks of British draw gear. Used in America for small four-wheel coal cars only.

Triple Valve (Air Brake). Figs. 1233-1240. 1. A valve device consisting of a body or case, called the triple valve body, which has connections to the brake pipe, the auxiliary reservoir and the brake cylinder, in which a slide valve is operated by a piston, so that when the pressure of the air in the brake pipe is increased the auxiliary reservoir is charged and the air in the brake cylinder is released to the atmosphere; and so that, when the air pressure in the brake pipe is reduced, air from the auxiliary reservoir is discharged into the brake cylinder for applying the brakes. A triple valve performing only these functions is now known as the plain triple valve.

2. The quick-acting triple valve has all the features and performs all the functions of the plain triple valve, and has the additional function of causing a discharge of air from the brake pipe to the brake cylinder, when, in emergencies, the maximum force of the brakes is instantly required.

3. (For Freight Air Brake Gear.) Fig. 1234. A

special form, not differing in principle from the passenger brake valve, but generally combined with the reservoir and brake cylinder in one single part for economy and convenience of attachment.

Triple Valve Body. 2, Figs. 1233-1237.

Triple Valve Branch Pipe (Air Brake). A short pipe by which the triple valve is connected with the brake pipe.

Triple Valve Gasket. A gasket placed in the joint between the triple valve and the brake cylinder.

Triple Valve Piston (Air Brake). 4, Figs. 1233-1237. See **Triple Valve.**

Tripod. 1. A three-legged stand.

2. (For Lamp Shade.) A cheap substitute for a shade ring.

Trojan Coupler. Figs. 1777-1793.

Trolley (Street Car). A small wheel, or a carriage with journal, bearings, case, etc., usually attached to the end of a trolley pole, the latter being attached, pivoted and swiveled to the top of a street car, and so stayed by springs that it tends to stand in a vertical position. This tendency of the trolley pole to stand erect keeps the trolley wheel in contact (on the under side), of an electric conductor stretched above the car over the center of the car tracks. Electric motor cars which derive the electric current through a trolley are called "Trolley Cars." The majority of electric motor cars in use at the present time are "trolley cars," taking the current from an overhead conductor.

Trolley Base. Figs. 6341, 6344. A swivel base placed on the roof of an electric car for the support of the trolley pole; strong springs preserve a firm contact between the trolley wheel and wire.

Trolley Board (Street Car). A board or several boards making a long, narrow platform (very much like a running board of a freight car), to which the trolley pole is attached, and on which inspectors and repair men may stand. The boards rest upon trolley board cleats. Trolley base blocks are fastened to the trolley boards, and the trolley pole is fastened to the base blocks.

Trolley Cord. Fig. 2186. An extra heavy cord, by which the trolley is handled from the platform.

Trolley Harp. Fig. 6352-6353. A clevis-shaped metallic frame at the end of the trolley pole for holding the trolley wheel. Also called trolley fork.

Trolley Hoist. Fig. 6853.

Trolley Wheel. Figs. 6346-6347, 6350-6351. A deeply grooved metal wheel mounted on a trolley pole for collecting current from an overhead wire.

Truck. 1. "A small wheel; hence trucks, a low carriage for carrying goods, stone, etc., either on common roads or on railroads. Indeed, this kind of carriage is often called a truck, in the singular."—Webster. The term is applied to different kinds of small vehicles used on and about stations for handling freight and baggage by hand, sometimes in a confused sense. The usage seems to be increasing, however, to speak of baggage barrows and freight trucks, although both are sometimes designated as barrow trucks. Four-wheeled vehicles, called baggage wagon trucks and freight wagon trucks, are also used. Vehicles of this class are also designated as warehouse trucks. Special varieties are the telecope, swing barrel and self-leading trucks. Many other exist, in limited use.

2. Figs. 4350-4574. A car truck, which is, mechanically, a small four-wheel (or sometimes six-wheel) car, under each end of an American car body, and carrying the latter as a dead load by means of two swiveling center plates connected by a center pin or king bolt. The purpose of the truck is to enable short wheel bases to be used in connection with long car bodies. See **Car Truck.**

Passenger car trucks are nearly always of wood in combination with iron flitch plates, truss rods, etc. For freight car trucks wood has almost passed out of use, except for the transoms, truck bolsters and spring planks, and steel is being rapidly substituted for the latter as well. Even when wood is employed it is frequently strengthened by iron or steel plates. Wooden brake beams are the exception. For spring planks, transoms and bolsters the common structural forms of channels and I beams or pressed steel shapes are used.

Truck Bolster. 30, Figs. 4705-4713, 4771-4777, and Figs. 4796-4797, 4995-5066. A cross timber or beam in the center of a truck, to which the lower center plate is fastened, and on which the car body rests. The truck bolster is connected to the body by a center pin, which passes through it.

Truck Bolster Chafing Plate (Passenger Trucks.) A plate attached to a swing bolster to protect it from wear.

Truck Bolster Flitch Plates. See **Bolster Flitch Plates.**

Truck Bolster Guide Bars (Diamond Trucks). 37, Figs. 4705-4713. More commonly called columns. Cast iron posts between the arch bars, held in place by column bolts, which form a guide for the end of the bolster. These columns are sometimes also required to perform the office of brake hanger carrier. An offset shoulder is then cast on the column near the top and on the inside with a jaw, to which the brake hanger is fastened by a pin.

Truck Bolster Guide Block. A cast iron shoe for the end of a truck bolster, which slides vertically between the columns or bolster guide bars. They are used only in connection with the latter. See above.

Truck Bolster Truss Block. See **Truss Block.**

Truck Bolster Truss Rod (Rigid Bolster Trucks). A rod attached near the ends of a wooden truck bolster. In swing bolster trucks, rods of a similar nature are used, and are termed transom truss rods.

Truck Center Bearing Truss. Figs. 66, 4780-4783. The combination of the **Center Bearing Arch Bar** and **Center Bearing Inverted Arch Bars,** which see.

Truck Center Plate. 12, Figs. 1128-1129; 63, Figs. 4361-4369, and Figs. 4502-4504. See **Center Plate.**

Truck Check Chain Eye. 70. Figs. 4771-4777. See **Check Chain.** A body check chain eye is also used.

Truck Check Chain Hook. 69, Figs. 4771-4777. A hook on the end of a **Check Chain,** which see.

Truck Details. Figs. 4784-4994.

Truck End Piece or **End Sill.** 17, Figs. 4771-4777. See **End Piece.**

Truck Frame. Figs. 5068-5071. A structure composed of wooden beams, iron or bars or cast steel to which the journal boxes or pedestals, springs and other loose parts are attached, and which forms the skeleton of a truck.

Truck Frame Corner Plate. 130, 131, Figs. 4771-4777, and Figs. 4488-4489, 4905-4907. A malleable iron or pressed steel plate bolted to the corners of a wooden truck frame to keep it stiff and rigid. They take the place of **Knee Irons,** which see.

Truck Frame Knee Iron (Passenger Car Trucks). An interior angle plate of cast or wrought iron to connect the truck frame together.

Truck Side. A **Truck Side Frame**, which see.

Truck Side Bearing. 10, Figs. 1128-1129; 61, Figs. 4705-4713, 4771-4777. A plate, block or roller or spring plate attached to the top of the truck bolster, on which a corresponding bearing fastened to the body bolster rests. Their purpose is to prevent the car body from having too much rocking or rolling motion. They are made of various forms, such as a plain metal plate, to protect a wooden bolster from wear, a cup-shaped casting to hold oil or grease and waste, and various forms of rollers, rockers, studs, spring cases and the like.

Truck Side Frame. The longitudinal portion of a truck frame, on the outside of the wheels, which extends from one axle to the other, and to which the journal boxes and bolsters or transoms are attached. See **Diamond Truck Side Frame**, in designating which the term is chiefly employed.

Truck Sub-Sill. A sub-sill bolted to the side sill of a four-wheel street car which bears upon the truck frame, to which it is bolted.

Trunnion. The pivot upon which any body, as a gun, revolves. The term is usually applied to bearings for objects of irregular shape, and having slow or irregular motion, as distinguished from the journals of wheels, etc.

Truss. A frame to which rigidity is given by uniting the parts so that its figure shall be in effect cut up into triangles, making it incapable of distortion by turning of the bars about their joints. The simplest form of truss is that in which a truss rod and king post are put underneath a beam to strengthen it, or two beams are framed together in the form of a letter A, and tied together at their lower ends by a rod or another beam. These are called king post trusses. Another form is that in which two posts are used, which are called queen post trusses. This is not a perfect truss, since it is capable of altering its shape by simply bending without rupturing its parts, when unequally loaded. In order to prevent this counterbalances should be added. This is the usual way of trussing the underframe of cars. The sills resist bending and act as straining beams, thus preventing great distortion. The usual forms of trusses used for the side framing of cars are the Pratt and the Howe types. In the former all the braces are subject to tension, and in the latter the braces are compression members. The Pratt truss is rarely used alone to-day for side trussing, but is often used in combination with the Howe truss. The Howe truss is rarely used in its simple form, being usually provided with vertical posts alongside of the vertical tension members. The side of a car is not a perfect truss as ordinarily built, for the middle panel, which contains the door, lacks the essential element of braces or counterbraces. Long cars are reinforced with heavy trusses of the bridge or roof type, and further strengthened by body truss rods.

The **Challender Truss**, which see, is a kind of plate girder. See **Girder**. See also **Bastard Howe**, **Bastard Pratt**, **Framing**, **Bunk Truss** (of Logging Cars).

Truss Block. A distance piece between a truss rod and the compression member of a trussed beam, which forms a bearing for both. See **Body Bolster Truss Block**, **Transom Truss Block**, **Truck Bolster Truss Block**.

Truss Plank (Passenger Car Framing). 63, Figs. 577-588, 599-619. A wide piece of timber, set on edge and bolted to, or sometimes gained into the posts on the inside of the car immediately above the sills.

Truss Plank Cap. A strip of wood attached to the top of a truss plank between the seat frames.

Truss Rod. Figs. 886-889. An inclined rod used in connection with a king or queen post truss, or trussed beam, to resist deflection. It is attached to the ends of the beam, and is supported in the middle by a king post, truss block, or two queen posts between the beam and the rod. See **Body Truss Rod**.

Truss Rod Anchor Iron. 24, Figs. 599-619; Figs. 956-957, 998-999. A wrought iron strap with lugs and a turn at the end which engage with the body bolster and in recesses cut into the side sill, to which it is bolted. It serves as an anchor to attach the ends of the body truss rods to the side sills.

Truss Rod Bearing. Figs. 753-758. A bearing used to furnish support to a truss rod, at an angle or bend in the latter, as

Body Bolster Truss Rod Bearing. **Truck Bolster Truss Rod Bearing.**

Body Truss Rod Bearing.

The bearing over the bolster of a long body truss rod running from end sill to end sill is called a body truss rod saddle, probably in part from its form. A distinction has been attempted between a truss rod bearing and a truss rod saddle, founded upon the direction of the strain which it resists, and this distinction has been preserved in this edition. It cannot, however, be said to be founded on usage, either of bridge builders or car builders, except in respect to the body truss rod saddle, as above stated.

Truss Rod End Plate. Figs. 809-830.

Truss Rod Iron. 24, Figs. 599-613, 617-619. A bar of iron, having an eye, to which a body truss rod is attached, bolted to the under side of a sill below a body bolster. It is a form of attaching body truss rods almost out of use for freight cars, but in common use on passenger cars. A truss rod anchor iron.

Truss Rod Queen Post. See **Truss Rod** and **Queen Post**.

Truss Rod Saddle. See **Truss Rod Bearing** and **Body Truss Rod Saddle**, 20, Figs. 305-308, 319-324, etc.

Truss Rod Safety Hanger. Figs. 1000-1001. An iron eye bolted to the longitudinal sills, through which the body truss rods are passed to prevent them from dropping to the track in case they should break.

Truss Rod Strut. Figs. 971-973.

Truss Rod Washer. Figs. 717-718, 725-726. A large flat or beveled washer, used under a nut on the end of a truss rod. Sometimes called a skew back. See **Body Bolster Truss Rod Washer**, **Truck Bolster Truss Rod Washer**.

Trussed Brake Beam. Fig. 5083, etc. Many brake beams in use to-day are trussed beams. The usual method is to use a truss rod from end to end of the beam with a king post in the middle.

Tufting Button. Fig. 3781. A button used in upholstery to hold the cord which passes through the upper covering of the upholstered surface, dividing it up into squares or diamonds.

Tumbler. 1. A drinking glass.

2. (Foundry.) A machine for cleaning castings, locomotive tubes, etc. It consists of a case mounted on a shaft, on which it is made to revolve.

The articles inside of the case are cleaned by their attrition against each other and the case.

3. (Locksmithing.) "A latch engaging within a notch in a lock, bolt, or otherwise, opposing its motion until it is lifted or arranged by the key so as to remove the obstacle."—Knight.

Tumbler Holder. Figs. 3643-3667-3673. A bracket or stand for holding glass tumblers or drinking cups. They are either single or double.

Tumbler Holder and Drip. Fig. 3643. A water cooler drip, the top of which is made large enough to hold a glass.

Turnbuckle. 23, Figs. 599-619, and Fig. 3857. A device inserted in the middle of a long rod for changing its length. Right and left screw turnbuckles, Fig. 3488, or single screw turnbuckles are rarely used.

A form that has gained much favor for use on cars is that shown in Fig. 3857. They are made the following sizes, and larger in proportion.

Size.	D.	A.	B.	C.	L.
1	inch	6 in.	1½ in.	9 in.	25 in.
1⅛	"	6 "	1 11-16 "	9⅜ "	25 "
1¼	"	6 "	1⅞ "	9¾ "	26 "
1⅜	"	6 "	2 1-16 "	10⅛ "	27 "
1½	"	6 "	2¼ "	10½ "	27 "
1⅝	"	6 "	2 7-16 "	10⅞ "	28 "
1¾	"	6 "	2⅝ "	11¼ "	28 "

D. Size = Outside Diameter of Screw.

A. Length in Clear between head = 6 in. first length for all sizes.

B. Length of Tapped Heads = 1½ D.

C. Total Length of Buckle without Bolt Ends.

L. Total Length of Buckle and Stub Ends when open.

Turn Under (British). See **Fall Under.**

Turtle Back Roof. A roof for a passenger car which is arched, but without a clear story or upper deck. It is the prevailing roof for British carriages, but has not found favor in this country, its use being confined chiefly to a few coaches on the Boston & Albany Railroad.

Twin Car Seat. Figs. 4118, 4126, etc. A seat stand with a division arm, two cushions, two seat backs with two striker arms each, so that they may be turned so as to bring the occupants face to face.

Twin Door Panels. 10, Figs. 1329-1337. A pair of panels side by side in a door, formed by inserting a parting rail into a wide panel.

Twin Hopper Gondola Car. Figs. 35-36, 428-452, etc. A gondola car with two hoppers, the centers of which are about 10 feet apart. This type of gondola has been adopted to get a long flat-bo'tomed car that will discharge its contents with the least amount of shoveling. The car may also be used for long timber. See **Gondola.**

Twin Washer. A **Double Washer,** which see.

Twist Gage for New Couplers (M. C. B. Recommended Practice). Figs. 5948-5950. In 1899 a twist gage for new couplers, as shown, to be used so as to insure that the heads are neither twisted nor displaced sidewise with relation to shank, was adopted as Recommended Practice. In 1904 the gage was changed to conform to the couper contour ines adopted in 1903; and also to have raised figures "1904" cast on same.

Twisted Flat Wire (for Car Seals). 4087. A form adapted to prevent the possibility of the lead seal being stripped from the wire and afterward replaced upon it. See **Car Seals.**

Two-Light Center Lamp. See **Center Lamp** and **Chandelier.** The majority of center lamps have two burners.

Tyre (of a wheel). See **Tire.** The spelling "tyre" is the British method, and corresponds with the supposed origin of the word, which is from the fact that iron bands were first used on wheels in the city of Tyre, Syria.

U

U-Bolt. A double bolt made of a bar of iron, bent in the shape of the letter U, with a nut and screw on each end. See **Brake Hanger Carrier, Stake Pocket U-Bolt.**

U-Bolt Casting. Figs. 4823-4824.

"U" Brake Shoe. Fig. 5242. A cast-iron brake shoe with inclined ends chilled from the back.

Umbrella Holder and Pocket. Fig. 3836. A bracket with oval holes, put up in a horizontal position with the pocket a suitable distance below it. The umbrella is thrust through the bracket, the end resting in the pocket below.

Uncoupling Attachments (M. C. B. Recommended Practice).

In 1897 designs showing the details of uncoupling arrangements to concealed end sill cars and outside end sill cars were adopted as Recommended Practice.

In 1905 the shoulder of the bracket for the uncoupling rod was made level.

In 1908 these details were revised and changes made to overcome former defects.

The special feature of this uncoupling attachment is the slotted center bracket. By placing the rod back on the top of end sill or head block a longer arm is obtained, which gives sufficient lift with ample slack in the chain, and by using a sloping slotted bracket the rod projects 1½ inches in front of coupler lock, which is about the best position for an efficient lift. The slotted bracket allows the rod to slide back 3½ inches and avoids interference when slack of train is bunched.

The handle shown should preferably project below end of car or be bent as shown by dotted lines on Sheet M. C. B.—B, in order to protect the operator's hand.

Three links 3¾ inches, 5¾ inches and 7¾ inches long, respectively, are shown. By using one of these three links, therefore, a chain 6½, 8½ or 10½ inches long is obtained, which should fit all cars and M. C. B. couplers. These links should avoid the use of split links, "S" hooks and other temporary repair devices now very common. The arrangement as a whole is applicable to all types of cars, and if properly applied will largely obviate present troubles. Only a few limiting dimensions are shown on the drawing, as the others must be adapted to each particular class of car; but the dimensions for center arm, chain slack and position of lift pin eye should be carefully adhered to.

Uncoupling Chain. See below.

Uncoupling Lever (Freight Cars). 210, Figs. 262-272. An iron rod with a bent handle forming a lever, usually attached to the end sill, by which the lock of the automatic coupler is opened and the cars uncoupled without going between them. The lever and rod are in various forms, as the form of lock may require.

Uncoupling Lever Chain (Buhoup 3-Stem Coupler). 675, Figs. 1886-1935.

Uncoupling Lever Collar (Buhoup 3-Stem Coupler). 720, Figs. 1886-1935.

Uncoupling Lever Guide (Buhoup 3-Stem Coupler). 683, Figs. 1886-1935.

Uncoupling Lever Plate (Buhoup 3-Stem Coupler). 715, Figs. 1886-1935.

Uncoupling Rod. 210, Figs. 262-272, etc.; and 173, Figs. 648-651. A rod connecting the uncoupling lever with the lock of an automatic coupler. On freight cars it is forged in one piece with the lever. Figs. 905-907. See below.

Uncoupling Shaft (Passenger Cars). 173, Figs. 648-651. A vertical rod extending up through the platform floor having a square end at the top to take the uncoupling lever and a crank arm at the bottom to which is attached the uncoupling rod. A partial turn of the uncoupling lever pulls out the uncoupling rod and releases the coupler lock allowing the knuckle to open and the cars to part.

Uncoupling Shaft Bracket. Figs. 702-704, 768-769. A bracket supporting the uncoupling shaft on the end of the car.

Underframe. Figs. 1012-1039. A stout framework, which receives the buffing and pulling stresses and carries the weight of the floor and body of the vehicle. In both freight and passenger cars in America the underframe and body are rigidly connected and mutually stiffen and strengthen one another, but in British carriages the body is framed as an independent structure, and merely rests on the underframe, rubber pads (india rubber body cushions) being interposed to deaden shocks. The only connection is through a body holding-down bolt. Underframe includes all the framing below the floor, and includes the platforms, draft timbers, etc. Many cars have been built with pressed steel underframes and structural steel underframes.

Underframe Plate (British). See **Spider Plate.**

Underhung Door. A sliding door which is supported and slides on a rail below the door. Overhung doors are preferred.

Union (Pipe Fittings). A **Union Joint**, which see.

Union Joint. Fig. 3058. (Pipe Fittings.) A means of uniting the ends of two pipes with a nut. The latter is attached to one pipe with a collar, and is screwed on the opposite pipe, or on a thimble attached to the pipe. Often called simply a union or coupling. They are largely used for all forms of pipe work, and take their distinctive names, if any, from the parts with which they are connected, as drain pipe union, reservoir union, etc., of Westinghouse brake.

United States Standard System of Screw Threads. This term is often used to designate the **Sellers' System of Screw Threads**, which see.

Unit Switch System of Control. Figs. 6393-6401.

Universal Joint. "A device for connecting the ends of two shafts so as to allow them to have perfect freedom of motion in every direction within certain defined limits."—Knight. An application in car building which has not yet secured general use as a substitute for brake hose, in connection with air brake and steam apparatus. Fig. 2839.

Upholstery. In passenger car construction, the term includes the cushions, curtains, carpets, beds, etc., and generally the materials from which they are made.

Upholsterers' Nails and Buttons. Fig. 3781.

Upper Bearing. See **Swing Link Hanger.**

Upper Belt Rail (Passenger Car Exteriors). 82, Figs. 648-651. A horizontal bar attached to the posts on the outside and above the windows.

Upper Berth. 2, Figs. 2201-2202. The top berth in a sleeping car section. It folds up by day against the roof, being secured by a berth latch or safety berth latch, having a pocket above it in which the head board, two thin mattresses and the bedding are stored. See **Berth.**

Upper Berth Bracket. Fig. 4325. A form of upper berth rest closely resembling a bracket.

Upper Berth Pocket. A pocket against the sides of the car which closes up flush therewith when the upper berth was folded up, but dropped open when the berth was made up, so as to afford a receptacle for clothing and baggage. It has been replaced by a hammock. Similar pockets for the lower berth are made by turning up the head rest of the seat.

Upper Berth Rest (Sleeping Cars). Fig. 4326. A metal lug, or shelf, which supports an upper berth when lowered.

Upper Berth Rest Pivot. Fig. 4354. A pin attached to a plate fastened to an upper berth. The pin engages in a hole in a **Berth Rest**, which see.

Upper Bolster Plate. 12a, Figs. 262-272, etc. A body bolster top plate. See **Body Bolster.**

Upper Brake Shaft Bearing. 96, Figs. 262-272, and 156, Figs. 644-651. A metal eye by which the upper end of a brake shaft is held in place. In passenger and street cars, usually attached to the hand rail; on freight box cars, when the brakes are operated from the roof, to the end of the body near the top.

Upper Corner Plate. Figs. 817-818, 900-902, and 55, Fig. 262-272. See **Corner Plate.**

Upper Deck (Passenger Cars). 110, Figs. 599-619. Also called clear story. The raised central portion of the roof. See **Deck.**

Upper Deck Bottom Rail (Street Car). The deck sill or sill of a clear story.

Upper Deck Carline. 118. Figs. 599-619. **Carlines**, which see, passing from side to side of the upper deck only, resting on the deck plate. Usually called simply deck carline.

Upper Deck Eaves Molding. A molding, usually called simply deck eaves molding, on the outside edge of the roof.

Upper Deck Furring Strip. See **Furring.**

Upper Diaphragm (Pintsch Lamp). 287, Figs. 3208-3224.

Upper Door Sash. 12, Figs. 1329-1337. The part of a double window sash in a car door which covers the upper part of the opening. This upper section is usually made movable, so that it can be lowered for ventilation.

Upper End Panel (Street Cars). See **Panel.**

Upper Floor (Stock Car). 28, Figs. 352-355. More commonly double deck. In a stock car, a deck or floor built in half way between the main floor of the car and the roof, to double the carrying capacity of the car for pigs, sheep, calves, etc.

Upper Rail (Sliding Doors). Usually called top door rail. A guide rail above doors which are supported upon rollers at the bottom, or one carrying a door suspended upon door hangers. See **Door Rail.**

Upper Seat Back Rail. See **Seat Back.**

Upper Swing Hanger Pivot. 47, Figs. 4705-4777. See also **Lower Swing Hanger Pivot.**

Upper Wainscot End Rail (Passenger Car Interiors). See below.

Upper Wainscot Rail. 75, Figs. 648-651, and E, Fig. 2204. A longitudinal wooden bar or rail, fastened to the posts on the inside of a passenger car immediately under the window. See **Wainscot Rail.**

Upper Window Blind. See **Window Blind.**

Upper Window Blind Lift. Figs. 4545, etc. Distinguished from a lower window blind lift in not having a lug or ledge. See **Window Blind Lift.**

Urinal. A metal or porcelain receptacle used in saloons, connected to a pipe leading through the floor. They are distinguished as corner or side urinals. A concealing urinal, shutting up flush with the wood work when not in use, is sometimes used.

Urinal Cover. A wooden or sheet metal lid for inclosing a urinal.

Urinal Drip or **Drip Pan.** A pan under a urinal on the floor.

Urinal Handle. Fig. 4057. A handle in a saloon, placed above the urinal to hold on to. They are distinguished as corner or side urinal handles, according to their position on the side of the car.

Urinal Pipe. See **Urinal.**

Urinal Ventilator. A pipe attached to a cap on a urinal, communicating with the top of a car, where some form of wind scoop is often added.

V

V-shaped Screw Thread. A thread with a sharp edge at the top and sharp groove at the root. The Sellers' (U. S.) standard thread is flat at the top and at the root, and the Whitworth is rounded at those threads.

Vacuum Brake. Figs. 6785-6792. A system of continuous brakes which is operated by exhausting the air from some appliance under each car, by which the pressure of the external air is transmitted to the brake levers and shoes. So called in distinction from **Air Brakes,** which see, are technically understood to refer only to brakes operating with compressed air, although in a literal sense the vacuum brake is also an air brake. An ejector on the engine is ordinarily used for exhausting the air, connected with the rest of the train by pipes and flexible hose between the cars. The latest type of vacuum brakes, in general use in passenger service and to some extent for freight service in Great Britain is shown in Fig. 6785. A continuous pipe is connected through the train between cars by rubber hose, wound with wire to prevent collapsing, and suitable couplings. Under each car is a large cylinder with a piston and rod connected to the brake levers actuating the brake shoes. These cylinders are connected to the train pipe through a simple form of ball valve. An **Ejector,** which see, on the locomotive, maintains a vacuum of from 20 to 24 in. in the train pipe and in the cylinders under each car. In the release position the piston rests by its own weight in the bottom of the cylinder. To apply the brakes air is admitted to the train pipe and through the ball valve under each car to the space **below** the piston. The vacuum **above** the piston permits the atmosphere presure below the piston to raise it and apply the brakes. A vacuum is always maintained above the piston and is available for applying the brakes at any time. In case the train parts the admittance of air to the broken train pipes applies the brakes in both sections of the train. A valve in the guards van may also be used to admit air to the train pipe and apply the brakes in case of emergency. To release the brakes, the vacuum is restored in the train pipe and under the pistons by working the ejector.

Valance. A term applied to the tasselated decorations of windows and which cover and conceal the shade roller and curtain holder. B, Fig. 2204.

Valve. A lid, cover, or plug for opening and closing an aperture or passage.

Valve Body. The shell case or frame of a valve. See **Triple Valves.** 2, Figs. 1233-1237.

Valve Indicator Plate. Fig. 2848.

Valve Key (Pintsch Gas Lighting Apparatus). Fig. 3093. A key for opening all the high pressure valves, the lamp key, Fig. 3094, being used for the low pressure valves connected with the burners.

Valve Piston (Reducing Valve). 4, Figs. 1248-1252.

Valve Seat. "The flat or conical surface on which a valve rests."—Knight. See **Tank Valve Seat.**

Valve Stem. A rod attached to a valve, and by which the latter is moved, is always called a valve stem.

Van (British). A comprehensive term for any covered vehicle not used for conveying ordinary passengers or ordinary freight. See **Brake Van, Guard's Van.**

Vanderbilt Bolsters. Figs. 5023-5029.

Vanderbilt Brake Beam. Figs. 5157-5159.

Vanderbilt Coke Car. Figs. 517-520. A steel car for carrying coke designed with trussed side frames to assist in carrying the load and having expanded metal sides instead of steel plates.

Vanderbilt Hopper Car. Figs. 69, 482-485. A hopper car built entirely of steel with only two sills, of 15-in. channels, which are in the center of the car. The side plates are reinforced to form a plate girder and carry a large part of the load.

Vanderbilt Tank Car. Figs. 562-566. A tank car with steel underframe, made up of two I-beams placed well under the sides of the car as sills. Short channels are used as center sills for the attachment of draft gear, extending from the end sill back to the bolster.

Vanderbilt Truck. A form of arch bar truck using channels for the compression members, of the truss. It is fitted with **Rocker Side Bearings,** which see.

Van Dorn Radial Draft Gear. A form of draft gear for street cars principally, in which the coupler and draft springs are carried on a long yoke pivoted at the truck center pin or close to it so that they have a wide range of deflection when rounding sharp curves.

Van Dyke Tank Car. Figs. 128, 554-556. A type of tank car in which the tank is supported on saddles over each truck. No sills are used, the bottom tank plate being made extra heavy and the draft gear riveted to it.

Varnish. A liquid for covering paint or woodwork with a hard, impervious and glossy surface. See **Finishing Varnish.**

Vegetable Car. Fig. 22.

Velocipede Car. Figs. 6194-6195, 6198-6201. Generally a three-wheeled car, in which the rider sits astride and propels the car with his feet (or feet and hands together), after the manner of a velocipede. They comprise a variety of light cars for inspectors, telegraph line repairers, lamp lighters, etc.

Veneer. "A thin leaf of a superior wood for overlaying an inferior wood."—Webster. By trade usage it is a veneer if it covers other materials than inferior wood. Thus in the Spurr veneers and wood carvings, Fig. 3802, the material covered is a matrix resembling wood carving.

Vent. "A small aperture; a hole or passage for air or other fluid to escape."—Webster. See **Lamp Vent.**

Ventilating Bell (Acetylene Lamp). Fig. 3323.

Ventilated Box Car or **Fruit Car.** Figs. 21, 341-344. A box car with grated doors and screened openings

called ventilators, through which the air can circulate freely. Used chiefly for fruit. See **Fruit Car.**

Ventilating Chimney (Pintsch Lamp). 324, Figs. 3208-3229.

Ventilating Jack (for Saloons). Also called wind scoop. A flaring horizontal tube, constituting a simple form of the ventilating devices which use the current produced by the motion of the cars to cause an exhaust current of air. See **Wind Scoop, Injector,** etc.

Ventilator. 1. Figs. 4418-4443. A device for admitting or exhausting air to or from a car. Ventilators, according to their position, are designed as deck ventilators (end or side), end ventilators, frieze ventilators, etc. They are often designated as automatic or self-acting. The prominent forms of the latter varieties are shown in Figs. 4418-4443.

Day coaches usually depend upon the deck windows for ventilation, the sash at every other window being hung on different sides, so that the open sash may be hinged on the front end. Sash openers for deck sash hinged in this manner are shown in Figs. 4444-4455. For a report of tests with the various ventilators shown see Proceedings M. C. B. Association, 1894, page 234.

2. (For Fruit Car.) A system of slate protected by netting at each end of the car, so arranged as to enable the ventilators to be readily opened or closed from the outside.

3. (Refrigerator and Produce Cars.) Figs. 313-318.

Ventilator Arm. A small attachment carried on deck sashes, especially of street cars, for holding them open.

Ventilator Casing (Street Car). The casing of the side ventilators, or deck windows, which takes the ventilator sash, or to which the wire screen is fastened.

Ventilator Cowl (British). See **Ventilator Hood.**

Ventilator Deflector. A metal plate or board placed in such a position at a ventilator opening that it will cause a current of air to flow into or out of the car when the latter is in motion. Another form, used in windows to produce an exhaust draft when opened, is a mere loose board with a notch to receive the lower edge of the window sash, Fig. 4655. See **Deflector.**

Ventilator Door. A door for closing the aperture of a ventilator.

Ventilator Fixed Panel (British). The outer panel in a ventilator, composed of two perforated panels, one being capable of being slid over the other so that the perforations coincide or become covered. This form of ventilator is used in British cars to the exclusion of any other. See also **Ventilator Hood** and **Ventilator Sliding Panel.**

Ventilator Hood. 1. A shield over the outside of a ventilator to prevent the entrance of sparks, cinders, rain or snow. It is sometimes intended to direct the current of air either into or out of the car. See also **Deck End Ventilator Hood.**

2. (British.) Also called ventilator cowl. A shield made of either wood or metal, preventing the entrance of rain or cinders.

Ventilator Netting. 1. A wire screen or netting fastened over the outer deck window sash to prevent the entrance of sparks, cinders and dust.

2. A netting over the ventilator windows of a fruit car.

Ventilator Opener. See **Deck Sash Opener.** Figs. 4444-4455.

Ventilator Panel. A panel in the frame of a valve or door for closing the aperture of a ventilator.

Ventilator Pivot. A pin on which a ventilator door or sash is swung or hinged. It is the same as a deck sash pivot, Figs. 4467-4468.

Ventilator Pivot Plate. The same as a sash lock plate or stop. Fig. 4509, etc.

Ventilator Plate. See **Frieze Ventilator Plate.**

Ventilator Register. A metal plate or frame attached to a ventilator opening, provided with slats arranged so as to turn, and thus either open or close the ventilator. They are chiefly used as frieze ventilators, but sometimes elsewhere.

Ventilator Sash. Usually a deck sash.

Ventilator Sash Pivot. A deck sash pivot.

Ventilator Sliding Panel (British). Part of a ventilator in which there are two perforated hardwood slides, the outer fixed, the inner movable, so as to make the perforations coincide or be covered. See **Ventilator Hood** and **Ventilator Fixed Panel.**

Ventilator Staff. Fig. 4497. A **Pull Hook** or **Deck Sash Opener,** which see.

Ventilator Stop (Street Car). A small metal bracket on which a ventilator sash rests when open.

Ventilator Valve. A door for opening or closing the aperture of a ventilator, usually made to turn on pivots at or near its center. See **Deck Sash Pivot.**

Vertical Equalizing Lever (Pullman Vestibule). A vertical lever, one end of which bears against an overhead face plate buffing spring (called an overhead equalizer spring) and the other end against the horizontal equalizing lever, the middle of which is pivoted by a bracket attached to a longitudinal plate or bar that abuts against the body end plate. The object of these vertical equalizing levers is to get the horizontal equalizer lever high enough to give head room in the vestibule for the dome lamp, etc.

Vertical Steam Trap and Blow-Off (Gold's Car Heating). Fig. 2865. A **Thermostatic Steam Trap,** which see, and a blow-off valve combined. It may be operated from inside of the car.

Vertical Telegraph Cock or **Faucet.** See **Telegraph Cock.**

Vestibule. 1. (Of a Car.) Formerly that part of the car nearest the door, cut off from the main saloon by an interior door. It was occupied by the saloon, washing and heating arrangements, etc. Its purpose was to give protection to the interior of the car against drafts and noise.

2. Fig. 2207; details, Fig. 2216, etc. Figs. 3988-3989. Usually a platform enclosure, consisting of a face or buffer plate, constituting an arched doorway, connected with a spring extended rod, a foot plate combined with the buffer stems and face plate, a bellows-like connection called a diaphragm between the face plate and car frame and side doors opening to the steps. The successful application of the vestibule to cars was first accomplished by the Pullman Company. It was patented April 29, 1887, by H. H. Sessions, and assigned to the Pullman Company. It claimed the invention of "the combination with the end of a railway car of a frame plate or equivalent series of buffers backed by springs, arranged with its face in a vertical plane and normally projecting beyond the end of the car, whereby, upon the coupling of two cars, a spring buffer will be interposed between the superstructures of such adjacent cars above

their platforms, and also frictional surface opposing spring pressures to prevent the racking of the car frames upon sudden stoppages and to oppose the tendency of the cars to sway laterally (oscillate) when in motion," so arranged and adjusted that "when the two cars were coupled the faces of the buffers will bear against each other in contact under pressure."

The courts have upheld the validity of the patent on the grounds that "the device possessed patentable novelty and utility." The claims sustained were those of "frictional contact of the face plates under constantly opposing spring pressure, which diminished the shock to the superstructure in collisions and resisted the forces tending to create oscillation." The frame plate of the original vestibule was to have longitudinal motion, but no lateral motion except with the car body. The use of the canopy feature was old, for it had been in use for more than twenty years in England, Russia and the United States.

Vestibule Curtain Handle. Fig. 3950.

Vestibule Body Corner Post. The inner post of a vestibule, set against the end of the car body and directly over the platform sills.

Vestibule Buffer Plate. Y, Figs. 648-651. An extra long and wide buffer plate, recessed or chamfered at the ends to take the face plate of the vestibule whose face is flush with the buffer plate.

Vestibule Diaphragm. Fig. 2289. See **Diaphragm.**

Vestibule Dome Lamp. Fig. 3200. A lamp specially designed for vestibules.

Vestibule Door. Fig. 1332. A door by which the vestibule of a car is entered from the side. In the older type of vestibule they are double or divided, the two doors being hinged together and to the vestibule corner post.

Vestibule Door Bolt or **Latch.** Figs. 2489-2490. See **Door Bolt.**

Vestibule Door Hinge. 1. Strap hinges, Figs. 2458-2459, which fasten the double doors of a vestibule together.

2. For rabbeted doors, Fig. 2464.

Vestibule Door Latch. Figs. 2489-2490. A door latch specially designed for vestibule doors.

Vestibule Door Rod. Figs. 3977-3978, 3992-3994. A bar or rod across the vestibule doors to prevent their being pushed in.

Vestibule End Carline. A platform hood end carline.

Vestibule (Composite) **End Post.** The end post of a vestibule, resting upon the platform end sill. In the Pullman, it is a composite end post composed of an iron bar or angle bent at the ends and bolted to the platform and platform hood end carline. It is stiffened with wood bolted to the sides of the bar or angle.

Vestibule End Window. The window in the end of the vestibule enclosure.

Vestibule Face Plate. X, Figs. 599-619 and Fig. 2294. An inverted U-shaped forging about the size of a door frame, arched at the top, and forming a passageway from the platform of one car to that of the next. The weight of it is carried on the buffer plate; it is kept thrust out against the opposing face plate either by springs, as in the Pullman vestibule, or by its own weight, as in the Barr and Gould vestibules.

Vestibule Fittings. Fig. 3933, etc.

Vestibule Gate (Pullman). Z, Figs. 648-651; Fig. 4016. A gate to the arched doorway, leading from the platform of one car to that of the next car.

Vestibule Hood. A platform hood.

Vestibule Lamps. Figs. 3325, 2984. See **Pintsch Lamps.**

Victor-Balata Belt (for Car-Lighting Purposes). This type of belting has for its foundation a specially woven 37-ounce duck. The duck is folded and not cut in forming the plies for various thicknesses. Into the duck itself a vegetable gum known as balata is impregnated. This gum is somewhat akin to rubber, but can be solutionized and made to saturate the fibers of cotton duck without the vulcanizing process, as in the case of rubber belting.

"Vienna" Lamp Shade. Fig. 3565. See **Lamp Shade.**

Vulcanized Fiber. A leathery material of great durability and toughness, which is made by subjecting various kinds of vegetable fiber to the action of acids. It is insoluble in all ordinary solvents, such as oil, alcohol, ether, ammonia, etc. It is made in two classes, hard or flexible (the former being that used generally in car construction for the dust guards of journal boxes), and in sheets from 16 to 24 in. wide by about 50 in. long, and from 1-32 in. to ¾ in. thick. Another name for the same article is gelatinized fiber.

W

Wagon or **Goods Wagon** (British). Figs. 6541-6544, 6549-6556. American equivalent, freight car. A vehicle (usually four-wheeled) used to convey any sort of merchandise, minerals or live stock, and run in freight trains. See

Ballast Wagons.*	Goods Wagon.
Batten Wagon.*	High-Sided Wagon.*
Boiler Wagon.*	Low-Sided Wagon.*
Cattle Wagon.	Open Wagon.*
Covered Wagon.	Well Wagon.*

Wagons marked thus * are open wagons (gondola cars), having no roof.

Wagon Coupling or **Draw Chain** (British). Fig. 6724. The draft coupling universally used on freight cars (goods wagons) in Great Britain in connection with a **Draw Hook,** which see.

Wagon Sheet (British). See **Tarpaulin.**

Wagon Truck. A four-wheel vehicle for moving baggage or freight about a station or warehouse.

Wagon Wheel (British). See **Wrought Iron Wheel. Steel Tired Wheel.**

Wainscot Panel. 76, Figs. 648-651 and 12, Figs. 2201-2202. A board which forms a panel under the windows between the two wainscot rails.

Wainscot Rails (Pasenger Car Interiors). 74, 75, Figs. 648-651. Longitudinal wooden strips fastened to the posts and extending from one end of the car to the other. The lower wainscot rail comes immediately above the truss plank; the upper wainscot rail is immediately under the window. The wainscot end rails are the wainscot rails at the end of the car.

Waist Panel (British). The panel immediately above the lowest panel on the outside of a carriage body.

Waist Rail (British). A horizontal piece in the framing of the side of a passenger carriage.

Walkover Car Seat. Figs. 4101-4104.

Wall Lamp. Fig. 3199, etc. A lamp to fit in a recess in the wall of a car or corridor.

Wall Seat End. The seat end next to the wall or side of a car, so called in distinction from the aisle seat end.

Wall Socket Casting. A casting bolted or otherwise fastened to the inside end of a car seat, to which

the striker arms are pivoted and in which the seat end connecting rail is also fastened to this casting.

Wards (of a Lock). The interior circular ridges which fit into corresponding recesses in the bit of a key (the latter also termed wards), the surrounding solid parts of the bit being called the web.

Warehouse Truck. A small vehicle which is used for moving freight about a warehouse. See **Barrow, Truck. Wagon Truck.**

Wash Basin or **Wash Stand.** Figs. 3682-3691. See below.

Wash Bowl or **Wash Basin.** 1, Figs. 3684-3686. A **Basin,** which see. They are used in sleeping and drawing room cars, and generally form a part of a fixed wash stand.

Wash Bowl Pipe. A waste pipe.

Wash Room. A lavatory. A compartment provided with toilet facilities. In private and officers' cars it is placed in various irregular positions to leave the ends of the car free. Wash rooms with pumps and water tanks underneath the wash bowls are being replaced on Pullman cars by what is known as the Pullman compressed air system of water supply, Fig. 3696. See **Lavatory.**

Wash Room Furnishings. Figs 3639-3695.

Wash Room Pump. More properly **Basin Pump,** which see. They are either single or double acting.

Wash Stand (Postal Cars). A cast stand carrying a basin. They are distinguished as corner or side wash stands.

Wash Stand Sink. A cast iron plate with one or more bowls, made in one piece and lined with porcelain and used for the top of a wash stand. Used only in second-class cars.

Wash Stand Slab. 2, Figs. 3684-3686. A stone or metal slab which forms the top for a wash stand. Commonly, simply slab.

Washburn Coupler (Freight). Figs. 1730-1736. (Passenger.) Figs. 1810-1811.

Washburn Draft Gear. Figs. 1564-1566.

Washburn Wheel. 1. A cast iron car wheel, designed and patented by Nathan Washburn in 1850. It consists of two plates, which extend from the hub to about half the distance between it and the rim. There they unite into one plate, which extends to the rim. The plates are all curved, so as to contract when the wheels are cooled without danger of fracturing the wheel. The single plate and the rim are united together and strengthened by curved ribs cast on the side of the wheel. See **Chilled Cast Iron Wheel.**

2. (Steel Tired Wheels.) Wheels having a cast iron center and steel tire shrunk on. Fig. 5390, etc.

Washer. Figs. 745-746, 828-829. 1. A plate of metal or other material, usually annular, which is placed under a nut or bolt head to give it a better bearing. Two or more washers are sometimes combined and called washer plates, strap washers, double or twin washers, triple washers, etc.; they are sometimes made beveled or triangular for a rod or bolt which is oblique with reference to the bearing surface. A socket washer or flush washer is one provided with a recess for the bolt head, so as to leave it flush with the surface of the adjoining parts. Cut washers or wrought washers are those stamped out of rolled iron plates. Cast washers are made from cast iron. Both are largely used. Washers in car work all take their name from that of the bolt or rod to which they are attached, except the base washer, which stands at the base of the platform posts on passenger car platforms. A **Gasket,** which see, is sometimes called a washer.

2. A brush for washing objects, as car washer, Fig. 3844, etc.

Washer Plate. A **Strap Washer,** which see.

"Washington" Type Car. Figs. 6229-6230.

Waste. The spoiled bobbins of cotton or woolen mills, used for wiping machinery and for **Journal Packing,** which see.

Waste Cock. (Baker Heaters.) A cock attached to the expansion drum or circulating drum of the Baker heater for drawing off or changing the water in the heater pipes.

Water Alcove. Figs. 3703-3706. A recess in the side of a partition of a passenger car to receive the faucet of a water cooler or water pipe and a drinking cup. The term is generally used to designate the metal casing or lining with which the recess is covered. The water tank for supplying water alcoves is usually placed on the other side of the partition, in the saloon, and commonly when so placed extends to the roof.

Water Closet. Figs. 4042-4044, 4049. "A commode with water supply to rinse the basin and carry off the contents."—Knight. The water closet is in increasing use in passenger cars. It is sometimes provided with an upholstered cover, and is then known as a concealing water closet.

Water Cooler. 14, Figs. 3684-3686. A tank or vessel for carrying drinking water, which is usually cooled with ice. The sides are generally made double, and the space between filled with some non-conducting substance. They frequently extend to the roof. See **Water Alcove, Water Tank.**

Water Cooler Valve or **Waste Cock.** Fig. 3650.

Water Drip. 1. A pan or receptacle to receive the waste water from a water cooler. A drip pipe, or waste pipe, connects with it.

2. A slight projection or raised seam in the roof of a passenger or baggage car over the side doors, or at the end of the car in the platform roof to divert the water so it will not fall upon persons entering the car or passing from one car to the next.

Water Raising System. Fig. 3696. See **Pullman System of Water Supply.**

Water Reservoir (Baker Heater). Fig. 2704. See **Circulating Drum.**

Water Table. 1. (Masonry.) A projecting beveled face of stone to shed water from the parts below. Hence, especially applied to the top course of a foundation, which nearly always has such a face, the masonry above being set back.

2. A **Window Ledge,** which see.

Water Tank. 1. A vessel or reservoir for holding water. Those used on cars for drinking water are usually made of sheet iron, and often extend to the roof. They are then usually drawn from by a water alcove, Fig. 3705, the tank being usually in the corner of the saloon concealed from the interior of the car.

2. Pullman Water Pressure System. Fig. 3696.

Watson & Stillman Jacks. Fig. 3866, etc. **Hydraulic Jacks,** which see.

Wattmeter. An instrument connected into an electrical circuit for measuring the power used therein; if of the indicating type, the instantaneous power is shown by the instrument; if of the recording type, the power is integrated, and the total energy

used is recorded. The latter type is sometimes used on an electric car.

Waved Moldings. Moldings which by a special machine are made of a corrugated section longitudinally, the number of waves or corrugations varying from 3 to 6 per inch. The cost of the moldings is increased by this waving from 1½ to 2½ cents per foot.

Way Car. Fig. 119. A **Caboose Car,** which see. Sometimes a so-called way car partakes more of the character of a tool car. The application of the term is not well defined.

Waycott Brake Beam. Figs. 5126-5129.

Waycott Dust Guard. Fig. 5321.

Weather Strips. Figs. 2648-2651. A rubber strip with a metallic or wooden binding to apply around the crevices of windows or doors, for excluding the dust and wind, and for preventing water from entering around the windows. Weather strips are divided generally into single edge strips and cushion strips, both being usually provided, as now manufactured, with a wood or metal molding. The cushion strip is simply rubber, folded over so as not to show a selvage edge. The standard widths of weather strips are ⅜, ½, ¾, and 1 in. They are usually made in lengths of fifty feet, but some of the cushion strips in lengths of only 7 ft.

Web (of a Key). The solid portion of a bit of a key, the recesses cut away being termed wards. See **Bit.**

Webbing. A strong fabric, from one to four inches wide, made of hemp or other material which is not liable to stretch, used in upholstering car seats. A detached spring section is shown in Fig. 4168, showing the application of the webbing. Others are shown in Figs. 4166, etc.

Wedge. A term in quite general use for a **Journal Bearing Key,** which see. Fig. 5494, etc. See also **Stop Wedge, Door Wedge.**

Well Wagon (British). Fig. 6548. A bogie wagon with the floor depressed between the bolsters in order to permit a large and bulky load to be carried without exceeding the loading gage of height. Used for transporting heavy fly wheels, car bodies, etc. Also called trolley wagon.

Western Flush Car Door. Figs. 1365-1366.

Westinghouse Air and Steam Pipe Coupling. Figs. 1199-1204. See **Automatic Coupling.**

Westinghouse Air Brake. Figs. 1205-1292. A system of continuous brakes invented and patented (the first patent in 1869) by Mr. George Westinghouse, which is operated by compressed air. The air is compressed by a steam air pump on the locomotive or an electric motor on the car, and is stored up in a tank called the main reservoir on the engine or tender. By the original form of brake the compressed air was conveyed from the tank by pipes connected together between the cars by flexible brake hose to brake cylinders under each car, by means of which the pressure of the air was communicated to the brake levers, and thence to the brake shoes. A later and improved form is the Westinghouse automatic air brake, commonly called simply Westinghouse brake, which is now in universal use. At the present time the Westinghouse brake, unless otherwise specified, is always understod to mean the automatic air brake. The change made from the original form of the Westinghouse air brake in order to make it automatic was to carry a full pressure of air at all times in the break pipes and cause the brakes to be applied by a reduction of this pressure instead of by the admission of pressure, so that the breaking apart of the train or a reduction of pressure by escape of air at any point on the brake pipe would apply the brakes to the whole train at once. A further advantage was that the action of the brakes was made quicker by saving the appreciable interval of time required for the compressed air to flow from a single reservoir at one end of the train in sufficient quantities to fill all the brake cylinders. An auxiliary reservoir is placed under each car, containing air at the same pressure as in the brake pipes. An ingenious valve called the triple valve connects the brake pipe, auxiliary reservoir and brake cylinder together in such manner that any reduction of pressure in the brake pipes opens a passage for the air from the auxiliary reservoir to the brake cylinder, applying the brakes, and closes the connection between brake pipe and reservoir. To release the brakes, the pressure in the brake pipes is restored, when the triple valve closes the connection between the auxiliary reservoir and brake cylinder and opens one between the brake cylinder and the outer air and between the auxiliary reservoir and the brake pipe. In order that the train brakes may be applied from any car, each car is fitted with a valve called the conductor's valve, connected to the brake pipe, so that the compressed air therein can be permitted to escape by opening the valve.

Westinghouse Electric Motor (Electric Cars). Figs. 6372-6275, 6402-6403.

Westinghouse Freight Brake. Figs. 1208-1211, etc. A device not differing essentially from the Westinghouse passenger brake gear except that the parts are made lighter and cheaper for use on freight cars. To this end the triple valve, reservoir and brake cylinder are commonly combined in one part, as in Fig. 1275. The engine, air pump and main reservoir, on the contrary, are made somewhat larger. Special arrangements for operating extra long trains and on extra heavy gradients have been introduced, as shown in the engravings. See **Air Brake** and **Straight-Air Brake.**

Westinghouse Friction Draft Gear (Freight). Figs. 1413-1439. (Passenger) Figs. 1848-1870. A form of draft gear in which the forces are absorbed and dissipated by friction. The friction device is encased in a malleable iron cylinder open at the front end. The front follower bears against a preliminary spring, the other end of which bears against the center wedge of the shape of the frustum of an octagonal pyramid. Surrounding the wedge are four pairs of segmental carriers having one rib each, which lies in a groove in the cylinder. The other grooves in the cylinder are filled by friction strips resting on the carriers. These strips are of wrought iron and have lugs formed on them which engage in corresponding cavities in the carriers, so that the friction strips must move with the carriers. The function of the preliminary spring is to absorb the light shocks without bringing into action the friction parts. The main release spring, placed back of the carriers, forces the carriers to their normal position when the pressure is removed and also adds to the capacity of the device. When the follower plates are moved toward each other, the preliminary spring is compressed until its capacity of 20,000 lbs. is exceeded, when the follower bears against the release pin and forces it forward, relieving the wedge from the pressure of

the auxiliary release spring, thereby allowing the compression of the preliminary and auxiliary preliminary springs to force the wedge forward and press the segmental carriers and friction strips firmly into the cylinder grooves. The follower then strikes and forces the segmental carriers in, producing friction between the friction strips and the grooves. The complete movement gives a resistance of 160,000 lbs. In releasing, the preliminary spring is gradually restored, and the auxiliary release spring then forces the wedge out, while the release spring returns the friction strips and carriers, giving a complete release. Owing to the varying width of the slots and lugs on the friction strips and carriers the strips are released four at a time through successive small distances. The operations of buffing and pulling are exactly the same, except that the load comes on the front or rear follower first, as the case may be. See **Draft Gear.**

Westinghouse Traction Brake. Figs. 1212-1215. The adaptation of the Westinghouse air brake equipment to electrically propelled cars or trains. The changed conditions of motive power and method of operating such cars or trains, have necessitated various changes in the details of the equipments, while the general principles of the Westinghouse straight-air and automatic brakes, which are the foundation of all known air brake equipments, remain the same. A motor-driven air compressor furnishes the compressed air; an electric pump governor controls the operation of the same; the brake and triple valves are of different design to accord with the conditions for which they are required. Otherwise the description of **Westinghouse Air Brake,** which see, covers the traction brake also. The principal divisions into which the traction brake equipments are divided, with their designations, are as follows:

Equipment SM.—Plain straight-air brake for single car operation only.

Equipment SME.—Straight-air brake with an automatic emergency feature for two-car, and under some conditions three-car, trains, consisting of motor car and trailers, where the motor car operates singly most of the time.

Equipment AMS.—Plain automatic brake with straight-air release on first car; for two or three-car trains, consisting of motor car and trailers, which operate together most of the time.

Equipment AMT.—Plain automatic brake with graduated release on each car or straight-air release on head car, whichever desired; for trains consisting of all motor cars, which may at times operate singly, or of motor cars and trailers, the length of the train in each instance not to exceed five cars.

Equipment AMQ or AMR.—Quick action automatic brake, with graduated release, quick service and quick recharge features on every car; for trains of any length, consisting of all motor cars, or motor cars and trailers.

Equipment AMP.—Quick action automatic brake of the standard steam railroad type; for trains of any length, hauled by an electric locomotive.

Electro-Pneumatic System No. 3.—A set of additional devices that may be used with any of the above mentioned automatic brake equipments, by which the brakes may be applied and released, during service applications, electrically, without in any way interfering with the proper operation of the pneumatic system, which latter is always in reserve if needed.

Westinghouse Train Air Signal Apparatus. Figs. 1101-1102 and 1114-1115. A device for utilizing the supply of compressed air required for operating the Westinghouse brakes to transmit signals to the engine or motorman's cab instead of using the ordinary bell cord. See **Train Air Signal Apparatus.**

Westinghouse Unit Switch System of Multiple Control. A system of control for railway and other motors by means of low potential train line circuits taken from a storage battery under the car, which operate electro-magnets controlling pneumatic valves and cylinders operating the main controller circuits under each car by air taken from the brake pipe. The main controller under each car consists of a group of electro-pneumatic switches, which give the desired combinations to the motor circuits. A reverse switch and auxiliary resistance are essential parts of the apparatus under each car. The apparatus is applicable for either direct current or alternating current motors. See **Control System.**

Wheel. 1. A circular frame or solid piece of wood or metal which revolves on an axis. See

Brake Ratchet Wheel.	**Ratchet Wheel.**
Brake Wheel.	**Spur Wheel.**
Gear Wheel.	**Winding Shaft Ratchet Wheel.**
Hand Wheel.	

2. Figs. 5390-5465. A circular frame or disk, as above defined, serving to support a moving vehicle, as **Car Wheel,** which see, hand car wheel, street car wheel, etc. Car wheels are generally either cast (chilled) or steel tired. Steel wheels do not come fully under either of these titles. See also **Wheel Tread, Car Wheel, Chill.**

3. The rules for **Interchange of Traffic,** which see, give the defects for which wheels may be replaced.

Wheels (Distance Gages Between Backs of Flanges). In 1883 the standard distance between the backs of flanges of car wheels was made 4 ft. 5⅜ in. The standard distance between the backs of car wheels, as indicated, Fig. 5600, was made 4 ft. 5⅜ in.; drawing shows the form of gage for measuring this distance. In 1885 it was decided by letter ballot that in fitting wheels on axles variation of ⅛ in. each way from the standard distance between flanges would be allowed. In 1907 this standard distance was made 4 ft. 5⅜ in. owing to increase in width of wheel plan. See **Check Gage.**

Wheels. (Gage for locating equidistant from center of axle.) Fig. 6922. Formerly an M. C. B. Standard. Revoked in 1907.

Wheels and Track (Terms and Gaging Points). Fig. 5598. Standard terms and gaging points for wheels and track were adopted in 1894, as follows:

1. Track rails are the two main rails forming the track.

2. Gage of track is the shortest distance between the heads of track rails.

3. Base line, for wheel gage, is a line parallel to the axis of the wheels drawn through the point of intersection of tread with a line perpendicular to the axis, and passing through the center of the throat curve.

4. Inside gage of flanges is the distance between backs of flanges of a pair of mounted wheels measured on a line parallel to the base line, but ¼ inch nearer to the axis of the wheels.

5. Gage of wheels is the distance between the outside faces of flanges of a pair of mounted wheels measured on a line parallel to the base line, but 17-64 in. farther from the axis of the wheels.

6. Thickness of flange is the distance measured parallel to the base line between two lines perpendicular thereto, one drawn through the point of measurement of "inside gage of flanges," and the other drawn through the point of measurement of "gage of wheels."

7. Width of tread is the distance measured parallel to the base line from a line perpendicular thereto, drawn through the point of measurement of "gage of wheels" to the outer edge of tread.

8. Check gage distance is the distance measured parallel to the base line between two lines perpendicular thereto, one drawn through the point of measurement of "inside gage of flanges" on either wheel, and the other drawn through point of measurement of "gage of wheels" on mate wheel.

9. Over all gage is the distance parallel to base line from outer edge of one wheel to the outer edge of mate wheel.

The above mentioned wheel gage distances are either directly or by inference as follows:

Inside Gage of Flanges	4 feet	5 7-32	inches.
Gage of Wheels	4 "	7 11-16	"
Thickness of Flange		1 11-32	"
Width of Tread		4 11-32	"
Check Gage Distance	4 "	6 29-64	"
Over All Gage	5 "	4⅜	"

Wheels, Specifications for 33-Inch Cast Iron (M. C. B. Recommended Practice for cars of 60,000, 80,000 and 100,000 pounds capacity. The cancellation of the specifications for cast-iron wheels now appearing on pages 658-660, Proceedings 1908, and the substitution therefor of the following revised specifications was adopted by letter ballot in 1909:

1. Chills must have an inside profile that, in the finished wheel, will produce the exact form of flange and tread contour shown by M. C. B. drawings. The normal diameter of the wheel produced by the chill must be the M. C. B. Standard of 33 inches, measured at a point 2⅝ inches from outside of tread of wheel.

2. Wheels furnished under this specification must not vary more than one-fourth (¼) of an inch above or below the normal size "measured on the circumference," and the same wheel must not vary more than one-sixteenth (1-16) of an inch in diameter. The body of the wheel must be smooth and free from slag, shrinkage or blowholes. The tread must be free from deep and irregular wrinkles, slag, chill cracks and sweat or beads in throat, and swelled rims.

3. The wheels must show clean gray iron in the plates, except at chaplets, where mottling to not more than one-half (½) inch from same will be permitted. The depth of pure white iron must not exceed one (1) inch nor be less than one-half (½) inch in the middle of the tread.

(A) It shall not exceed one (1) inch in the middle of the tread nor be less than three-eighths (⅜) inch in the throat, for wheels having a maximum weight of six hundred and twenty-five (625) pounds.

(B) It shall not exceed one (1) inch in the middle of the tread nor be less than seven-sixteenths (7-16) inch in the throat for wheels having a maximum weight of six hundred and seventy-five (675) pounds.

(C) It shall not exceed one (1) inch in the tread nor be less than one-half (½) inch in the throat for wheels having a maximum weight of seven hundred and twenty-five (725) pounds.

(D) The depth of white iron shall not vary more than one-fourth (¼) of an inch around the tread on the rail line in the same wheel.

4. When ready for inspection, the wheels must be arranged in groups, all wheels of the same date being grouped together, and for each hundred wheels which pass inspection and are ready for shipment, two representative wheels shall be taken at random, one of which shall be subjected to the following tests:

The wheels shall be placed flange downward on an anvil block, weighing not less than seventeen hundred (1,700) pounds, set on rubble masonry at least two (2) feet deep, and having three supports not more than five (5) inches wide to rest upon. It shall be struck centrally on the hub, by a weight of two hundred (200) pounds.

(A) For wheels having a maximum weight of six hundred and twenty-five (625) pounds, ten (10) blows falling from a height of nine (9) feet.

(B) For wheels having a maximum weight of six hundred and seventy-five (675) pounds, twelve (12) blows falling from a height of ten (10) feet.

(C) For wheels having a maximum weight of seven hundred and twenty-five (725) pounds, twelve (12) blows falling from a height of twelve (12) feet.

Should the test wheel stand the given number of blows without breaking in two or more pieces, the Inspector will then subject the other wheel to the following test:

The wheel must be laid flange down in the sand, and a channel way one and one-half (1½) inches wide and four (4) inches deep must be molded with green sand around the wheel. The clean tread of the wheel must form one side of the channel way, and the clean flange must form as much of the bottom as its width will cover. The channel way must then be filled to the top with molten cast iron, which must be hot enough when poured, so that the ring which is formed when metal is cold shall be solid or free from wrinkles or layers. The time when the pouring ceases must be noted, and two minutes later an examination of the wheel must be made. If the wheel is found broken in pieces, or if any crack in the plate extends through or into the tread, the one hundred wheels represented by the tests will be rejected.

5. In the drop tests, should the test wheel break in two or more pieces with less than the required number of blows, then the second wheel shall be taken from the same lot and similarly tested. If the second wheel stands the test it shall be optional with the inspector whether he shall test the third wheel or not; if he does not do so, or if he does, and the third wheel stands the test, the hundred wheels shall be accepted as filling the requirements of the drop test.

6. The lower face of the weight of two hundred (200) pounds shall be eight (8) inches diameter, and have a flat face.

7. The thickness of the flange shall be regulated by the maximum and minimum flange thickness gages adopted by the M. C. B. Association in 1907.

All wheels furnished under this specification must conform to the respective sections shown by

M. C. B. drawings for the different weights of wheels, and these weights shall be as follows:

(A) Wheels for service under 60,000-pound capacity cars shall have a maximum weight not exceeding six hundred and twenty-five (625) pounds, and a minimum weight not less than six hundred and fifteen (615) pounds.

(B) Wheels for service under 80,000-pound capacity cars shall have a maximum weight not exceeding six hundred and seventy-five (675) pounds, and a minimum weight not less than six hundred and sixty-five (665) pounds.

(C) Wheels for service under 100,000-pound capacity cars shall have a maximum weight not exceeding seven hundred and twenty-five (725) pounds, and a minimum weight not less than seven hundred and fifteen (715) pounds.

(D) Weights given for the respective wheels mentioned in sections A, B and C are based on M. C. B. Standard drawings covering wheel design adopted in 1909.

8. All wheels must be numbered consecutively, in accordance with instructions from the railway company purchasing them and must have the initials of such railroad company, also the wheel number, the weight of wheel, and the day, month and year when made plainly formed on the inside plate in casting. No two wheels shall have the same number. All wheels shall also have the name of the maker and place of manufacture plainly formed on the outside plate in casting.

Wheels conforming to the requirements and furnished under this specification must have the letters "M. C. B., 1909," plainly formed on the outside plate in casting.

9. Individual wheels will not be accepted which

(1) Do not conform to standard design and measurements.

(2) Are under minimum weight *All excess weight over the maximum given to be at the expense of the manufacturer.*

3. Have physical defects described in Section 2.

Any lot of one hundred wheels submitted to test will not be accepted—

(1) If wheels broken do not meet the prescribed drop test.

(2) If the wheel tested does not stand the thermal tests.

(3) If the conditions prescribed in Section 3 are not complied with.

10. All wheels must be taped with M. C. B. Standard design of wheel circumference tape having numbers 1, 2, 3, 4, 5 stamped one-eighth (⅛) inch apart, the figure three (3) to represent the normal diameter, 103.67 inches circumference. The figure one (1) the smallest diameter and the figure five (5) the largest diameter.

Wheel Bar (Metal Six-Wheel Truck). A substitute of iron or steel for a wooden wheel piece, to which the pedestals are attached.

Wheel Boss (British). American term hub. The center of the wheel, which is bored out to receive the axle.

Wheel Box (Street Cars). A covering for a wheel which projects through the floor. The sides are usually of wood and the top of sheet iron, but they are sometimes made entirely of wood or metal.

Wheels, Cast Iron (M. C. B. Recommended Practice). In 1904 the designs of cast iron wheels shown in Fig. 6070, etc., for cars of 60,000 lbs., 80,000 lbs. and 100,000 lbs. capacity were adopted as Recommended Practice.

Wheel Center or **Skeleton.** The whole of a railway wheel, except the tire, and the fastenings which connect the tire to the rim.

Wheel Center (Steel Tired Wheels). Fig. 5390, etc. The portion of a wheel inside of the tire and between it and the hub or boss. The wheel center is sometimes in one piece and sometimes made up of two parts, the hub or boss and the central filling piece. Face plates, front and back, are also used. The term is seldom applied to chilled or cast wheels.

Wheel Check Gage. See **Check Gage.**

Wheel Circumference Measure (M. C. B. Standard). Figs. 5514-5517. By letter ballot in 1893 the wheel circumference measure was adopted as a standard of the Association. Prior to that date it had been recommended for use in all car building shops. In 1900 a new form of wheel circumference measure was adopted as standard. Figs. 5511-5517.

Wheel Cover (British). See **Splasher.**

Wheel Cut Glass. The ordinary process of glass cutting, which leaves a perfectly polished and perfectly transparent surface.

Wheel Defect Gage (M. C. B. Standard). In 1903 the wheel defect gage, Figs. 5573, formerly shown in the Rules of Interchange, was adopted as standard. Modified in 1904, 1905 and 1907.

Wheel Fit. See **Wheel Seat.**

Wheel Flange. Fig. 5518. The projecting edge or rim on the periphery of a car wheel for keeping it on the rail.

Wheel Flanges, Gages for Max. and Min. Thickness (M. C. B. Standard). Fig. 5602. See **Wheel.**

Wheel Flange Thickness Gages, for New Wheels (M. C. B. Standard). Fig. 5602. Maximum and minimum wheel flange thickness gages for new wheels were adopted as standard in 1894. These gages admit a variation of 1-16 inch either way from the standard thickness of 1⅜ inches when measured, as shown. Such gages should be used on all new wheels after September 1, 1894, to insure ability to mount them properly to check gage. In 1907 a modified form of wheel flange thickness gages, applicable to the larger wheel tread than a standard, was adopted as standard.

Wheel Piece. 10, Figs. 4771-4777 and Figs. 4798-4799. A stick of timber in a wooden frame truck, which forms the side of the frame and to which the pedestals are attached. It is often stiffened by outside and inside wheel piece plates or by a wheel piece truss rod, the latter serving also as a wheel piece tie rod to tie the two end pieces firmly to the wheel piece. A wheel piece tie rod is in all cases used, but it is not always used in the form of a truss rod. Iron wheel pieces are sometimes called wheel bars.

Wheel Piece Plate. 11, 12, Figs. 4771-4777 and Figs. 4830-4832. See above.

Wheel Piece Tie Rod. See above.

Wheel Plate. 1. (Cast Iron Wheels.) That part of a plate car wheel which connects the rim and the hub. It occupies the place and fulfils the same purpose as the spokes do in an open or spoke wheel. See **Car Wheel, Wheel, Washburn Wheel, Plate Wheel.**

2. (Steel Tired Wheels.) Fig. 5428, etc. See **Face Plate.**

Wheel Press. Fig. 6849.

Wheel Ribs (Cast Iron Wheels). Fig. 5460, etc. More commonly, brackets. Projections cast usually on the inner side of plate car wheels to strengthen them. They are placed in a radial position and are often curved so as to permit the wheel to contract when it cools.

Wheel Seat or **Wheel Fit** (of an Axle). The part which is inserted in the hub of a wheel. It is made truly cylindrical and very slightly larger than the axle seat of the wheel. The wheel is pressed on it by hydraulic pressure, and very rarely becomes loose. Prick punching and shimming the seat have been forbidden by the Rules of Interchange. See **Wheels.**

Wheel Timber. A **Wheel Piece,** which see.

Wheel Tires, Minimum Thickness of Steel Tires (M. C. B. Recommended Practice). Fig. 5766. See **Interchange of Traffic, Steel Tire.**

Wheel Tread. The outer surface or part of a car wheel which bears on the rail. The standard width of wheel tread is 5½ in., measured from outside of tread to inside of flange, i. e., including the entire thickness of the flange. See Fig. 5518.

Wheel Tread and Flange (M. C. B. Standard). Fig. 5518. This form of wheel tread and flange was adopted as a standard of the Association by letter ballot in 1886.

Wheel Truing Brake Shoe. Fig. 5235. A brake shoe with abrasive inserts to grind the wheel tread and flange true to center while in service.

Wheeler Car Seats. Figs. 4113-4115. A slide-over car seat made by Heywood Bros. & Wakefield.

Whisk Broom or **Wisp Broom,** and **Holder.** Fig. 3843 A small broom for brushing wearing apparel, furniture and upholstering.

Whistle Reservoir. A small tank or reservoir to store air for operating a pneumatic signal whistle on electric motor cars.

White Metal Band. Fig. 4197. More properly, **Seat Back Molding,** which see.

Whitworth Gages. See **Cylindrical Gages.**

Whitworth System of Screw Threads. A system of screw threads designed by Sir Joseph Whitworth, of England, and which is almost universally used in that country and throughout Europe. It differs from the Sellers' system in that the sides of the threads stand at an angle of 55 degrees instead of 60 degrees, and the tops of the threads and the spaces between them at the root are rounded, instead of being flat, as in the Sellers' system. The number of threads per inch in the two systems is as follows:

Diameter of screw	No. threads per in.	Diameter of screw	No. threads per in.
¼	20	1⅛	7
5-16	18	1¼	7
⅜	16	1⅜	6
7-16	14	1½	6
½	12	1⅝	5
⅝	11	1¾	5
¾	10	1⅞	4½
⅞	9	2	4½
1	8		

The Whitworth pipe thread differs from the above. See **Pipe Thread.**

The Whitworth system in this country has practically passed out of use. See **Screw Thread.**

Wickes Refrigerator Car. Figs. 339-340 show the Wickes system of refrigeration. In the Wickes car the refrigerator doors open out and are flush with the outside sheathing. See Figs. 1390-1392. The usual sliding doors are omitted. There is a cooling compartment at each end, occupying the full width of the car and 2 feet 10 inches of the length and separated from the storage compartment by a wooden partition or jacket, which starts about 2 feet from the floor and extends to within about 16 inches of the ceiling.

There are two ice tanks in each cooling compartment. These tanks are constructed of an oak framework, to which are nailed in vertical and horizontal rows galvanized iron strips 2 inches wide interwoven in the manner of basketwork. Projecting outward from these strips 2 inches are galvanized iron leaves, which largely increase the cooling surface. These tanks are separated from one another, from the jacket and from the walls at the sides at the end of the car by air spaces of about 4 inches. They are supported by 2x4-inch oak grate bars 2 feet from the floor. Beneath the bars are many rows of galvanized iron wire, crossing and recrossing from side to side of the car. A sloping bottom or apron of galvanized iron at the bottom of the jacket leads the drip water to the wires. There is another apron of galvanized iron in front of the wires, extending to within 12 inches of the floor. On the floor, directly under the wires, is the drip pan, with a properly trapped drain at each end. The drip water falls from the ice through the grate bars onto the wires and down into the drip pan. The warm air enters the cooling compartment through the opening at the top of the jacket, and, descending as it cools, comes in contact with the ice, the metal surface of the tanks, the wires, and the spray of drip water about the wires, and re-enters the car through the opening below the apron in front of the wires, having become cooled, dried and purified. Each tank is iced through an opening in the roof, provided with an inner and outer door, each properly insulated.

This car may be also used for shipment of goods under ventilation. When so used the ice hatches are left open and protected by iron screens. This gives a thorough circulation of air into the openings at the front end, passing the length of the car and out through the openings at the rear end.

Wide Gage. In a general usage, the distance between the heads of the rails of a railroad when it is slightly greater than 4 ft. 8½ in., in distinction from **Broad Gage,** which see, which means a material increase, as to 5 ft. or 6 ft.

Wind Guard (Pintsch System). Fig. 3106. A perforated brass disc, fitting in globe holder, 8ob, Fig. 3106a, below the opal globe, 102, Fig. 3121, and supplied with a small covered hole for admitting a match or taper when lighting the gas. Its purpose is, as indicated by its name, to protect the flame from the action of drafts from below the globe.

Wind Scoop. A hood or ventilating jack (often so called) attached to a pipe passing through the roof of a car, and so formed as to create either an exhaust draft or the contrary by the current of external air passing over the car.

Wind Arbor. See **Square End.**

Winding Gear (Pile Driver Car). Consists of spools and a spur gear of the ordinary form controlled by a strap brake and treadle, so that on the release of the brake the shears attached to the ham-

mer rope will descend by their own weight and engage with the hammer eye.

Winding Shaft (Drop Doors of Coal Cars, etc.). 70, Figs. 428-431. A round iron bar supported by the winding shaft plates or bearings, around which the drop door chain or hopper chain is wound. It carries a ratchet wheel and is usually formed with a square end for applying a wrench or handle to turn it.

Winding Shaft Plate (Hopper Bottom Coal Car). The plate attached to the side of the car carrying the ratchet wheel, pawl and dog, serving as a bearing for the winding shaft. See above.

Winding Shaft Ratchet Wheel and Pawl. 66, 67, Figs. 428-431. The ratchet wheel and pawl attached to the end of the winding shaft to prevent its turning and allowing the doors to drop.

Window. 137, Figs. 599-619, and Figs. 2204-2205. "An opening in the wall of a building or car for the admission of light and of air when necessary. This opening has a frame on the sides, in which are set movable sashes containing panes of glass."—Webster. Hence the window itself, especially in compound words, is often termed simply the sash. In Great Britain carriage windows are technically termed lights. See also **Deck Sash.** Car windows are now generally made of uniform size throughout. In sleeping and parlor cars double windows are almost always used to inclose an air space between them and prevent radiation of heat and drafts.

Window Balance. W, Figs. 648-651 and Figs. 4659, 4325. A device in which a spring is used instead of a weight to counterbalance the weight of the sash and glass. See **Sash Balance.**

Window Blind. 140, Figs. 648-651, etc. A wooden screen composed of a frame called the sash, carrying slats, placed in a window to exclude sunshine. Window blinds, especially in street cars, are sometimes made single, but for lack of room to raise so large a sash they are usually made double and distinguished as upper and lower. Window shades have nearly displaced blinds in first-class passenger cars, blinds being used in the saloons only.

Window Blind Bolt. Figs. 4537-4544. A bolt used for holding a window blind in any desired position. It enters into a window blind bolt bushing or plate.

Window Blind Bolt Bushing. Figs. 4531-4532. See above. Same as sash lock bushing.

Window Blind Lift. Figs. 4534-4535. Commonly called simply blind lift. A metal hook fastened to the blind for raising and lowering it, usually attached to the bottom rail, but in street car blinds, which are lowered below the window, to the top rail. Window blind lifts are distinguished as single and double, the single lift being the upper and the double lift the lower, which has a projection for raising the outer part. Double window blind lifts are also distinguished as lower and upper. The upper lift differs from the lower by not having a lug or ledge, which is carried on the lower blind for the purpose of engaging with the upper when the lower one is half raised, so that the two may thereafter be raised together.

Window Blind Mullion. An upright bar in the center of a window blind sash.

Window Blind Pull. Figs. 4545-4554. A **Window Blind Lift,** which see.

Window Blind Rail (Street Cars). A horizontal bar of a window blind sash.

Window Blind Rest. 1. A wooden strip to fill up the lower part of the groove in which an upper window blind slides, and on which it rests when down.

2. (Street Cars.) A horizontal strip of wood which extends from one body post to another, on which the blind rests when it is lowered.

Window Blind Sash. 86, Figs. 648-651. The frame in which the inclined thin slats of a window blind are held.

Window Blind Slat. See **Window Blind.**

Window Blind Spring. Figs. 4527-4529. The same as a **Sash Spring,** which see.

Window Blind Stile. An upright bar in a window blind sash.

Window Blind Stop. An **Inside Window Stop,** which see.

Window Casing. 7, Fig. 2205. A frame which incloses or surrounds a window. Often called an inside window stop.

Window Cleaner. Fig. 3846.

Window Cornice. A purely ornamental projecting structure, usually made of wood, placed over a window on the inside. It is now little used.

Window Cove Molding. 87, Figs. 648-651 and 26, Fig. 2074. A small concave molding around the sides and top of a window on the inside of a passenger car.

Window Curtain. C, Fig. 2204. A cloth or some kind of textile material loosely hung over a window to exclude sunshine, and which can be spread or drawn aside at pleasure. Curtains of this kind are now little used. **Window Shades,** which see, lie always flat, and are rolled up upon shade rollers. They are often also called curtains.

Window Curtain Bracket. Fig. 4682. More commonly, simply curtain brackets, for supporting window shade rollers. A more correct term would be shade or window shade brackets, but in common usage, curtain brackets support shade rollers.

Window Curtain Holder or **Hook.** Y, Fig. 2204; Figs. 3386-3391. A metal hook fastened at the side of a window for holding a curtain when drawn aside. Knobs are also used.

Window Curtain Knob. A form of window curtain hook.

Window Curtain Leather. Fig. 4672. More properly, window shade leather.

Window Curtain Rings. Fig. 3728. See **Curtain.**

Window Curtain Rod. Fig. 3713. See **Curtain.**

Window Curtain Roller. Fig. 4681. More properly, a **Shade** or **Window Shade Roller,** which see.

Window Deflector Ventilator. See **Deflector** and **Ventilator.**

Window Dust Guard or **Deflector.** Figs. 4655-4657. A thin narrow board of the height of the window adjusted perpendicular to the car side at the forward edge of the window, to deflect dust and cinders so they shall not enter the open window. It is fastened to the window casing by a dust guard spring holder, Fig. 4658.

Window Fastener. Figs. 4598, etc. A **Sash Lock,** which see.

Window Furnishings (for Deck Shades). Figs. 4444, etc. (Lower Windows.) Figs. 4573, etc.

Window Glass. Panes of glass used for windows. They are either plate or rolled glass, made by pouring the molten glass onto a table having the height of the desired thickness of the plate, and then passing a roller over the top; or blown, or common window glass, the latter being by far the cheapest and most widely used, but of very much inferior quality. It is made by blowing the glass into a large bulb,

which is then slit open while still hot and flattened out.

Window Grating. A wrought or cast iron partition made of bars, or in other form, placed on the outside of the windows of passenger cars to prevent passengers from putting their heads or arms outside. Now rarely used.

Window Guards (Street Cars). Fig. 3990, etc. Small metal rods to act as fenders for the end windows.

Window Holder. A **Sash Holder**, which see.

Window Latch. Fig. 4598. A **Sash Lock**, which see.

Window Latch Plate. A form of sash lock stop.

Window Latch Stop (Lower and Upper). See **Sash Lock Stop.**

Window Ledge (Street Cars). A projecting molding outside of a car which extends from one end of it to the other above the windows, intended to shed the rain. A water table or window lintel.

Window Lift. See **Sash Lift.**

Window Lintel. 90, Figs. 599-619. A horizontal strip on the outside of a passenger car between the posts and over the window openings.

Window Molding (Passenger Car Interiors). 88 Figs. 648-651. Known to the trade as car moldings, and used around or on each side of a window, especially to cover the joint between the panel and post. It sometimes forms a groove on the post in which a window or window blind slides, in place of the **Inside Window Stop**, which see.

Window Molding Base. An ornament made of wood or metal attached to the lower end of a window molding.

Window Molding Joint Cover. A piece of metal or wood used to cover the joints of window moldings when two pieces join each other.

Window Panel. 68, Figs. 599-619. See **Panel.** A panel between the windows known as inside, outside and end window panels.

Window Panel Furring. Horizontal distance pieces between the window posts to which the panel is fastened.

Window Pilaster, Cap and Base. 8, 9, 10, Fig. 2205. A decorative feature of a car interior, placed between the windows and covering the window post.

Window Post (Passenger Cars). 58, Figs. 599-619. A post extending from sill to plate at the side of a window opening, against which the sash and blind slide.

Window Rail. 12, Fig. 2205. A horizontal bar in a window sash.

Window Rod Bracket. Figs. 3717-3721.

Window Rod Bushing. Figs. 3737-3739. A support for the ends of a **Curtain Rod**, which see.

Window Sash. 85, Figs. 599-601; 1351. See **Sash.**

Window Sash Balance. See **Window Balance** and **Sash Balance.**

Window Sash Holder. See **Sash Lock.** Fig. 4598.

Window Sash Lift. A **Sash Lift**, which see. Fig. 4613, etc.

Window Sash Rest (Street Cars). A strip of wood extending from one body post to another, on which the sash rests when lowered.

Window Sash Spring. Fig. 4527. See **Sash Spring.**

Window Shade. 140a, Figs. 648-651. A window curtain, which is wound on a roller above the window, in distinction from one which is drawn aside. In car building it is finished at the bottom with a window shade leather, Fig. 4672, and a heavy window shade rod bar or shade holder. A rectangular clot, which is somewhat inaccurately called an eyelet, is inserted in the leather to fasten the shade down by slipping it over the sash lift. In passenger cars window blinds have been superseded by shades, and all sleeping and parlor cars have window shades in place of blinds. An automatic shade roller is always used, the old-fashioned pulleys and cord tighteners being practically obsolete.

Window Shade Leather. Fig. 4672. See above.

Window Shade Stop. 10, Fig. 2204. That part of a shade holder which engages with or bears against the window casing and holds the shade.

Window Shade Thumb Latch. 16, Fig. 2204. A thumb latch which releases the bottom of the shade so that it may be moved up or down. It fixes the shade in any position automatically.

Window Sill. 77, Figs. 599-619 and 77, 78, Figs. 648-651. A horizontal piece of wood or metal under a window, on which the sashes rest when down. There are usually two, inside and outside. A thin strip called the window sill cap goes above it.

Window Sill Cap. See above.

Window Sill Cornice Board. 65a, Figs. 648-651. An ornamental strip placed on the inside of a passenger car under the window sill. 648-651.

Window Sill Molding. 80, Figs. 648-651. A small wooden molding under an inside window sill. In modern cars it is usually a belt molding.

Window Spring. Fig. 4527. See **Sash Spring.**

Window Stile. 11, Fig. 2205; N, Fig. 2204. The upright bars of a window sash.

Window Stop. The strips, or beads, attached to the window posts which hold the sashes in place. There are always two, inside and outside, and parting beads or sash parting strips in between.

Window Stop (Inside). See **Window Casing.**

Window Valance. See **Valance.**

Window Ventilator. See **Deflector, Ventilator.**

Winslow Car Roof. Figs. 2098-2111. A car roof which consists of metal roof sheets laid crosswise to the car. They are made with corrugations and are let into grooves in the rafters. The latter are covered with strips of sheet iron and the whole with a layer of transverse boards, which are fastened to longitudinal purlins attached to the rafters or carlines. See **Car Roof** and **Murphy's Improved Winslow Roof.**

Wire. See **Seal Wires.** Fig. 4074.

Wire Base (Lantern). Fig. 3622.

Wire Gauze (for Ventilator). A fine netting made of wire with which the outside of deck windows and ventilator openings is covered to prevent the admission of dust.

Wire Shade Tripod. See **Shade Ring.**

Wood Center Car Wheel. A form of car wheel used in Great Britain almost universally for passenger service, but rarely in this country. The wheel center is entirely made up of teakwood used as a continuous and solid series of spokes held in place by side plates and Mansell retaining rings. Called in Great Britain the Mansell wheel. See **Steel Tired Wheel, Car Wheel, Tire Fastening.**

Wood Screw. Fig. 3079. A small cylindrical bar of iron or steel with a wood screw thread cut on it and a slotted head so that it can be turned with a screw driver. A lag screw is a heavy kind of wood screw, but is not so called. It has a square instead of a slotted head, as Fig. 2911. See **Screw.**

Wood Screw Thread. A form of screw thread used for screws which are intended to screw into wooden objects. It differs from a metal thread in having the spaces between the projections wider.

Wood Worker (Woodworking Machinery). Fig. 6810.

A light machine built like a planer with a revolving cutter spindle which is supplied with a number of adjustments and attachments for doing a large variety of woodworking operations, including sawing, matching, planing, molding, gaining, etc.

Wood's Platform Gate. Fig. 4012. A gate, the details of which are shown in the figures, that has found considerable favor on steam and suburban roads. When opened it folds against the end of the car quite out of the way.

Wood's Roller Bearings. Figs. 5359, etc.

Wood's Vestibule Diaphragm. Figs. 2289-2293.

Wooden Brake Block (British). A piece of soft wood used in Great Britain as a **Brake Block**, which see.

Wooden Floor Mat (Street Cars). A sort of grating made of strips of wood, with distance pieces and spaces between.

Wooden Frame Truck. A car truck, of which the wheel pieces and end pieces are made of wood. See **Truck, Car Truck.**

Wooden Wheel (Hand Cars). A form of **Wood Center Car Wheel**, which see.

Woodworking Machinery. Figs. 6793, etc.

World Ventilator. Fig. 4428. See **Ventilators.**

Worm. A helix like a screw thread for winding a rope or a chain upon. See **Brake Chain Worm**, Figs. 946-947.

Worn Flat (Car Wheels). Under the rules for the interchange of traffic this defect is defined to be irregular wear under fair usage, due to unequal hardness of the thread of the wheel, and to be carefully distinguished from slid flat, which is a defect produced by the slipping of the wheels from excessive brake pressure. The rules provide that flats exceeding 2½ in. in length are cause for rejection. See **Wheels and Interchange of Traffic.**

Wrecking Crane. Fig. 248. A powerful crane mounted on trucks and operated usually by steam for use in clearing up wrecks. They are built in capacities up to 100 tons.

Wrecking Frog. Figs. 3864-3865. A frog-like device with one end elevated to form an incline plane by which derailed trucks can be replaced upon the track by pulling the car in the direction of its length.

Wrecking Hook. Figs. 1776-1777.

Wrench. A contrivance for screwing and unscrewing a nut. A monkey wrench is adjustable to take nuts of various sizes. A socket wrench is one having a cubical cavity to receive a square end. The wrenches for the Westinghouse brake are packing nut and cap screw wrenches, and the discharge valve seat wrench. A **Spanner**, which see, is a wrench for use on round or many-sided nuts, like hose couplings to which lugs or slots are added for engaging with the wrench.

Wrought Iron Wheel (British.) A "wagon wheel." A wheel in which the rim and spokes are of wrought iron and the hub (boss) is either of wrought or cast iron. If the former, the spokes are welded to it; if the latter, it is cast round the spokes. The tire is shrunk on. This wheel is largely used in freight (goods) service in Great Britain, and in both freight and passenger service on the continent of Europe. See **Wheel, Car Wheel.**

Wrought Molding or **Fascia Molding** (British). A molding which is worked out of the solid on a horizontal or vertical part of the framing of a carriage body. See **Planted Molding.**

Y

Yale Lock. Figs. 2594-2599. Named after its inventor. It has pin tumblers instead of lever tumblers or other style of lock. The key does not engage the bolt as in other locks, but the bolt is engaged by a cam attached to the rear of the lock, which in turn is actuated by the key. The key is bitted on its upper edge to engage with pin tumblers contained in the cylinder. The original flat key has been superseded by the corrugated and the paracentric forms.

The key raises the pin tumblers to the proper height and is then able to rotate the plug in the cylinder, thus to actuate the lock. Advantages of the Yale lock are its compactness, simplicity, security, small size of key and unequaled capacity for key changes. It is made in a great variety of forms adapted to all uses.

Yoke. 1, Figs. 1010-1011. A pocket strap, U-shaped, which contains the spring and follower plates of a drawbar. It is the means of attaching the drawbar to the spring and follower plates. A **Drawbar Yoke**, which see.

2. (M. C. B. Recommended Practice.) Fig. 5779. In 1905 the designs of yokes for tandem spring, twin spring and friction draft gear were adopted as Recommended Practice superseding the standard yoke formerly shown. See **Attachments of Couplers to Cars.**

Z

Zane's Bibb Cock. Fig. 3656.

INDEX TO ENGRAVINGS.

NOTE.—The following engravings, 6,934 in all, are alphabetically arranged under the following general heads; these twelve general headings include the engravings, and they are again sub-classed alphabetically. The page number is put at the bottom and the inclusive figure numbers at the top of each page.

If the above general arrangement be borne in mind, there will be no difficulty in turning at once to any class of engravings desired, all being alphabetically arranged under their title and sub-title, as shown above and more fully in the following detailed index. Under each of the headings and sub-headings of the following list, the engravings are in general arranged alphabetically, so far as their nature would permit. In a few cases cars have been grouped together on account of their constructive features and uses, in preference to the particular kind of freight carried, and by which name they are usually distinguished. This, it is thought, will not lead to confusion, as they are never widely separated, but are nearly in alphabetical order.

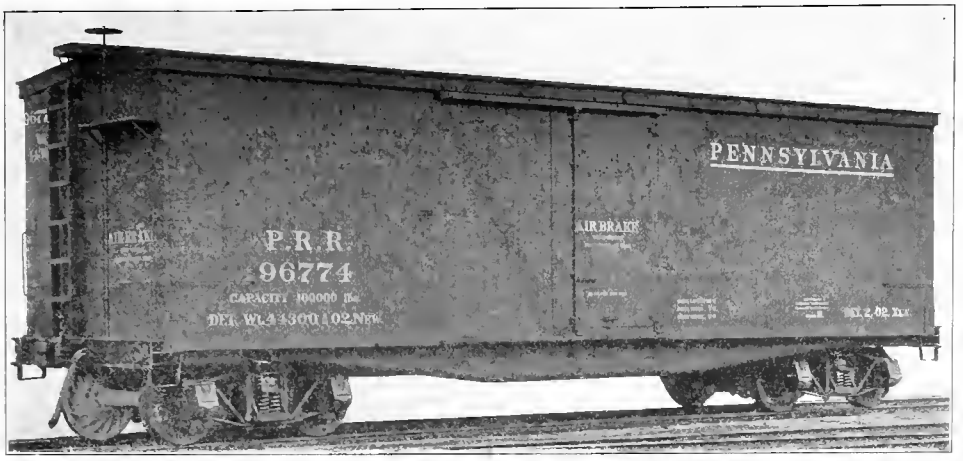


Fig. 1. Box Car, Pressed Steel Underframe. Capacity, 100,000 lbs. Weight, 44,300 lbs. Length, 36 ft.
American Car & Foundry Co., Builders.
(Drawings of this car are shown in Figs. 266-268.)

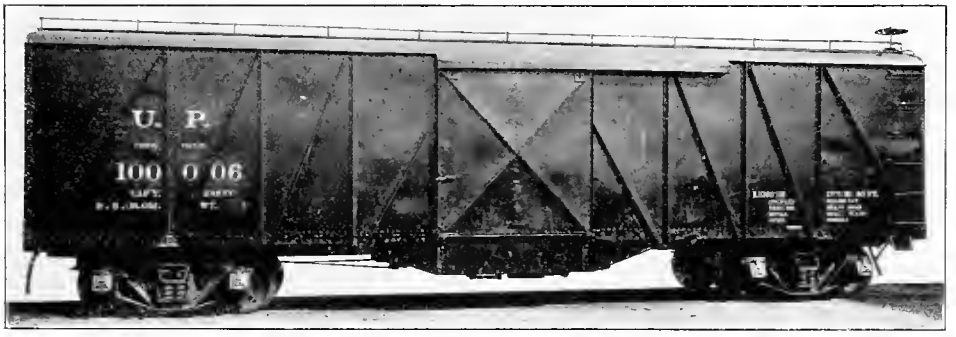


Fig. 2. All Steel Box Car. Capacity, 100,000 lbs. Length, 40 ft.
Union Pacific Railroad Co., Builders.
(Underframe of this car shown in Fig. 1042.)

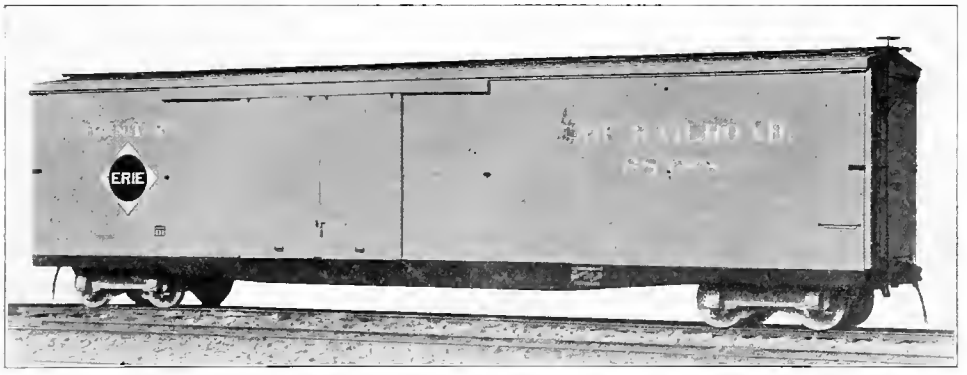


Fig. 3. Furniture Car, Pressed Steel Underframe. Capacity, 60,000 lbs. Weight, 44,000 lbs. Length, 50 ft.
Pressed Steel Car Co., Builders.
(Drawings of this car are shown in Figs. 287-290.)

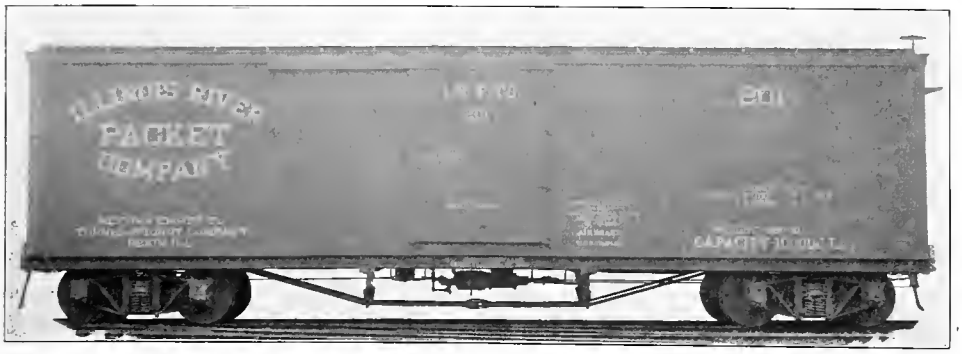


Fig. 4. Box Car, King Patent Underframe, Structural Steel. Capacity, 100,000 lbs.
Weight, 48,000 lbs. Length, 40 ft. Middletown Car Works, Builders.

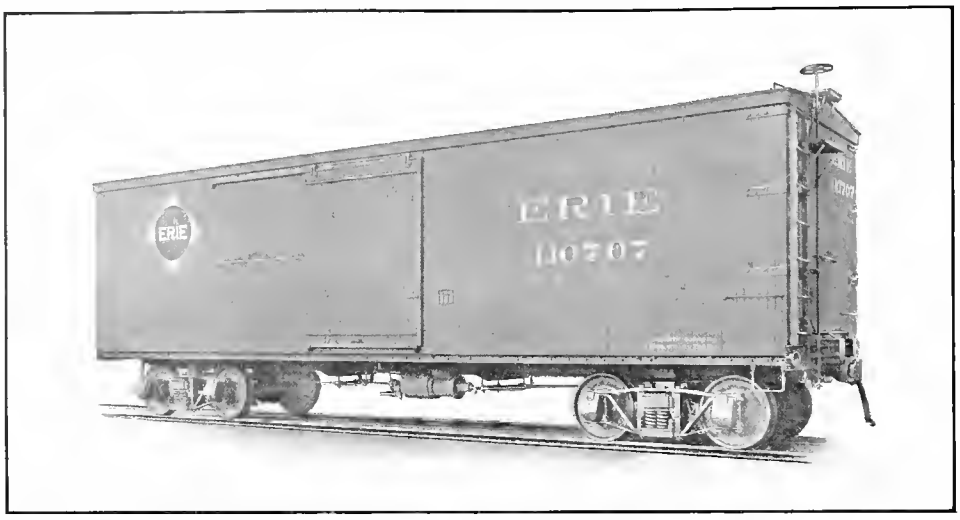


Fig. 5. Box Car, Structural Steel Underframe. Capacity, 80,000 lbs. Weight, 40,700 lbs. Length, 36 ft.
American Car & Foundry Co., Builders.
(Drawings of this car are shown in Figs. 303-304.)

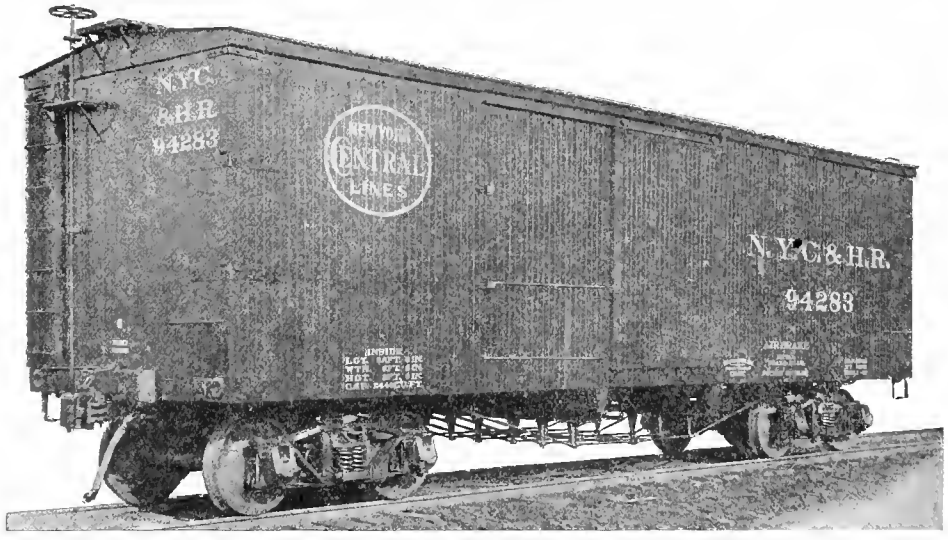


Fig. 6. Box Car, Wooden Underframe. Capacity, 80,000 lbs. Weight 39,700 lbs. Length, 36 ft.
Western Steel Car & Foundry Co., Builders.
(Drawings of this car are shown in Figs. 262-265.)

Fig. 7. Box Car, Single I-Beam Center Sill Underframe. Capacity, 80,000 lbs. Weight, 39,300 lbs. Length, 42 ft.
Bettendorf Axle Co., Builders.

Fig. 8. Box Car, Structural Steel Underframe. Capacity, 60,000 lbs. Weight 35,700 lbs. Length 36 ft. Pressed Steel Car Co., Builders.

Fig. 9. Box Car, Steel Underframe. Capacity, 66,000 lbs. Weight, 26,400 lbs. Meter Gage. Middletown Car Co., Builders.

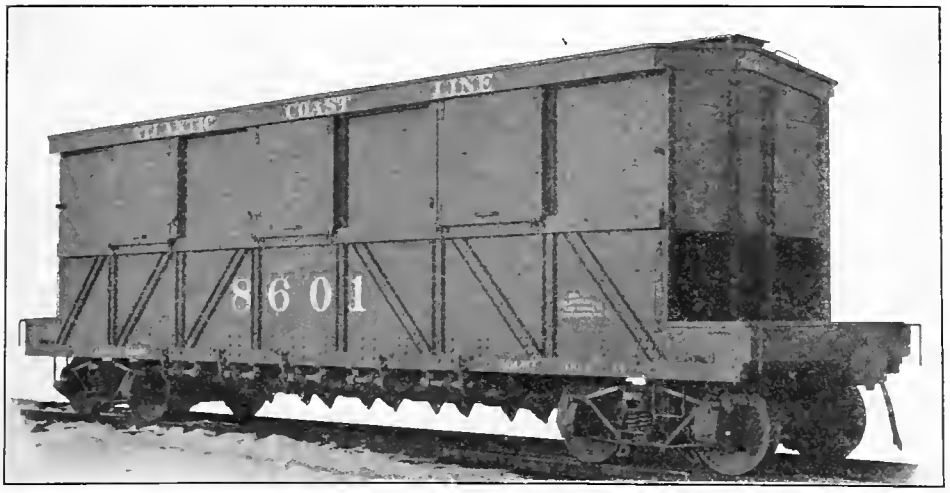


Fig. 10. Phosphate Box Car, Steel Side and Underframe. Capacity, 80,000 lbs. Weight, 46,150 lbs. Middletown Car Co., Bnilders.

Fig. 11. Box Car, Wooden Underframe. Capacity, 60,000 lbs. Weight, 36,200 lbs. Length, 36 ft. American Car & Foundry Co., Builders.

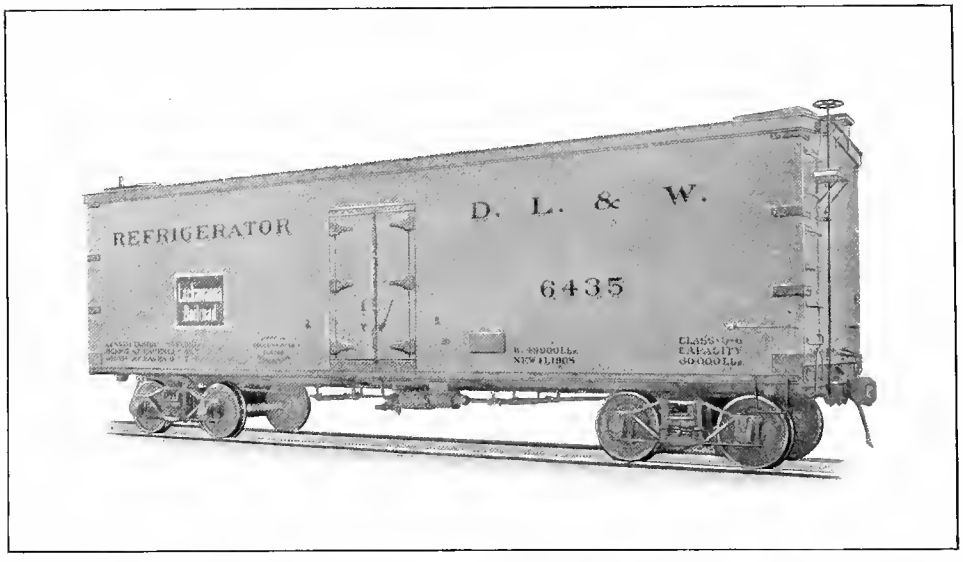


Fig. 12. Refrigerator Car, Structural Steel Underframe. Capacity, 60,000 lbs. Weight, 49,900 lbs. Length, 35 ft. 9½ in. American Car & Foundry Co., Builders.

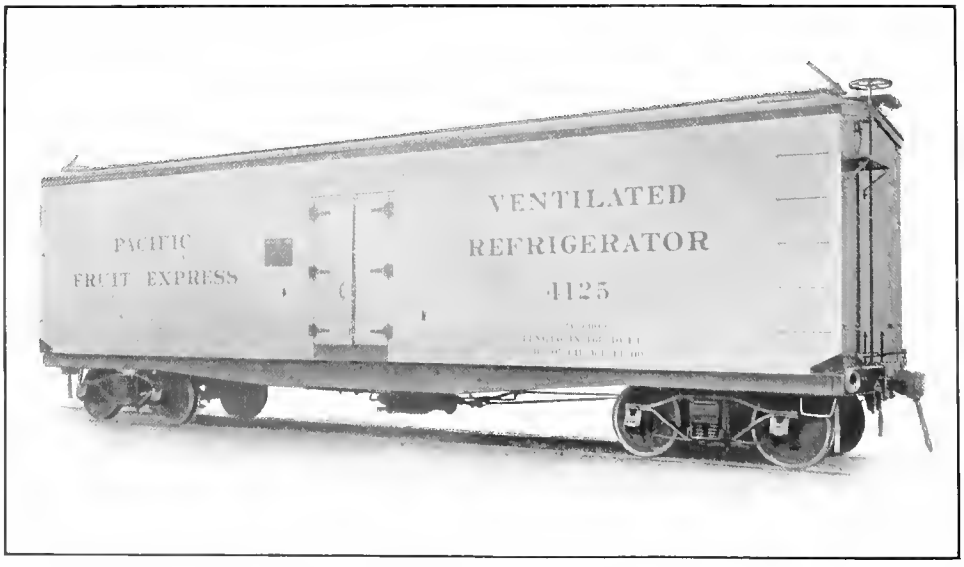


Fig. 13. Refrigerator Car, Steel Underframe. Capacity, 60,000 lbs. Weight, 44,700 lbs. Length, 40 ft. American Car & Foundry Co., Builders.

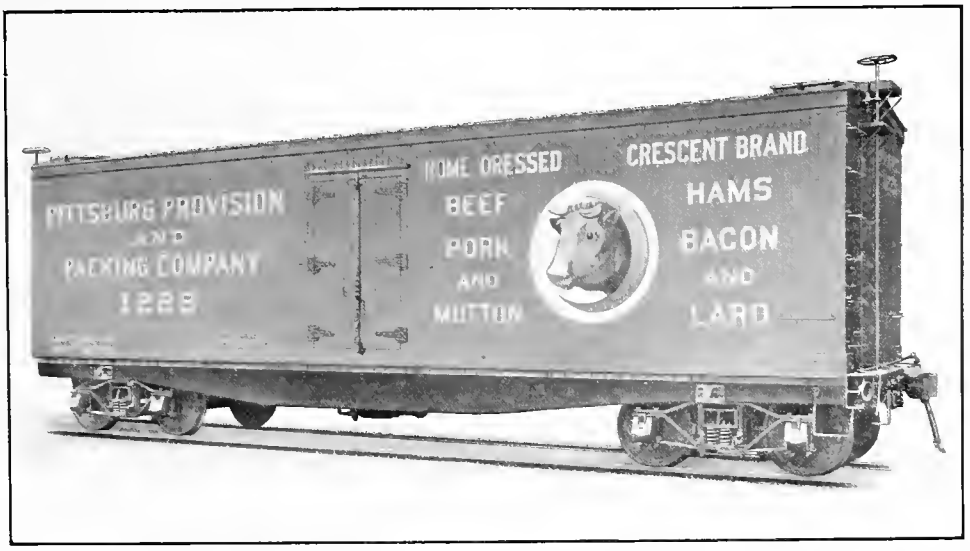


Fig. 14. Refrigerator Car, Pressed Steel Underframe, Capacity, 50,000 lbs. Weight, 46,100 lbs. Length, 35 ft., 2⅜ in.
American Car & Foundry Co., Builders.

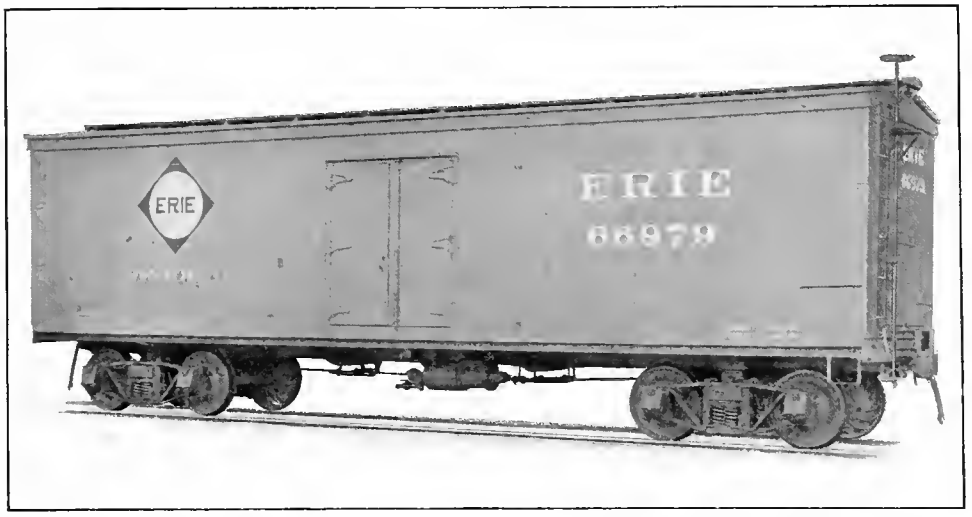


Fig. 15. Produce Car, Structural Steel Underframe. Capacity, 80,000 lbs. Weight, 45,700 lbs. Length, 36 ft.
American Car & Foundry Co., Builders.
(Drawings of this car are shown in Figs. 302-312.)

Fig. 16. Refrigerator Car with End Ice Boxes. Capacity, 60,000 lbs. Weight, 38,400 lbs. Length, 38 ft., 8 in.
American Car & Foundry Co., Builders.
(Drawings of this car are shown in Figs. 305-308.)

Fig. 17. Refrigerator Car, Wooden Underframe, Bowen Patent. Capacity, 50,000 lbs. Weight, 35,300 lbs. American Car & Foundry Co., Builders.

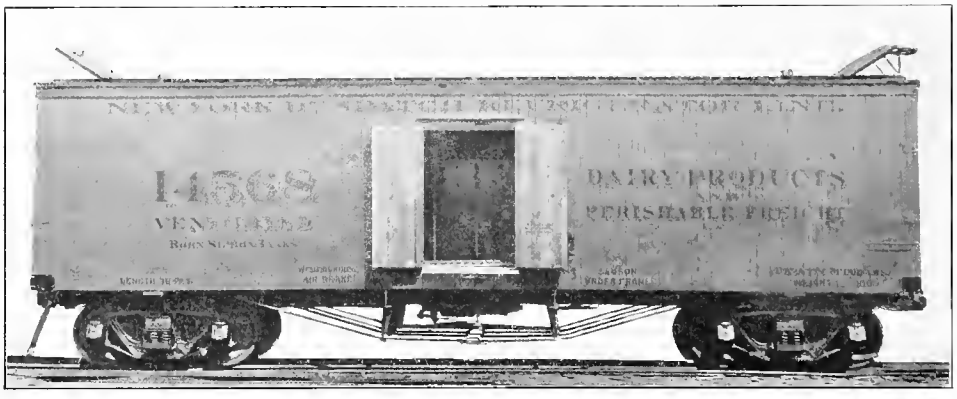


Fig. 18. Refrigerator Car, Steel Underframe, Samson Patent. Capacity 60,000 lbs. Whipple Car Co., Builders.

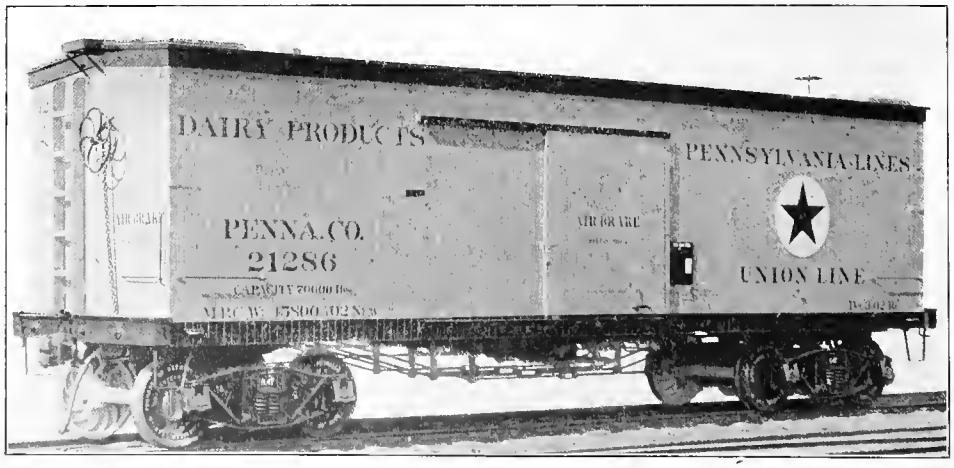


Fig. 19. Refrigerator Car for Dairy Products. Capacity, 70,000 lbs. Weight, 45,800 lbs. American Car & Foundry Co., Builders.

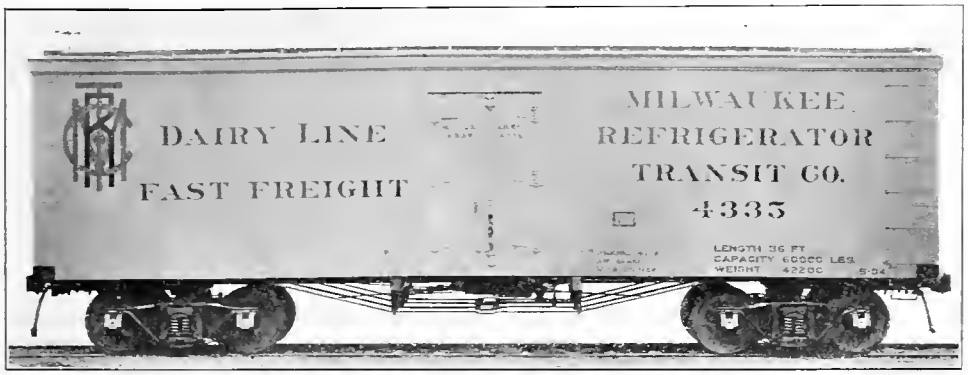


Fig. 20. Refrigerator Car for Dairy Products. Capacity, 60,000 lbs. Weight, 42,200 lbs. Length, 36 ft. Milwaukee Car Mfg. Co., Builders.

Fig. 21. Ventilated Fruit Car. Capacity, 60,000 lbs. Weight, 33,800 lbs. Length, 36 ft. Georgia Car & Manufacturing Co., Builders.

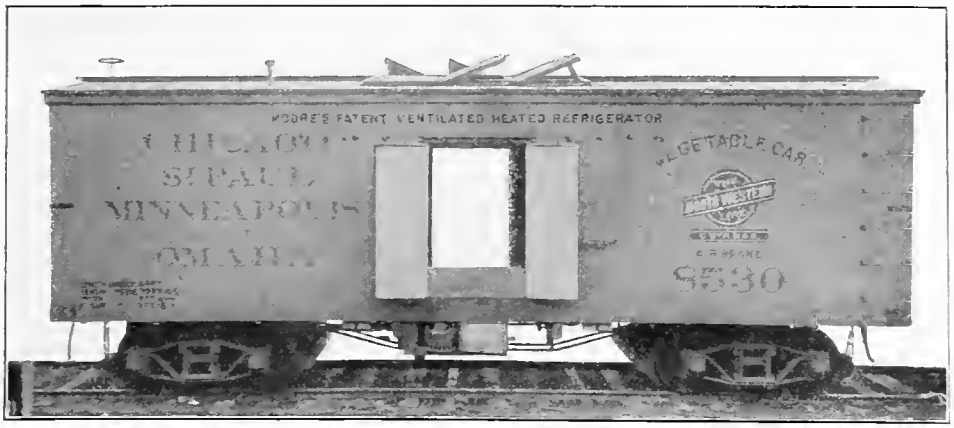


Fig. 22. Refrigerator Vegetable Car. Moore's Patent. Capacity, 60,000 lbs. Weight, 44,000 lbs. Length, 32 ft., 10½ in. Moore Patent Car Co., Builders.

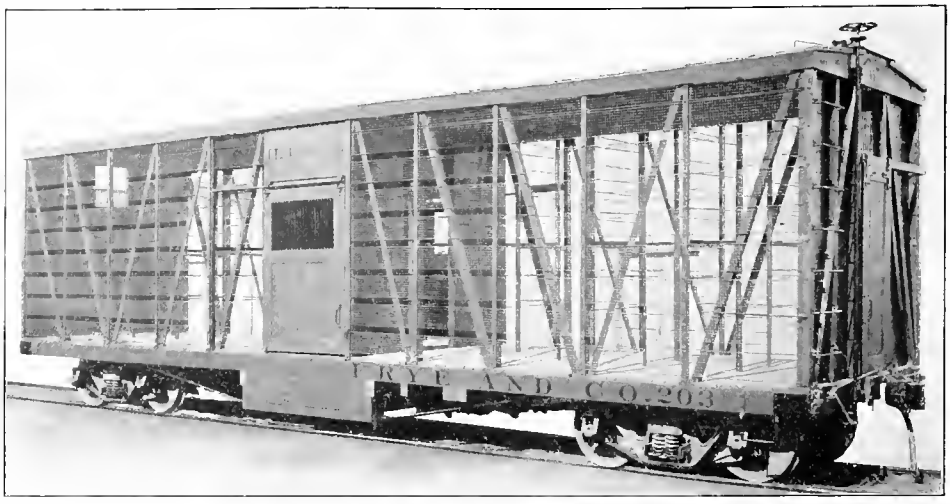


Fig. 23. Poultry Car without Coops.
Milwaukee Car Mfg. Co., Builders.

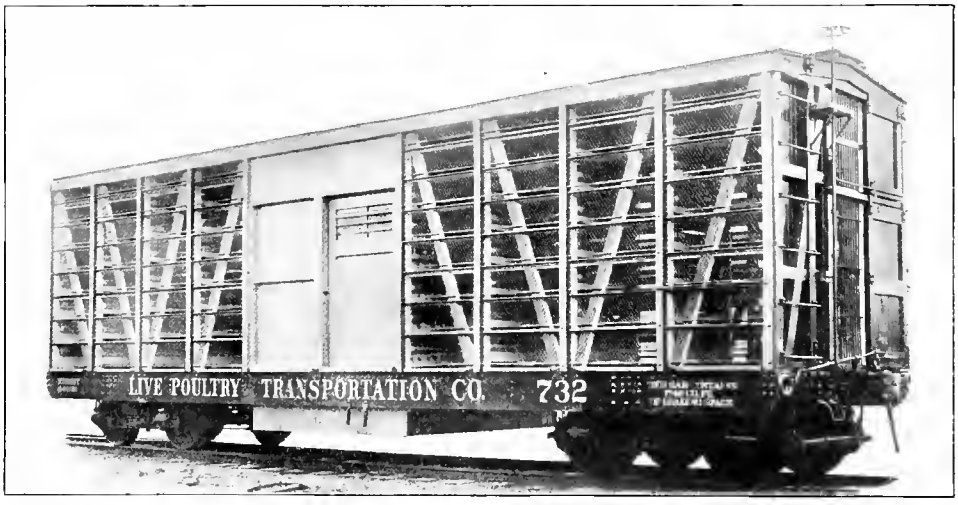


Fig. 24. Steel Underframe Poultry Car. American Car & Foundry Co., Builders.

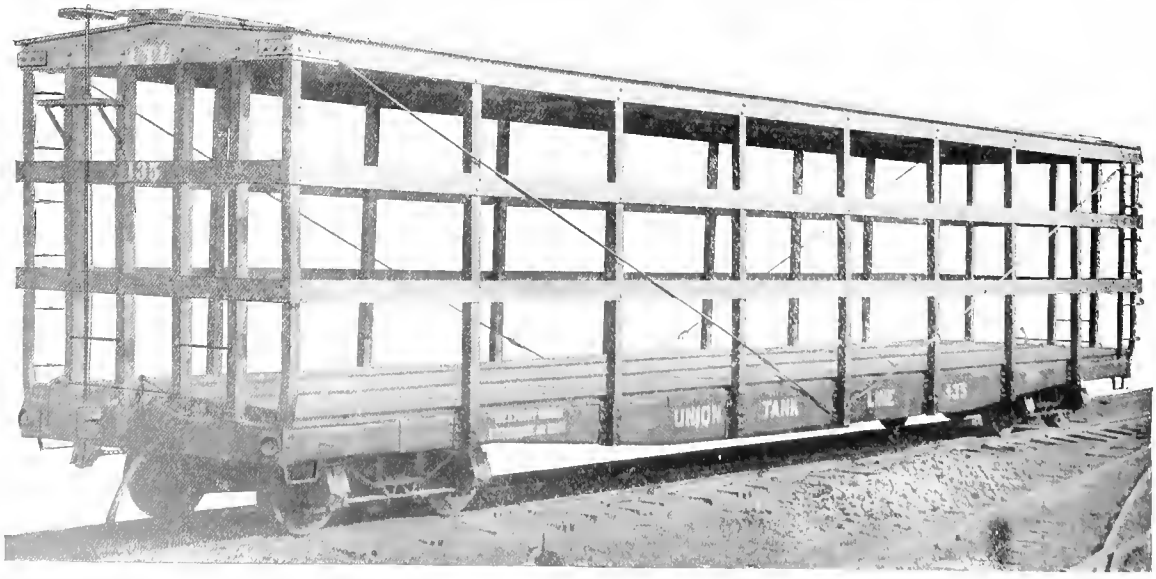


Fig. 25. Barrel Rack for Empty Barrels.
Pressed Steel Car Co., Builders.

Fig. 26. Flat Car, Wooden Underframe. Capacity, 80,000 lbs. Weight, 27,200 lbs. Length, 41 ft.
American Car & Foundry Co., Builders.

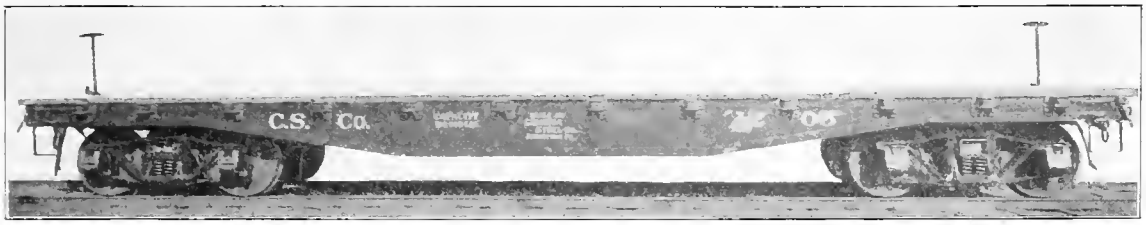


Fig. 27. Flat Car, Structural Steel Underframe. Capacity, 100,000 lbs.
Cambria Steel Co., Builders.

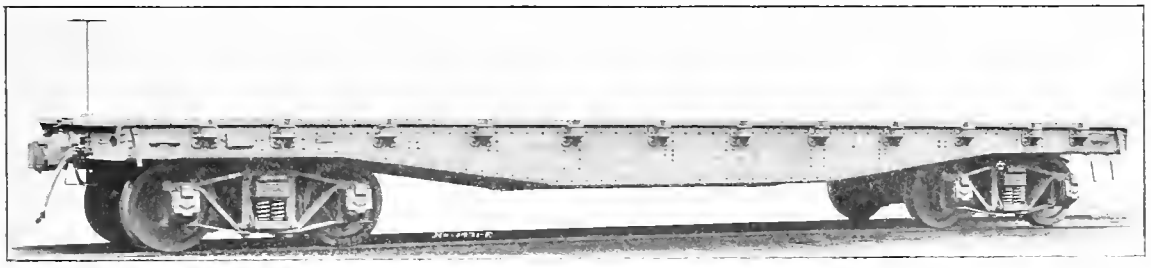


Fig. 28. Flat Car, Pressed Steel Underframe. Capacity, 100,000 lbs. Weight, 39,500 lbs. Length, 40 ft.
Pressed Steel Car Co., Builders.

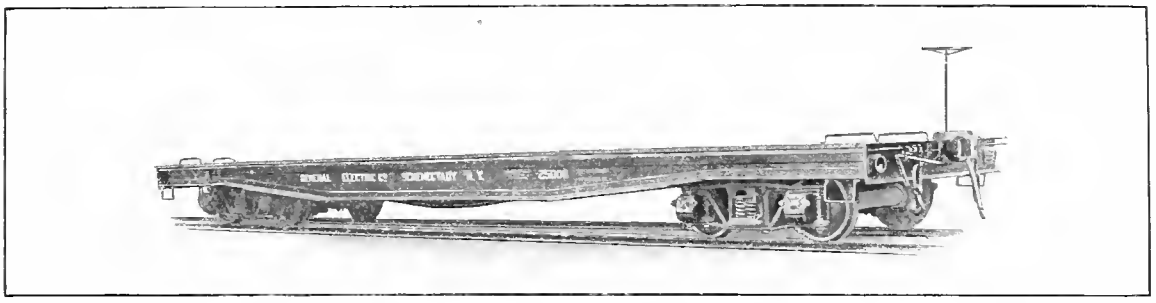


Fig. 29. Flat Car, Steel Underframe. Capacity, 120,000 lbs. Weight, 47,500 lbs. Length, 40 ft., 7 in.
American Car & Foundry Co., Builders.

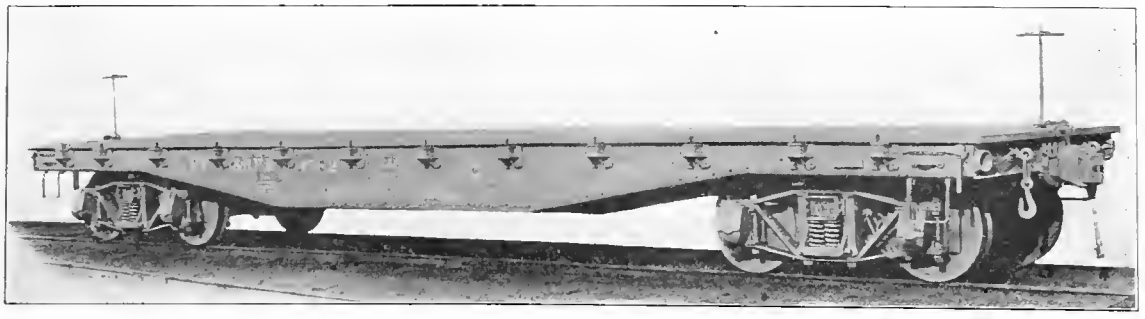


Fig. 30. Flat Car, Pressed Steel Underframe. Capacity, 100,000 lbs. Weight, 38,800 lbs.
Pressed Steel Car Co., Builders.

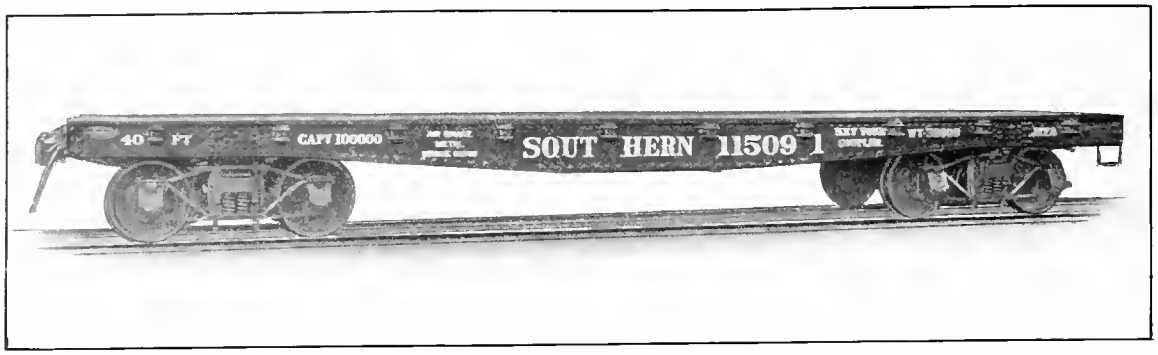


Fig. 31. Flat Car, Steel Underframe. Capacity, 100,000 lbs. Weight, 33,900 lbs. Length, 40 ft.
American Car & Foundry Co., Builders.

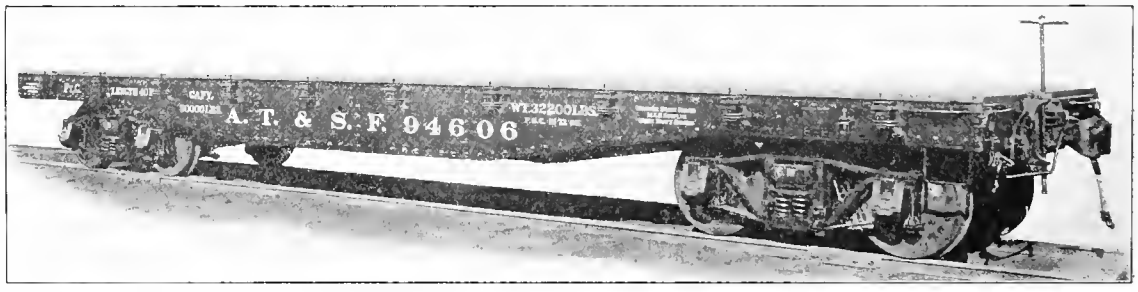


Fig. 32. Flat Car, Pressed Steel Underframe. Capacity, 80,000 lbs. Weight, 32,200 lbs.
Pressed Steel Car Co., Builders.
(Another view of a similar car with body applied for ballasting is shown in Fig. 52.)

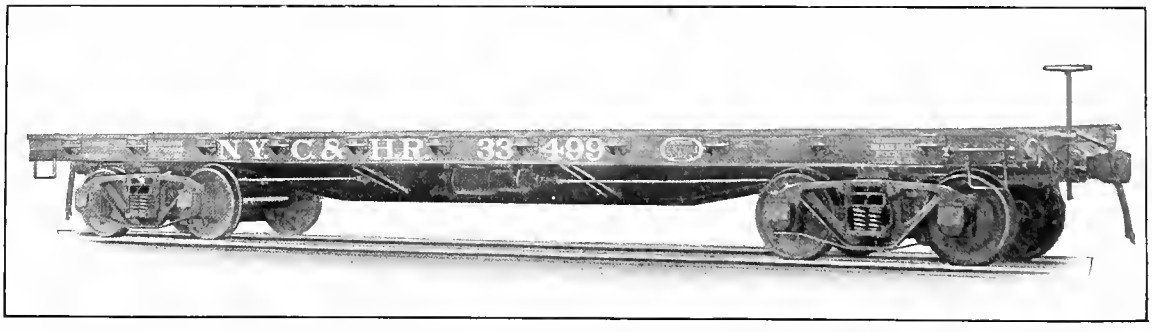


Fig. 33. Flat Car, Steel Underframe. Capacity, 80,000 lbs. Weight, 29,700 lbs. Length, 41 ft., 4 in.
American Car & Foundry Co., Builders.

Fig. 34. Flat Car, Wood Underframe. Capacity 80,000 lbs., Weight 29,700 lbs., Length 40 ft.
Fitz-Hugh Luther Co., Builders.

Fig. 35. Gondola Car, Twin Hopper, All Steel. Capacity, 100,000 lbs. Weight, 42,600 lbs. Length, 40 ft.
Barney & Smith Car Co., Builders.

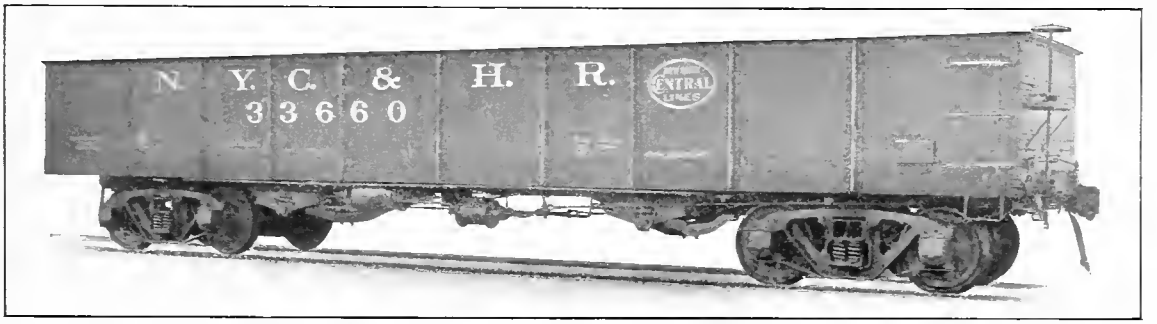


Fig. 36. Gondola Car, Twin Hopper, All Steel. Capacity, 100,000 lbs. Weight, 38,800 lbs. Length, 40 ft.
American Car & Foundry Co., Builders.

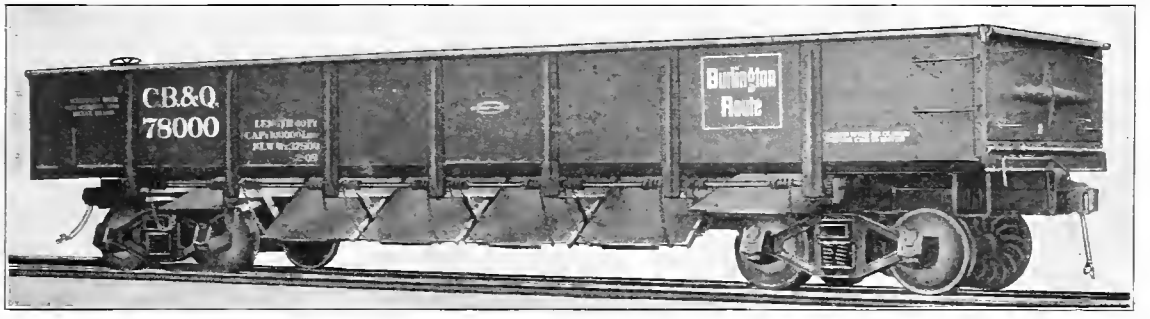


Fig. 37. Gondola Car, Drop Bottom, All Steel. Capacity, 100,000 lbs. Weight, 37,800 lbs. Length, 40 ft.
Bettendorf Axle Co., Builders.

(Drawings of this car are shown in Figs. 400-401.)

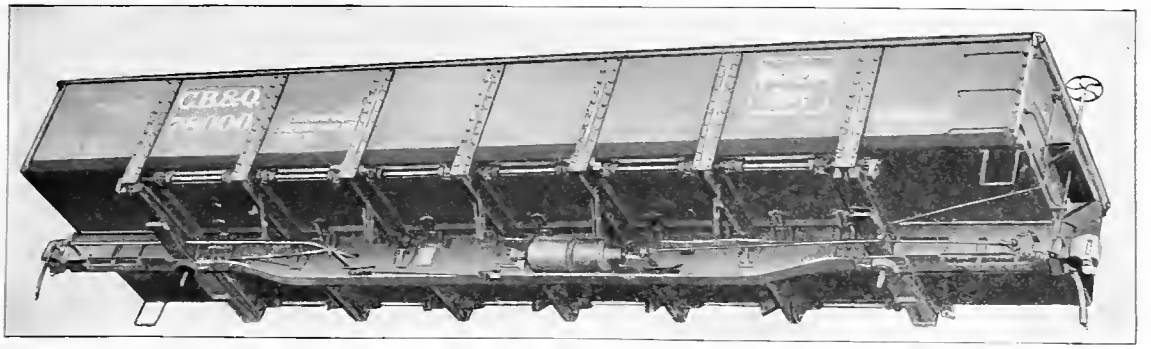


Fig. 38. Gondola Car, Drop Bottom, All Steel. Capacity, 100,000 lbs. Weight, 37,800 lbs. Length, 40 ft.
Bettendorf Axle Co., Builders.

Fig. 39. Gondola Car, Drop Ends, Wooden Body, Pressed Steel Underframe. Capacity, 100,000 lbs. Weight, 44,500 lbs. Pressed Steel Car Co., Builders.
(Drawings of this car are shown in Figs. 388-391.)

Fig. 40. Gondola Car, Drop Bottom and Ends, Pressed Steel. Capacity, 100,000 lbs. Weight, 39,900 lbs. Pressed Steel Car Co., Builders.

Fig. 41. Gondola Car, Twin Hopper Bottom, Pressed Steel. Capacity, 100,000 lbs. Weight, 40,600 lbs. Pressed Steel Car Co., Builders.
(Drawings of this car are shown in Figs. 428-441.)

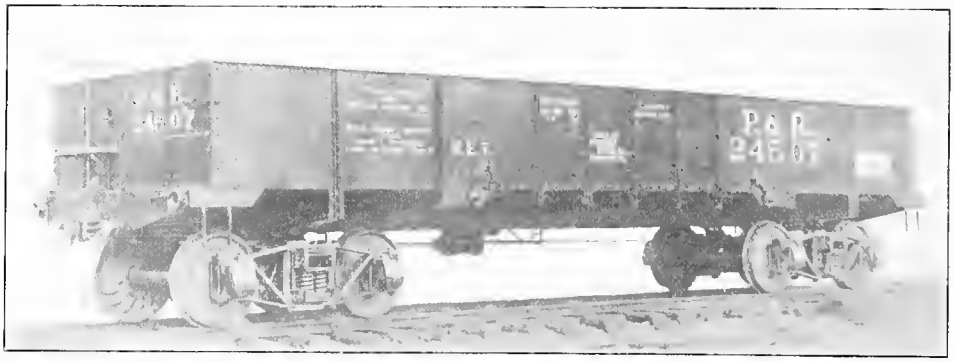


Fig. 42. Gondola Car, Flat Bottom, Structural Steel. Capacity, 100,000 lbs. Weight, 23,300 lbs. Cambria Steel Co., Builders.
(Drawings of this car are shown in Figs. 408-410.)

Fig. 43. Wooden Gondola Car with Inside Stakes. Capacity, 80,000 lbs. Middletown Car Co., Builders.

Fig. 44. Gondola Car, Flat Bottom, Structural Steel Underframe, Wooden Body. Capacity, 100,000 lbs. Weight 44,800 lbs. Standard Steel Car Co., Builders.
(Drawings of this car are shown in Figs. 411-413.)

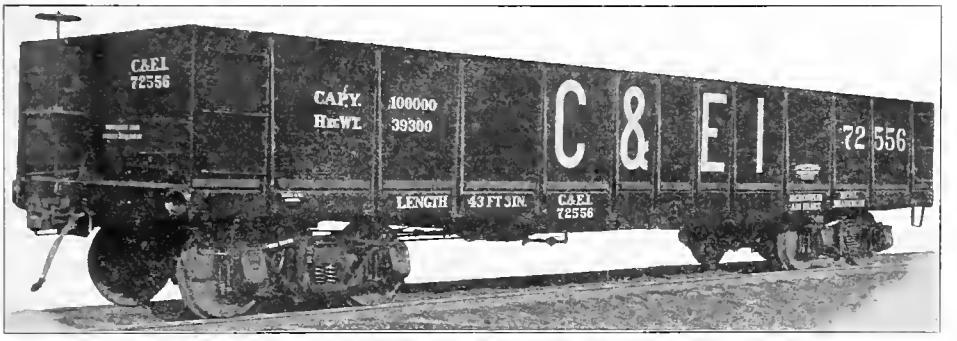


Fig. 45. Gondola Car, Flat Bottom, Pressed Steel Underframe. Capacity, 100,000 lbs. Weight, 39,300 lbs. Western Steel Car & Foundry Co., Builders.

Fig. 46. Gondola Car, Drop Bottom, High Side. Capacity, 90,000 lbs. Weight, 37,200 lbs. American Car & Foundry Co., Builders.

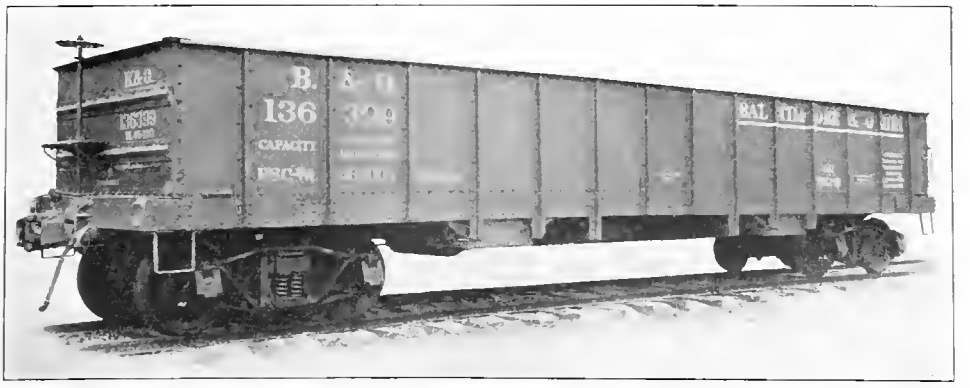


Fig. 47. Gondola Car, Twin Hopper Bottom, Pressed Steel. Capacity, 100,000 lbs. Weight, 46,400 lbs. Pressed Steel Car Co., Builders.
(Drawings of this car are shown in Figs. 432-437.)

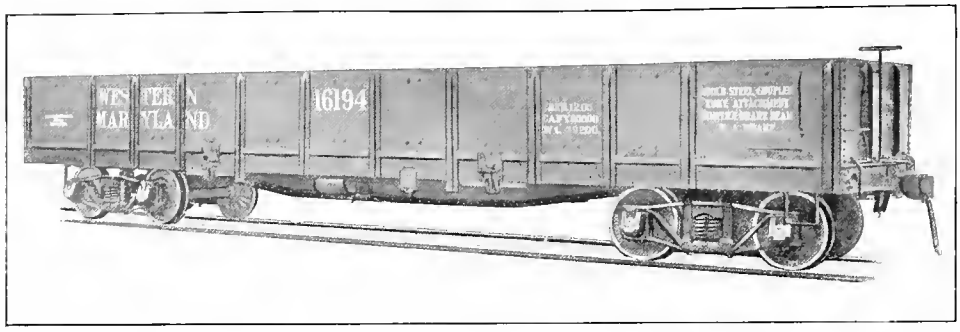


Fig. 48. Gondola Car, Steel Underframe. Capacity, 80,000 lbs. Weight, 39,200 lbs. Length, 41 ft.
American Car & Foundry Co., Builders.

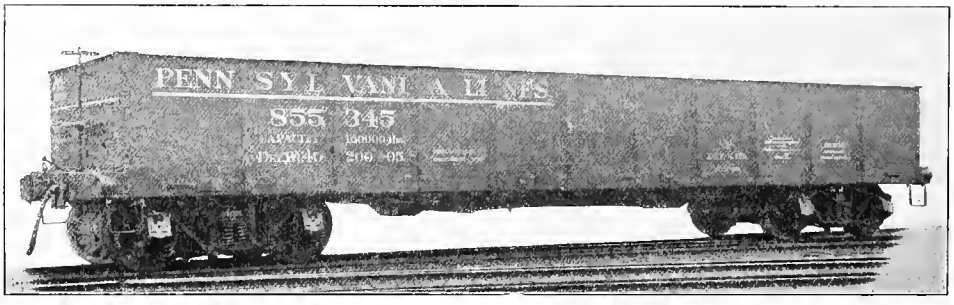


Fig. 49. Gondola Car, Drop Bottom, Pressed Steel. Capacity, 100,000 lbs. Weight, 40,200 lbs. Length, 38 ft., 2½ in.
American Car & Foundry Co., Builders.

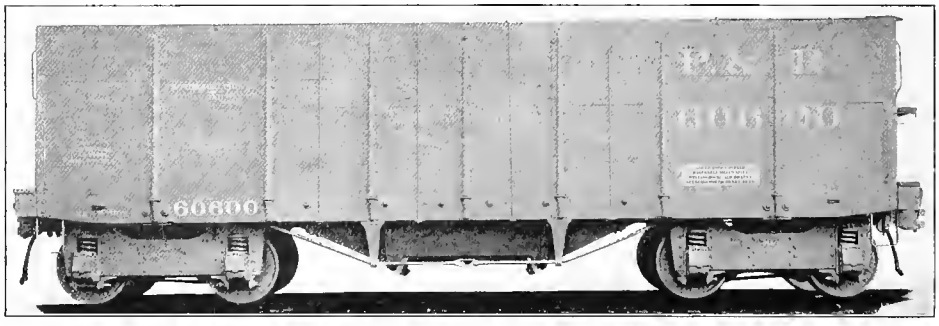


Fig. 50. Gondola Car, High Side, Hopper Bottom. Capacity, 80,000 lbs.
Middletown Car Co., Builders.

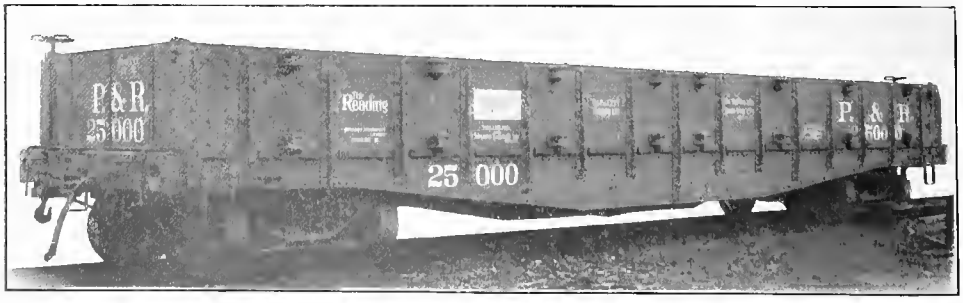


Fig. 51. Gondola Car, High Side, Drop End, Steel Underframe. Capacity, 100,000 lbs. Weight, 51,800 lbs.
Middletown Car Co., Builders.

Fig. 52. Gondola Car, Side Dump, Pressed Steel Underframe. Capacity, 80,000 lbs. Weight, 36,300 lbs.
Pressed Steel Car Co., Builders.
(Another view of this car with body removed is shown in Fig. 32.)

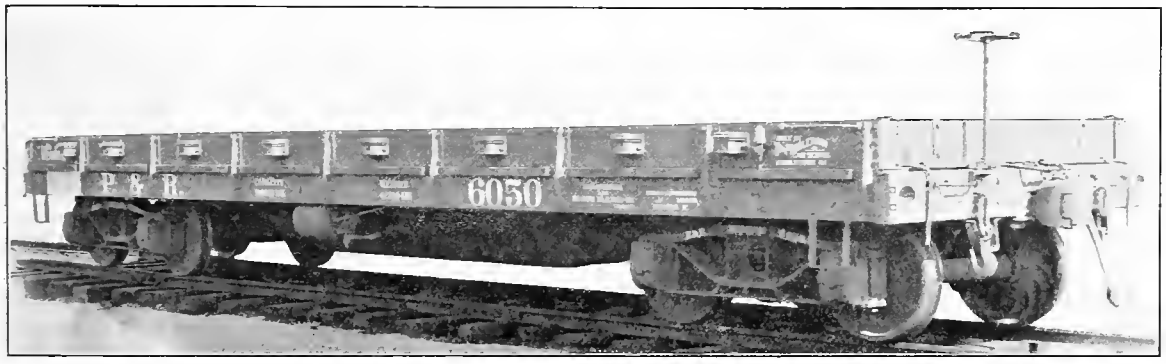


Fig. 53. Gondola Car, Low Side, Drop End, Steel Underframe. Capacity, 100,000 lbs. Weight, 42,700 lbs.
Middletown Car Co., Builders.

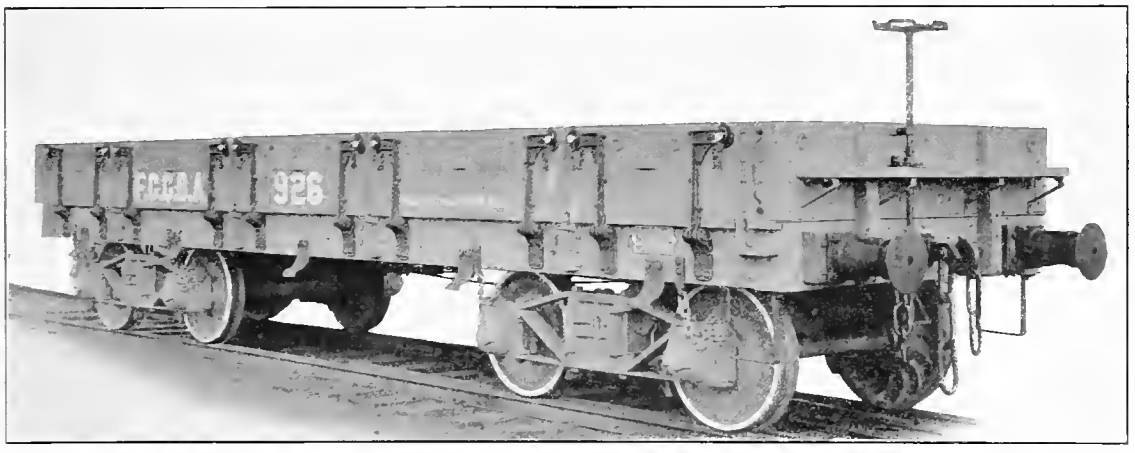


Fig. 54. Gondola Car, Drop Side, Steel Underframe. Capacity, 66,000 lbs.
Middletown Car Co., Builders.

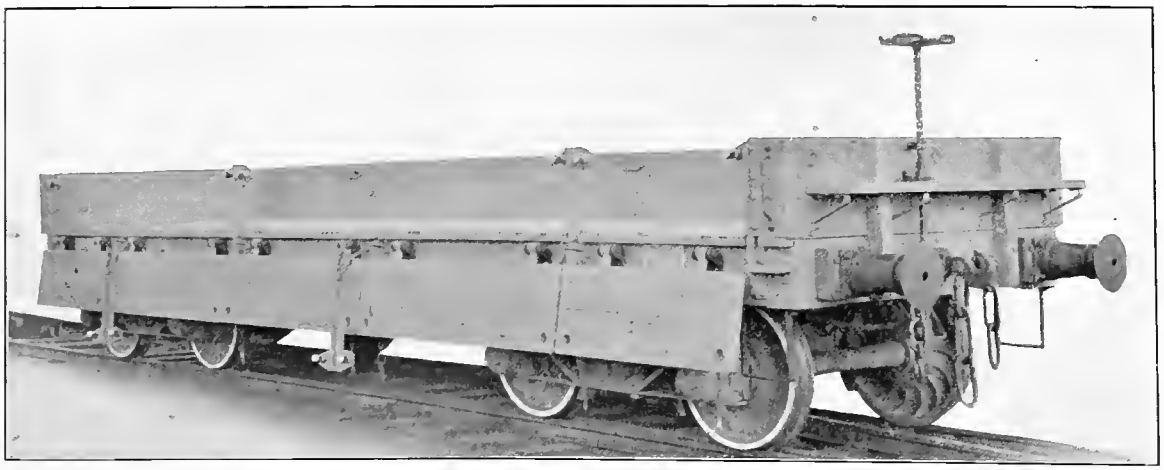


Fig. 55. Gondola Car, Drop Side, Steel Underframe. Capacity, 66,000 lbs.
Middletown Car Co., Builders.
(Underframe of this car shown in Fig. 1034.)

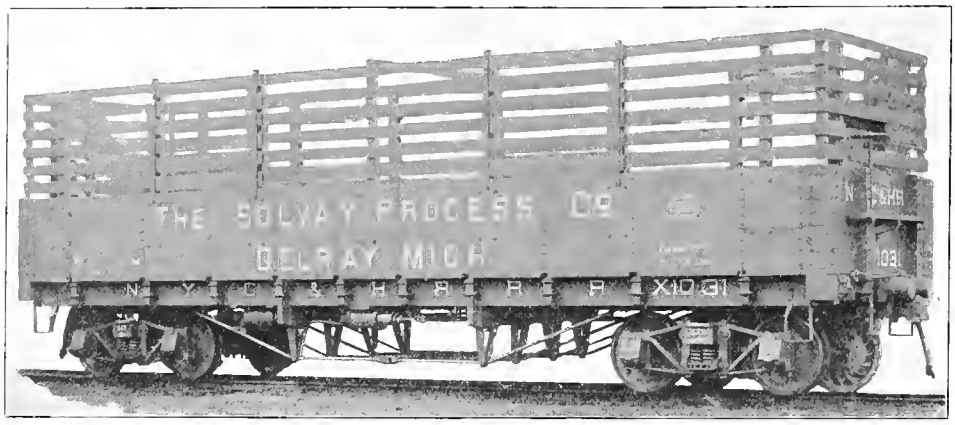


Fig. 56. Gondola Car with High Coke Racks. Capacity, 80,000 lbs. Middletown Car Co., Builders.
(Drawings of this car are shown in Figs. 381-382.)

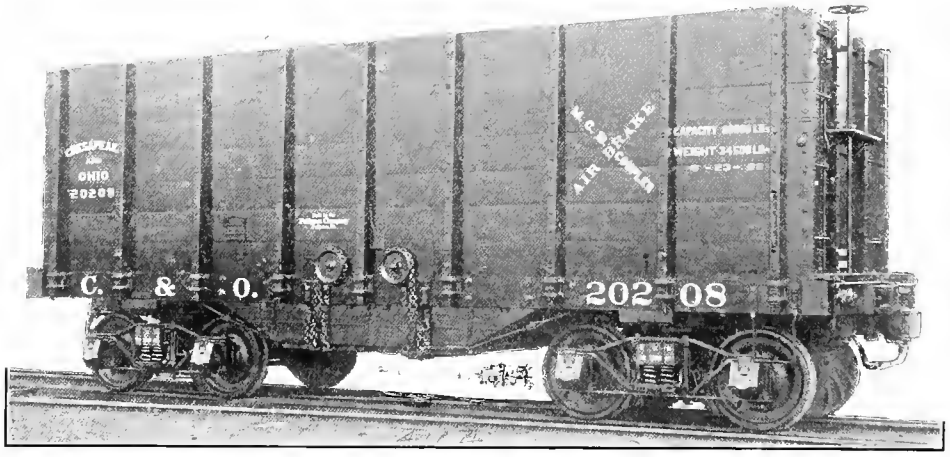


Fig. 57. Coal Car, High Side, Hopper Bottom. Capacity, 80,000 lbs. Weight, 34,500 lbs. Pullman Company, Builders.

Fig. 58. Coal Car, Hopper Bottom, Steel Side and Underframes. Capacity, 100,000 lbs. Weight, 38,600 lbs Middletown Car Co., Builders.

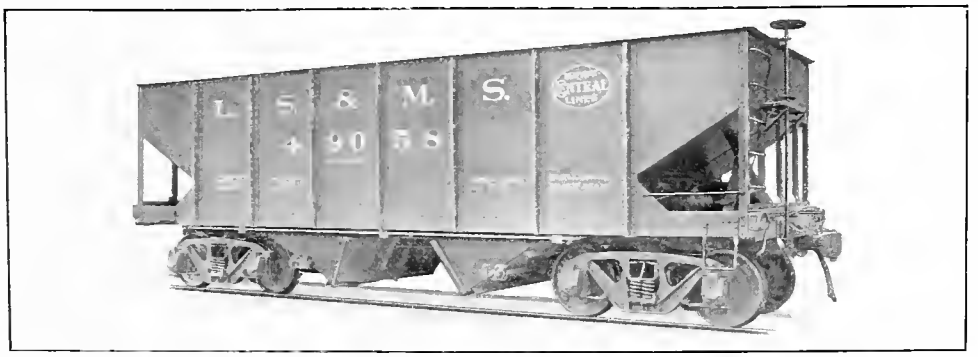


Fig. 59. Hopper Car, All Steel, Self Clearing. Capacity, 100,000 lbs. Weight, 37,400 lbs. Length, 30 ft.
American Car & Foundry Co., Builders.
(Drawings of this car are shown in Figs. 467-470.)

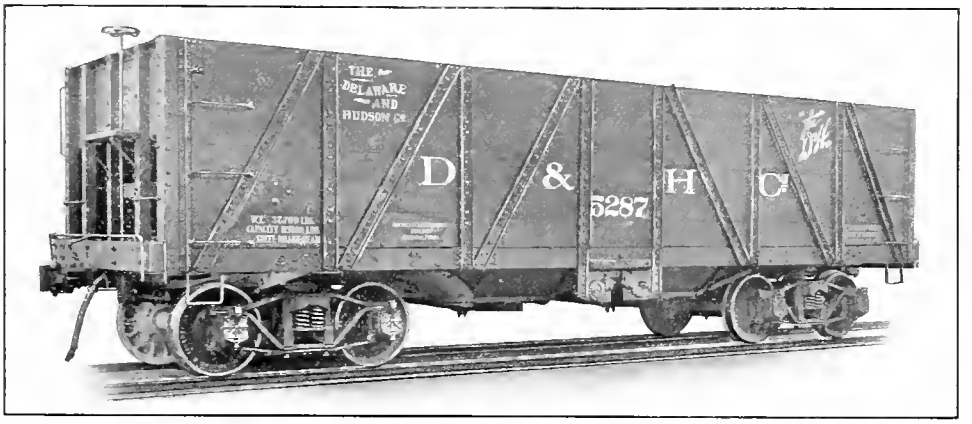


Fig. 60. Hopper Car, Steel Underframe, Self Clearing. Capacity, 85,000 lbs. Weight, 37,700 lbs. Length, 32 ft.
American Car & Foundry Co., Builders.
(Drawings of this car are shown in Figs. 463-466.)

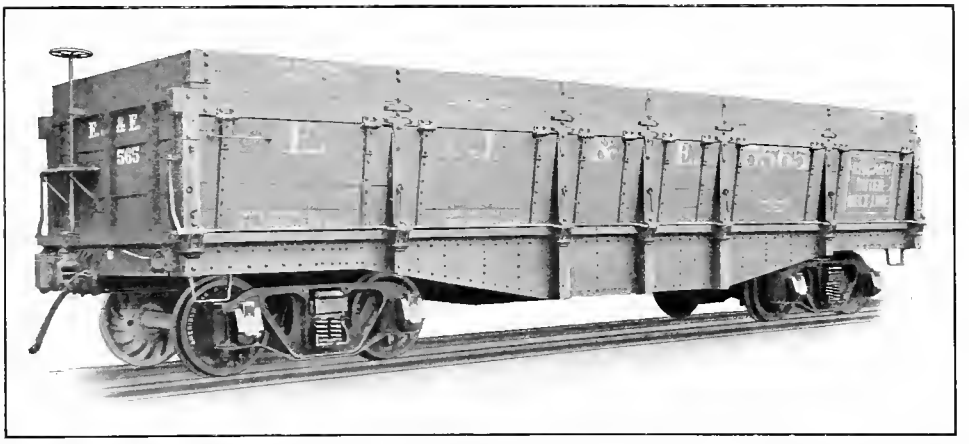


Fig. 61. Gondola Car, Side Unloading. Capacity, 100,000 lbs. Weight, 41,600 lbs. Length, 36 ft.
American Car & Foundry Co., Builders.

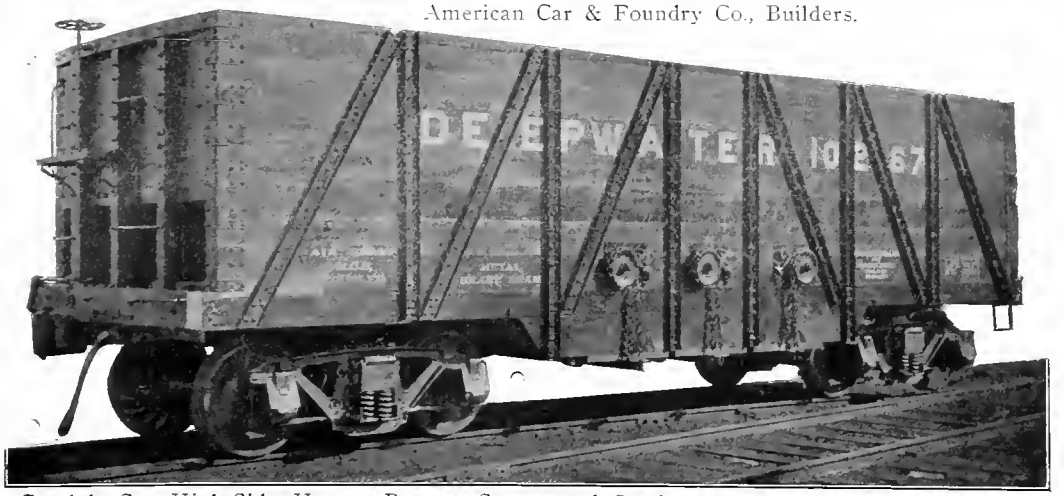


Fig. 62. Gondola Car, High Side, Hopper Bottom, Struc tural Steel Underframe and Side Frame. Capacity, 100,000 lbs. Weight, 37,700 lbs. Western Steel Car & Foundry Co., Builders.

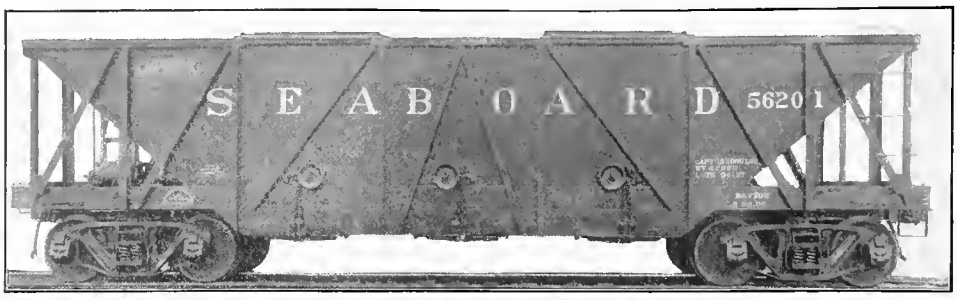


Fig. 63. Phosphate Car, Hopper Bottom, All Steel. Capacity, 100,000 lbs. Weight, 42,000 lbs. Length, 34 ft. Barney & Smith Car Co., Builders.

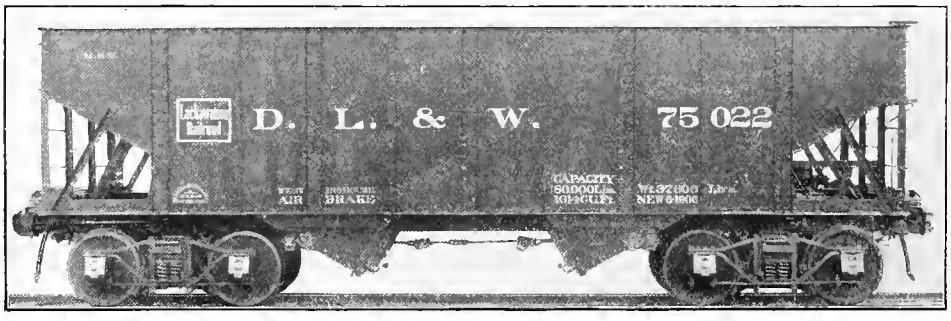


Fig. 64. Coal Car, Hopper Bottom, Self Clearing, All Steel. Capacity, 80,000 lbs. Weight, 37,600 lbs. Barney & Smith Car Co., Builders.

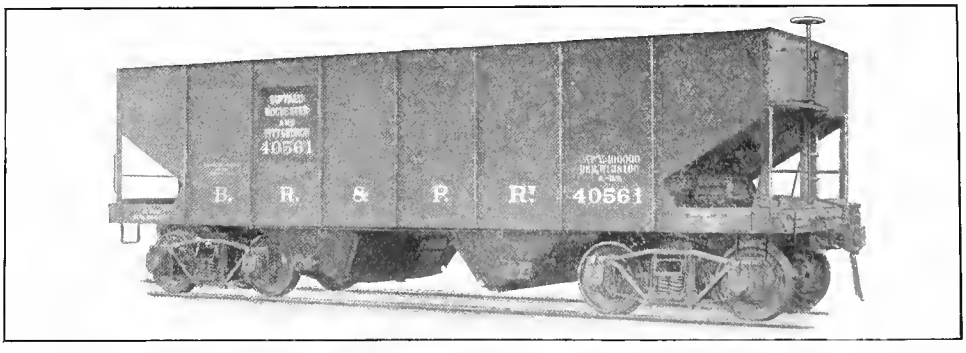


Fig. 65. Hopper Car, Self Clearing, All Steel. Capacity, 100,000 lbs. Weight, 38,100 lbs. Length, 30 ft. American Car & Foundry Co., Builders.

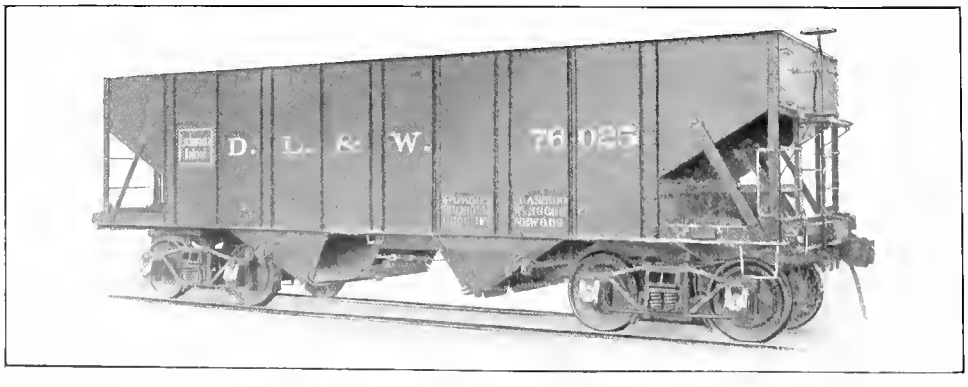


Fig. 66. Hopper Car, Self Clearing, All Steel. Capacity, 80,000 lbs. Weight, 36,600 lbs. Length, 30 ft. American Car & Foundry Co., Builders.

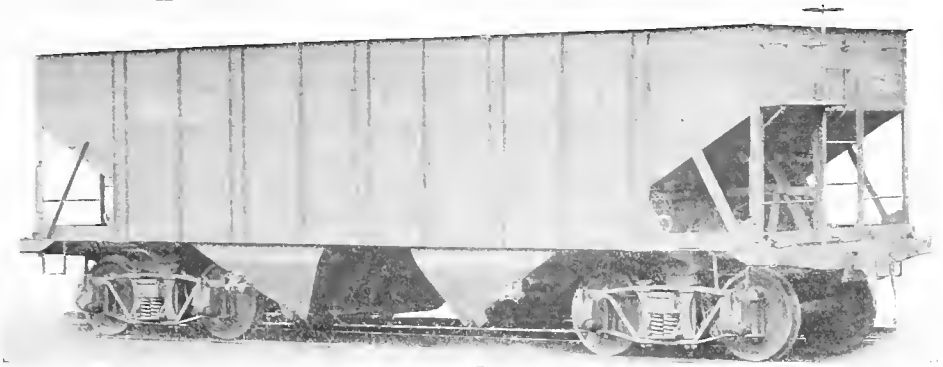


Fig. 67. Hopper Car, Structural Steel. Capacity, 100,000 lbs. Weight, 38,300 lbs.
Standard Steel Car Co., Builders.

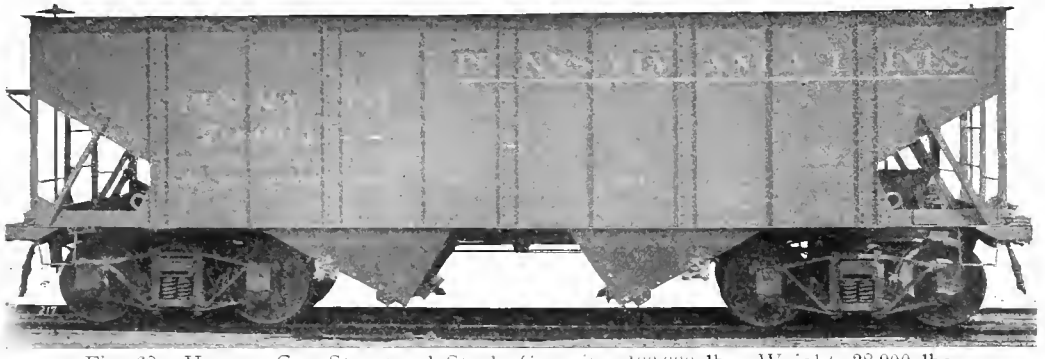


Fig. 68. Hopper Car, Structural Steel. Capacity, 100,000 lbs. Weight, 38,900 lbs.
Standard Steel Car Co., Builders.
(Drawings of this car are shown in Figs. 478-481.)

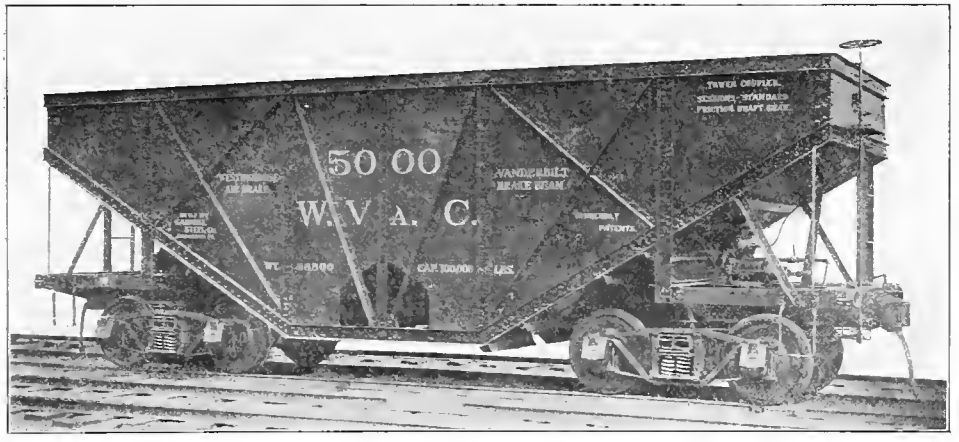


Fig. 69. Hopper Car, Structural Steel, Vanderbilt Patent. Capacity, 100,000 lbs. Weight, 36,800 lbs.
Cambria Steel Co., Builders.
(Drawings of this car are shown in Figs. 482-485.)

Fig. 70. Steel Hopper Car. Capacity, 100,000 lbs. Weight, 43,600 lbs.
Pressed Steel Car Co., Builders.
(Drawings of this car are shown in Figs. 490-495.)

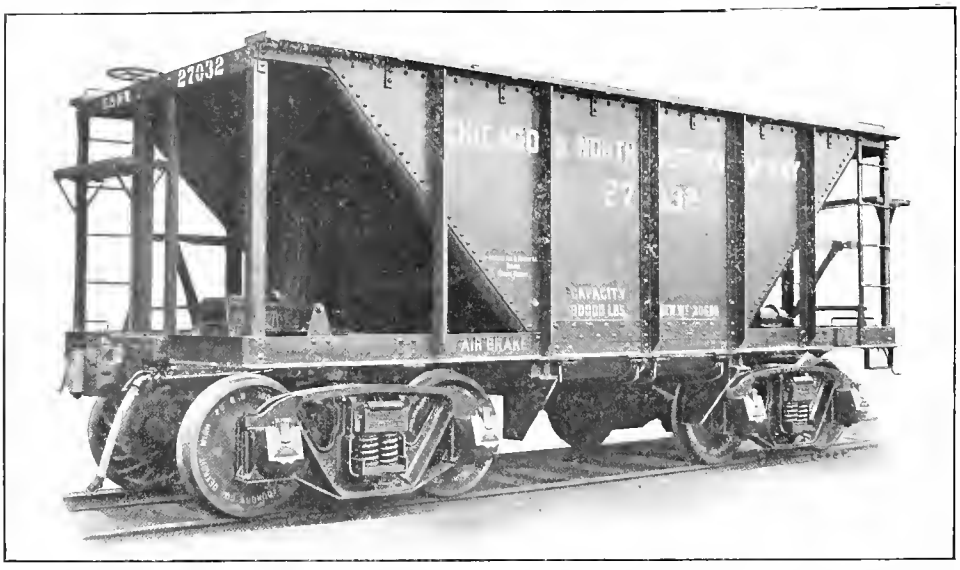


Fig. 71. Ore Car, All Steel, Self Clearing. Capacity, 80,000 lbs. Weight, 30,600 lbs.
American Car & Foundry Co., Builders.

Fig. 72. Ore Car, Pressed Steel. Capacity, 100,000 lbs. Weight, 32,800 lbs.
Pressed Steel Car Co., Builders.

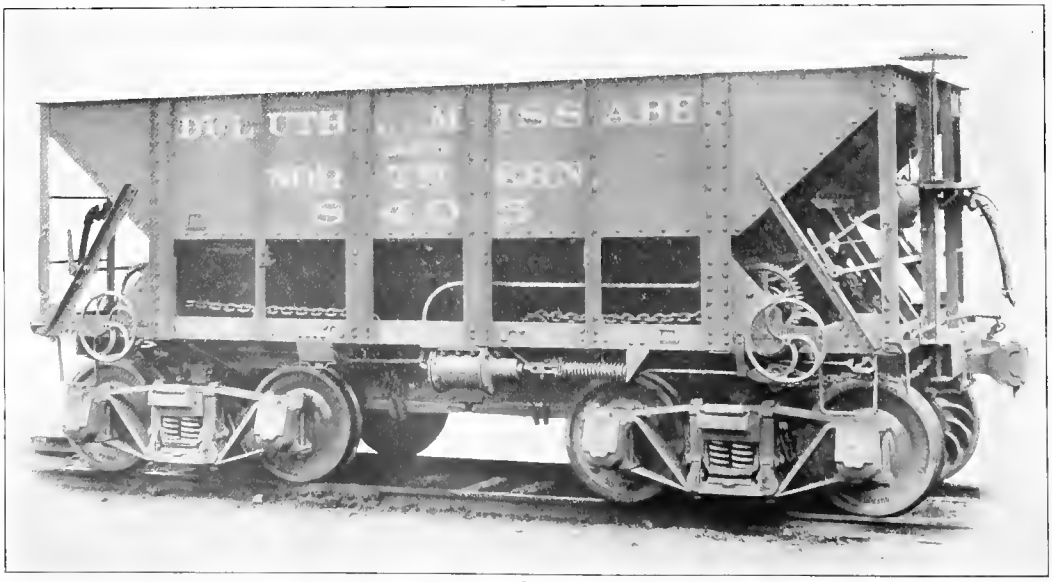


Fig. 73. Ore Car, Structural Steel. Capacity, 100,000 lbs. Weight, 32,200 lbs.
Standard Steel Car Co., Builders.
(Drawings of this car are shown in Figs. 505-508.)

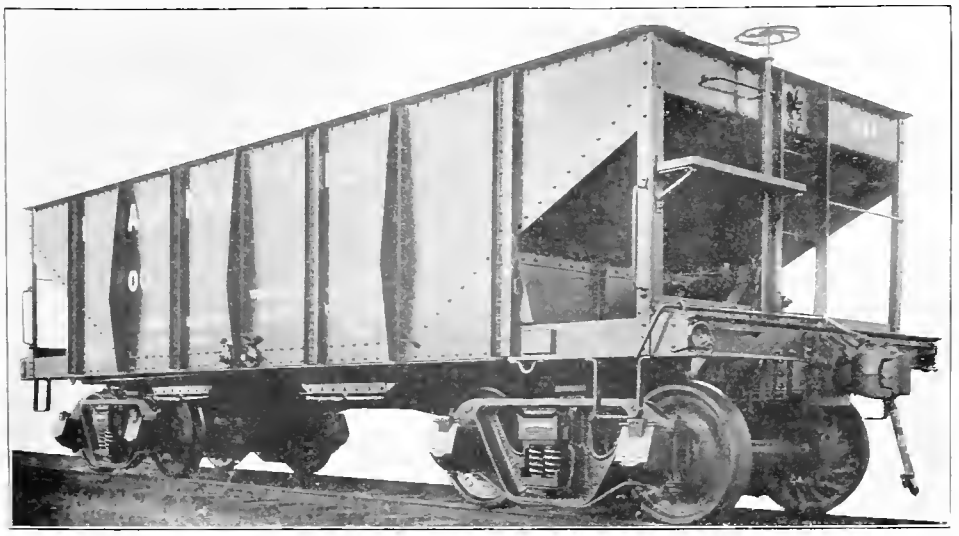


Fig. 74. Ore Car, Hopper Bottom, Self Clearing, All Steel. Capacity, 100,000 lbs. Weight, 38,100 lbs.
Ralston Steel Car Co., Builders.

Fig. 75. Coke Car, Pressed Steel. Capacity, 100,000 lbs. Weight, 47,500 lbs.
Pressed Steel Car Co., Builders.

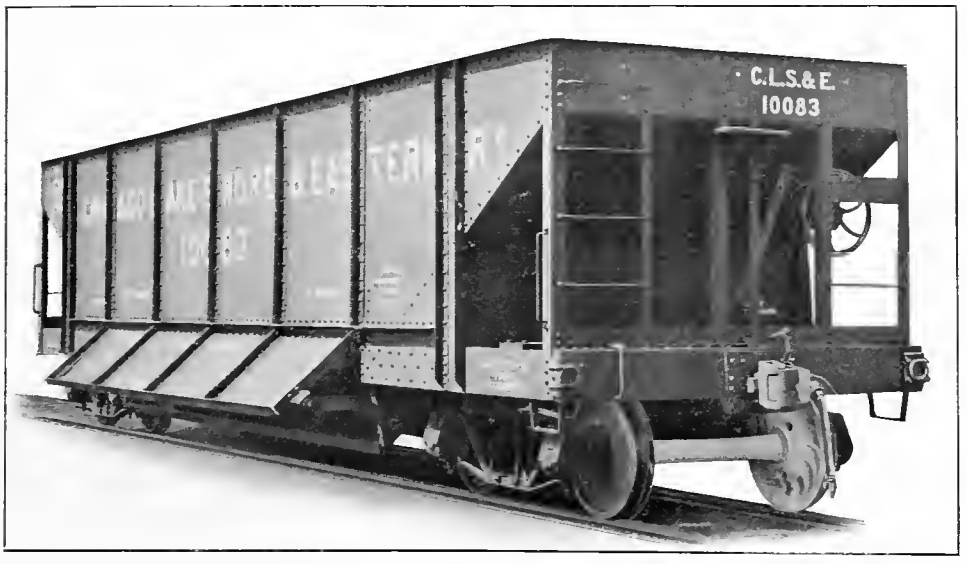


Fig. 76. Coke Car, All Steel, Self Clearing. Capacity, 100,000 lbs. Weight, 47,600 lbs.
American Car & Foundry Co., Builders.

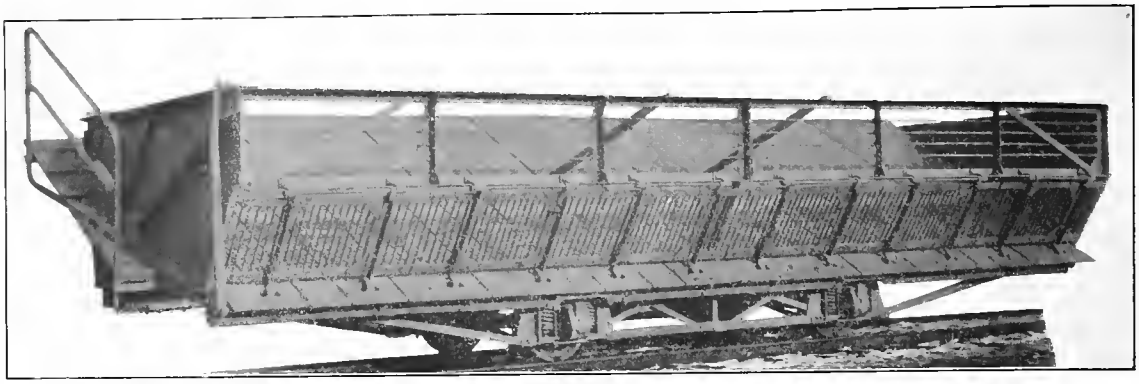


Fig. 77. Coke Quenching Car. Capacity, 20,000 lbs.
Middletown Car Co., Builders.

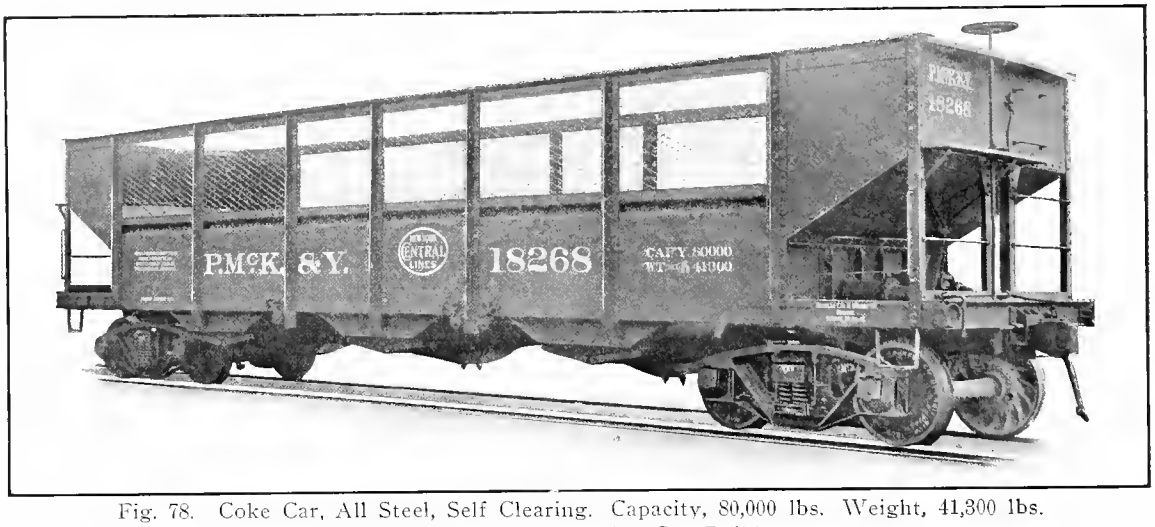


Fig. 78. Coke Car, All Steel, Self Clearing. Capacity, 80,000 lbs. Weight, 41,300 lbs.
American Car & Foundry Co., Builders.

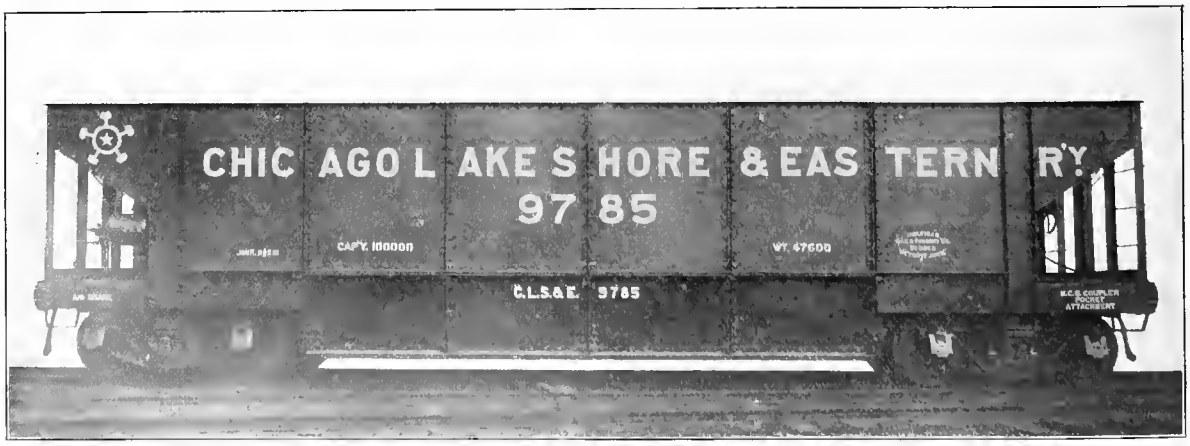


Fig. 79. Coke Car, Structural Steel. Capacity, 100,000 lbs. Weight, 47,600 lbs.
American Car & Foundry Co., Builders.
(Drawings of this car are shown in Figs. 524-528.)

Fig. 80. Center Dump Ballast Car, Pressed Steel. Capacity, 100,000 lbs. Weight, 38,000 lbs.
Pressed Steel Car Co., Builders.

Fig. 81. Dump Car, Drop Bottom, Flush Floor, Steel Underframe. Capacity, 100,000 lbs. Weight, 41,000 lbs.
Ralston Steel Car Co., Builders.

Fig. 82. Dump Car, Drop Bottom, Pressed Steel. Capacity, 100,000 lbs. Weight, 40,500 lbs.
Pressed Steel Car Co., Builders.

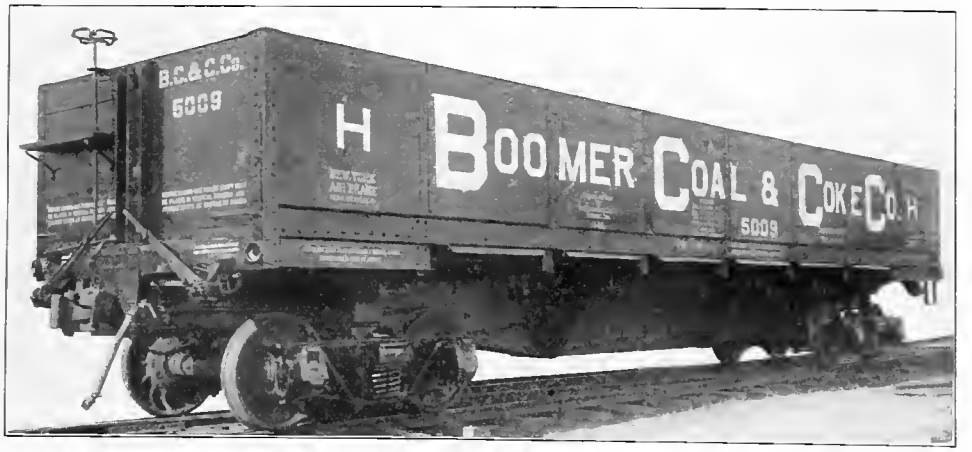


Fig. 83. Dump Car, Drop Bottom, Flush Floor, Steel Underframe. Capacity, 100,000 lbs. Weight, 41,000 lbs.
Ralston Steel Car Co., Builders.

Fig. 84. Dump Car, Steel Sides and Underframe. Capacity, 100,000 lbs. Weight, 38,900 lbs. Length, 36 ft., 6 in. National Dump Car Co., Builders.

Fig. 85. National Dump Car with Drop Doors Closed.

Fig. 86. National Dump Car with Drop Doors Open.

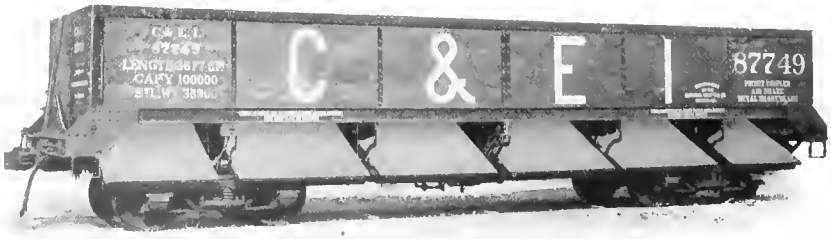


Fig. 87. Dump Car, Steel Side and Underframe. Capacity, 100,000 lbs. Weight, 38,900 lbs. Length, 36 ft., 6 in. National Dump Car Co., Builders.

Fig. 88. Hart Convertible Car, Class C. S., Center and Side Dump. Capacity, 100,000 lbs. Weight, 41,800 lbs. Rodger Ballast Car Co., Builders.

Fig. 89. Hart Convertible Car Arranged for Center Dumping Ballast.

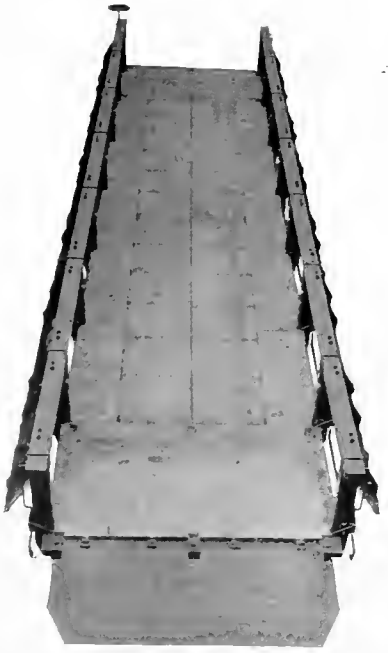


Fig. 90. Hart Convertible Car Arranged with Swinging Sides for Use with Top Plow.

Fig. 91. Hart Convertible Car Arranged as Flat Bottom Gondola Car for General Service.

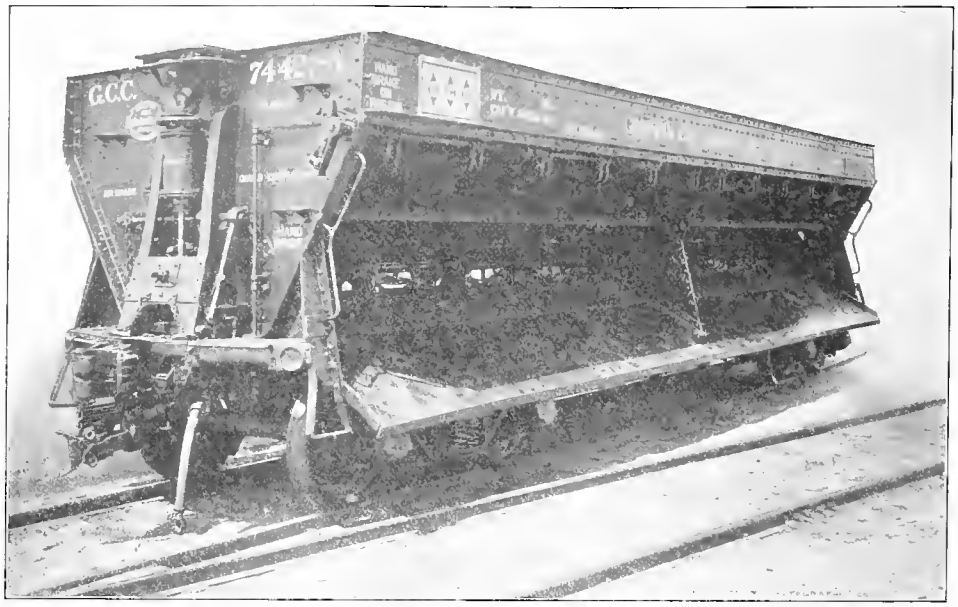


Fig. 92. Goodwin Dump Car. Class G. Capacity, 80,000 lbs.
(Drawings of this car are shown in Figs. 536-538.)

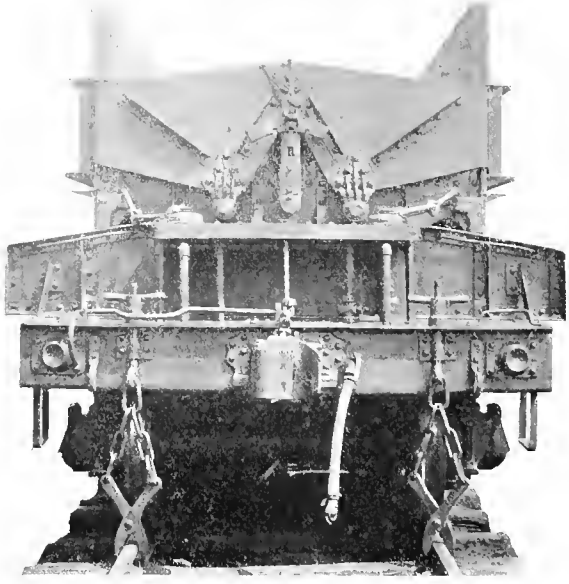


Fig. 93. End View, King-Lawson Steel Dump Car.
Capacity, 80,000 lbs.
Middletown Car Co., Builders.

Fig. 94. King-Lawson Steel Dump Car. Capacity, 80,000 lbs.
Middletown Car Co., Builders.

Fig. 95. Campbell-Olden Steel Side Dump Car. Capacity 100,000 lbs.
Joliet Steel Car Mfg. Co., Builders.
(Drawings of this car are shown in Figs. 543-544.)

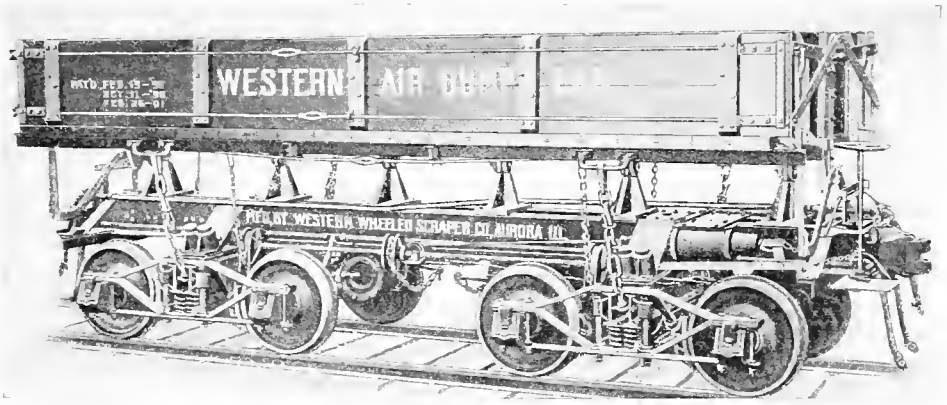


Fig. 95a. Contractor's Air Dump Car. Capacity, 12 cu. yds. Western Wheeled Scraper Co., Builders.

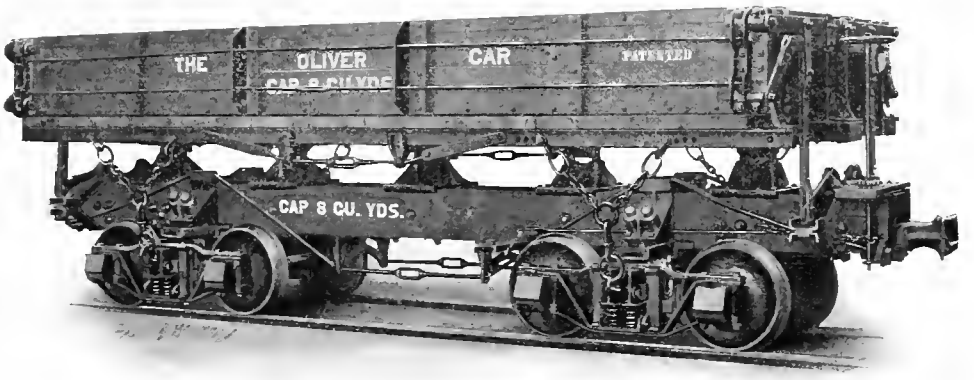


Fig. 95b. All Steel Type Oliver Dump Car. 12 cu. yds. Capacity. Isthmian Canal Commission.
Wm. J. Oliver Mfg. Co., Builders.

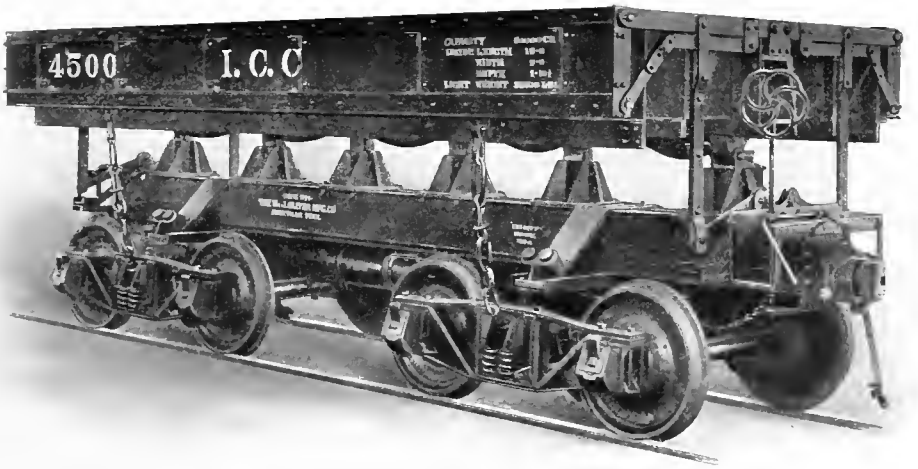
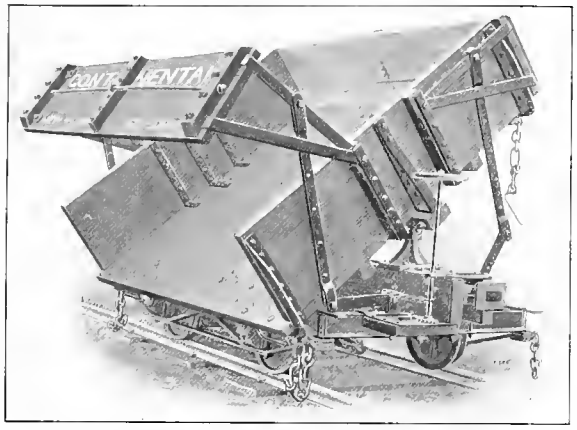
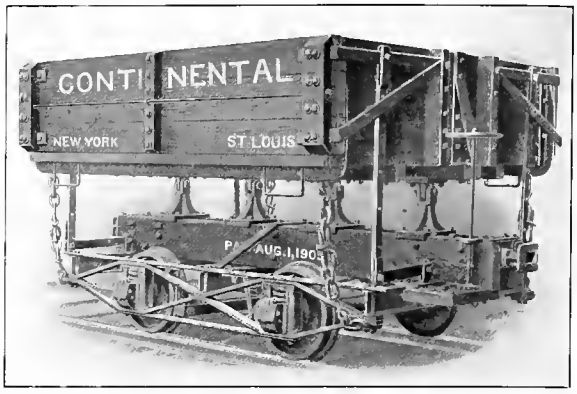


Fig. 96. Narrow Gage Type, Oliver Double Truck, Two-Way Dump Car. 8 cu. yds. Capacity
Wm. J. Oliver Mfg. Co., Builders.





Figs. 97-97a. Six-Yard, 8,500-lb., Contractor's Dump Car. Continental Car & Equipment Co., Builders.

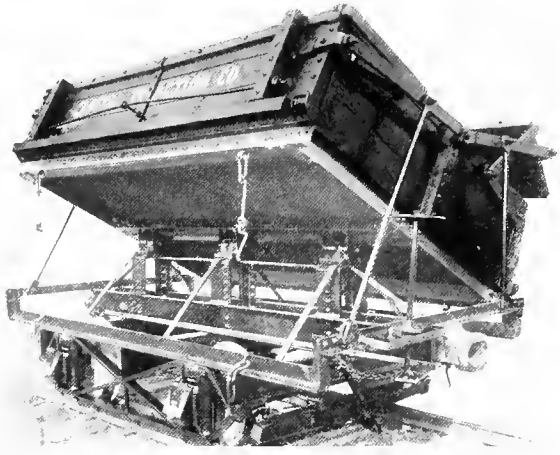
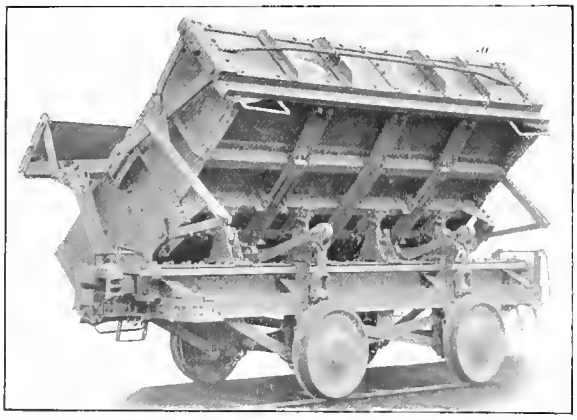
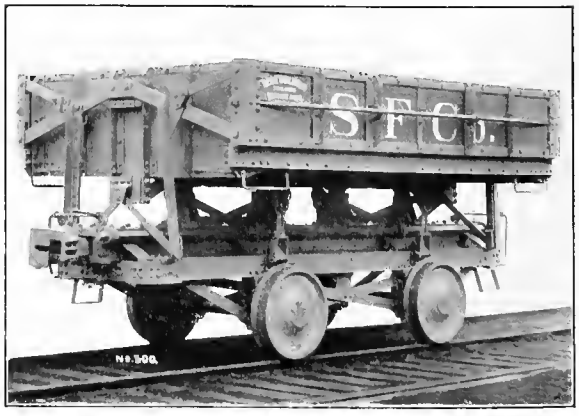


Fig. 98. Contractor's Dump Car.
Ralston Steel Car Co., Builders.

Fig. 98a. All Steel Mine Car.
Ralston Steel Car Co., Builders.





Figs. 99-99a. Seven-Yard Double Dump Car. Russel Wheel & Foundry Co., Builders.

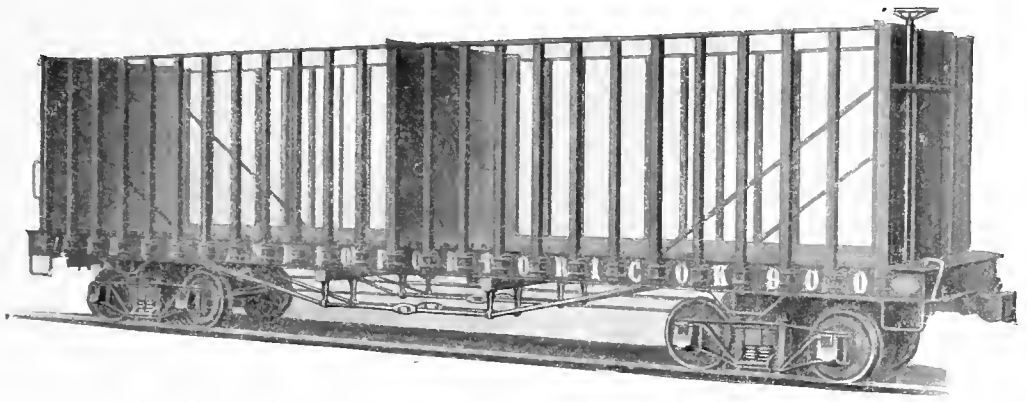


Fig. 100. Steel Sugar Cane Car. Capacity 10 to 30 Tons.
Arthur Kopple Co., Builders.

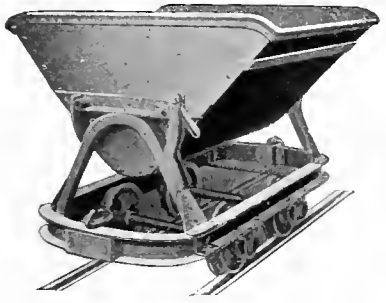


Fig. 100a. Six-Yard Cradle Dump Car.

Fig. 100b. Six-Yard Double Side Dump Car, Rocker Type.

Arthur Kopple Co., Builders.

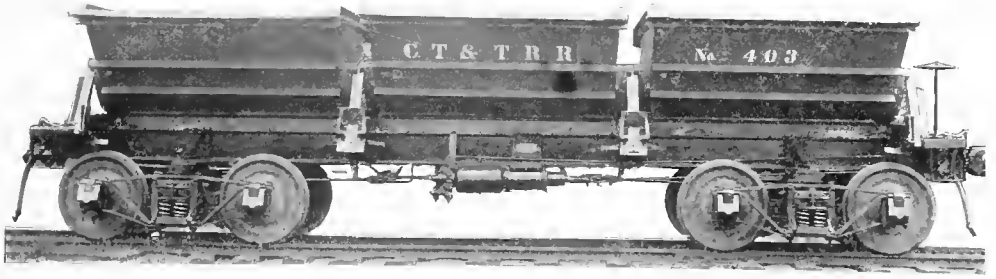


Fig. 101. Twelve-Yard Triple Body Double Side Dump Car.
Arthur Kopple Co., Builders.

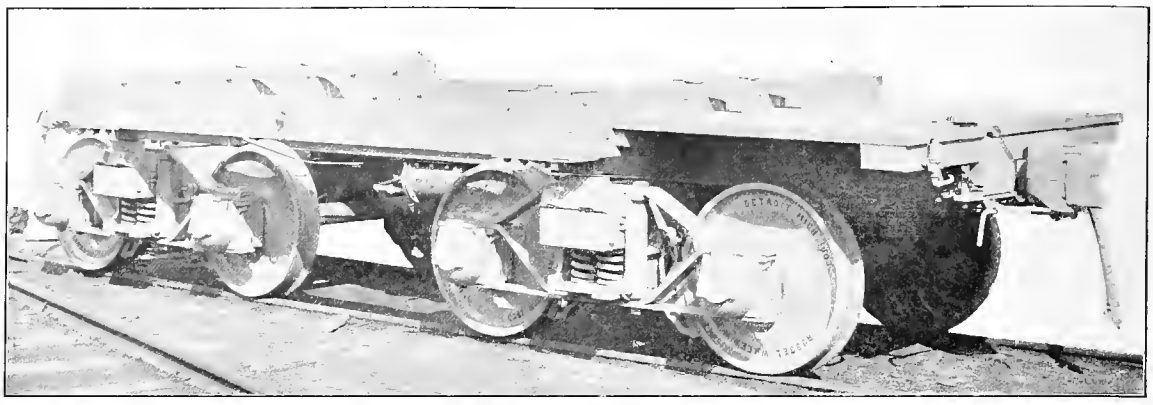


Fig. 102. Logging Car for 20-ft. Logs.
Russel Wheel & Foundry Co., Builders.

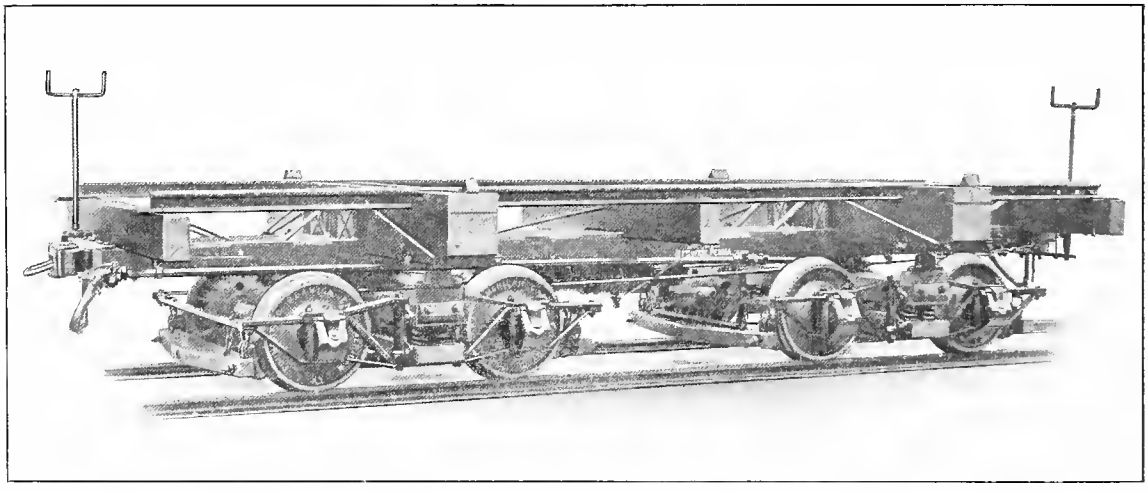


Fig. 103. Logging Trucks with Rails for Loader. Capacity, 40,000 lbs.
American Car & Foundry Co., Builders.

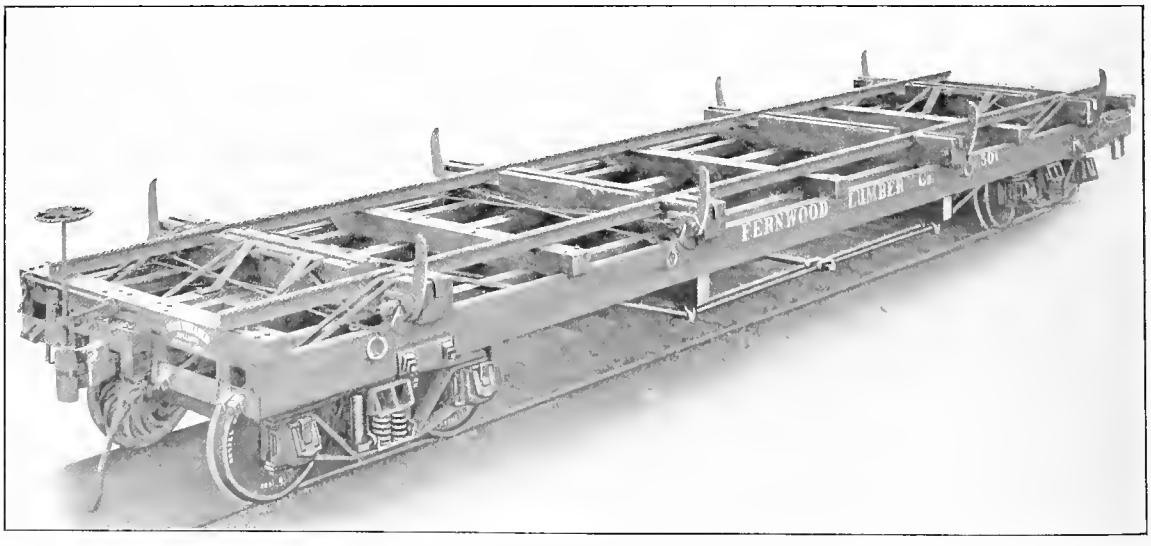


Fig. 104. Logging Car for Double Length Logs.
Russel Wheel & Foundry Co., Builders.

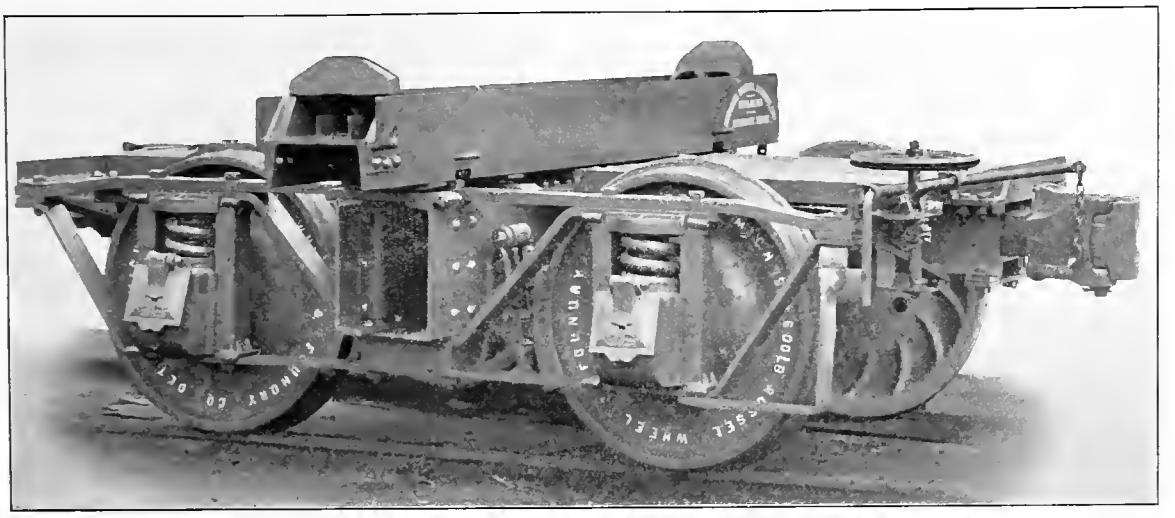


Fig. 105. 8,000-lb. Pacific Pattern Truck.
Russel Wheel & Foundry Co., Builders.

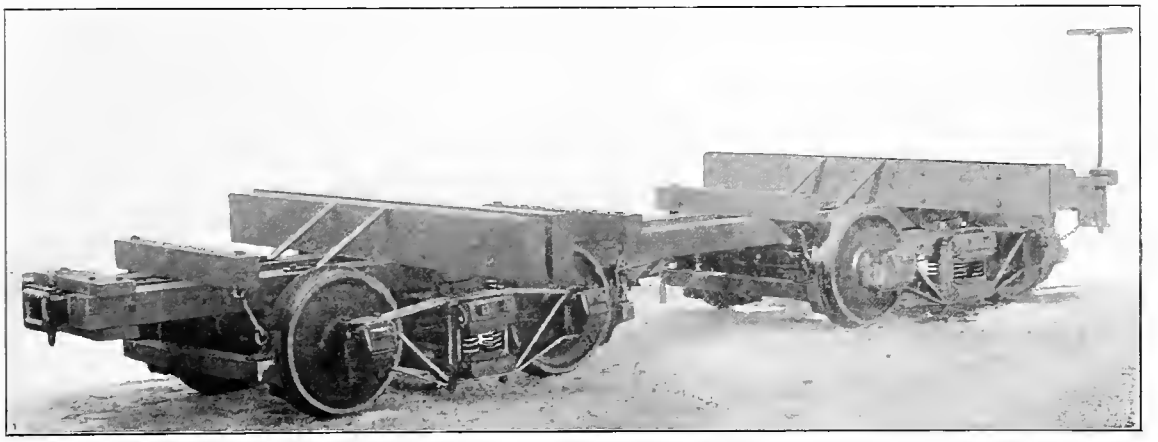


Fig. 106. Logging Car.
Sheffield Car Co., Builders.

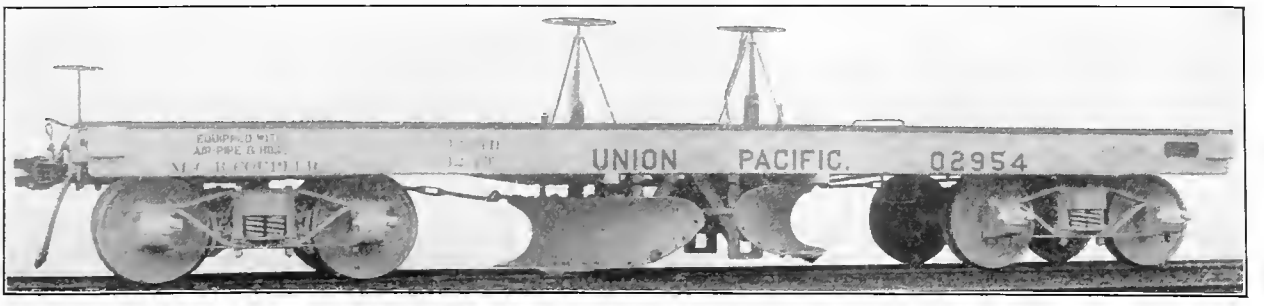


Fig. 107. Double-Plow Distributing Car.
Rodger Ballast Car Co., Builders.

Fig. 108. Stock Car. Capacity, 56,000 lbs. Weight, 32,100 lbs. Length, 36 ft., 6 in.
Western Steel Car & Foundry Co., Builders.

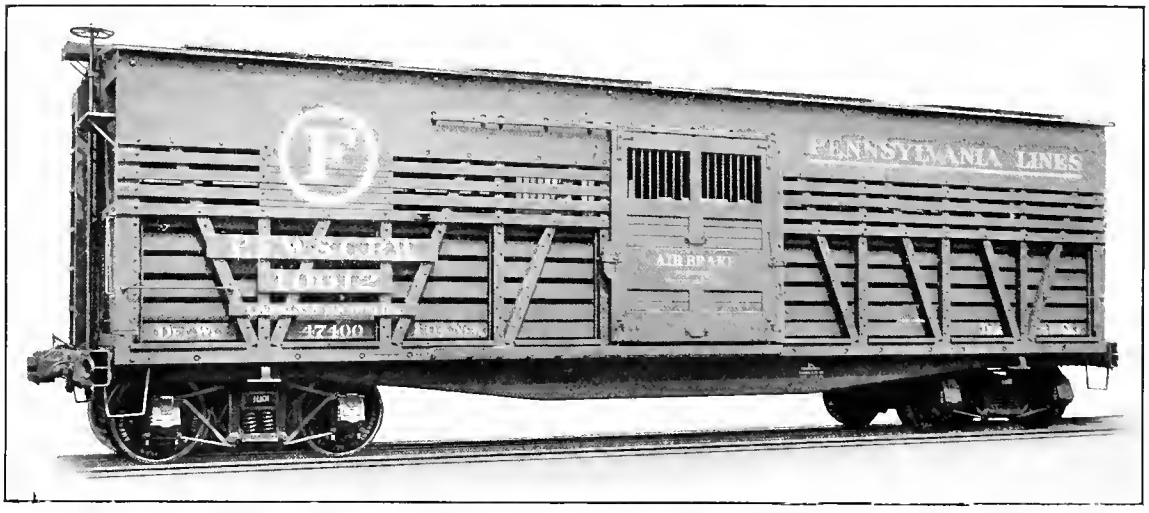


Fig. 109. Stock Car, Steel Underframe. Capacity, 100,000 lbs. Weight, 47,400 lbs.
American Car & Foundry Co., Builders.

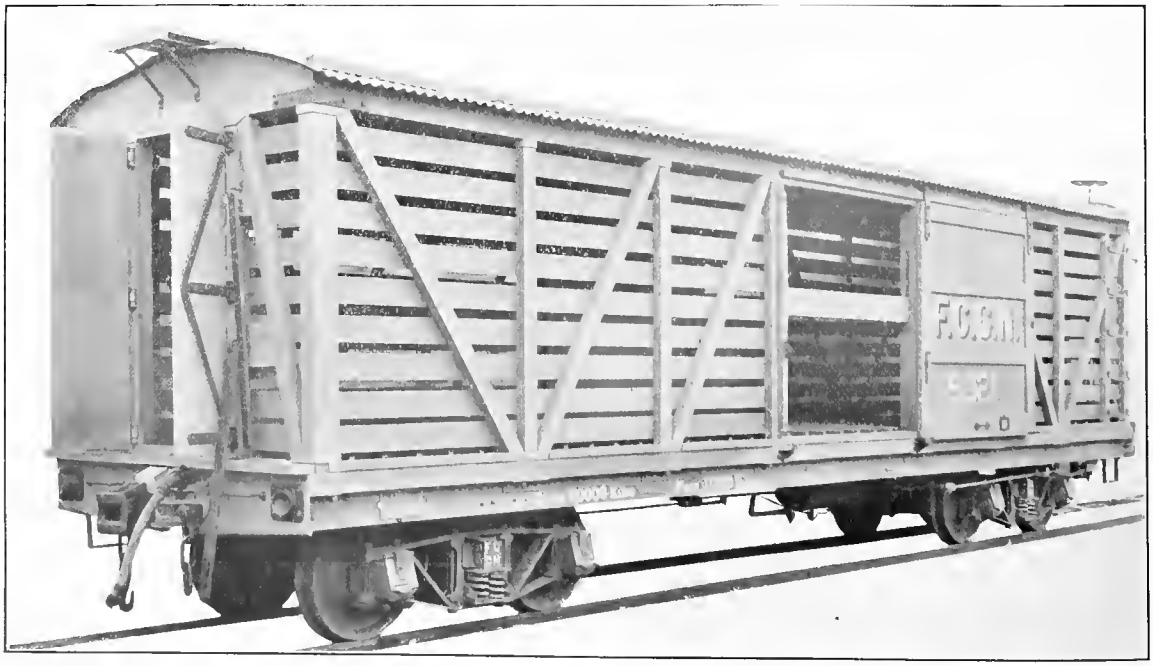


Fig. 110. Stock Car, Steel Underframe. Capacity, 66,000 lbs. Weight, 24,860 lbs. Meter Gage.
Middletown Car Co., Builders.

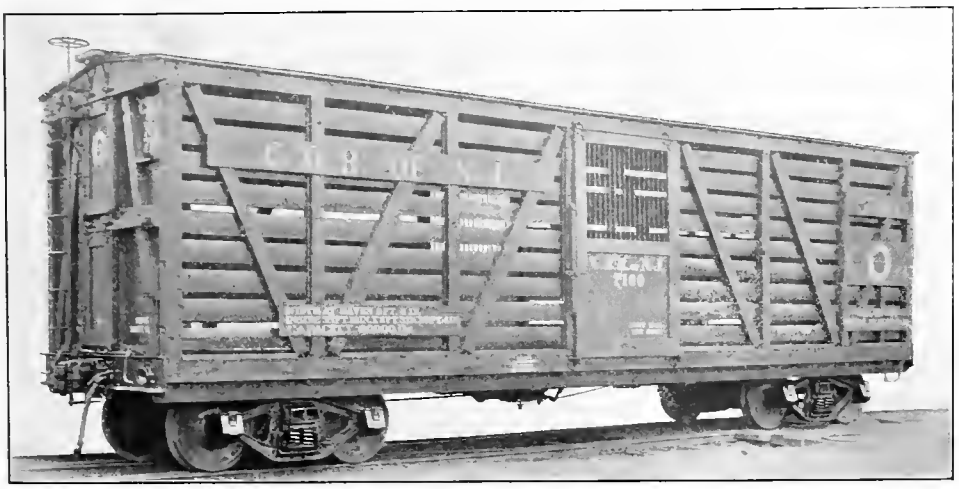


Fig. 111. Stock Car, Structural Steel Underframe. Capacity, 60,000 lbs. Length, 35 ft., 10 in.
Middletown Car Co., Builders.

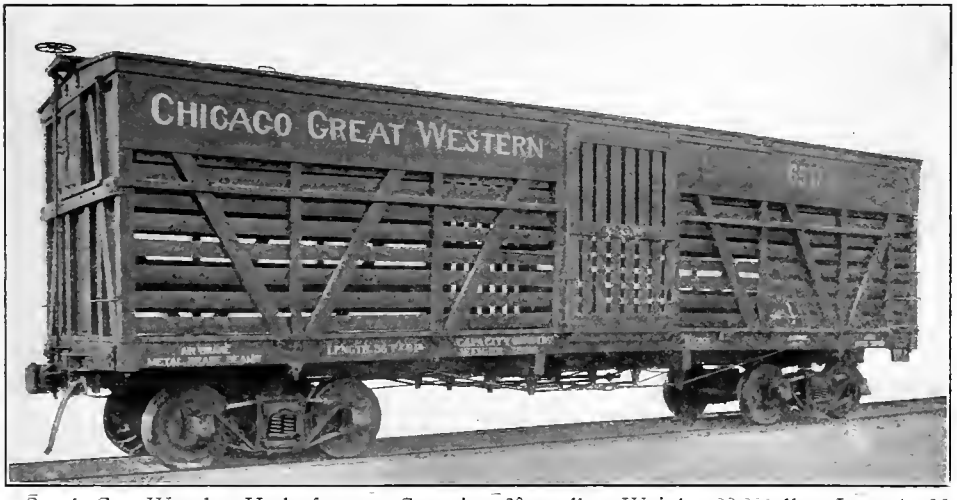


Fig. 112. Stock Car, Wooden Underframe. Capacity, 60,000 lbs. Weight, 32,200 lbs. Length, 36 ft. 6 in.
Hicks Locomotive & Car Works, Builders.

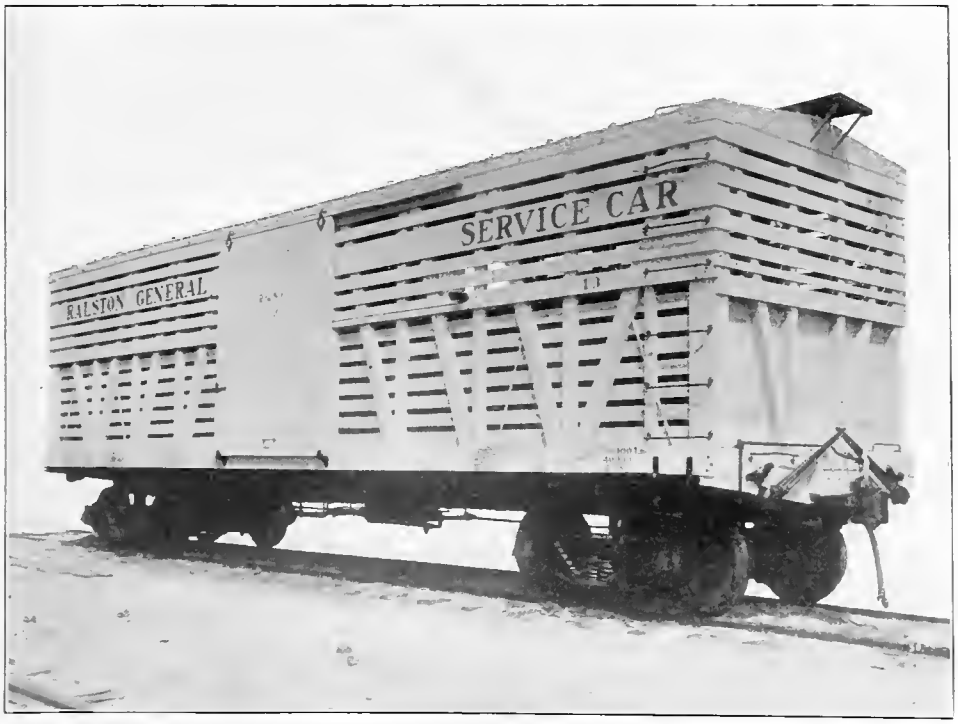


Fig. 113. General Service Car, Steel Underframe. Capacity, 60,000 lbs. Weight, 40,000 lbs. Length, 36 ft.
Ralston Steel Car Co., Builders.
(Drawings of this car are shown in Figs. 356-359.)

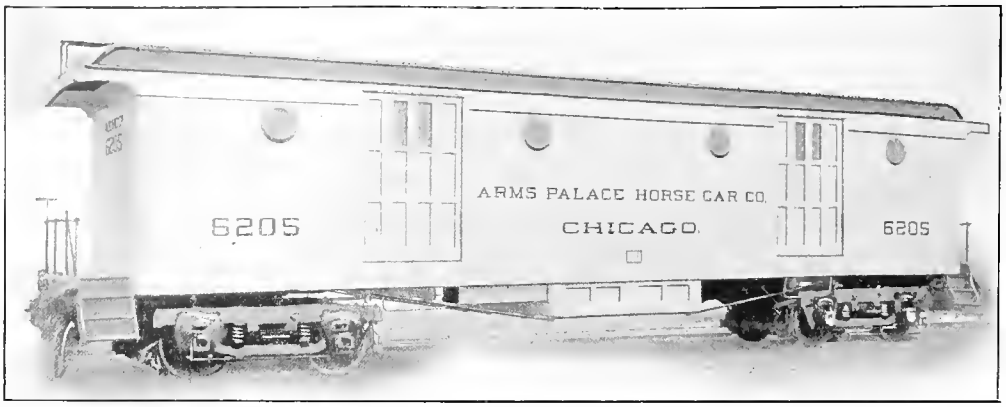


Fig. 114. Arms (Burton) "Perfected" Horse Car. Capacity, 16 Horses.

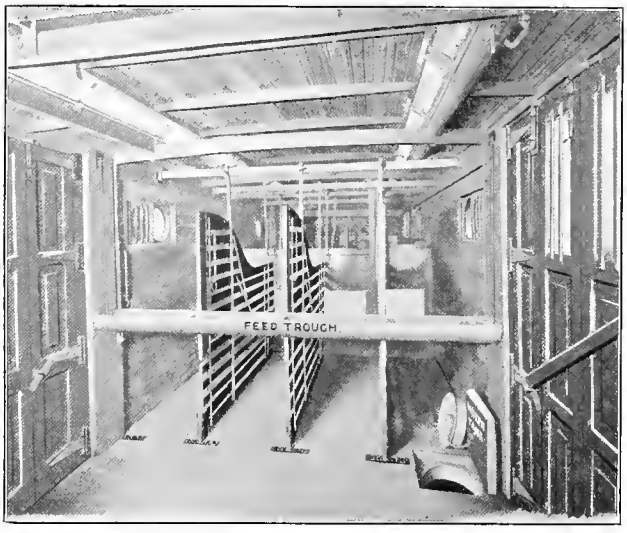


Fig. 115. Interior of "Perfected" Horse Car Showing Stall Partitions in Position for Four Horses.

Fig. 116. Interior of "Perfected" Horse Car Showing Stall Partitions Shifted to One Side.

Fig. 117. Arms Cross Stall Horse Car. 18 Stalls.

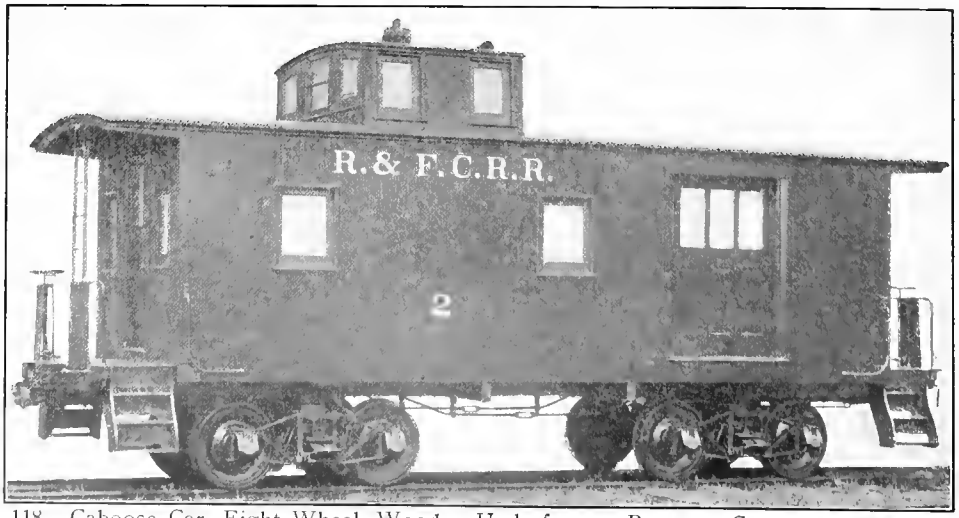


Fig. 118. Caboose Car, Eight Wheel, Wooden Underframe. Baggage Compartment, Side Door. Length, 26 ft. American Car & Foundry Co., Builders.

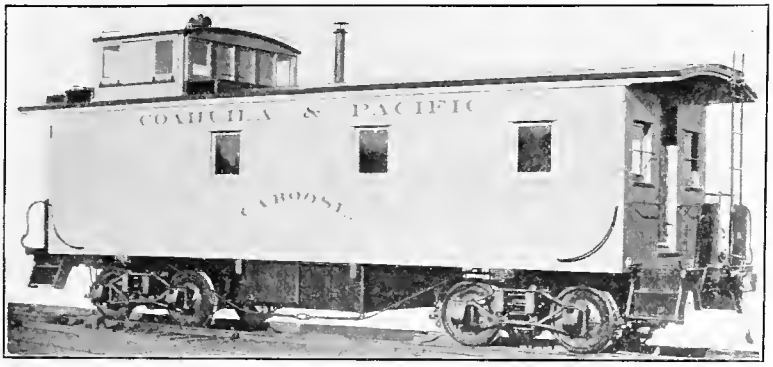


Fig. 119. Caboose Car, Eight-Wheel, Wooden Underframe. Toolbox.
American Car & Foundry Co., Builders.

Fig. 120. Caboose Car, Four-Wheel, Wooden Underframe.
American Car & Foundry Co., Builders.

Fig. 121. Caboose Car, Steel Underframe. Hicks Locomotive & Car Works, Builders.

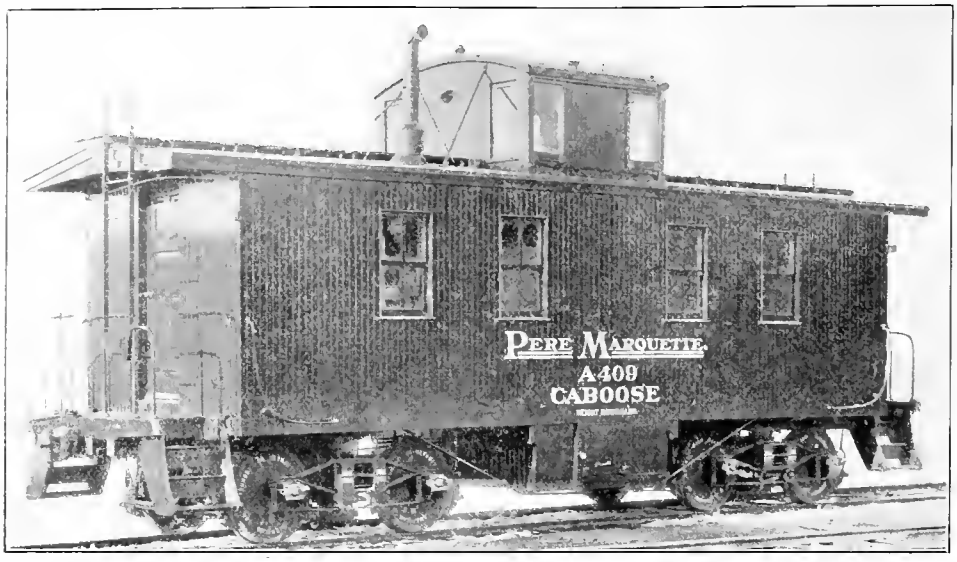


Fig. 122. Caboose Car, Wooden Underframe. Toolbox.
American Car & Foundry Co., Builders.

Fig. 123. Tank Car, Structural Steel Underframe. Capacity, 12,850 gals.
American Car & Foundry Co., Builders.
(Underframe of this car shown in Fig. 1030.)

Fig. 124. Tank Car, Structural Steel Underframe. Capacity, 8,000 gals. Weight, 38,000 lbs.
McGuire-Cummings Mfg. Co., Builders.
(Drawings of this car shown in Figs. 569-671.)

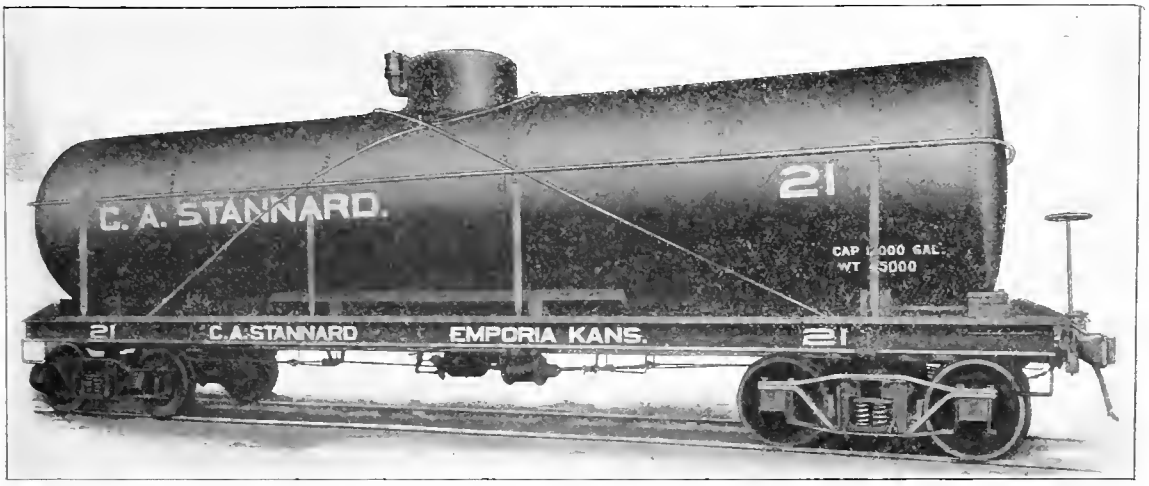


Fig. 125. Tank Car, Structural Steel Underframe. Capacity, 12,000 gals. Weight, 45,000 lbs.
McGuire-Cummings Mfg. Co., Builders.

(Drawings of this car are shown in Figs. 573-574.)

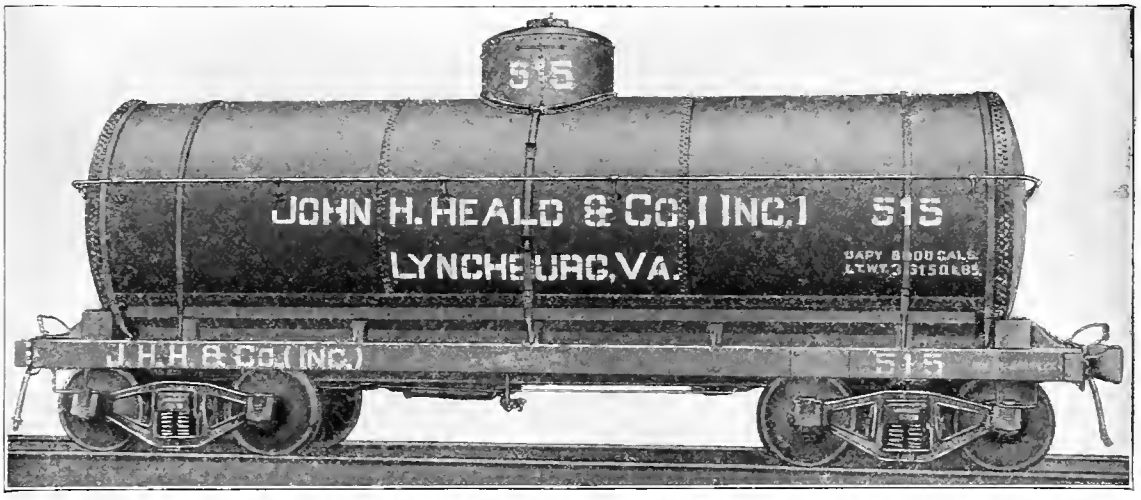


Fig. 126. Tank Car, Structural Steel Underframe. Capacity, 8,000 gals. Weight, 36,150 lbs.
Bettendorf Axle Co., Builders.

Fig. 127. Pickle Tank Car, Three Compartments. Capacity, 60,000 lbs. Weight, 37,300 lbs.
Middletown Car Co., Builders.

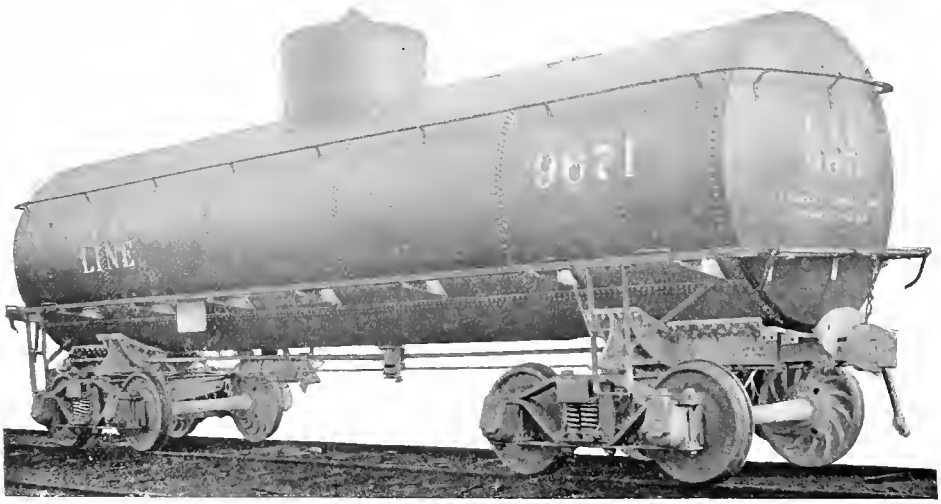


Fig. 128. Tank Car, Van Dyke Patent. Capacity, 10,000 gals.
(Drawings of this car are shown in Figs. 554-558.)

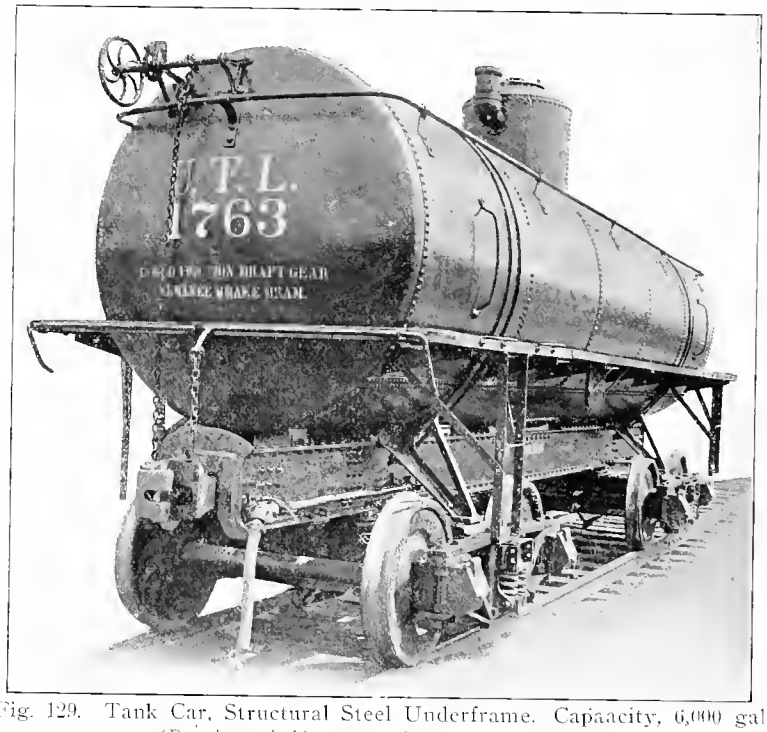


Fig. 129. Tank Car, Structural Steel Underframe. Capaacity, 6,000 gals.
(Drawings of this car are shown in Figs. 559-561.)

Fig. 130. Tank Car, Structural Underframe. Capacity, 8,020 gals. or 80,000 lbs. Weight, 39,900 lbs.
Standard Steel Car Co., Builders.

Fig. 131. Vestibuled Coach. Central Railroad of New Jersey.
Harlan & Hollingsworth, Builders.

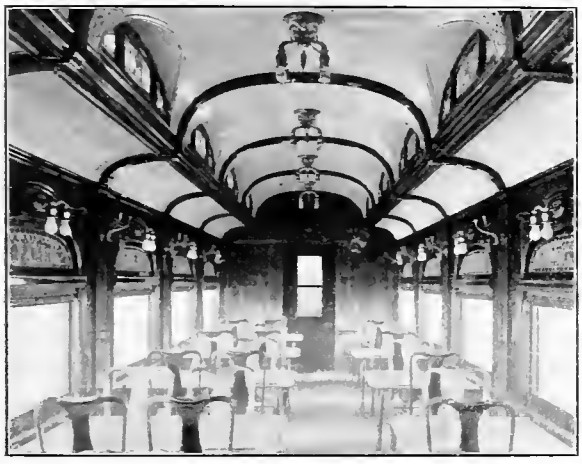


Fig. 132. Interior of Dining Car. Lehigh Valley.
Harlan & Hollingsworth, Builders.

Fig. 133. Interior of Chair Car. Chicago & Alton.
Harlan & Hollingsworth, Builders.

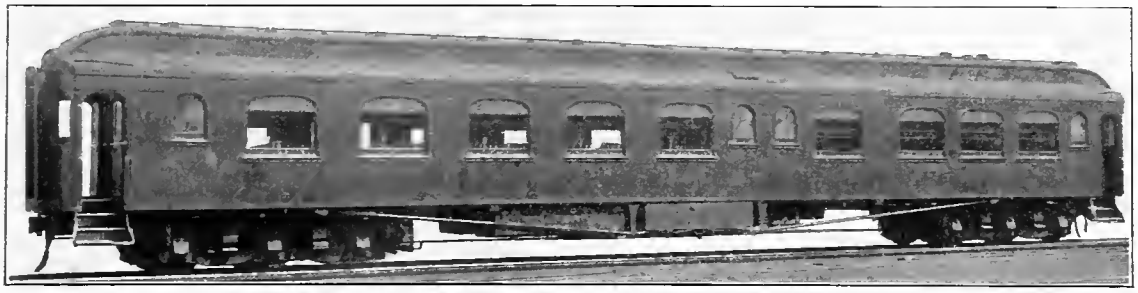


Fig. 134. Dining Car. Lehigh Valley. Harlan & Hollingsworth, Builders.

Fig. 135. Standard Coach. New York Central. Barney & Smith Car Co., Builders.
(Floor plan of this car is shown in Fig. 227.)

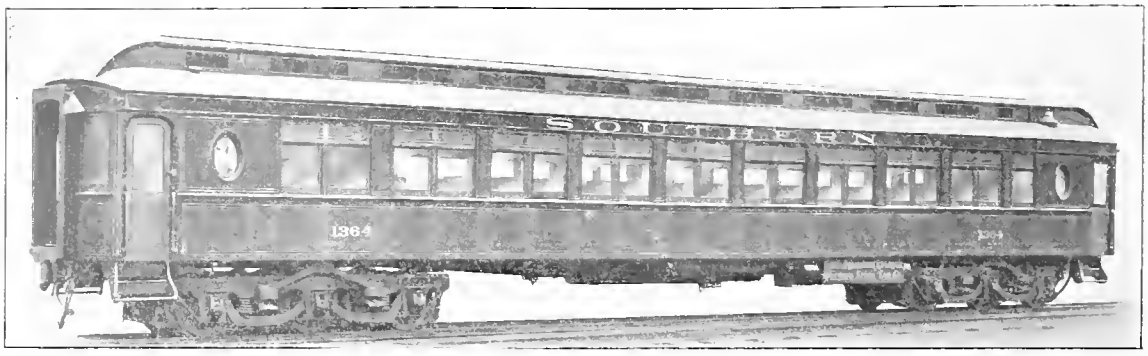


Fig. 136. Steel Vestibuled Coach. Southern. Pressed Steel Car Co., Builders.

Fig. 137. Interior of Coach. L. S. & M. S. Barney & Smith Car Co., Builders.

Fig. 138. Interior of Smoking Compartment, Combination Smoking and Baggage Car. C., C., C. & St. L. Barney & Smith Car Co., Builders.

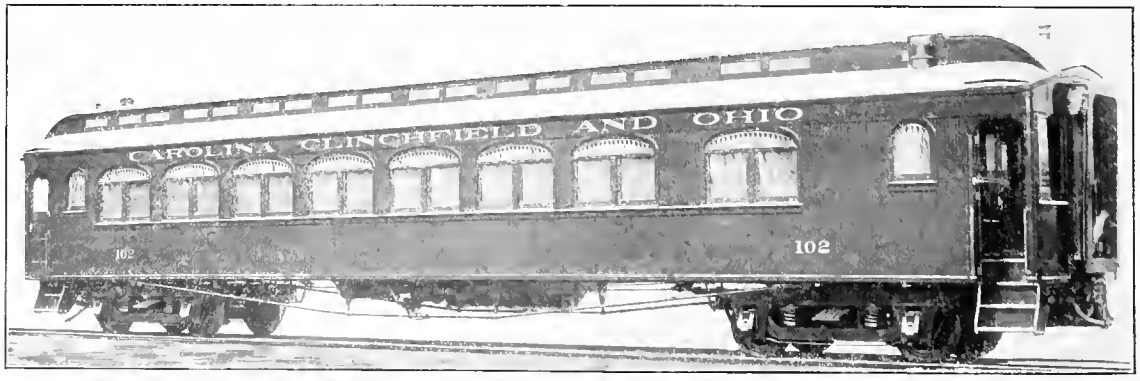


Fig. 139. Vestibuled Coach. Carolina, Clinchfield & Ohio. Harlan & Hollingsworth, Builders.

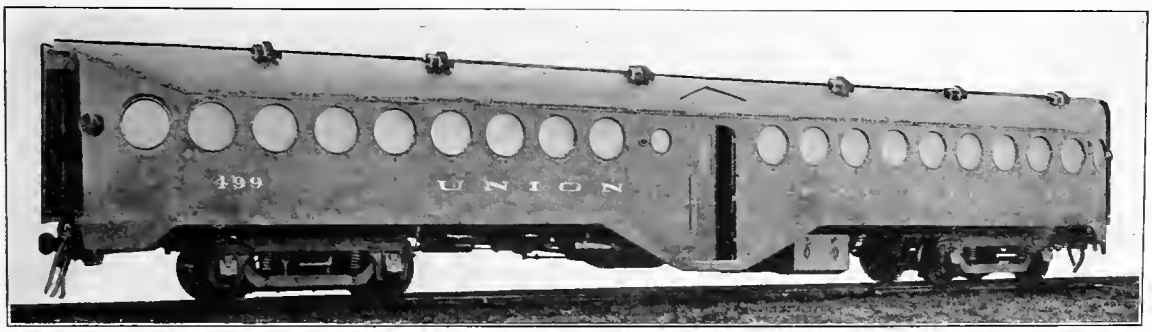


Fig. 140. All Steel Passenger Coach. Union Pacific. Union Pacific Railroad Co., Builders.
(Details of steel framing shown in Figs. 1040-1041.)

Fig. 141. Interior of All Steel Passenger Coach. Union Pacific Railroad Co., Builders.

Fig. 142. Interior of Standard Parlor Car. Pullman Co., Builders.

Fig. 143. Interior of Dining Car. Michigan Central. Barney & Smith Car Co., Builders.

Fig. 144. Interior of Standard Dining Car. Northern Pacific. Barney & Smith Car Co., Builders.

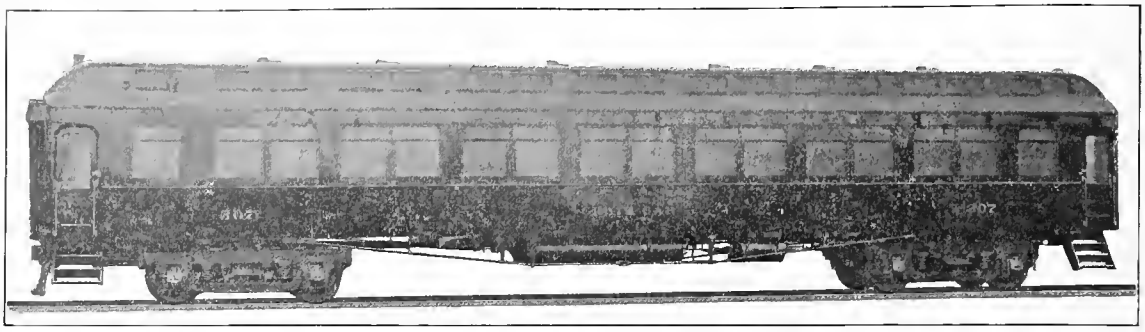


Fig. 145. Chair Car. S. P., L. A. & S. L. St. Louis Car Co., Builders.

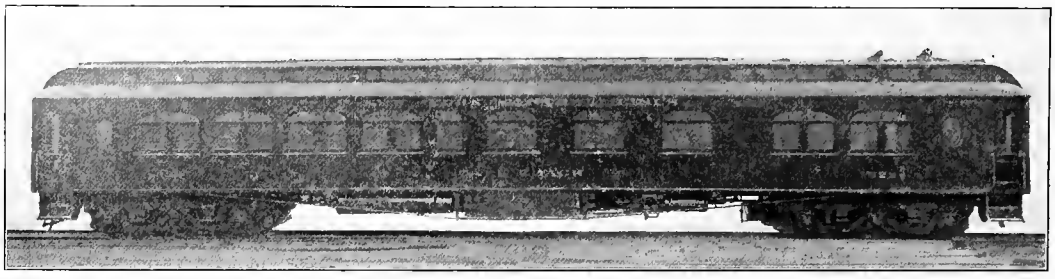


Fig. 146. Café Coach. Lake Shore & Michigan Southern. Barney & Smith Car Co., Builders.

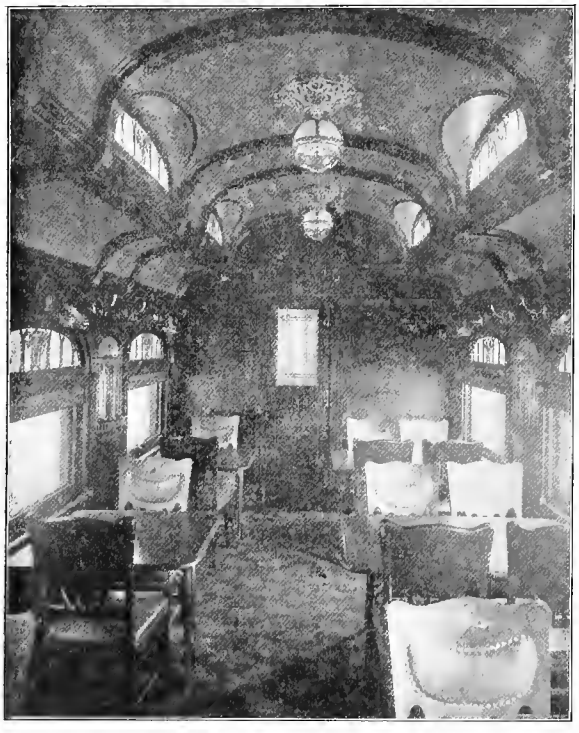


Fig. 147. Interior of Dining Compartment, Café Coach. L. S. & M. S. Barney & Smith Car Co., Builders.

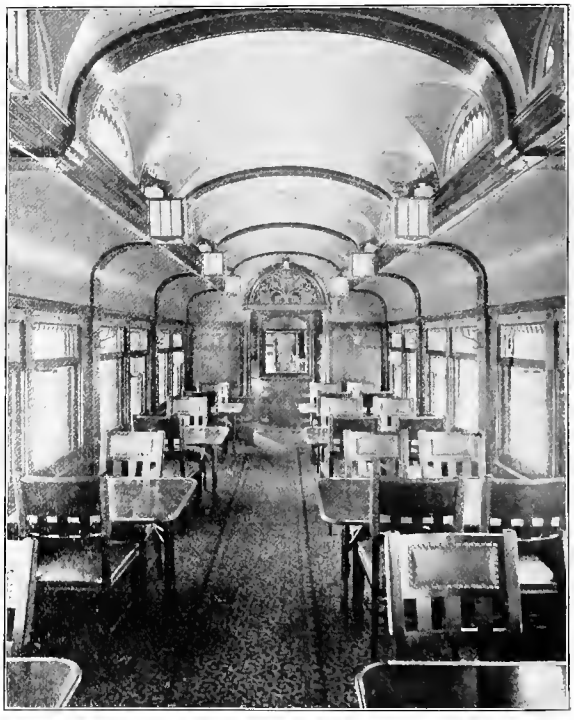


Fig. 148. Interior of Dining Car. C., B. & Q. Barney & Smith Car Co., Builders.

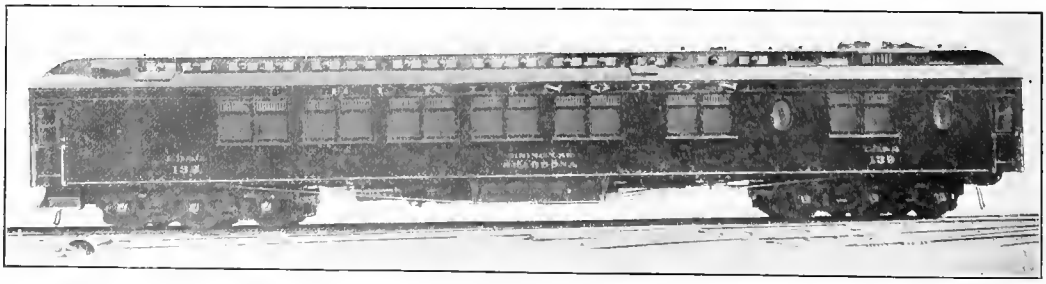


Fig. 149. Dining Car. Chicago, Burlington & Quincy. Barney & Smith Car Co., Builders.

Figs. 150-151. Interior of Dining Car. Erie R. R. Barney & Smith Car Co., Builders.

Fig. 152. Interior of Parlor Car. Pére Marquette R. R. Acetylene Gas Equipment.

Fig. 153. Interior of Parlor Car "Chenango." N. Y., O. & W. Harlan & Hollingsworth, Builders.

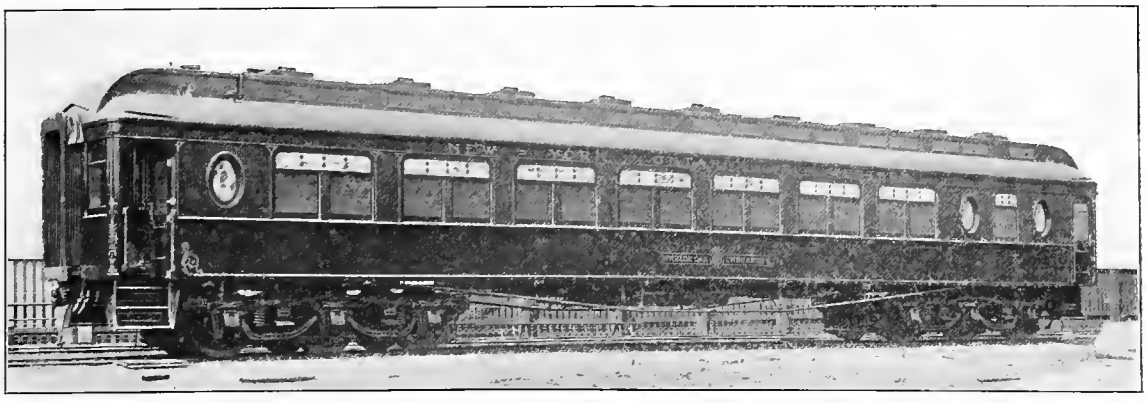


Fig. 154. Parlor Car "Chenango." New York, Ontario & Western. Harlan & Hollingsworth, Builders.

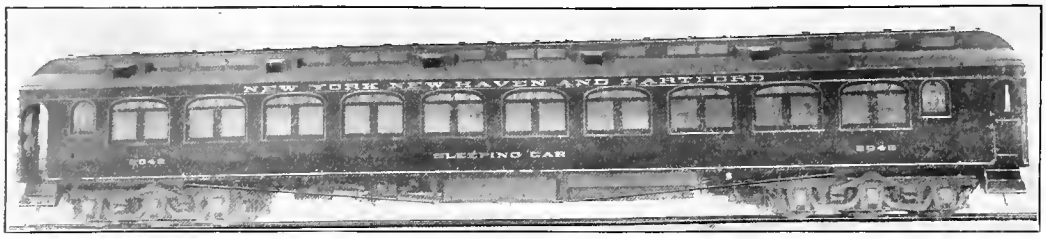


Fig. 155. Compartment Sleeping Car. New York, New Haven & Hartford.
Barney & Smith Car Co., Builders.

Fig. 156. Compartment Observation Car. Great Northern.
Barney & Smith Car Co., Builders.

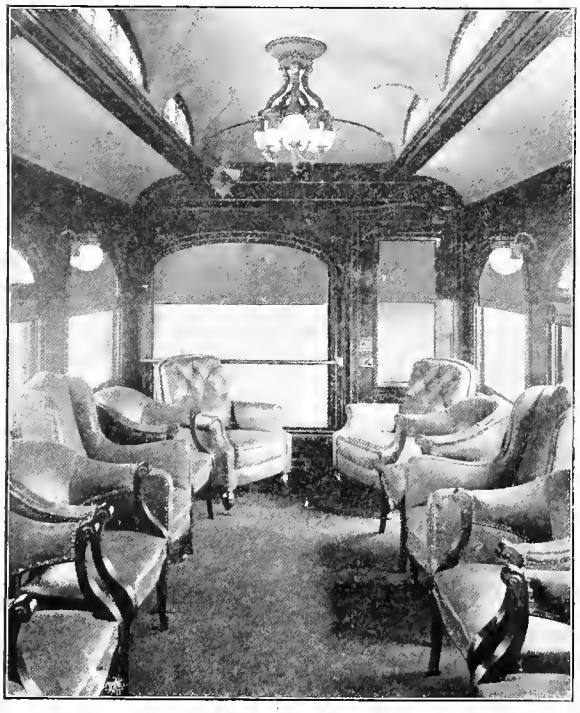


Fig. 157. Observation Room. Compartment Observation Car. Great Northern.
Barney & Smith Car Co., Builders.

Fig. 158. Interior of Observation Parlor Car "Mineola." C., M. & St. P.
Barney & Smith Car Co., Builders.

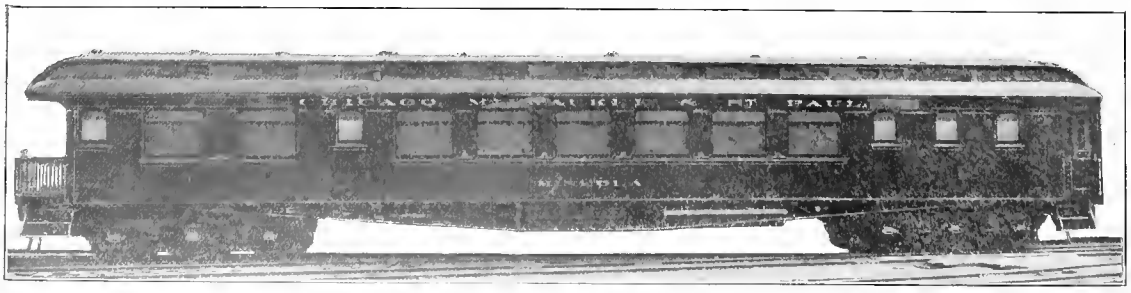


Fig. 159. Observation Parlor Car "Mineola." Chicago, Milwaukee & St. Paul.
Barney & Smith Car Co., Builders.
(Floor plan of this car is shown in Fig. 219.)

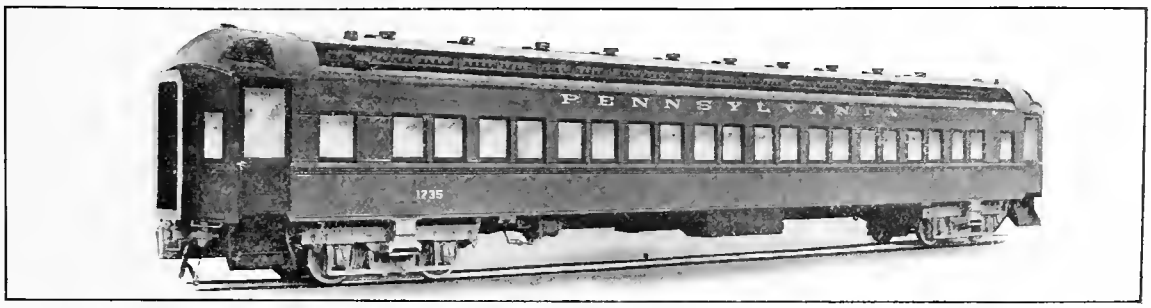


Fig. 160. Vestibuled Coach, All Steel. Pennsylvania. American Car & Foundry Co., Builders.

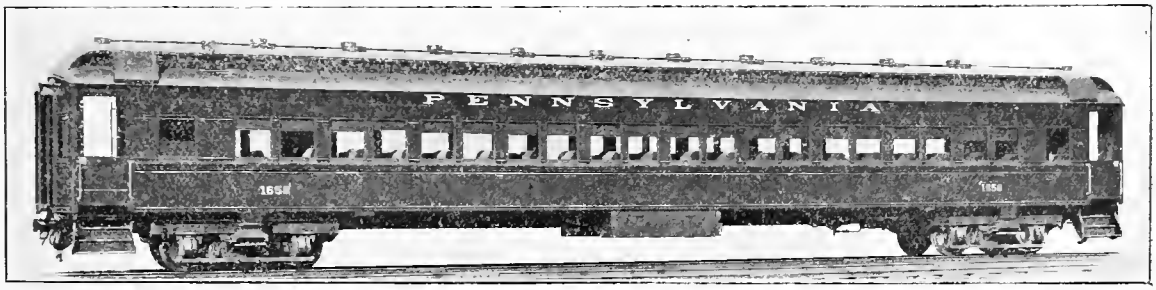


Fig. 161. Vestibuled Coach, All Steel. Pennsylvania. Pressed Steel Car Co., Builders.

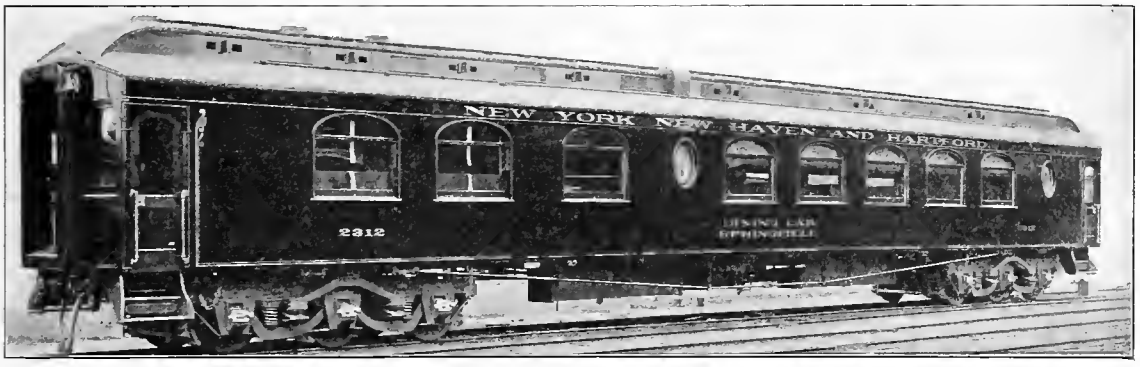


Fig. 162. Vestibuled Dining Car "Springfield." N. Y., N. H. & H. Wason Mfg. Co., Builders.

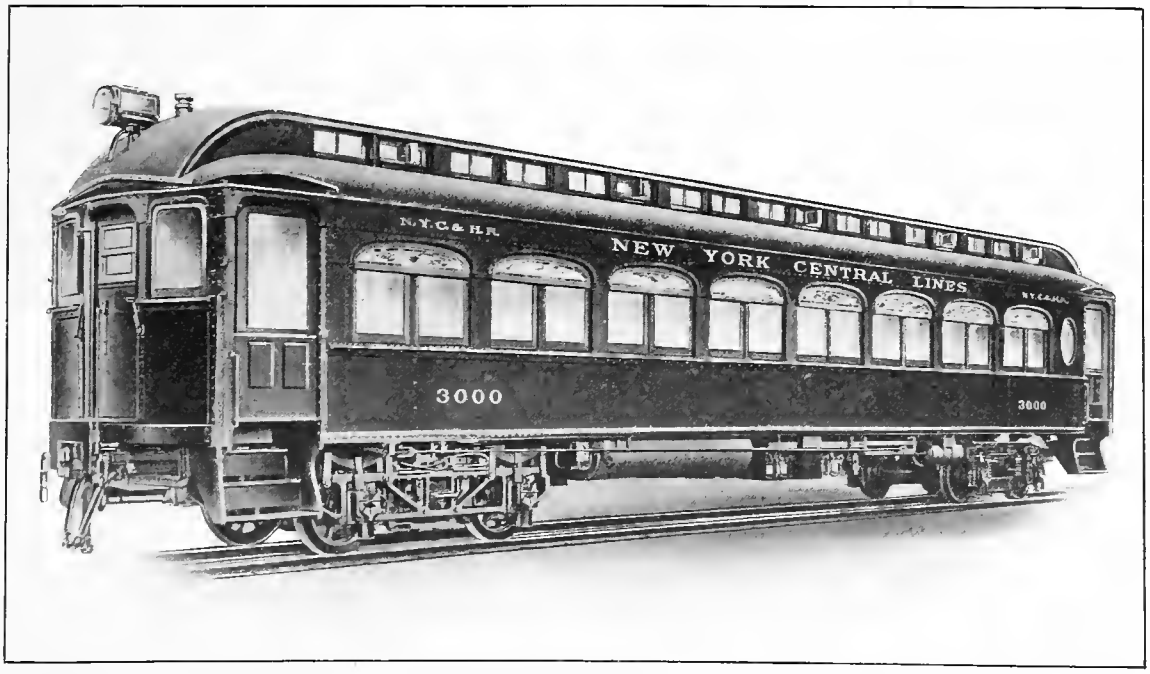


Fig. 163. Vestibuled Coach, All Steel. New York Central Lines. American Car & Foundry Co., Builders.

(Drawings of this car are shown in Figs. 642-644.)

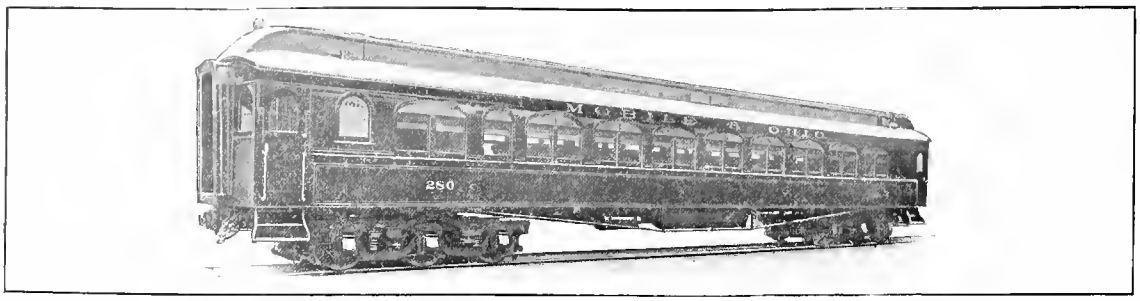


Fig. 164. Vestibuled Coach. Mobile & Ohio. American Car & Foundry Co., Builders.
(Floor plan of this car is shown in Fig. 238.)

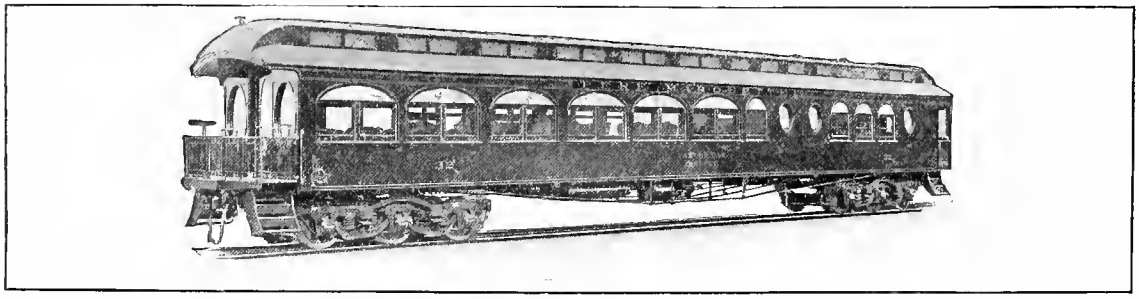


Fig. 165. Parlor Buffet Car. Pere Marquette. American Car & Foundry Co., Builders.
(Floor plan of this car is shown in Fig. 225.)

Fig. 166. Interior of Parlor Buffet Car. Pere Marquette. American Car & Foundry Co., Builders.

Fig. 167. Interior of Dining Car. Wabash. American Car & Foundry Co., Builders.

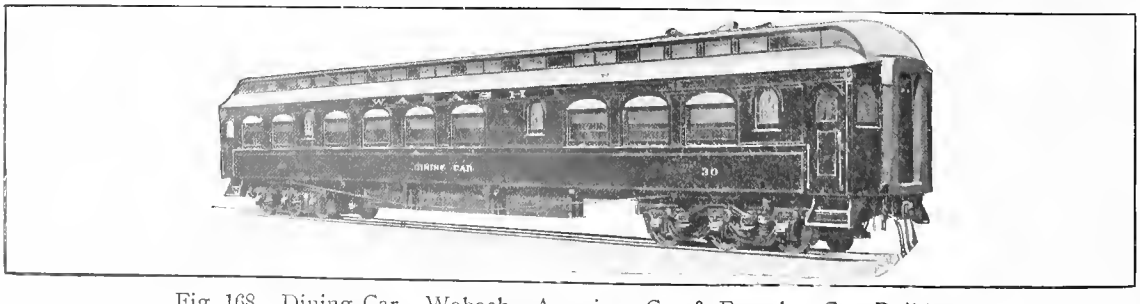


Fig. 168. Dining Car. Wabash. American Car & Foundry Co., Builders.

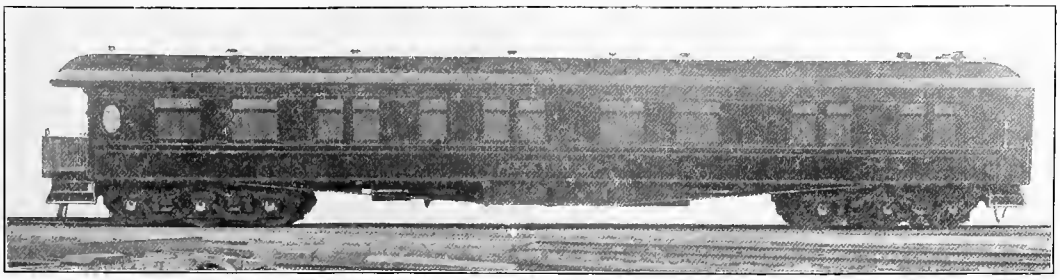


Fig. 169. Private Car "Eatonia." Barney & Smith Car Co., Builders.

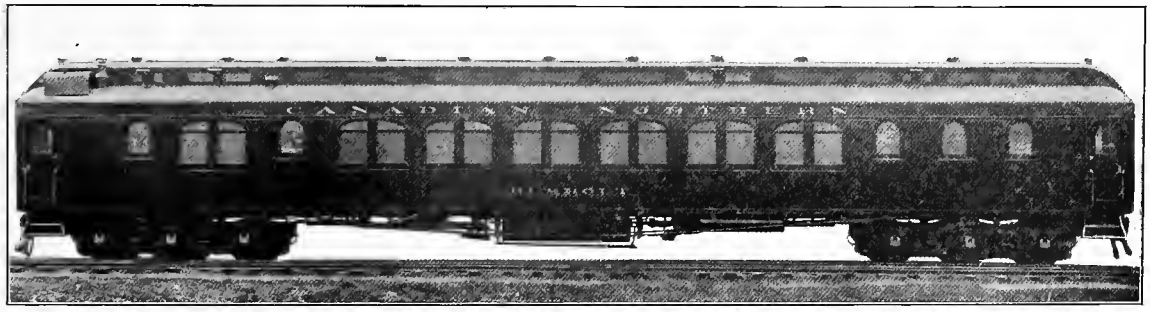


Fig. 170. Twelve-Section Sleeping Car "Humbolt." Canadian Northern. Barney & Smith Car Co., Builders.

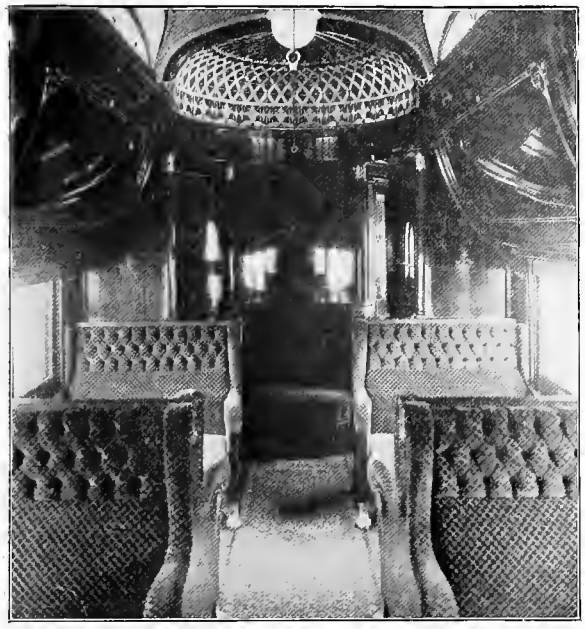


Fig. 171. Interior of Sleeping Car "Humbolt." Canadian Northern. Barney & Smith Car Co., Builders.

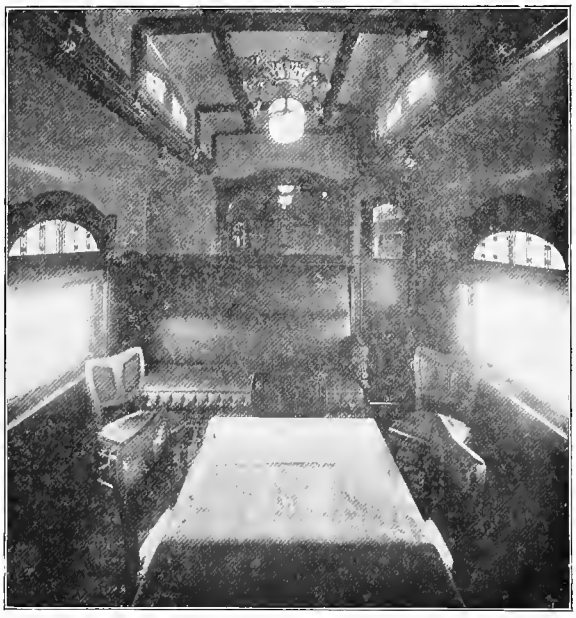


Fig. 172. Interior of Dining Room. Private Car "Eatonia." Barney & Smith Car Co., Builders.

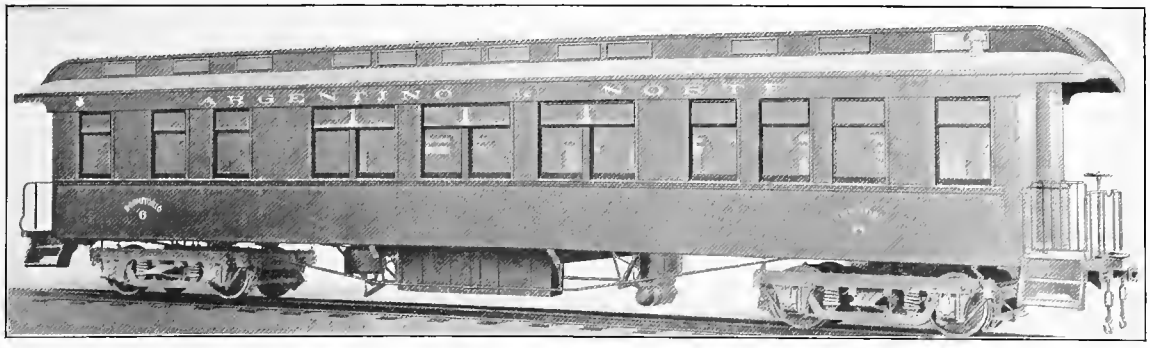


Fig. 173. Sleeping Car. Argentino del Norte. Wason Mfg. Co., Builders.

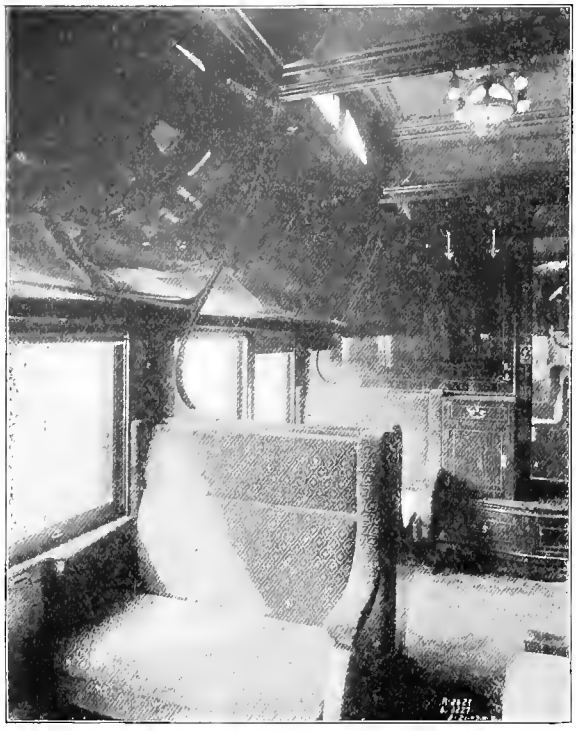


Fig. 174. Interior of Stateroom. Drawing Room, Stateroom Sleeping Car "Bissao." Pullman Co., Builders.

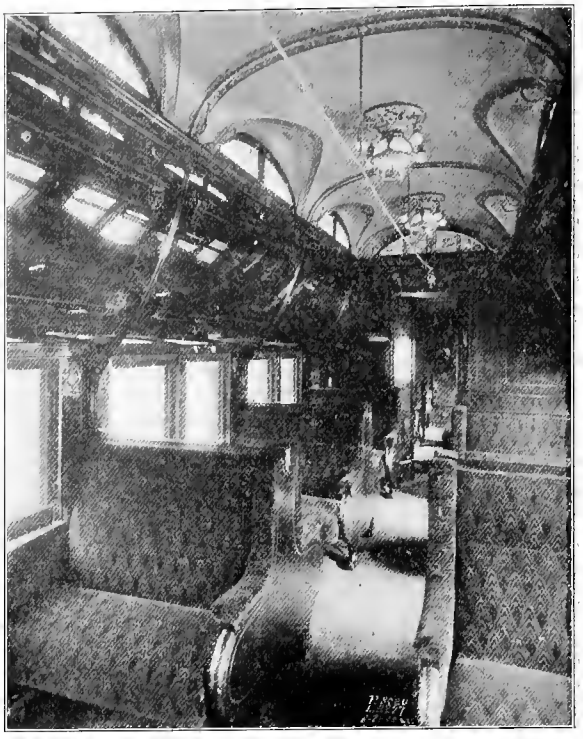


Fig. 175. Interior of Drawing Room. Stateroom Sleeping Car "Bissao." Pullman Co., Builders.

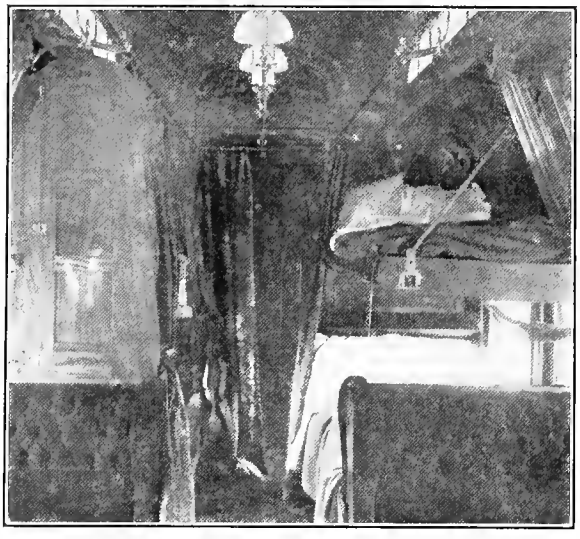


Fig. 176. Interior of Sleeping Car. Berths Arranged for Night.

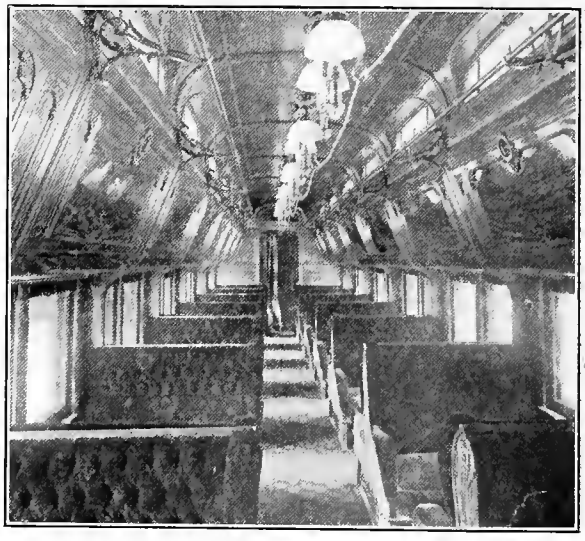


Fig. 177. Interior of Sleeping Car. Seats Arranged for Day.

American Car & Foundry Co., Builders.

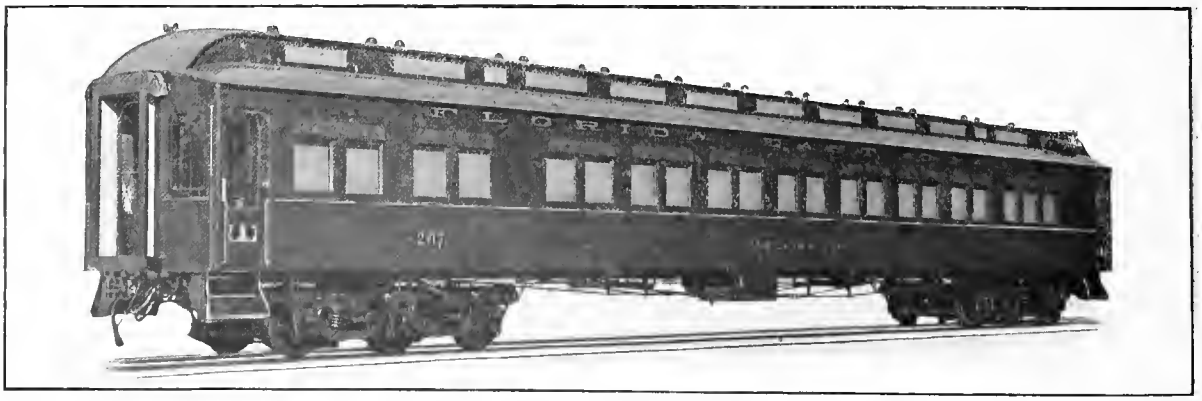


Fig. 178. Standard Sleeping Car. Florida East Coast. American Car & Foundry Co., Builders.

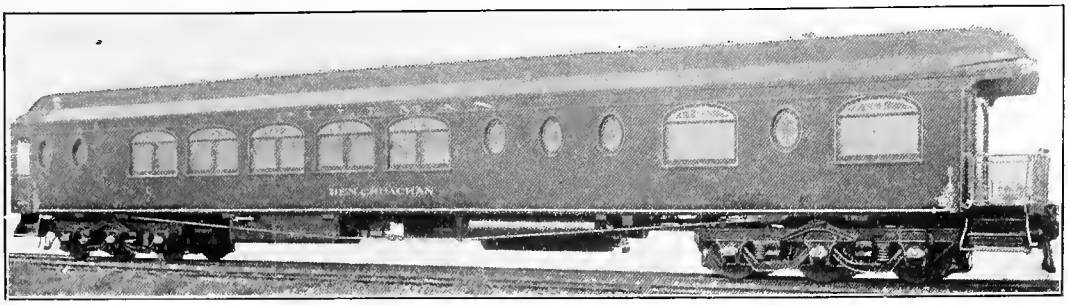


Fig. 179. Observation Sleeping Car "Ben Cruachan." Pullman Co., Builders.

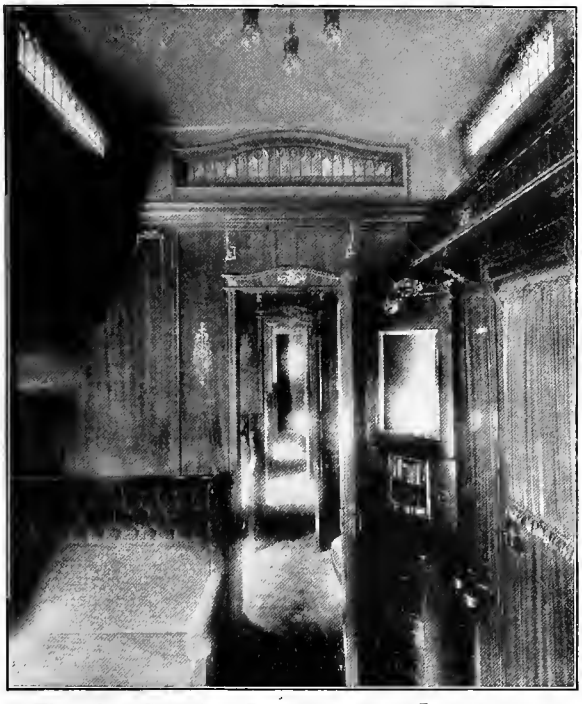


Fig. 180. Sleeping Compartment. Compartment Observation Car "Cranbrook." Barney & Smith Car Co., Builders.

Fig. 181. Observation Room. Compartment Observation Car "Cranbrook." Barney & Smith Car Co., Builders.

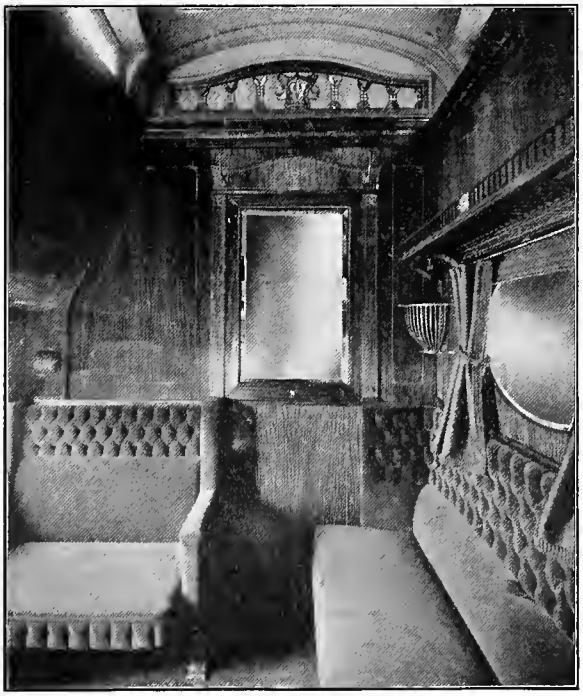


Fig. 182. Stateroom. Standard Sleeping Car "Osseo." C., M. & St. P. Barney & Smith Car Co., Builders.

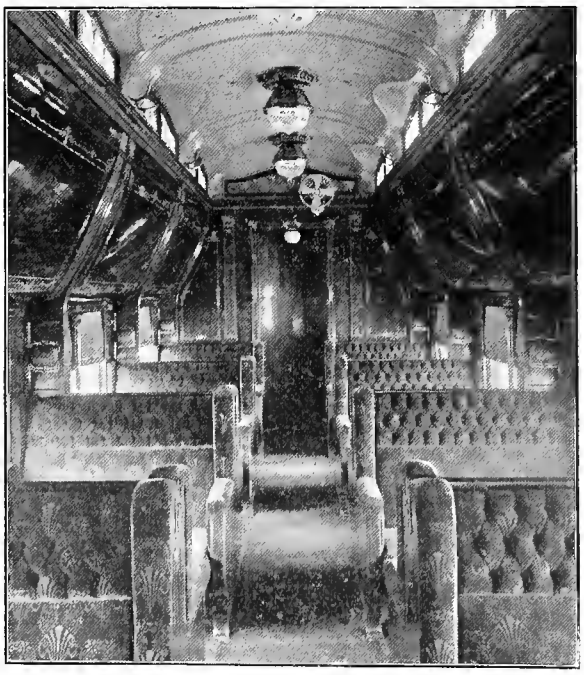


Fig. 183. Interior of Standard Sleeping Car "Osseo." C., M. & St. P. Barney & Smith Car Co., Builders.

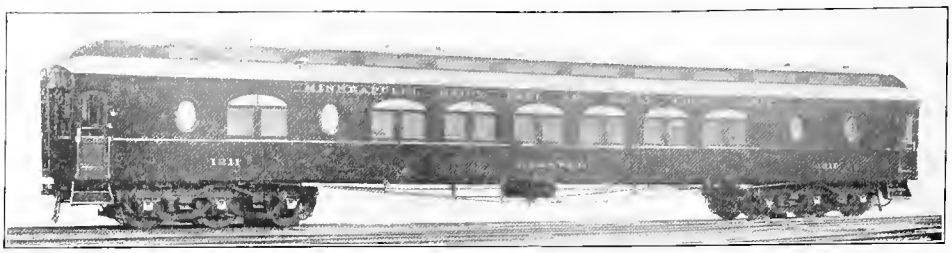


Fig. 184. Sleeping Car, "Glenwood." M., St. P. & S. St. M. Barney & Smith Car Co., Builders.
(Floor plan of this car is shown in Fig. 213.)

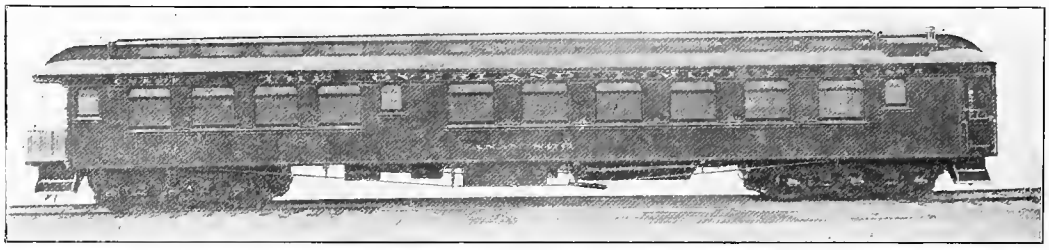


Fig. 185. Observation Buffet Car, "Wanamingo." Chicago, Milwaukee & St. Paul.
Barney & Smith Car Co., Builders.
(Floor plan of this car is shown in Fig. 235.)

Fig. 186. Interior of Smoking Compartment.
Observation Buffet Car "Wanamingo." C., M. & St. P.
Barney & Smith Car Co., Builders.

Fig. 187. Observation Room, Observation Buffet
Car "Wanamingo." C., M. & St. P.
Barney & Smith Car Co., Builders.

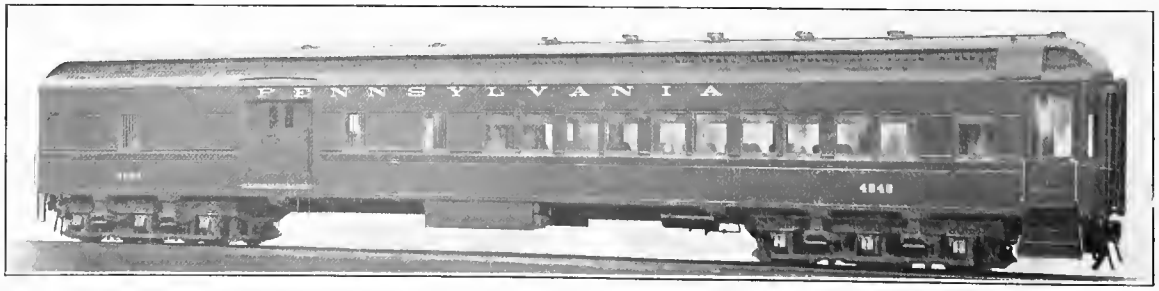


Fig. 188. Steel Combination Passenger and Baggage Car. Pennsylvania. Pressed Steel Car Co., Builders.

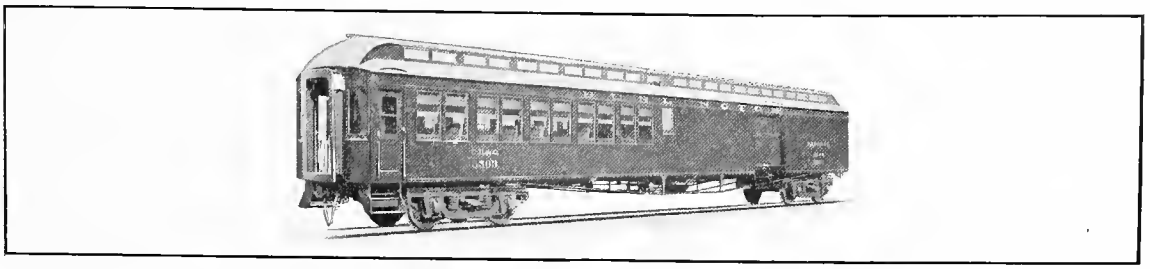


Fig. 189. Combination Passenger and Baggage Car. C., B. & Q.
American Car & Foundry Co., Builders.

(Floor plan of this car is shown in Fig. 231.)

Fig. 190. Postal Car. St. Louis & San Francisco.
American Car & Foundry Co., Builders.

(Floor plan of this car is shown in Fig. 241.)

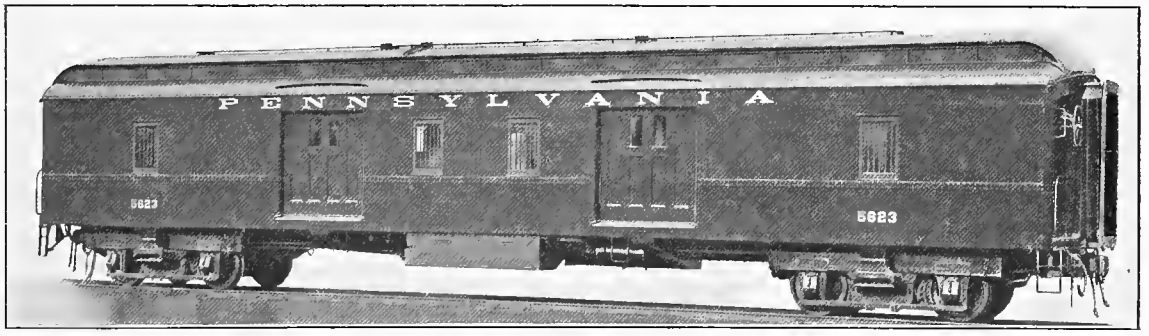


Fig. 192. Baggage Car, All Steel. Pennsylvania. Pressed Steel Car Co., Builders.

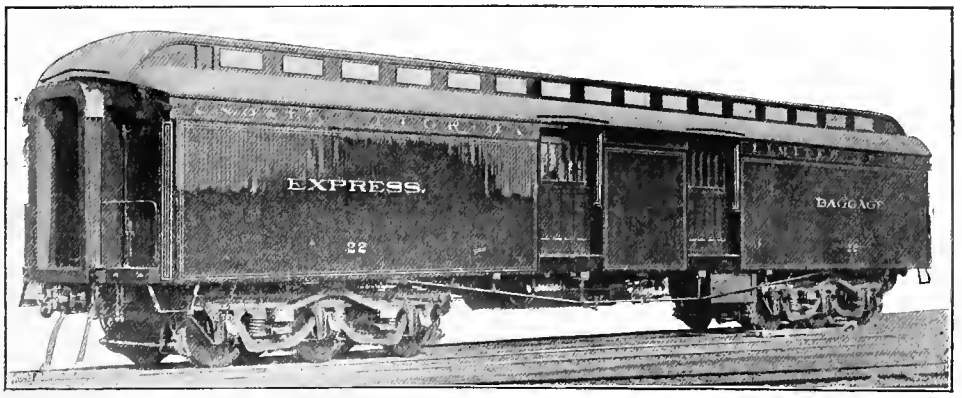


Fig. 193. Combination Baggage and Express Car. C., N. O. & T. P.
Barney & Smith Car Co., Builders.

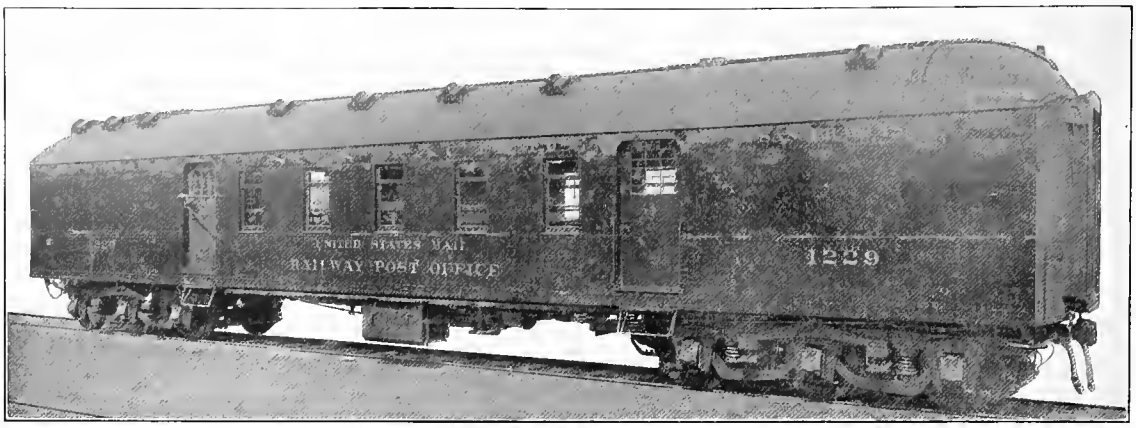


Fig. 194. All Steel Postal Car. Union Pacific. Union Pacific Railroad Co., Builders.

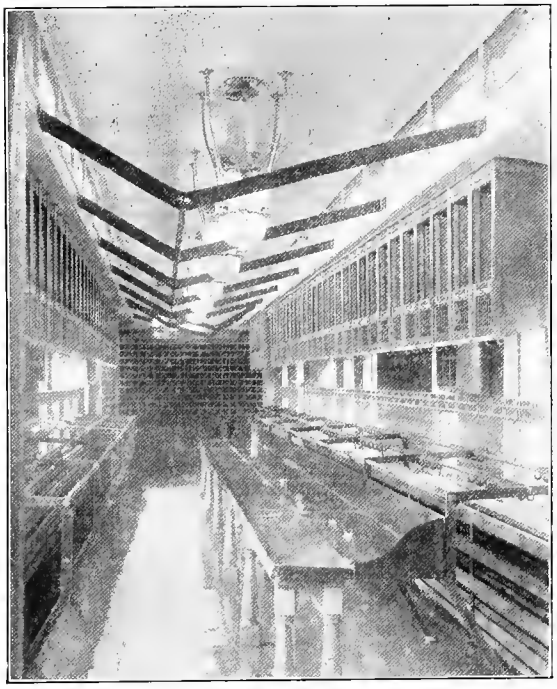


Fig. 195. Interior of Postal Car. D., L. & W. Barney & Smith Car Co., Builders.

Fig. 196. Interior of All Steel Postal Car. U. P. Union Pacific Railroad Co., Builders.

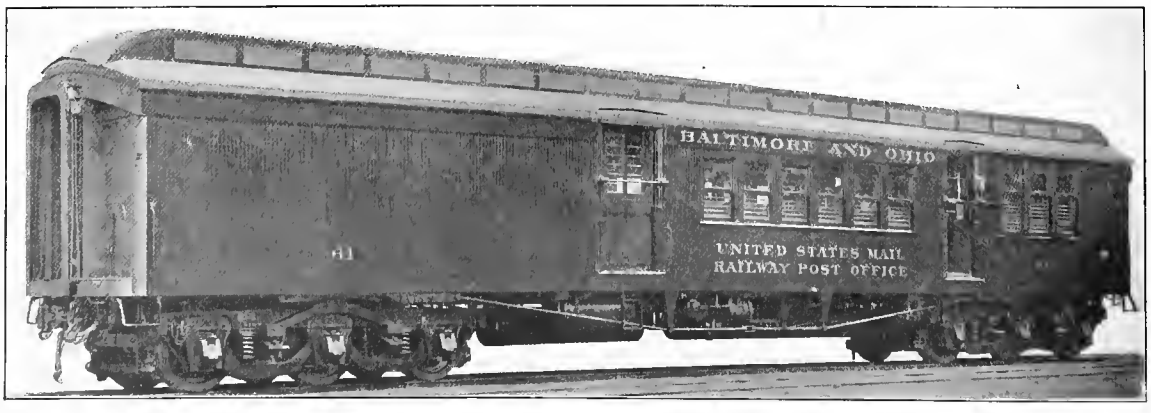


Fig. 197. Postal Car. Baltimore & Ohio. Harlan & Hollingsworth, Builders.

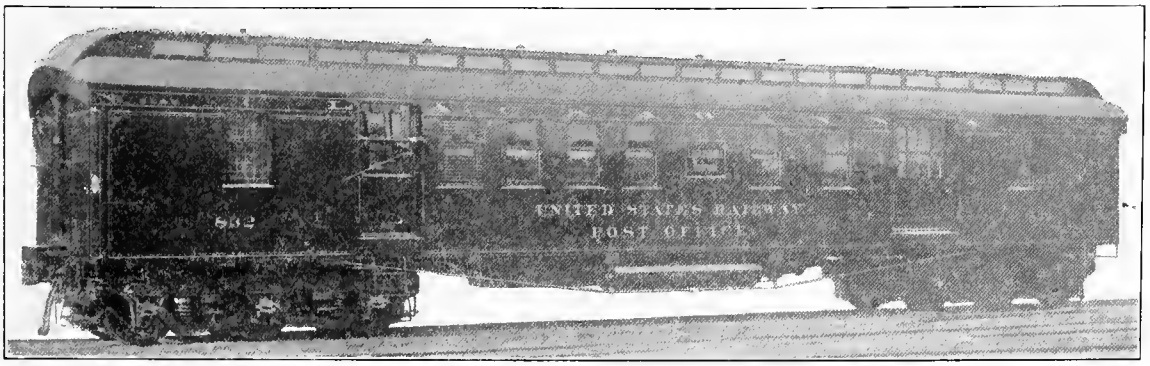


Fig. 198. Postal Car. D., L. & W. Barney & Smith Car Co., Builders.

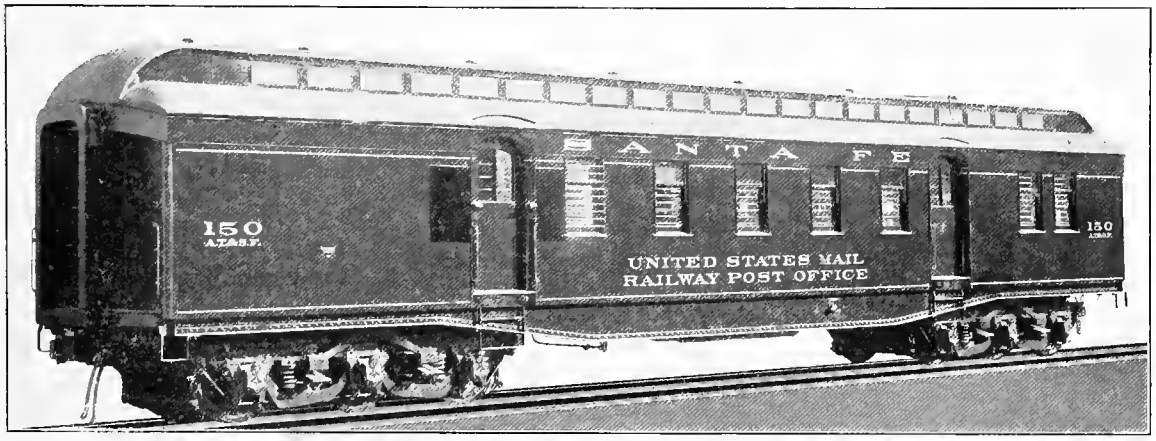


Fig. 199. Steel Underframe Postal Car. Atchison, Topeka & Santa Fe.
American Car & Foundry Co., Builders.

Fig. 200. Combination Postal and Baggage Car. Atlantic Coast Line.
Hicks Locomotive & Car Works, Builders.

Fig. 201. Special Horse Car. Lake Shore & Michigan Southern.
Harlan & Hollingsworth, Builders.

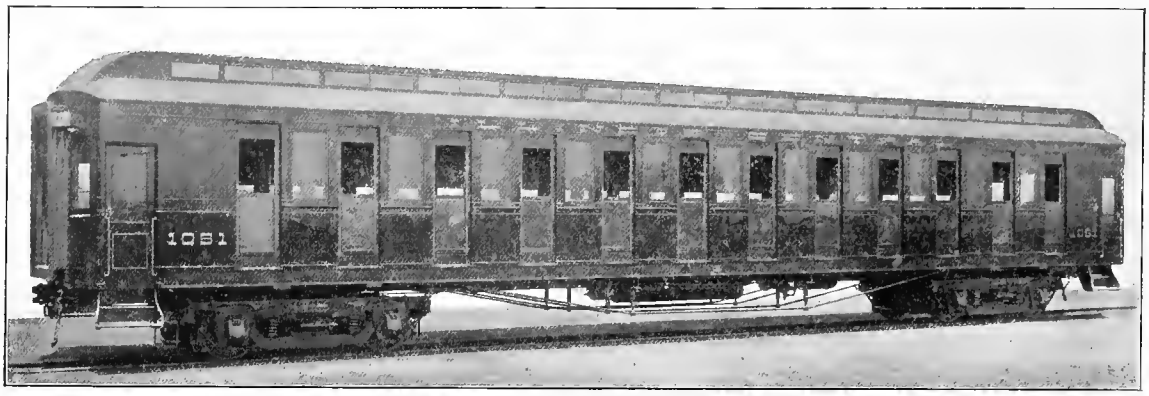


Fig. 202. Side-Door Suburban Car with Steel Underframe. Illinois Central.
(Drawings of this car are shown in Figs. 630-634.)

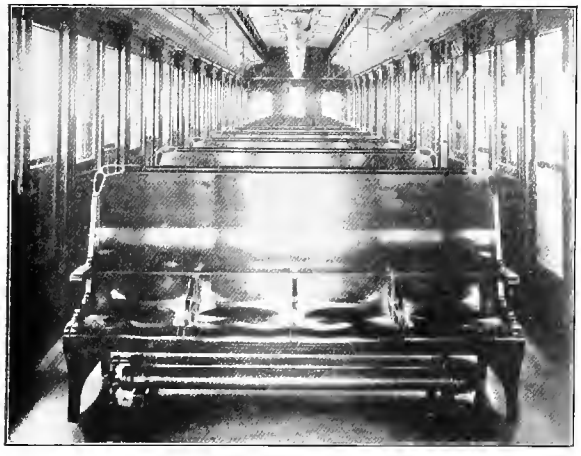


Fig. 203. Interior of Illinois Central Suburban Car.

Fig. 204. Interior of Refrigerator Express Car. Great Northern. Barney & Smith Car Co., Builders.

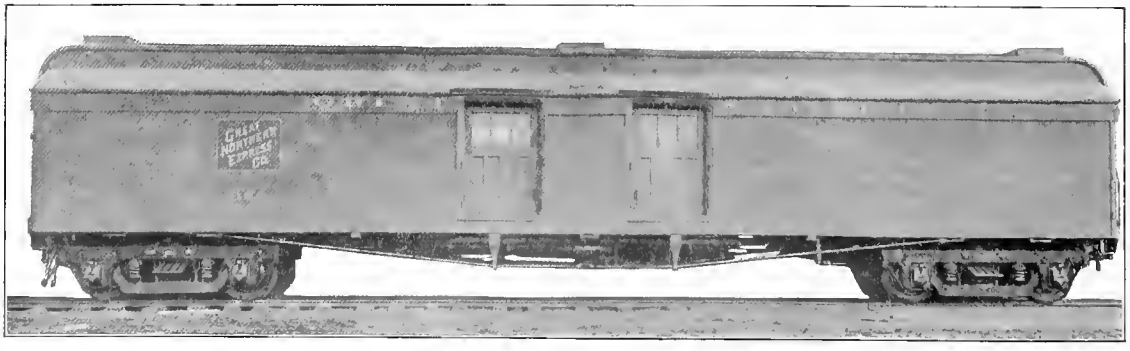


Fig. 205. Refrigerator Express Car. Great Northern.
Barney & Smith Car Co., Builders.
(Floor plan of this car is shown in Fig. 243.)

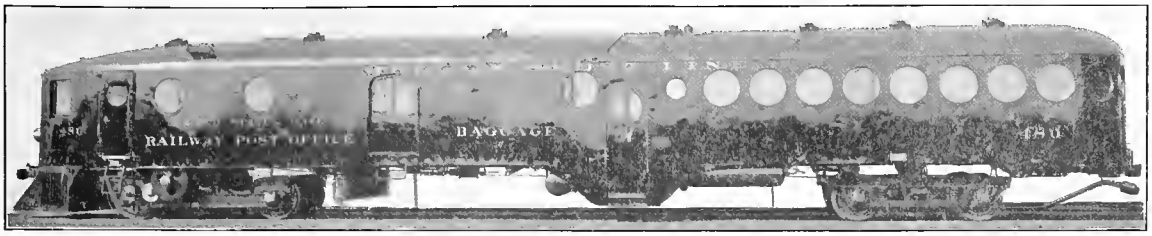


Fig. 206. Gasolene Passenger, Mail and Baggage Motor Car.
McKeen Motor Car Co., Builders.

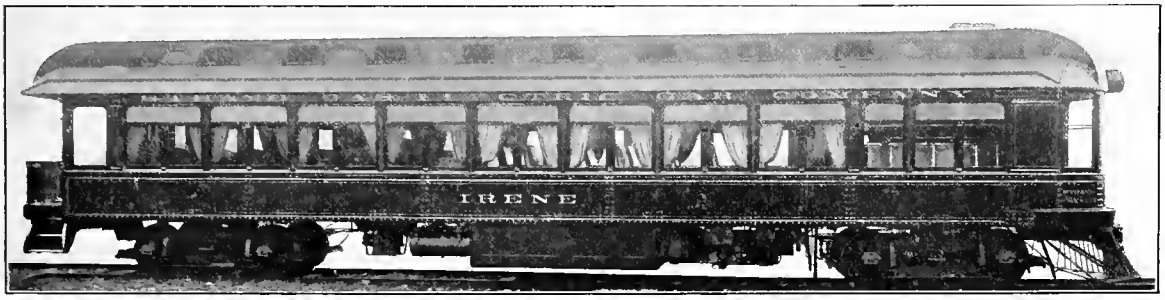


Fig. 207. Gas-Electric Passenger Motor Car. Strang Gas Electric Car Co., Builders.

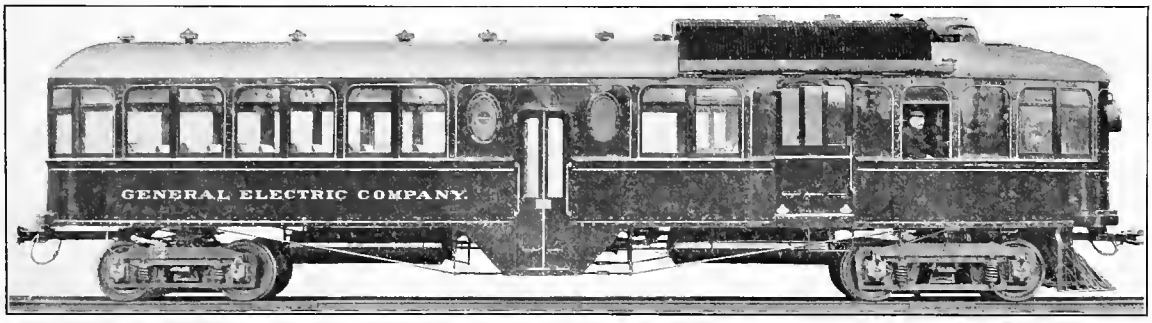


Fig. 208. Gasolene-Electric Passenger and Baggage Motor Car. General Electric Co., Builders.

Fig. 209. Steam Passenger and Baggage Motor Car. American Locomotive Co., Builders.

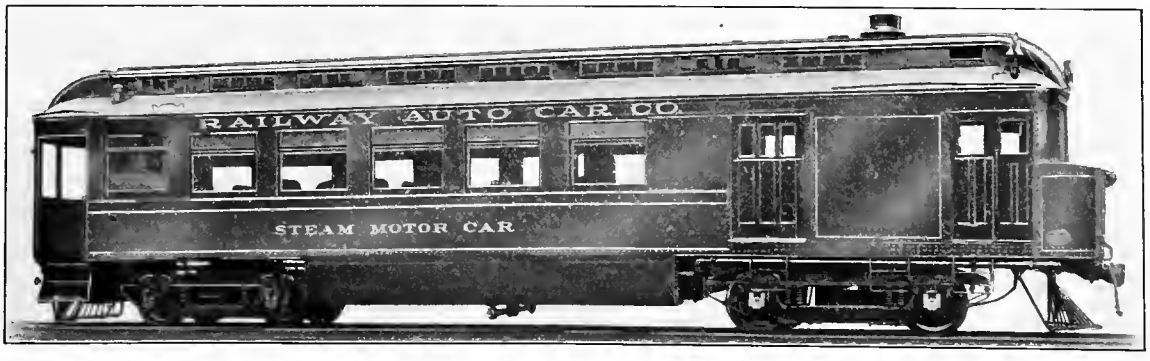
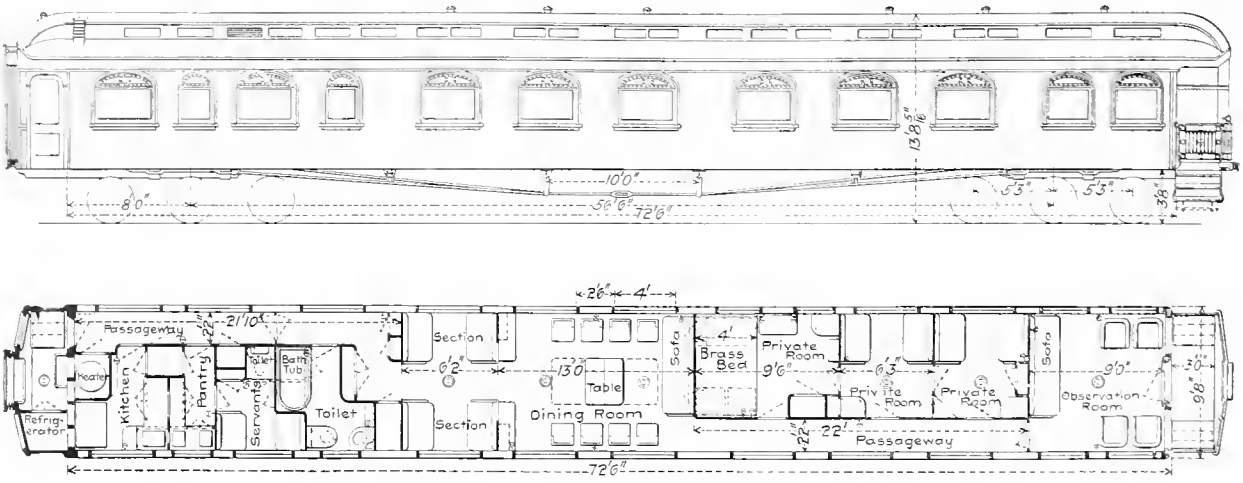


Fig. 210. Steam Passenger and Baggage Motor Car. Railway Auto Car Co., Builders.



Figs. 211-212. Private Car. Pullman Co., Builders.

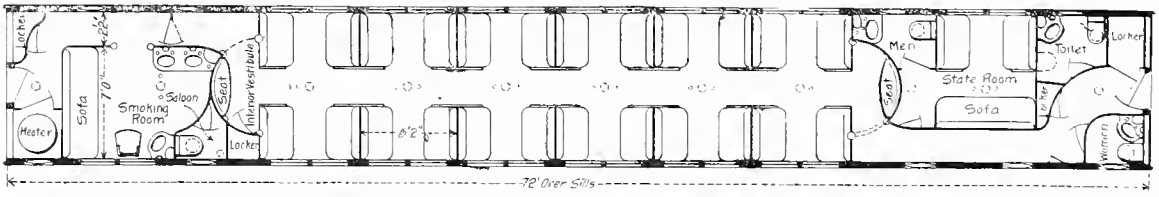


Fig. 213. Sleeping Car "Glenwood." M., St. P. & S. St. M. Barney & Smith Car Co., Builders.

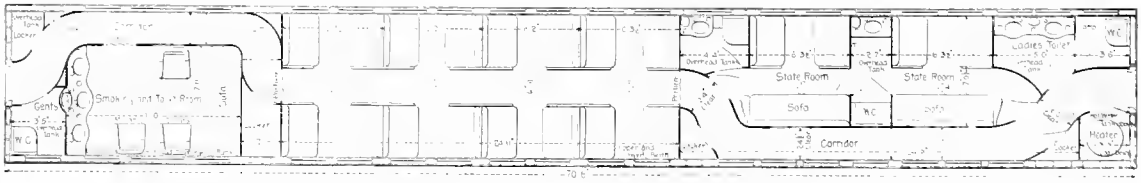


Fig. 214. Sleeping Car. Canadian Pacific.

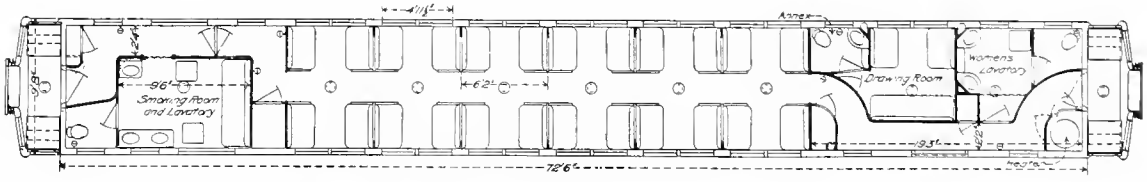


Fig. 215. Sleeping Car. Pullman Co., Builders.

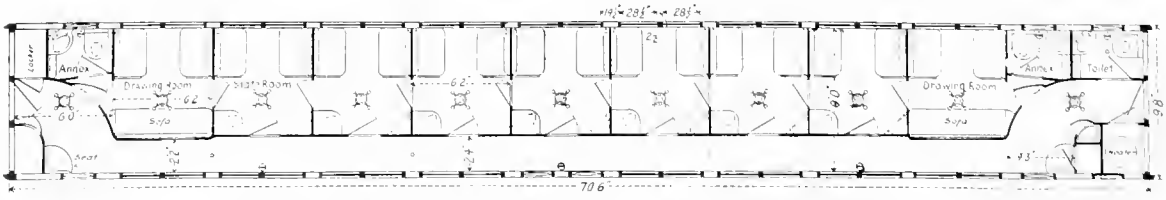


Fig. 216. Compartment Sleeping Car. Pullman Co., Builders.

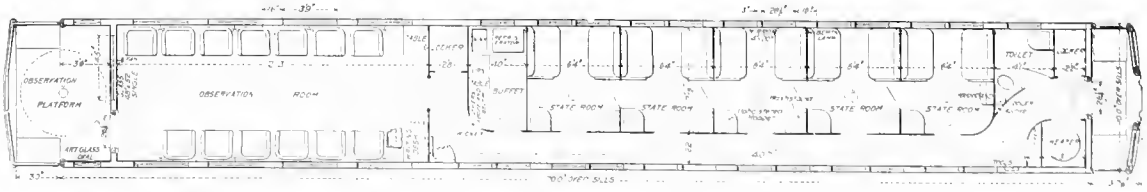


Fig. 217. Observation Sleeping Car. C., M. & St. P. Barney & Smith Car Co., Builders.

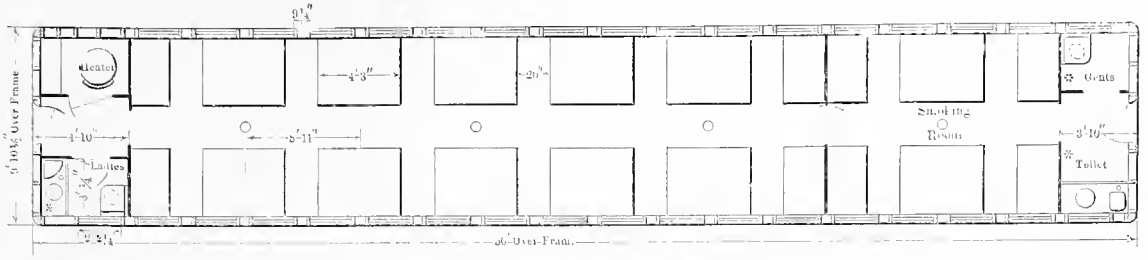


Fig. 218. Tourist Sleeping Car. Canadian Pacific.

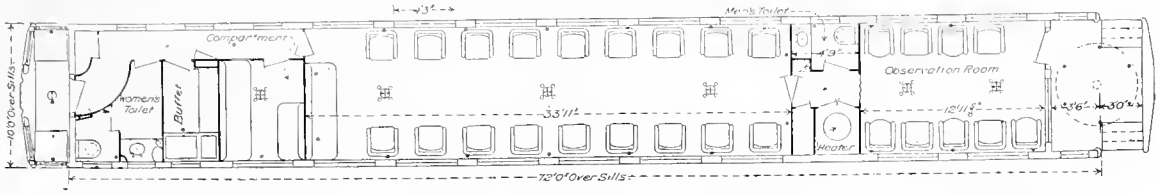


Fig. 219. Observation Parlor Car. C., M. & St. P. Barney & Smith Car Co., Builders.

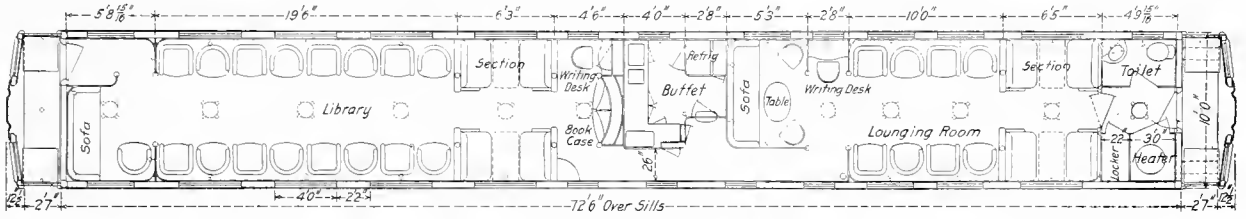


Fig. 220. Composite Steel Buffet Library Car. C., M. & St. P. Barney & Smith Car Co., Builders.

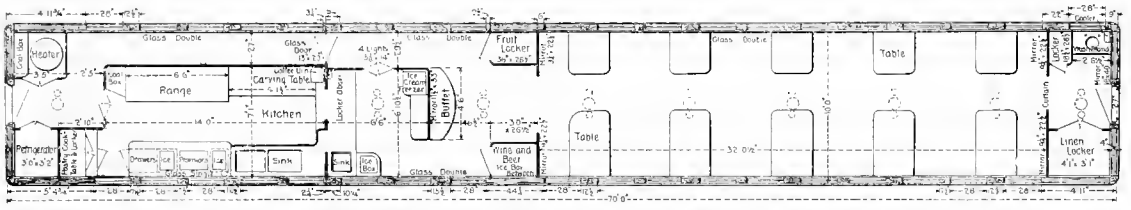


Fig. 221. Dining Car. C., C., C. & St. L. Barney & Smith Car Co., Builders.

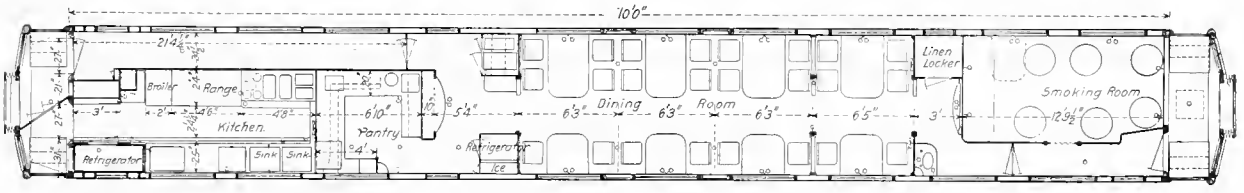


Fig. 222. Dining Car. Wabash. American Car & Foundry Co., Builders.

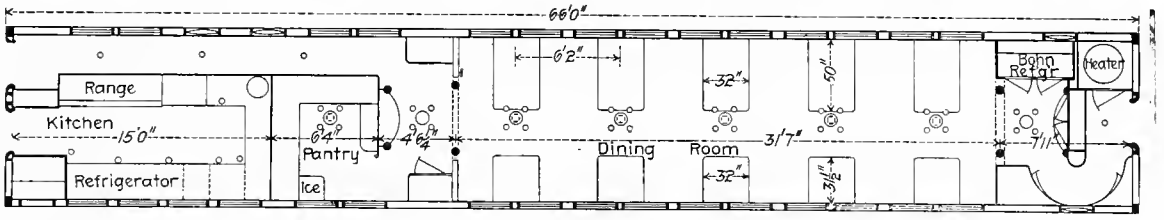


Fig. 223. Dining Car. C., B. & Q.

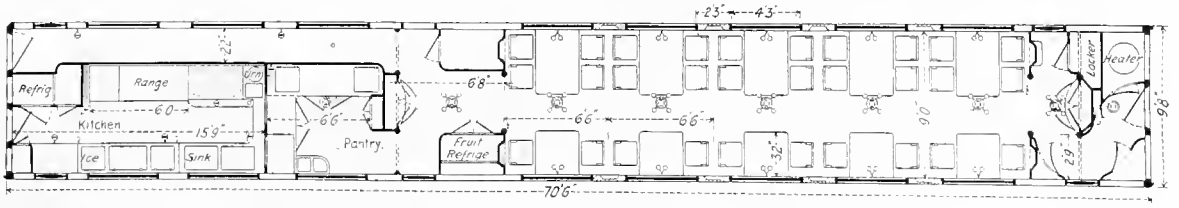


Fig. 224. Dining Car. Pullman Co., Builders.

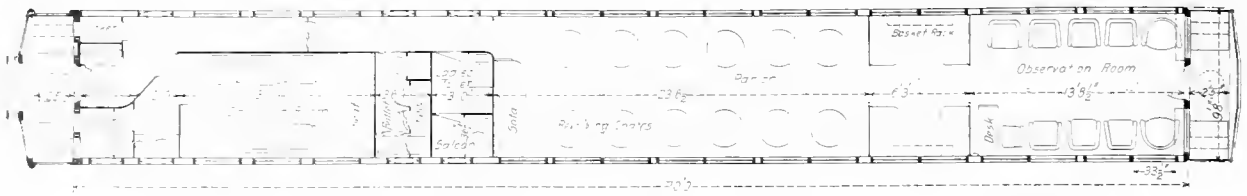


Fig. 225. Parlor Buffet Car. Père Marquette. American Car & Foundry Co., Builders.

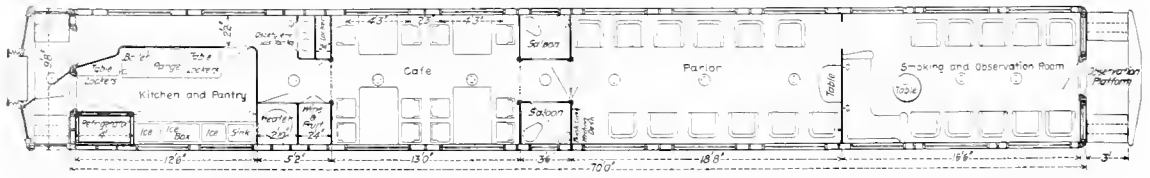


Fig. 226. Observation Café Car. Chicago Great Western. Pullman Co., Builders.

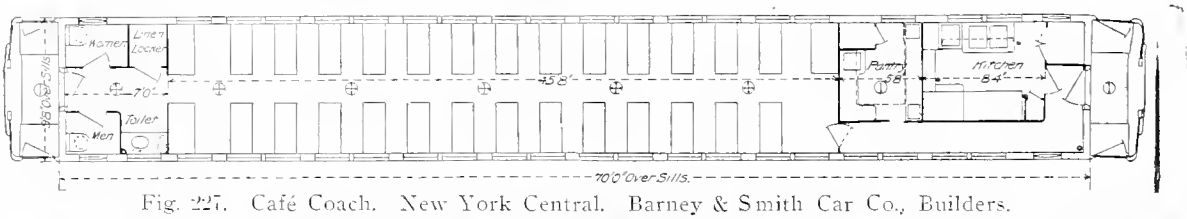


Fig. 227. Café Coach. New York Central. Barney & Smith Car Co., Builders.

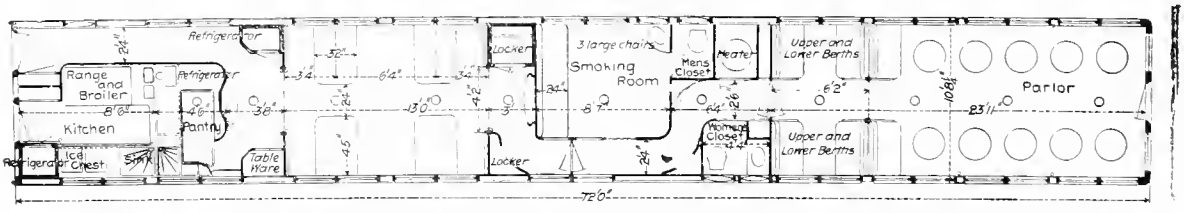


Fig. 228. Café Parlor Car. C., B. & Q. Pullman Co., Builders.

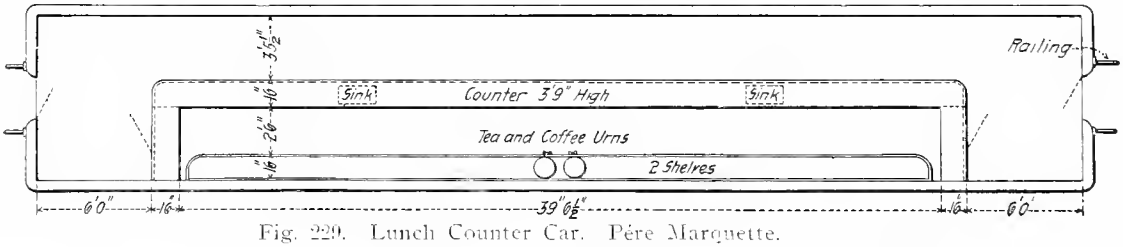


Fig. 229. Lunch Counter Car. Père Marquette.

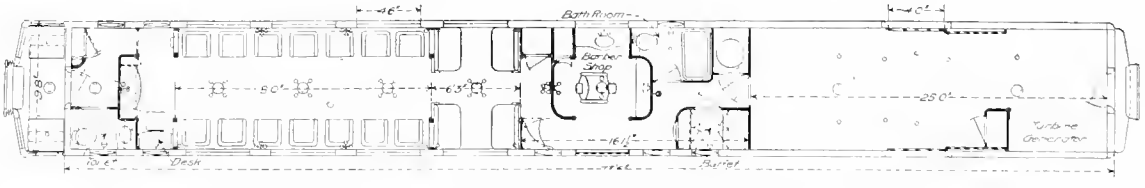


Fig. 230. Composite Car. Pennsylvania Railroad. Pullman Co., Builders.

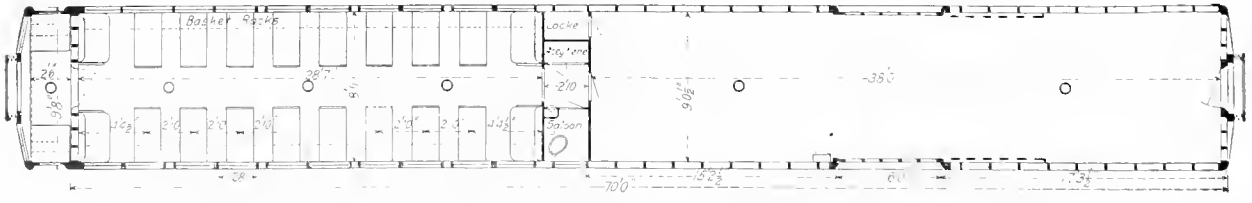


Fig. 231. Combination Passenger and Baggage Car. Chicago, Burlington & Quincy. American Car & Foundry Co., Builders.

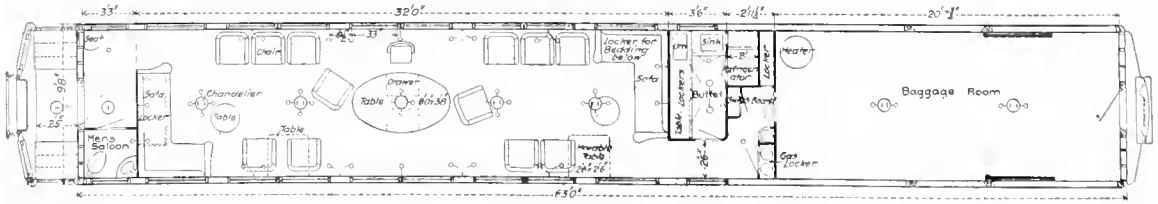


Fig. 232. Composite Smoking and Baggage Car. Chicago Great Western. Pullman Co., Builders.

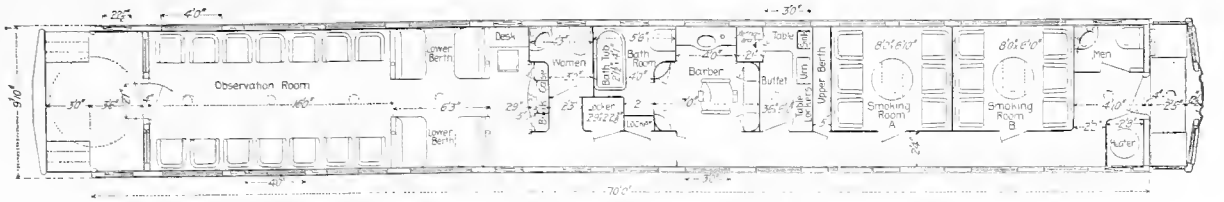


Fig. 233. Observation Buffet Car. Northern Pacific. Barney & Smith Car Co., Builders.

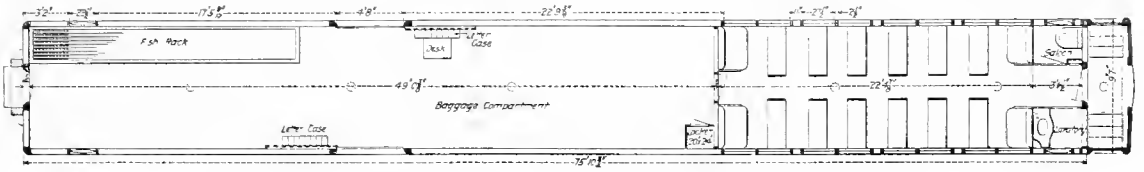


Fig. 234. Combination Car. Chicago, Indianapolis & Louisville.

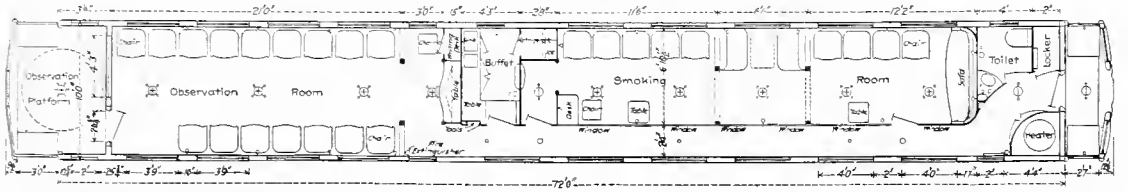


Fig. 235. Observation Buffet Smoking Car "Wanamingo." C., M. & St. P. Barney & Smith Car Co., Builders.

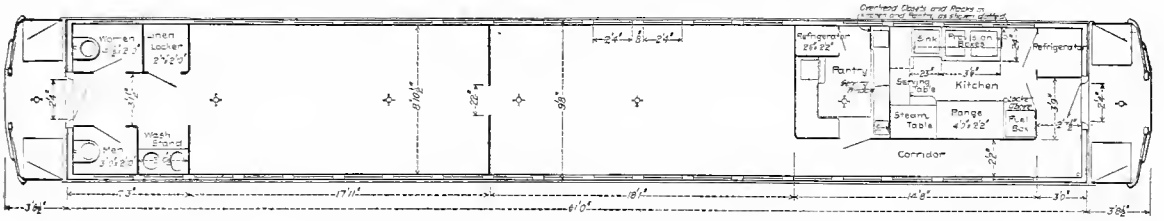


Fig. 236. Kitchen Car. New York Central.

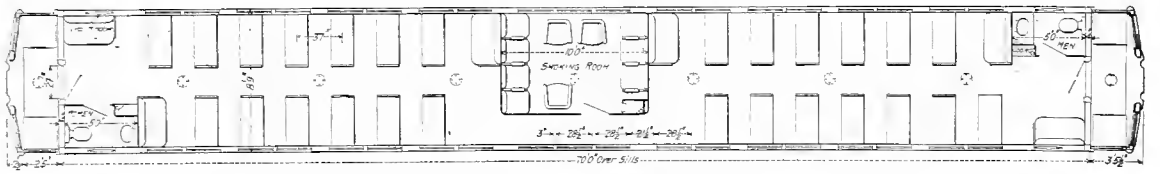


Fig. 237. Coach. Erie R. R. Barney & Smith Car Co., Builders.

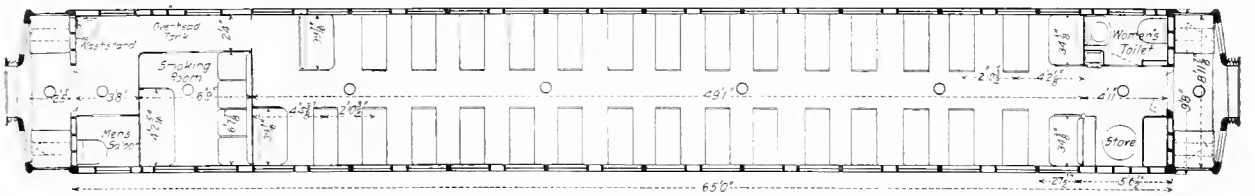


Fig. 238. Coach. Mobile & Ohio. American Car & Foundry Co., Builders.

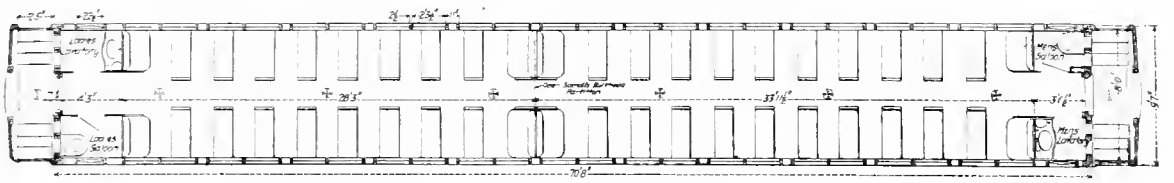


Fig. 239. Coach. Chicago, Indianapolis & Louisville.

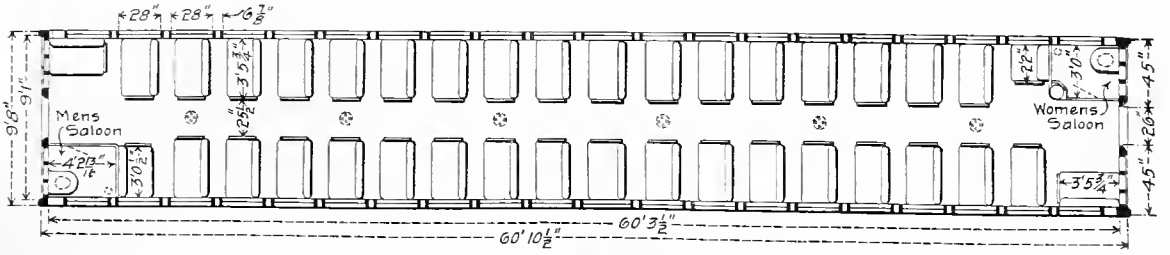


Fig. 240. Coach. N. Y., N. H. & H

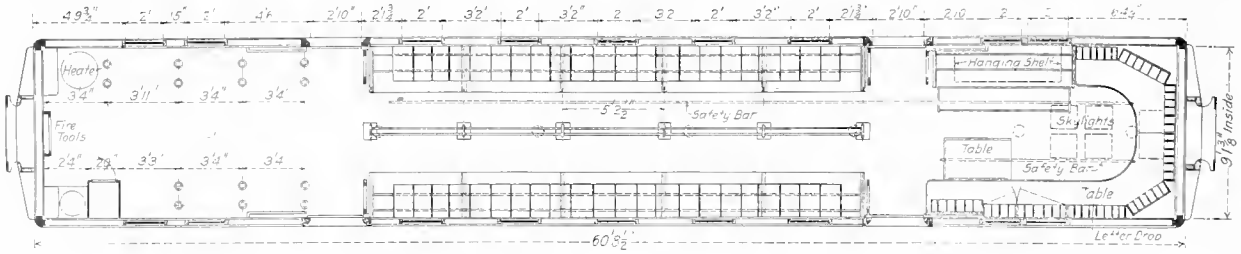


Fig. 241. Postal Car. St. Louis & San Francisco. American Car & Foundry Co., Builders

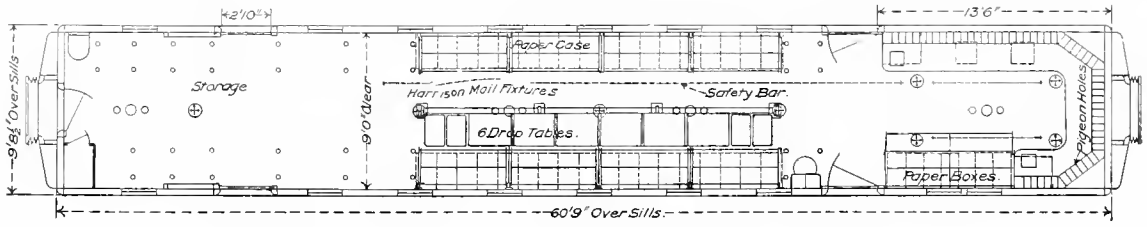


Fig. 242. Postal Car. C., H. & D. Barney & Smith Car Co., Builders.

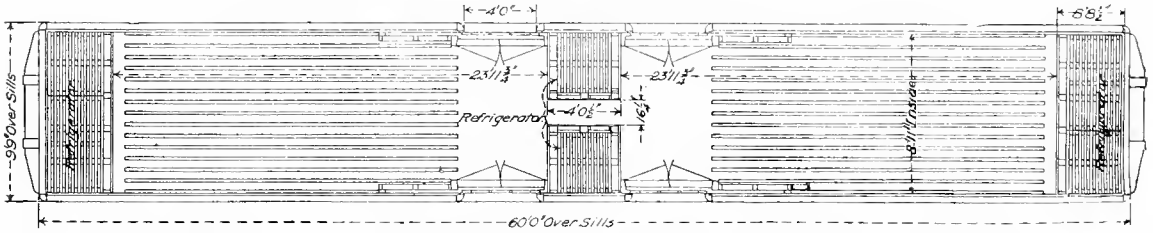


Fig. 243. Refrigerator Express Car. Great Northern. Barney & Smith Car Co., Builders.

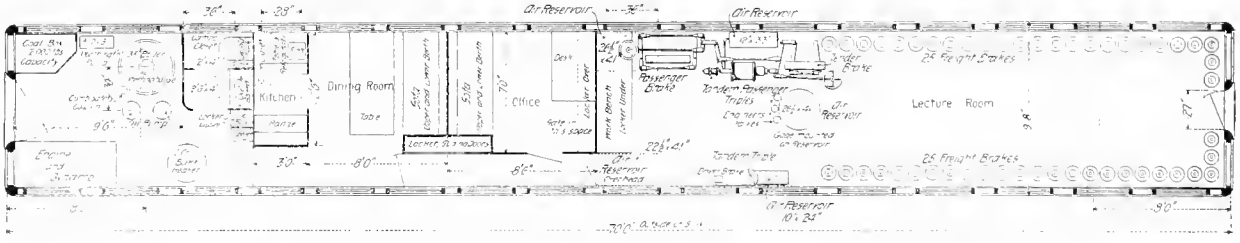


Fig. 244. Air-Brake Instruction Car. International Correspondence Schools.

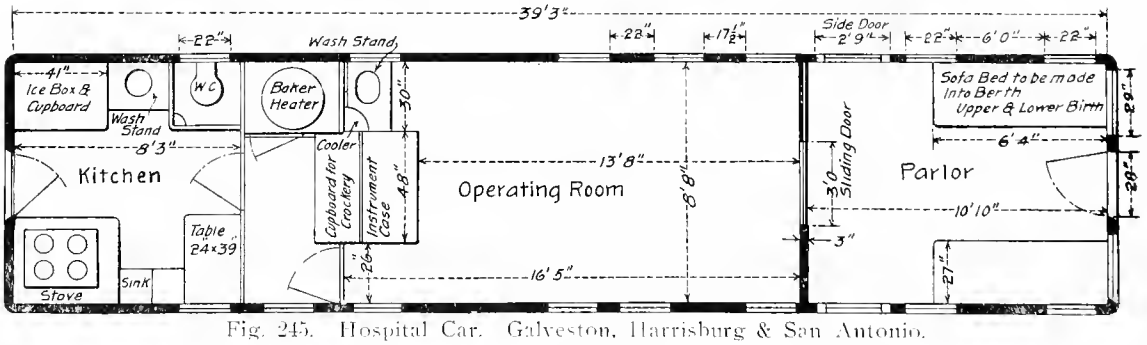


Fig. 245. Hospital Car. Galveston, Harrisburg & San Antonio.

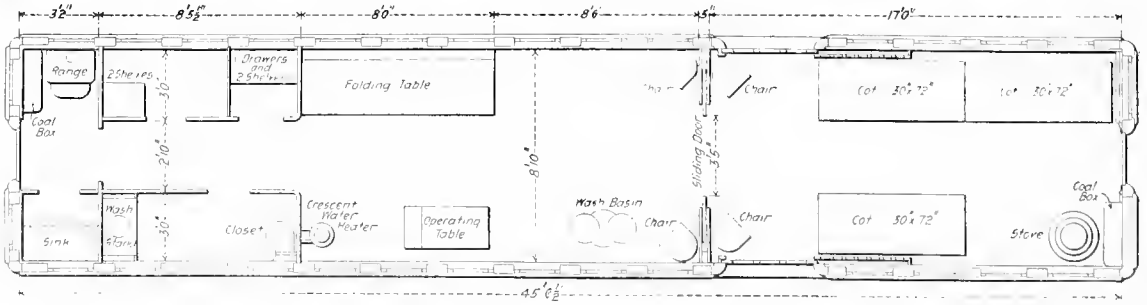


Fig. 246. Hospital Car. Lehigh Valley

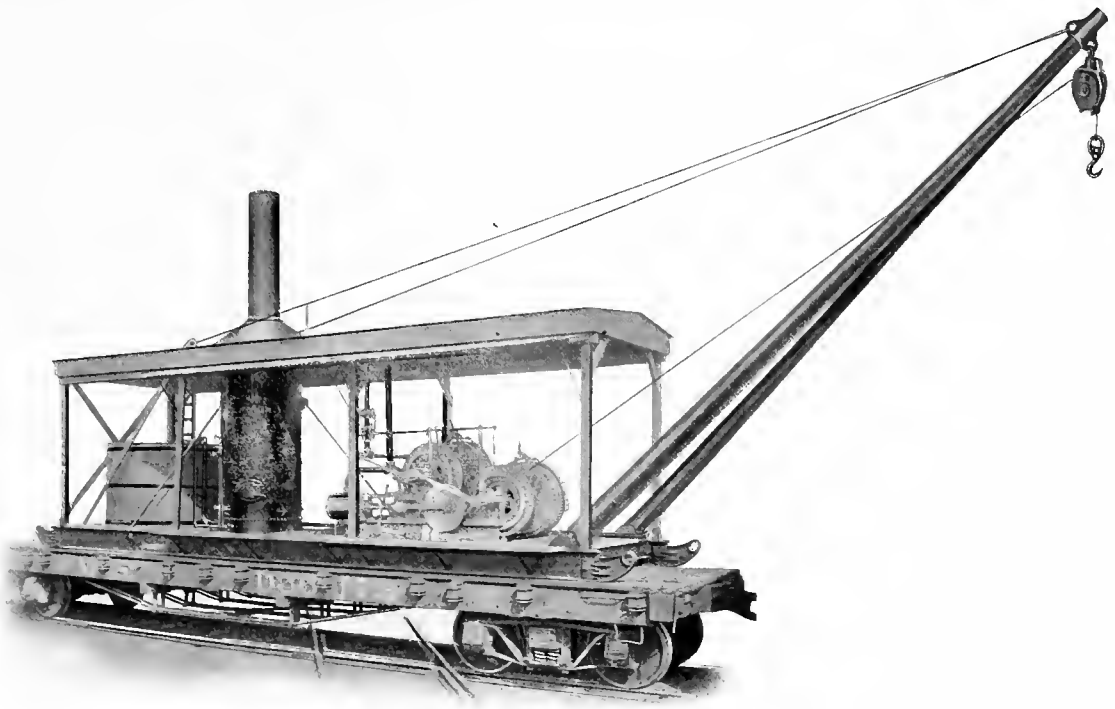


Fig. 247. Sliding Loader. Lake Shore & Michigan Southern. Russel Wheel & Foundry Co., Builders.

Fig. 248. Railway Wrecking Crane. Chicago & North Western.
The Bucyrus Co., Builders.

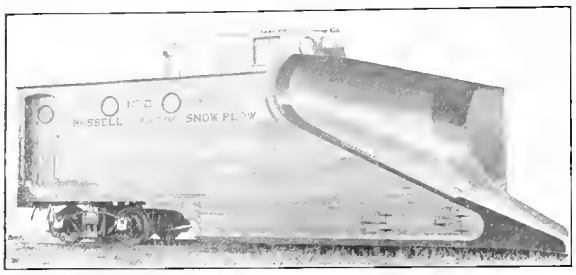


Fig. 249. Russell Double Track Snow Plow.

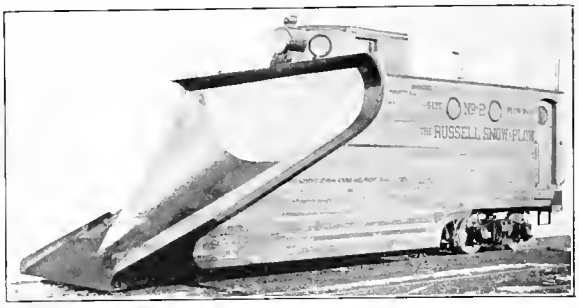


Fig. 250. Russell Single Track Snow Plow.

Russell Car & Snow Plow Co., Builders.

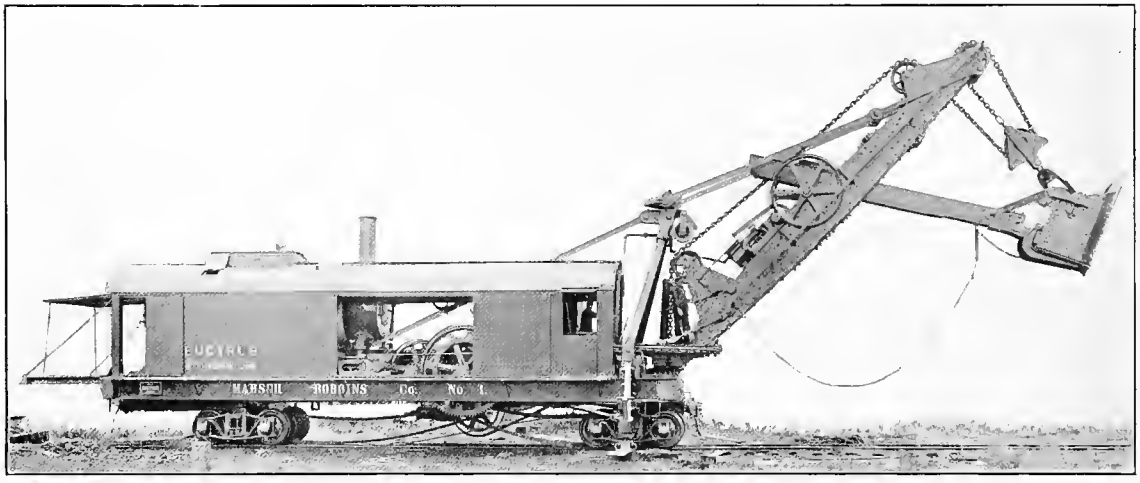


Fig. 251. 95-C Steam Shovel. The Bucyrus Co., Builders.

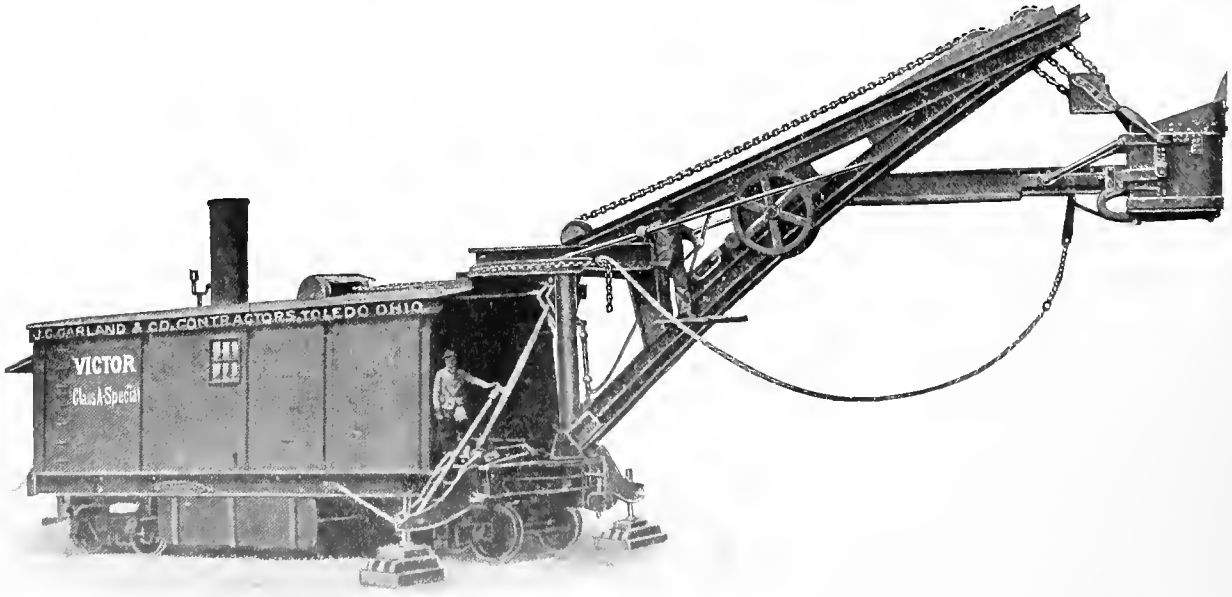


Fig. 252. 80-Ton Victor Steam Shovel, Class A-Special.

Toledo Foundry & Machine Co., Builders.

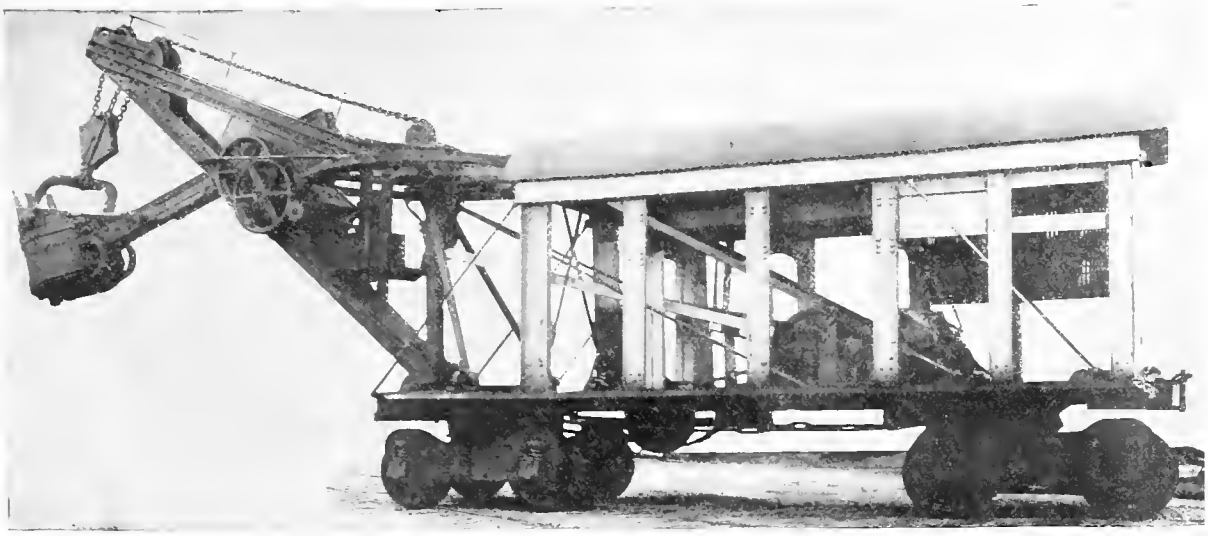


Fig. 253. 40-Ton Electric Shovel. The Vulcan Steam Shovel Co., Builders.

Fig. 254. 32-Ton "Little Giant" Traction Wheel Shovel. The Vulcan Steam Shovel Co., Builders.

 Fig. 255. 110-Ton "Heavy Duty" Steam Shovel. The Vulcan Steam Shovel Co., Builders.

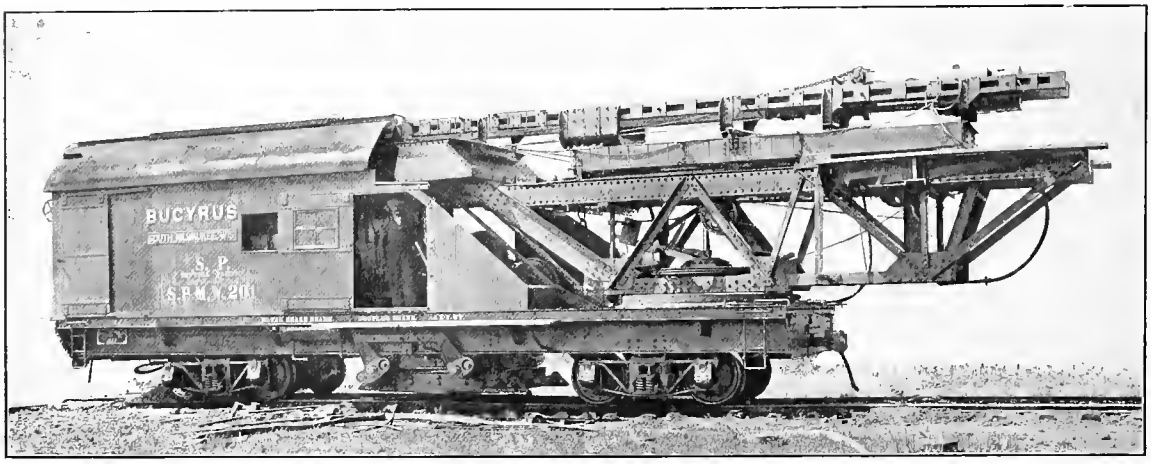


Fig. 256. Railway Pile Driver. Southern Pacific. The Bucyrus Co., Builders.

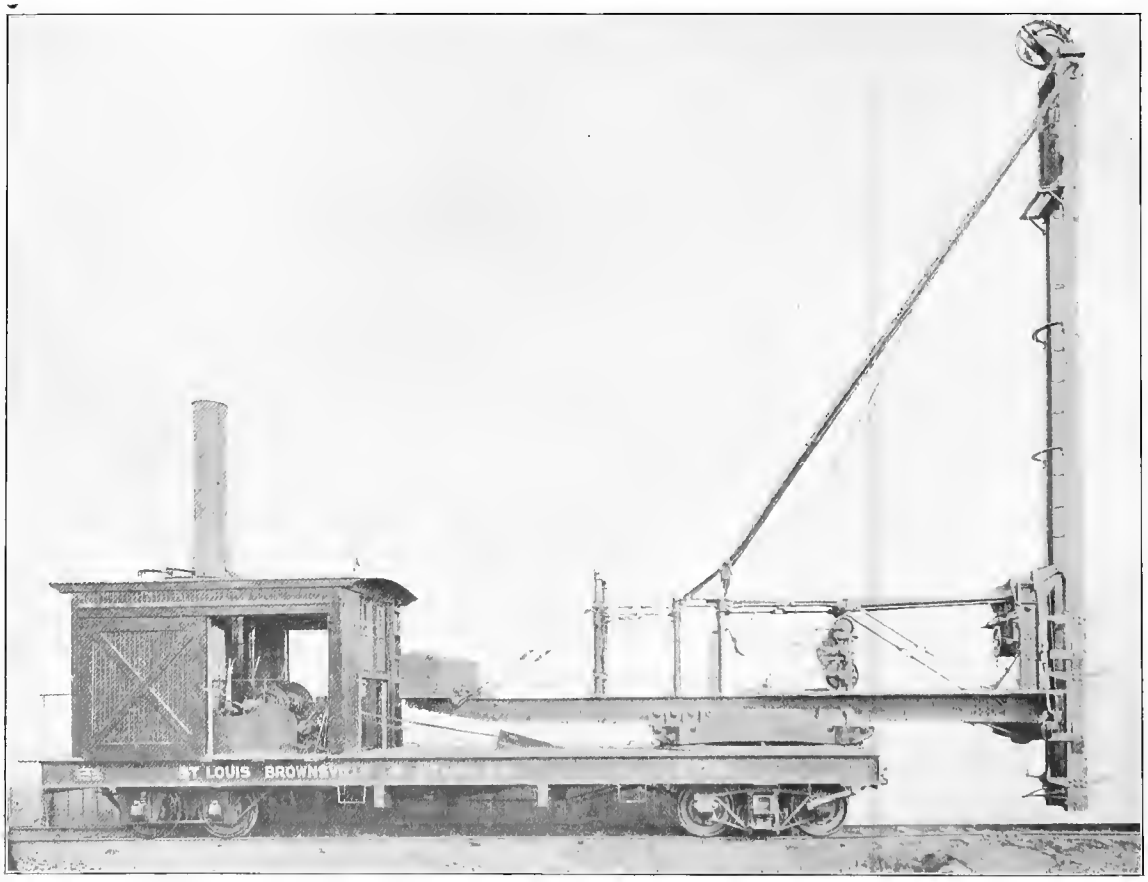


Fig. 257. Pile-Driving Car. St. Louis, Brownsville & Mexico.
Industrial Works, Builders.

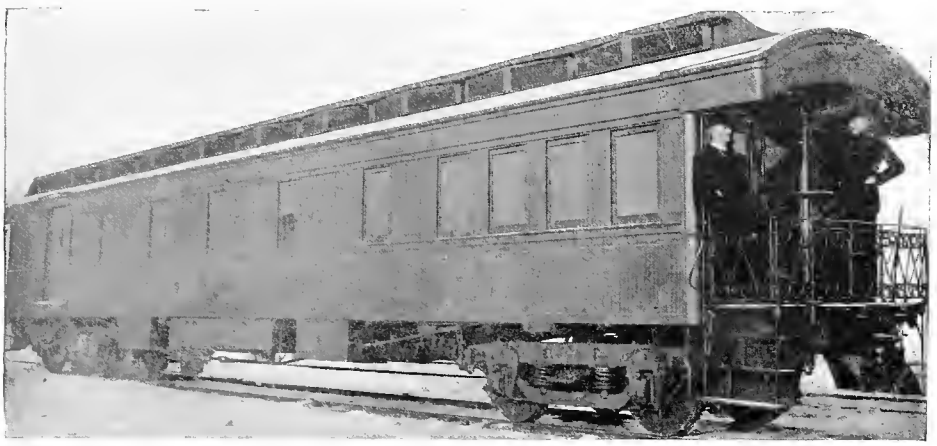


Fig. 258. Air Brake Instruction Car. Westinghouse Air Brake Co.

Fig. 259. Interior of Air Brake Instruction Car. International Correspondence Schools.

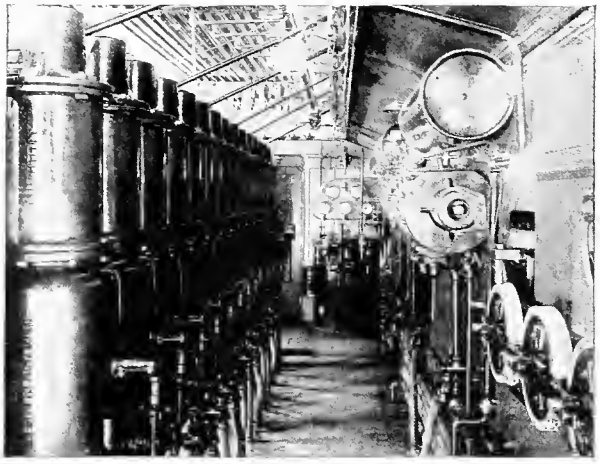


Fig. 260. Interior of Air Brake Instruction Car. Westinghouse Air Brake Co.

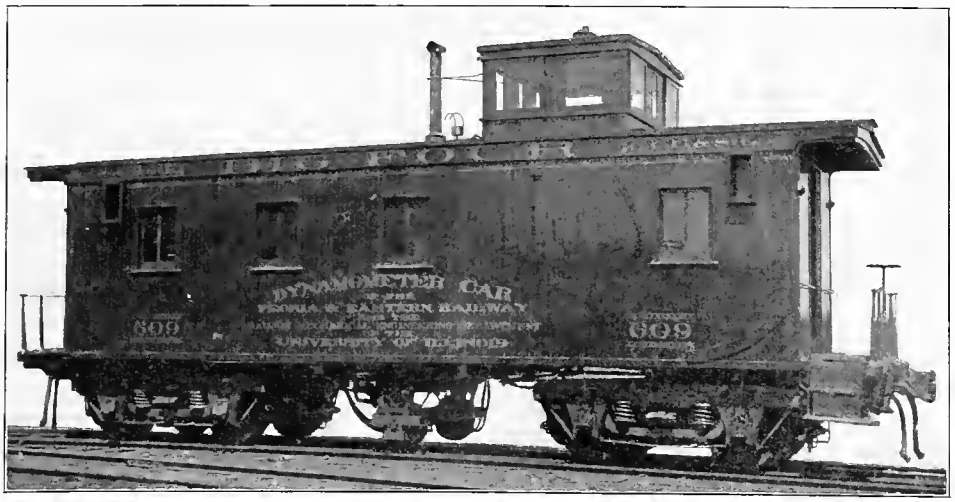
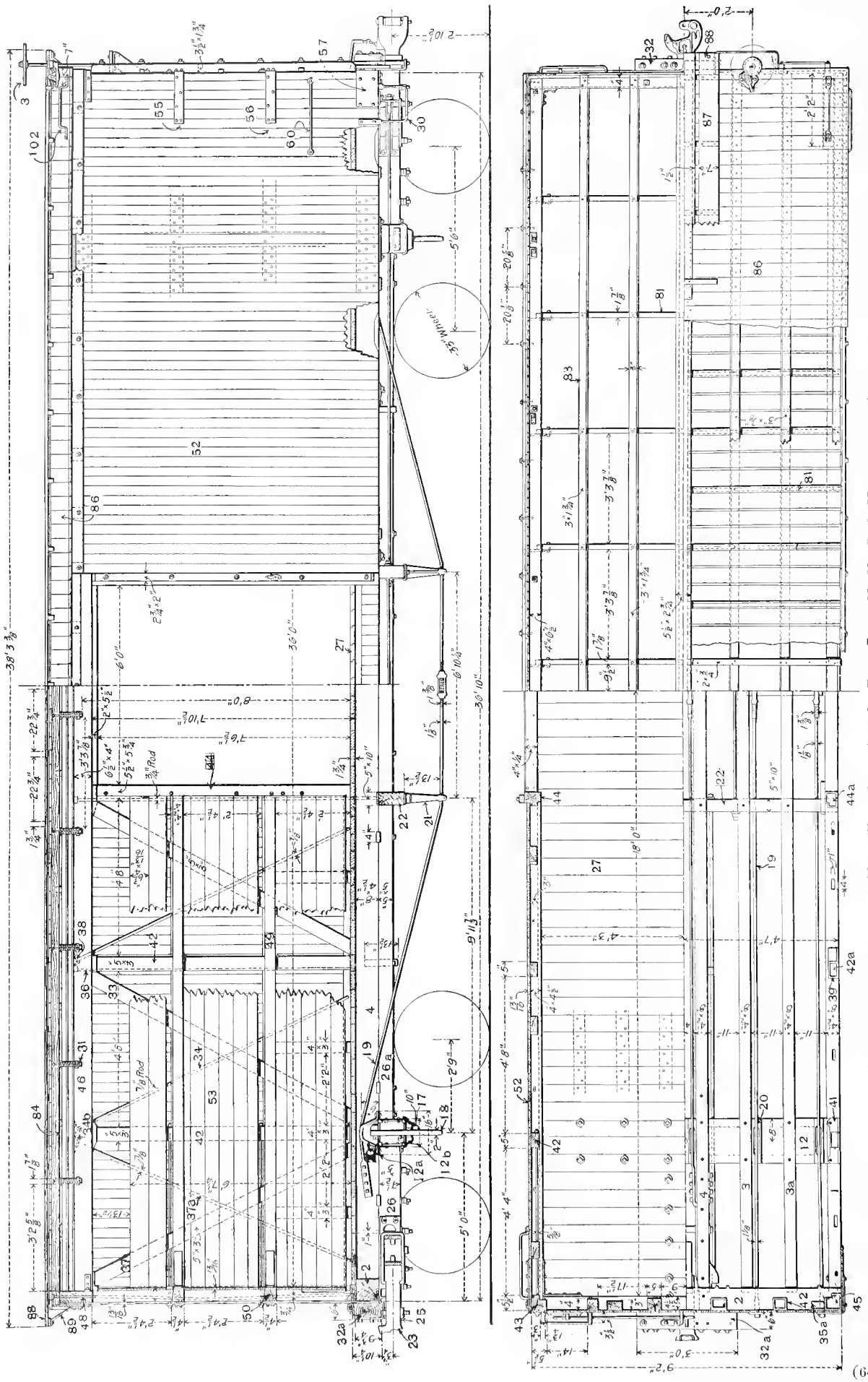


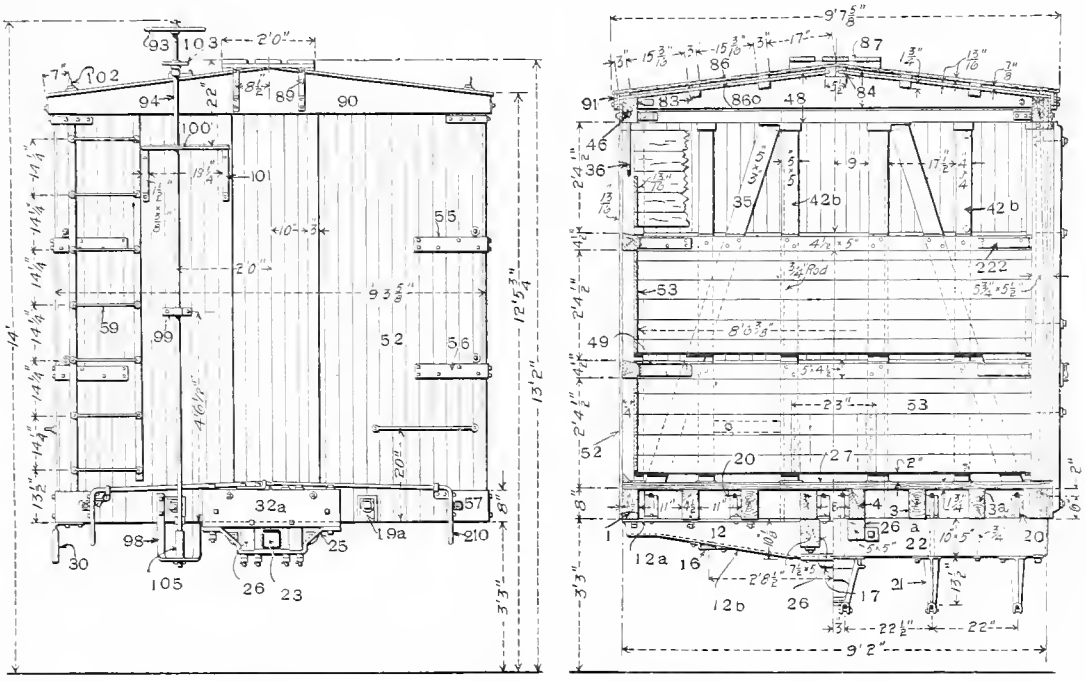
Fig. 261. Dynamometer Car. Big Four.
(Drawings of a dynamometer car are shown in Figs. 593-595.)

Numbers Refer to List of Names with Figs. 271-272.



Figs. 262-263. Plan and Side Elevation of 36-ft. Box Car. N. Y. C. & H. R. Capacity, 80,000 lbs.

Numbers Refer to List of Names with Figs. 271-272.



Figs. 264-265. End Elevation and Cross-Section of 36-ft. Box Car. N. Y. C. & H. R. Capacity, 80,000 lbs.

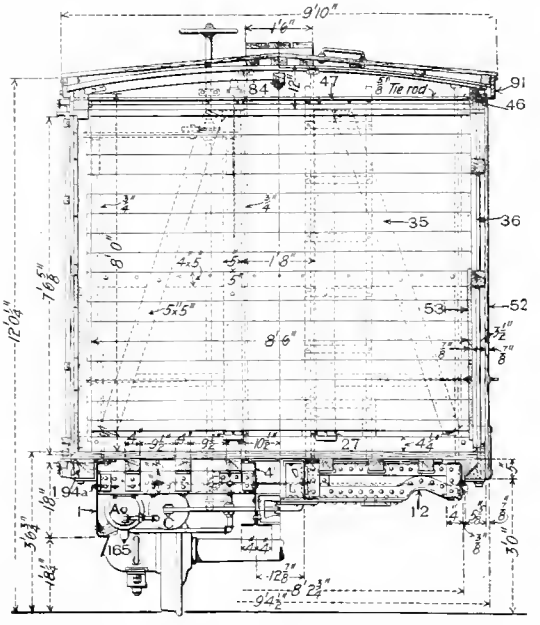
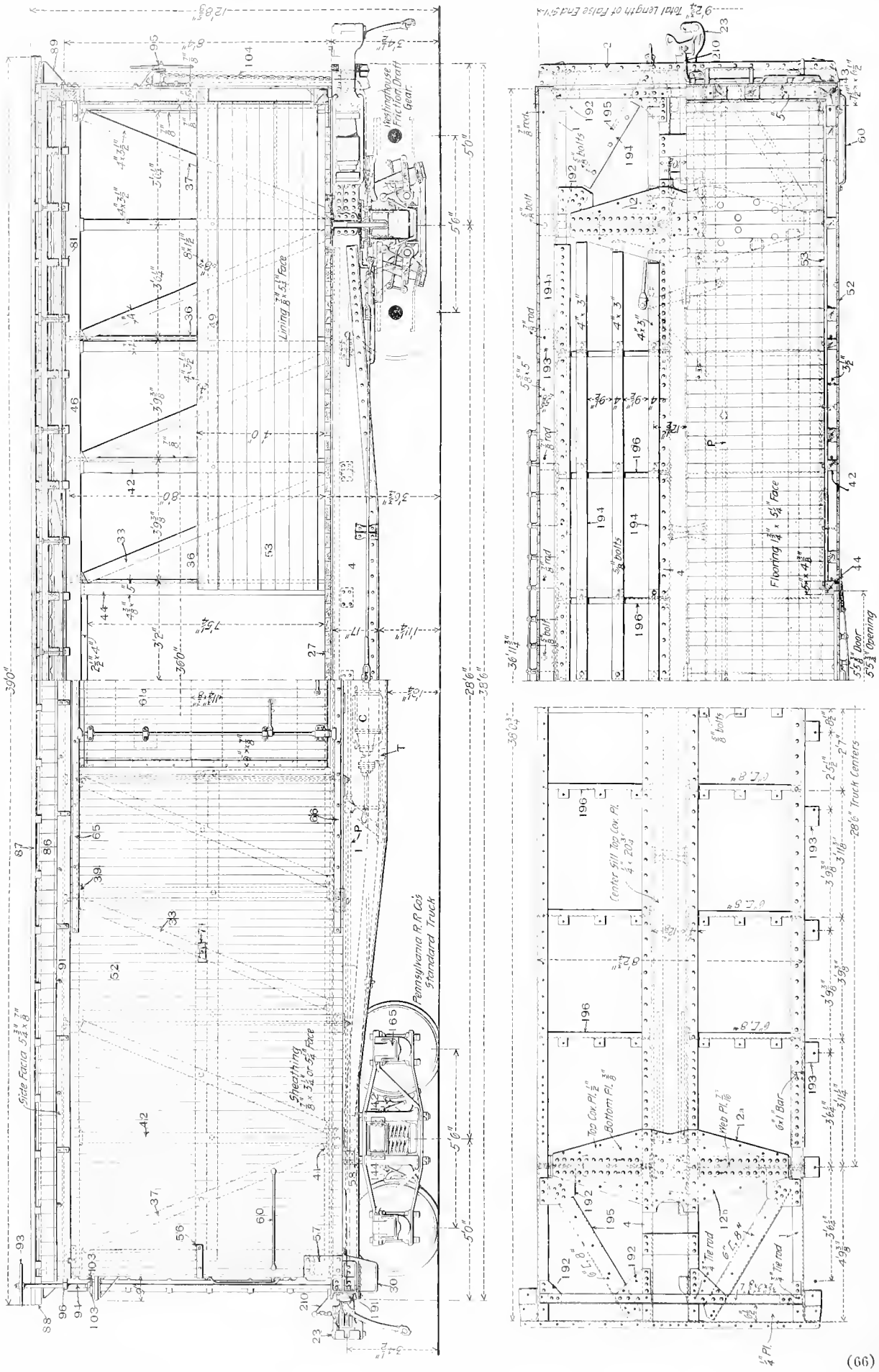


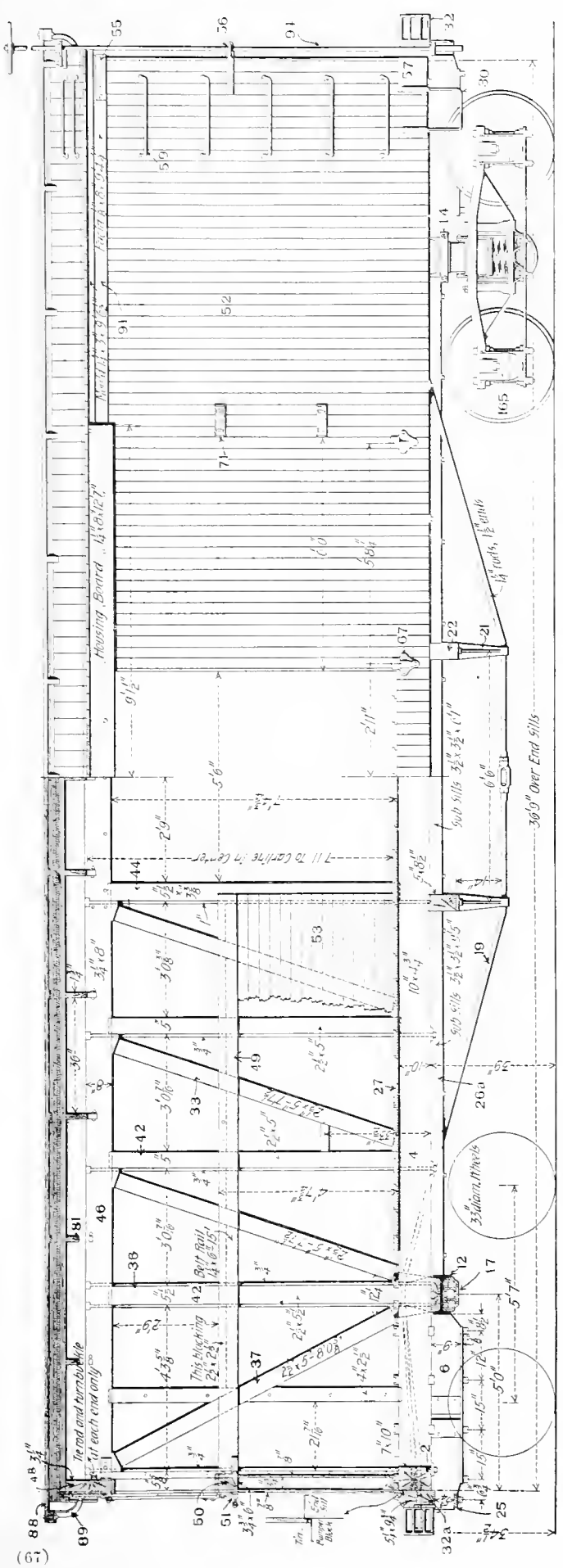
Fig. 266. Cross-Section of 36-ft. Standard Box Car. Pennsylvania Railroad. Pressed Steel Underframe. Capacity, 100,000 lbs.

Numbers Refer to List of Names with Figs. 271-272.



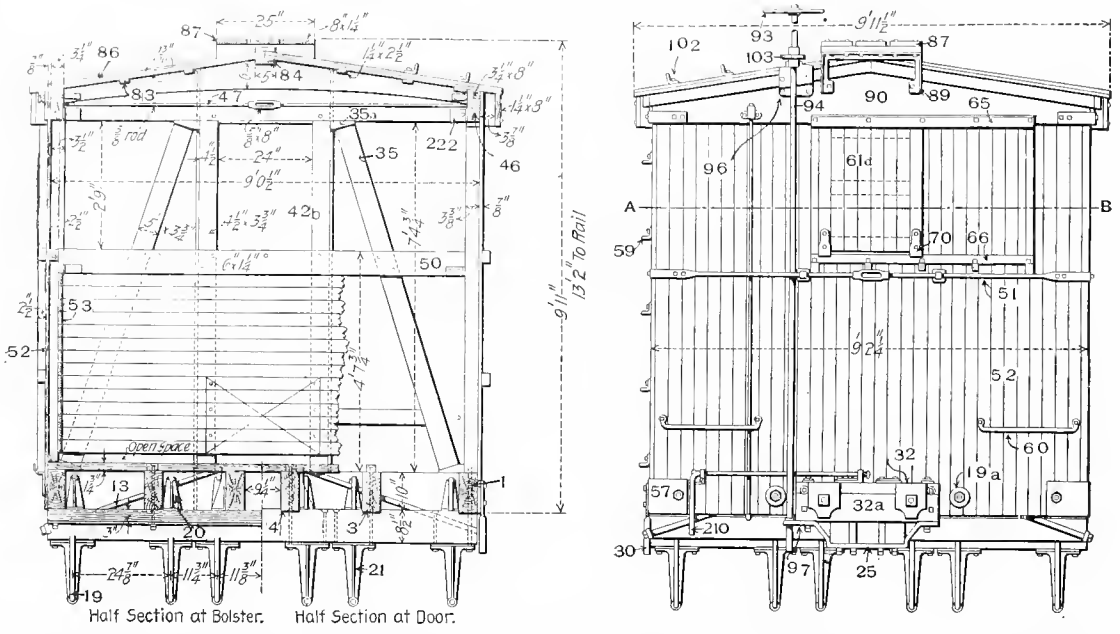
Figs. 267-268. Plan and Side Elevation of 36-ft. Standard Box Car. Pennsylvania Railroad. Pressed Steel Underframe. Capacity, 100,000 lbs.

Numbers Refer to List of Names with Figs. 271-272.



Figs. 269-270. Plan and Side Elevations of 36-ft. Box Car. Central of Georgia. Capacity, 80,000 lbs.

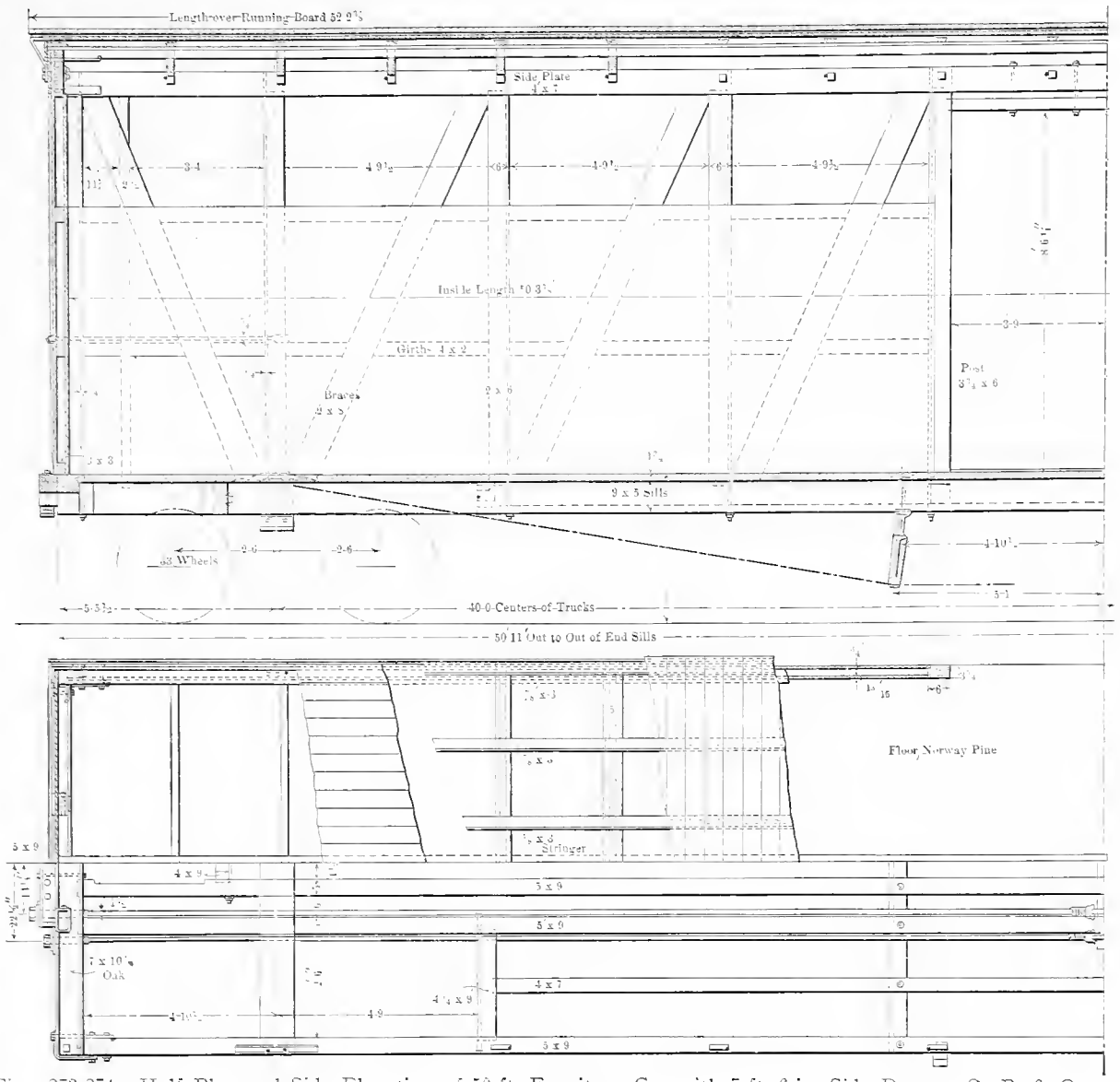
Numbers Refer to List of Names Below.



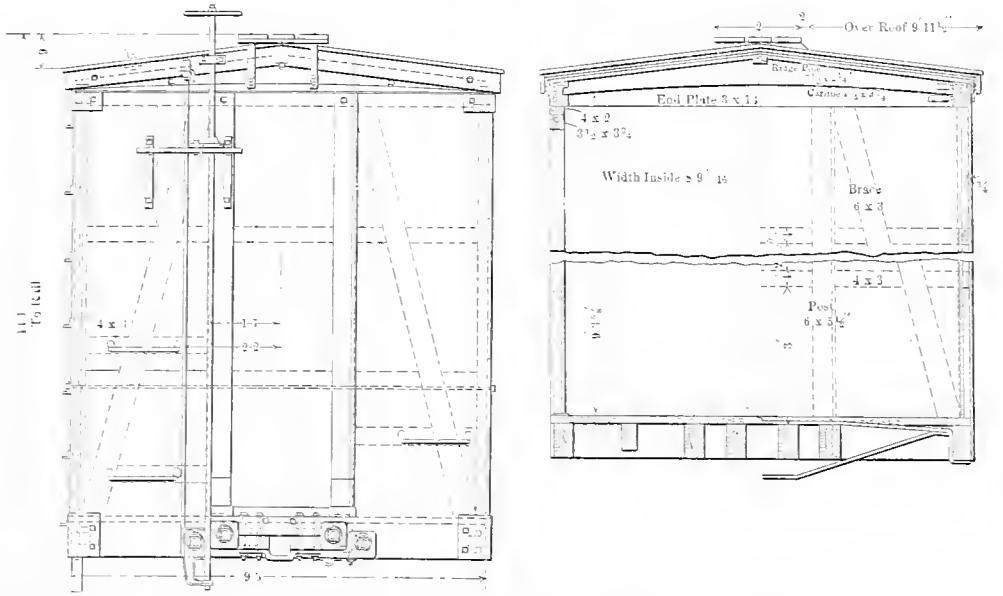
Figs. 271-272. End Elevation and Cross-Section of 36-ft. Box Car. Central of Georgia. Capacity, 80,000 lbs.

List of Names of Parts of Box Car Bodies. Figs. 262-272.

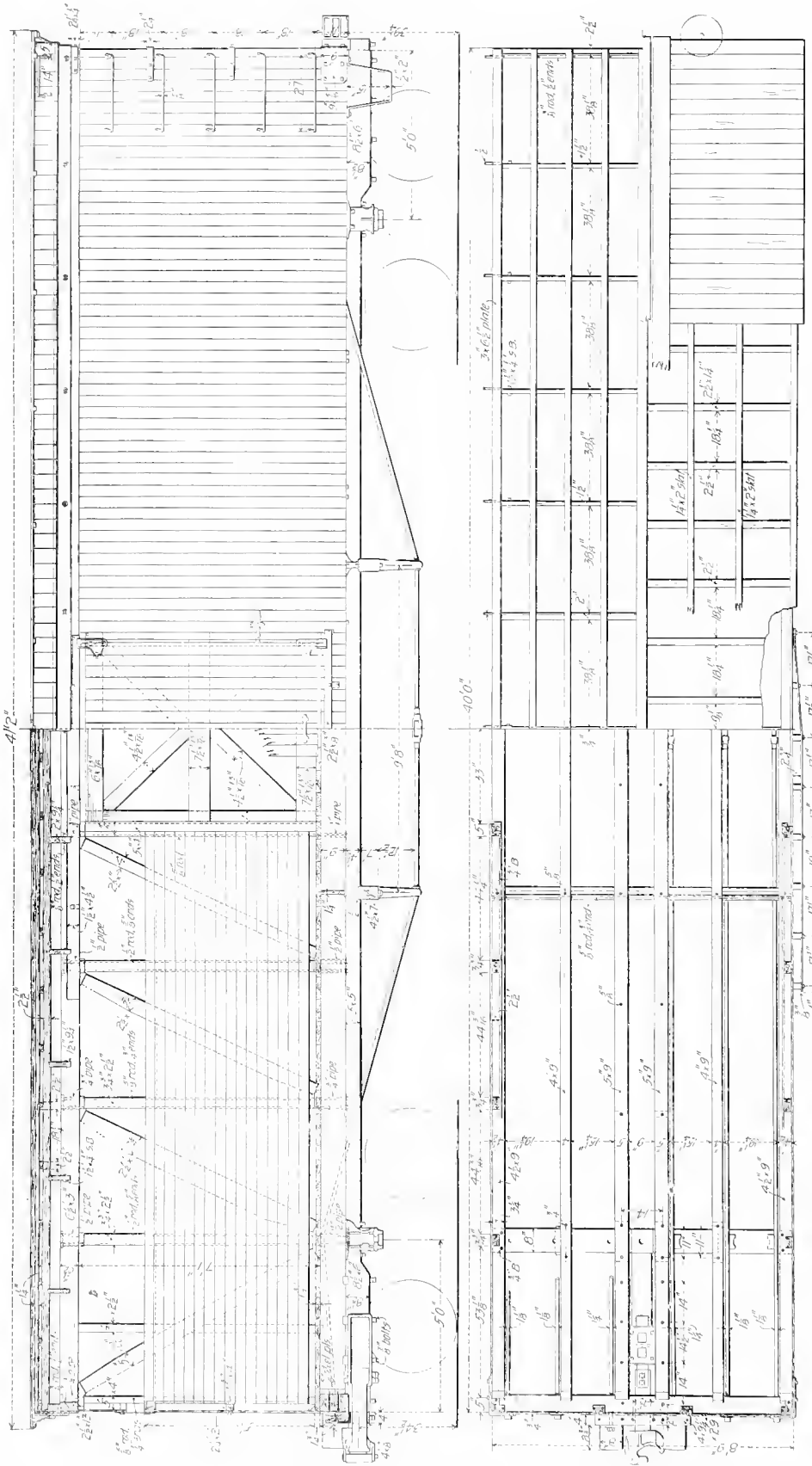
1 *Side Sill*
2 *End Sill*
3 *Inner Intermediate Sill*
3a *Outer Intermediate Sill*
4 *Center Sill*
12 *Body Bolster*
12a *Top Plate of Metal Body Bolster*
12b *Bottom Plate of Metal Body Bolster*
13 *Body Bolster Truss Rod*
14 *Body Bolster Truss Rod Washer*
16 *Body Side Bearing*
17 *Body Center Plate*
18 *King Bolt or Center Pin*
19 *Body Truss Rod*
19a *Body Truss Rod Washer*
20 *Body Truss Rod Saddle*
21 *Body Truss Rod Bearing*
22 *Cross Tie Timber or Needle beam*
22a *Cross Tie*
23 *Drawbar*
25 *Carry Iron*
26 *Droft Sill*
26a *Sub-sill*
27 *Floor*
30 *Sill Step*
32 *Buffer Block*
32a *Buffer Beam or Dead Block*
33 *Brace*
34 *Brace Rod*
34b *Double Counterbrace Rod Plate Washer*
35 *End Brace*
35a *End Brace Pocket*
36 *Sill and Plate Rod*
37 *Counterbrace*
37a *Counterbrace Rod*
38 *Brace Rod Washer*
42 *Post*
42a *Post Pocket*
42b *End Post*
43 *Corner Post*
44 *Door Post*
44a *Door Post Pocket*
45 *Corner Post Pocket*
46 *Plate*
47 *Plate Rod*
48 *End Plate*
49 *Belt Rail*
50 *End Belt Rail*
51 *End Belt Rail Truss Rod*
52 *Sheathing or Siding*
53 *Inside Lining*
55 *Upper Corner Plate*
56 *Middle Corner Plate*
57 *Lower Corner Plate*
59 *Ladder Round*
60 *Hand Hold*
61d *Door*
64 *Door Sill*
65 *Top Door Track*
66 *Bottom Door Track*
67 *Door Track Bracket*
68 *Door Hanger*
69 *Door Brace*
70 *Door Shoe*
71 *Open Door Stop*
73 *Door Hasp*
81 *Carline*
83 *Purlin*
84 *Ridge Pole*
86 *Roof Boards*
86c *Inside Roof*
87 *Running Board*
88 *Running Board Extension*
89 *Running Board Bracket*
90 *End Fascia Board*
91 *Fascia Board*
93 *Brake Hand Wheel*
94 *Brake Shaft*
95 *Horizontal Brake Shaft*
96 *Upper Brake Shaft Bearing*
97 *Lower Brake Shaft Bearing*
98 *Brake Shaft Step*
99 *Brake Shaft Bracket*
100 *Brake Step*
101 *Brake Step Bracket*
102 *Roof Hand Hold*
103 *Brake Ratchet Wheel*
103 *Brake Pawl*
104 *Horizontal Brake Shaft Chain*
105 *Brake Shaft Chain Sheave*
142 *Brake Head*
144 *Brake Hanger*
165 *Journal Box*
191 *Push Pole Corner Iron*
192 *Gusset Plates*
193 *Side Nailing Strip Brackets*
194 *Nailing Strip*
194a *Side Nailing Strip*
195 *End Sill Diagonal Brace*
196 *Nailing Strip Cross Ties*
201 *Drawbar Carry Iron*
210 *Uncoupling Lever and Rod*
222 *Inside Upper Corner Plate*
A *Auxiliary Air Reservoir*
C *Brake Cylinder*
P *Train Pipe*
T *Triple Valve*



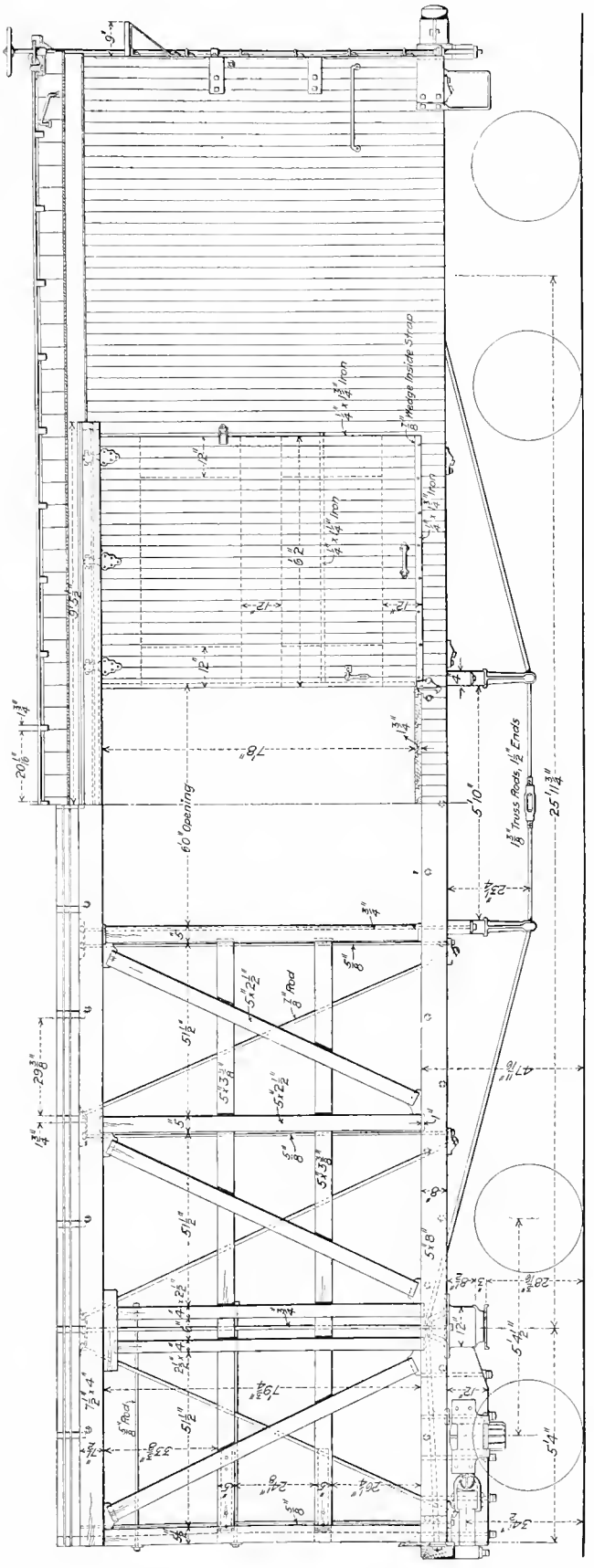
Figs. 273-274. Half Plan and Side Elevation of 50-ft. Furniture Car with 7-ft. 6-in. Side Doors. C., B. & Q. Capacity, 50,000 lbs.



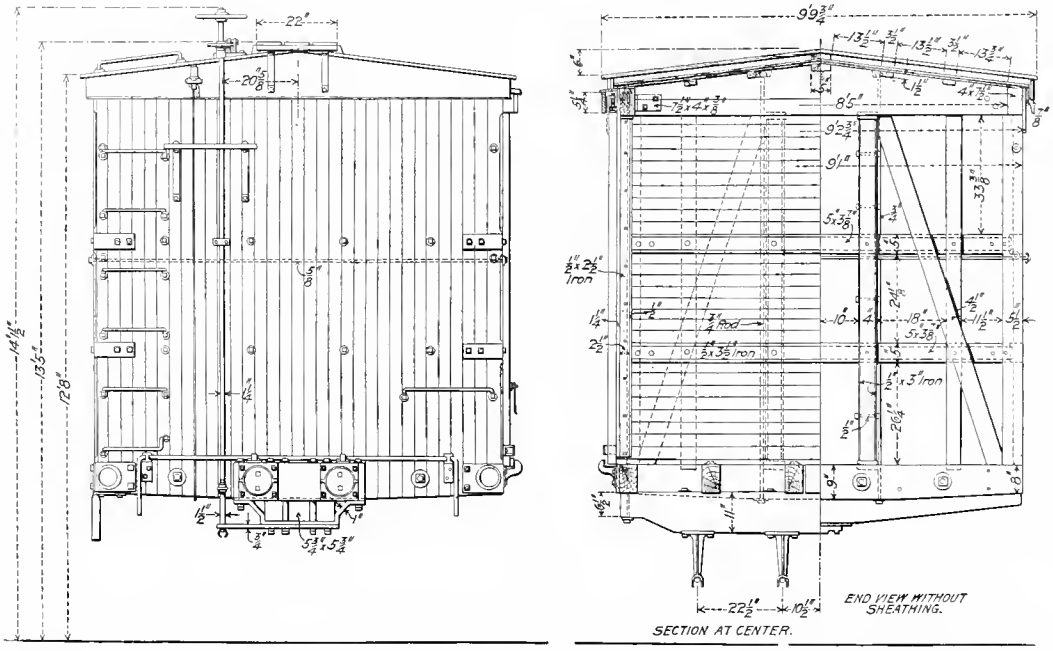
Figs. 275-276. End Elevation and Cross Section of 50-ft. Furniture Car with 7-ft. 6-in. Side Doors. C., B. & Q. Capacity, 50,000 lbs.



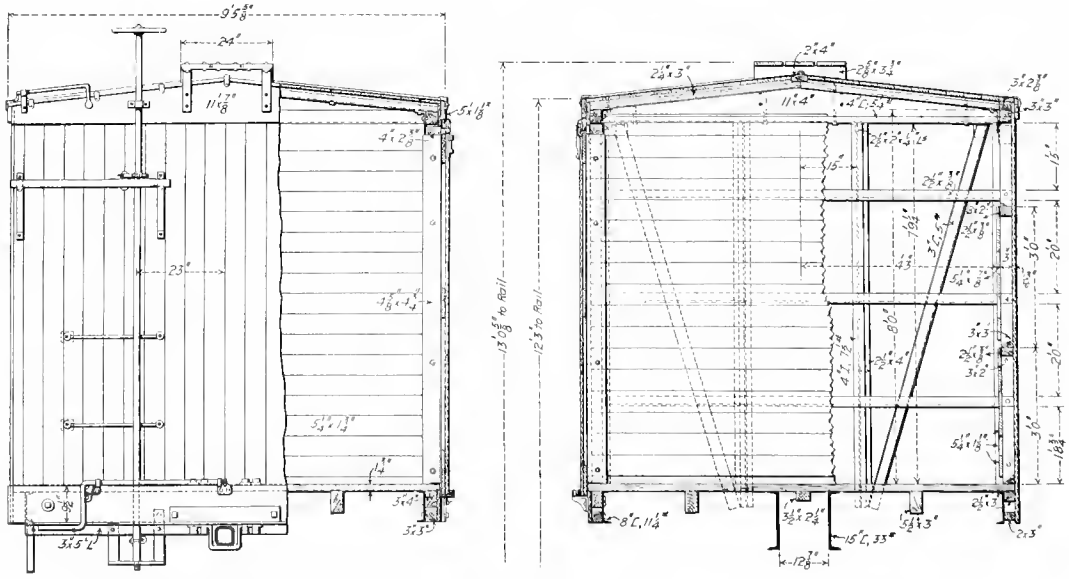
Figs. 277-278. Plan and Side Elevation of Canda Box Car. Length, 40 ft. Capacity, 100,000 lbs.



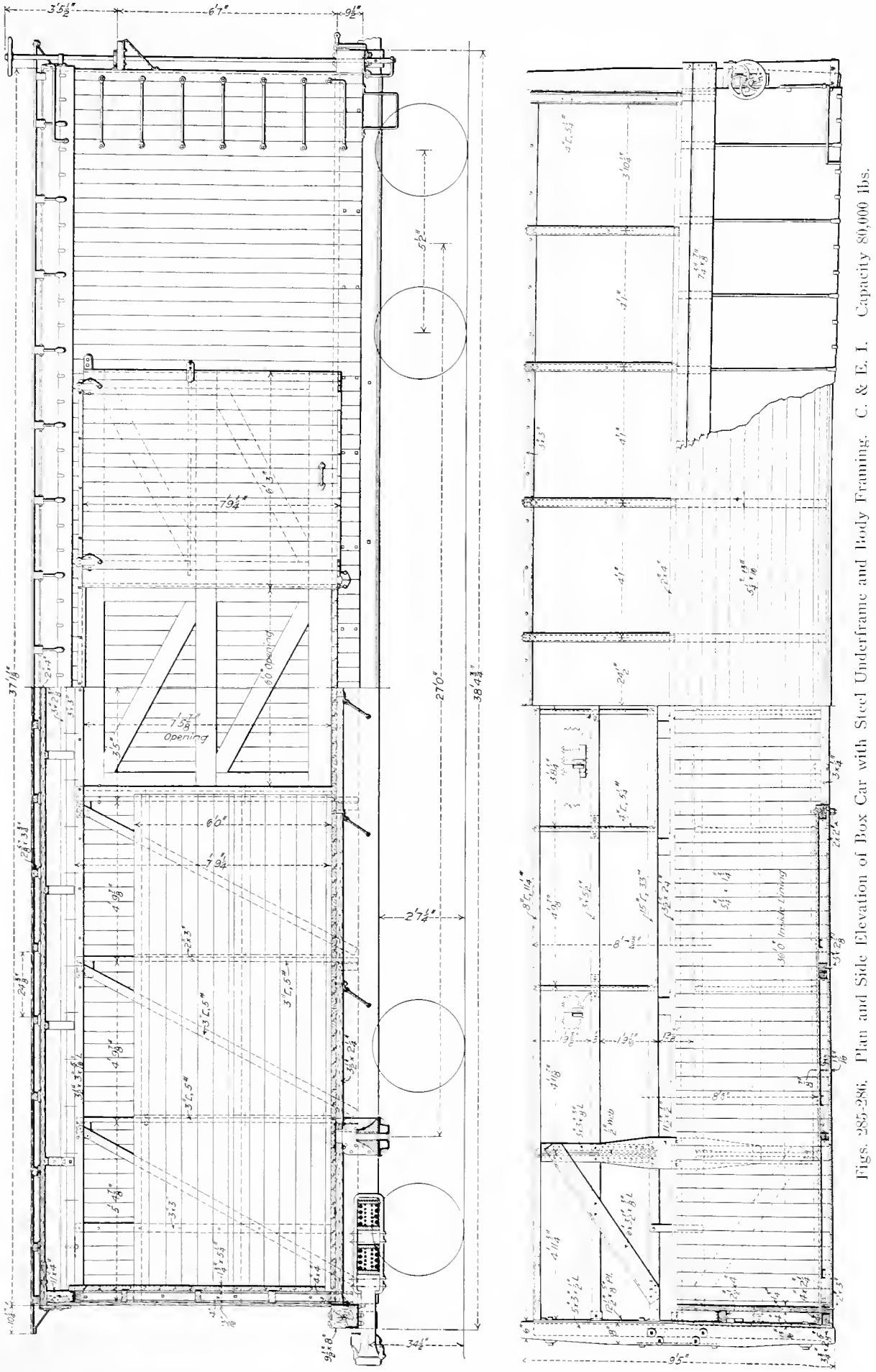
Figs. 279-280. Plan and Side Elevation of 36-ft. Box Car. N. Y., O. & W. Capacity, 80,000 lbs.



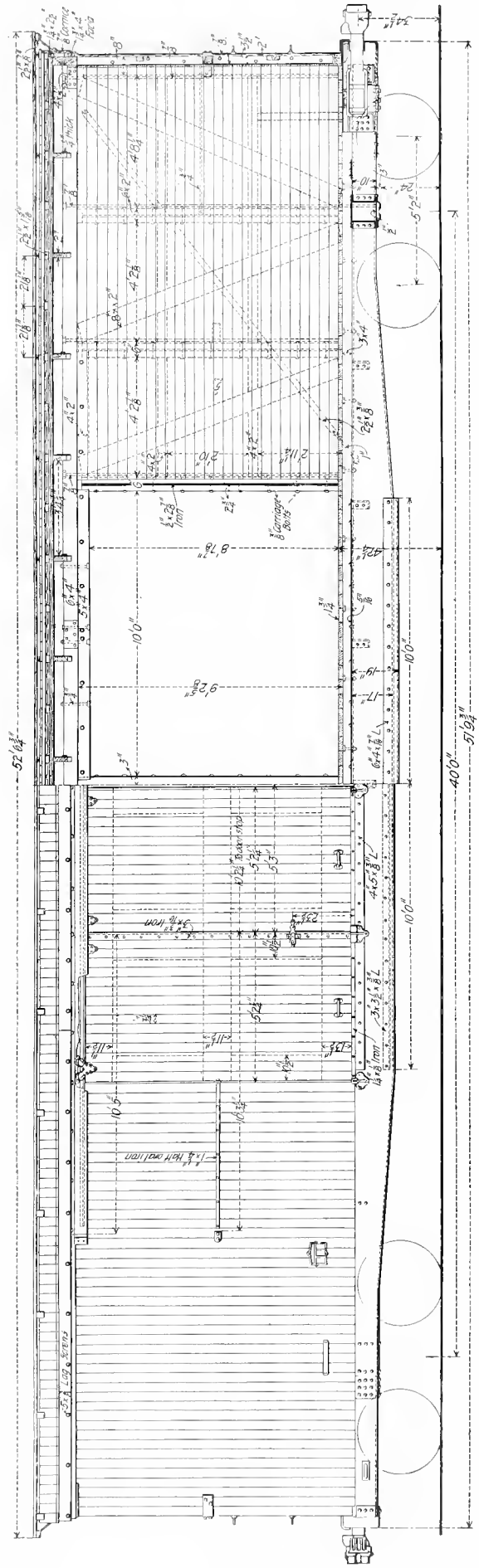
Figs. 281-282. End Elevation and Cross-Section of 36-ft. Box Car. N. Y., O. & W. Capacity, 80,000 lbs.

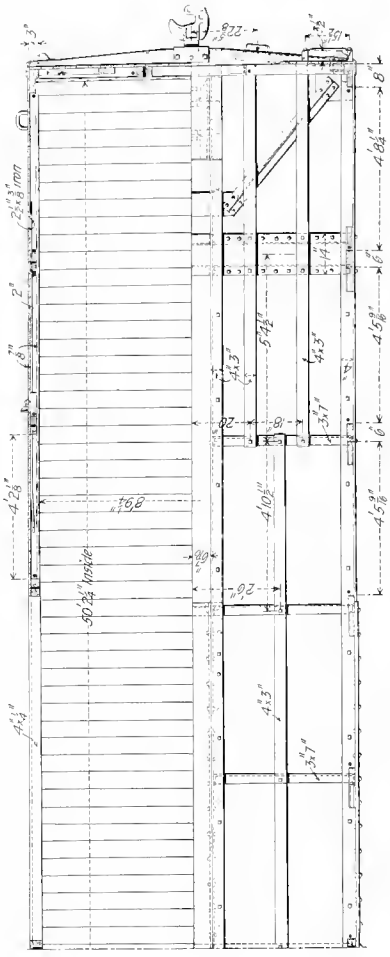


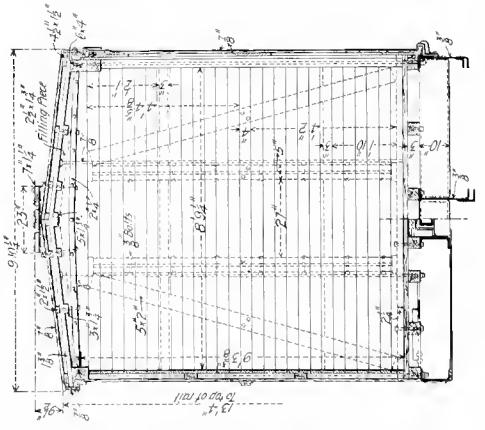
Figs. 283-284. End Elevation and Cross-Section of Box Car with Steel Underframe and Body Framing. C. & E. I. Capacity, 80,000 lbs.

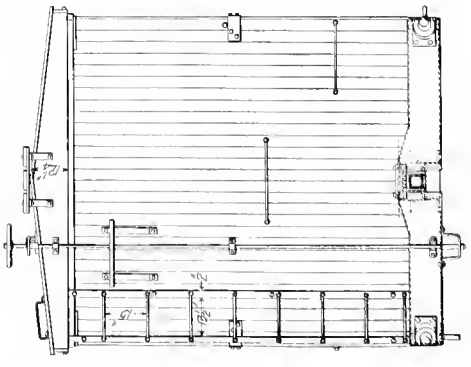


Figs. 285-286. Plan and Side Elevation of Box Car with Steel Underframe and Body Framing. C. & E. I. Capacity 80,000 lbs.









Figs. 287-290. Plan, Elevations and Sections of 50-ft. Furniture Car. Erie R. R. Pressed Steel Underframe. Capacity, 60,000 lbs.

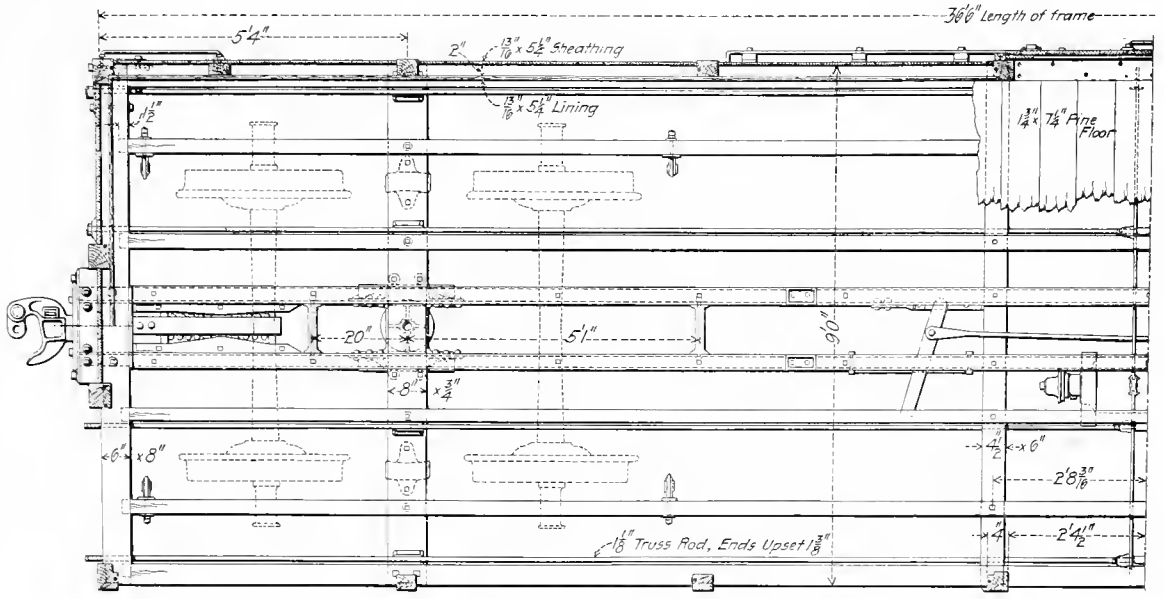


Fig. 292. Half Plan of 36-ft. Box Car, Steel Channel Center Sills. C., M. & St. P. Capacity, 60,000 lbs.

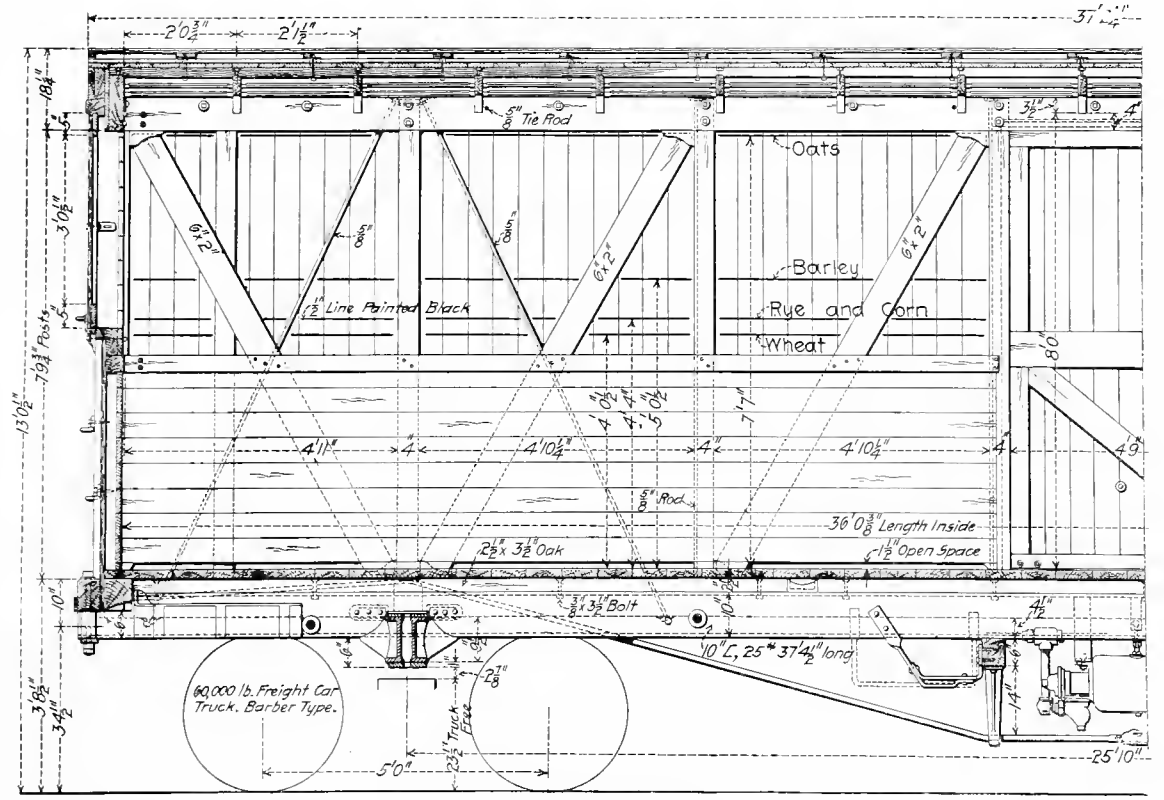


Fig. 293. Half Longitudinal Section of 36-ft. Box Car, Steel Channel Center Sills. C., M. & St. P. Capacity, 60,000 lbs.

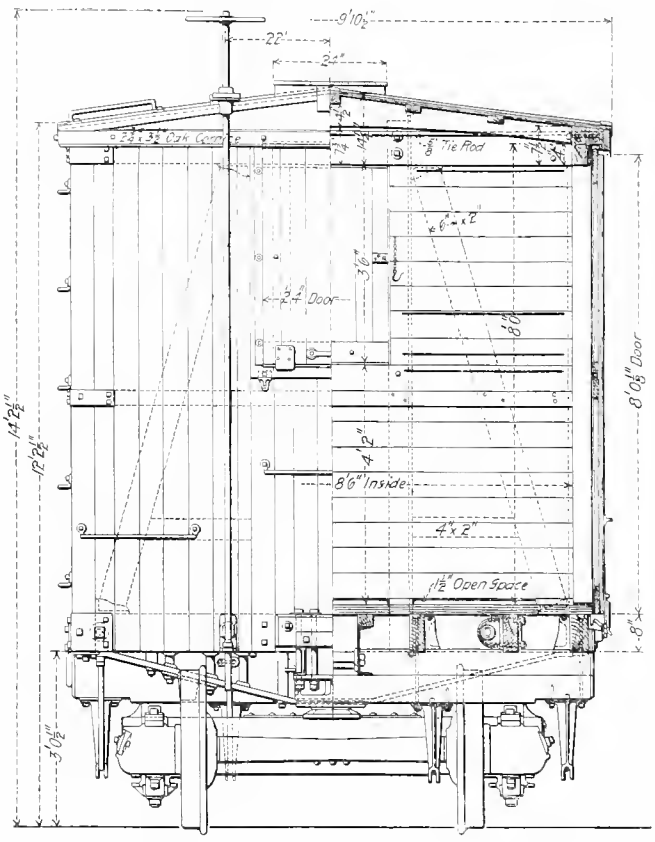
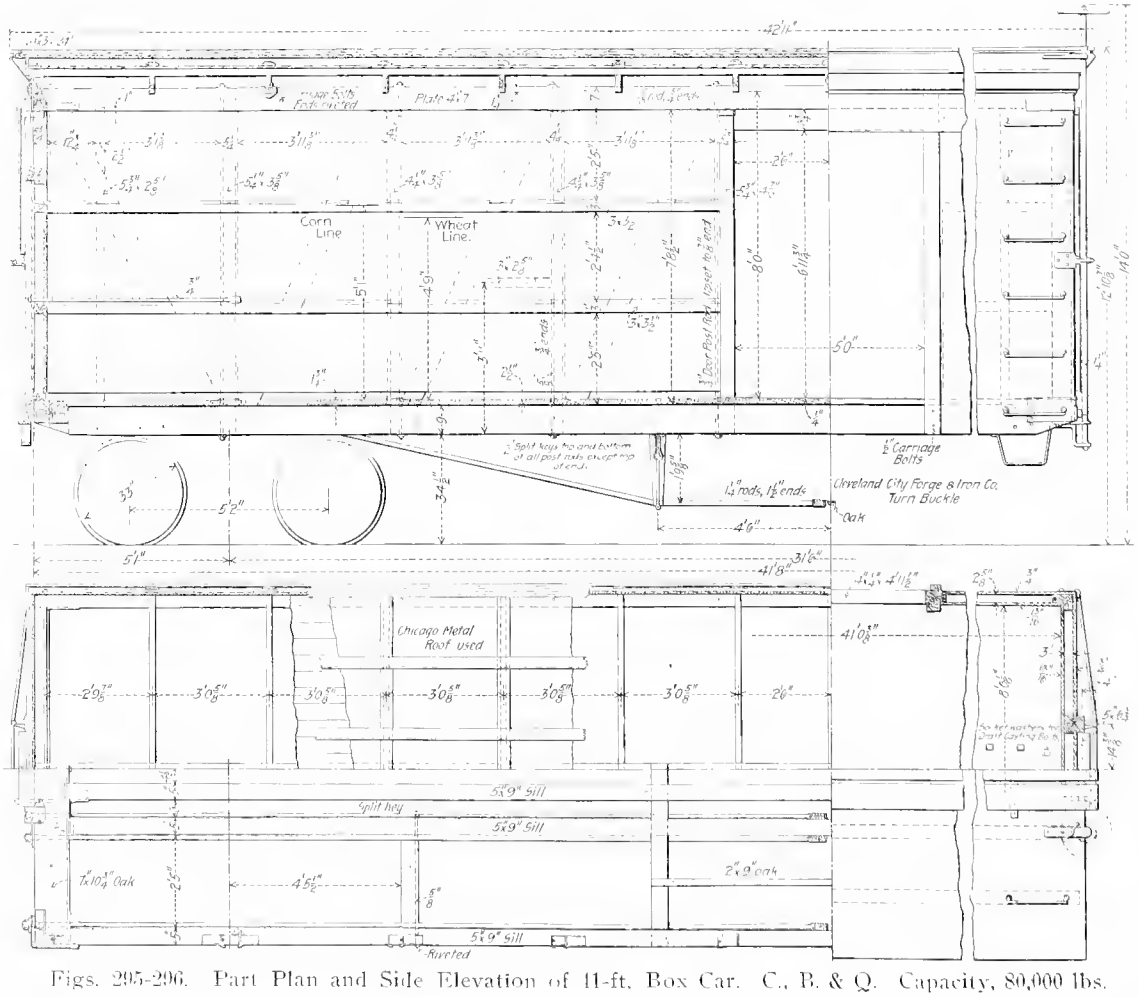
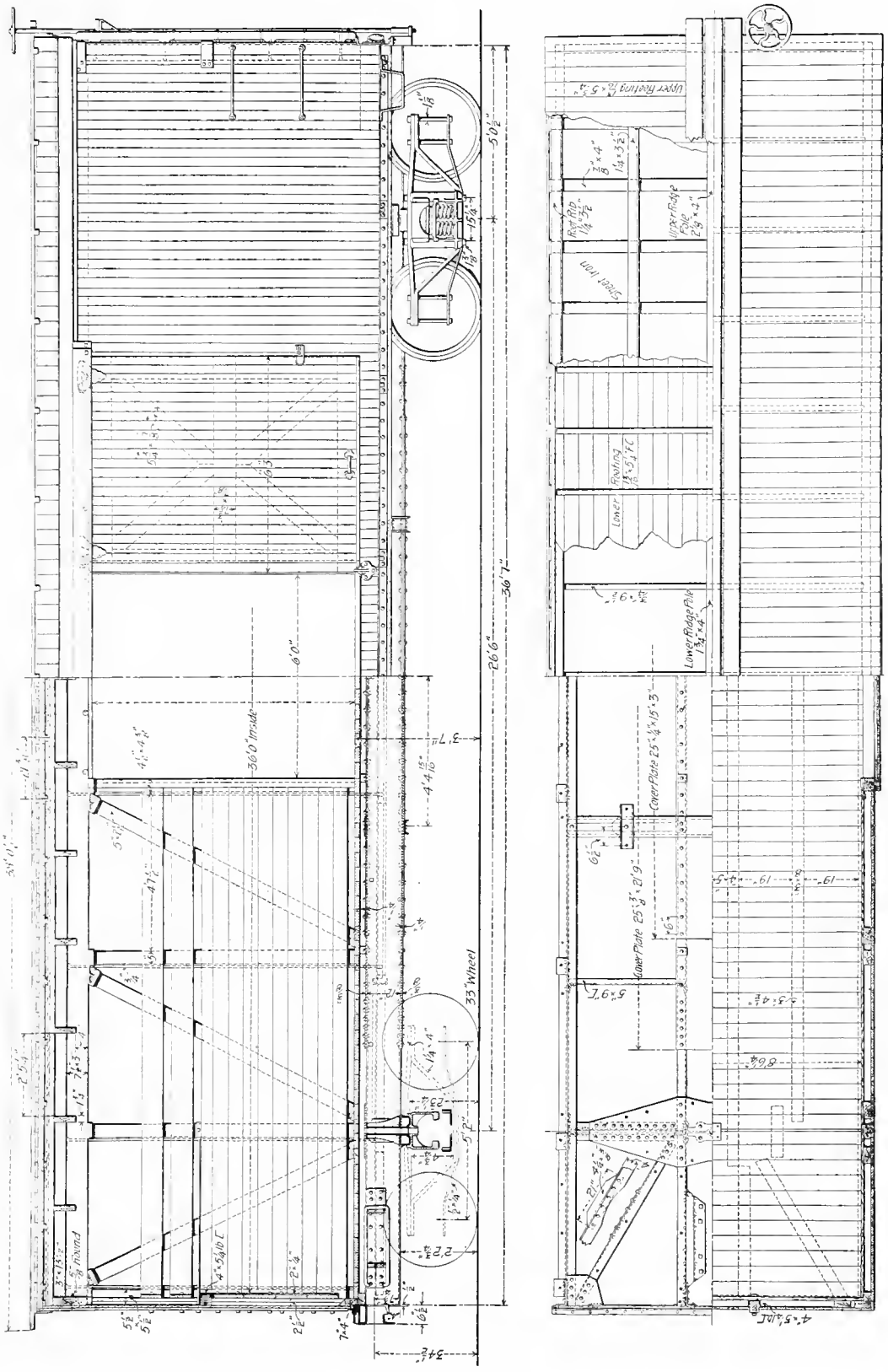


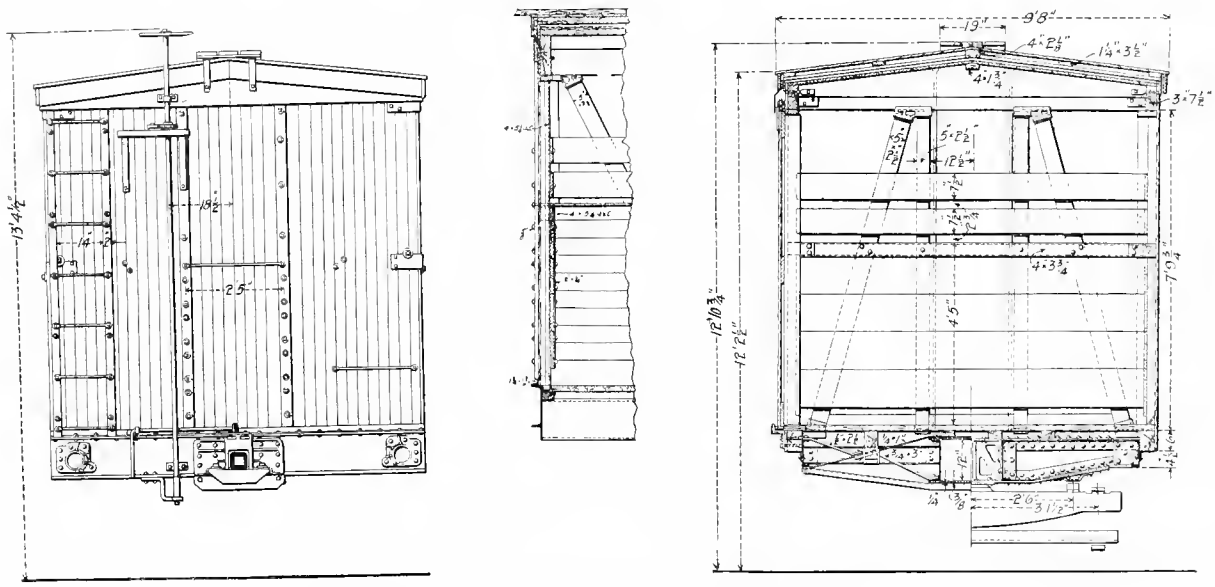
Fig. 294. Half End Elevation and Cross-Section of 36-ft. Box Car, Steel Channel Center Sills. C., M. & St. P. Capacity, 60,000 lbs.



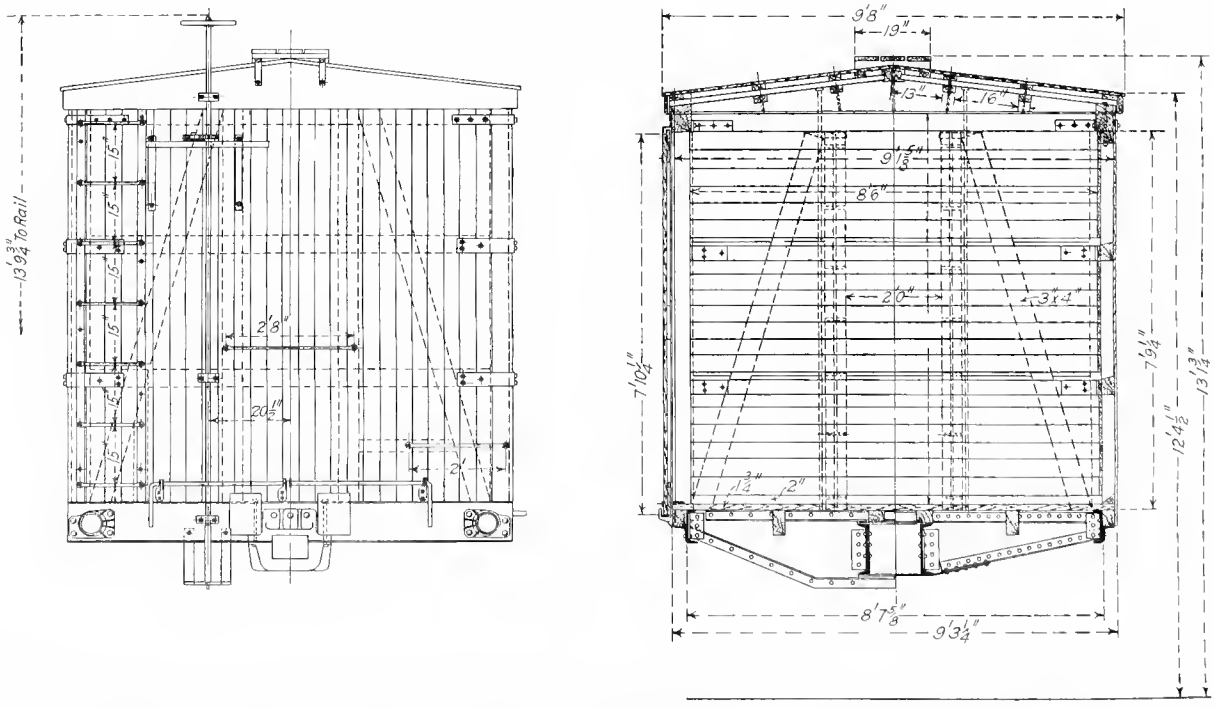
Figs. 295-296. Part Plan and Side Elevation of 11-ft. Box Car. C., B. & Q. Capacity, 80,000 lbs.



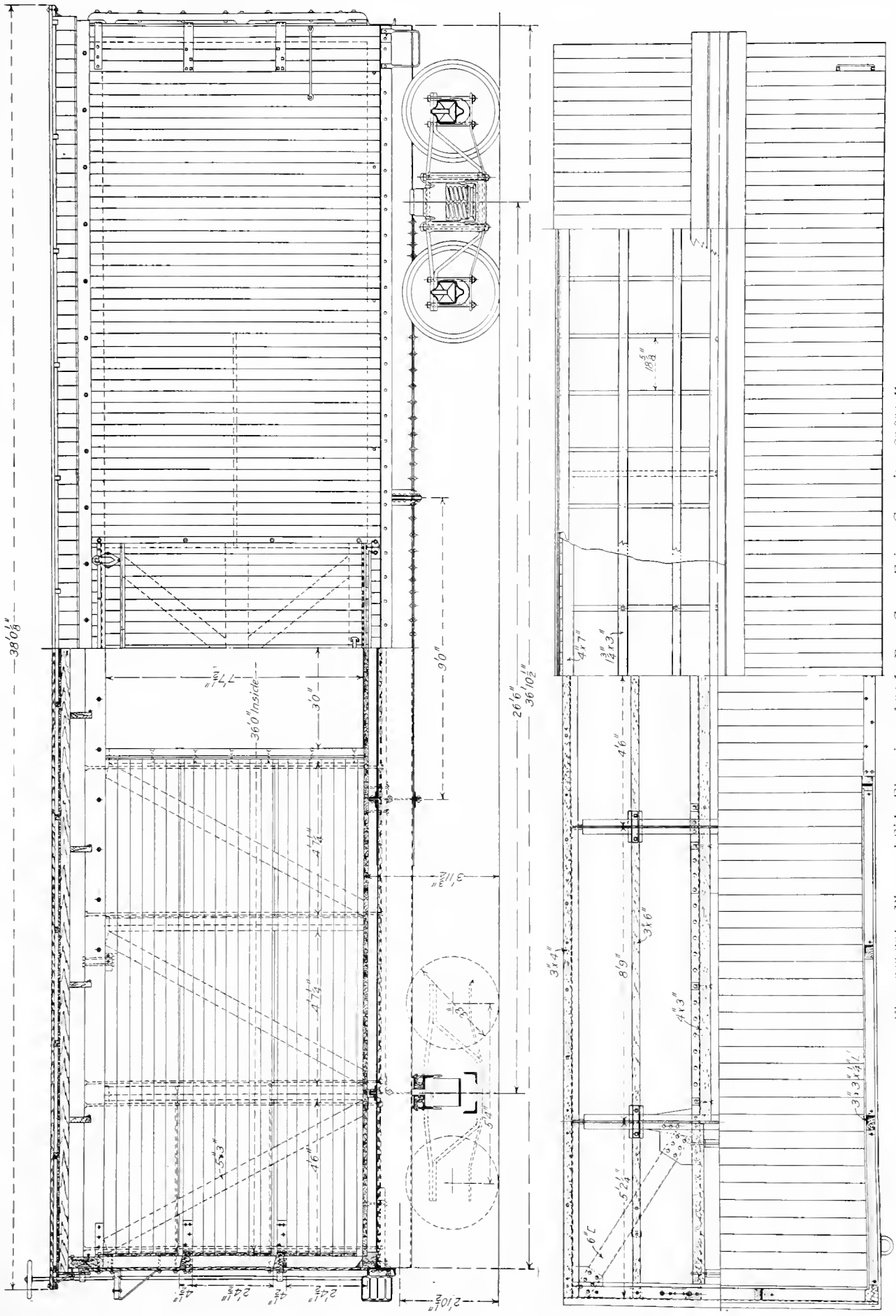
Figs. 297-298. Plan and Side Elevation of 36-ft. Box Car, Structural Steel Underframe. C. R. R. of N. J. Capacity, 60,000 lbs.



Figs. 299-300. End Elevation and Cross-Sections of 36-ft. Box Car, Structural Steel Underframe. C. R. R. of N. J.
Capacity, 60,000 lbs.

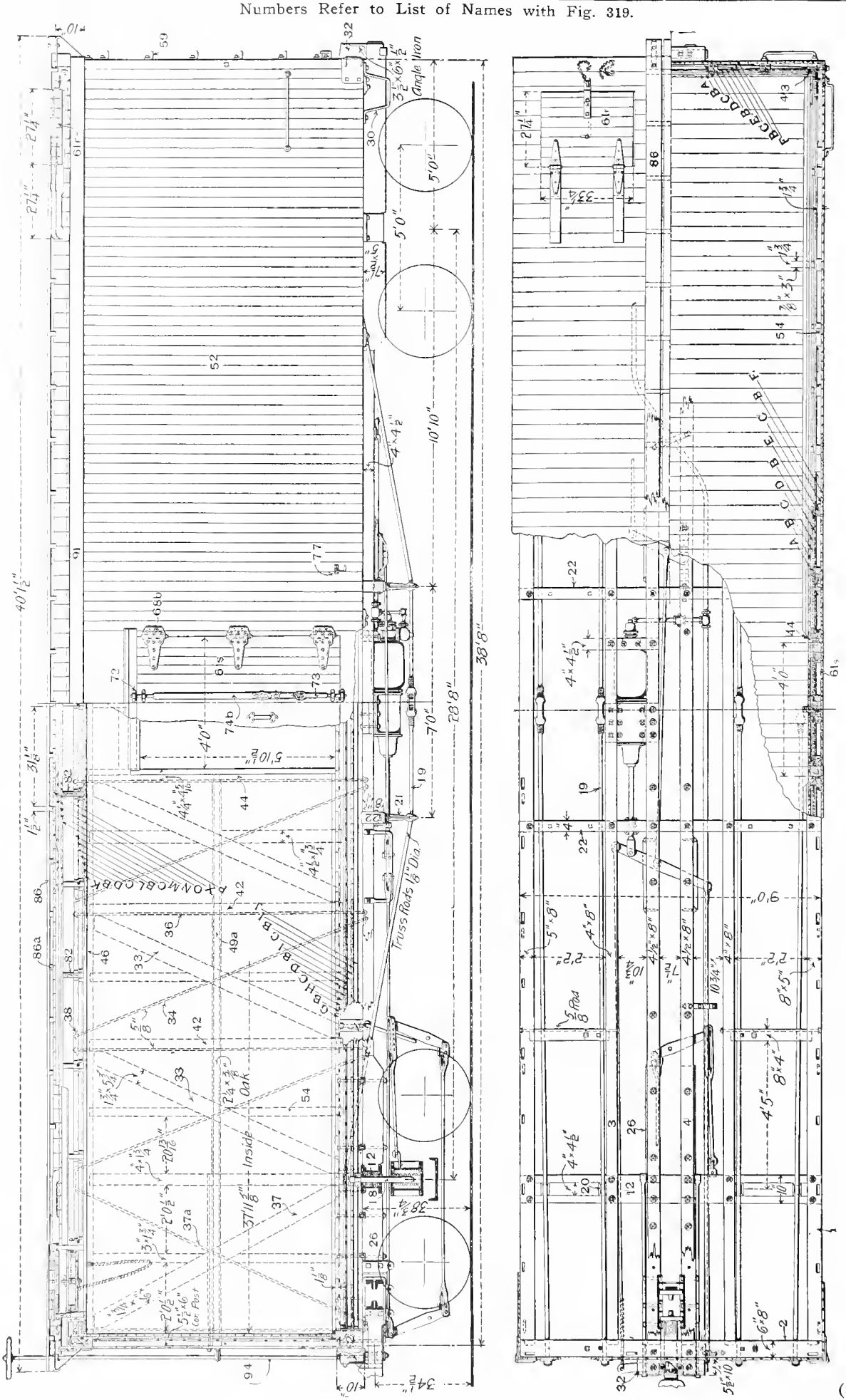


Figs. 301-302. End Elevation and Cross-Section of 36-ft. Box Car, Structural Steel Underframe. Erie.
Capacity, 80,000 lbs.



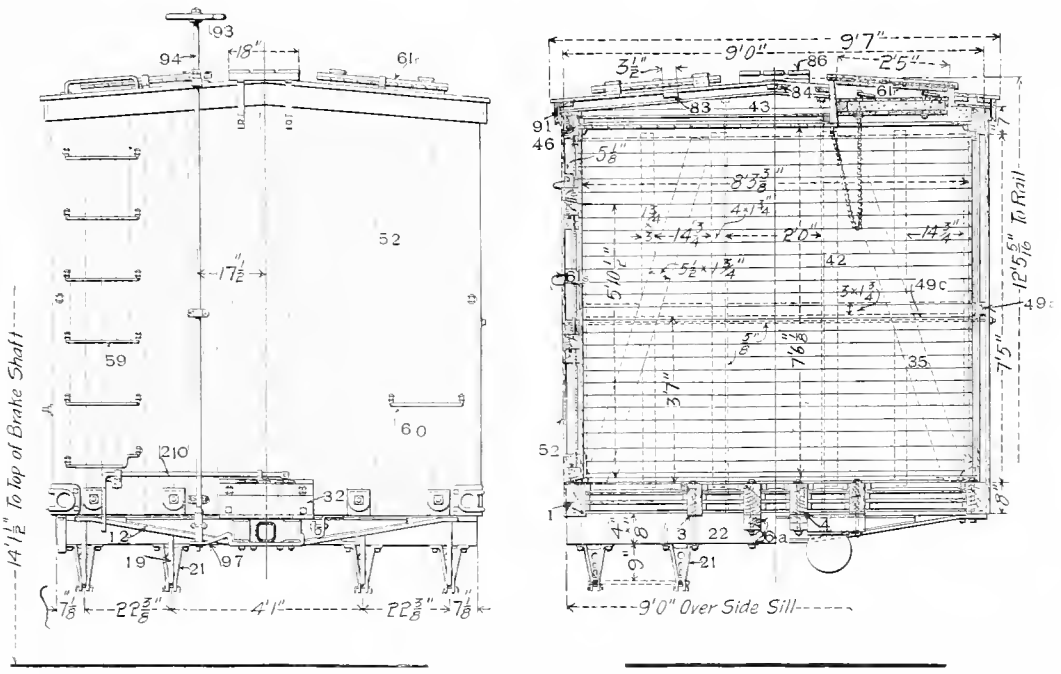
Figs. 303-304. Plan and Side Elevation of 36-ft. Box Car. Erie. Capacity, 80,000 lbs.

Numbers Refer to List of Names with Fig. 319.

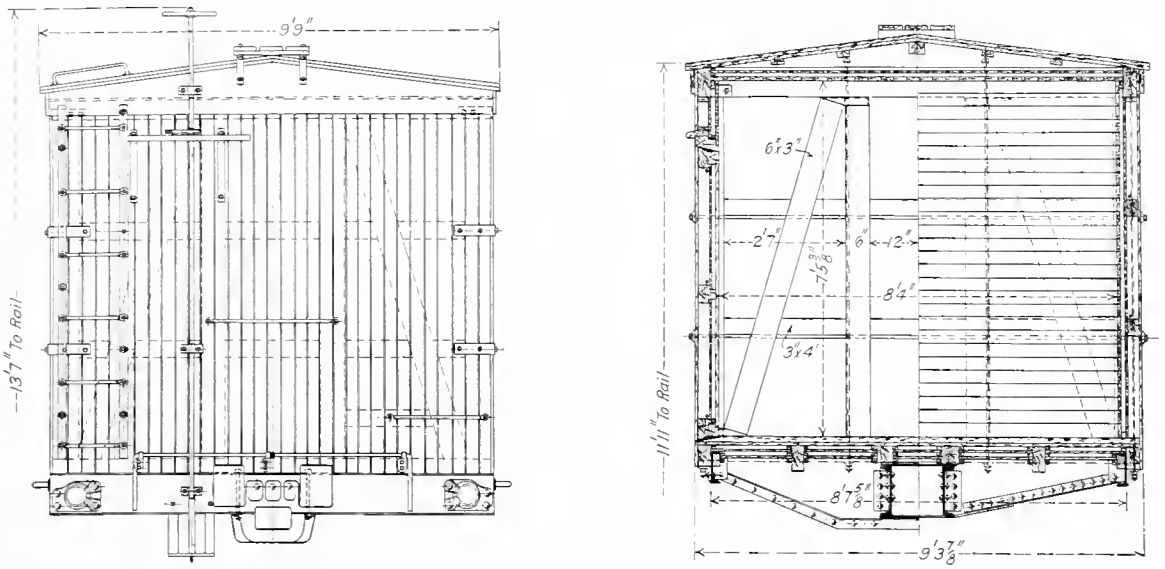


Figs. 305-306. Plan and Side Elevation of 38-ft. Refrigerator Car. Illinois Central. Capacity, 60,000 lbs.

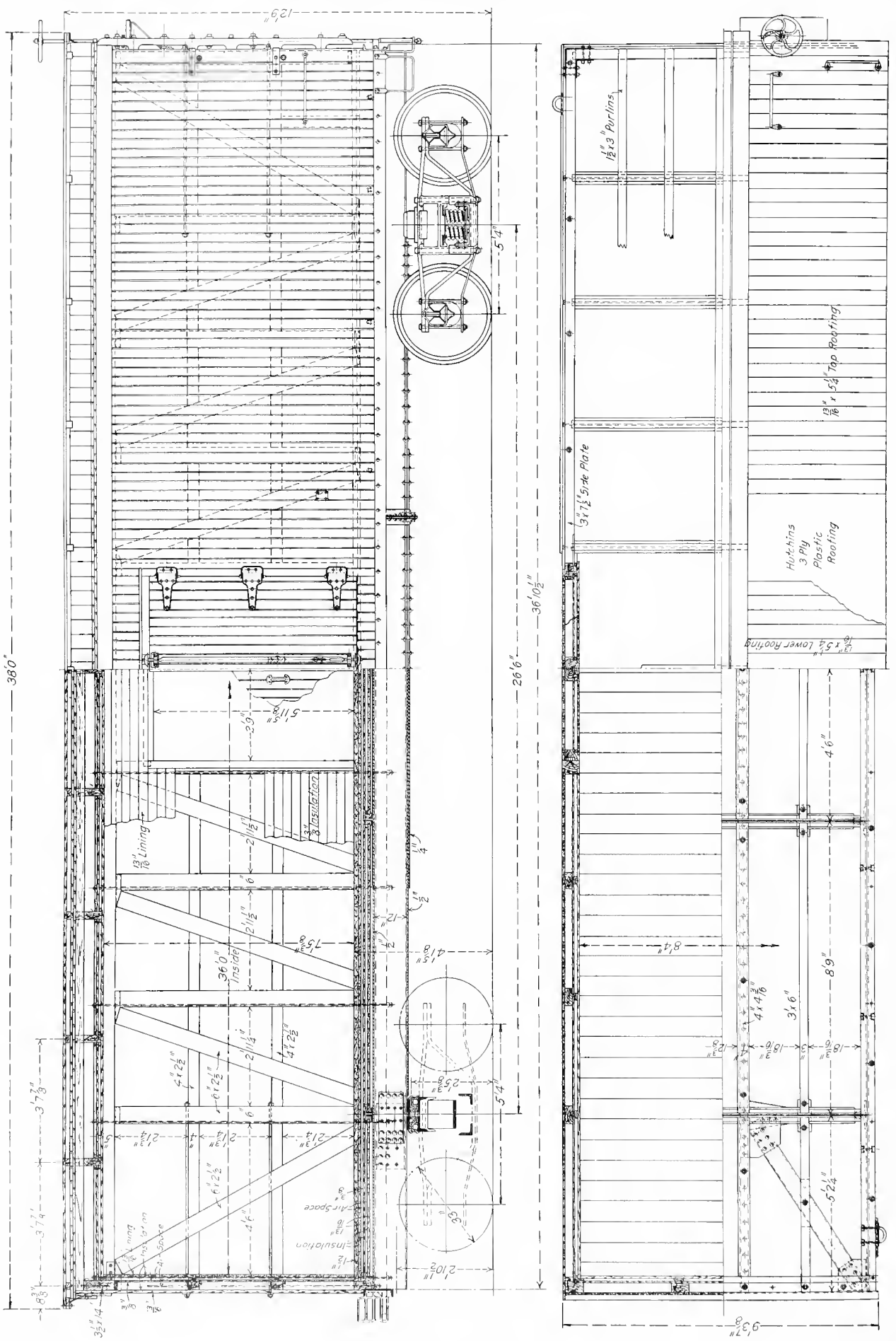
Numbers Refer to List of Names with Fig. 319.



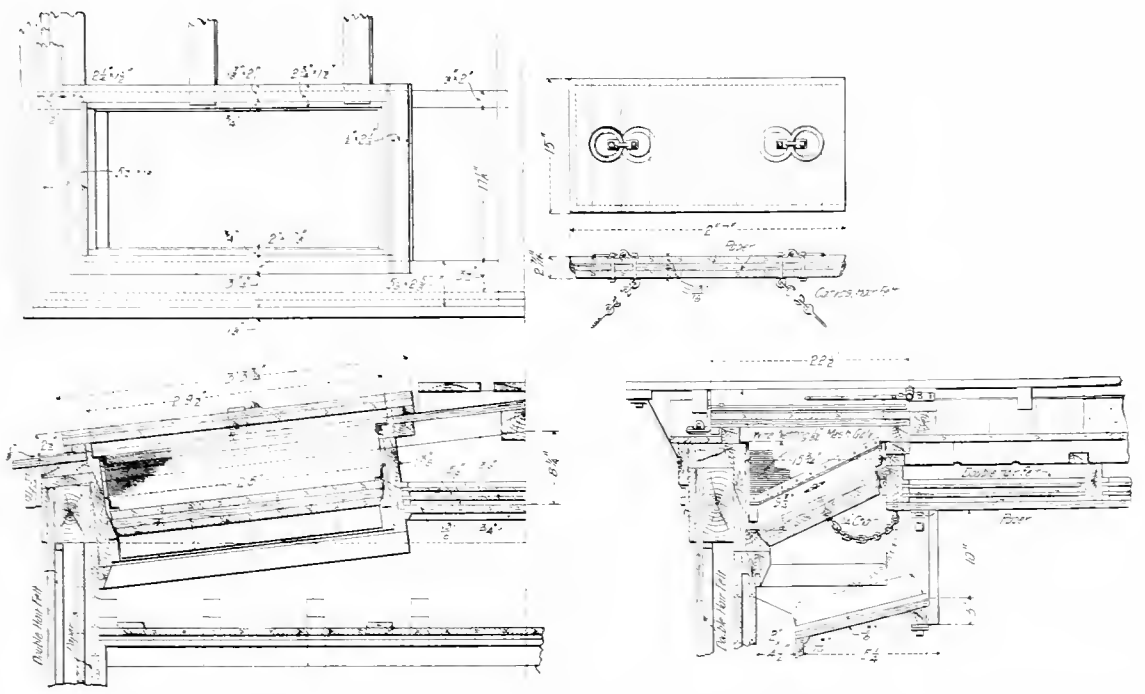
Figs. 307-308. End Elevation and Cross-Section of 38-ft. Refrigerator Car. Illinois Central. Capacity, 60,000 lbs.



Figs. 309-310. End Elevation and Cross-Section of 36-ft. Produce Car. Erie. Capacity, 80,000 lbs.



Figs. 311-312. Plan and Side Elevation of 36-ft. Produce Car. Erie. Capacity, 80,000 lbs.



Figs. 313-317. Details of End Ventilators. 35-ft. Produce Car, N. Y. C. & H. R., Shown in Figs. 319-321. Capacity, 60,000 lbs.

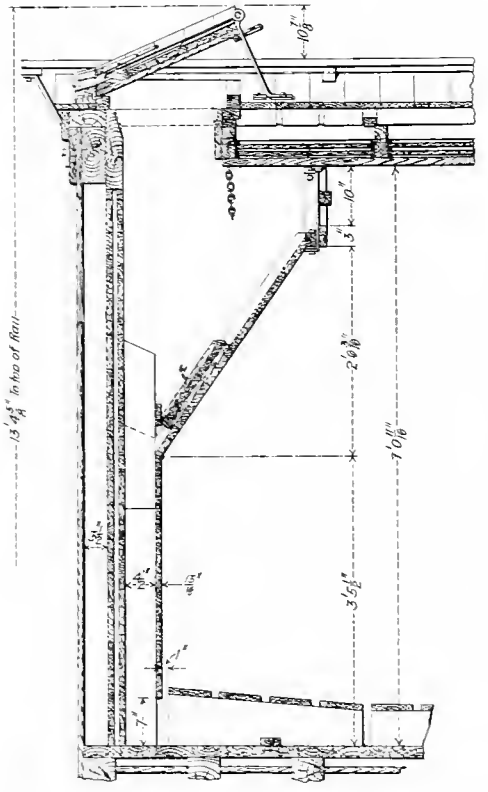


Fig. 318. Ventilator of Fruit Car. N. Y. C. & H. R.

Numbers Refer to List of Names Below.

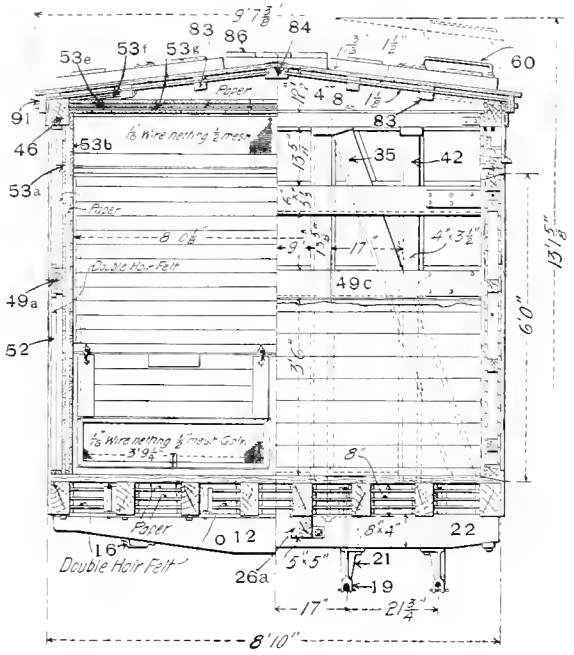
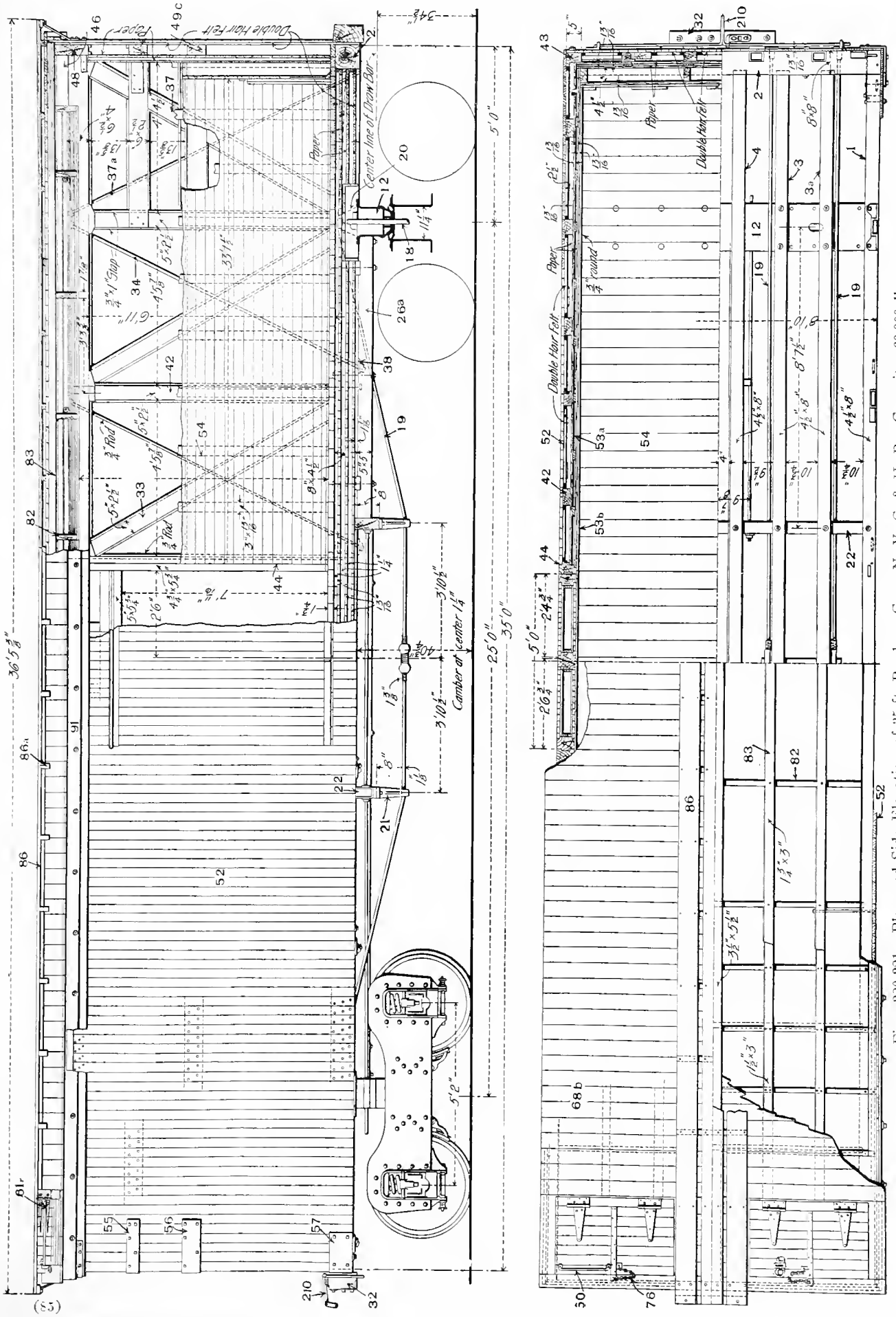


Fig. 319. Cross-Section of 35-ft. Produce Car.
N. Y. C. & H. R. Capacity, 60,000 lbs.

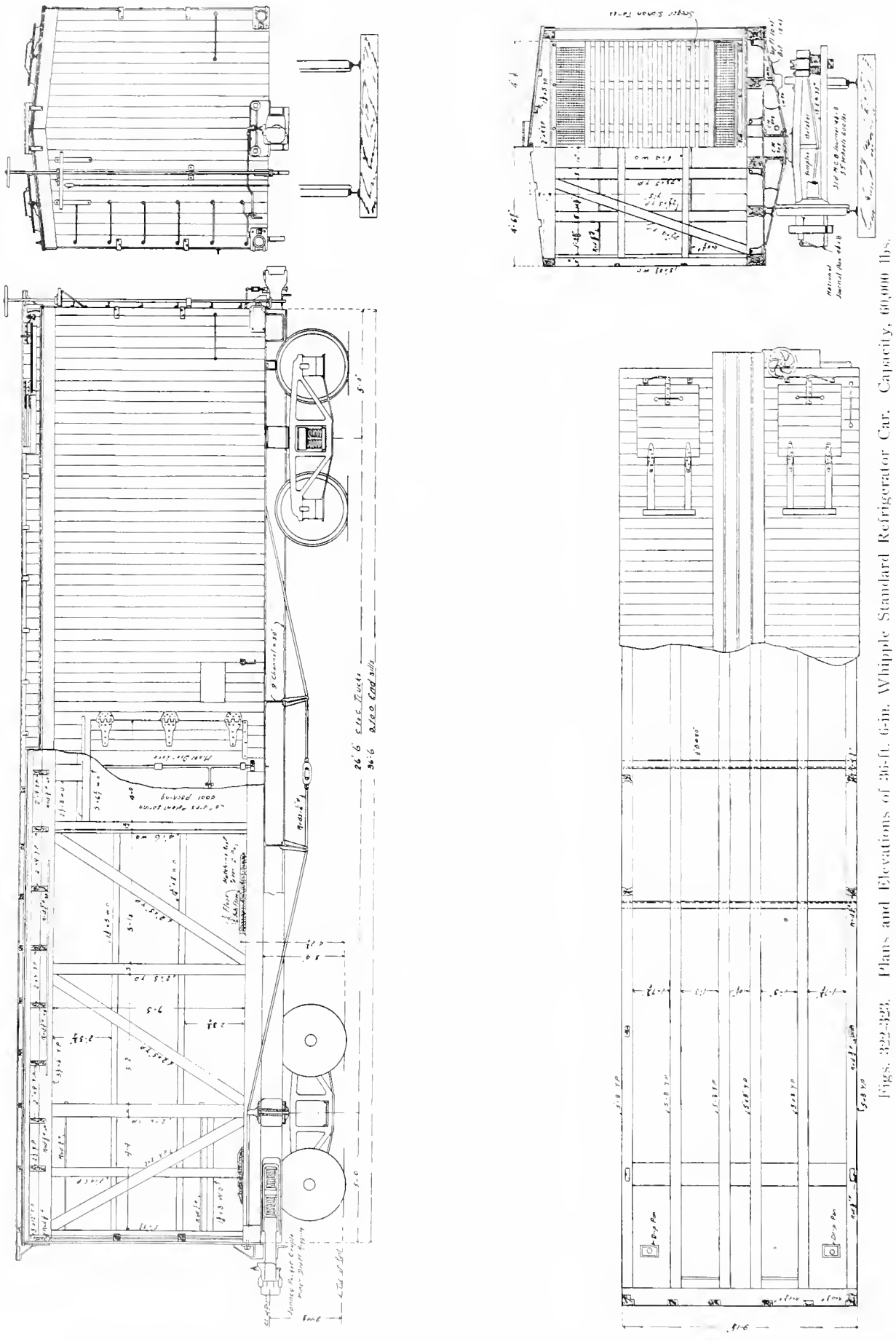
Names of Parts of Refrigerator Cars. Figs. 305-308 and 319-321.

1 *Side Sill*
2 *End Sill*
3 *Inner Intermediate Sill*
3*a* *Outer Intermediate Sill*
4 *Center Sill*
12 *Body Bolster*
16 *Body Side Bearing*
18 *King Bolt*
19 *Body Truss Rod*
20 *Body Truss Rod Saddle*
21 *Body Truss Rod Bearing*
22 *Cross Tie Timber or Needlebeam*
26 *Draft Timber*
26*a* *Sub-sill*
30 *Sill Step*
32 *Buffer Beam or Dead Block*
33 *Brace*
34 *Brace Rod*
35 *End Brace*
37 *Counterbrace*
37*a* *Counterbrace Rod*
38 *Brace Rod Washer*
42 *Post*
43 *Corner Post*
44 *Door Post*
46 *Plate*
48 *End Plate*
49*a* *Side Belt Rail*
49*c* *End Belt Rail*
52 *Sheathing. Same as* **F**
53*a* *Intermediate Lining. Same as* **E**
53*b* *Inside Lining. Same as* **A**
53*c* *Inner Overhead Lining. Same as* **K**
53*f* *Outer Overhead Lining. Same as* **L**
53*g* *Intermediate Overhead Lining*
54 *Lining Stud*
55 *Upper Corner Plate*
56 *Intermediate Corner Plate*
57 *Lower Corner Plate*
59 *Ladder Round*
60 *Hand Hold or Grab Iron*
61*c* *End Door*
61*r* *Roof Door for Ice*
61*s* *Side Door*
68*b* *Door Hinge*
72 *Door Bolt Bracket*
73 *Door Hasp*
74*b* *Door Bolt or Bar*
76 *Door Pin Chain*
77 *Door Stop*
82 *Carline*
83 *Purlin. Same as* **X**
84 *Ridge Pole*
86 *Running Board*
86*a* *Running Board Blocking*
91 *Fascia Board*
93 *Brake Wheel*
94 *Brake Shaft*
97 *Lower Brake Shaft Bearing*
210 *Uncoupling Lever and Rod*
A *Inside Lining. Same as* 53*b*
B *Insulating Paper*
C *Air Space*
D *Hair Felt or Linofelt*
E *Blind Lining. Same as* 53*a*
F *Outside Sheathing. Same as* 52
G *Main Floor*
H *Sub-floor*
I *Blind Floor*
J *Nailing Strip*
K *Inside Ceiling. Same as* 53*c*
L *Blind Ceiling. Same as* 53*g*
M *Sub-roof*
N *Plastic Roof*
O *Sub-carline*
P *Main Roof*
X *Purlin. Same as* 83

Numbers Refer to List of Names with Fig. 319.



Figs. 320-321. Plan and Side Elevation of 35-ft. Produce Car. N. Y. C. & H. R. Capacity, 60,000 lbs.



Figs. 322-323. Plans and Elevations of 36-ft. 6-in. Whipple Standard Refrigerator Car. Capacity, 60,000 lbs.

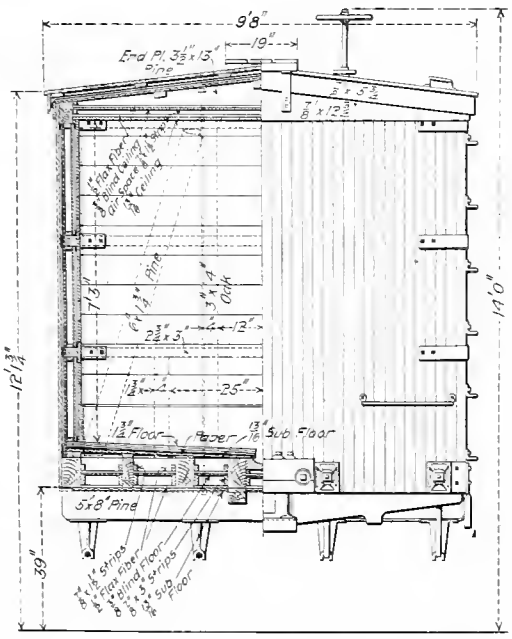
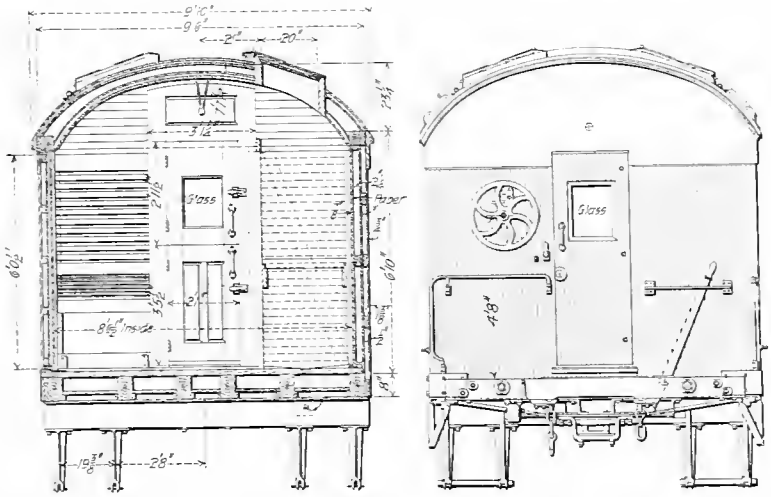
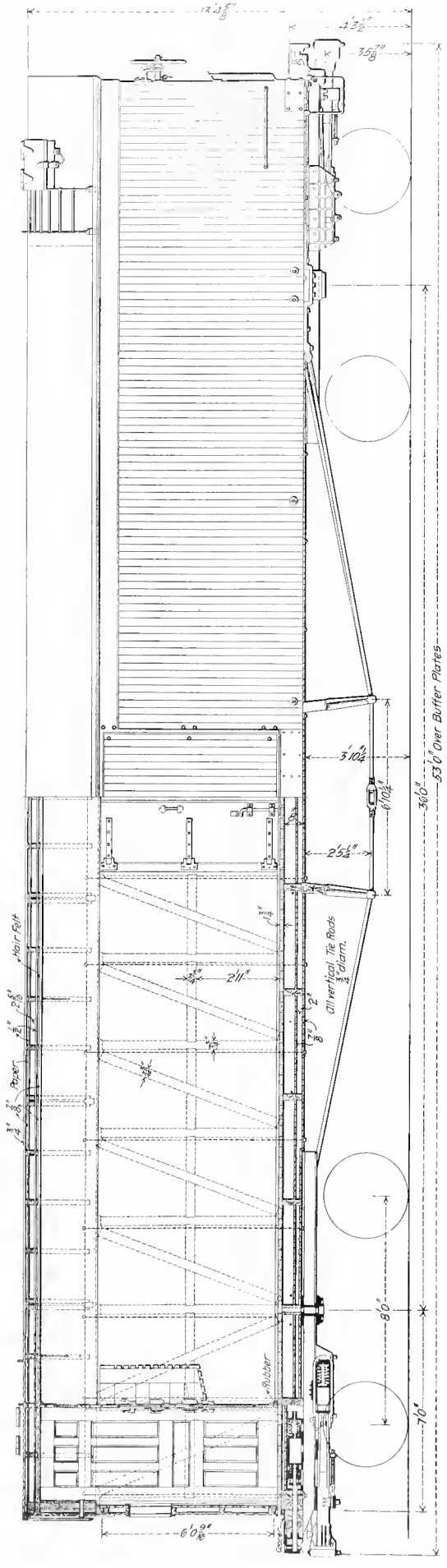
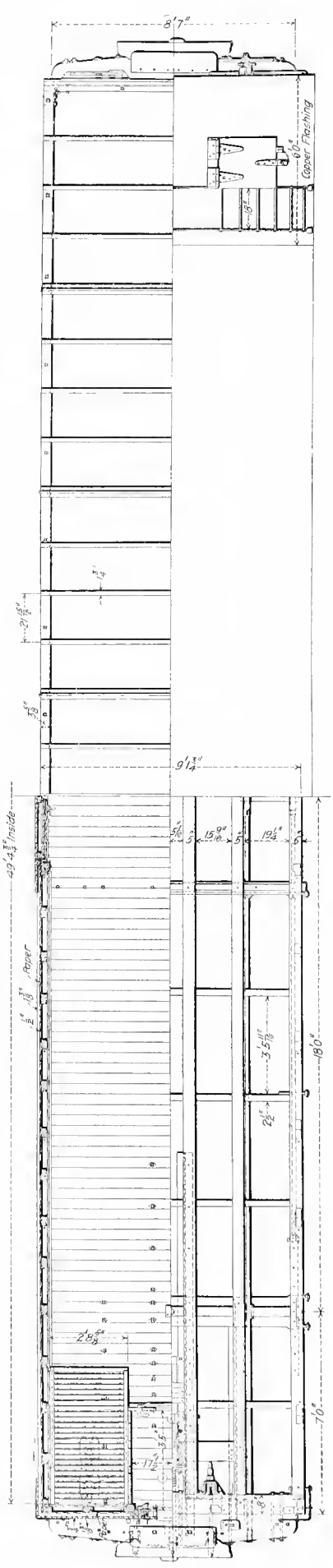


Fig. 324. Half End Elevation and Cross-Section of 36-ft. Refrigerator Car. Milwaukee Refrigerator Transit Co. Capacity, 60,000 lbs.

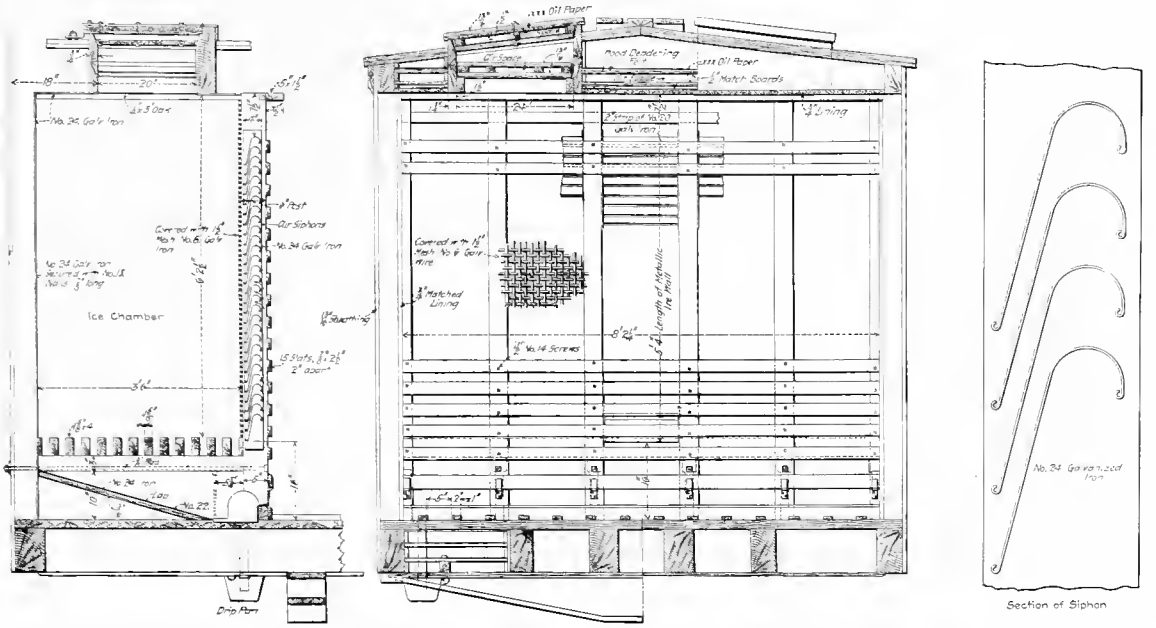


Figs. 325-326. Cross-Section and End Elevation of Milk Car. Lehigh Valley.

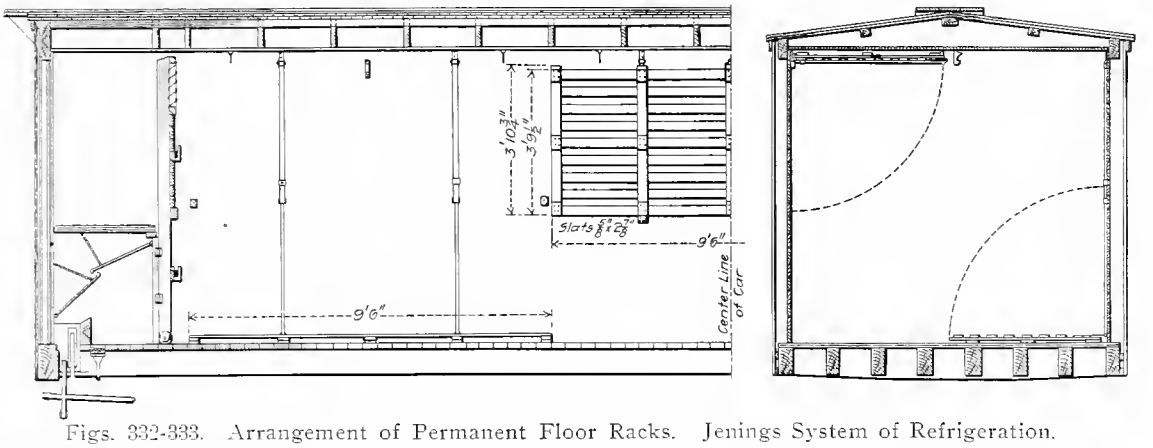




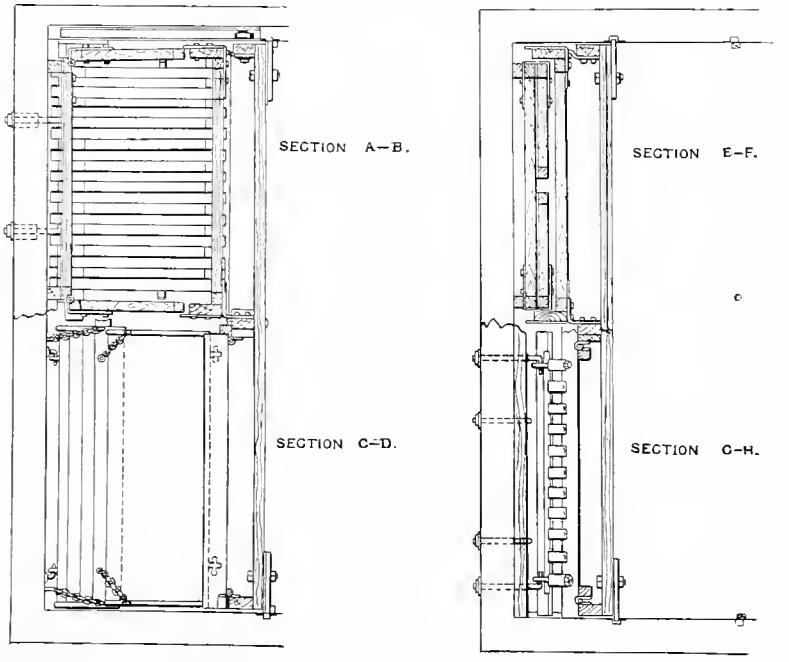
Figs. 327-328. Plan and Side Elevation of Milk Car. Lehigh Valley.



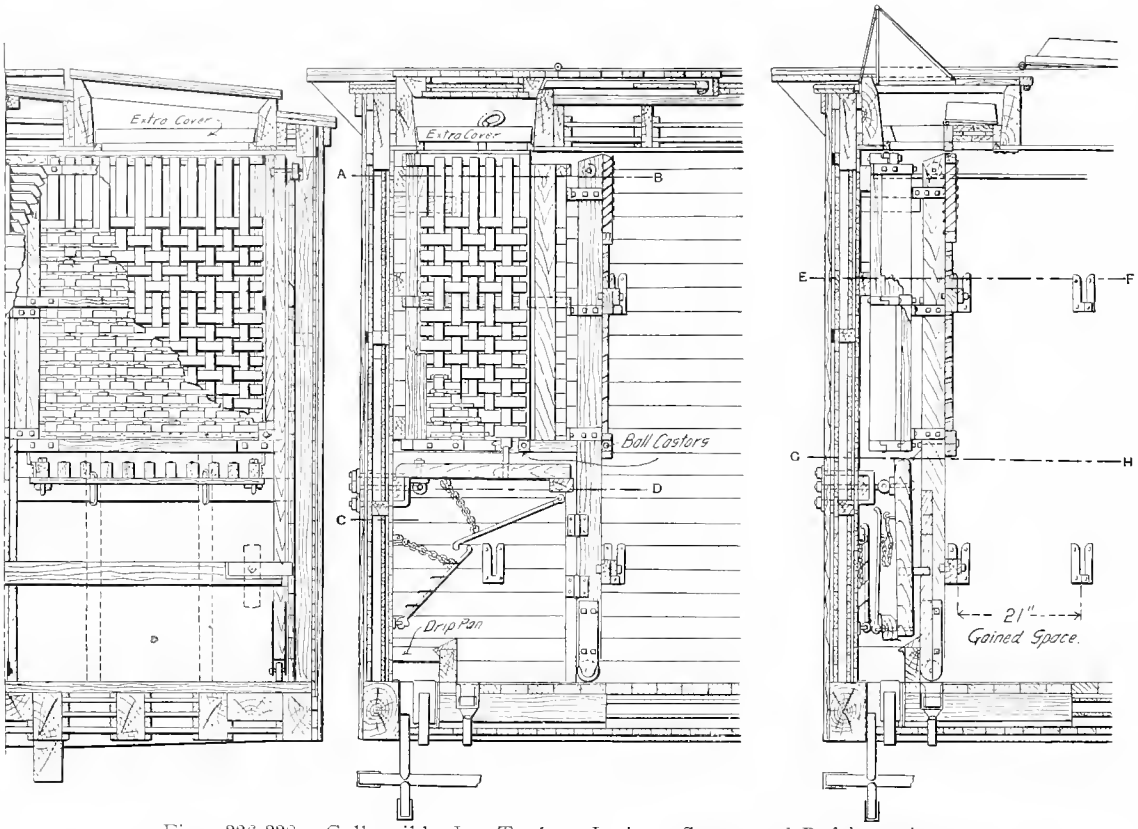
Figs. 329-331. Details of Bohn System of Refrigeration.



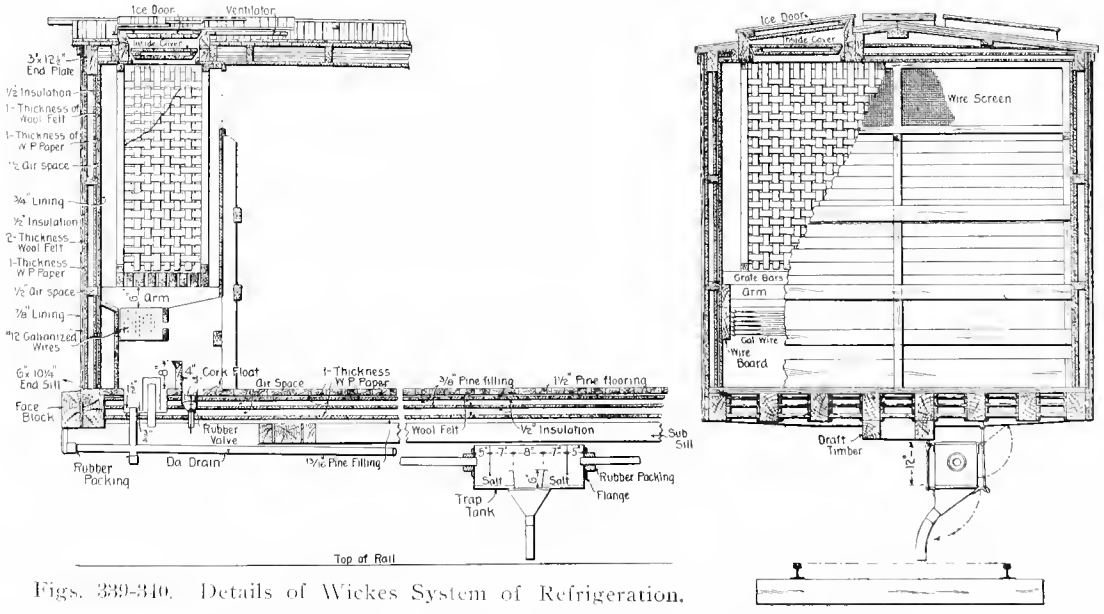
Figs. 332-333. Arrangement of Permanent Floor Racks. Jenings System of Refrigeration.



Figs. 334-335. Collapsible Ice Tanks. Jenings System of Refrigeration.



Figs. 336-338. Collapsible Ice Tanks. Jenings System of Refrigeration.

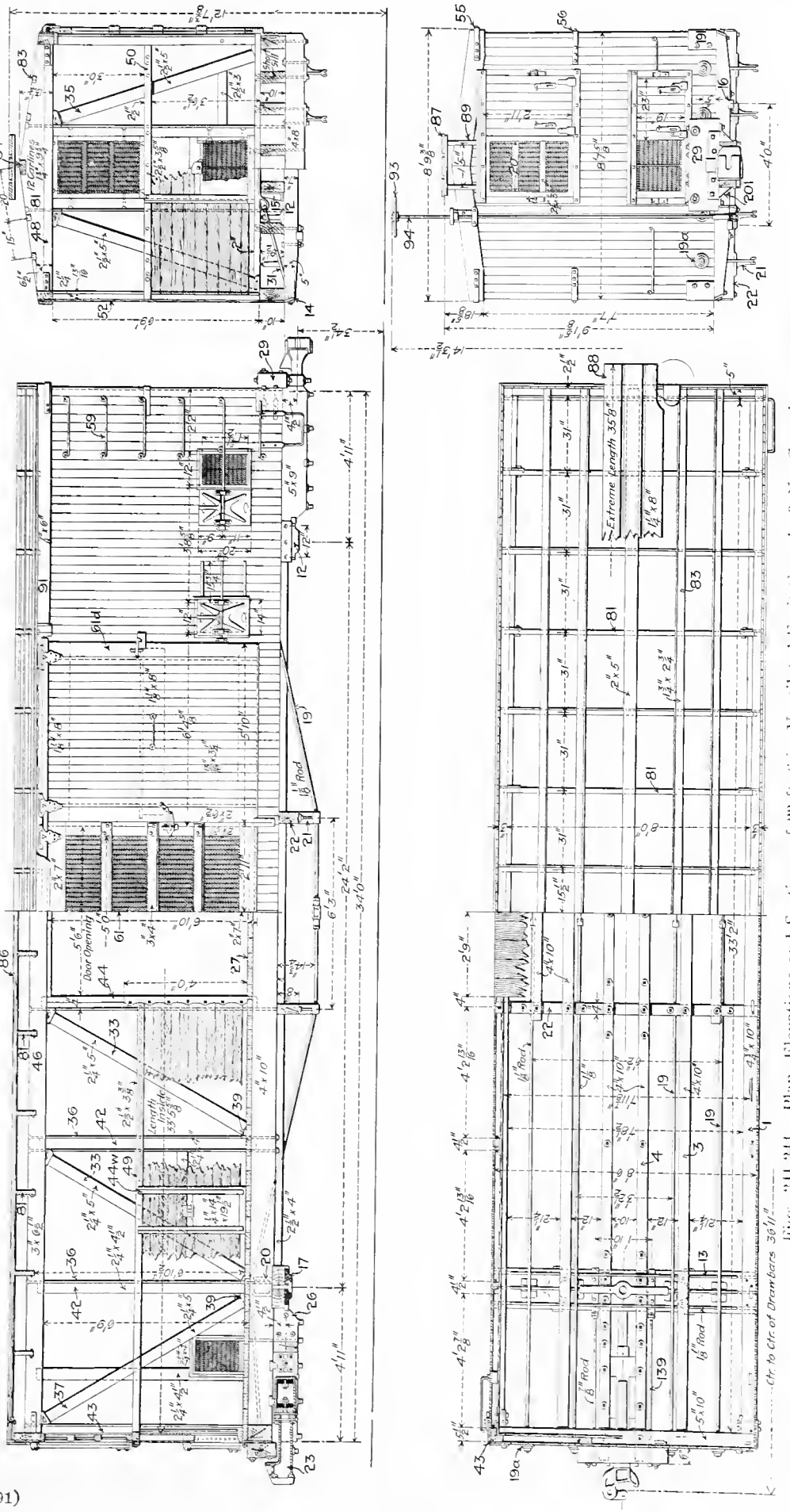


Figs. 339-340. Details of Wickes System of Refrigeration.

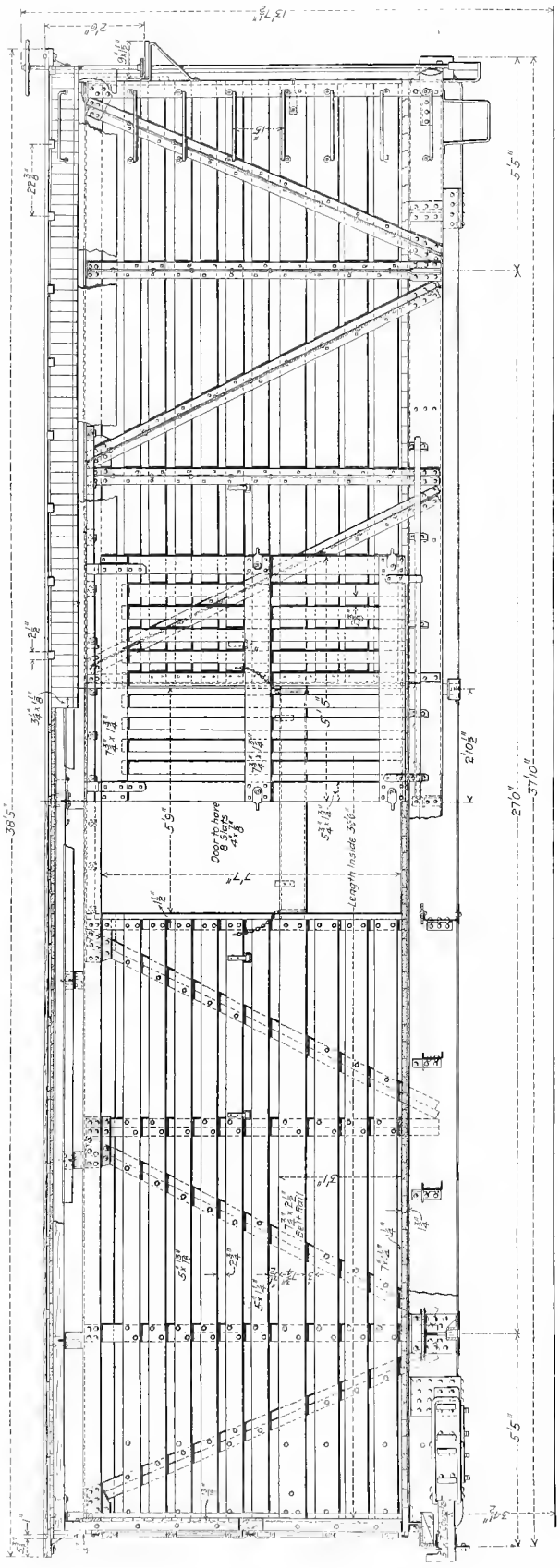
List of Names of Parts of Fruit Car Bodies. Figs. 341-344.

1 *Side Sill*
3 *Inner Intermediate Sill*
4 *Center Sill*
12 *Body Bolster*
14 *Body Bolster Truss Rod Washer*
15 *Body Bolster Truss Block*
17 *Body Center Plate*
19 *Body Truss Rod*
19*a* *Body Truss Rod Washer*
20 *Body Truss Rod Saddle*
21 *Body Truss Rod Bearing*
22 *Cross Tie Timber*
23 *Drawbar*
26 *Draft Timber*
27 *Floor*
29 *Buffer Block*
31 *Body Bolster Truss Rod*
33 *Brace*
35 *End Brace*
36 *Sill and Plate Rod*
37 *Counterbrace*
39 *Brace Pocket*
42 *Post*
43 *Corner Post*
44 *Door Post*
44*a* *Window Post*
46 *Plate*
48 *End Plate*
49 *Belt Rail*
50 *End Belt Rail*
52 *Sheathing or Siding*
55 *Upper Corner Plate*
56 *Middle Corner Plate*
59 *Ladder Round*
61 *Grated Door*
61*d* *Door*
31 *Carline*
83 *Purlin*
84 *Ridge Pole*
86 *Roof Boards*
87 *Running Board*
88 *Running Board Extension*
89 *Running Board Bracket*
91 *Fascia Board*
93 *Brake Hand Wheel*
94 *Brake Shaft*
139 *Draw Gear Tie Rod*
191 *Push Pole Corner Iron*
201 *Drawbar Carry Iron*

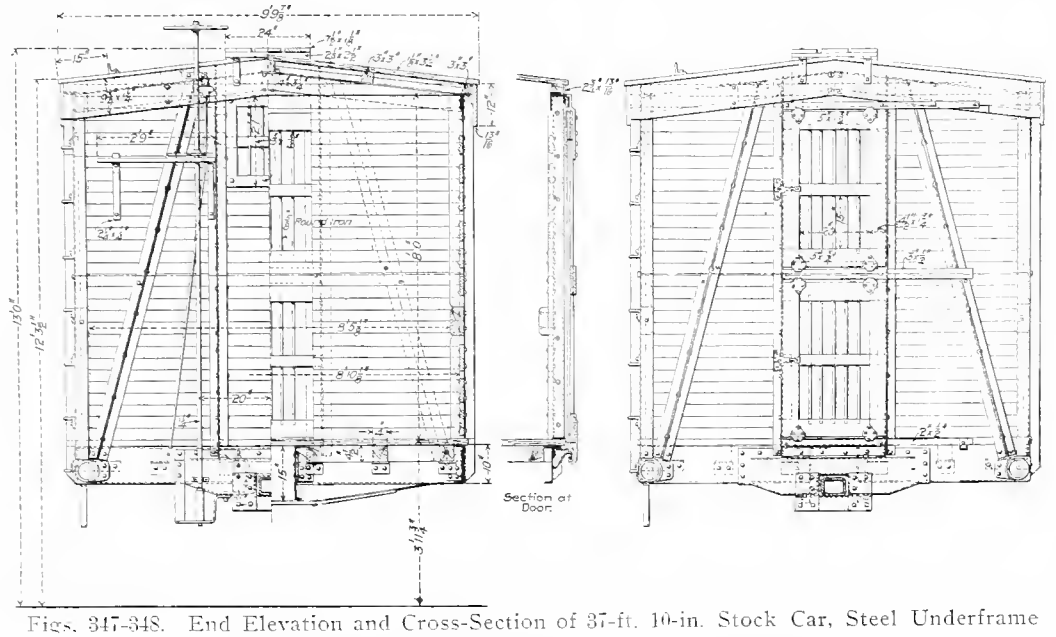
Numbers Refer to List of Names with Figs. 336-340.



Figs. 341-344. Plan, Elevations and Sections of 33-ft. 6-in. Ventilated Fruit Car. L. & N. Capacity, 60,000 lbs.



Figs. 345-346. Plan and Side Elevation of 37-ft. 10-in. Stock Car, Steel Underframe and Body Framing. Oregon Short Line. Capacity, 60,000 lbs.



Figs. 347-348. End Elevation and Cross-Section of 37-ft. 10-in. Stock Car, Steel Underframe and Body Framing. Oregon Short Line. Capacity, 60,000 lbs.

Names of Parts of Stock Car Bodies. Figs. 352-355.

1 *Side Sill*
2 *End Sill*
3 *Intermediate Sill*
3a *Outer Intermediate Sill*
4 *Center Sill*
12 *Body Bolster*
19 *Body Truss Rod*
21 *Body Truss Rod Bearing*
22 *Cross Tie Timber or Needlebeam*
26 *Draft Timbers*
27 *Floor*
28 *Upper Floor or Double Deck*
30 *Sill Step*
32 *Buffer Blocks or Dead Wood*
33 *Side Brace*
35 *Sill and Plate Rod*
36 *End Body Brace*
37 *Counterbrace*

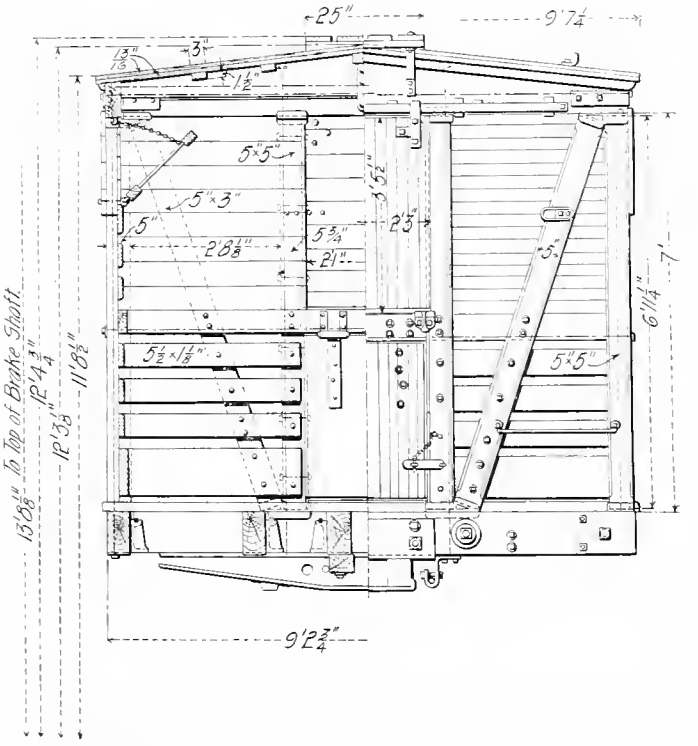


Fig. 349. Half Cross-Section and End Elevation of 36-ft. Stock Car. Illinois Central. Capacity, 60,000 lbs.

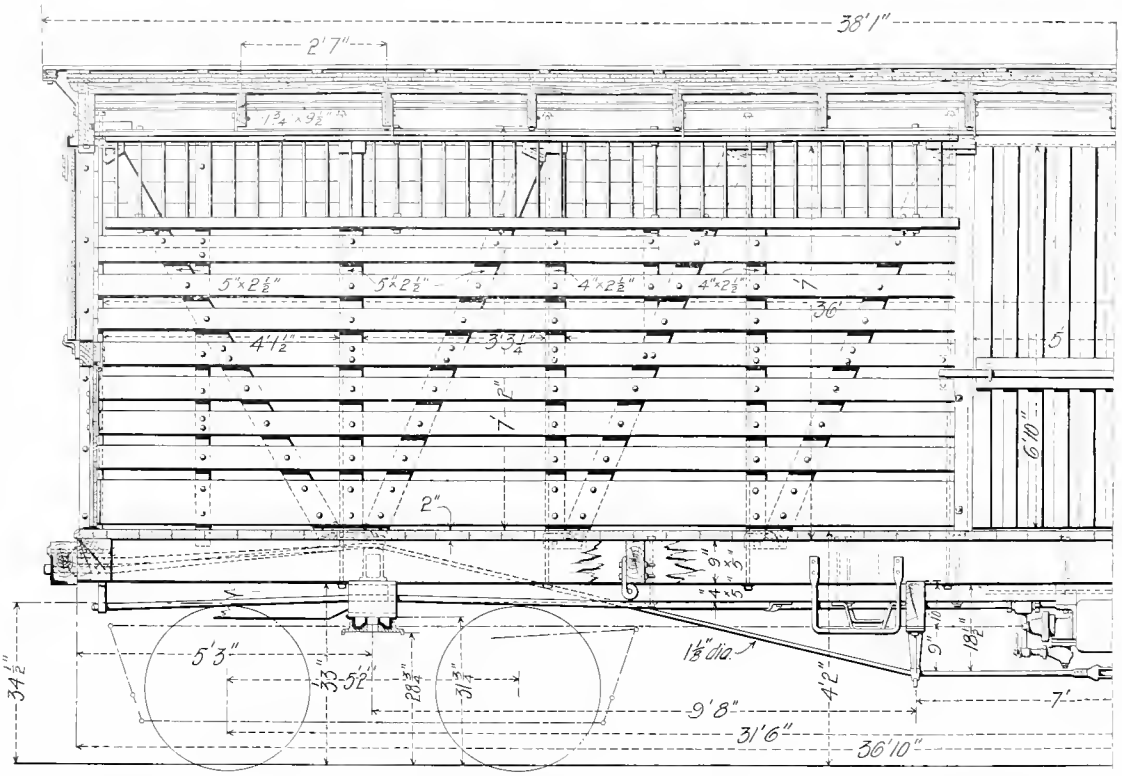


Fig. 350. Half Longitudinal Section of 36-ft. Stock Car. Illinois Central. Capacity, 60,000 lbs.

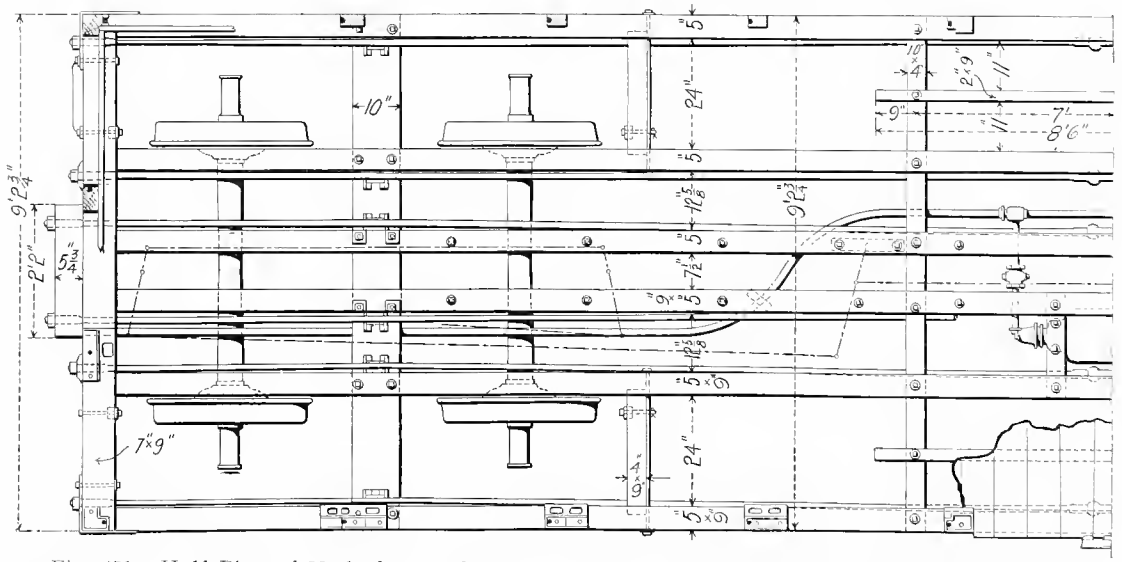
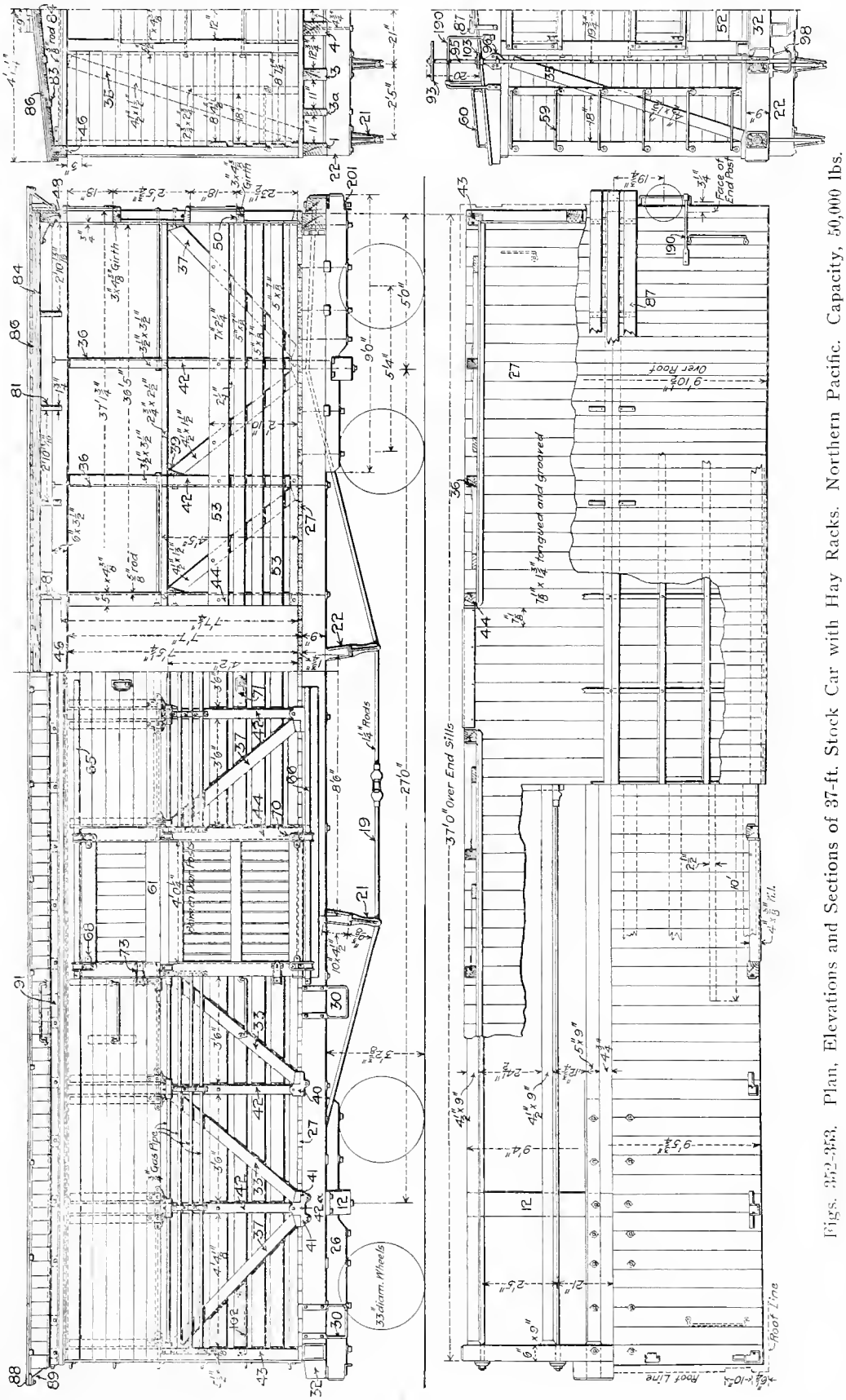


Fig. 351. Half Plan of Underframe of 36-ft. Stock Car. Illinois Central. Capacity, 60,000 lbs.

Names of Parts of Stock Car Bodies. Figs. 352-355. (Continued.)

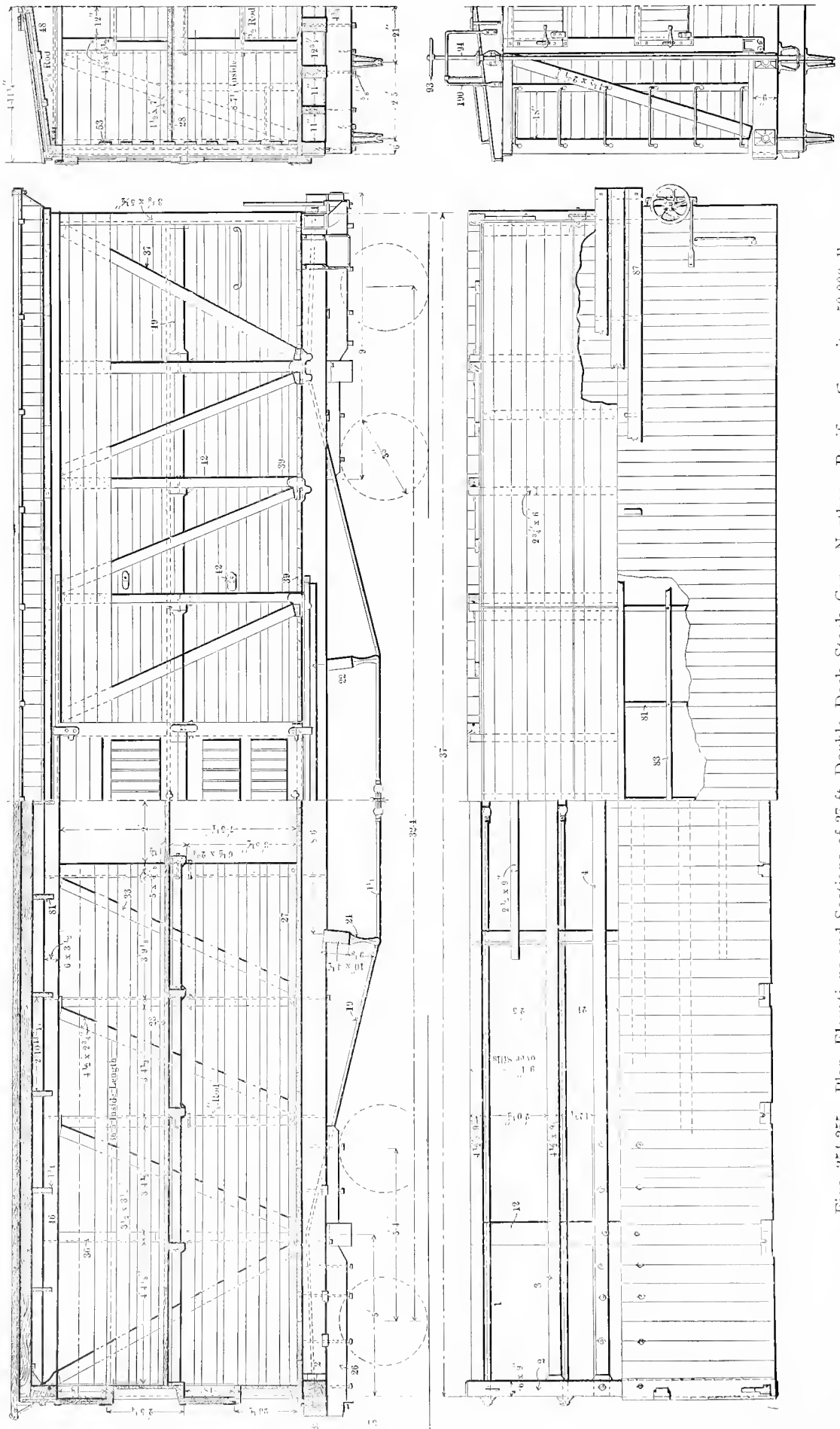
40 *Brace Pocket*
41 *Double Brace Pocket*
42 *Post*
42a *Post Pocket*
43 *Corner Post*
44 *Door Post*
46 *Plate*
47 *Plate Rod*
48 *End Plate*
49 *Girth*
50 *End Girth*
53 *Inside Lining*
59 *Ladder Rounds*
60 *Roof Grab Iron*
61 *Grated Door*
65 *Top Door Track*
66 *Bottom Door Track*
68 *Door Hanger*
70 *Door Shoe*
71 *Open Door Stop*
73 *Door Hasp*
81 *Carline*
83 *Purlin*
84 *Ridge Pole*
86 *Roof Boards*
87 *Running Board*
88 *Running Board Extension*
89 *Running Board Extension Bracket*
91 *Eaves Fascia Board*
93 *Brake Wheel*
94 *Brake Shaft*
95 *Same as* 94
96 *Brake Shaft Bearing*
98 *Brake Shaft Step*
103 *Brake Ratchet Wheel*
190 *Brake Hand Rail*
201 *Drawbar Carry Iron*

Numbers Refer to List of Names with Figs. 349-351.

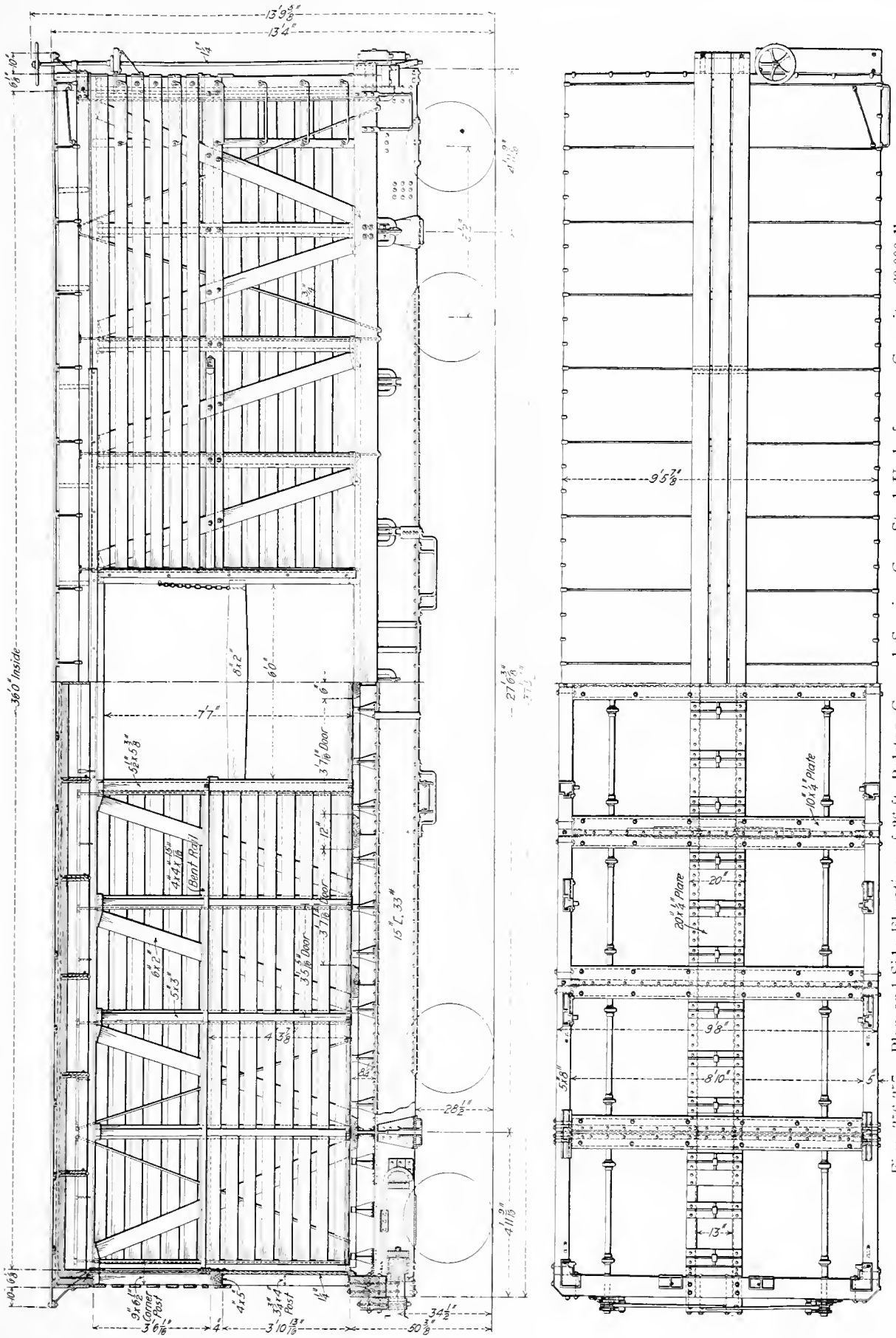


Figs. 352-353. Plan, Elevations and Sections of 37-ft. Stock Car with Hay Racks. Northern Pacific. Capacity, 50,000 lbs.

Numbers Refer to List of Names with Figs. 349-351.



Figs. 354-355. Plan, Elevations and Sections of 37-ft. Double Deck Stock Car. Northern Pacific. Capacity, 50,000 lbs.



Figs. 356-357. Plan and Side Elevation of 36-ft. Ralston General Service Car, Steel Underframe. Capacity, 60,000 lbs.

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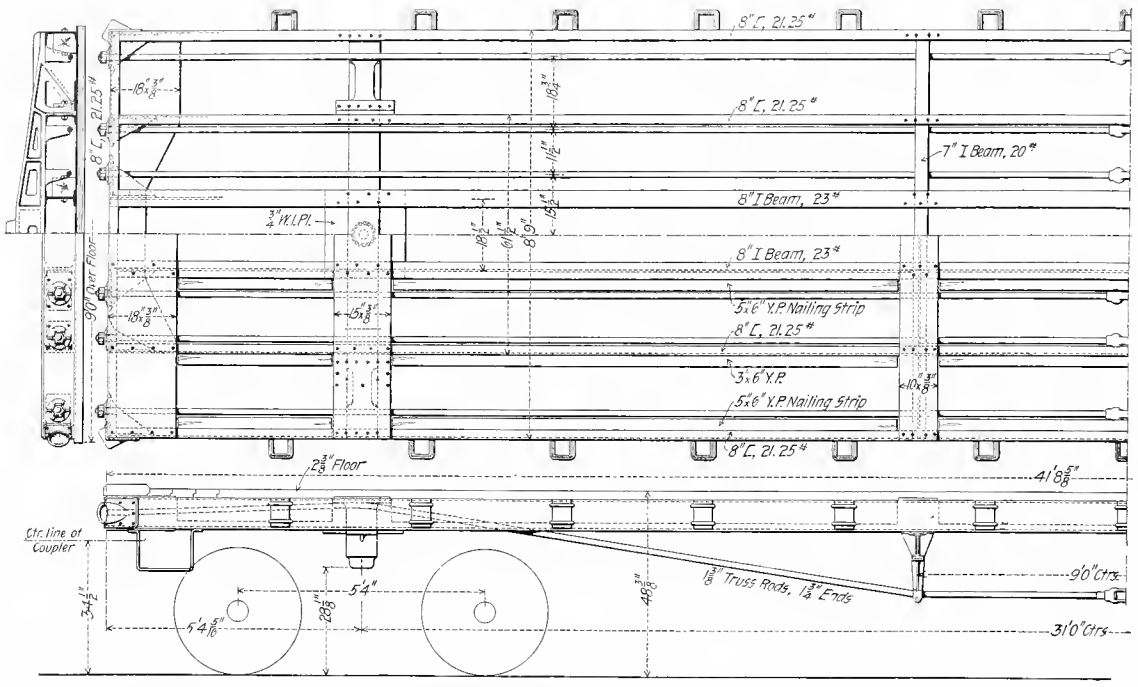


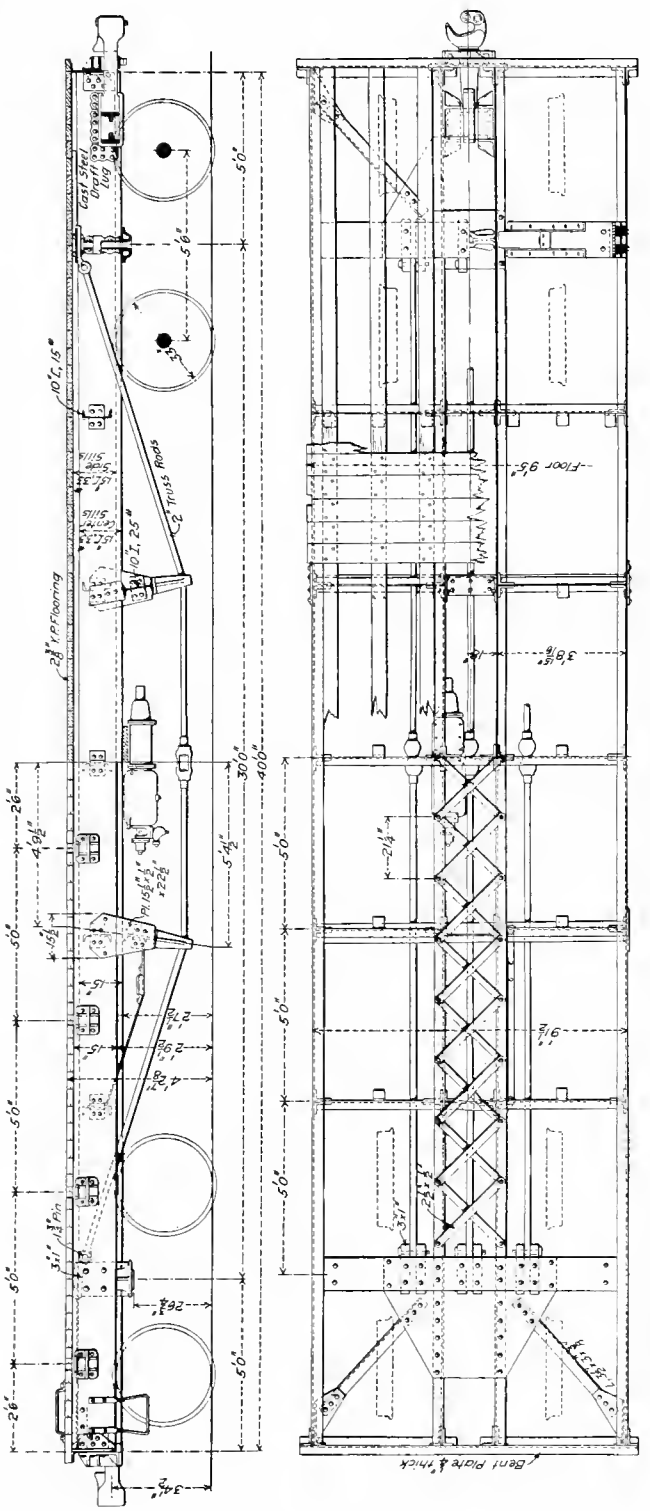
Figs. 364-365. Plan and Elevations of 41-ft. 8-in. Flat Car, with Structural Steel Underframe. Chicago & Alton. Capacity, 100,000 lbs.

Names of Parts of Flat Cars. Figs. 360-363.

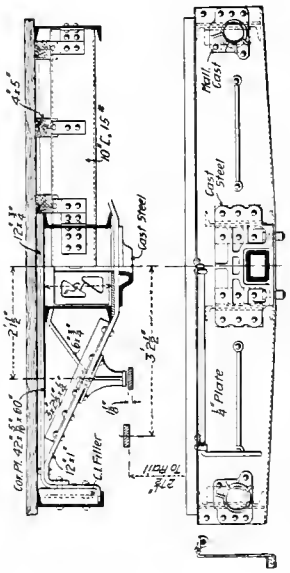
1 *Side Sill*
2 *End Sill*
4 *Center Sill*
12*a* *Top Plate of Body Bolster*
12*b* *Bottom Plate of Body Bolster*
16 *Body Side Bearings*
22 *Cross Tie or Needle Beam*
27 *Floor*
32 *Buffer Blocks*
39*a* *Stake Pocket*
103 *Brake Ratchet Wheel*
192 *Gusset Plates*
194 *Nailing Strips*
194*a* *Side Nailing Strip*
195 *End Sill Diagonal Brace*
196 *Nailing Strip Cross Ties*

Names of Parts of Gondola Cars. Figs. 383-387.

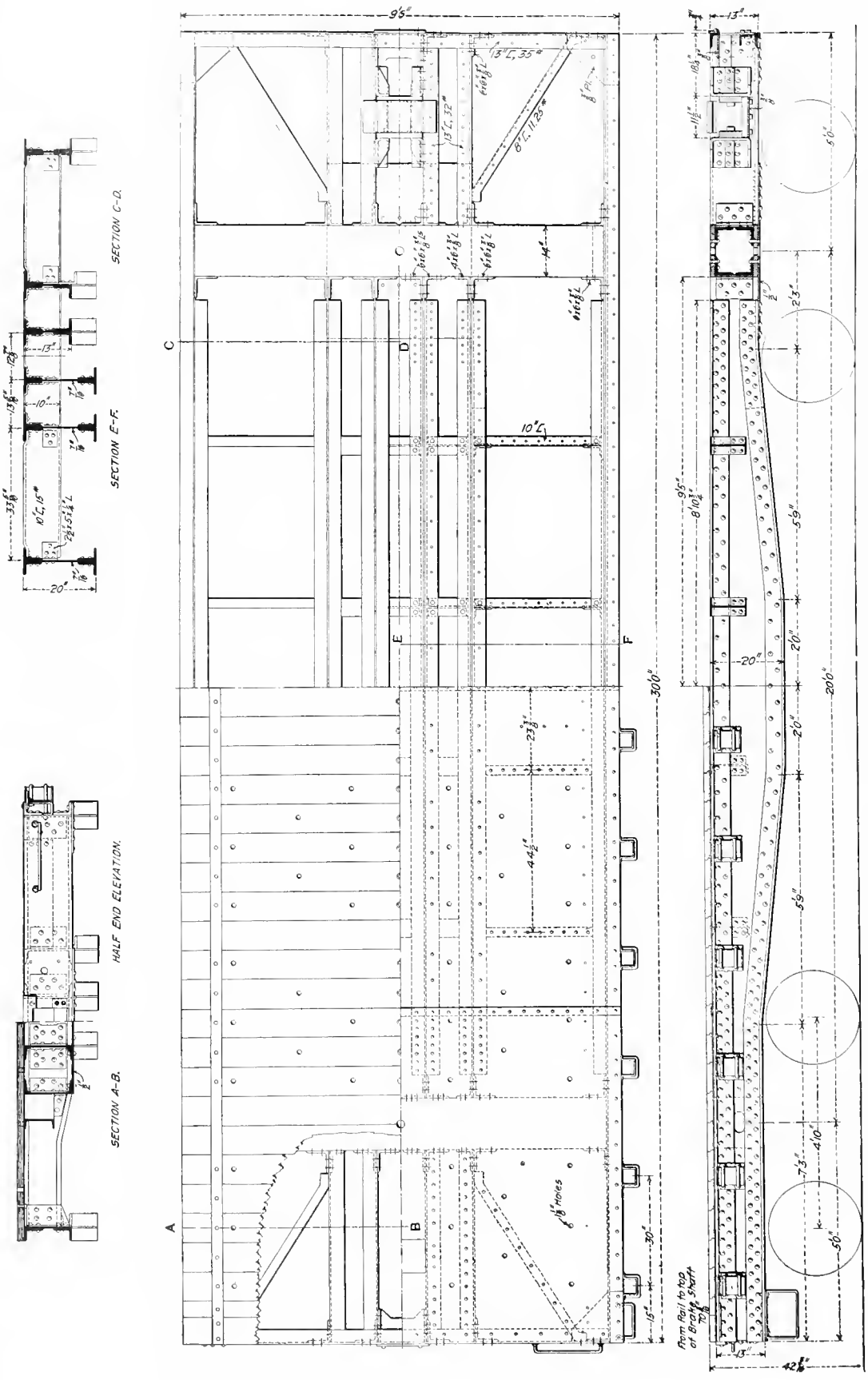
1 *Side Sill*
2 *End Sill*
3 *Inner Intermediate Sill*
4 *Outer Intermediate Sill*
5 *Center Sill*
6 *Sub-sill*
10 *Sill Tie Rod*
12 *Body Bolster*
16 *Body Side Bearing*
17 *Body Center Plate*
19 *Body Truss Rod*
20 *Body Truss Rod Saddle*
21 *Body Truss Rod Bearing*
23 *Drawbar*
24 *Draft Spring*
25 *Cross Tie or Needle Beam*
26 *Draft Timbers*
27 *Floor*
32 *Buffer Blocks*
32*a* *Buffer Beam*
39 *Stake Pocket*
42 *Stake*
52 *Side Plank*
93 *Brake Wheel*
94 *Brake Shaft*
96 *Upper Brake Shaft Bearing*
100 *Brake Shaft Step*
210 *Uncoupling Lever and Rod*



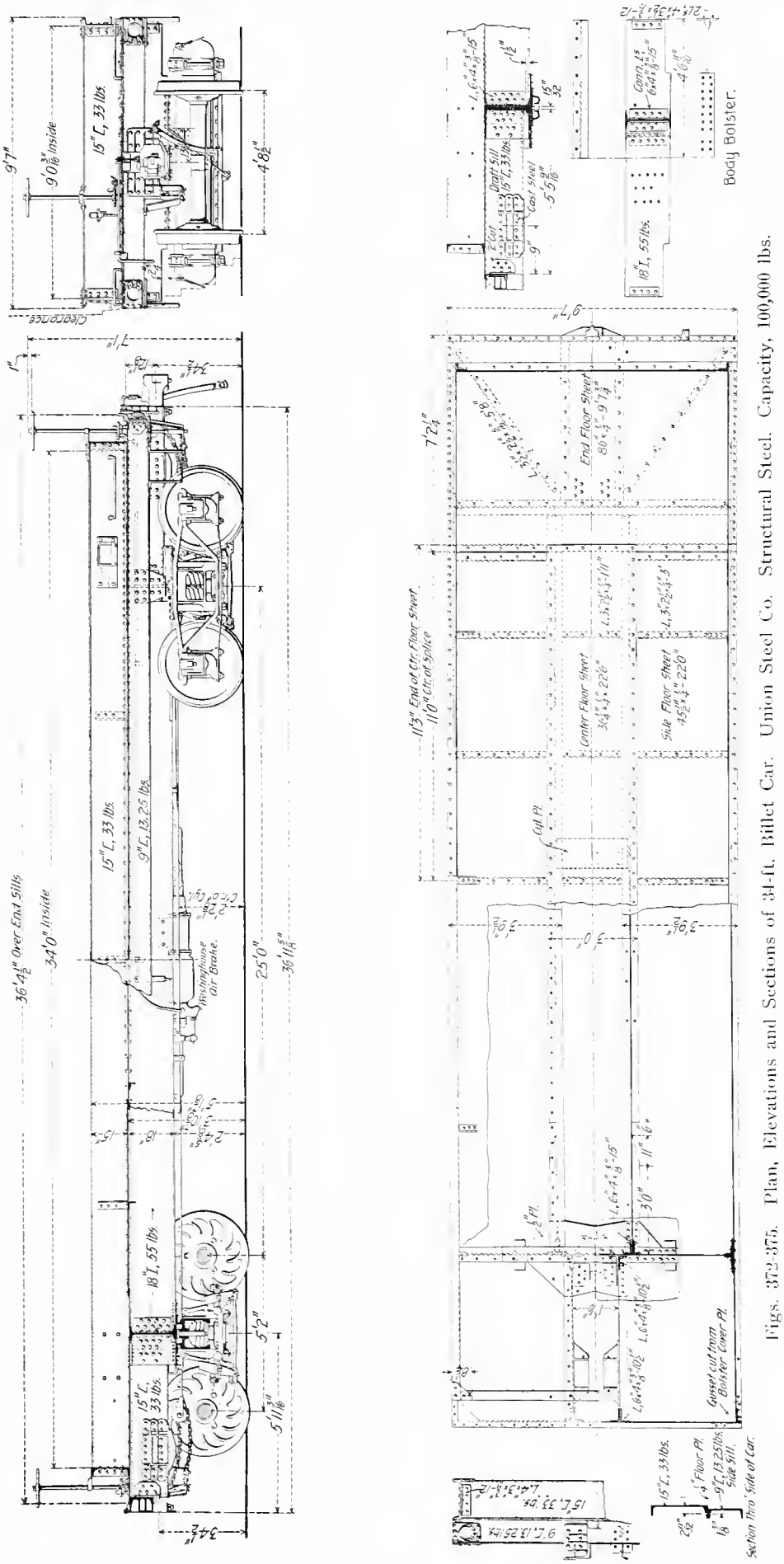
Figs. 366-367. Plan and Side Elevation of 40-ft. Flat Car, King Patent Trussed Steel Underframe. Capacity, 100,000 lbs.



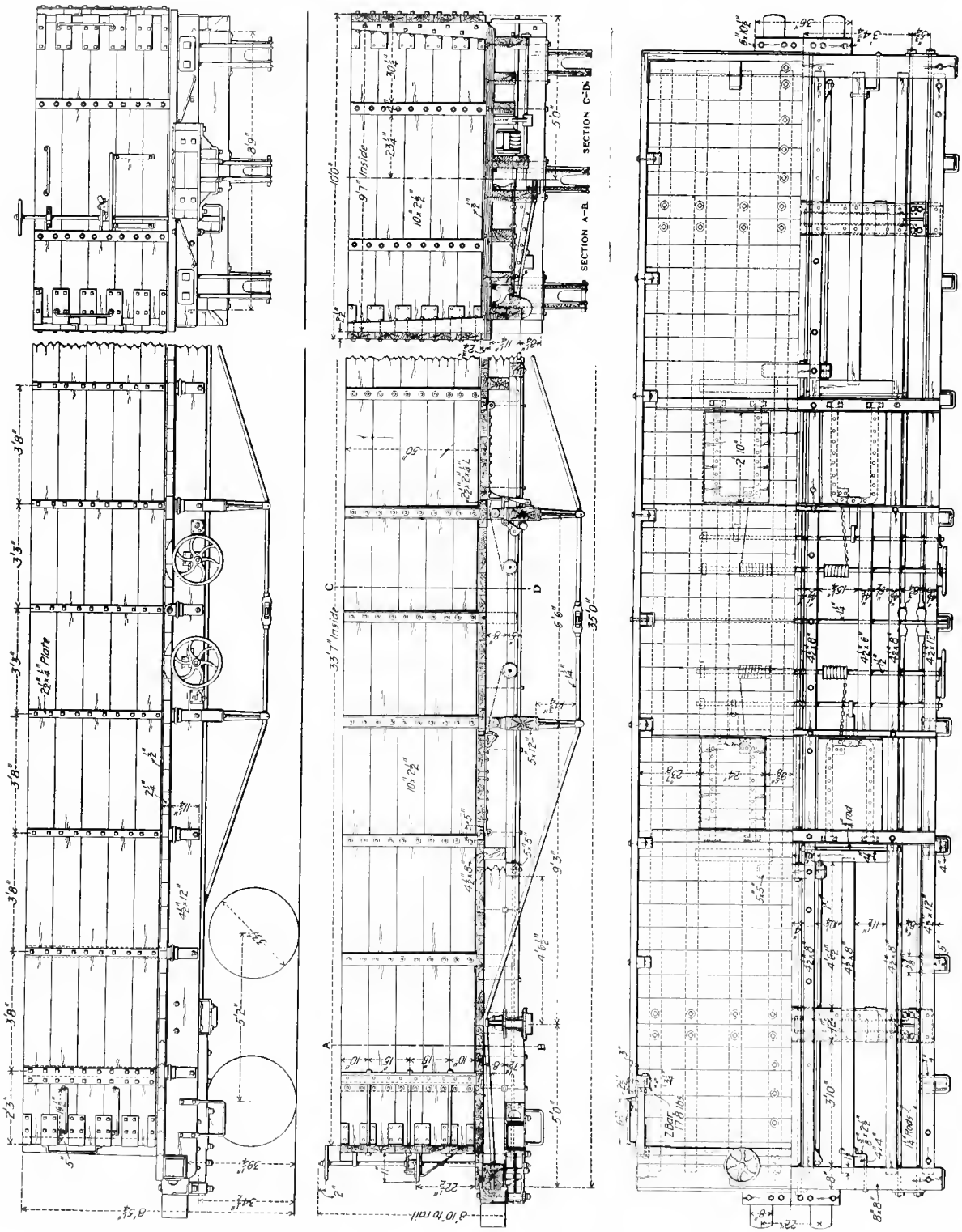
Figs. 368-369. Cross-Section and End Elevation of 40-ft. Flat Car, King Patent Trussed Steel Underframe. Capacity, 100,000 lbs.



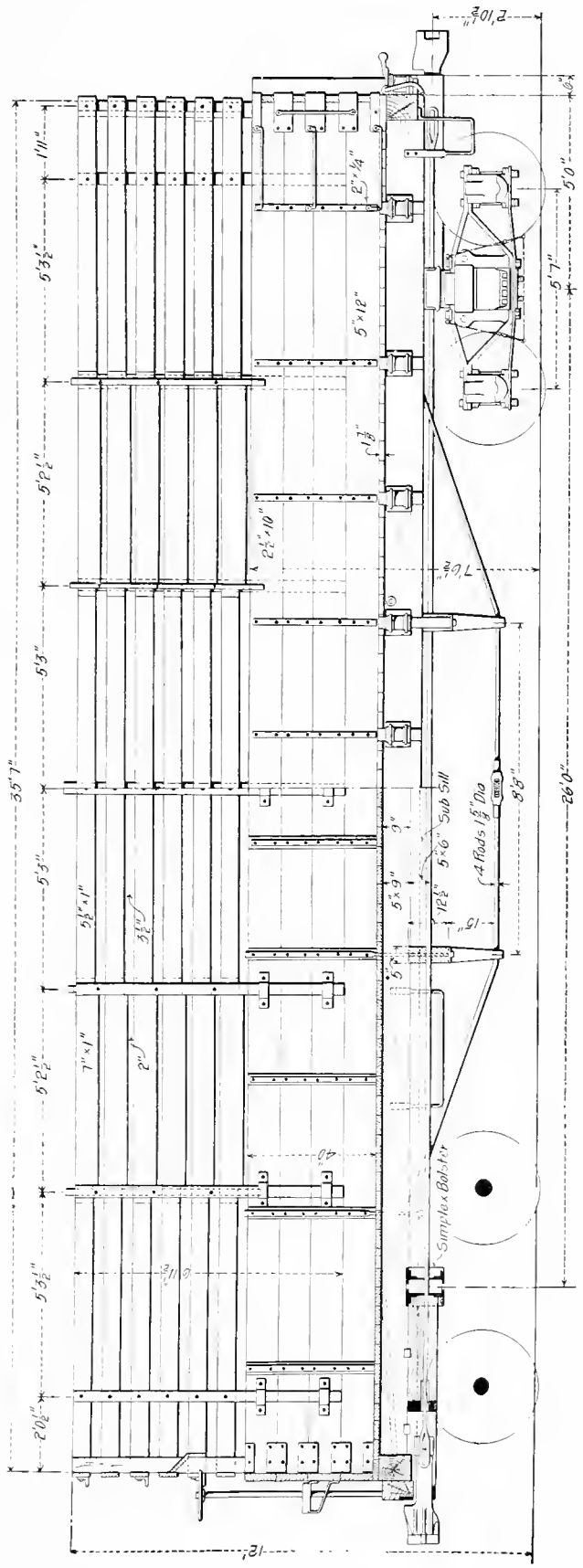
Figs. 370-371. Plan, Elevations and Sections of 30-ft. Flat Car, Structural Steel. P. & L. E. Capacity, 150,000 lbs.

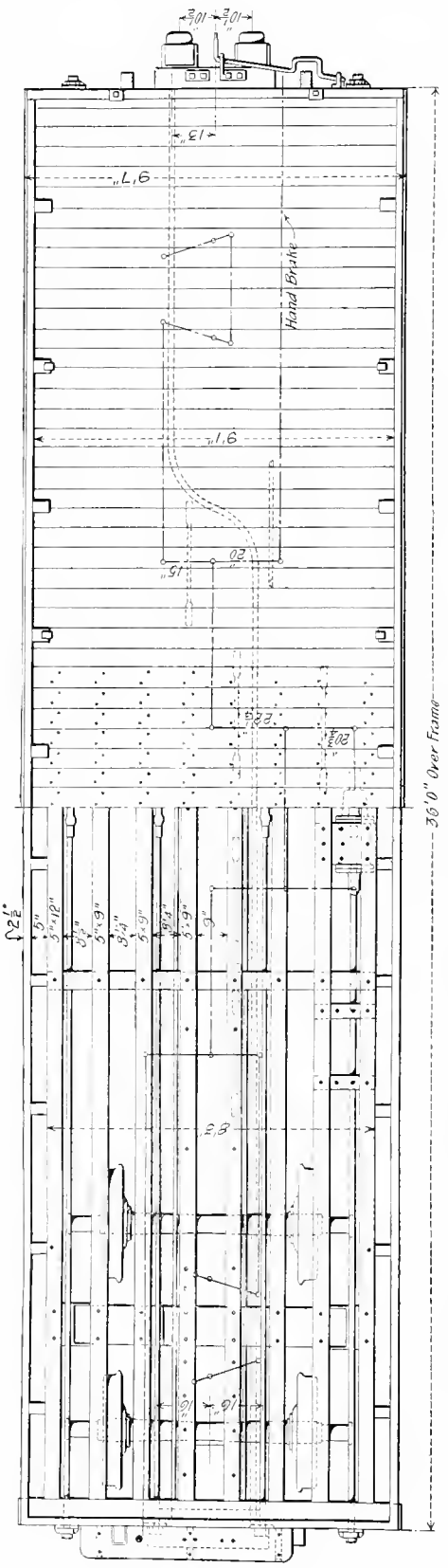


Figs. 372-375. Plan, Elevations and Sections of 34-ft. Billet Car. Union Steel Co. Structural Steel. Capacity, 100,000 lbs.



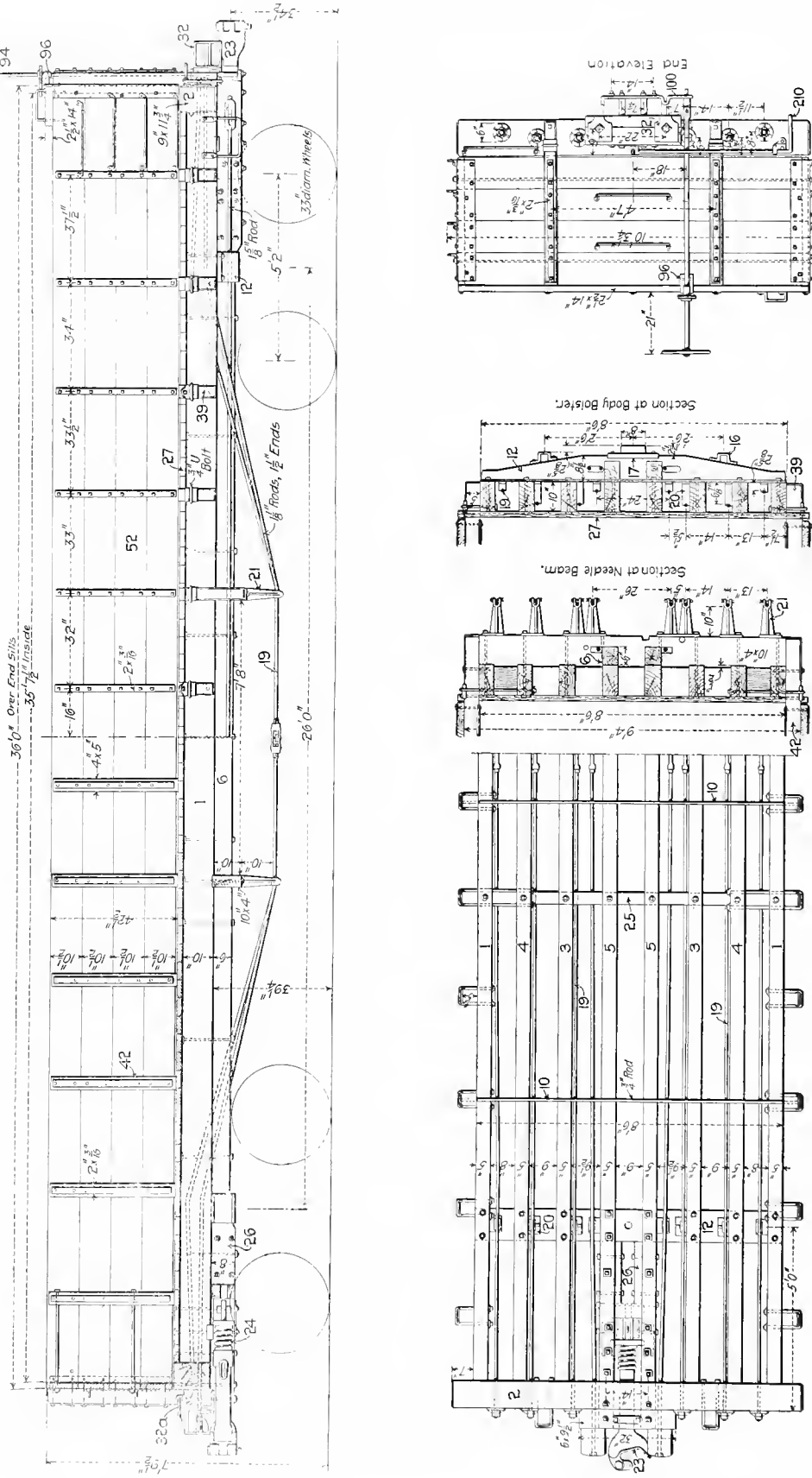
Figs. 376-380. Plan, Elevations and Sections of 33-ft. Drop-Bottom Gondola Car. Pittsburg Coal Co. Capacity, 80,000 lbs.



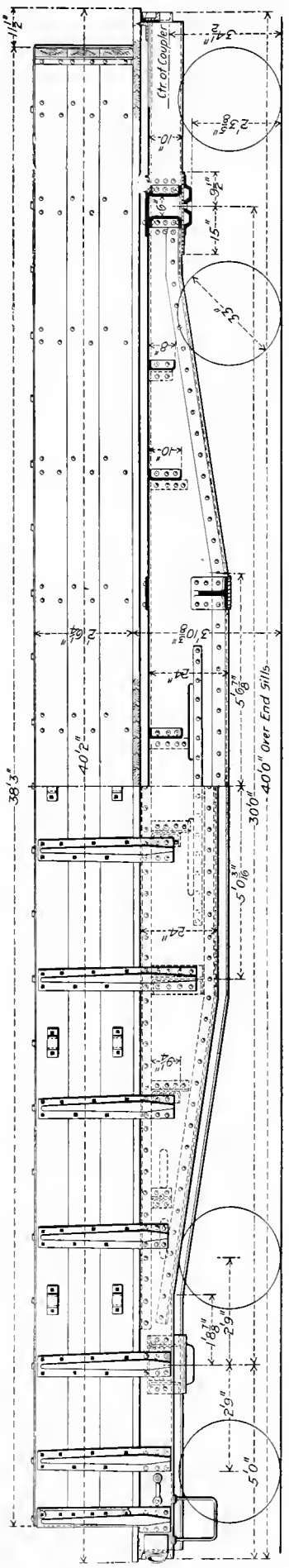


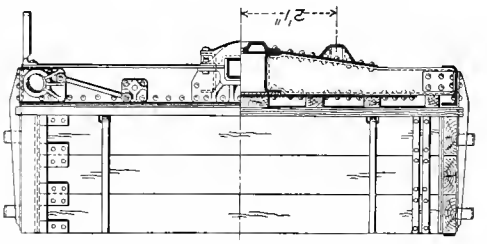
Figs. 381-382. Plan and Side Elevation of 36-ft. Gondola Car with Rack for Coke. Solvay Process Co. Capacity, 80,000 lbs.

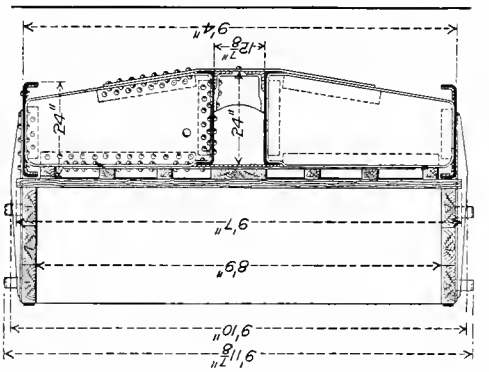
Numbers Refer to List of Names with Figs. 364-365.

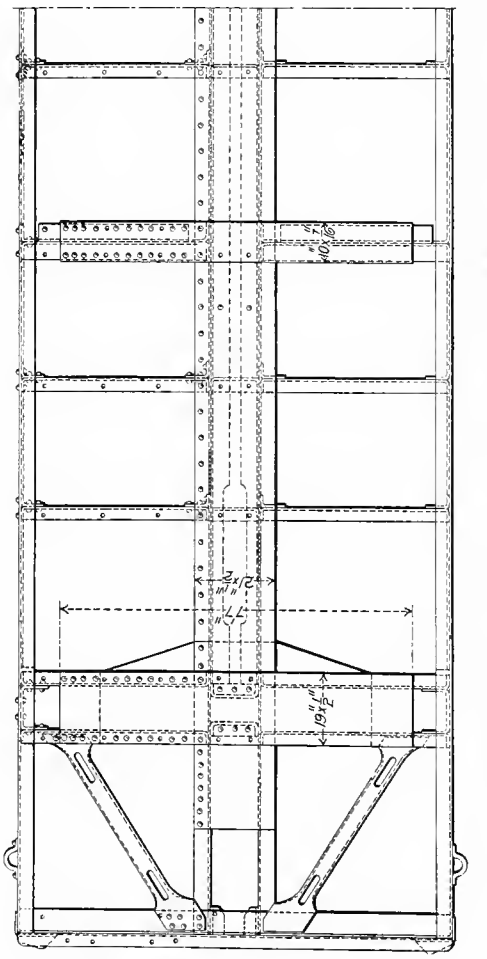


Figs. 383-387. Plan, Elevations and Sections of 36-ft. Gondola Car. C. & E. I. Capacity, 80,000 lbs.

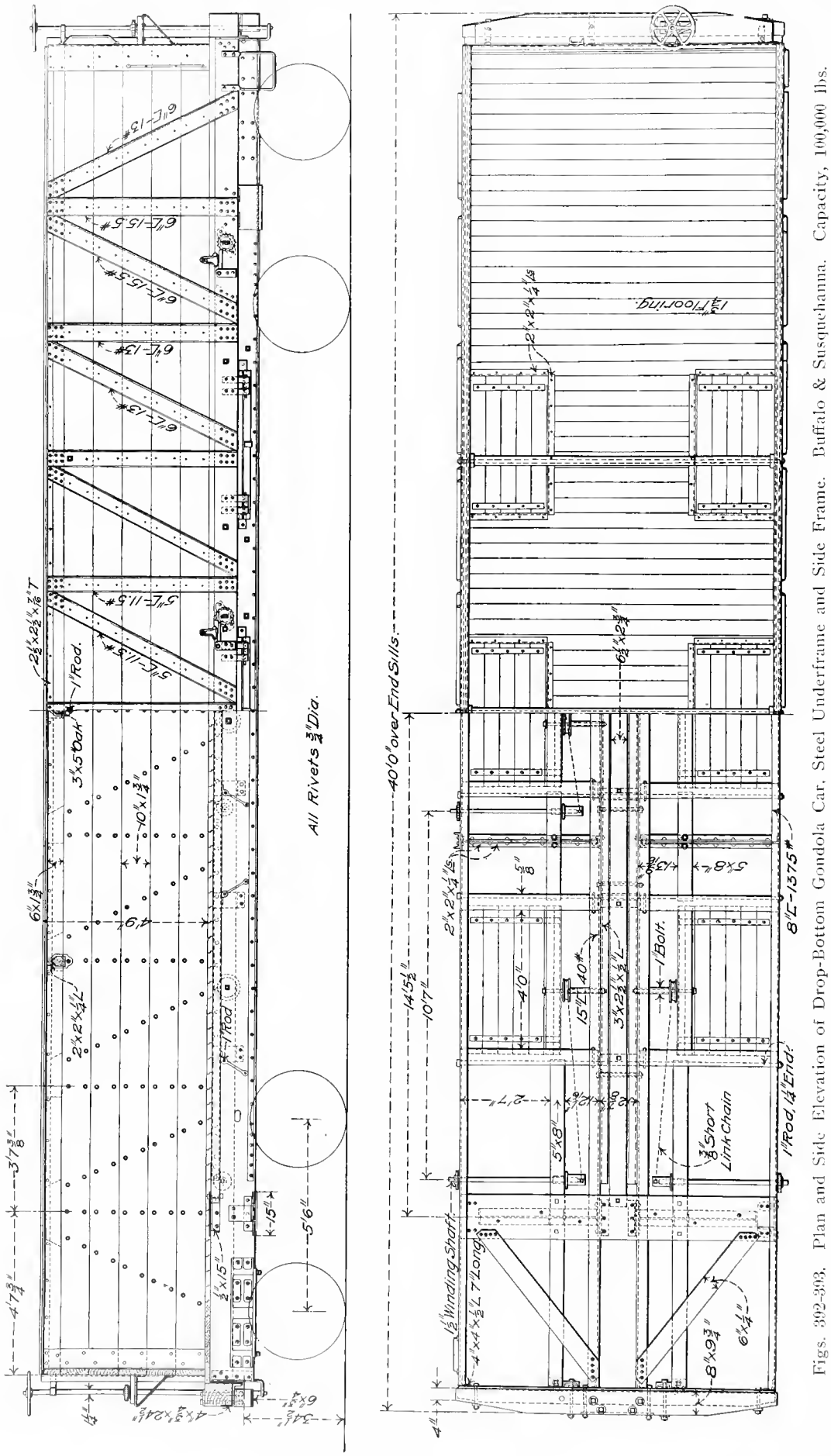




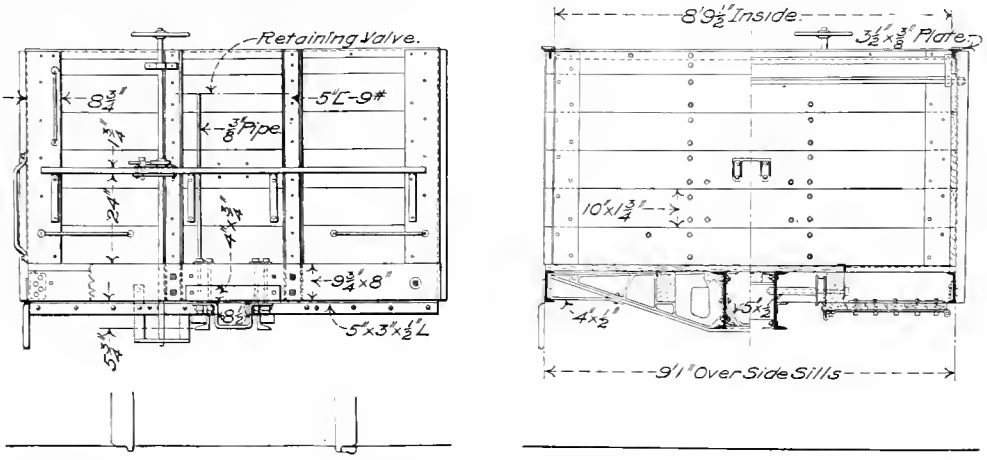




Figs. 388-391. Plan, Elevations and Sections of 38-ft. Gondola Car, Pressed Steel Underframe. Pennsylvania Railroad. Capacity, 100,000 lbs.



Figs. 392-393. Plan and Side Elevation of Drop-Bottom Gondola Car, Steel Underframe and Side Frame. Buffalo & Susquehanna. Capacity, 100,000 lbs.



Figs. 394-395. End Elevation and Cross-Section of Drop Bottom Gondola Car with Steel Underframe and Side Frame. Buffalo & Susquehanna. Capacity, 100,000 lbs.

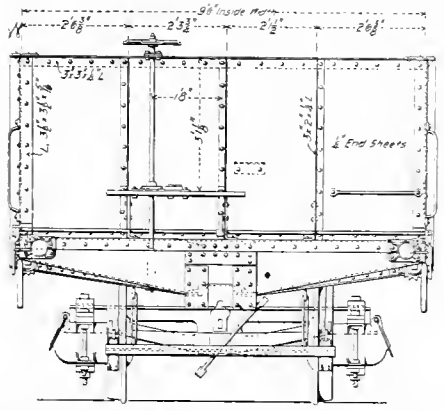
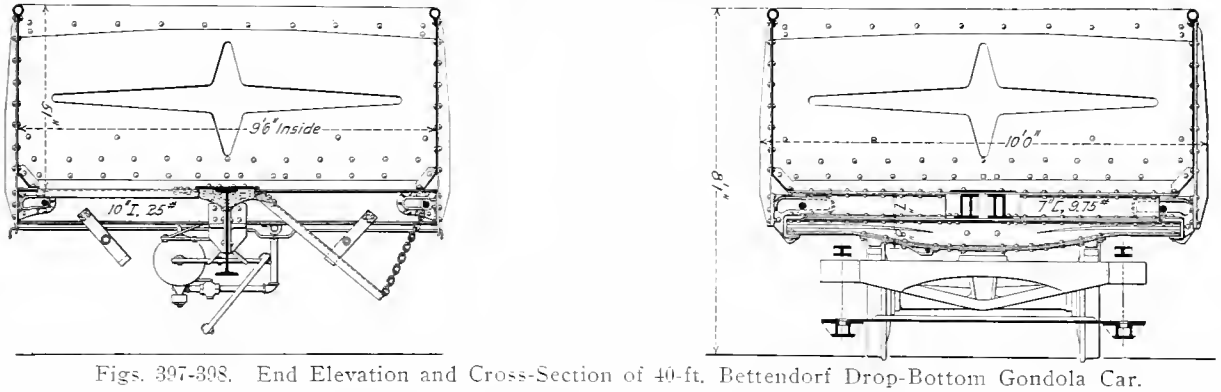


Fig. 396. End Elevation of 40-ft. Caswell Drop-Bottom Gondola Car, C., B. & Q. Structural Steel. Capacity, 100,000 lbs.



Figs. 397-398. End Elevation and Cross-Section of 40-ft. Bettendorf Drop-Bottom Gondola Car. C., B. & Q. Structural Steel. Capacity, 100,000 lbs.

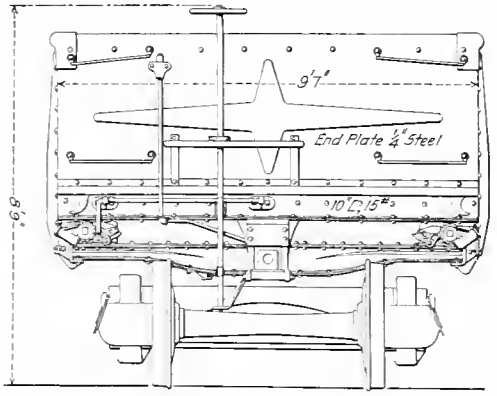
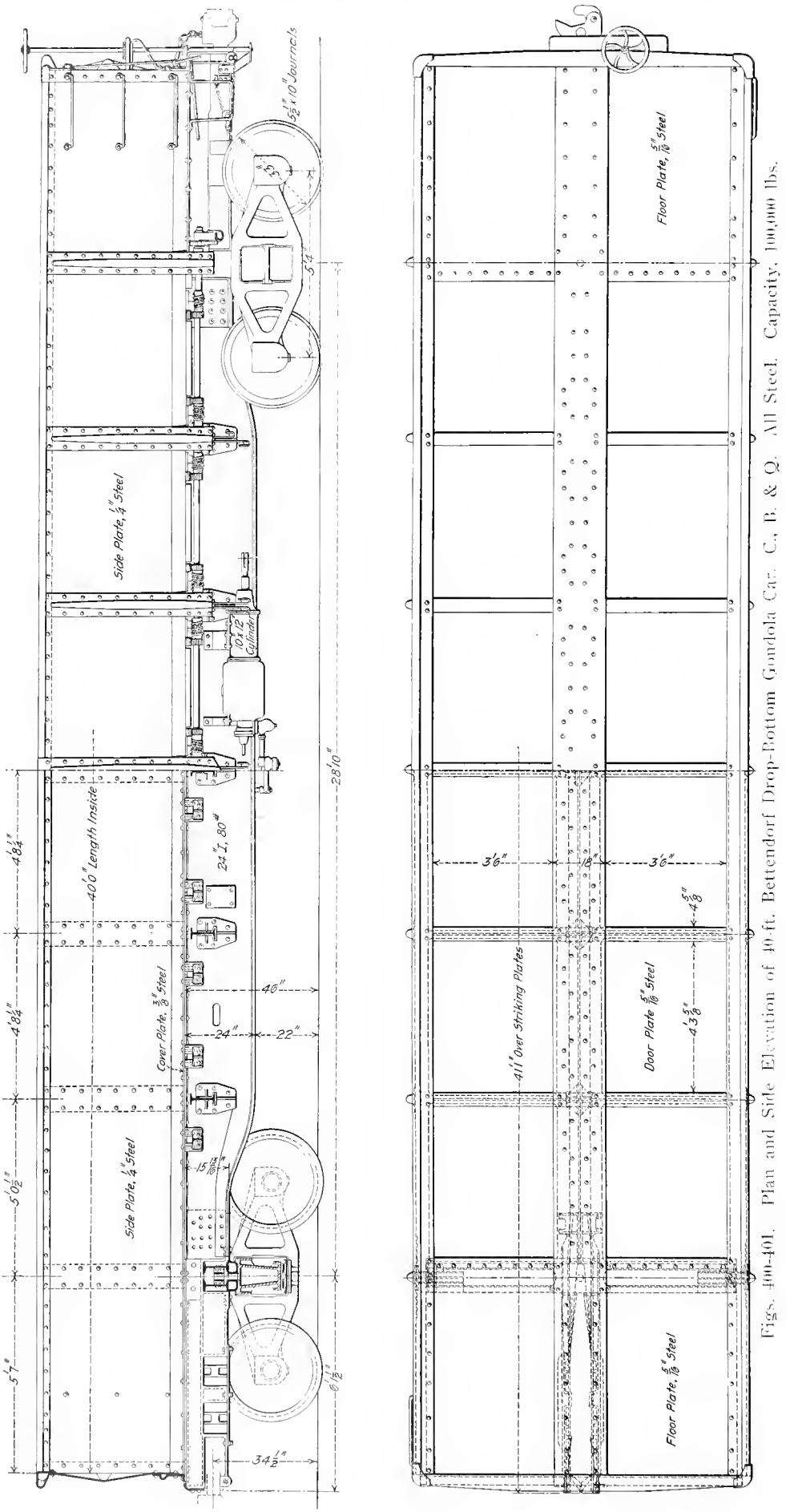
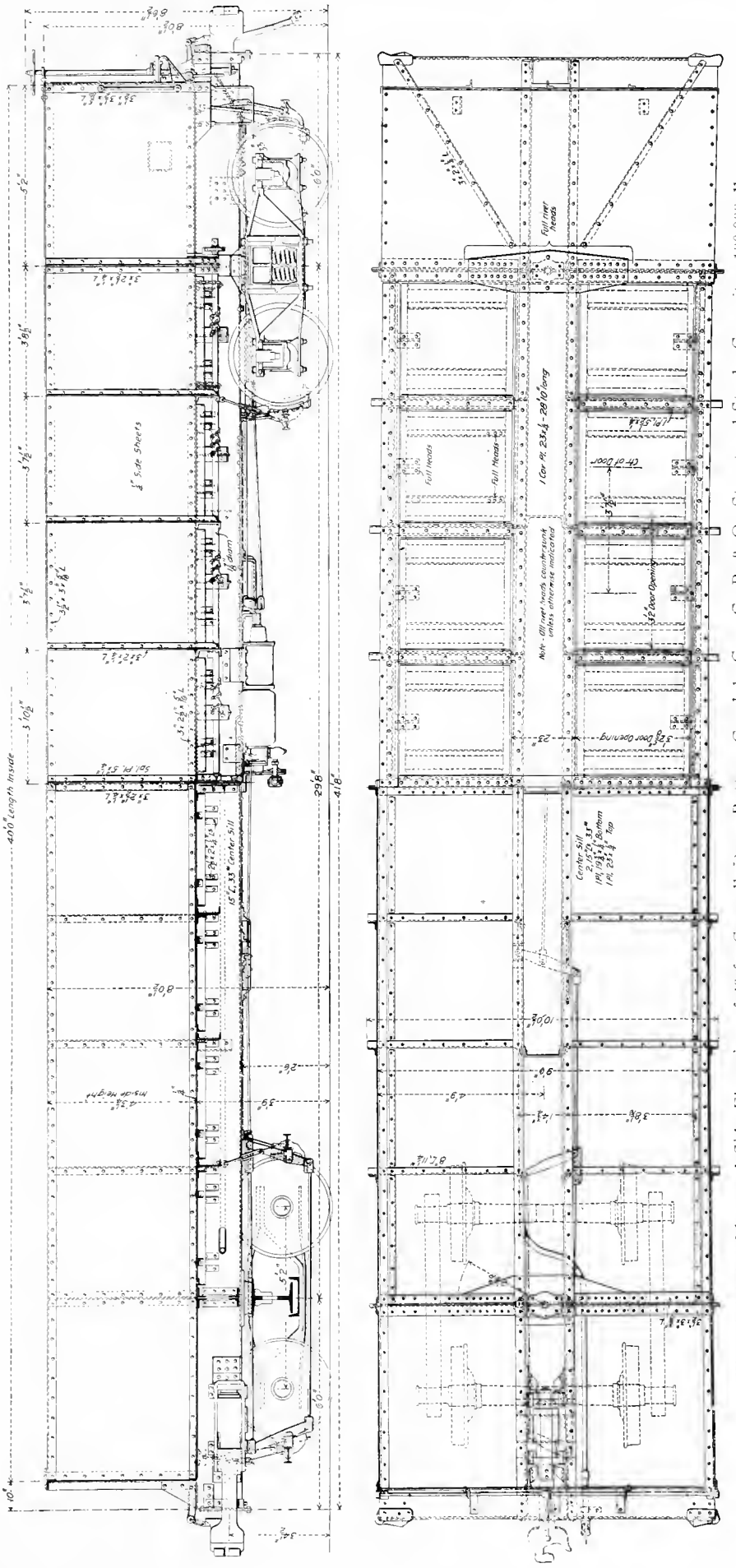


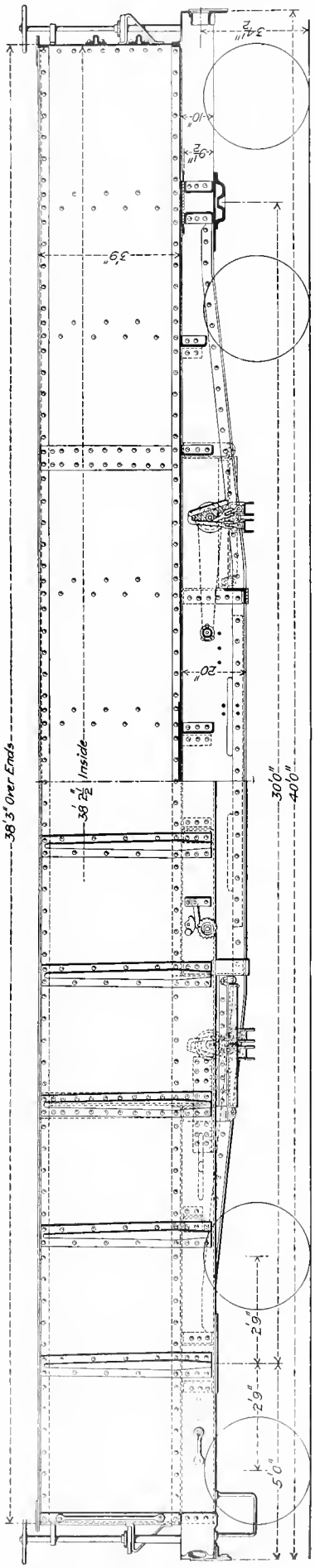
Fig. 339. End Elevation of 40-ft. Bettendorf Drop-Bottom Gondola Car. C., B. & Q. Structural Steel. Capacity, 100,000 lbs.

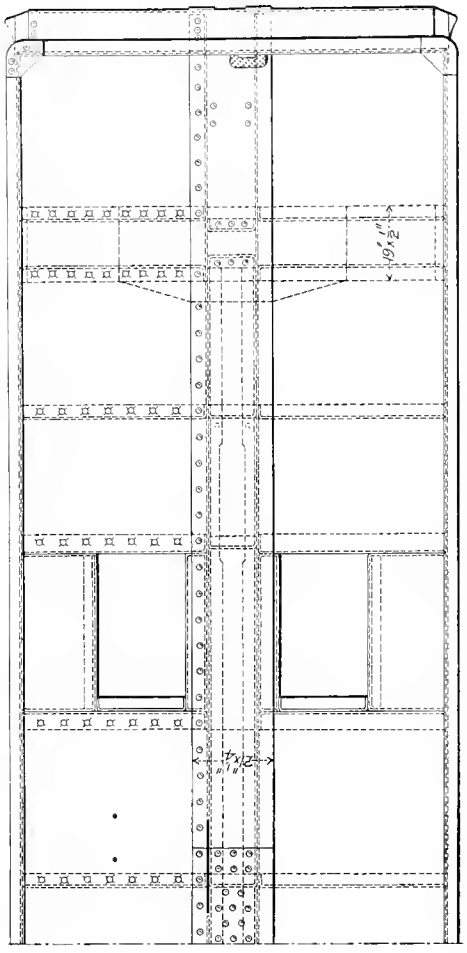


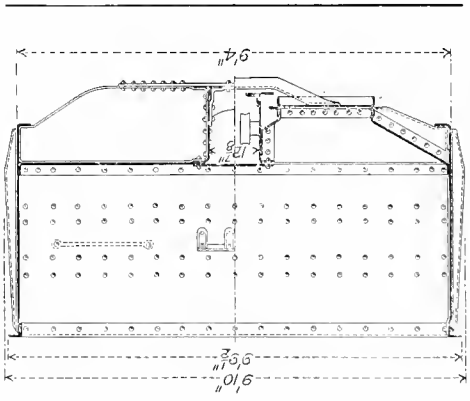
Figs. 400-401. Plan and Side Elevation of 40-ft. Bettendorf Drop-Bottom Gondola Car. C., B. & Q. All Steel. Capacity, 100,000 lbs.

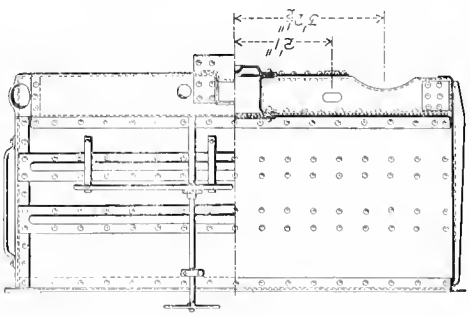


Figs. 402-403. Plan and Side Elevation of 40-ft. Caswell Drop-Bottom Gondola Car. C., B. & Q. Structural Steel. Capacity, 140,000 lbs.

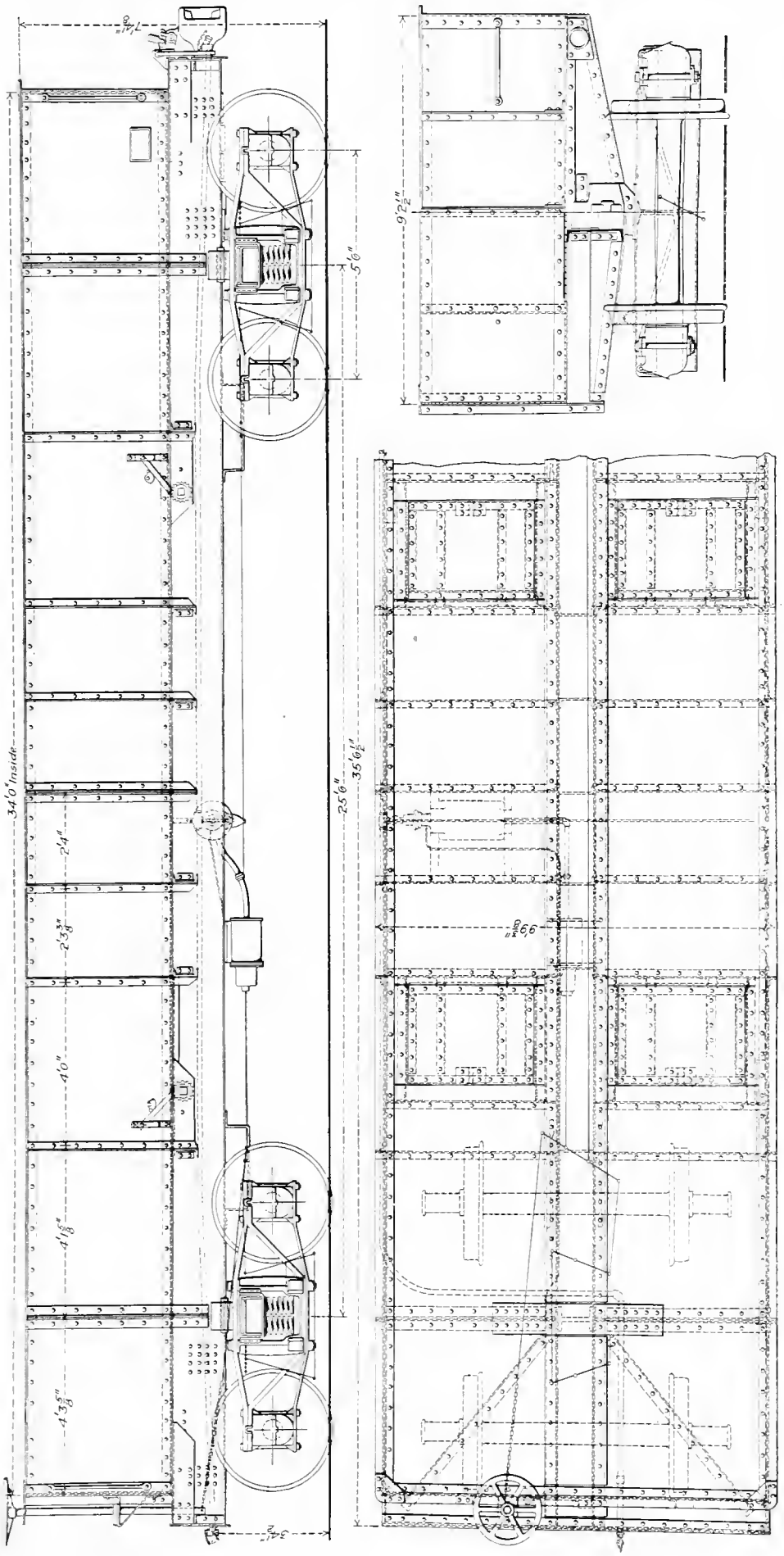




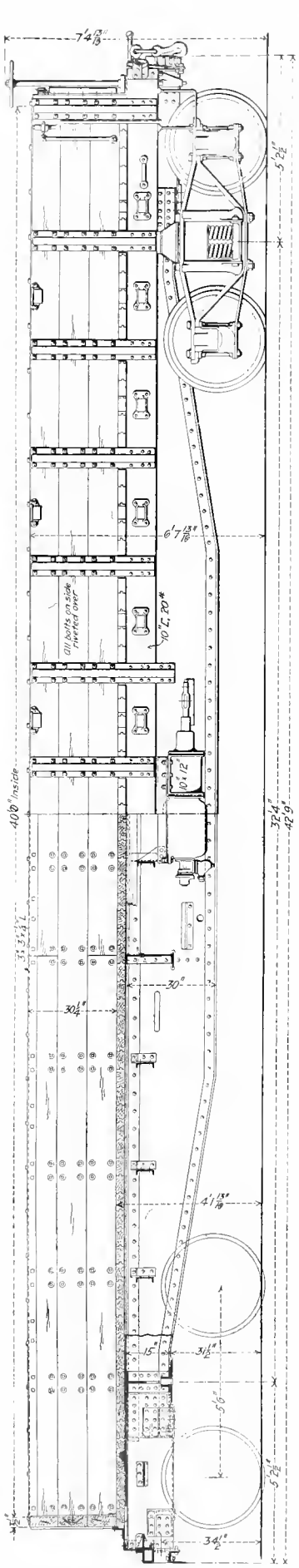


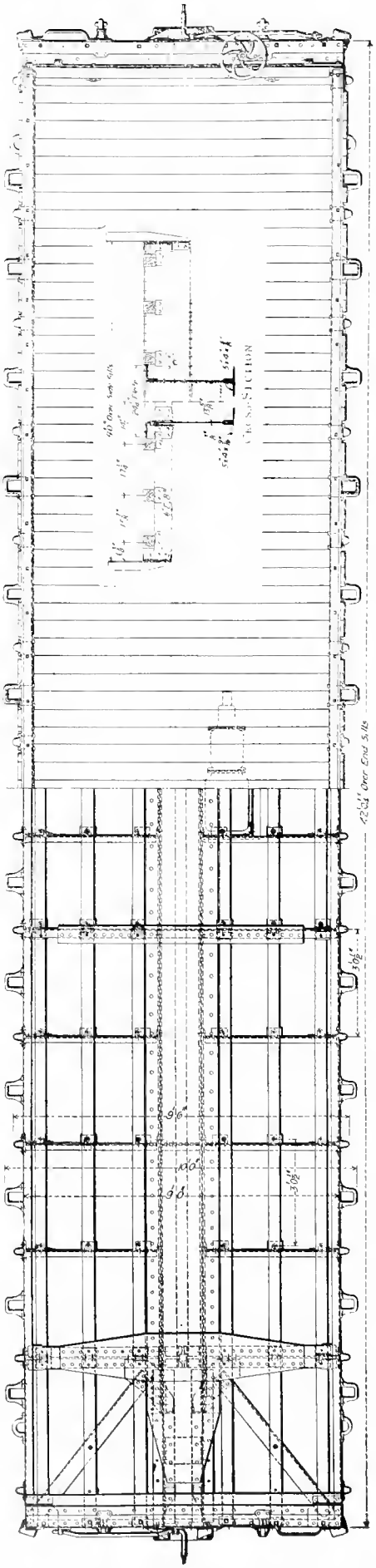


Figs. 404-407. Plan, Elevations and Sections of 38-ft. Drop-Bottom Gondola Car, Pressed Steel. Pennsylvania Railroad. Capacity, 100,000 lbs.

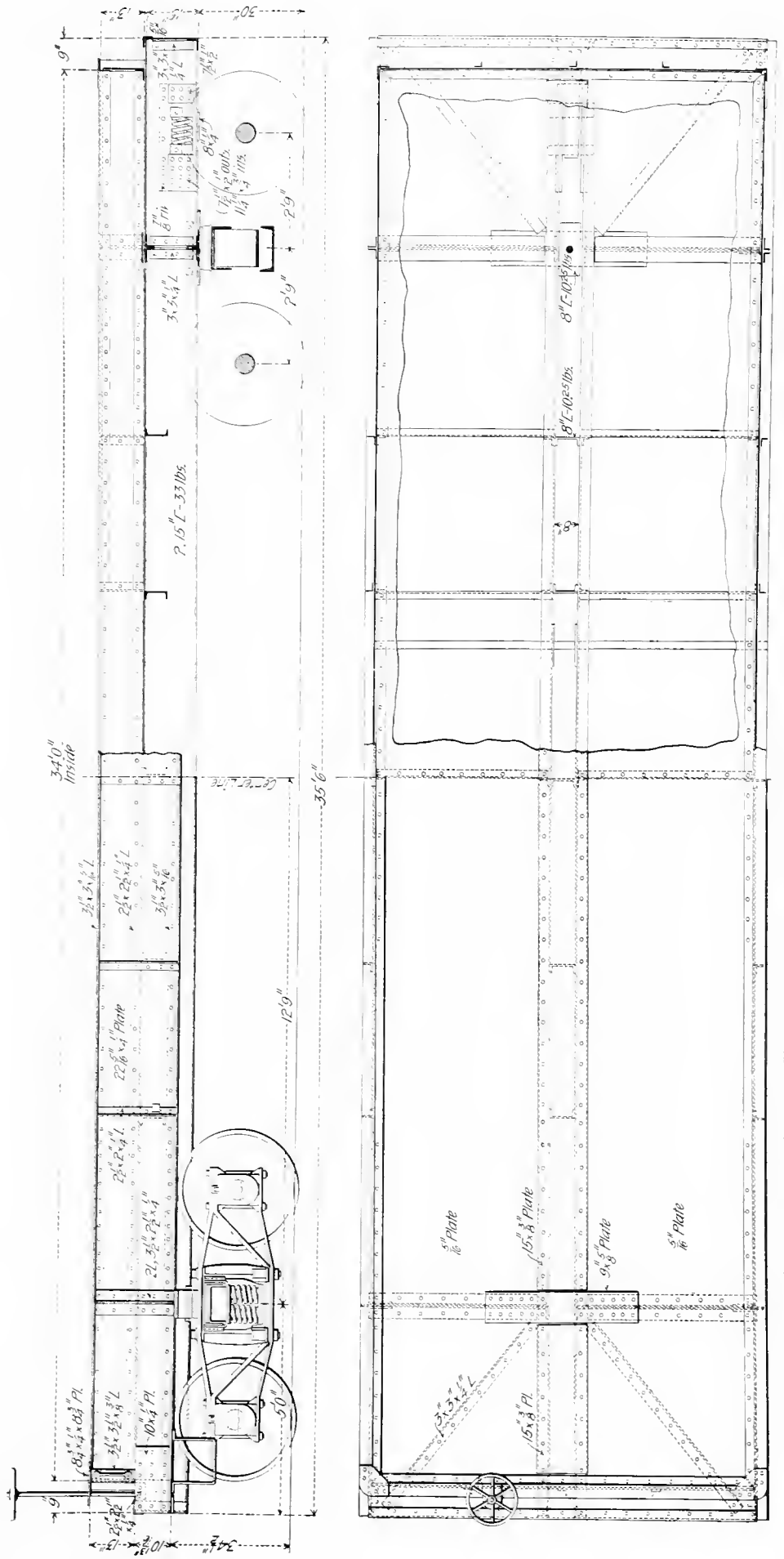


Figs. 408-410. Plan and Elevations of 34-ft. Drop-Bottom Gondola Car, Philadelphia & Reading. Structural Steel. Capacity, 100,000 lbs.

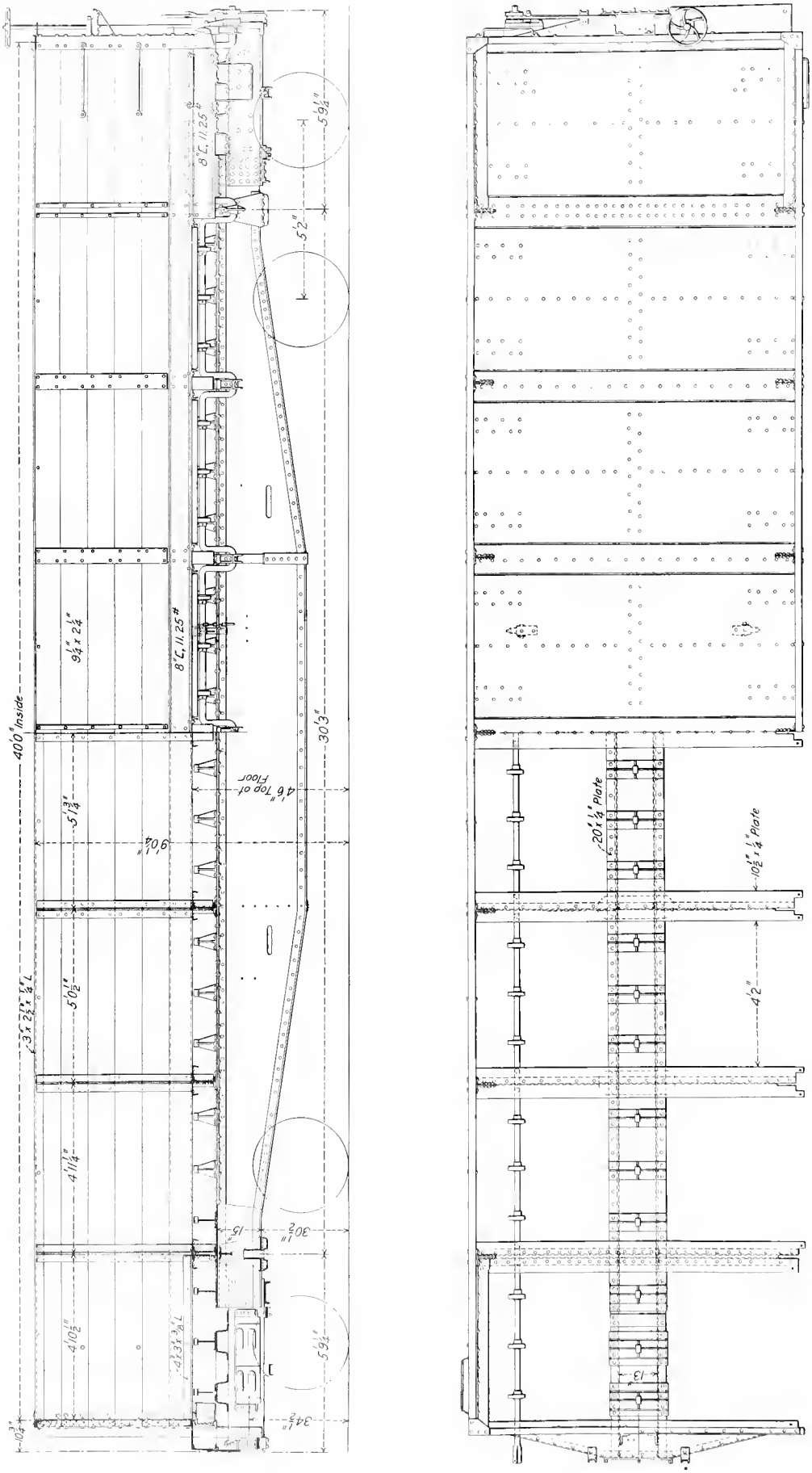




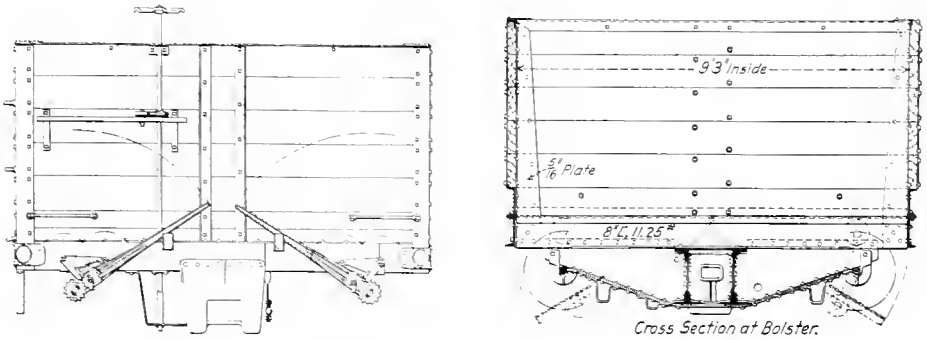
Figs. 411-413. Plan, Side Elevation and Cross-Section of 40-ft. Gondola Car with Drop Ends, B. & O. Structural Steel Underframe. Capacity, 100,000 lbs.



Figs. 414-415 Plan and Side Elevation of 34-ft Low Side Gondola Car, Structural Steel. Capacity, 100,000 lbs.



Figs. 416-417. Plan and Side Elevation of Ralston Flush-Floor, Drop-Bottom Gondola Car. Structural Steel Underframe. Capacity, 100,000 lbs.



Figs. 418-419. End Elevation and Cross-Section of Ralston Flush-Floor, Drop-Bottom Gondola Car. Capacity, 100,000 lbs.

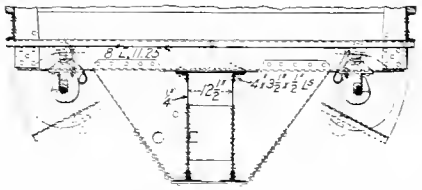
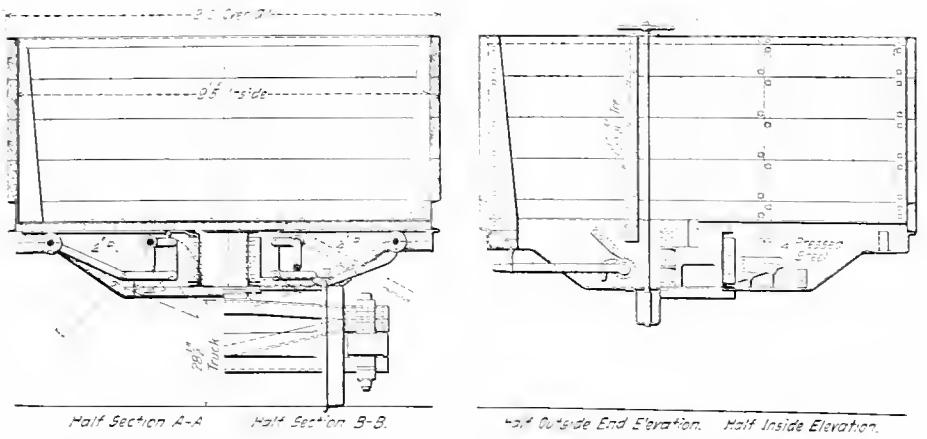
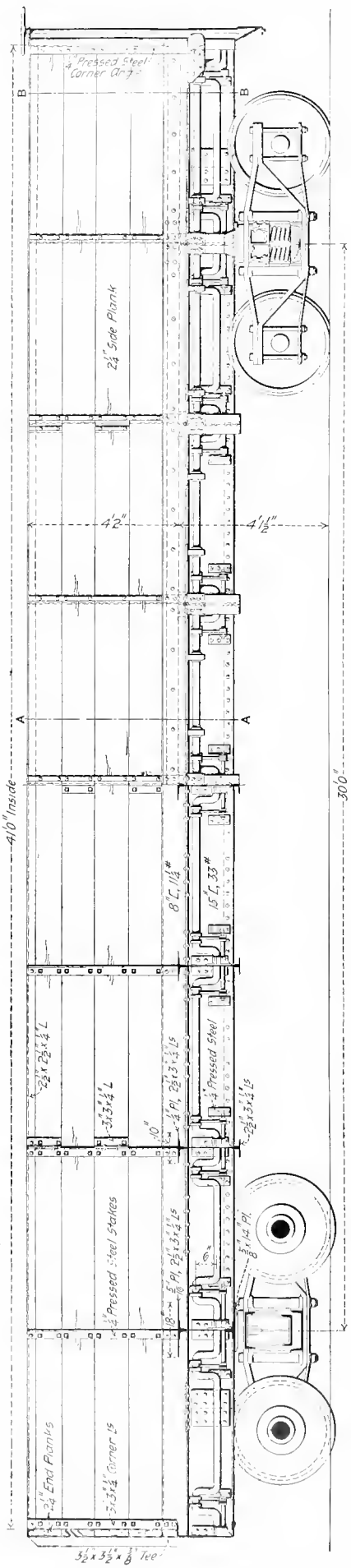
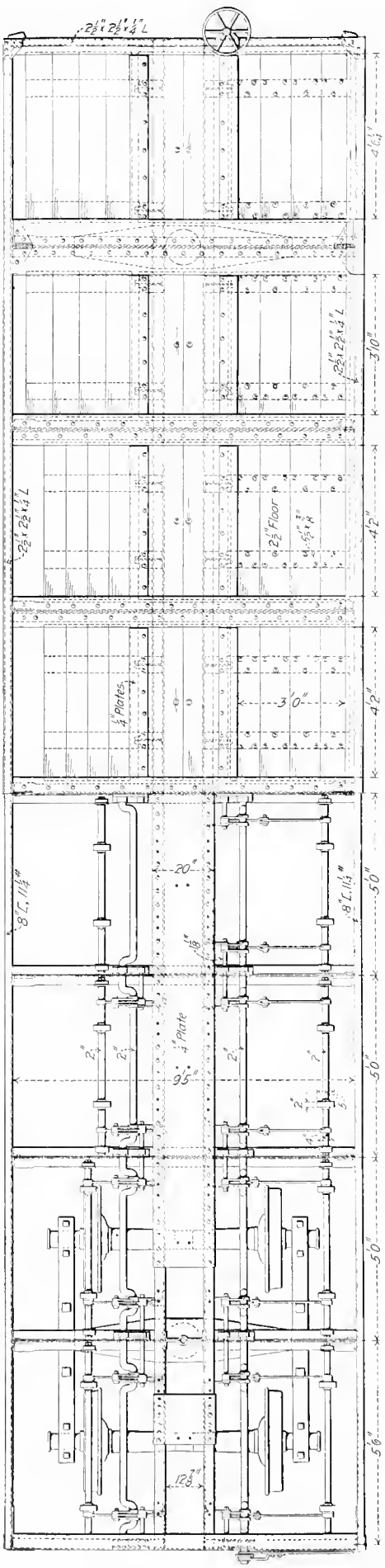


Fig. 420. Cross-Section at Cross Bearer of Ralston Flush-Floor, Drop-Bottom Gondola Car.



Figs. 421-422. End Elevation and Cross-Section of Campbell Drop-Bottom Gondola Car. Capacity, 100,000 lbs.





Figs. 423-424. Plan and Side Elevation of Campbell Drop-Bottom Gondola Car. Capacity, 100,000 lbs.

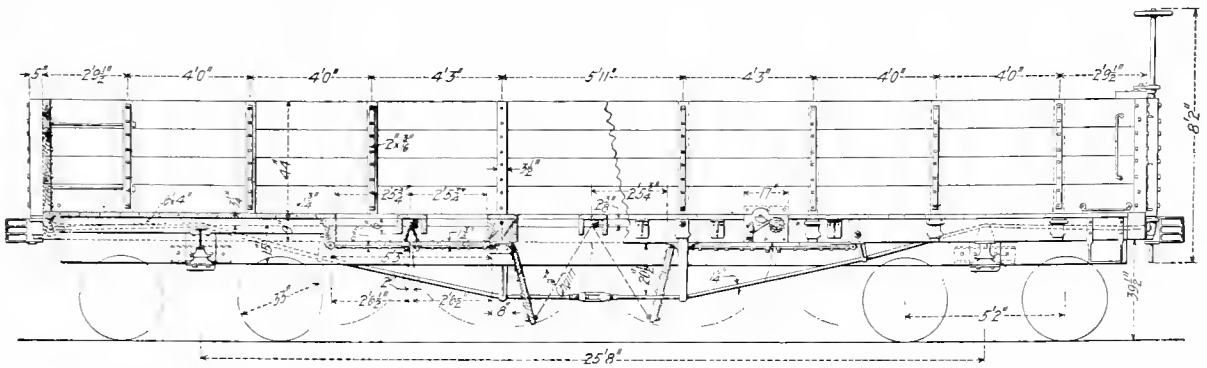


Fig. 425. Half Side Elevation and Section, Drop-Bottom Gondola Car, Steel Channel Center Sills. A., T. & S. F. Capacity, 80,000 lbs.

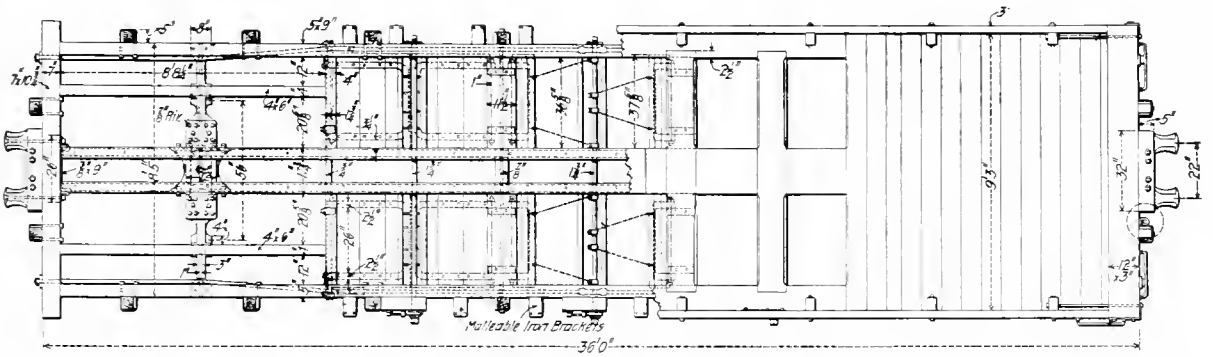


Fig. 426. Half Floor Plan and Framing.

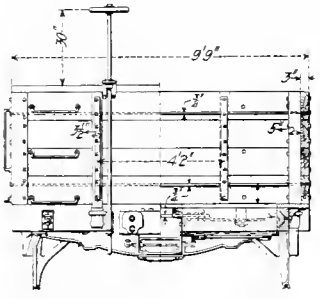
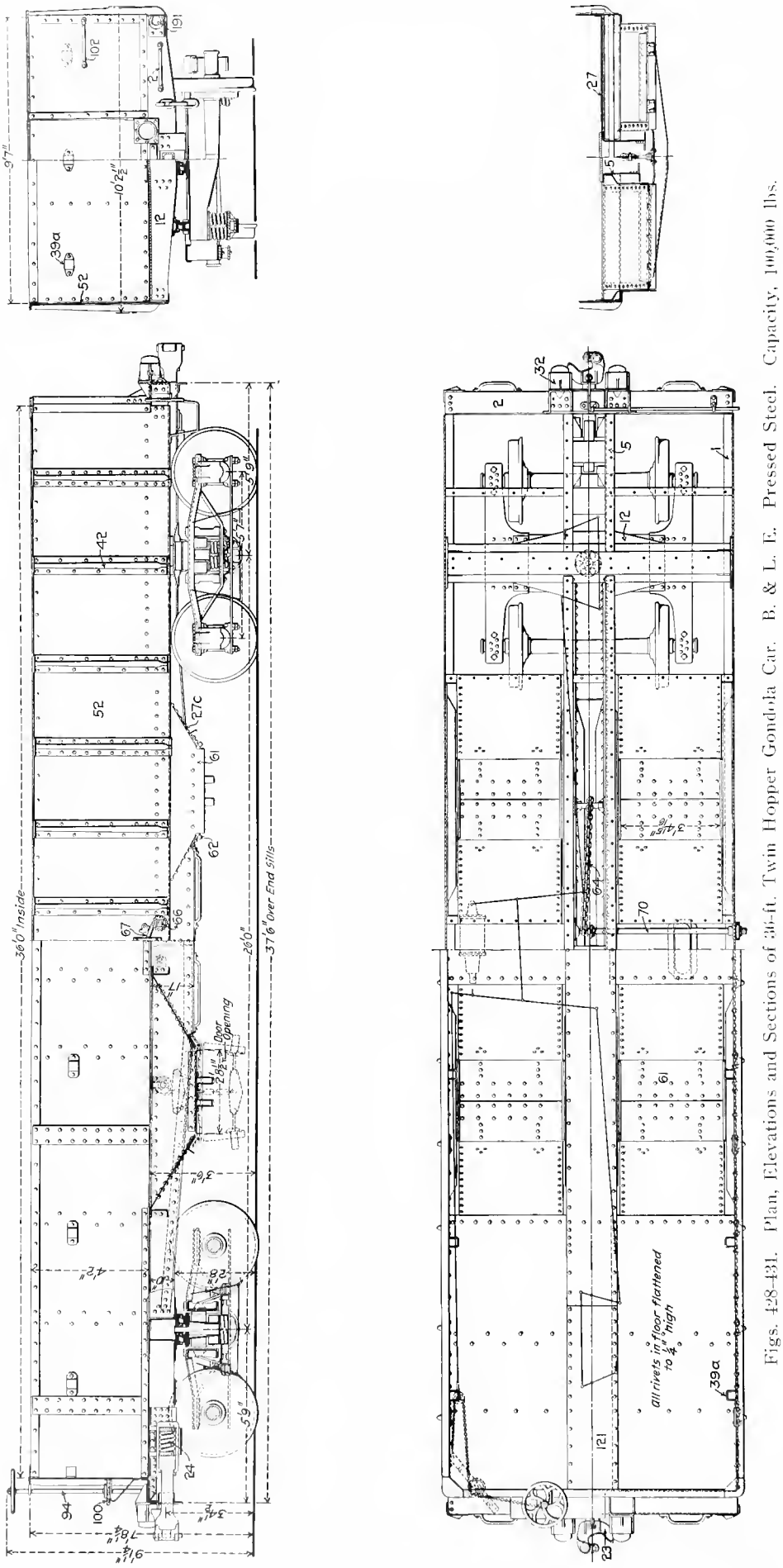


Fig. 427. End Elevation.

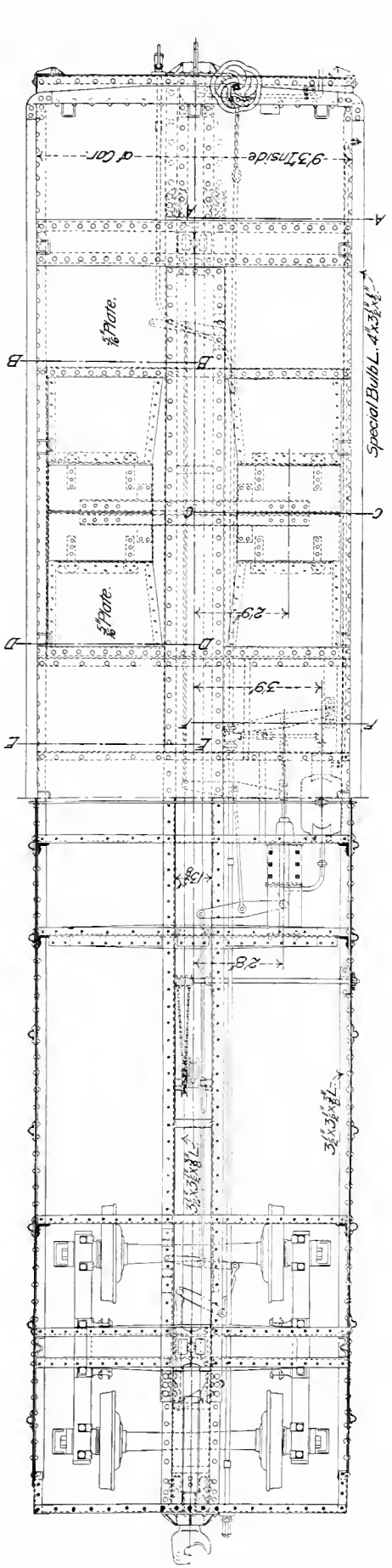
Names of Parts of Hopper Gondola Cars. Figs. 428-431.

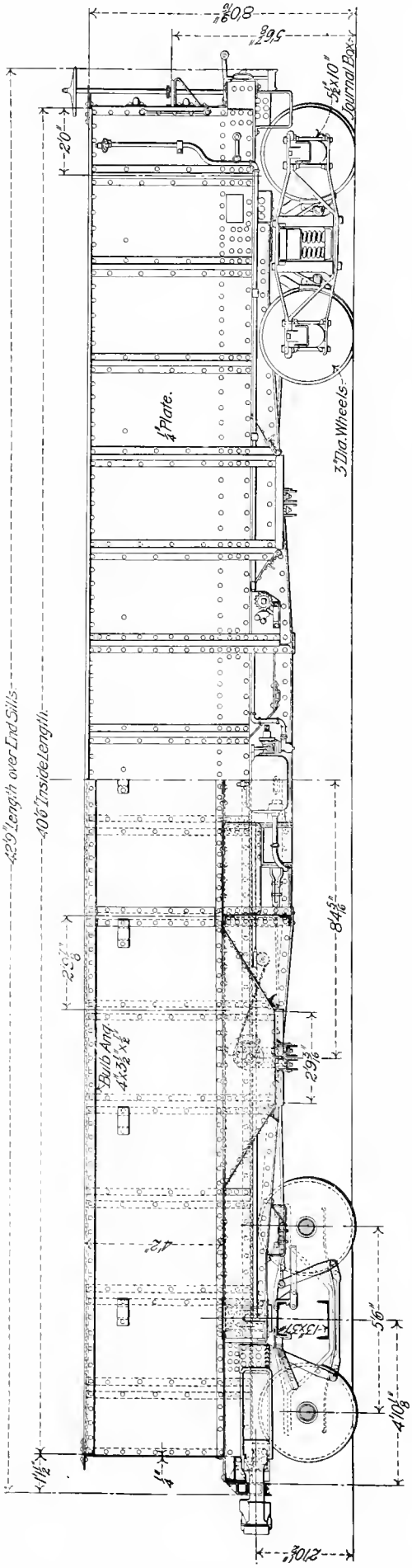
1 *Side Sill*
2 *End Sill*
5 *Center Sill*
12 *Body Bolster*
23 *Drawbar*
24 *Draft Spring*
27 *Floor*
27c *Hopper Slope*
32 *Buffer Blocks*
39a *Stake Pocket*
42 *Stake*
52 *Side Plank or Sheet*
61 *Drop Door*
62 *Drop Door Hinge*
64 *Drop Door Chain*
66 *Winding Shaft Rotchet Wheel*
67 *Winding Shaft Ratchet Pawl*
70 *Winding Shaft*
94 *Brake Shaft*
100 *Brake Step*
102 *Hand Hold*
121 *Center Sill Cover Plate*
191 *Push Pole Corner Iron*

Numbers Refer to List of Names with Figs. 425-427.

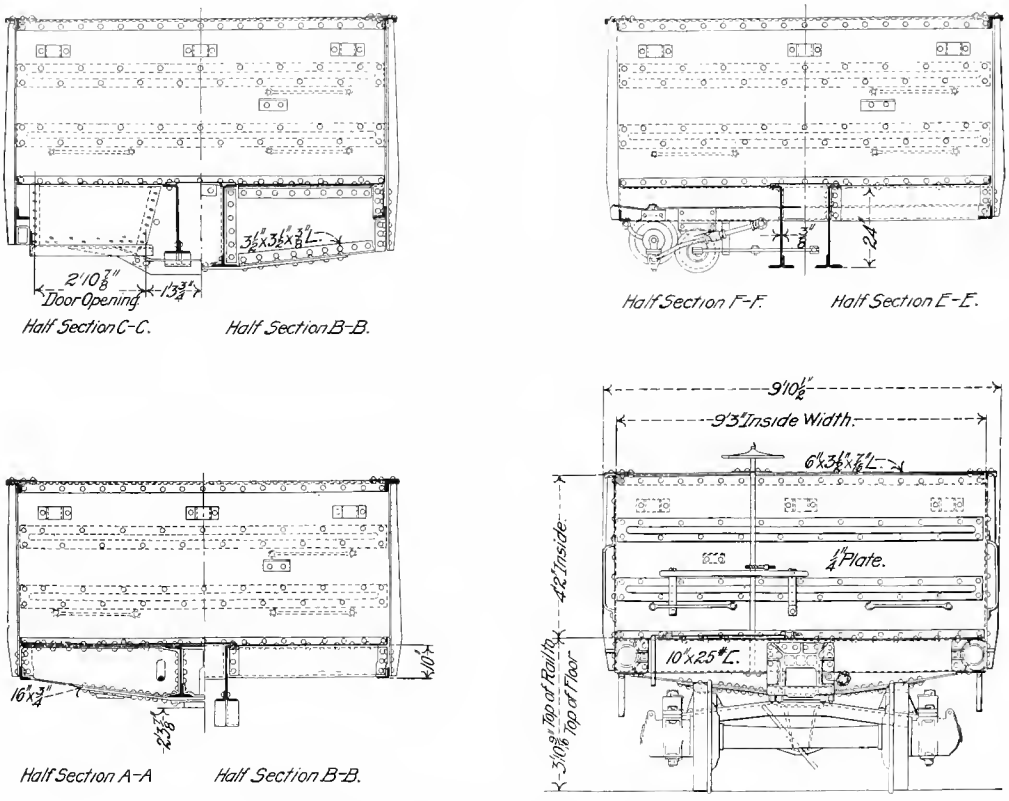


Figs. 428-431. Plan, Elevations and Sections of 36-ft. Twin Hopper Gondola Car. B. & L. E. Pressed Steel. Capacity, 100,000 lbs.

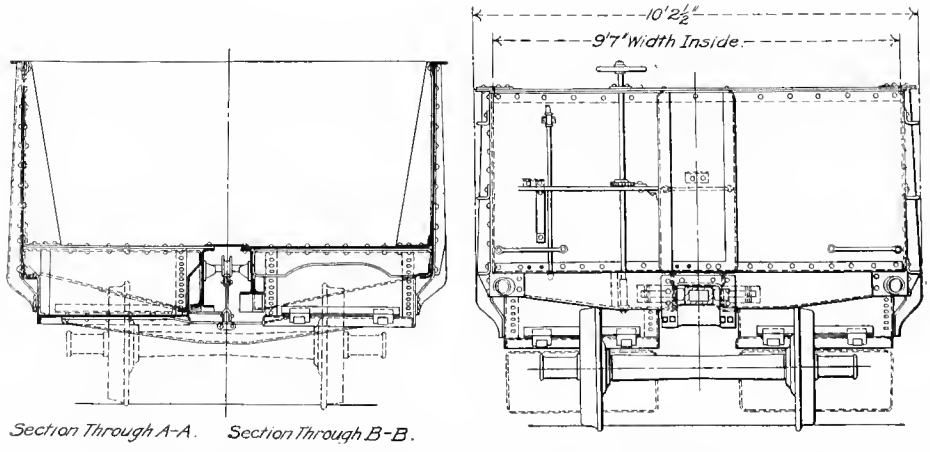




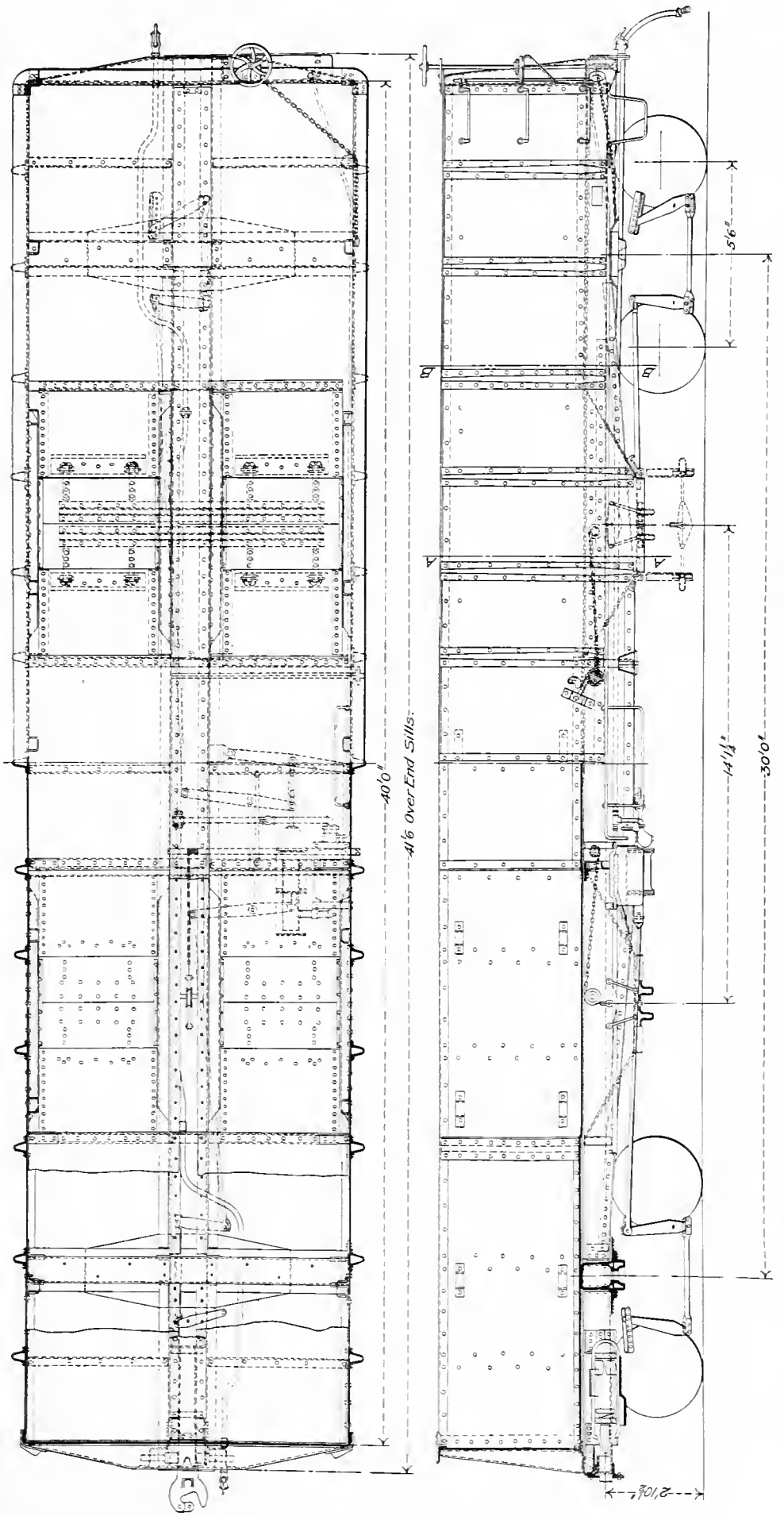
Figs. 432-433. Plan and Side Elevation of Twin Hopper Gondola Car. B. & O. Pressed Steel. Capacity, 100,000 lbs.



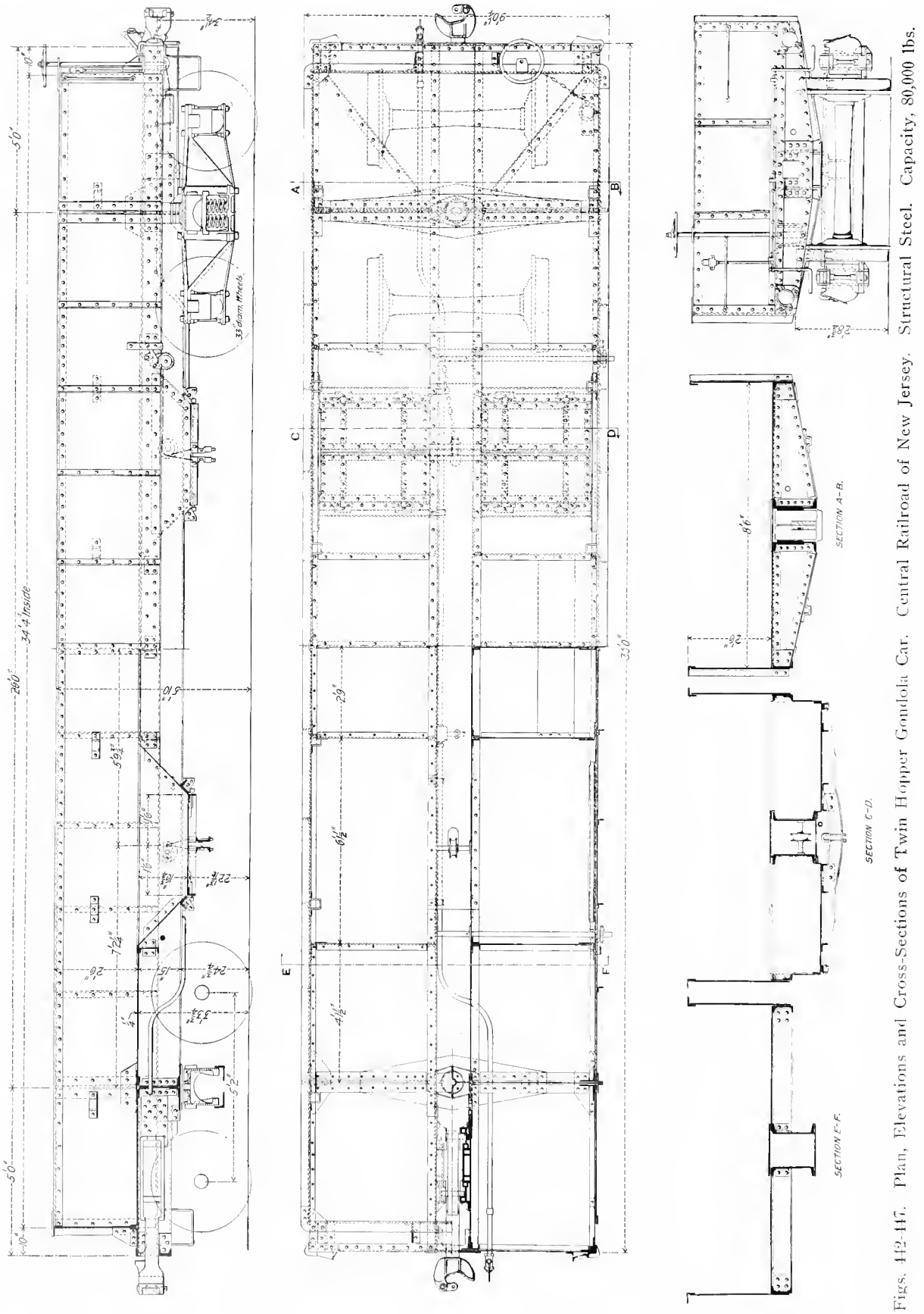
Figs. 434-437. End Elevation and Cross-Sections of Twin Hopper Gondola Car.
B. & O. Pressed Steel. Capacity, 100,000 lbs.



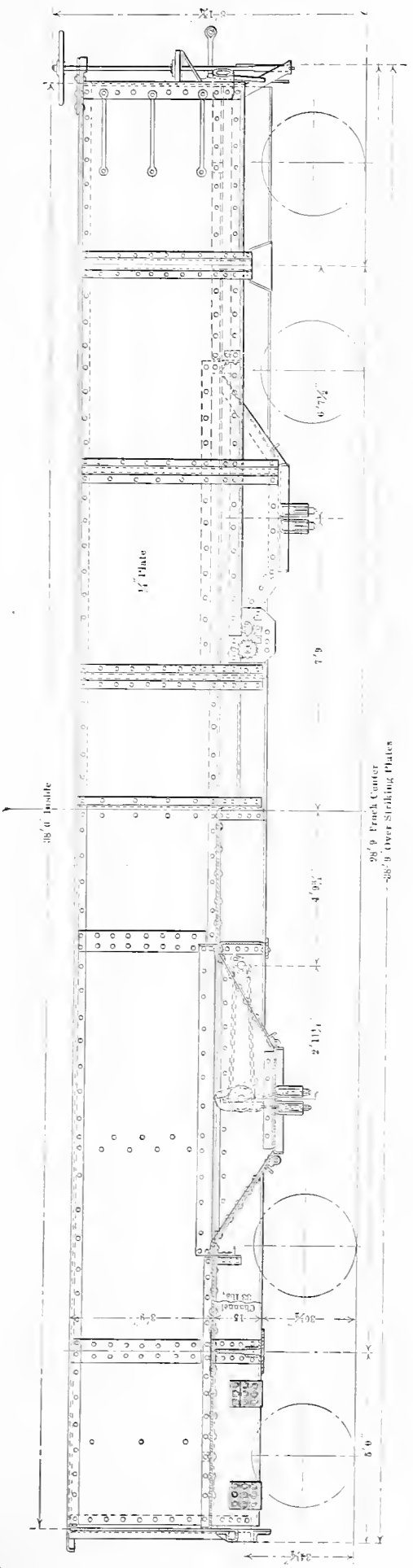
Figs. 438-439. End Elevation and Cross-Section of Twin Hopper Gondola Car.
L. S. & M. S. Pressed Steel. Capacity, 100,000 lbs.

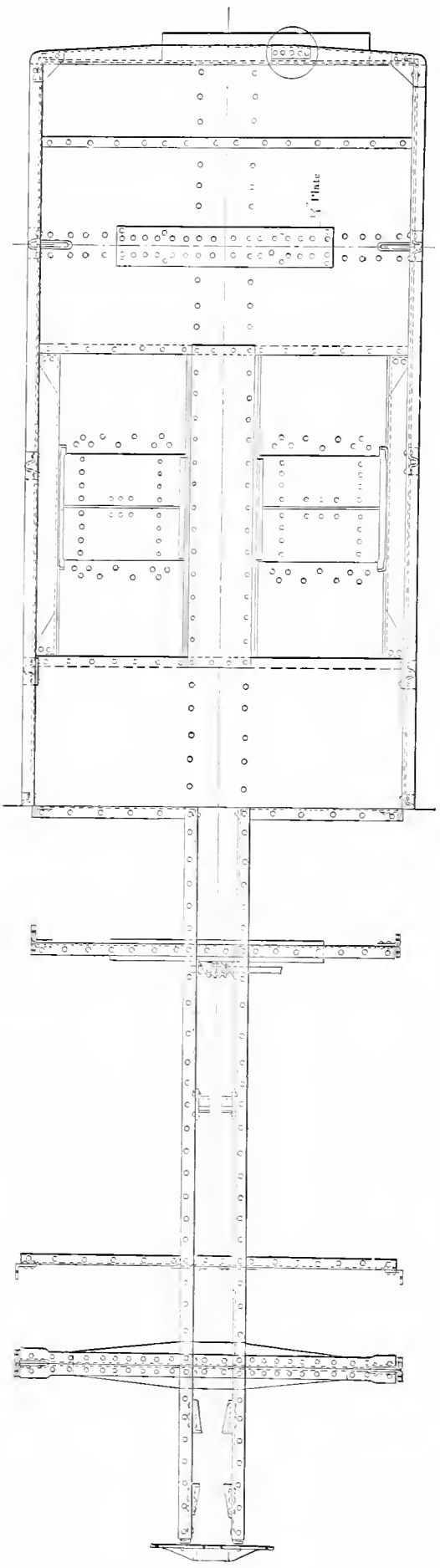


Figs. 440-441. Plan and Side Elevation of Twin Hopper Gondola Car. L. S. & M. S. Pressed Steel. Capacity, 100,000 lbs.

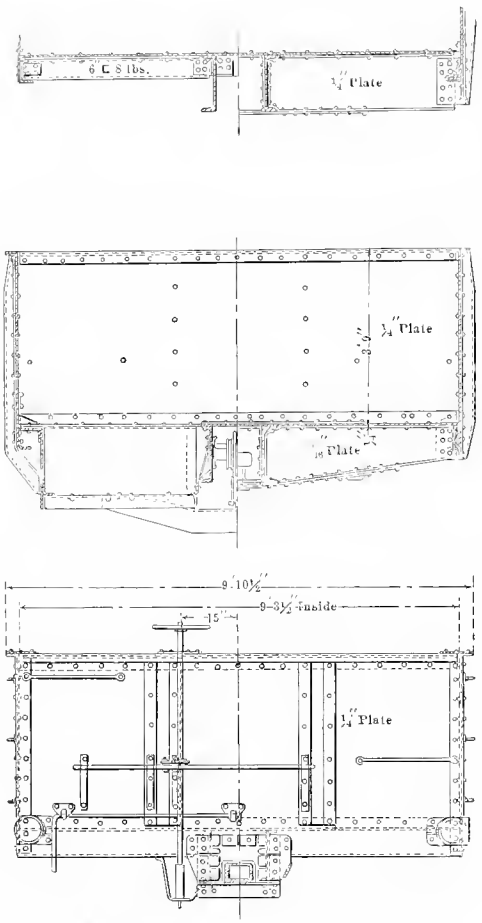


Figs. 442-447. Plan, Elevations and Cross-Sections of Twin Hopper Gondola Car. Central Railroad of New Jersey. Structural Steel. Capacity, 80,000 lbs.





Figs. 448-449. Plan and Side Elevation of Twin Hopper Gondola Car. Structural Steel. Capacity, 100,000 lbs.



Figs. 450-452. End Elevation and Cross-Sections of Twin Hopper Gondola Car. Structural Steel. Capacity, 100,000 lbs.

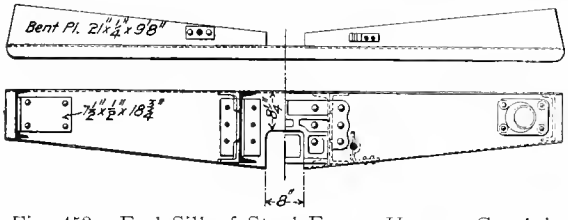


Fig. 453. End Sill of Steel Frame Hopper Gondola Car. Berwind-White Coal Mining Co. Capacity, 80,000 lbs.

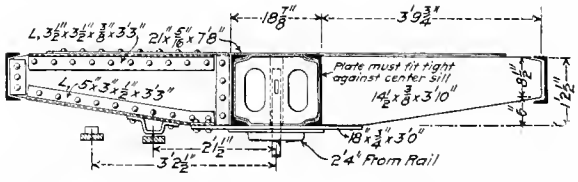


Fig. 454. Bolster of Steel Frame Hopper Gondola Car. Berwind-White Coal Mining Co. Capacity, 80,000 lbs.

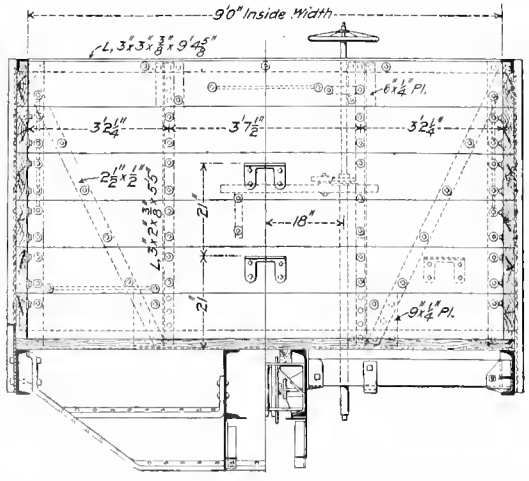
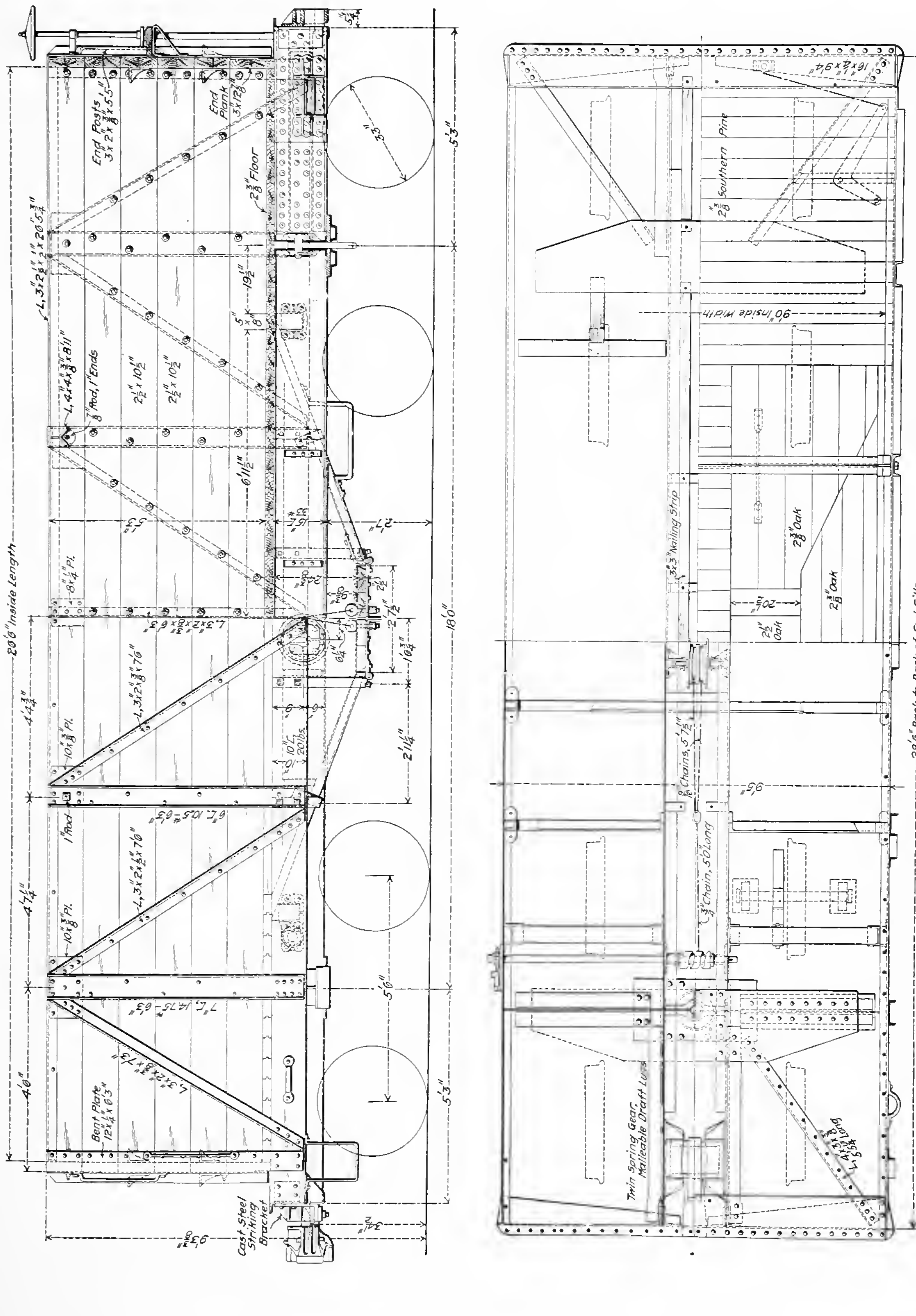
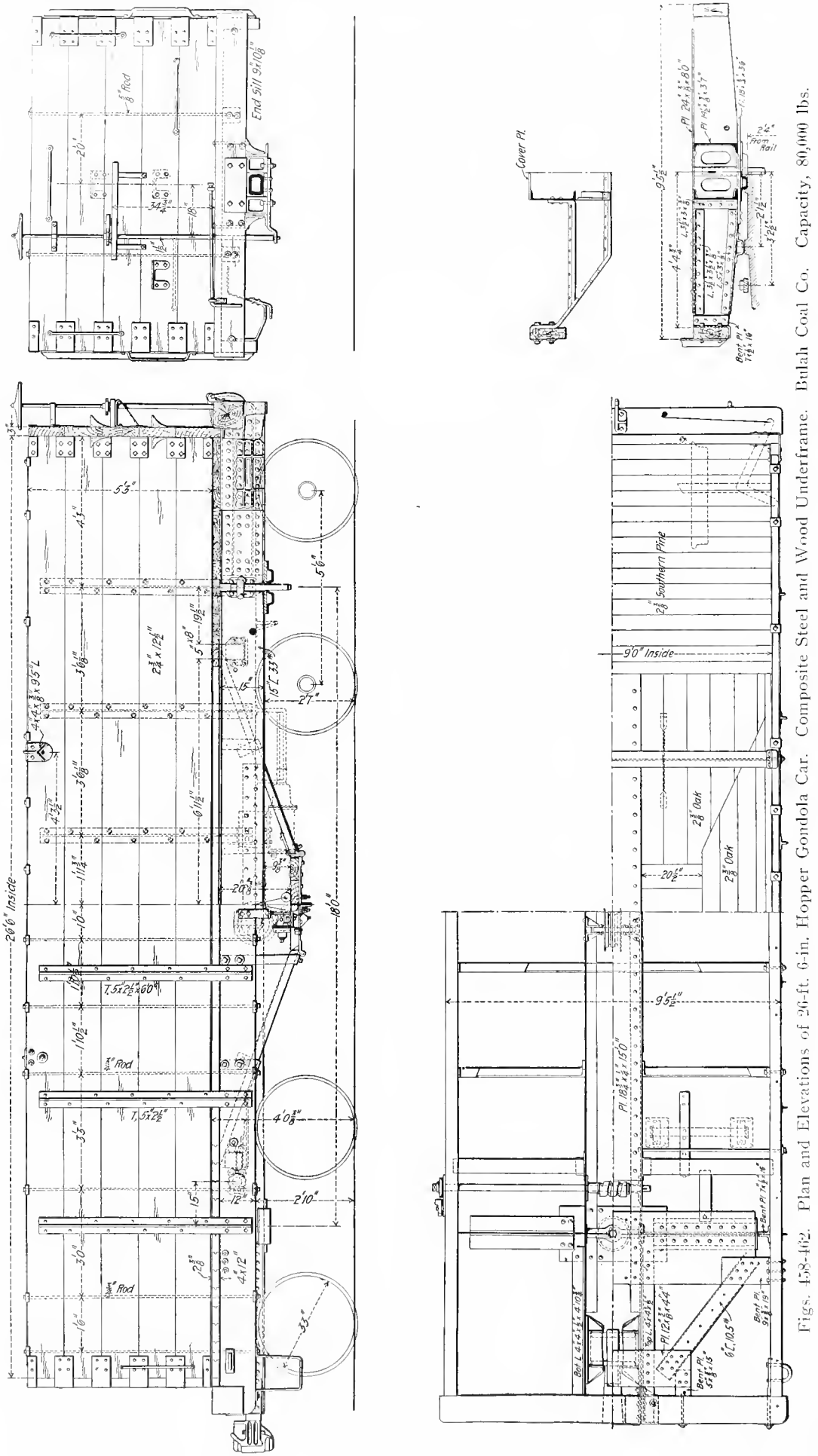


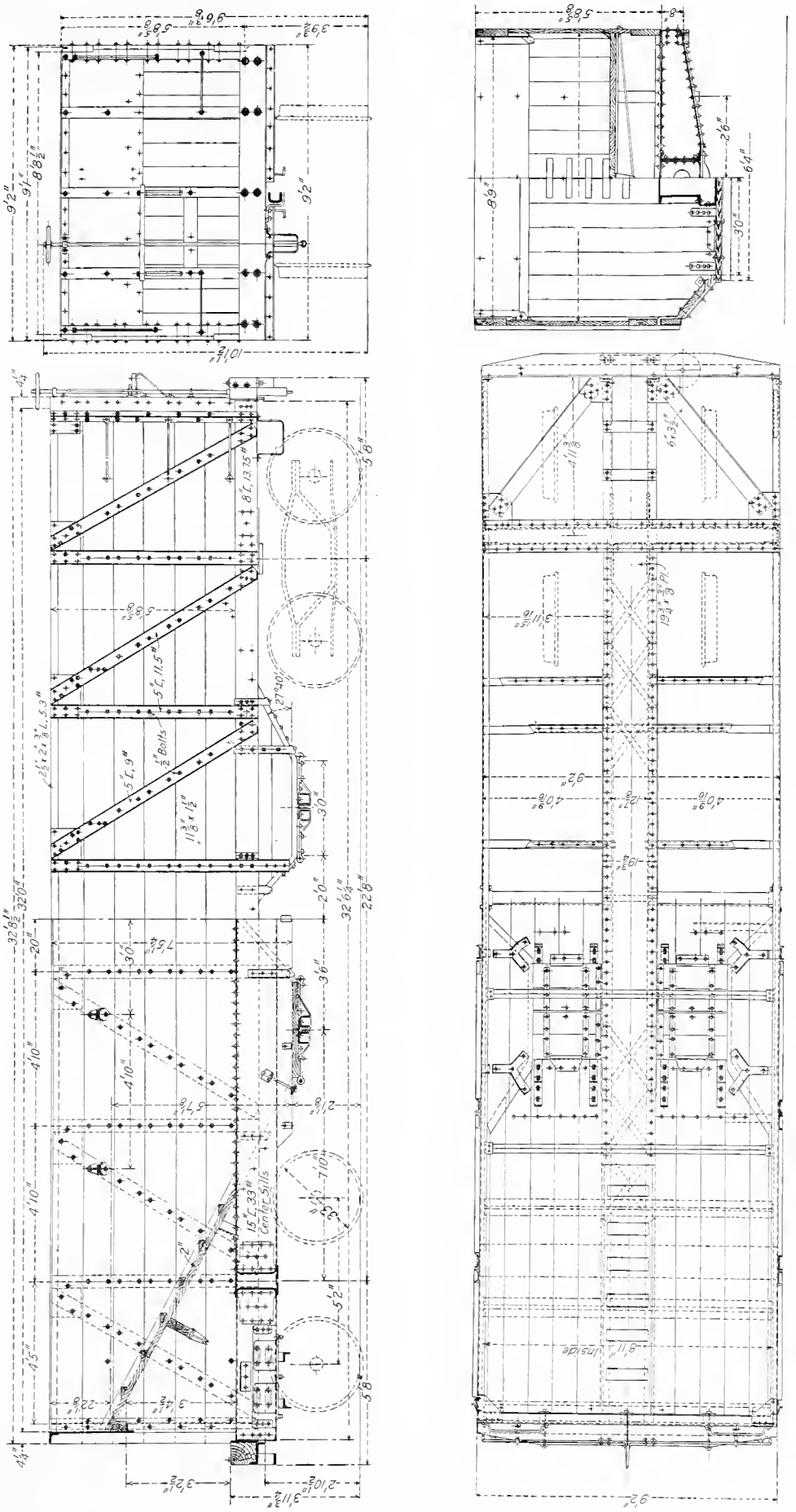
Fig. 455. End Elevation of Steel Frame Hopper Gondola Car. Berwind-White Coal Mining Co. Capacity, 80,000 lbs.



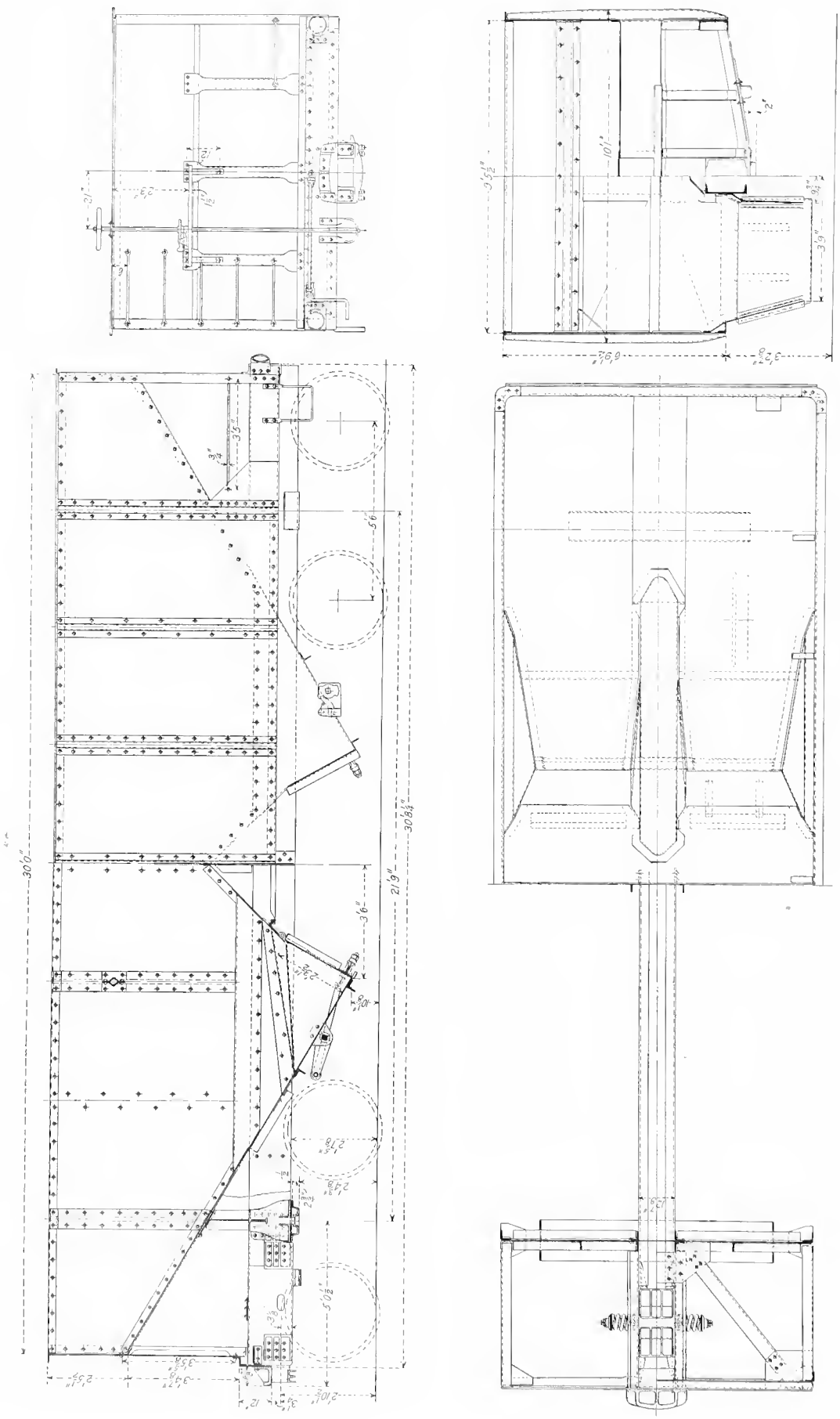
Figs. 456-457. Plan and Side Elevation of 26-ft. 6-in. Steel Frame Hopper Gondola Car. Berwind-White Coal Mining Co. Capacity, 80,000 lbs.



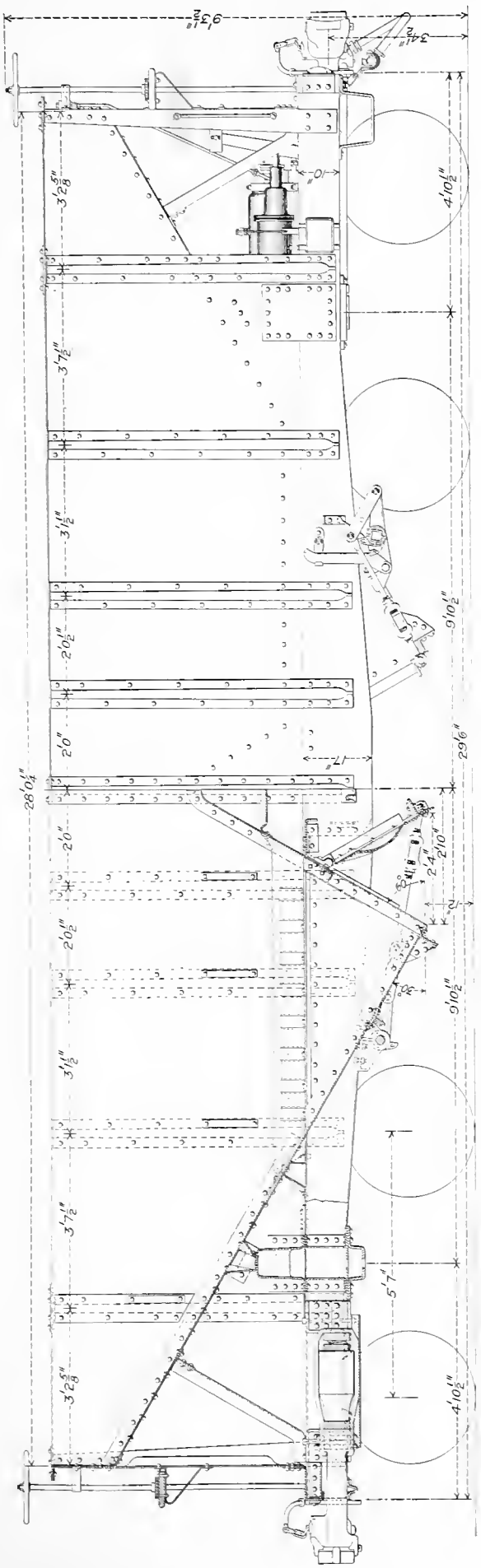
Figs. 458-462. Plan and Elevations of 26-ft. 6-in. Hopper Gondola Car. Composite Steel and Wood Underframe. Bulah Coal Co. Capacity, 80,000 lbs.

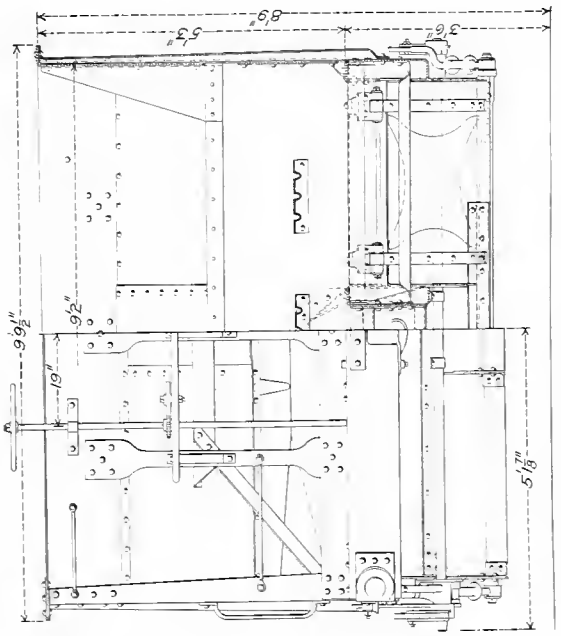


Figs. 463-466. Plan, Elevations and Cross-Section of 32-ft. Composite Hopper Car. D. & H. Capacity, 85,000 lbs.



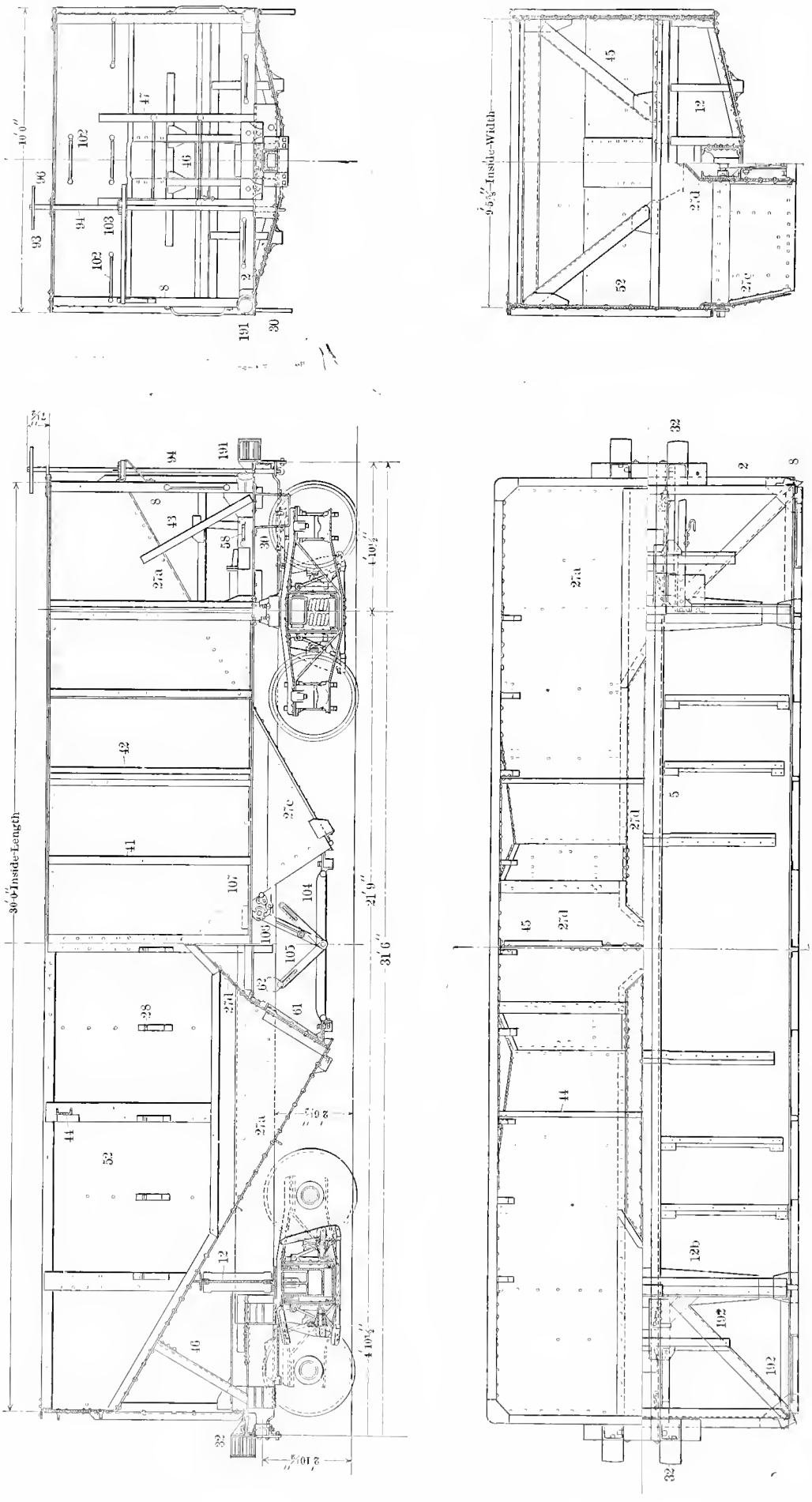
Figs. 467-470. Plan, Elevations and Sections of Hopper Car, All Steel, Self Clearing. L. S. & M. S. Capacity, 100,000 lbs



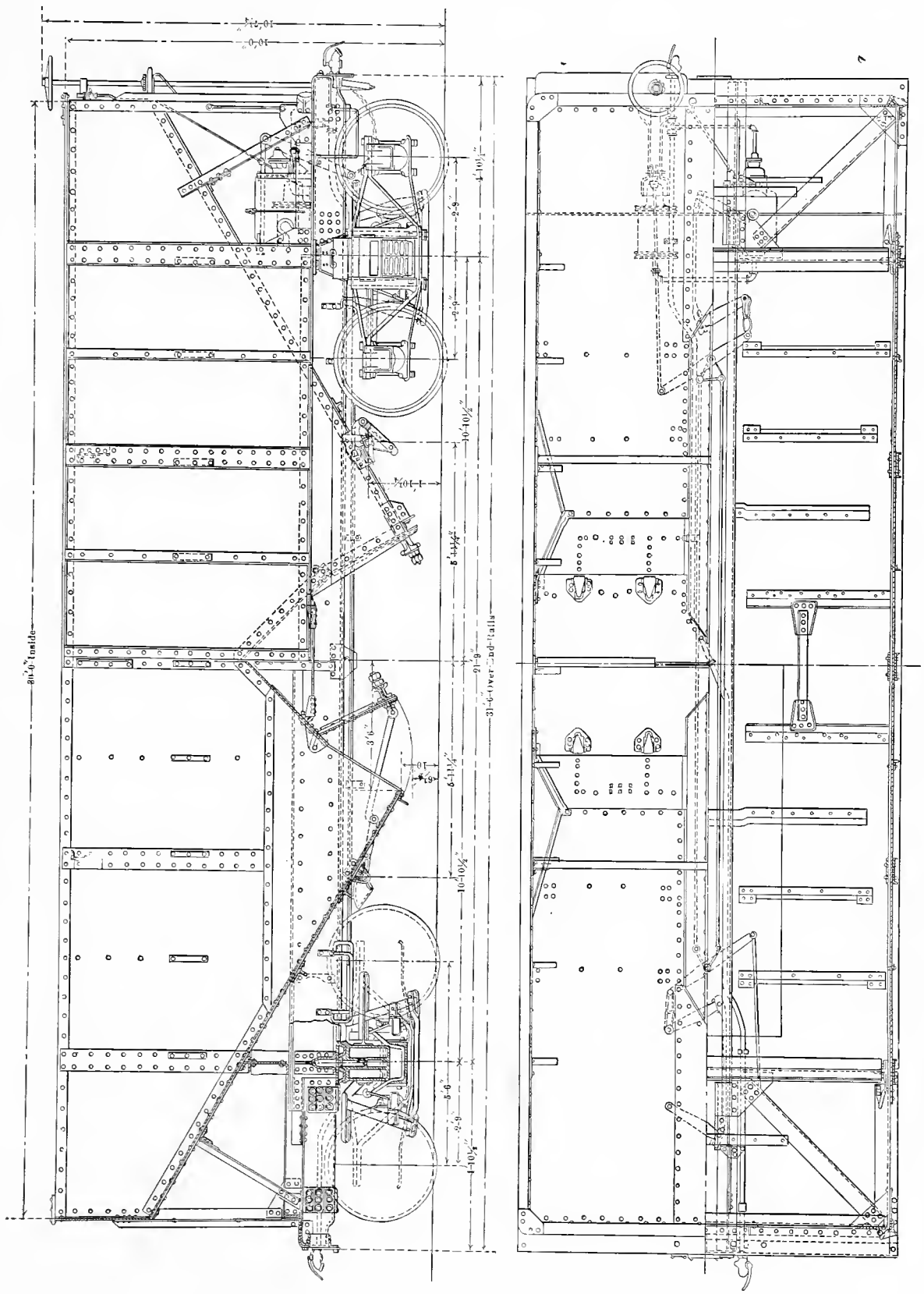


Figs. 471-473. Plan, Side Elevation and Sections of 28-ft. Hopper Car. B. & L. E. Pressed Steel. Capacity, 100,000 lbs.

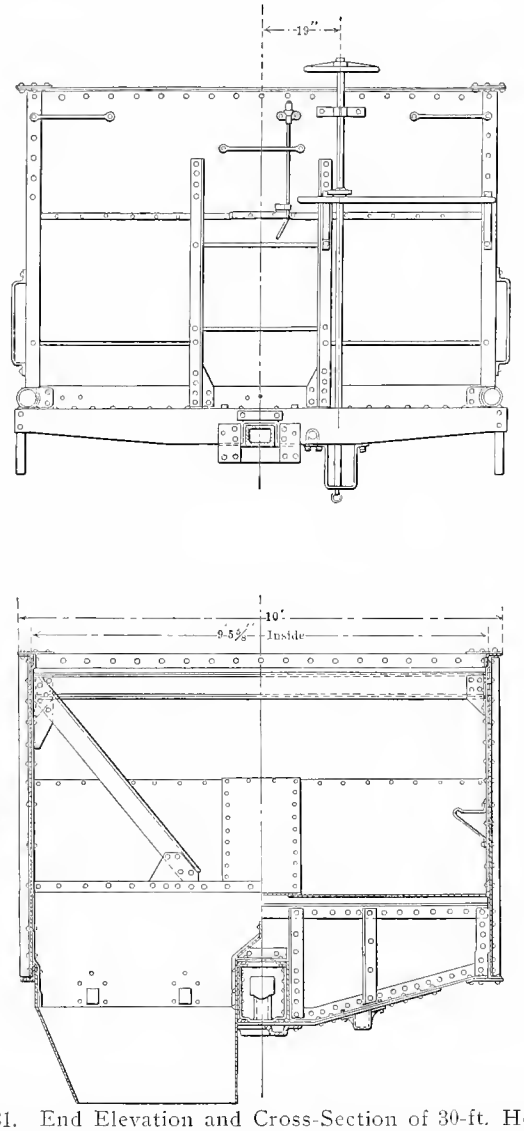
Numbers Refer to List of Names with Figs. 480-481.



Figs. 474-477. Plan, Elevations and Sections of 30-ft. Hopper Car, Pressed Steel. Capacity, 100,000 lbs.



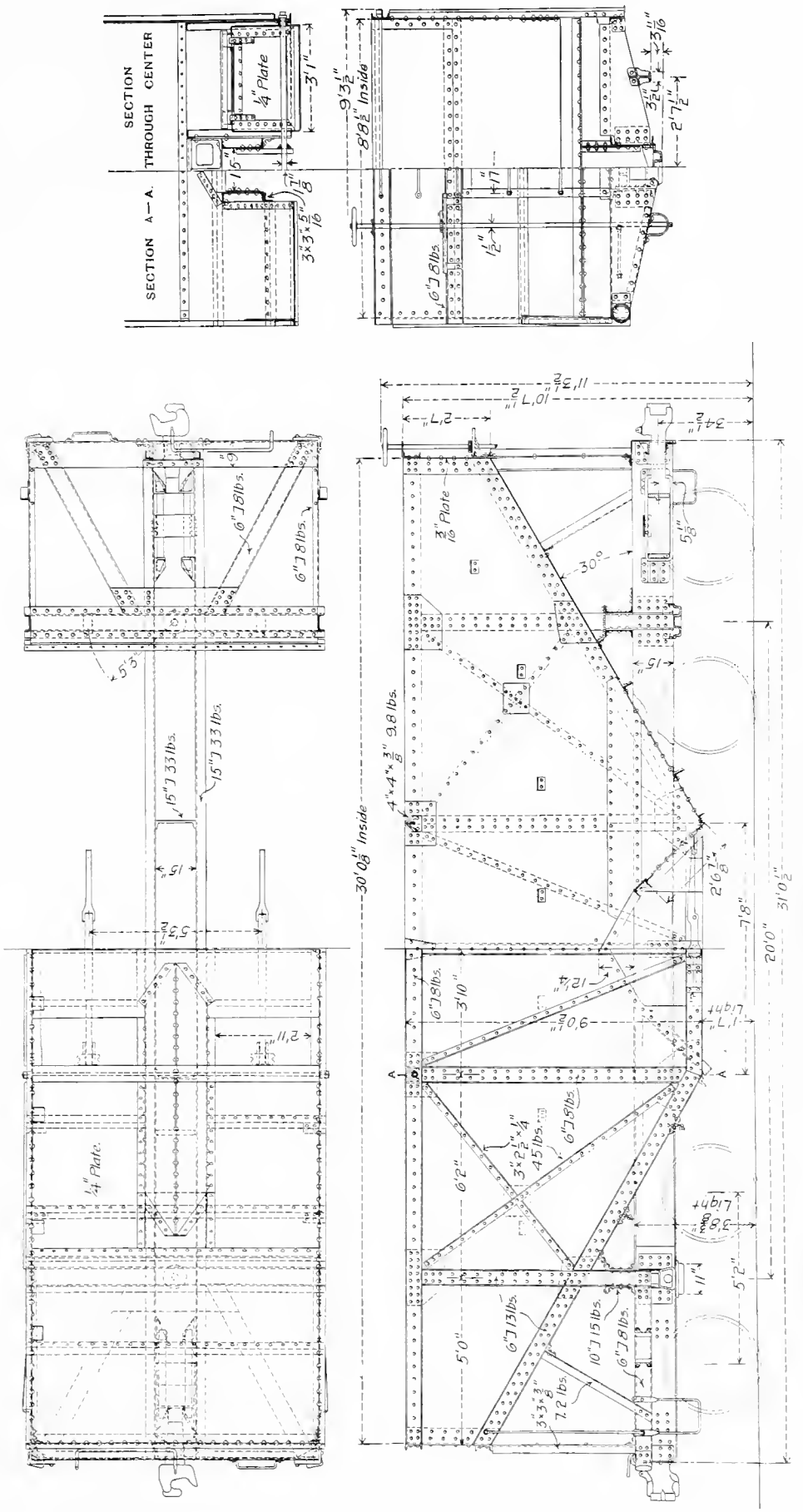
Figs. 478-479. Plan and Side Elevation of 30-ft. Hopper Car. Pennsylvania. Structural Steel. Capacity, 100,000 lbs.



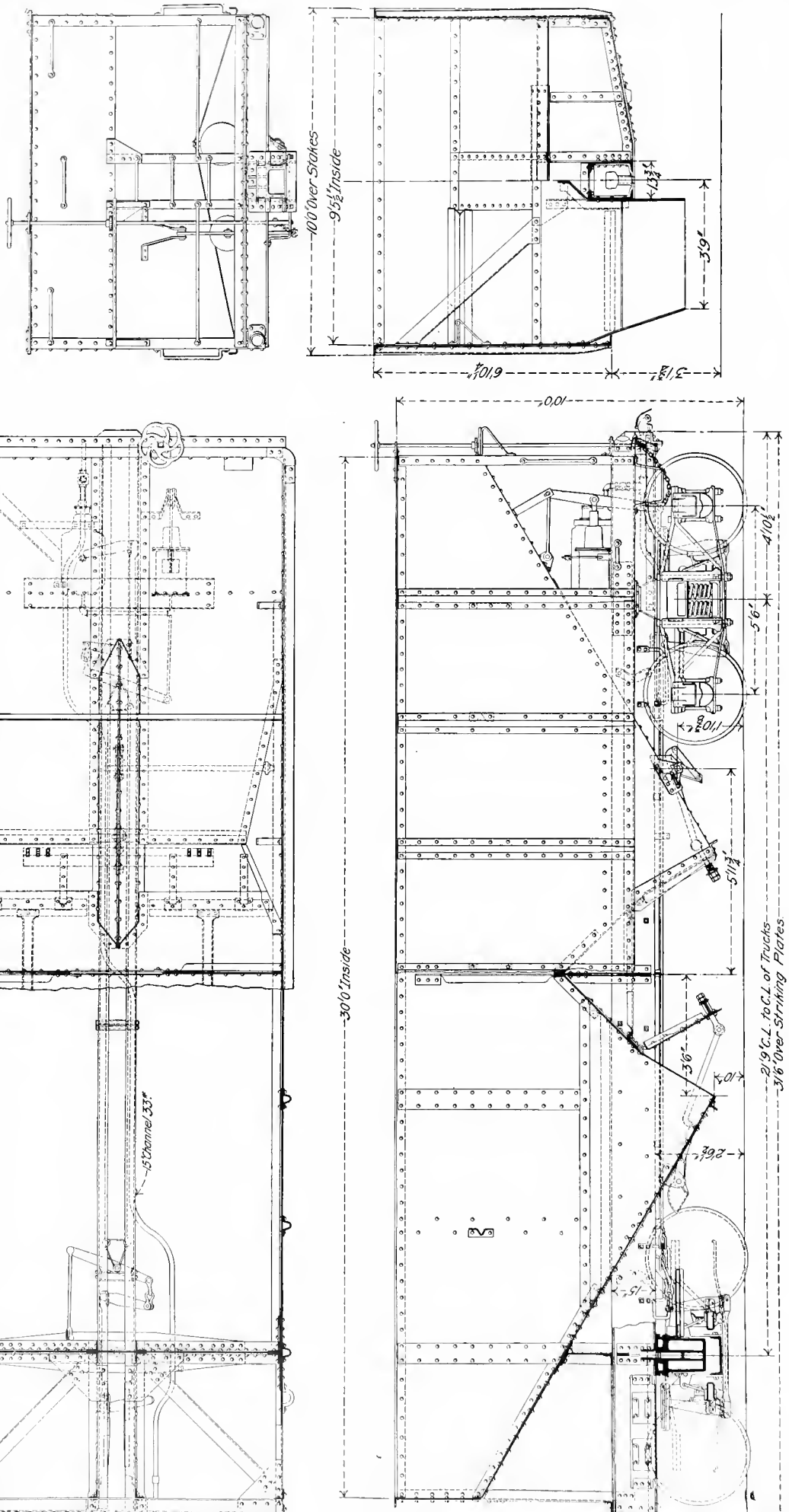
Figs. 480-481. End Elevation and Cross-Section of 30-ft. Hopper Car. Pennsylvania. Structural Steel. Capacity, 100,000 lbs.

Names of Parts of Hopper and Ore Cars. Figs. 474-477 and 496-500.

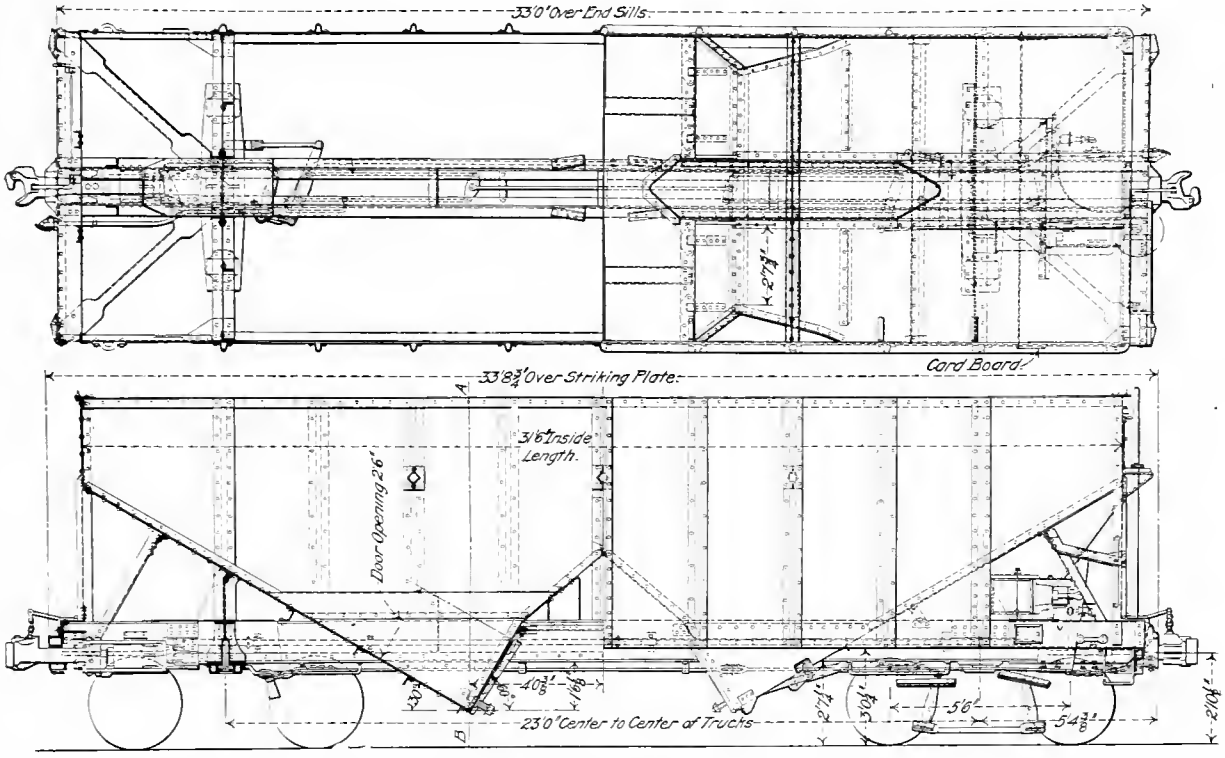
1 *Side Sill*
2 *End Sill*
5 *Center Sill*
8 *Corner Post*
10 *Sill Tie Rod*
10*a* *End Sill Tie Rod*
11 *End Sill Diagonal Brace*
12 *Body Bolster*
12*b* *Bottom Plate of Body Bolster*
16 *Body Side Bearing*
17 *Body Center Plate*
19 *Body Truss Rod*
20 *Body Truss Rod Saddle*
21 *Body Truss Rod Bearing*
22 *Cross Tie or Needle Beam*
23 *Drawbar*
26 *Draft Timbers*
27*a* *End Slope*
27*b* *Side Slope or Hopper Slope*
27*c* *Same as* **27***b*
27*d* *Same as* **27***b*
28 *Bracket Steps*
30 *Sill Steps*
32 *Buffer Blocks*
39 *Stake Pocket*
41 *Side Plate Stiffening Angle*
42 *Stake*
44 *Side Strut Angle Tie*
45 *Hopper Support*
46 *Center Strut for Hopper Floor*
47 *End Post*
52 *Side Plank or Sheet*
61 *Drop Door*
62 *Drop Door Hinge*
63 *Drop Door Eye Bolt*
64 *Drop Door Chain*
65 *Drop Door Chain Ring*
70 *Winding Shaft*
74 *Door Pin*
93 *Brake Wheel*
94 *Brake Shaft*
96 *Upper Brake Shaft Bearing*
100 *Brake Shaft Bracket*
102 *Hand Hold*
103 *Brake Ratchet Wheel*
104 *Hopper Door Toggle Arm*
105 *Hopper Door Toggle Link*
106 *Hopper Door Locking Pawl*
191 *Push Pole Corner Iron*
192 *Gusset Plates*



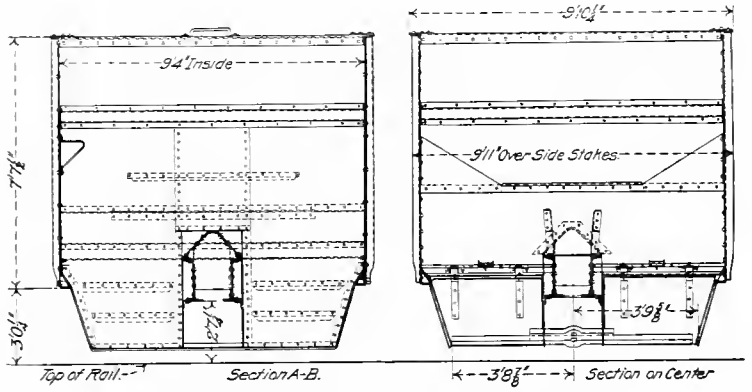
Figs. 482-485. Plan, Elevations and Sections of 30-ft. Vanderbilt Hopper Car. W. Va., C. & P. Structural Steel. Capacity, 100,000 lbs.



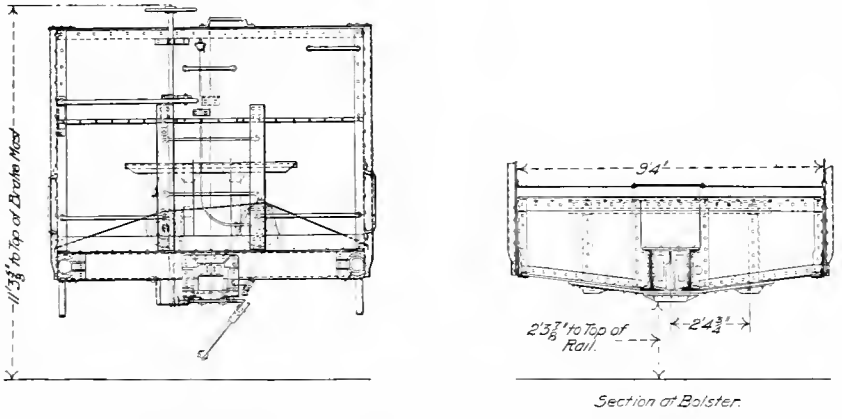
Figs. 486-489. Plan, Elevations and Sections of Steel Hopper Car. Capacity, 100,000 lbs.



Figs. 490-491. Plan and Side Elevation of Hopper Car, Pressed Steel. Capacity, 100,000 lbs.

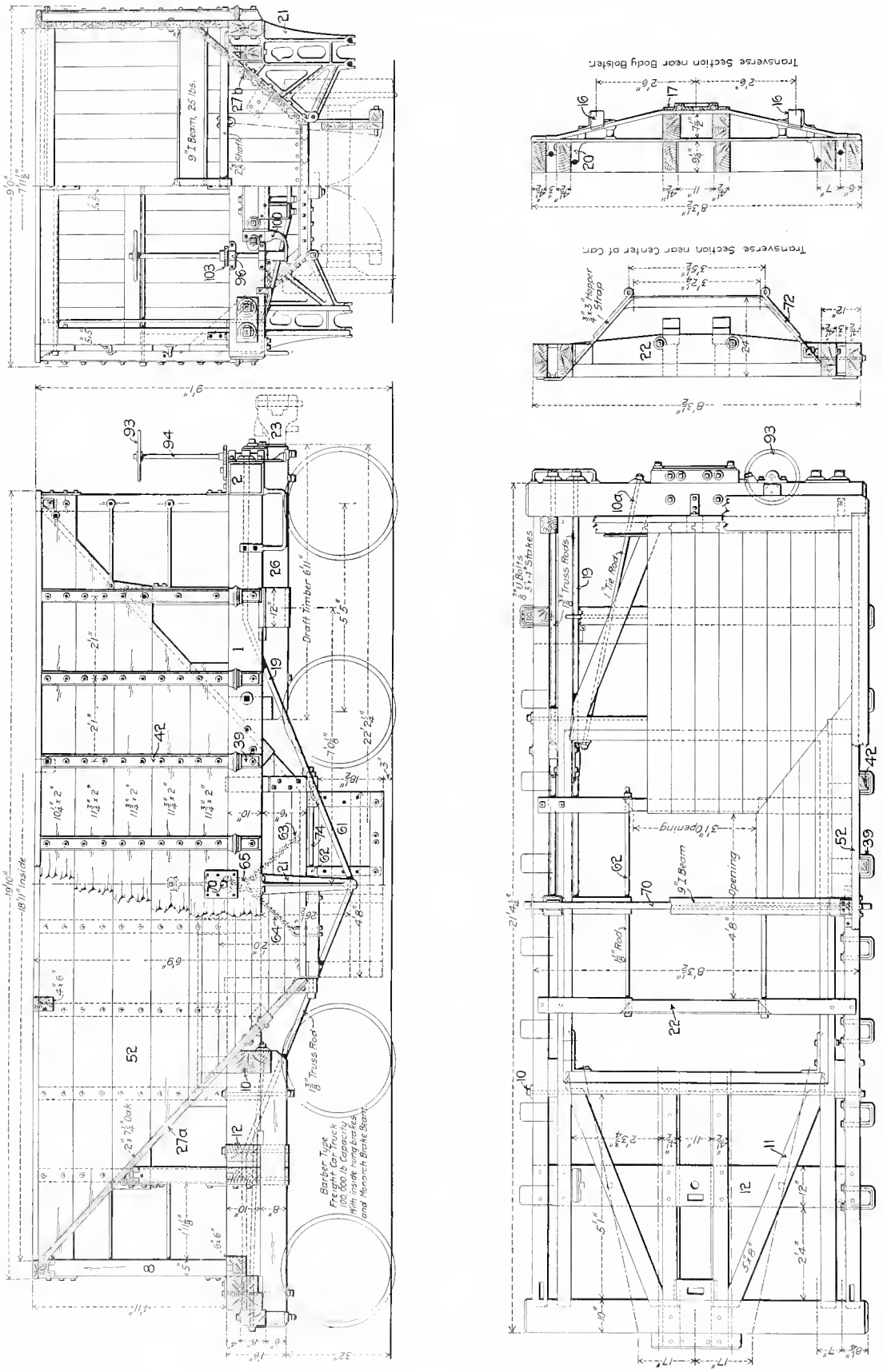


Figs. 492-493. Cross-Sections of Hopper Car.

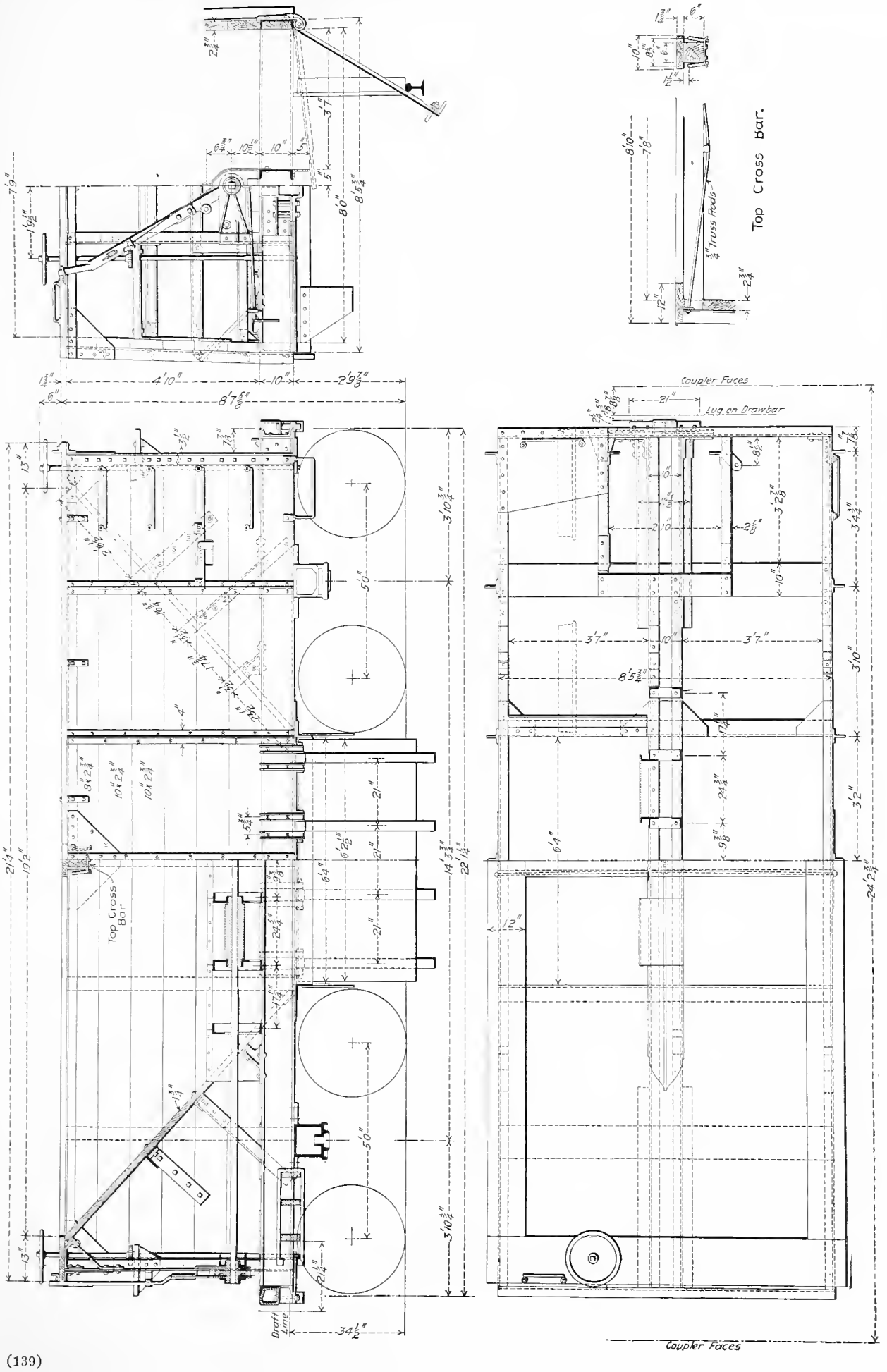


Figs. 494-495. End Elevation and Section at Bolster.

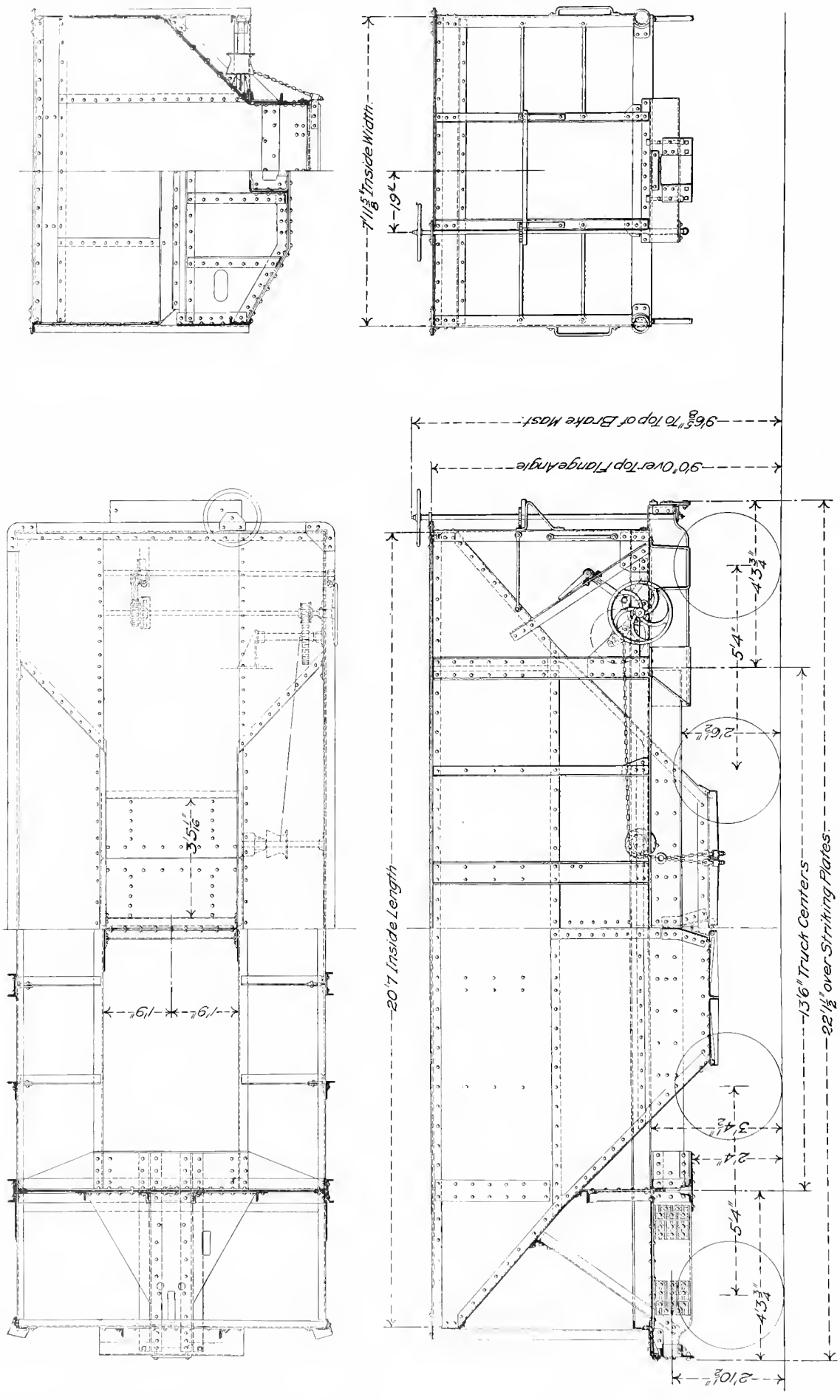
Numbers Refer to List of Names with Figs. 480-481.



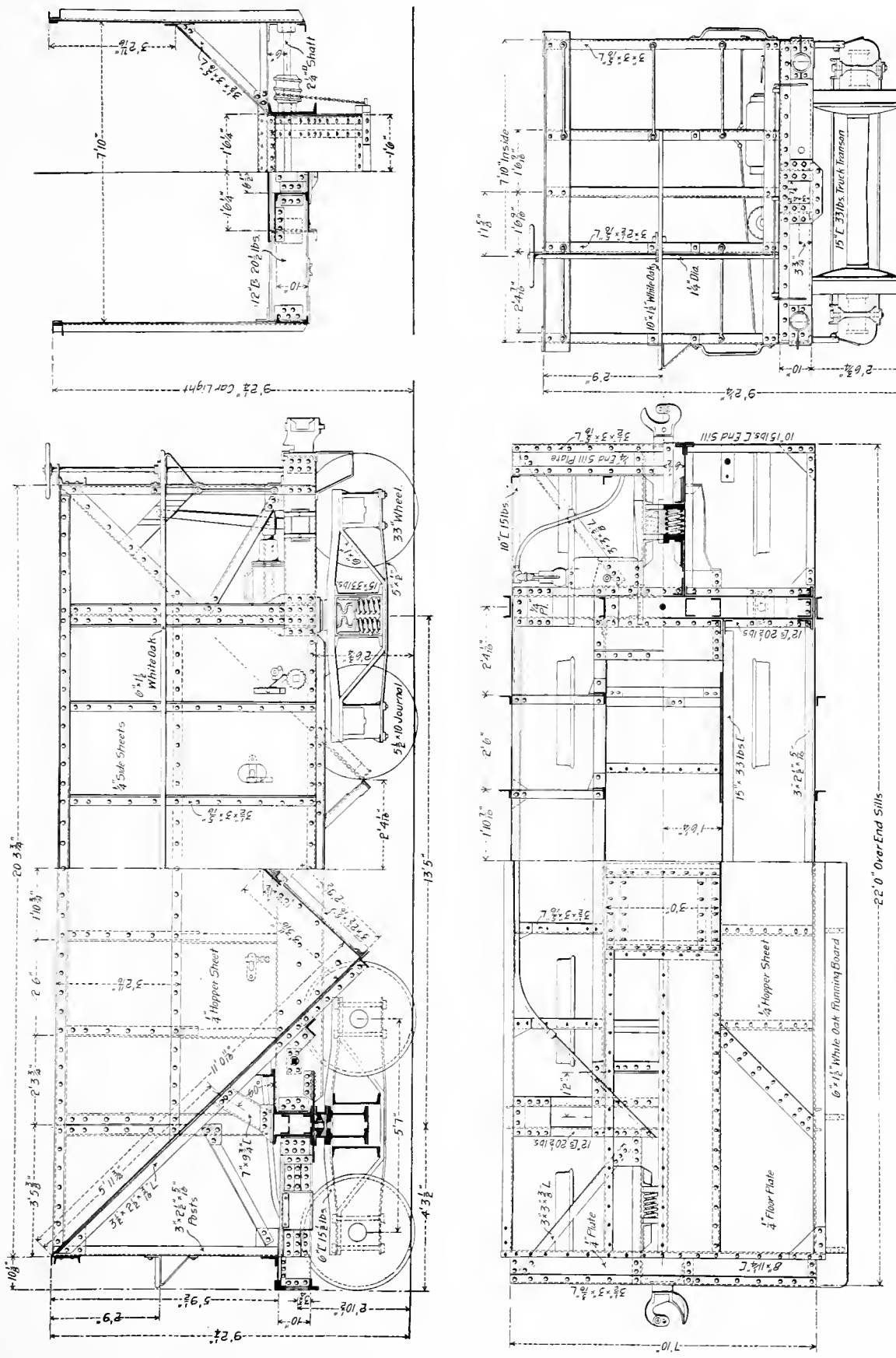
Figs. 496-500. Plan, Elevations and Sections of 19-ft. Hopper Ore Car. C., M. & St. P. Capacity, 100,000 lbs.



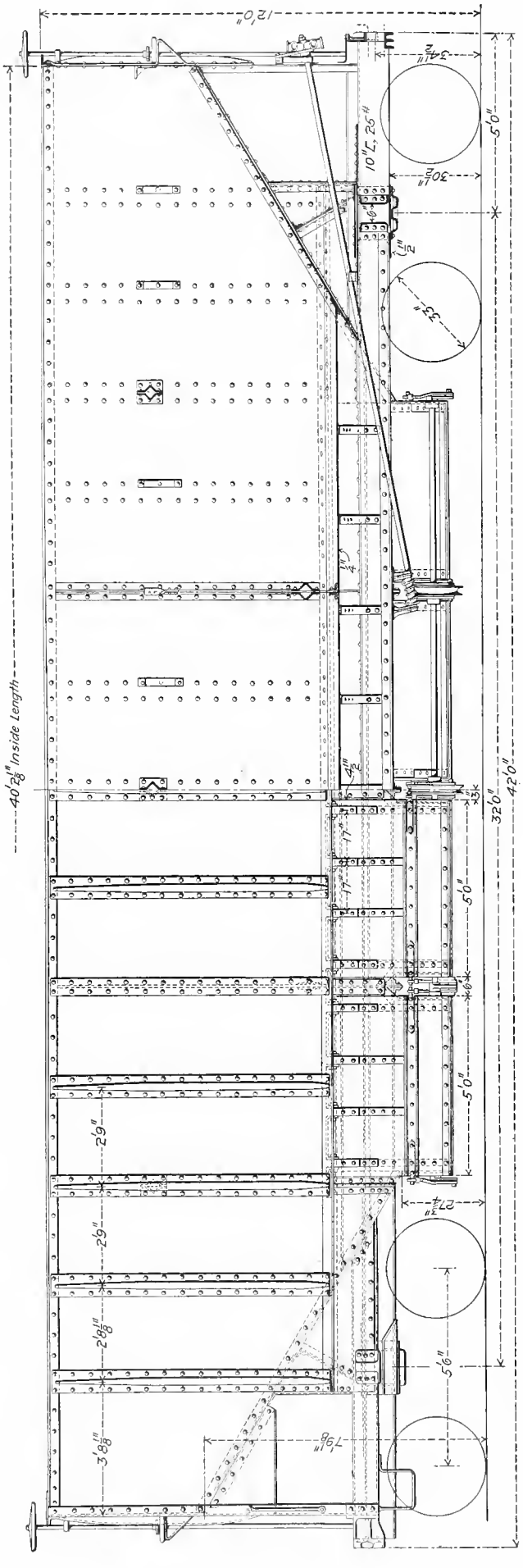
Figs. 501-504. Plan, Elevations and Sections of Hopper Ore Car, Structural Steel Underframe. Chicago & North Western. Capacity, 100,000 lbs.

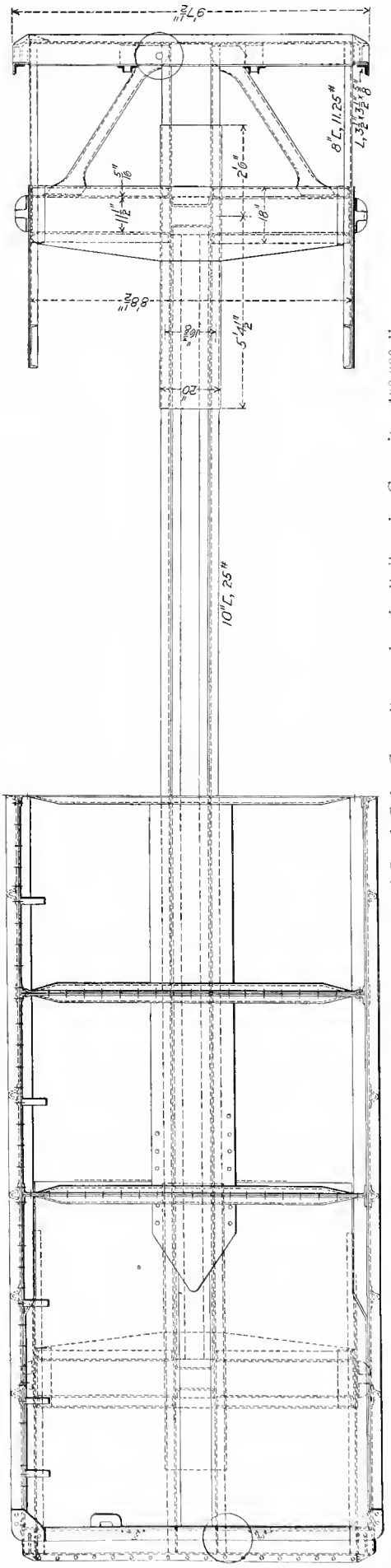


Figs. 505-508 Plan, Elevations and Sections of 20-ft. 7-in. Hopper Ore Car. D., M. & N. Structural Steel. Capacity, 100,000 lbs.

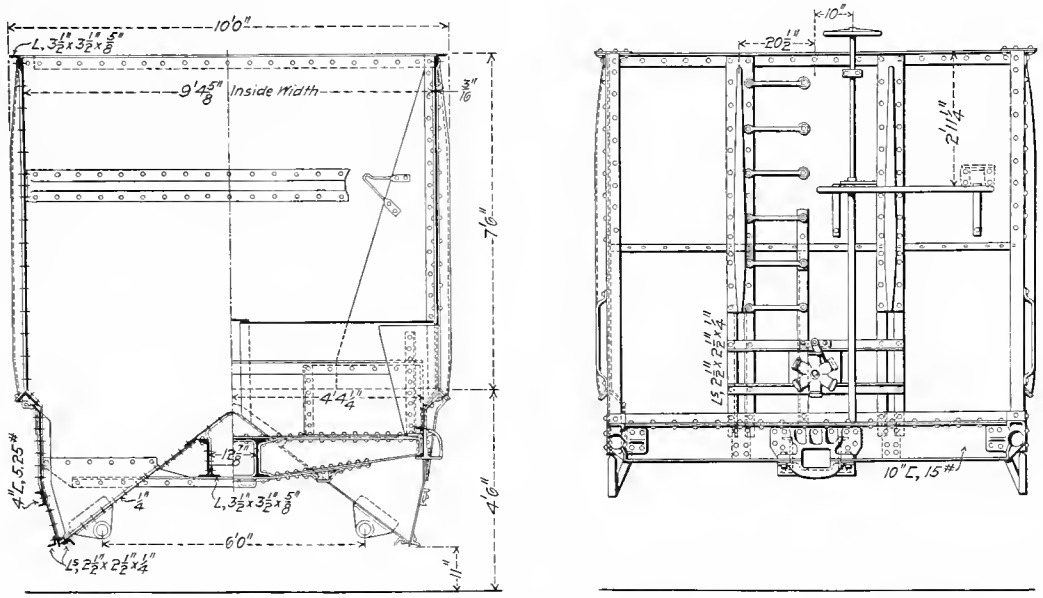


Figs. 509-512. Plan, Elevations and Sections of 20-ft. Hopper Ore Car. Great Northern. Structural Steel. Capacity, 100,000 lbs.

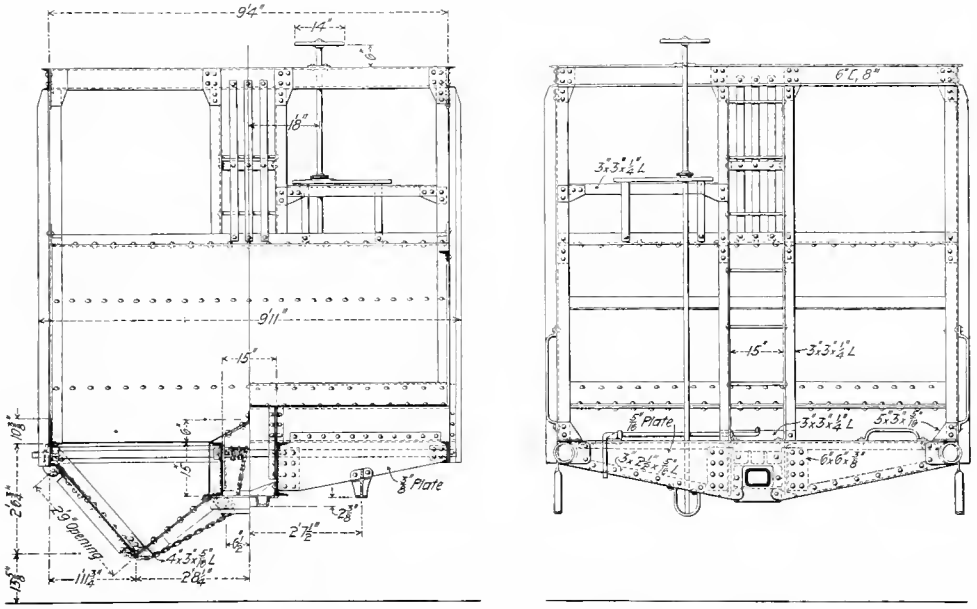




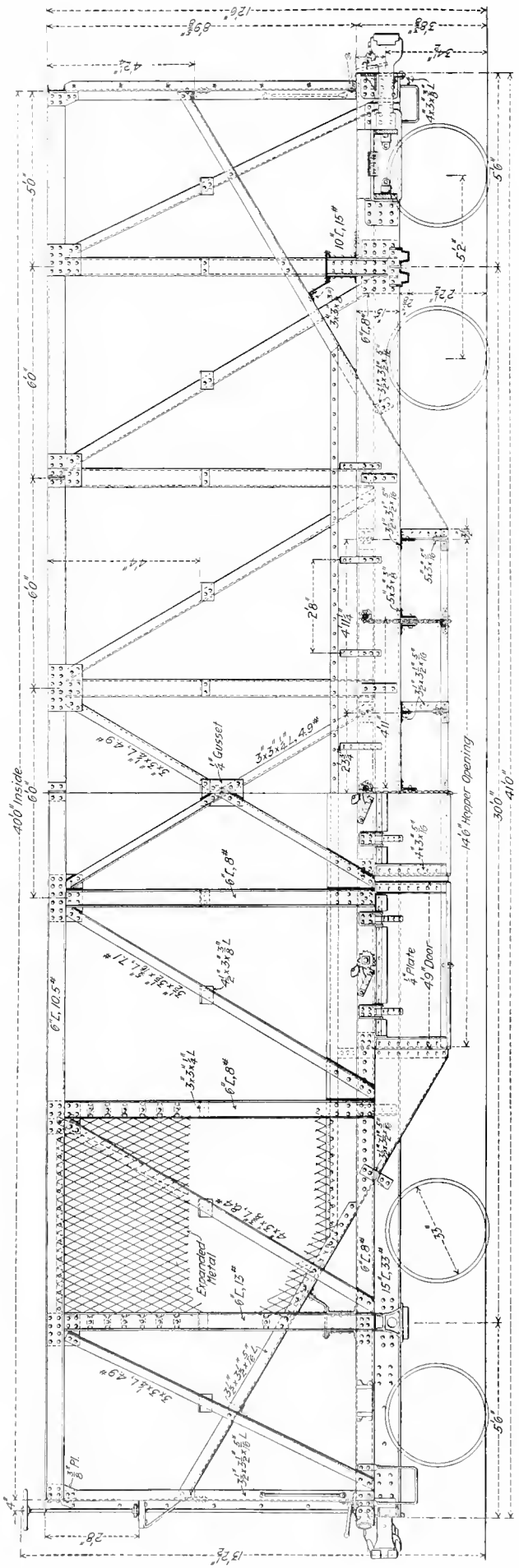
Figs. 513-514. Plan and Side Elevation of Steel Coke Car. Pennsylvania Railroad. Capacity, 100,000 lbs.

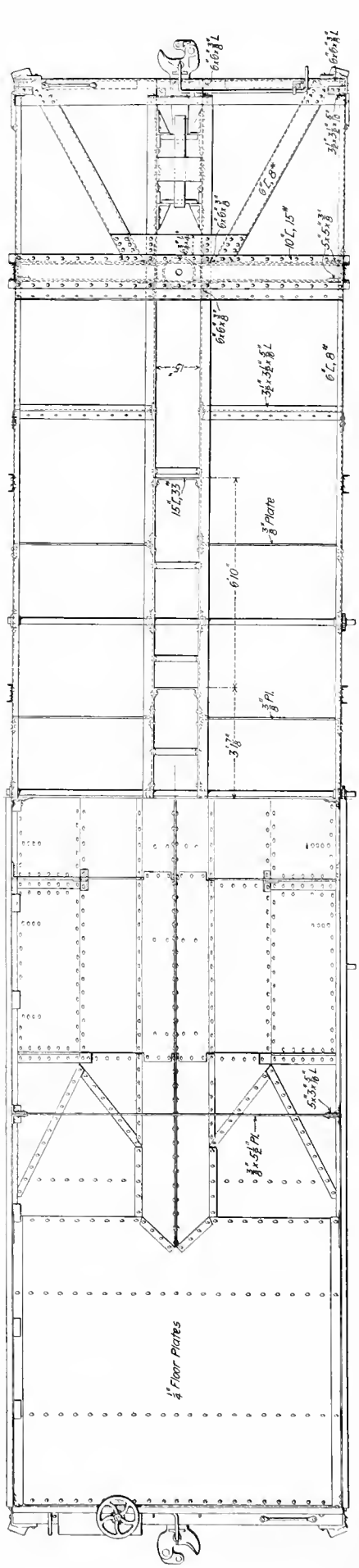


Figs. 515-516. Cross-Section and End Elevation of Steel Coke Car. Pennsylvania Railroad. Capacity, 100,000 lbs.

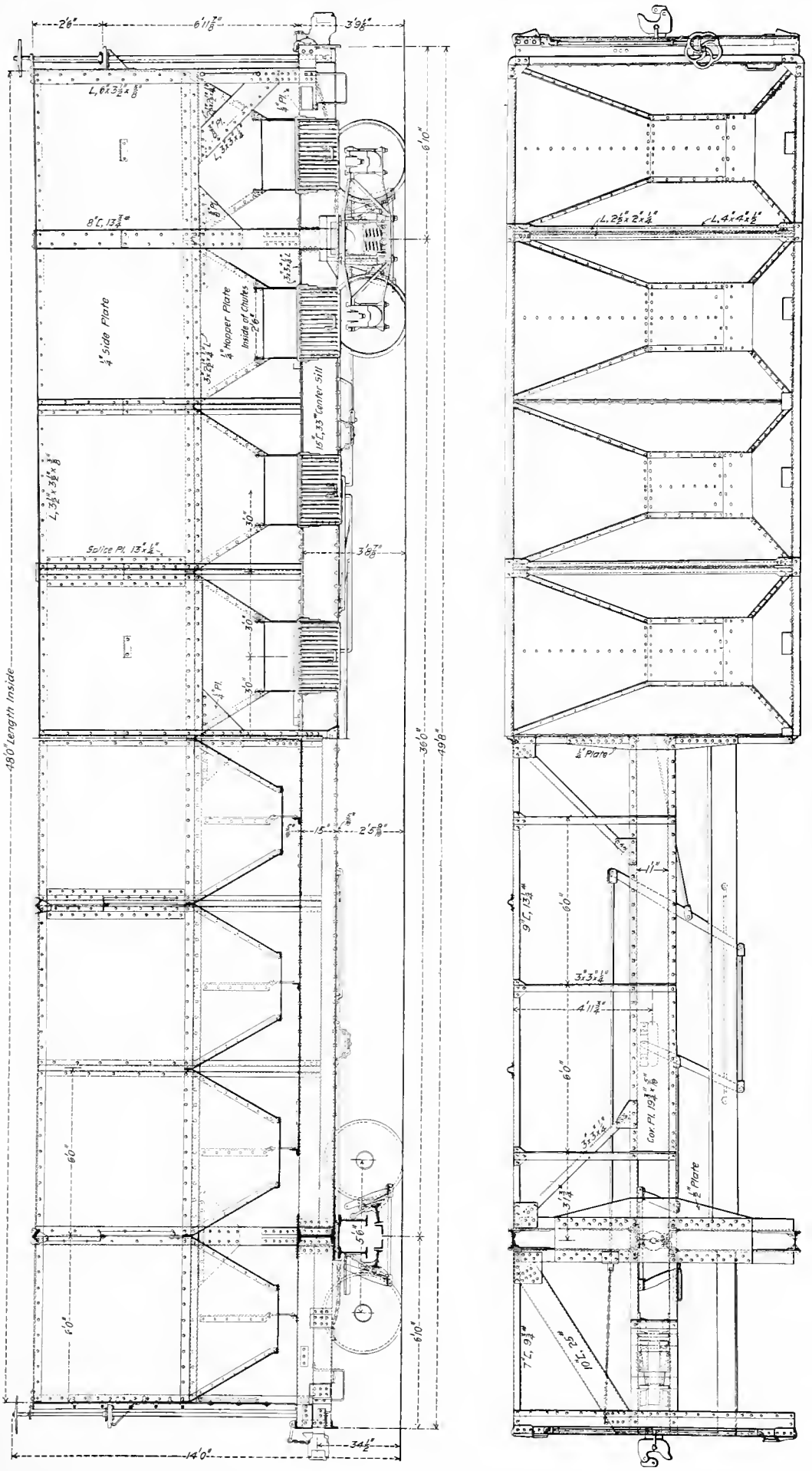


Figs. 517-518. Cross-Section and End Elevation of 40-ft. Vanderbilt Coke Car. Lackawanna Iron & Steel Co. Capacity, 100,000 lbs.





Figs. 519-520. Plan and Side Elevation of 40-ft. Vanderbilt Coke Car. Lackawanna Iron & Steel Co. Capacity, 100,000 lbs.



Figs. 521-522. Plan and Side Elevation of 48-ft. Bin Coke Car. Cambria Steel Co. Capacity, 100,000 lbs.

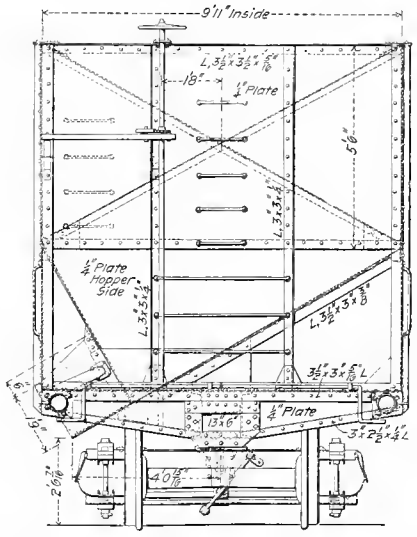
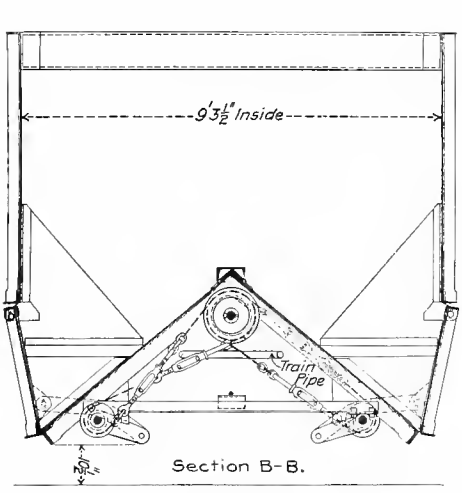
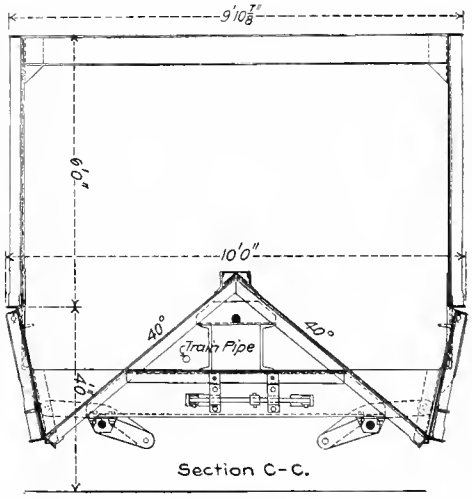


Fig. 523. End Elevation of 48-ft. Bin Coke Car.
Cambria Steel Co. Capacity, 100,000 lbs.





Figs. 524-525. Cross-Sections of Coke Car. C., L. S. & E. Capacity, 100,000 lbs.

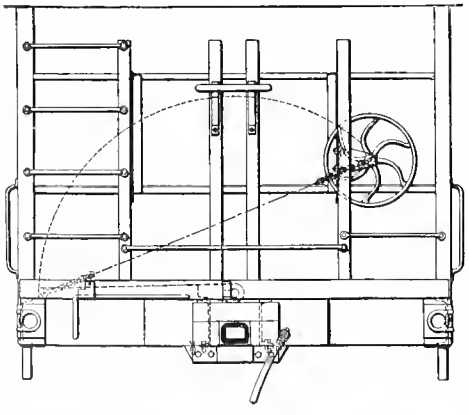
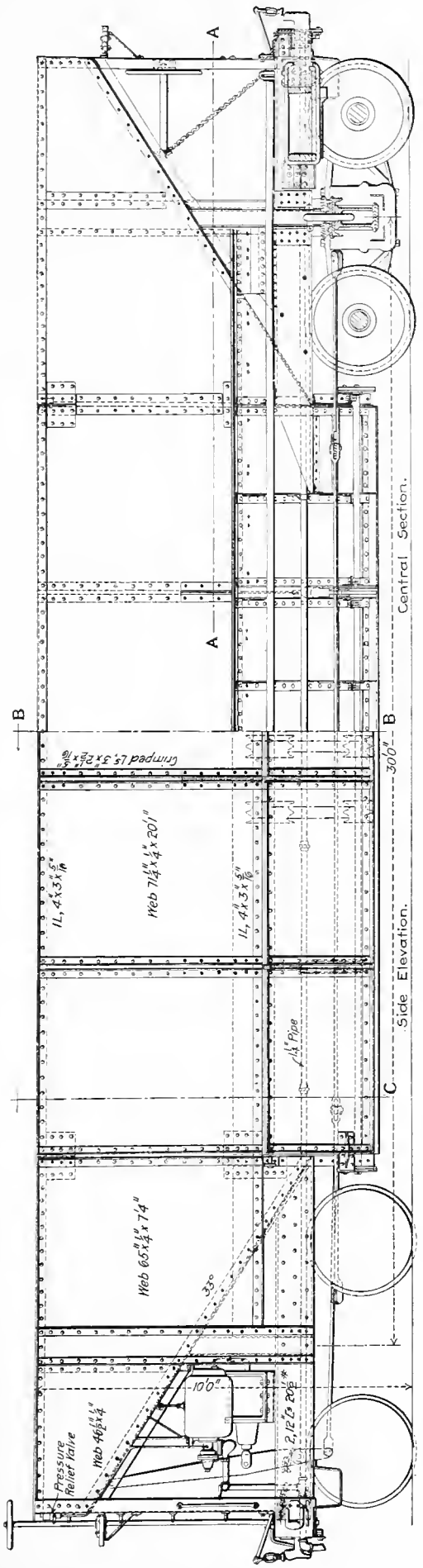
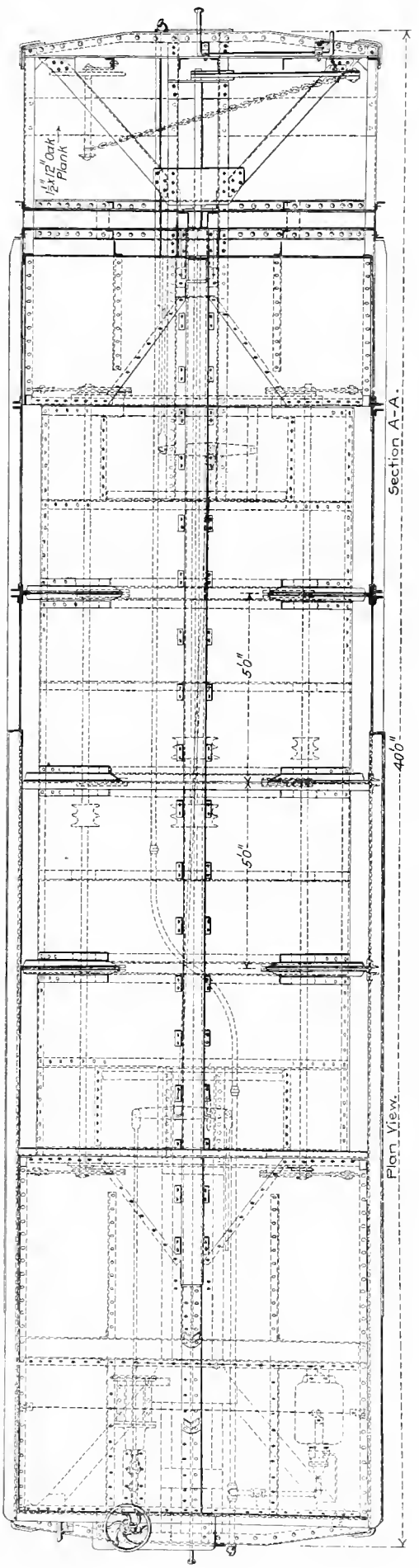
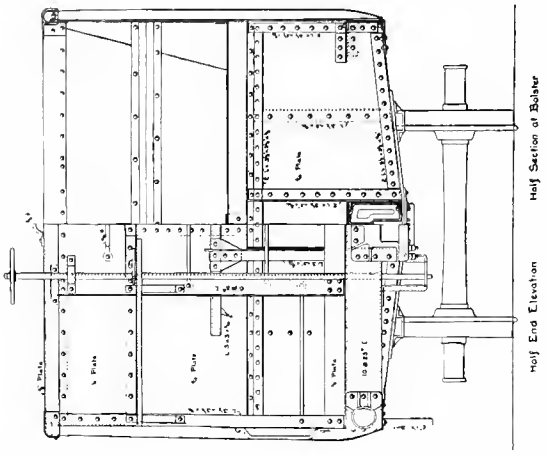


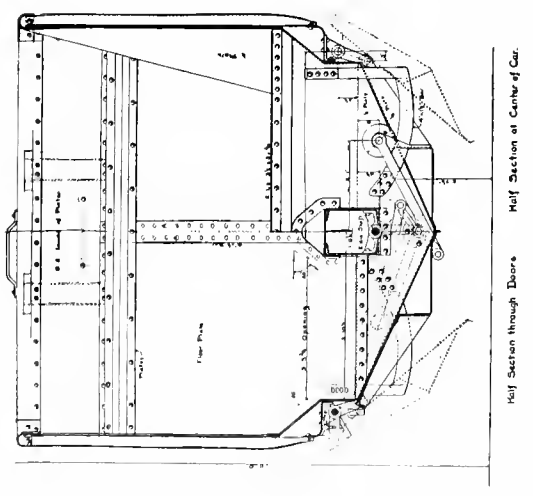
Fig. 526. End Elevation of Coke Car. C., L. S. & E. Capacity, 100,000 lbs.

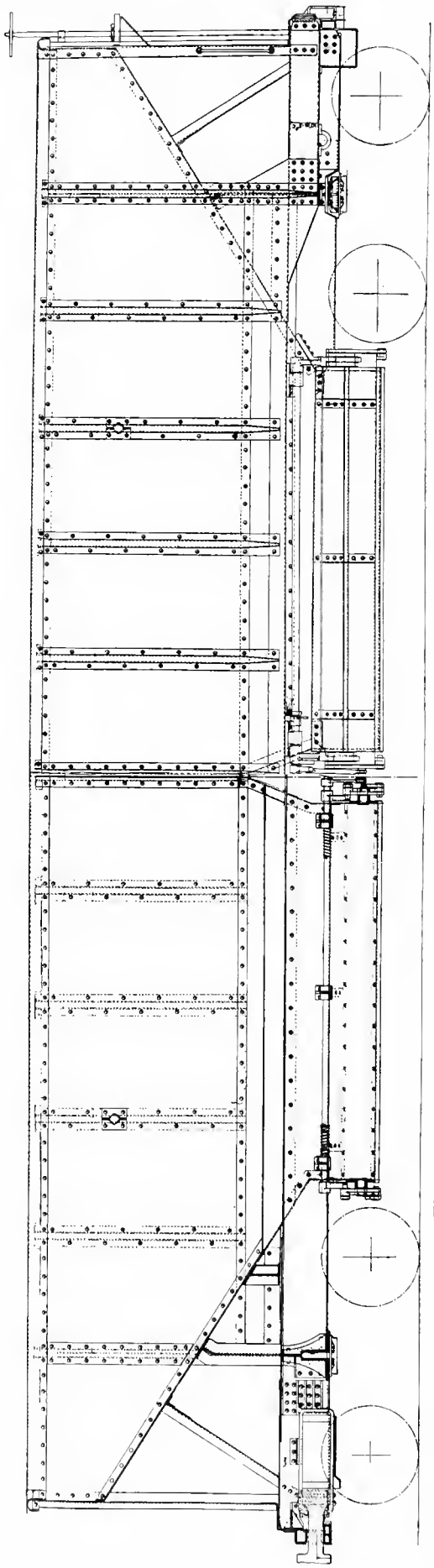




Figs. 527-528. Plan and Side Elevation of Coke Car. C., L. S. & E. Capacity, 100,000 lbs.







Figs. 529-531. Elevations and Sections of Center Dump Coke Car. Clark Car Co., Builders.

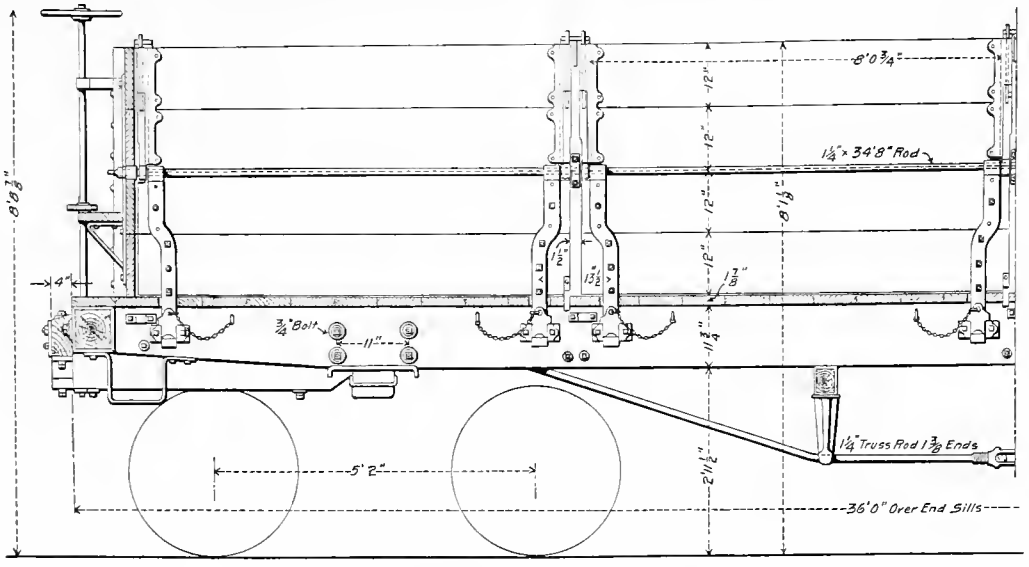


Fig. 532. Side Elevation.

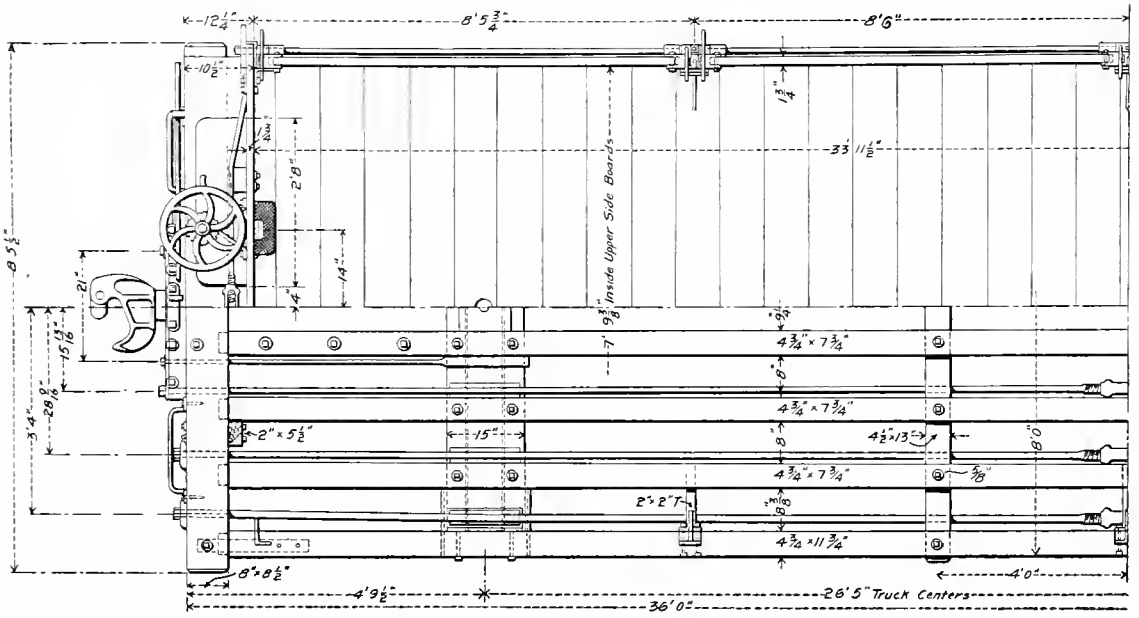


Fig. 533. Half Plan and Underframing.

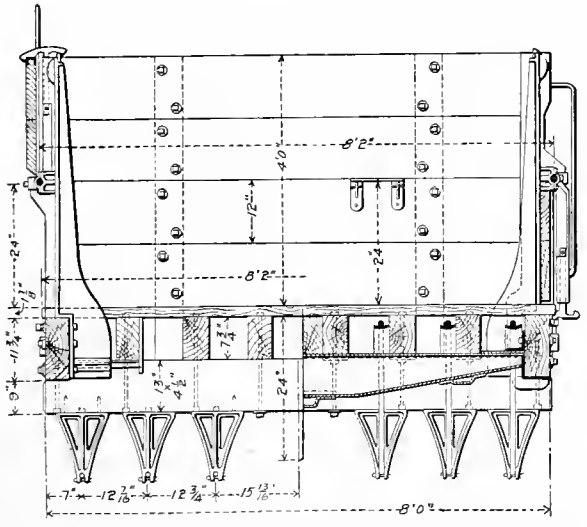


Fig. 534. Half Sections at Bolster and Needlebeam.
36-ft. Pratt Side Dump Coal Car. N. Y., N. H. & H. Capacity, 60,000 lbs.

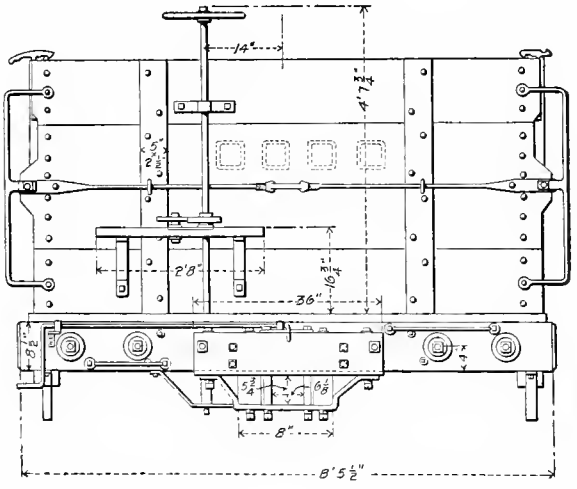


Fig. 535. End Elevation.

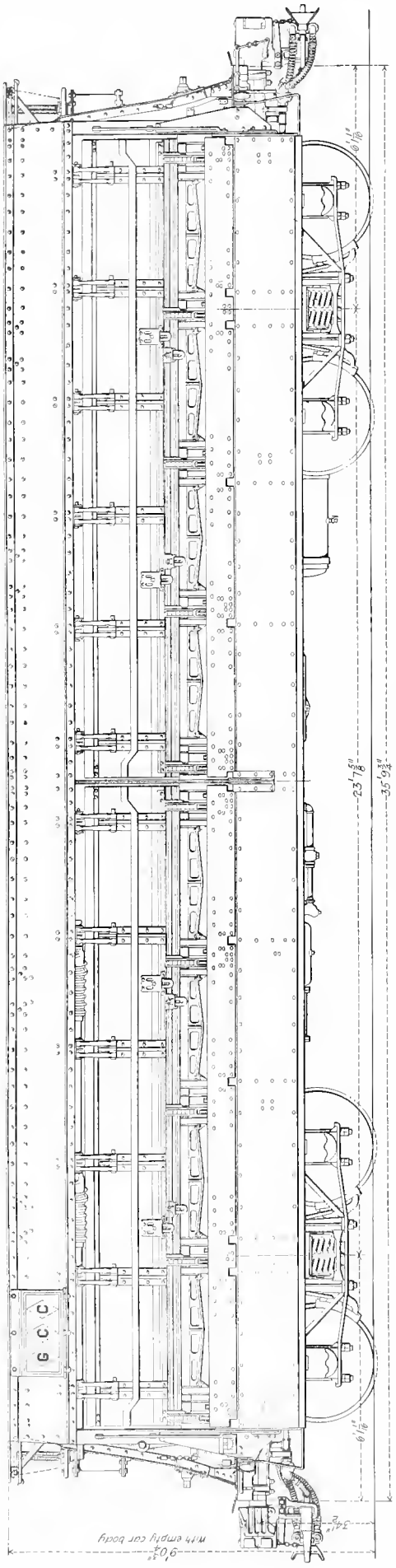


Fig. 536. Side Elevation.

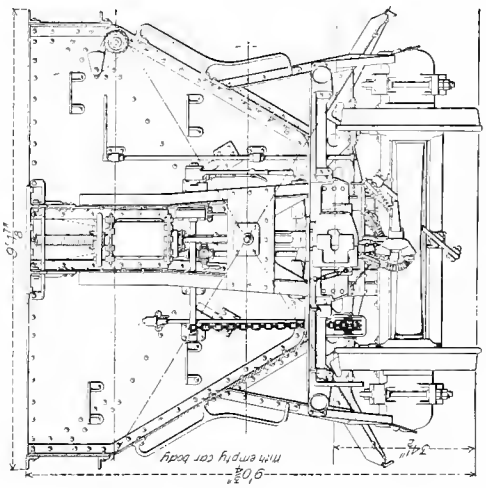


Fig. 538. Section.

Figs. 536-538. Goodwin Dump Car, Class G.
Structural Steel. Capacity, 80,000 lbs.

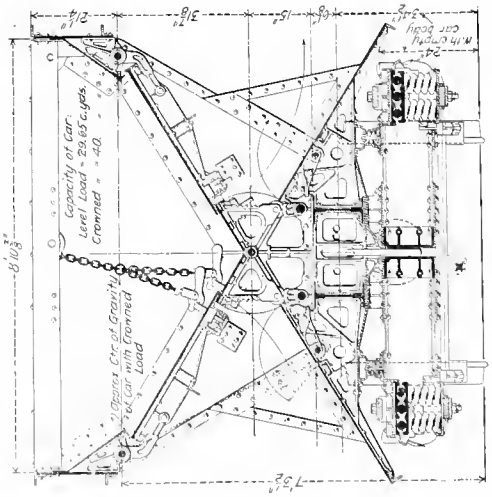


Fig. 537. End Elevation.

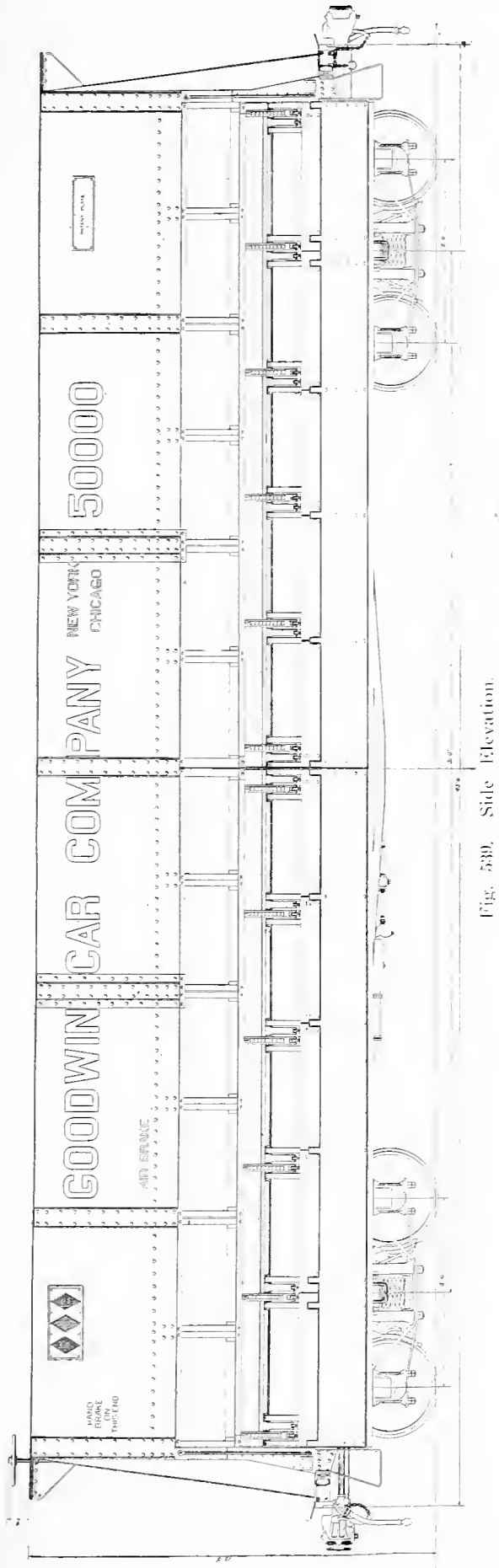


Fig. 539. Side Elevation.

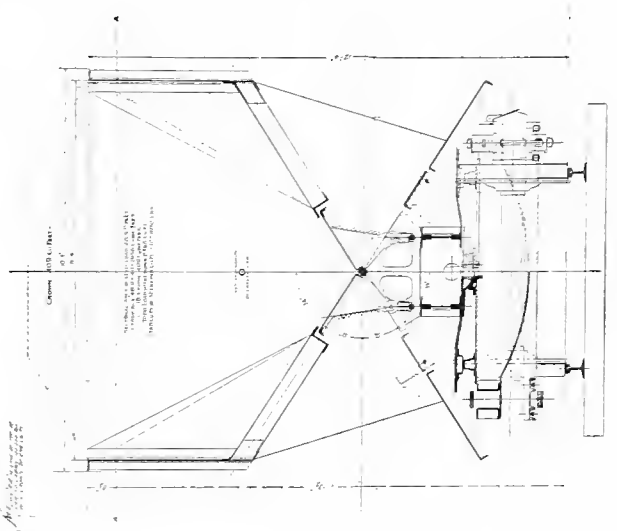


Fig. 541. Section.

Figs. 539-541. Goodwin Coal Car, Side Dump, Class P. P. C. Structural Steel. Capacity, 100,000 lbs.

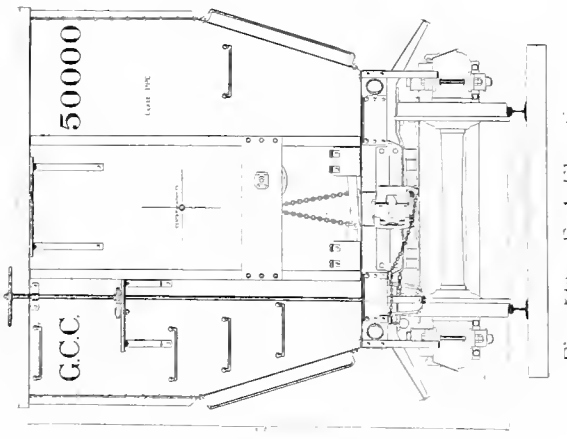


Fig. 540. End Elevation.

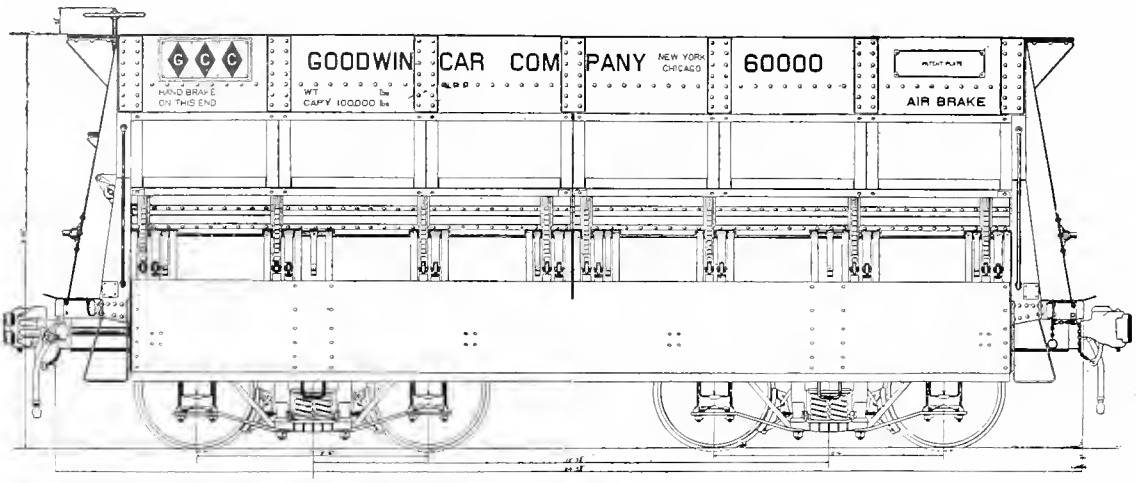
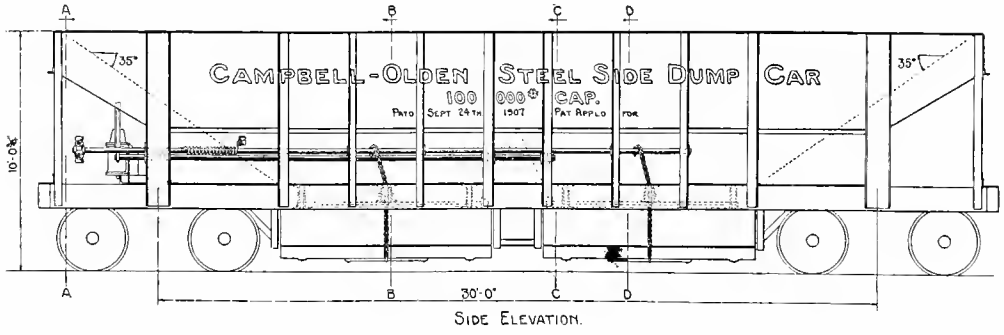
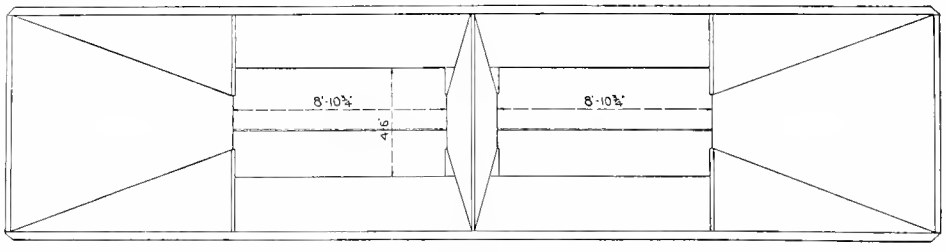


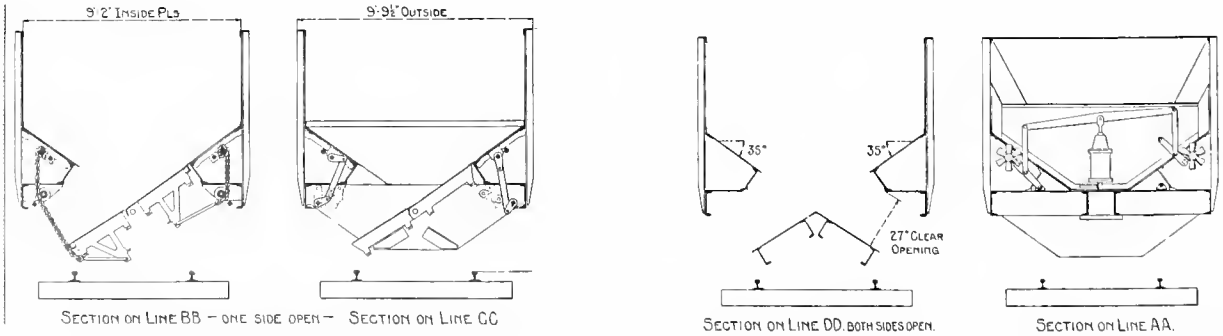
Fig. 542. Side Elevation of Goodwin Ore Car, Class SP. Capacity, 100,000 lbs.



SIDE ELEVATION.



TOP PLAN VIEW.



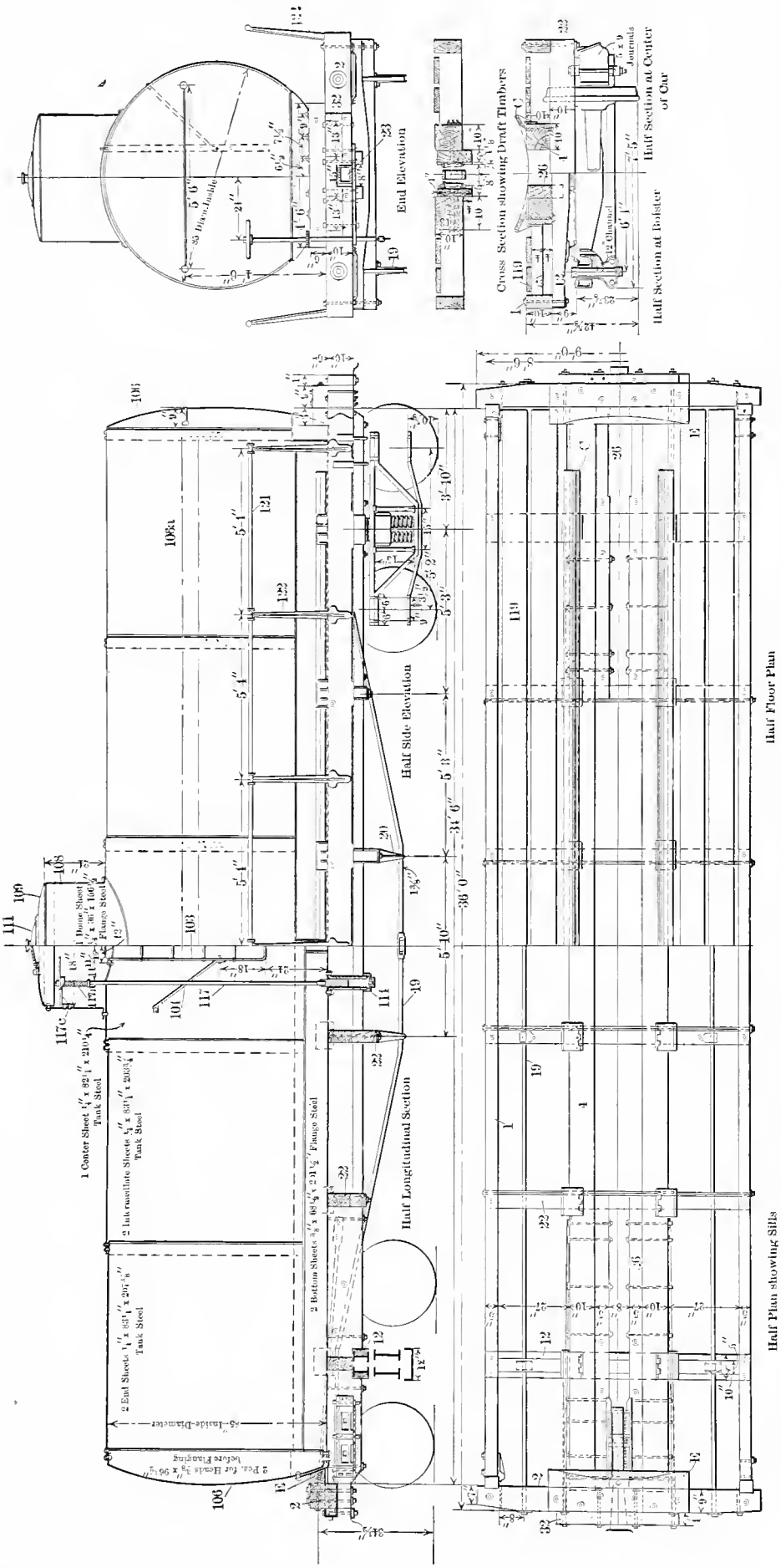
SECTION ON LINE BB — ONE SIDE OPEN — SECTION ON LINE CC

SECTION ON LINE DD, BOTH SIDES OPEN.

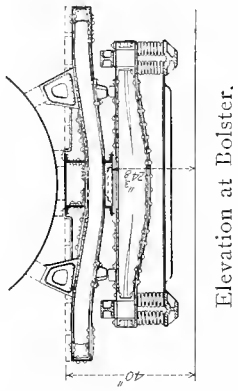
SECTION ON LINE AA.

Figs. 543-544. Elevation, Plan and Sections of Campbell-Olden Steel Side Dump Car. Capacity 100,000 lbs.

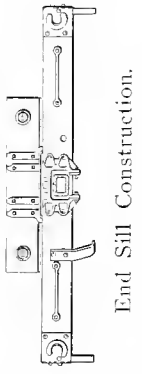
Numbers Refer to List of Names with Figs. 564-566.



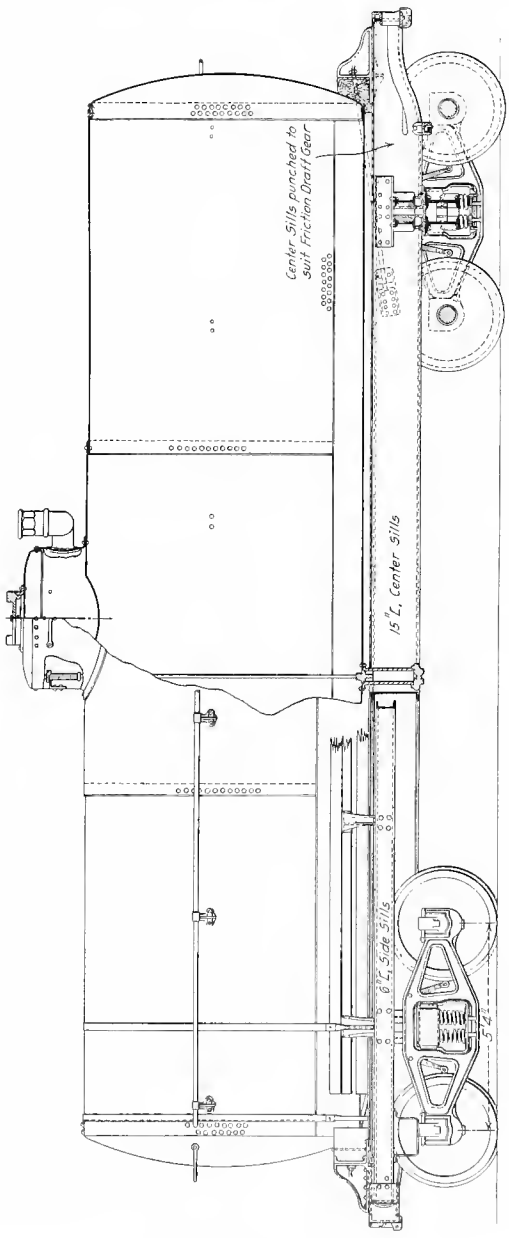
Figs. 545-549. Plan, Elevations and Sections of 36 ft. Tank Car with Wooden Underframe. Union Tank Line. Capacity, 10,000 gallons, or 70,000 lbs. Weight, 38,000 lbs.

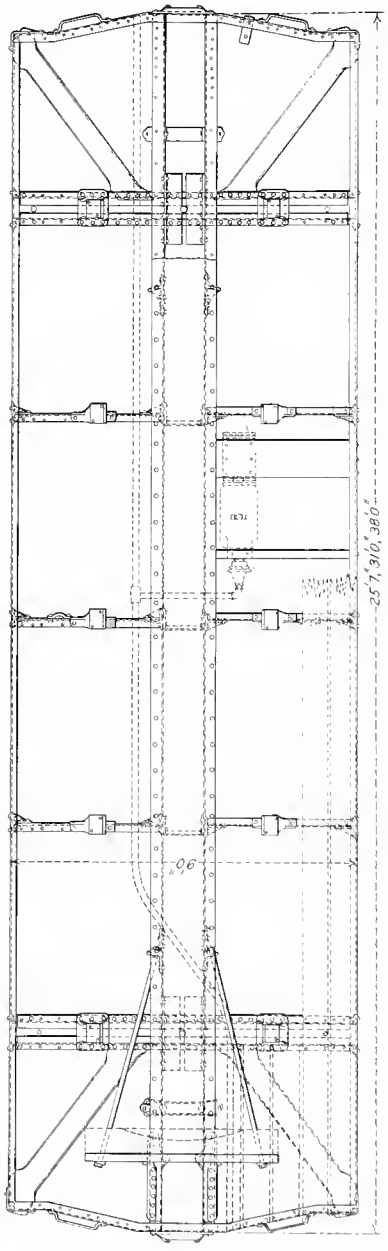


Elevation at Bolster.

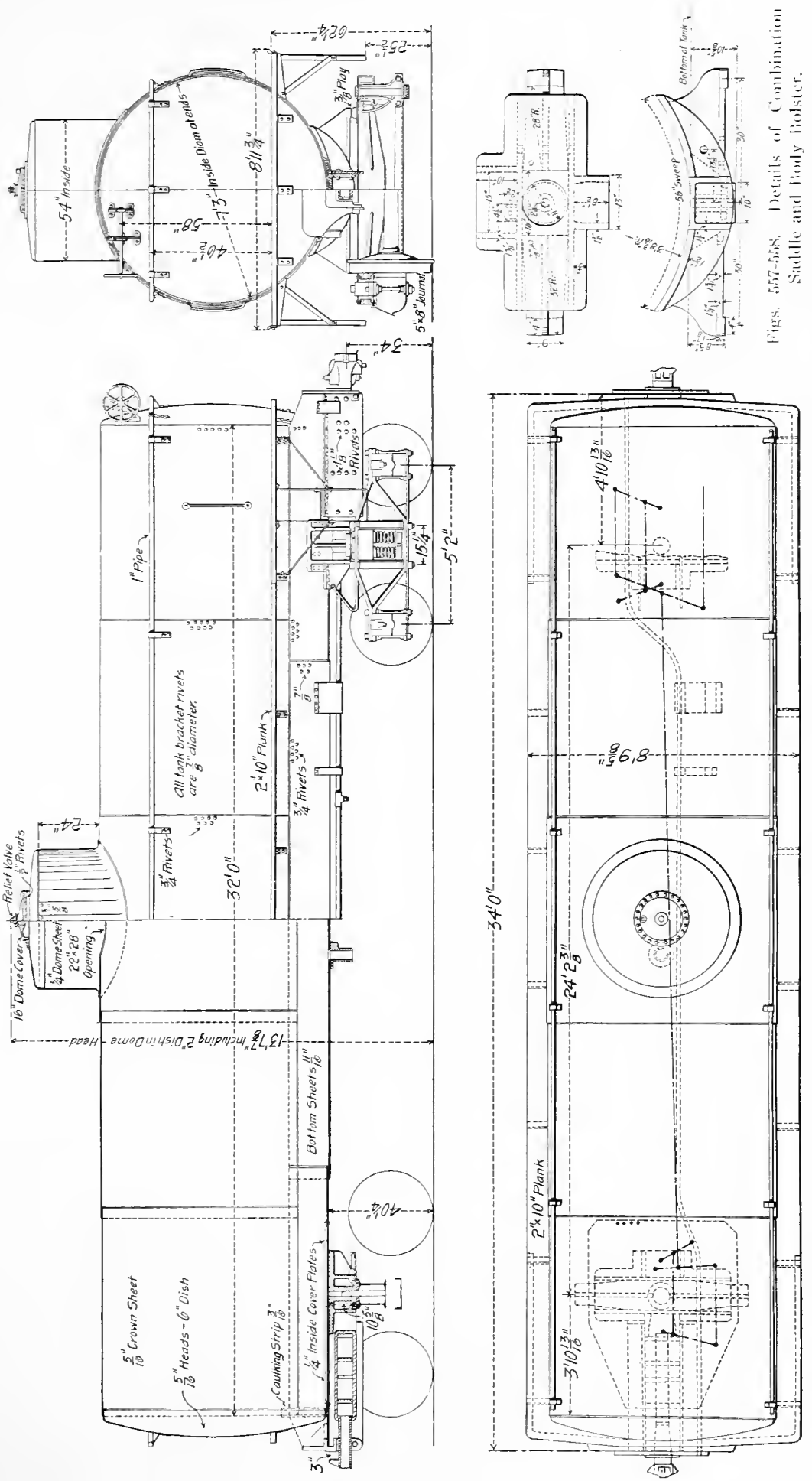


End Sill Construction.



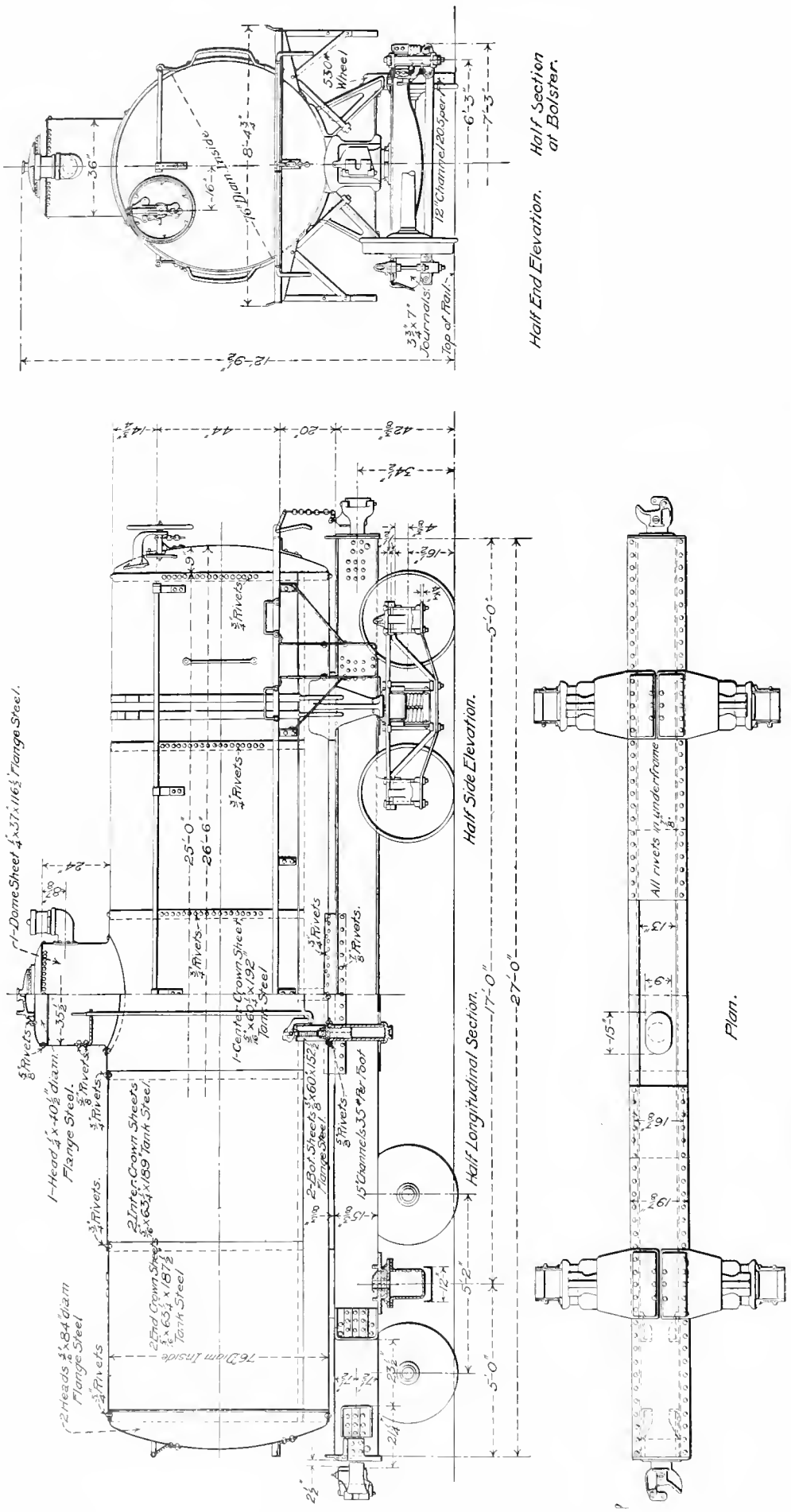


Figs. 550-553. Plan and Elevations of Oil Tank Car, with Bettendorf Standard Channel Underframe.

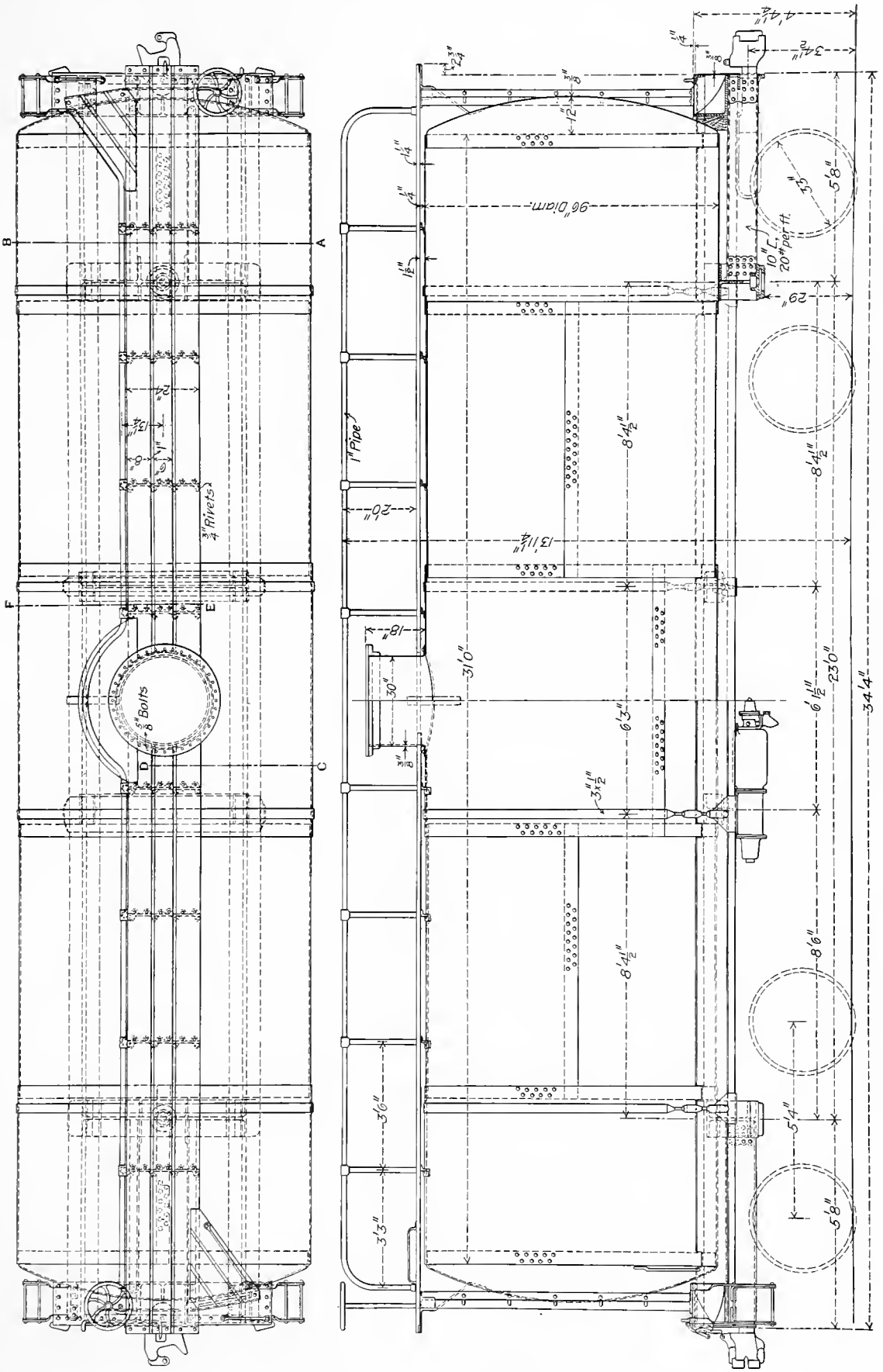


Figs. 551-556. Plan, Elevations and Sections of 34-ft. Van Dyke Tank Car, Union Tank Line. Capacity, 10,000 gallons, or 70,000 lbs.

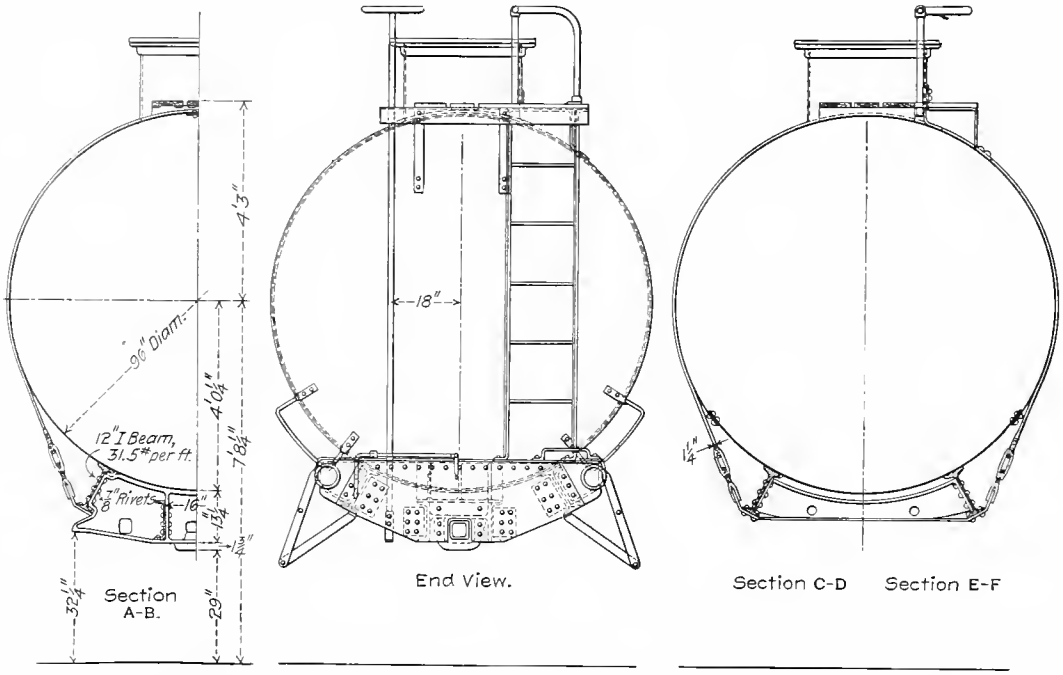
Figs. 557-558. Details of Combination Saddle and Body Bolster.



Figs. 559-561. Plan, Elevations and Sections of 27-ft. Tank Car, Union Tank Line. Capacity, 6,000 gallons.



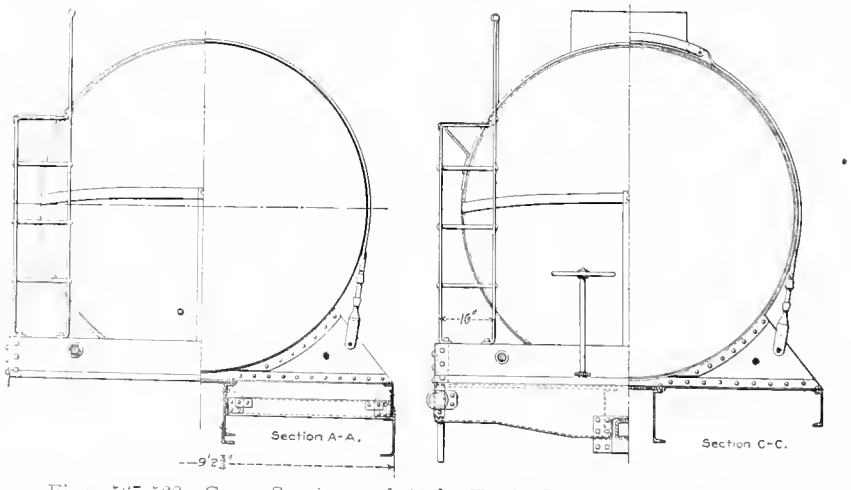
Figs. 562-563. Plan and Side Elevation of 34-ft. Vanderbilt Tank Car. Capacity, 12,000 gallons, or 100,000 lbs.



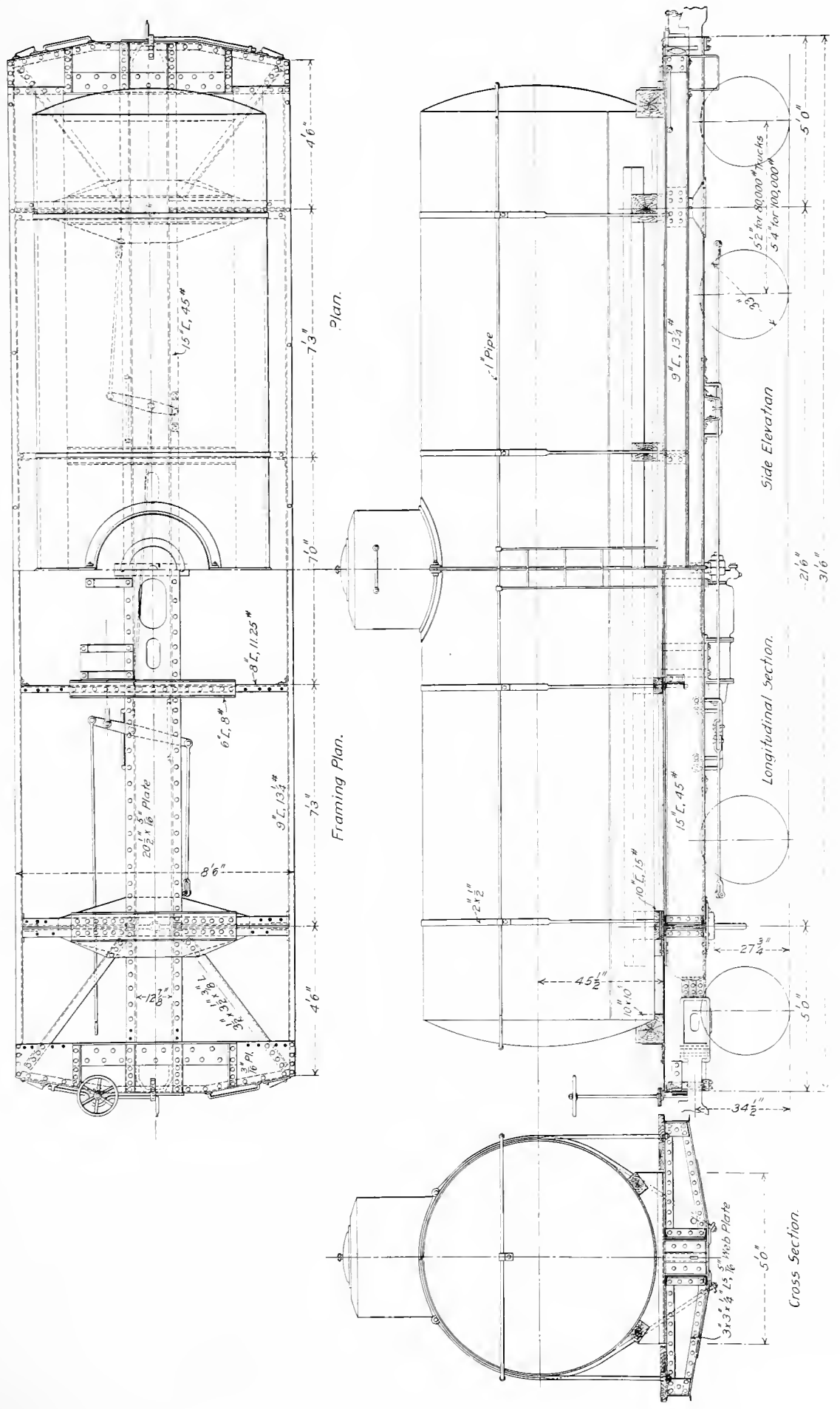
Figs. 564-566. End Elevation and Cross-Sections of 34-ft. Vanderbilt Tank Car. Capacity, 12,500 gallons, or 100,000 lbs.

Names of Parts of Tank Car. Figs. 545-549.

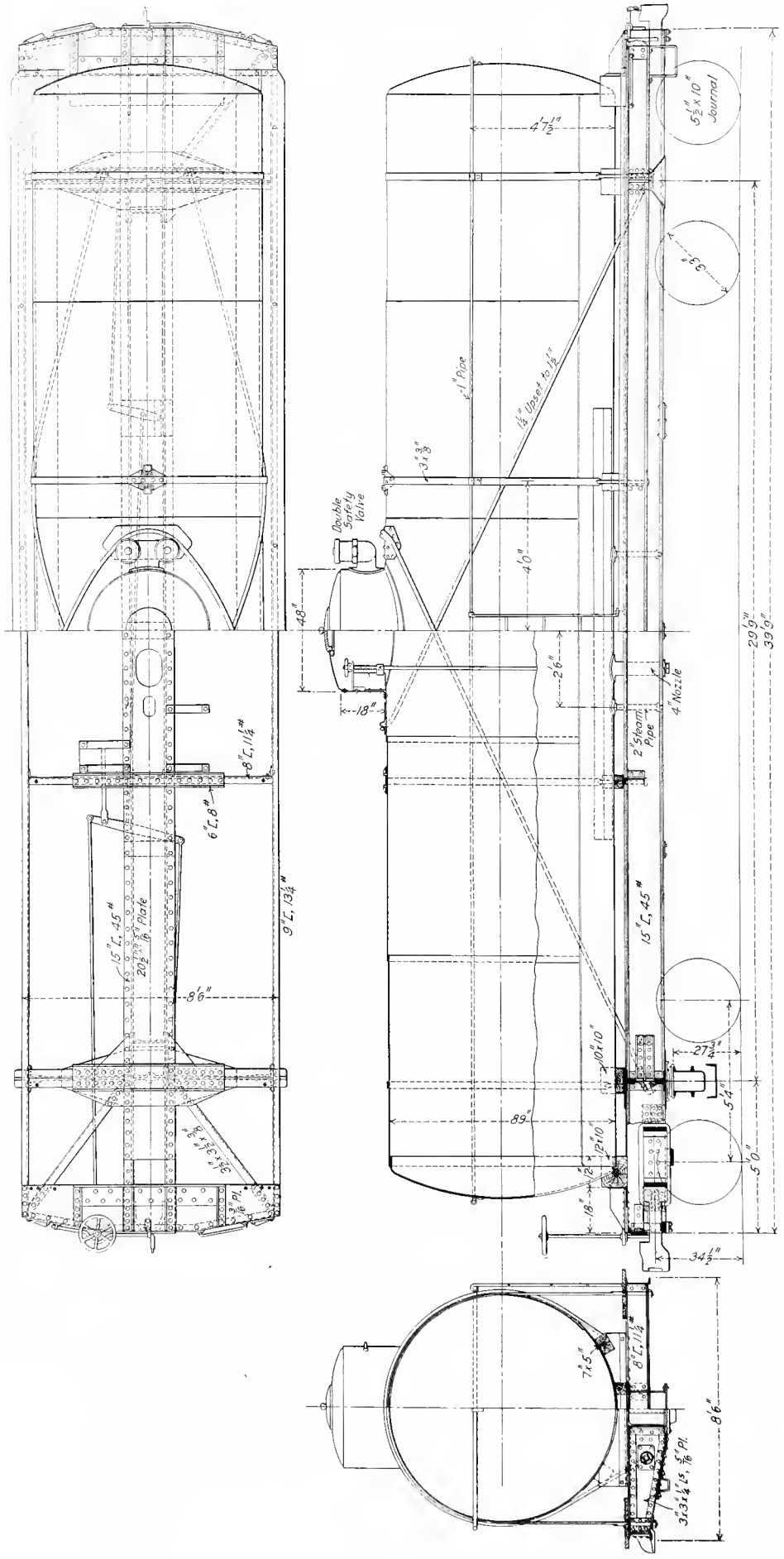
1 *Sill*
2 *End Sill*
4 *Center Sill*
12 *Body Bolster*
19 *Body Truss Rod*
20 *Body Truss Rod Bearing*
22 *Crosstie Timber*
23 *Drawbar*
26 *Draft Timbers*
30 *Sill Step*
32 *Dead Blocks*
32*a* *Buffer Beam*
102 *Grab Iron or Hand Hold*
103 *Manhole Ladder*
104 *Manhole Ladder Brace*
106 *Tank Head*
106*a* *Tank for Tank Car*
107 *Tank Band*
108 *Tank Dome*
109 *Dome Head*
110 *Manhole*
111 *Manhole Cover*
114 *Tank Valve*
117 *Tank Valve Rod*
117*a* *Tank Valve Rod Screw*
117*c* *Tank Valve Rod Bracket*
119 *Running Board*
121 *Hand Rail*
122 *Hand Rail Post*
135 *End Sill Diagonal Brace*
195 *Same as* **135**



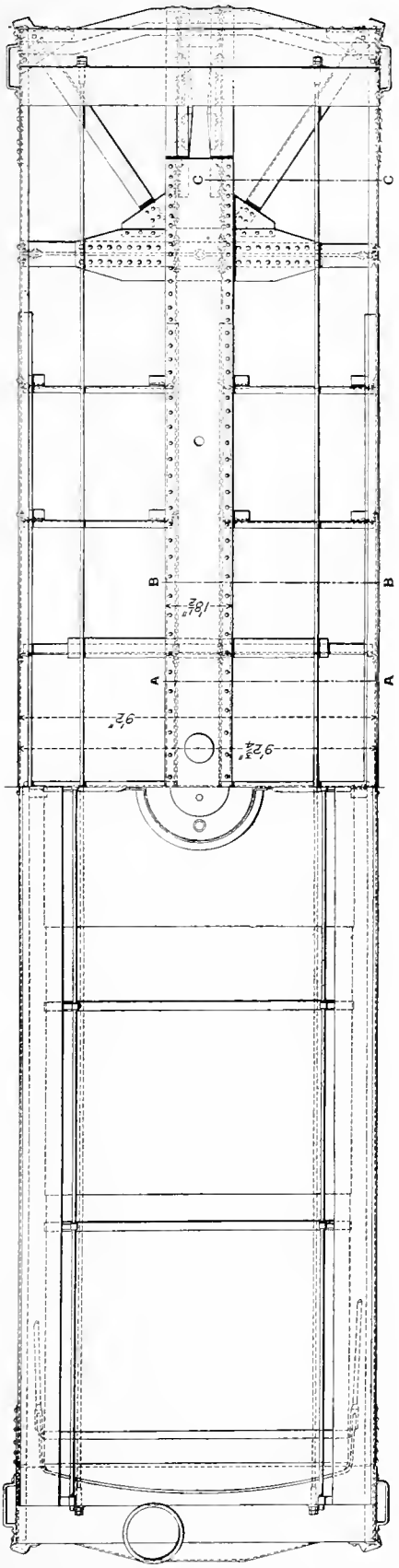
Figs. 567-568. Cross-Sections of 40-ft. Tank Car, Southern Pacific. Capacity, 12,500 gallons, or 100,000 lbs.

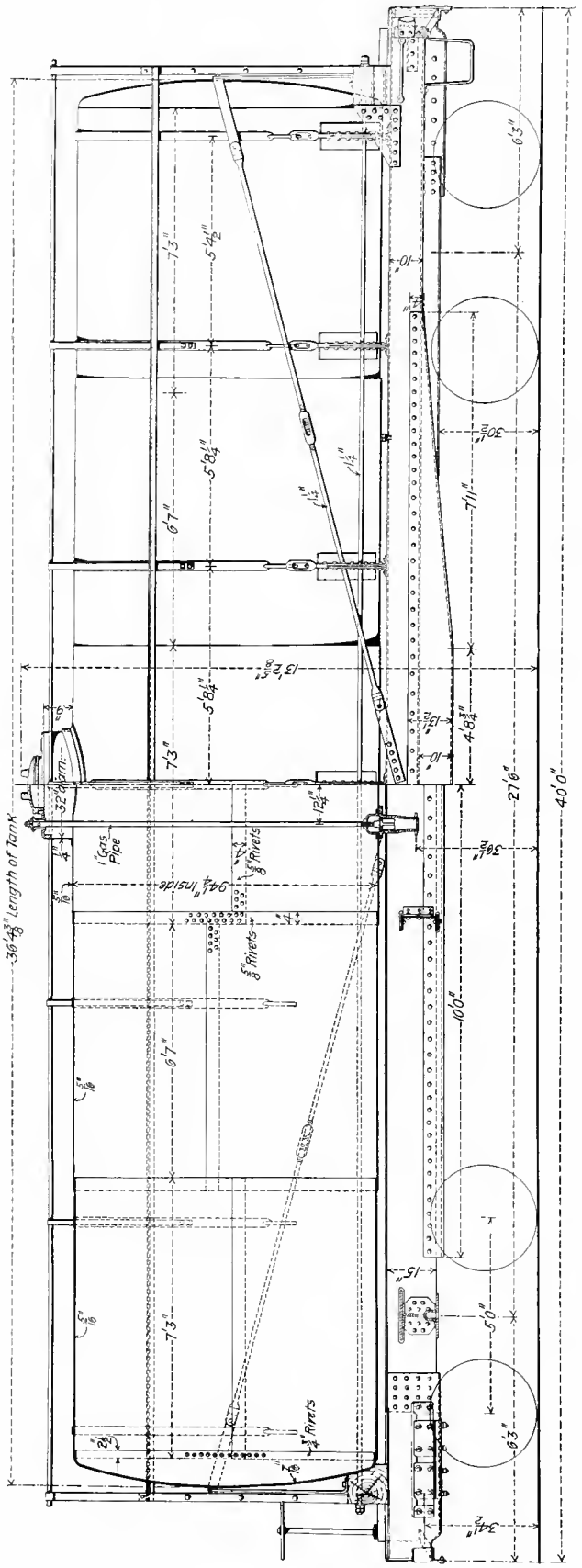


Figs. 569-571. Plans, Elevations and Section of 31-ft. 6-in. Tank Car. Capacity, 8,000 gals.



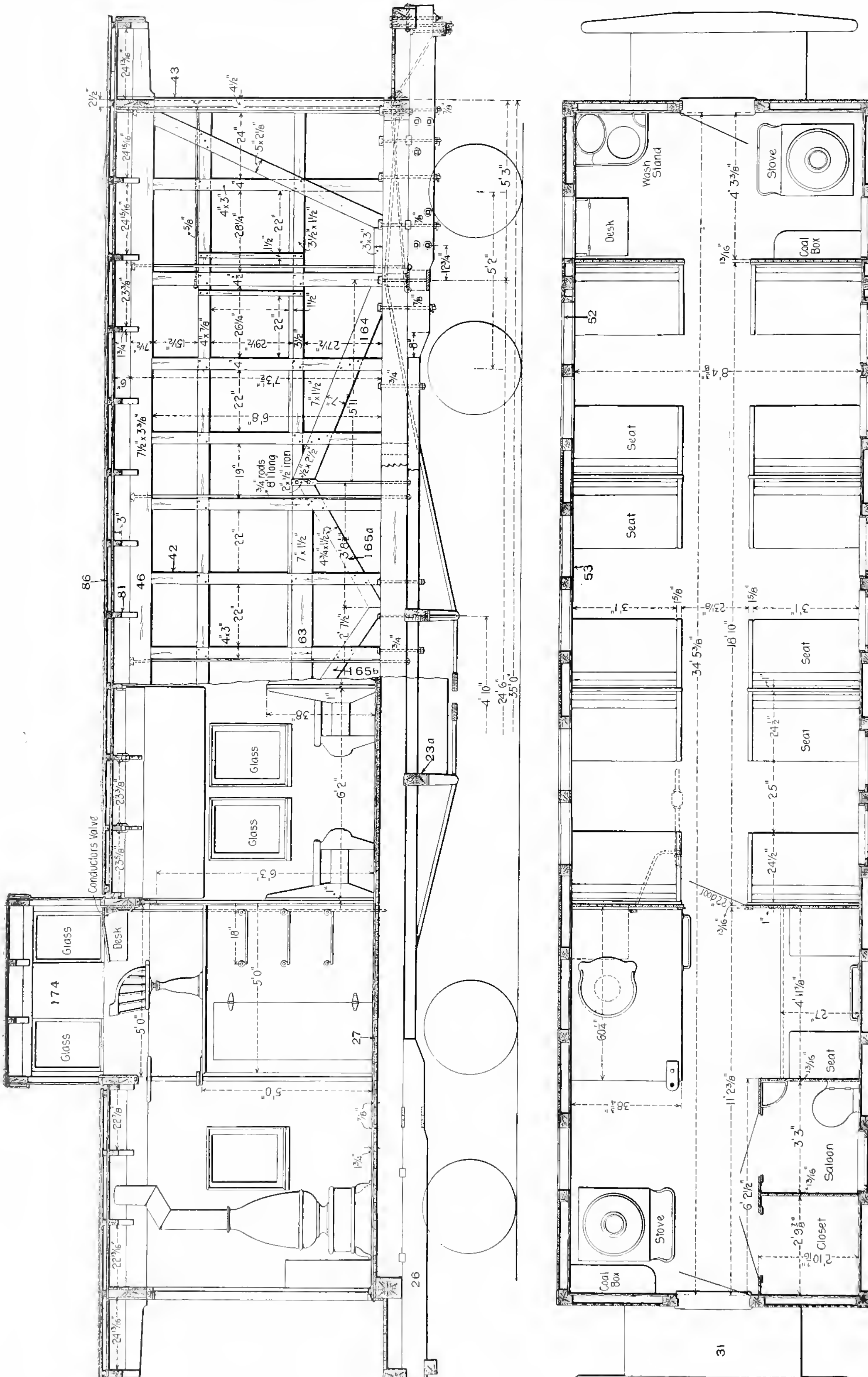
Figs. 572-574. Plans, Elevations and Section of 30-ft. 9-in. Tank Car. Capacity, 12,000 gals.



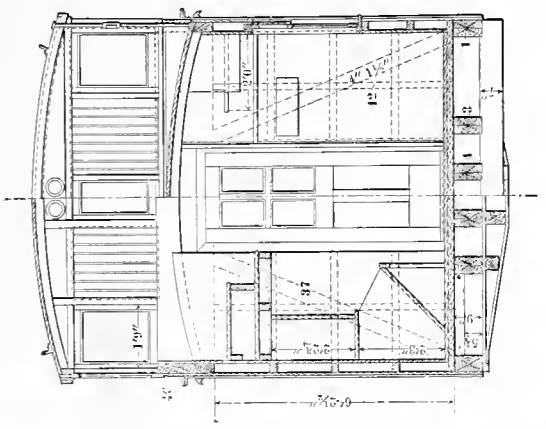


Figs. 575-576. Plan and Side Elevation of 40-ft. Tank Car, Southern Pacific. Capacity, 12,000 gallons, or 100,000 lbs.

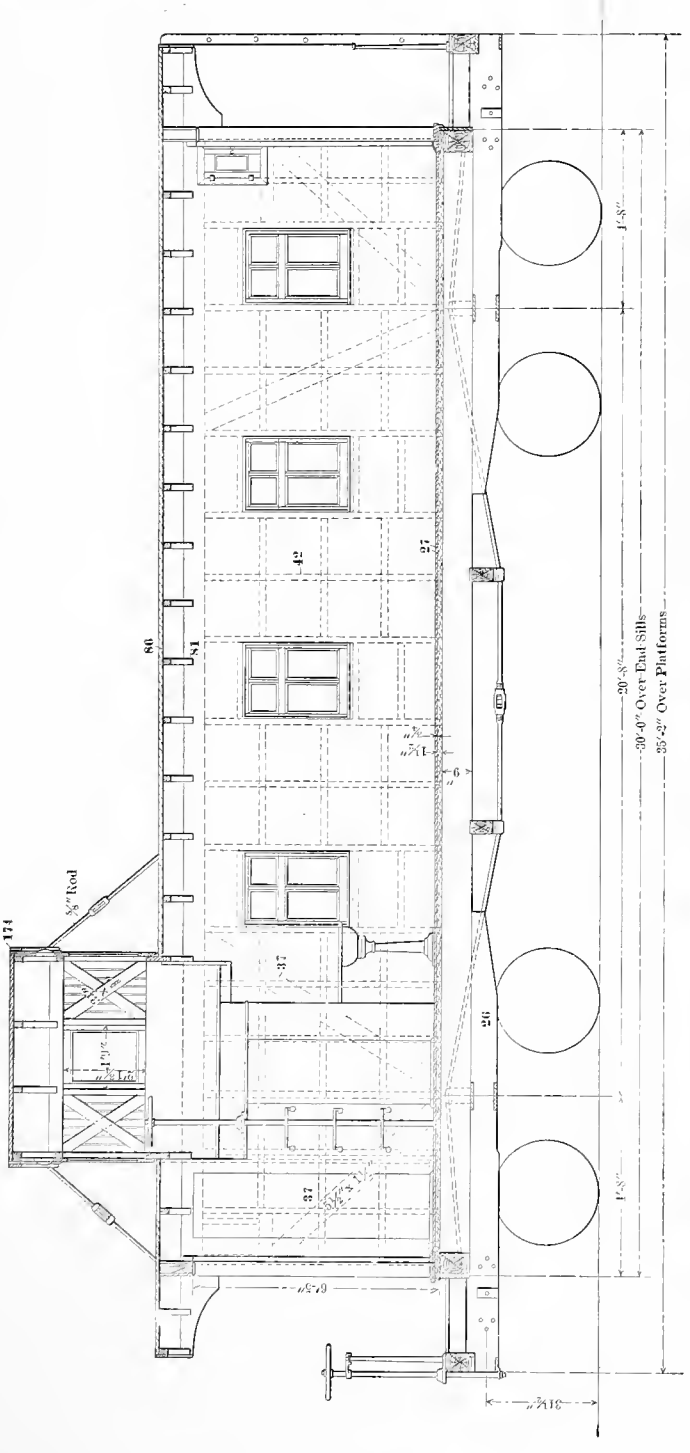
Numbers Refer to List of Names with Figs. 585-586.

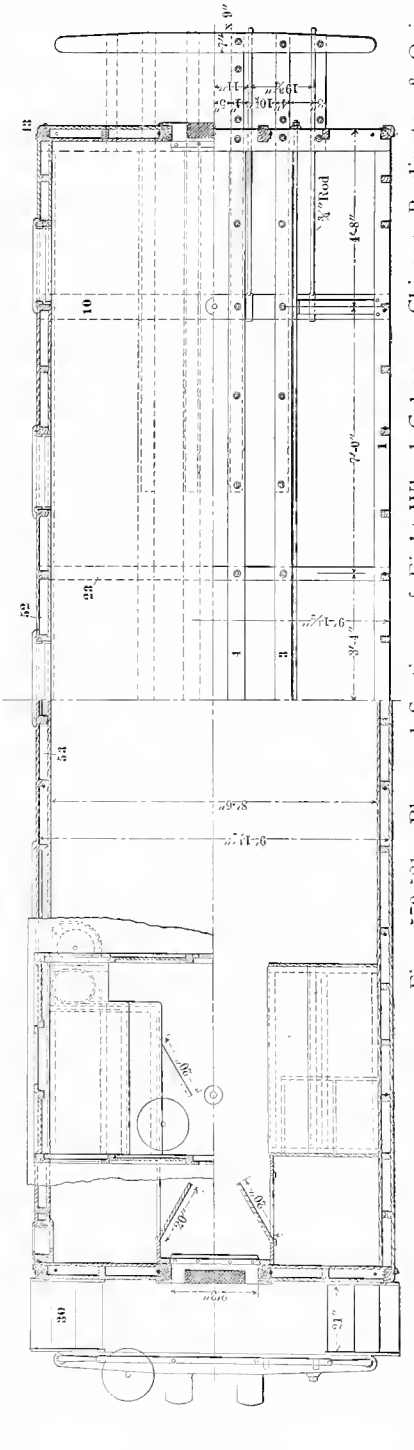


Figs. 577-578. Plan and Inside Elevation of Eight-Wheel Caboose. Illinois Central.



Numbers Refer to List of Names with Figs. 585-586.





Figs. 579-581. Plan and Sections of Eight-Wheel Caboose, Chicago, Burlington & Quincy.

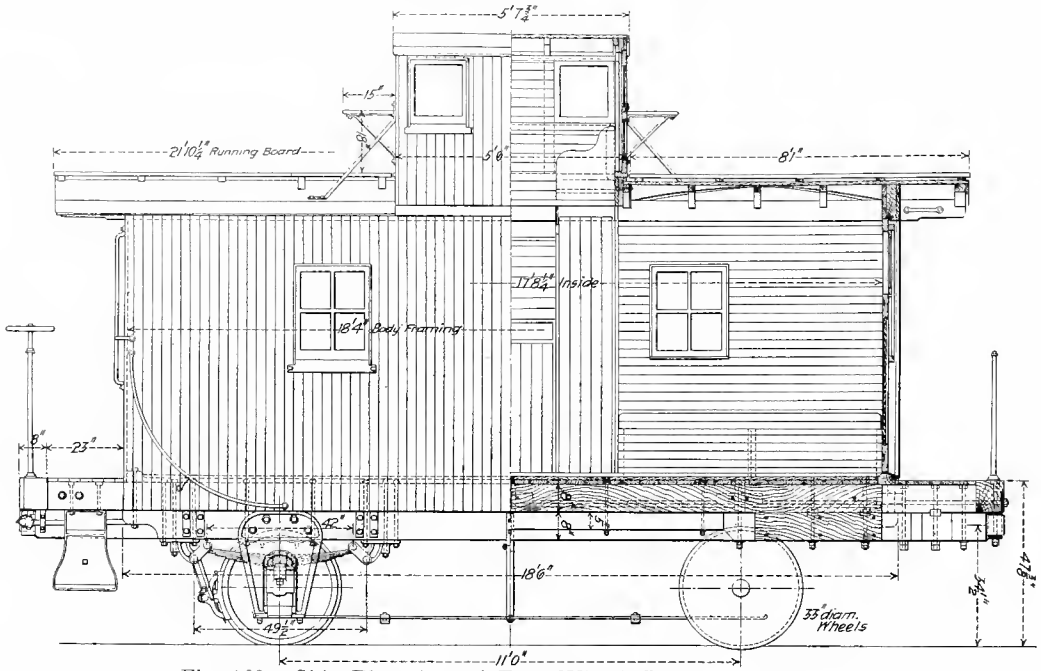


Fig. 582. Side Elevation of Four-Wheel Caboose. Big Four.

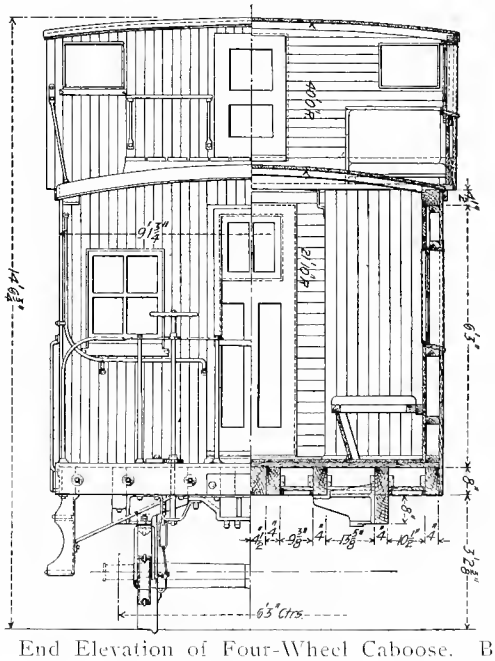


Fig. 583. End Elevation of Four-Wheel Caboose. Big Four.

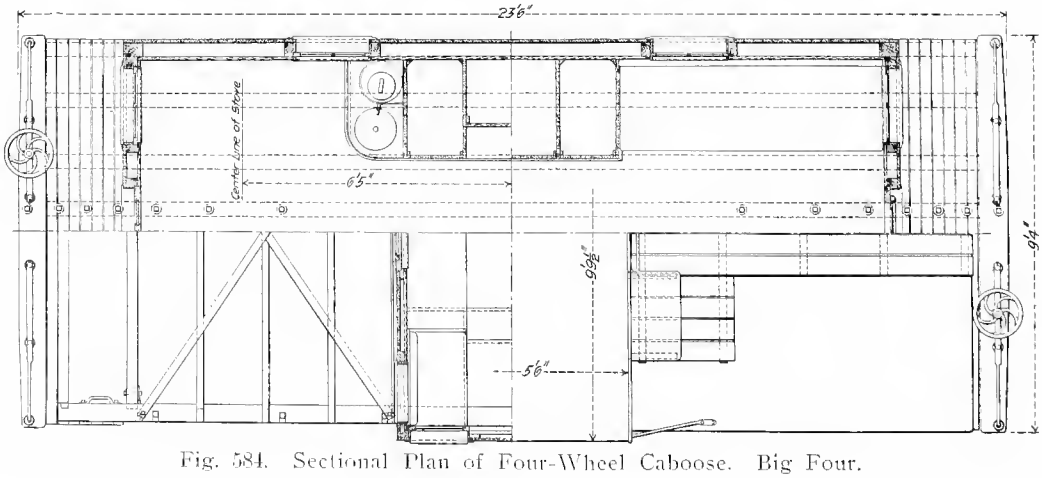
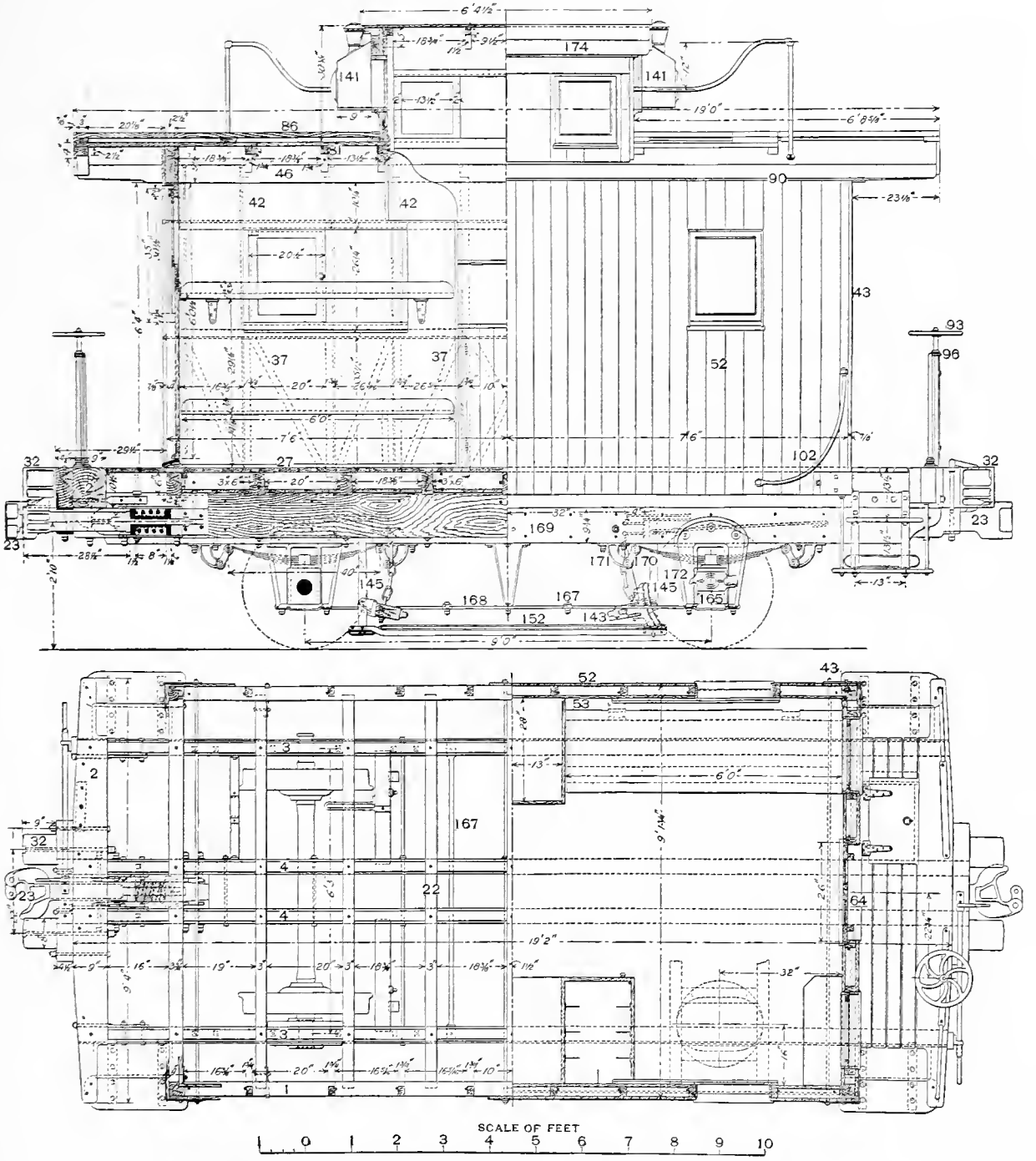


Fig. 584. Sectional Plan of Four-Wheel Caboose. Big Four.

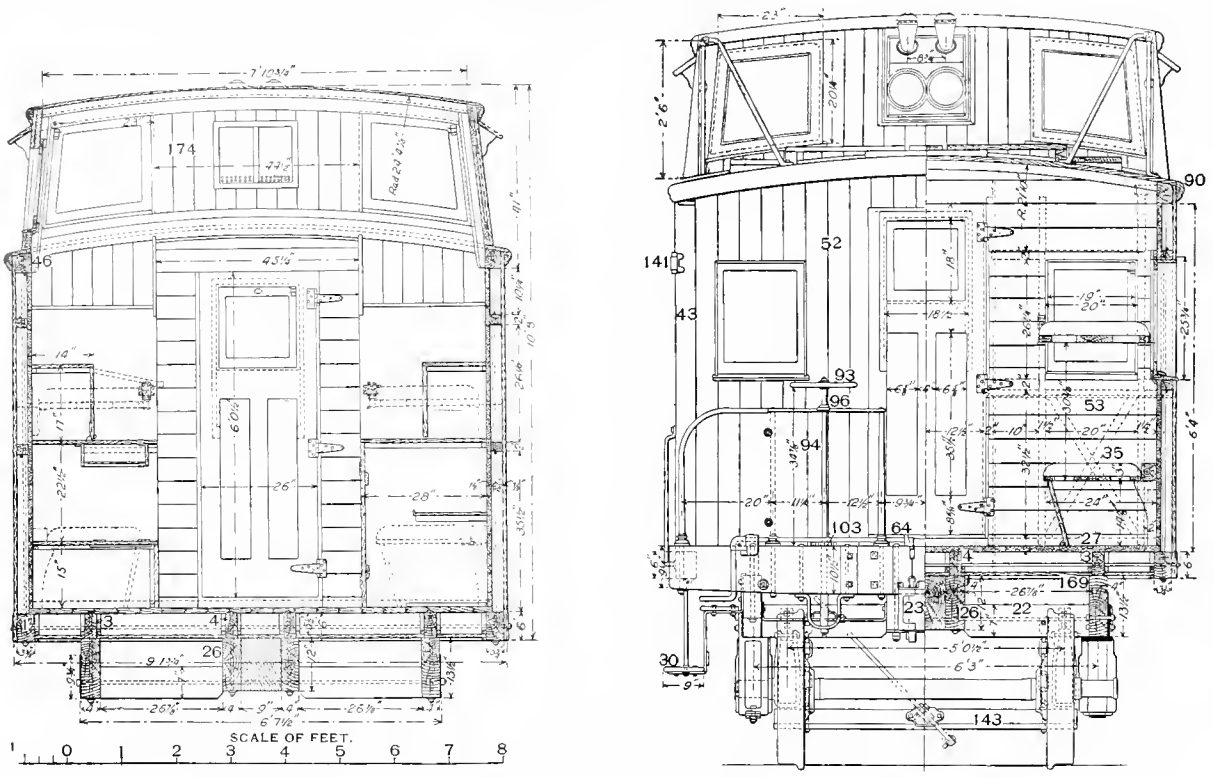
Numbers Refer to List of Names Below.



Figs. 585-586. Plan and Side Elevation of Four-Wheel Caboose. Erie R. R.

Names of Parts of Caboose Cars. Figs. 577-581, 585-588.

1 *Side Sill*
2 *End Sill*
3 *Intermediate Sill*
3a *Outer Intermediate Sill*
4 *Center Sill*
10 *Body Bolster*
19 *Body Truss Rod*
22 *Floor Timber*
23 *Crosstie Timber*
26 *Draft Timber*
27 *Floor*
30 *Platform Step*
31 *Platform*
32 *Buffer Beam*
37 *Brace*
37′ *Counterbrace*
42 *Post*
43 *Corner Post*
46 *Plate*
52 *Sheathing or Siding*
53 *Inside Lining*
63 *Truss Plank*
64 *Door Sill*
81 *Carline*
86 *Roof*
90 *Eaves Fascio Board*
93 *Brake Wheel*
96 *Upper Brake Shaft Bearing*
102 *Corner Grab Iron*
103 *Brake Ratchet Wheel*
141 *Lookout Signal Lamp*
141a *Signal Lamp Bracket*
145 *Brake Lever*
152 *Lower Brake Strut*
164 *Compression Beam Brace*
165 *Journal Box*
165b *Auxiliary Compression Beam Brace*
167 *Pedestal Stay Rod*
168 *Pedestal Tie Bar*
169 *Pedestal Timber*
170 *Spring Hanger*
171 *Spring Hanger Iron*
172 *Pedestal*
174 *Lookout*



Figs. 587-588. End Elevation and Cross-Section of Four-Wheel Caboose. Erie R. R.

Numbers Refer to List of Names with Figs. 585-586.

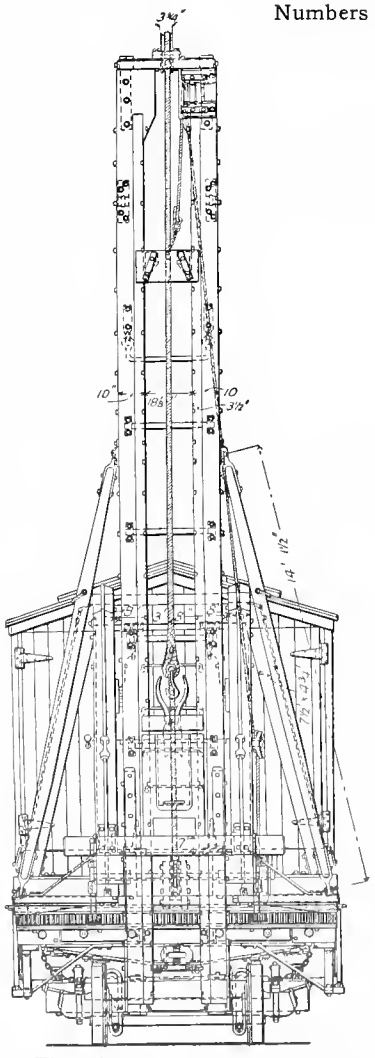


Fig. 589. Front End Elevation.

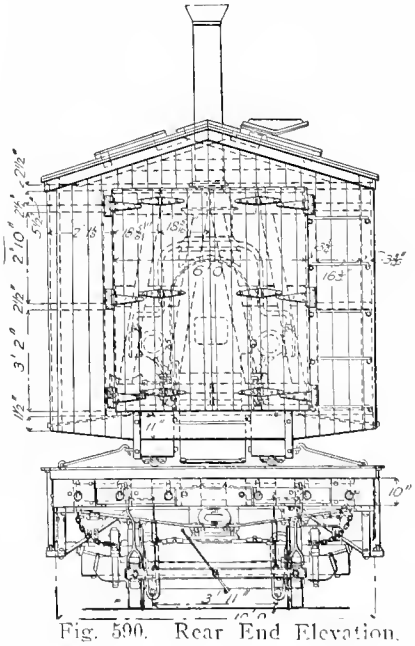


Fig. 590. Rear End Elevation.

Pile Driving Car. Chicago & North Western.

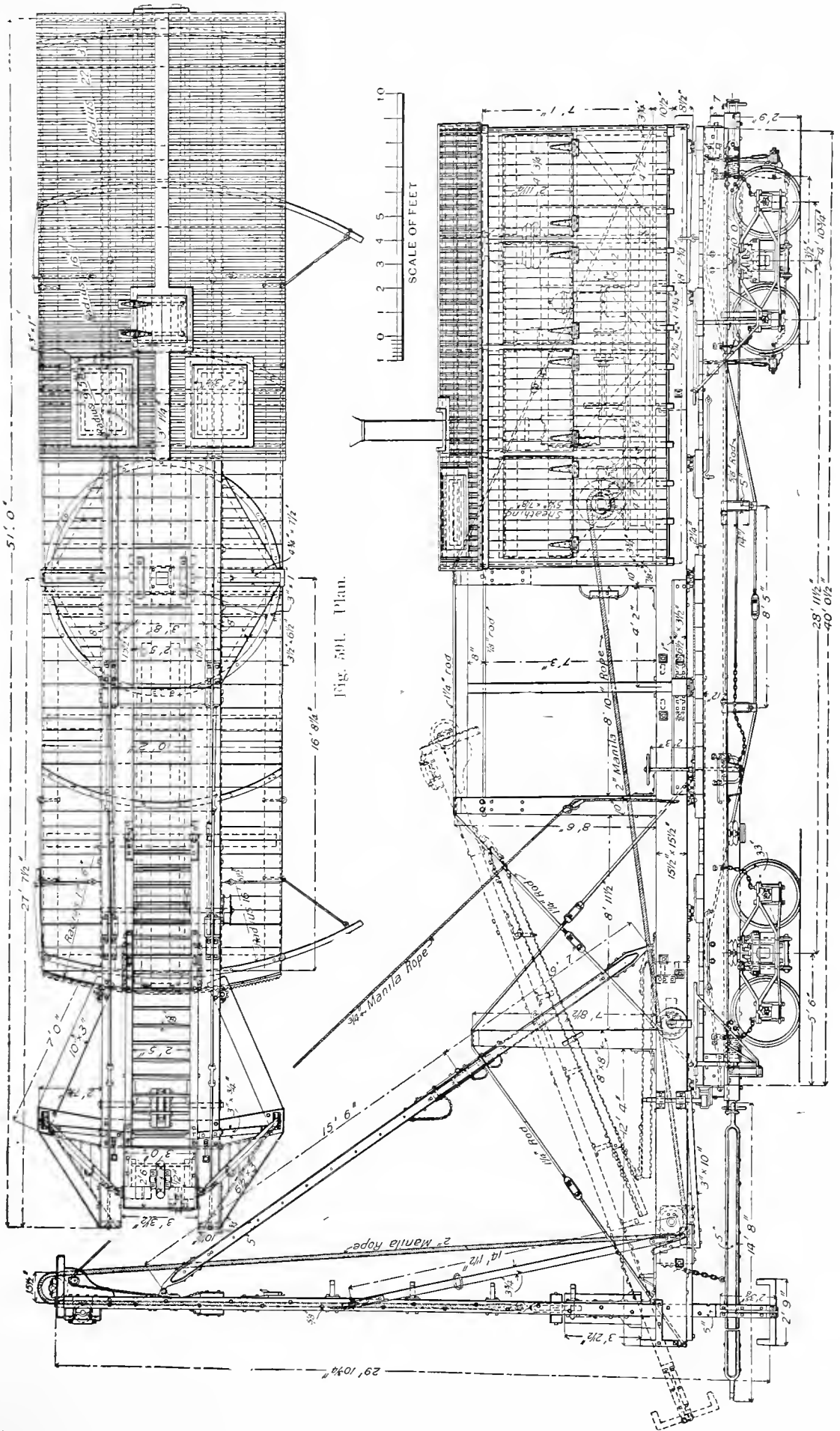
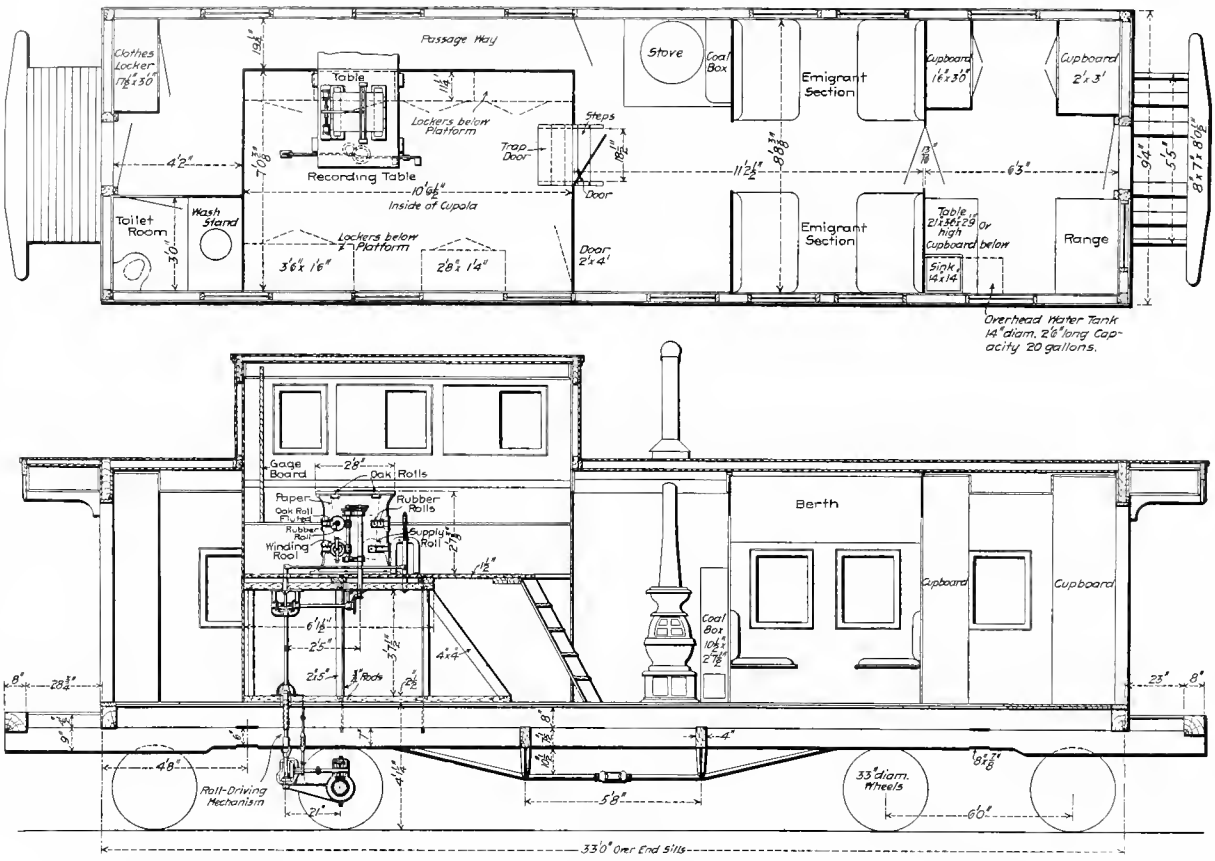


Fig. 591. Plan.

Fig. 592. Side Elevation of Pile Driver Car. Chicago & North Western.



Figs. 593-594. Plan and Longitudinal Section through Northern Pacific Dynamometer Car.

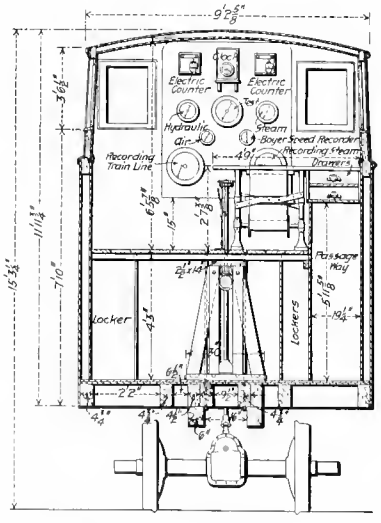


Fig. 595. Cross-Section through Dynamometer Car.

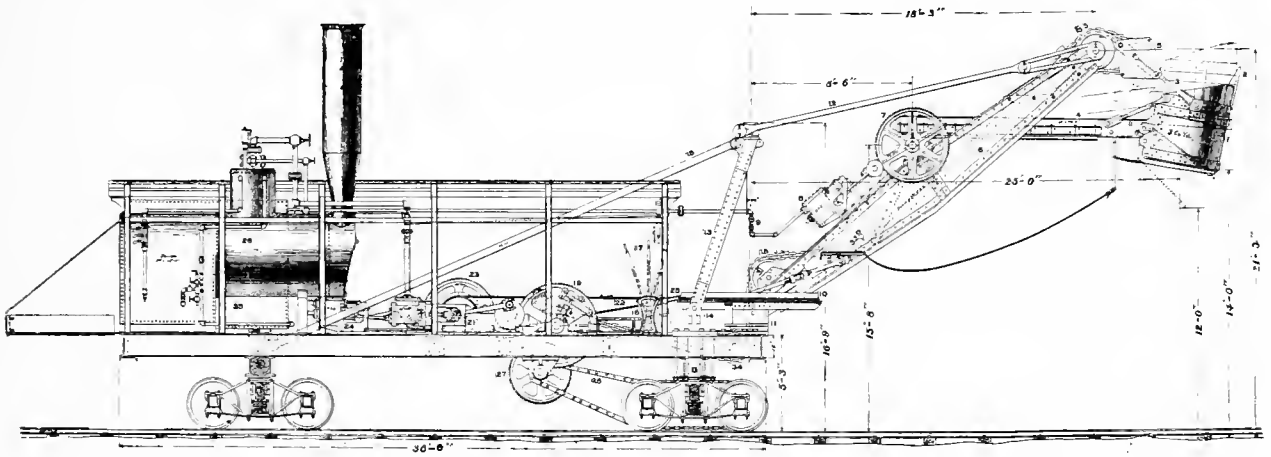


Fig. 596. Side Elevation.

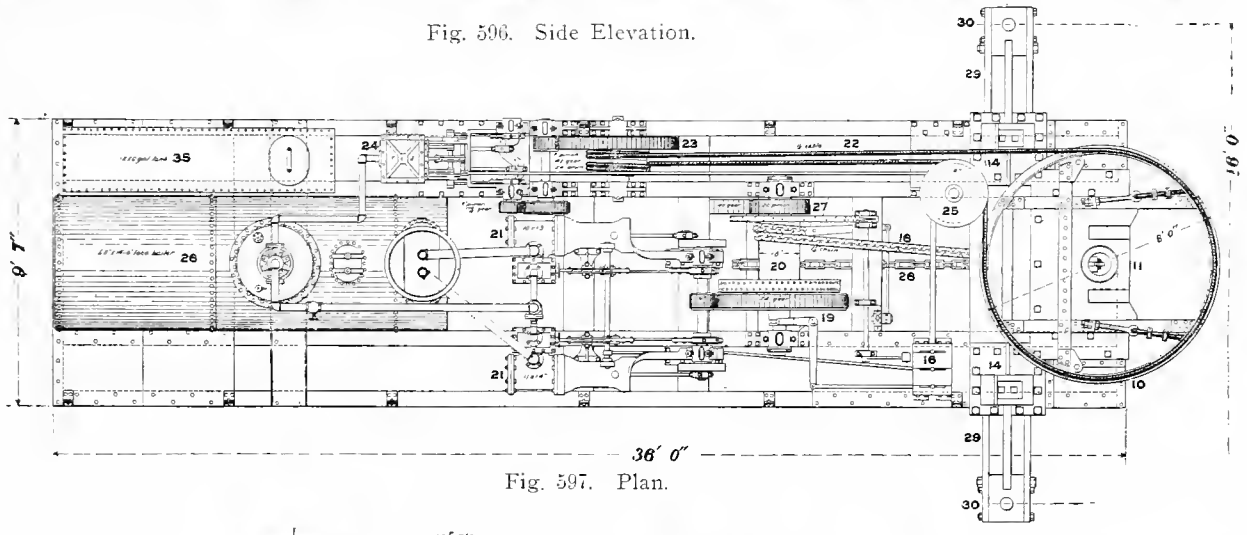


Fig. 597. Plan.

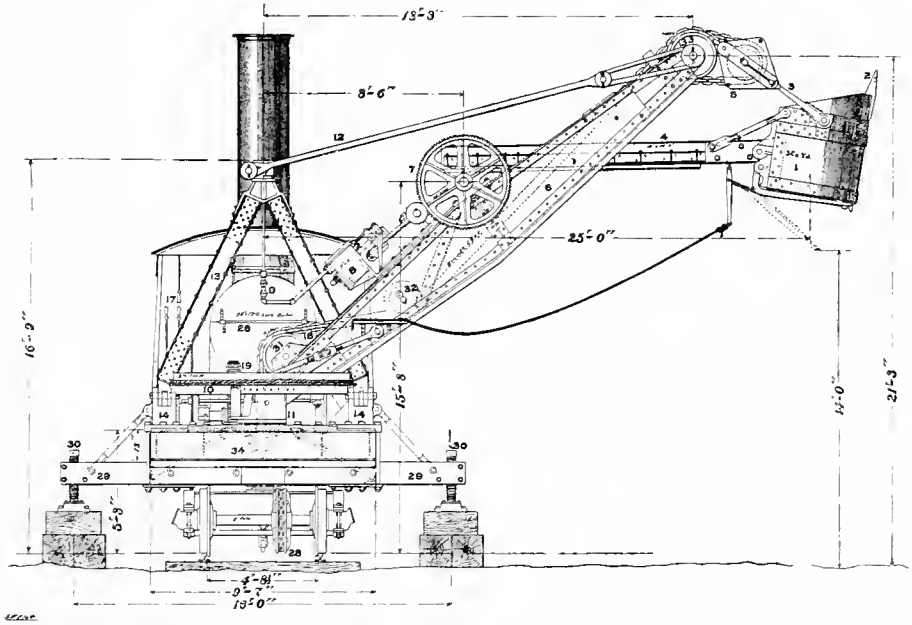


Fig. 598. End Elevation. 65-Ton Steam Shovel. The Vulcan Steam Shovel Co., Builders.

Names of Parts of Steam Shovels. Figs. 596-598.

1 *Dipper*
2 *Dipper Teeth*
3 *Dipper Bail*
5 *Dipper Block*
6 *Boom*
7 *Shipper Shaft and Gears*
8 *Boom Engine*
9 *Steam Pipe*
10 *Swinging Circle*
11 *Boom Step and Trunnion*
12 *Boom Guys*
13 *A-Frame*
14 *A-Frame Step*
15 *Back Guy*
16 *Quadrant*
17 *Quadrant Levers*
18 *Hoisting Chain*
19 *Hoisting Gear*
20 *Hoisting Drum*
21 *Hoisting Engine*
22 *Swing Cables*
23 *Swing Gear and Drum*
24 *Swing Engines*
25 *Swing Figurehead*
26 *Boiler*
27 *Propelling Gear*
28 *Propelling Chain*
29 *Jack Arms*
30 *Jack Screws*
31 *Boom Foot Sheave*
32 *Boom Idler Sheave*
33 *Boom Point Sheave*
34 *Forefoot Sheave*
35 *Tank*

Numbers Refer to List of Names with Figs. 605-606.

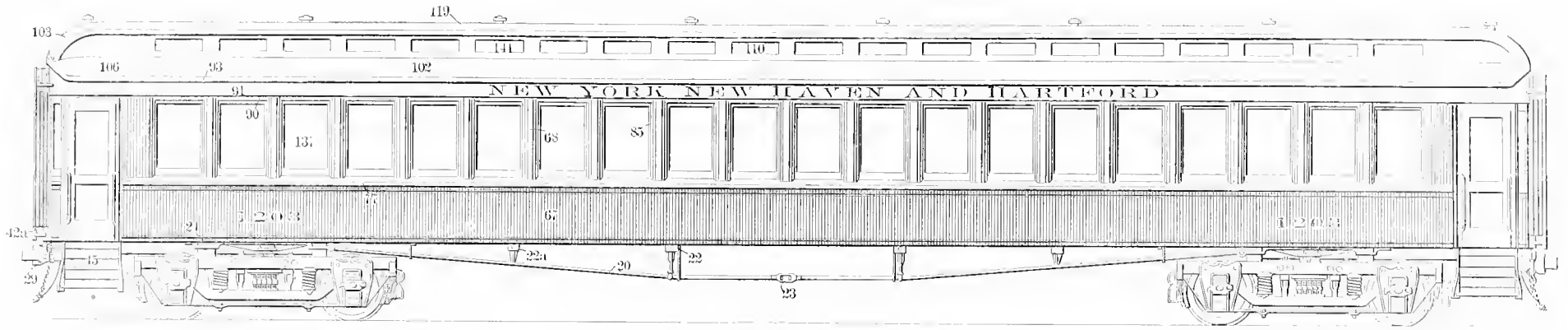


Fig. 599. Side Elevation.

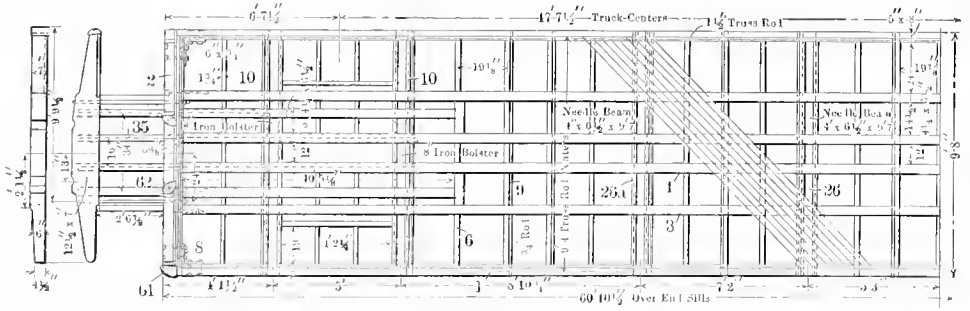


Fig. 600. Half Plan of Framing.

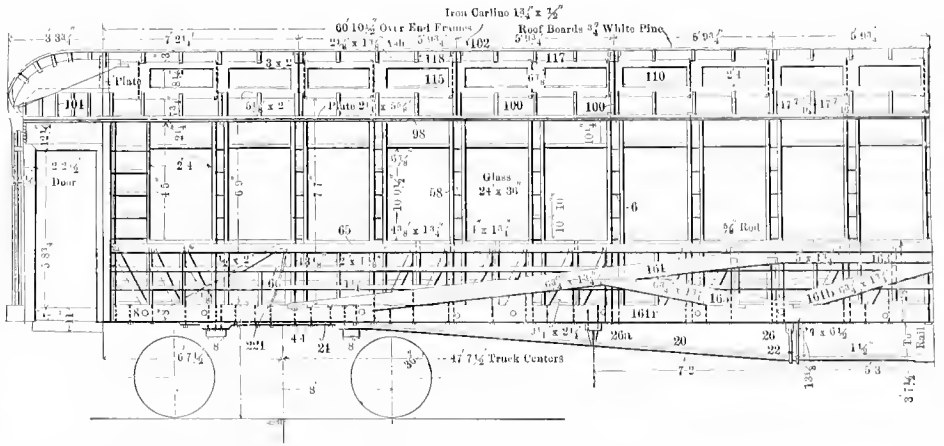
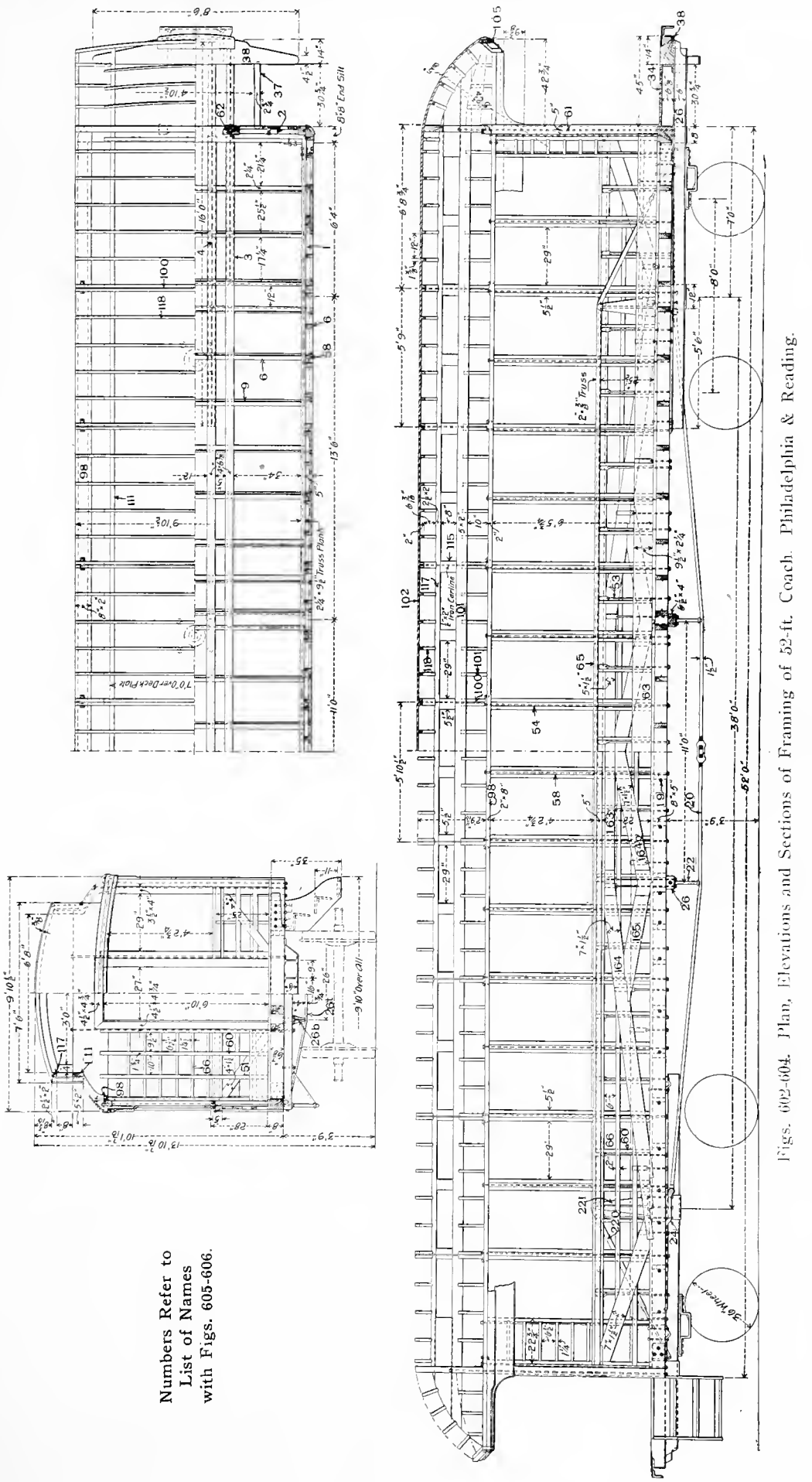
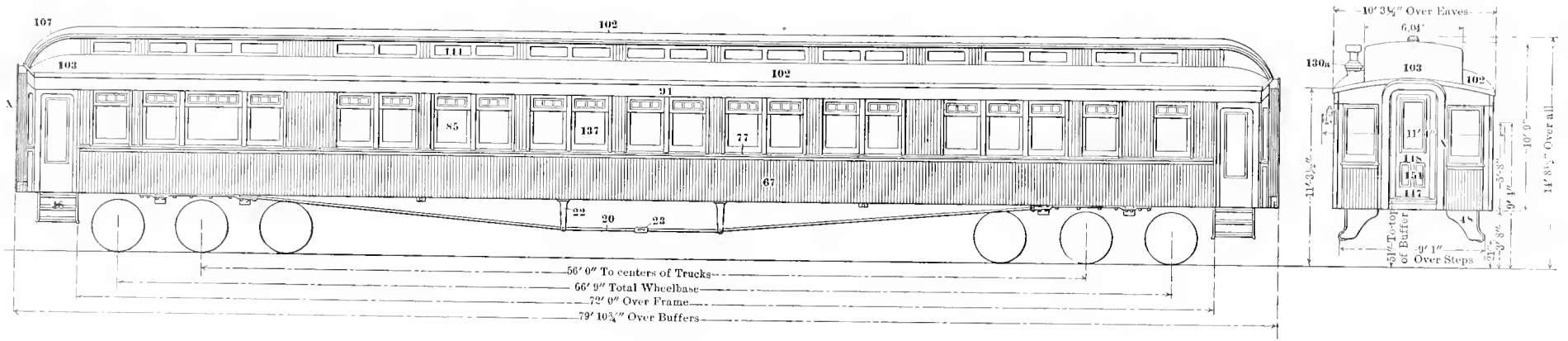


Fig. 601. Half Side Elevation of Framing.

First-Class Coach. New York, New Haven & Hartford.



Figs. 602-604. Plan, Elevations and Sections of Framing of 52-ft. Coach. Philadelphia & Reading.

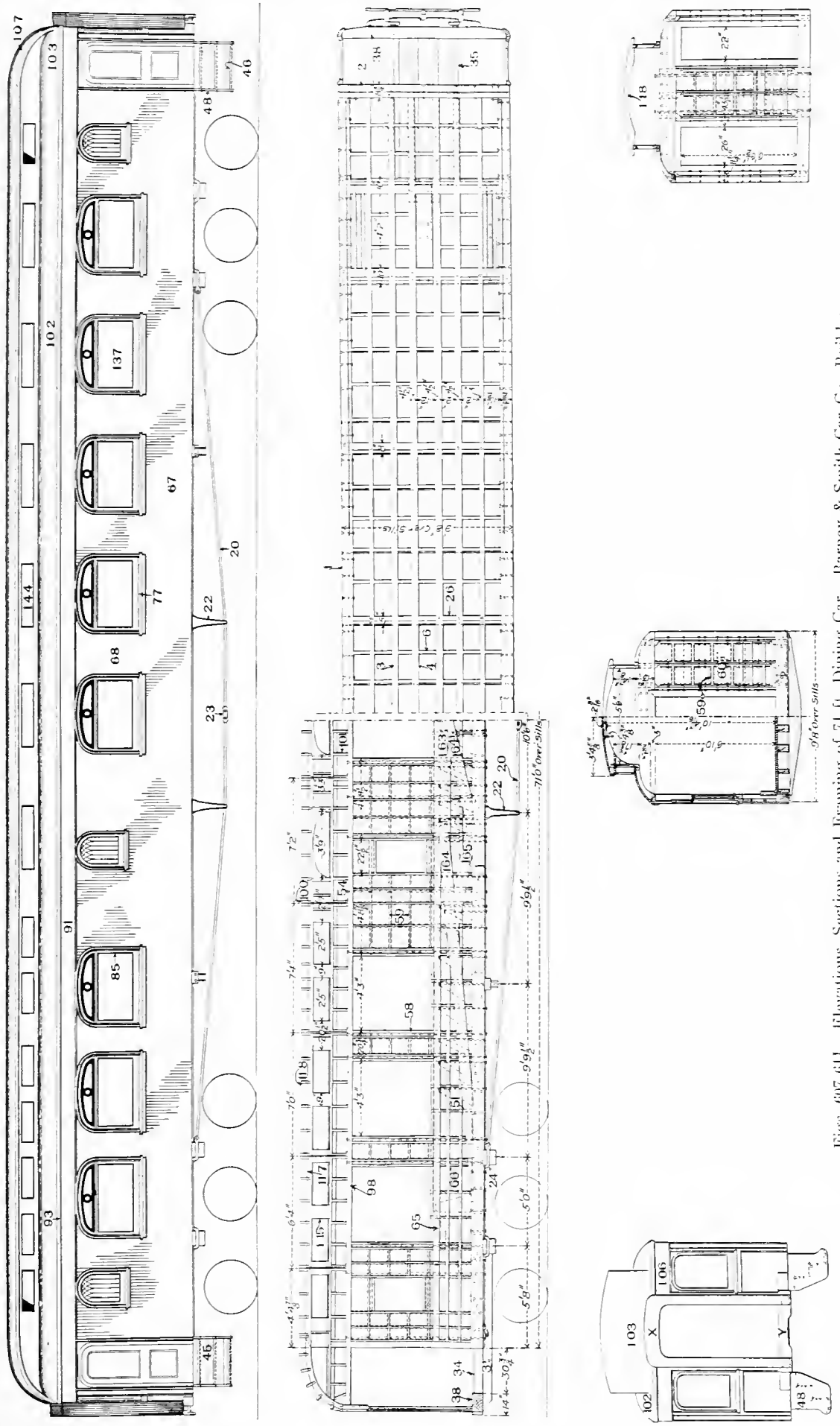


Figs. 605-606. Side and End Elevations of 72-ft. Colonist Sleeping Car. Canadian Pacific.

List of Names of Parts of Passenger Car Bodies. Figs. 599-613, 617-619.

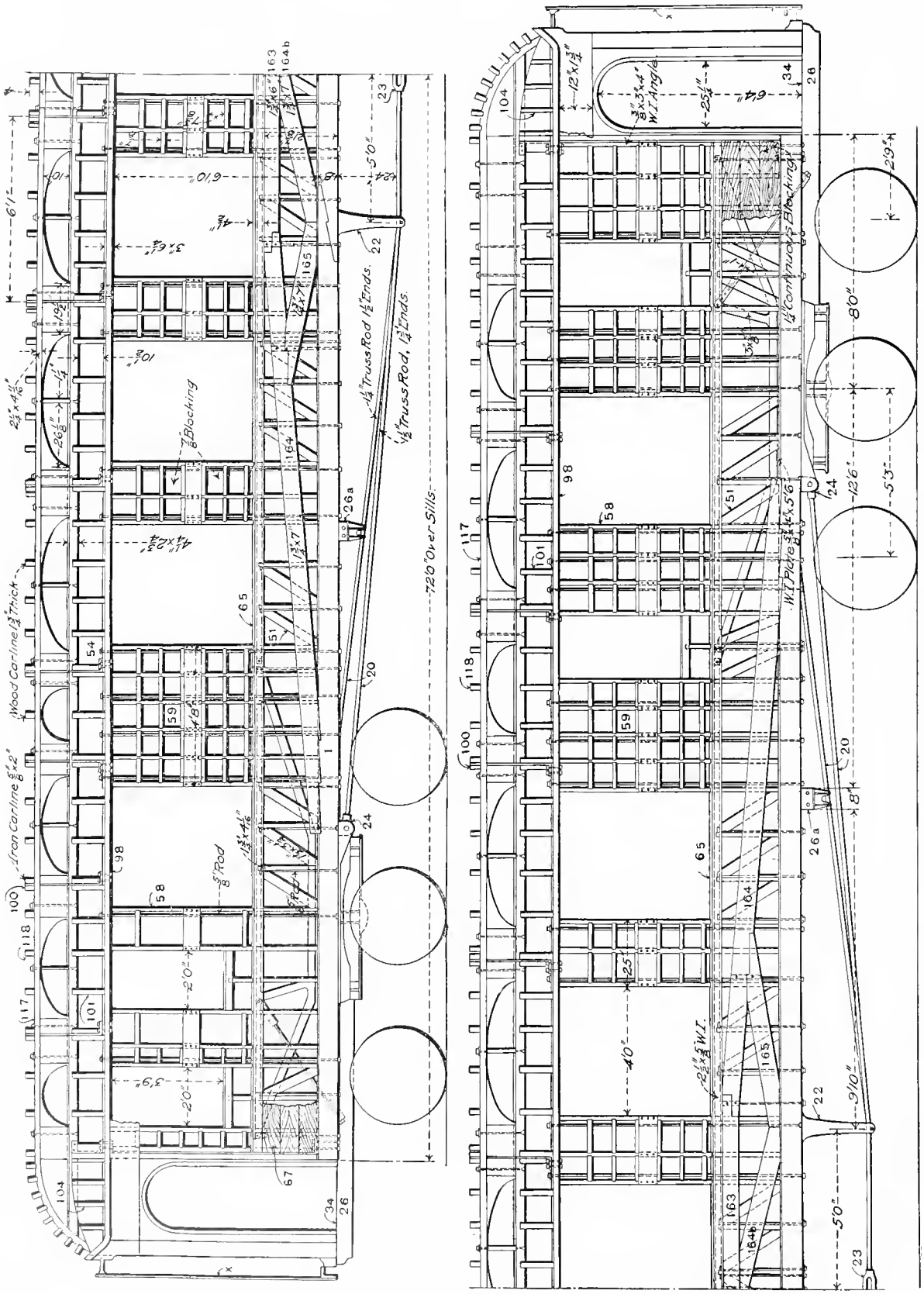
1 *Side Sill*
2 *End Sill*
3 *Intermediate Sill*
3*a* *Outer Intermediate Sill*
4 *Center Sill*
6 *Bridging*
8 *Sill Knee Iron*
9 *Sill Tie Rod*
10 *Body Bolster*
19 *Same as* 9
20 *Body Truss Rod*
21 *Body Truss Rod Saddle*
22 *Body Queen Post*
23 *Turnbuckle*
24 *Truss Rod Anchor Iron*
26 *Cross Tie Timber*
26*a* *Intermediate Cross Tie Timber*
26*b* *Cross Tie Timber Truss Rod Queen Post*
26*t* *Cross Tie Timber Truss Rod*
29 *Drawbar*
31 *Draft Timber*
34 *Platform Floor*
35 *Platform Sill*
37 *Platform Short Sill*
38 *Platform End Sill*
42*a* *Buffer Plate*
45 *Platform Step*
46 *Tread Board*
48 *Step Hanger*
51 *Brace*
54 *Sill and Plate Rod*
55 *Counterbrace*
58 *Window Post*
59 *Sheathing Strips*
59*c* *End Sheathing Strips*
60 *Stud*
60*c* *Same as* 60
61 *Corner Post*
62 *Door Post*
63 *Truss Plank*
65 *Belt Rail*
66 *Sheathing Rail*
67 *Outside Panel or Sheathing*
67*a* *Same as* 67
68 *Outside Window Panel or Sheathing*
77 *Outside Window Sill*
85 *Window Sash*
90 *Window Lintel*
91 *Letter Board*
93 *Eaves Moulding*
98 *Plate*
99 *Door Lintel*
100 *Carline or Compound Carline*
101 *Rafter*
102 *Roof Boards*
103 *Platform Roof*
104 *Platform Roof Carline*
105 *Platform Roof End Carline*
106 *Roof Apron*
107 *Platform Hood*
110 *Clear Story or Upper Deck*
111 *Deck Sill*
115 *Deck Post*
117 *Deck Plate*
118 *Upper Deck Carline*
119 *Upper Deck Eaves Molding*
130*a* *Deck Ventilator*
137 *Window*
144 *Deck Sash or Deck Window*
147 *Bottom Door Rail*
148 *Middle Door Rail*
150 *Door Stile*
151 *Door Panel*
163 *Compression Beam*
164 *Compression Beam Brace*
164*b* *Auxiliary Compression Beam Brace*
165 *Counterbrace*
167 *Overhang Brace Rod*
220 *Same as* 167
221 *Overhang Brace Rod Strut Vestibule Face Plate*

Numbers Refer to List of Names with Figs. 605-606.

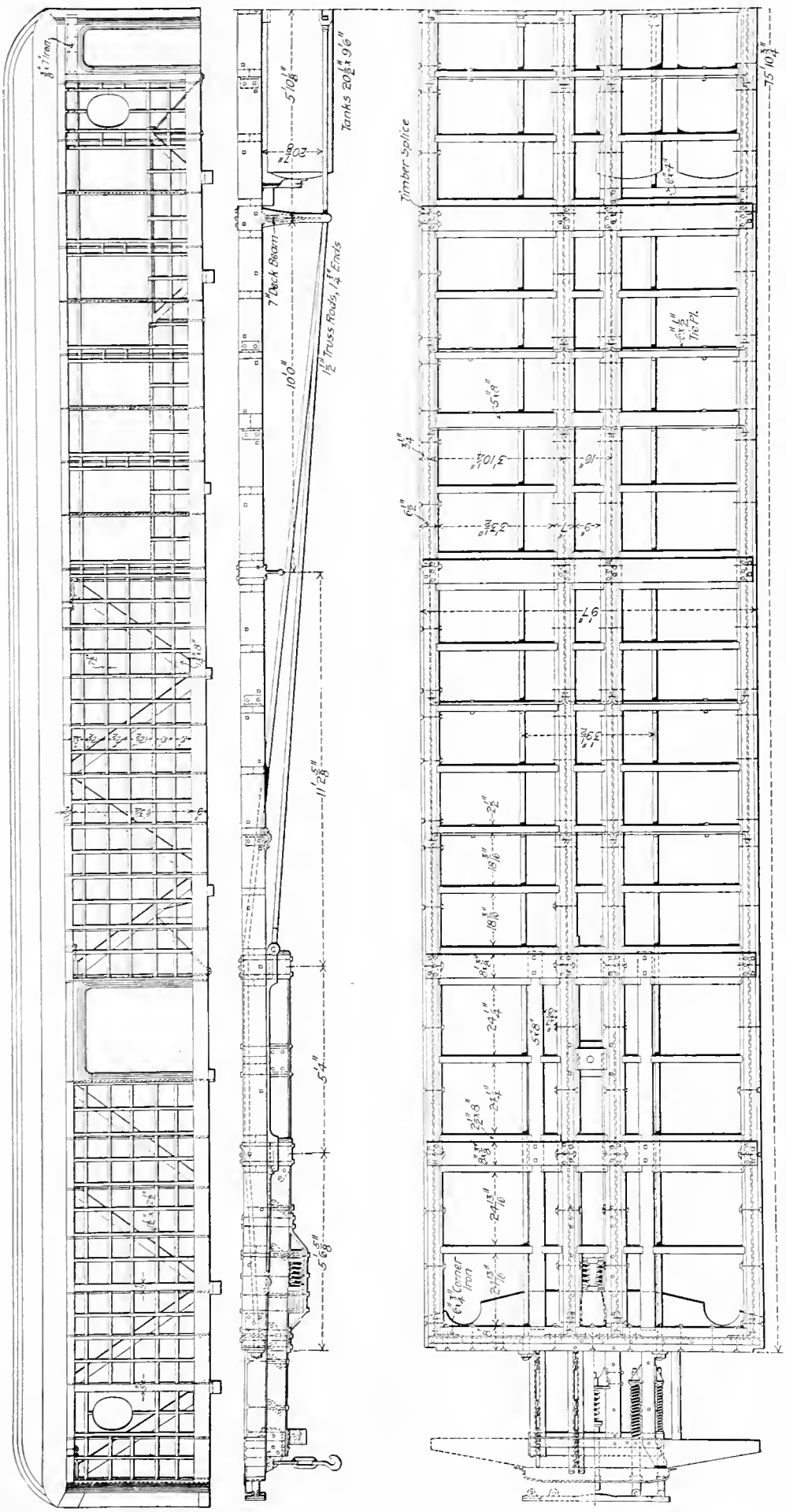


Figs. 607-611. Elevations, Sections and Framing of 71 ft. Dining Car. Barney & Smith Car Co., Builders.
Barney & Smith Standard Framing for Passenger Car Bodies.

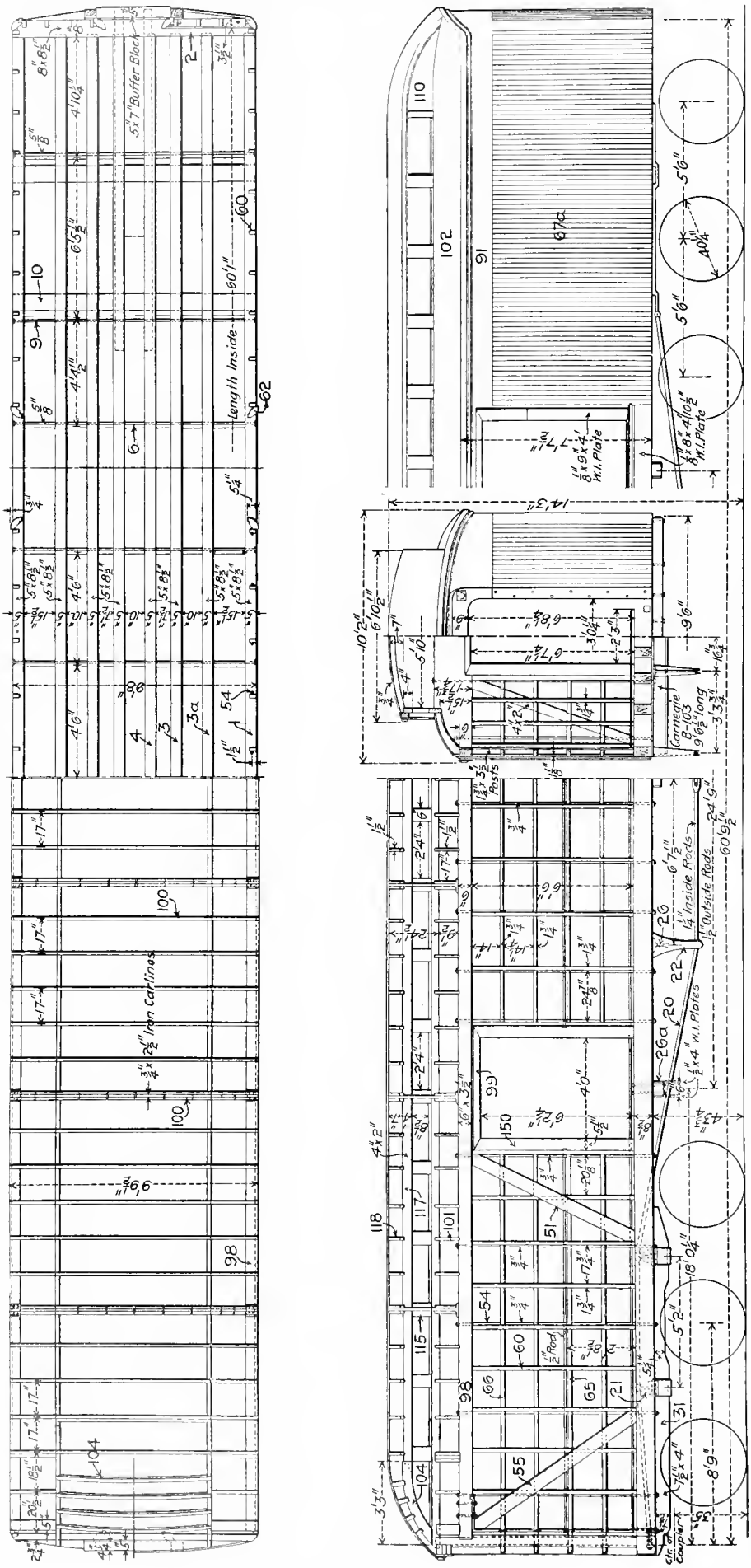
Numbers Refer to List of Names with Figs. 605-606.



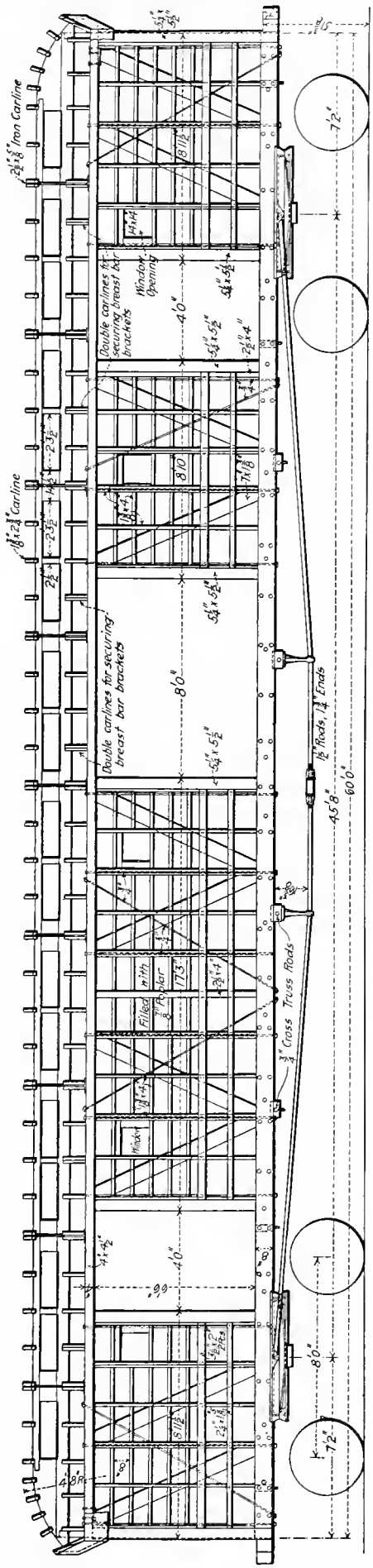
Figs. 612-613. Framing for 72-ft. Twelve-Section Sleeping Car. Pullman Co., Builders. Pullman Standard Framing for Passenger Cars.

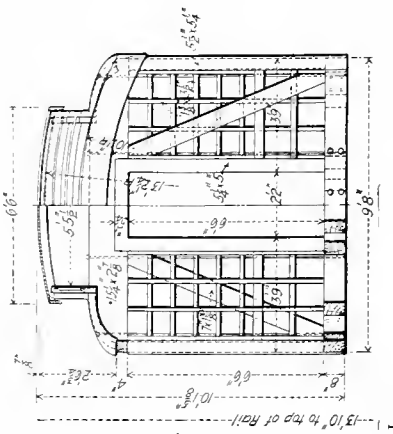


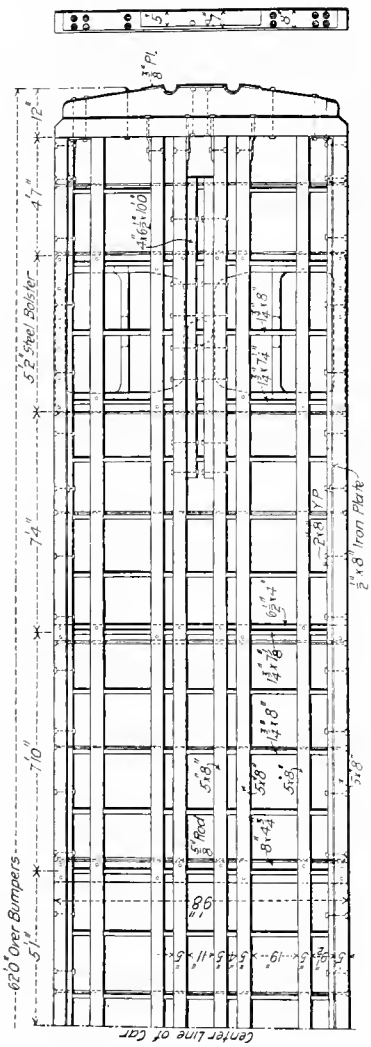
Figs. 614-616. Framing for 76 ft. Combination Baggage and Smoking Car, Chicago, Indianapolis & Louisville.



Figs. 617-619. Part Elevations and Framing of 60-ft. Baggage Car. C., B. & Q.







Figs. 620-622. Framing for 60-ft. Special Horse Car, Central Railroad of New Jersey.

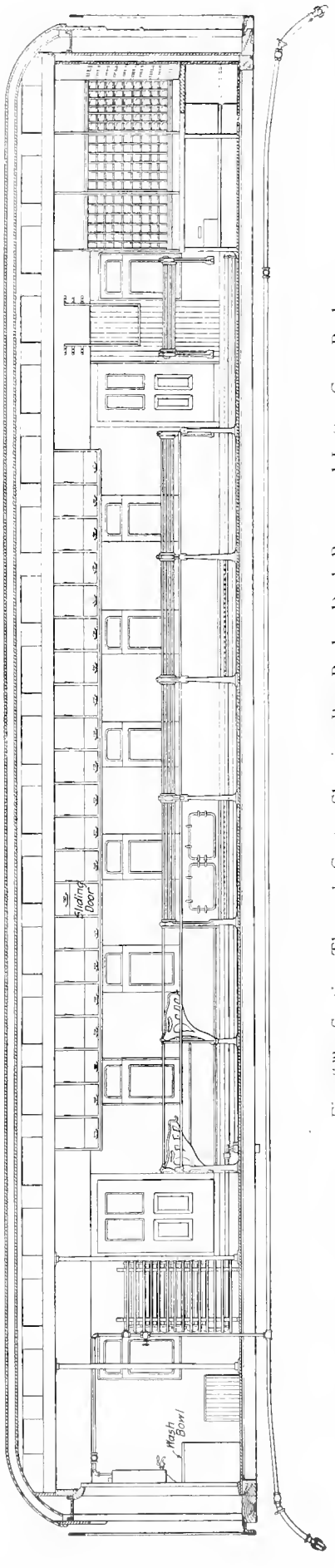


Fig. 623. Section Through Center Showing Bag Racks, Deck Boxes and Letter Case Rack.

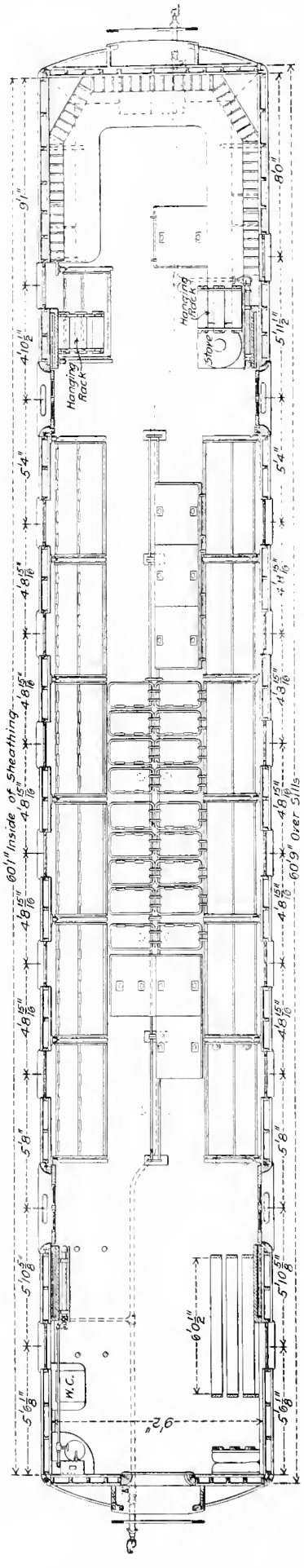
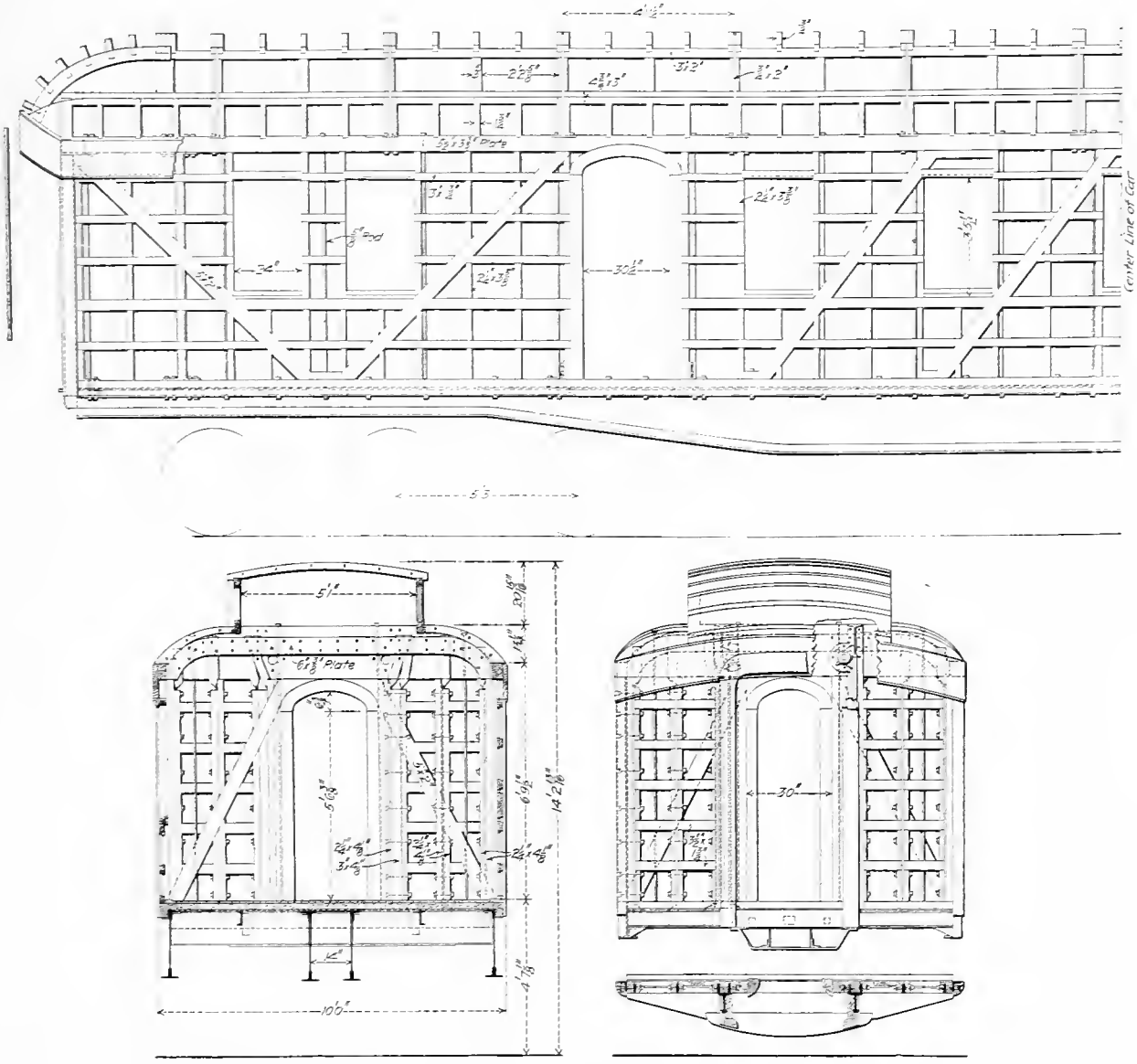
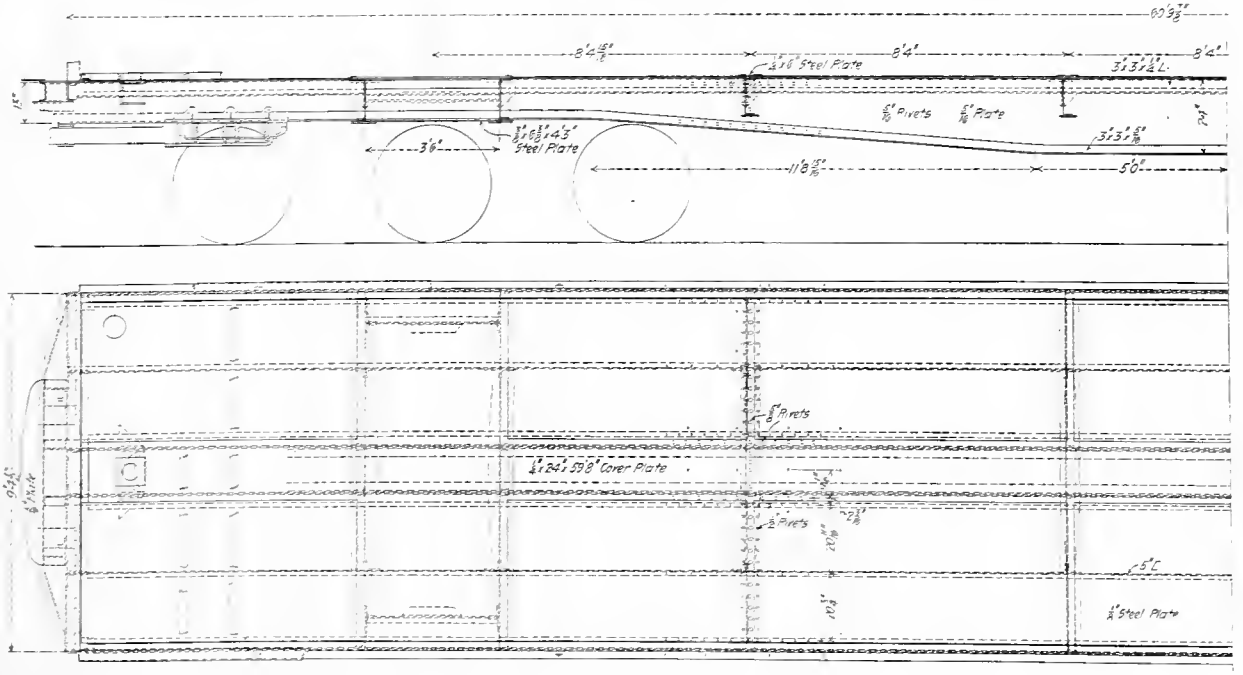


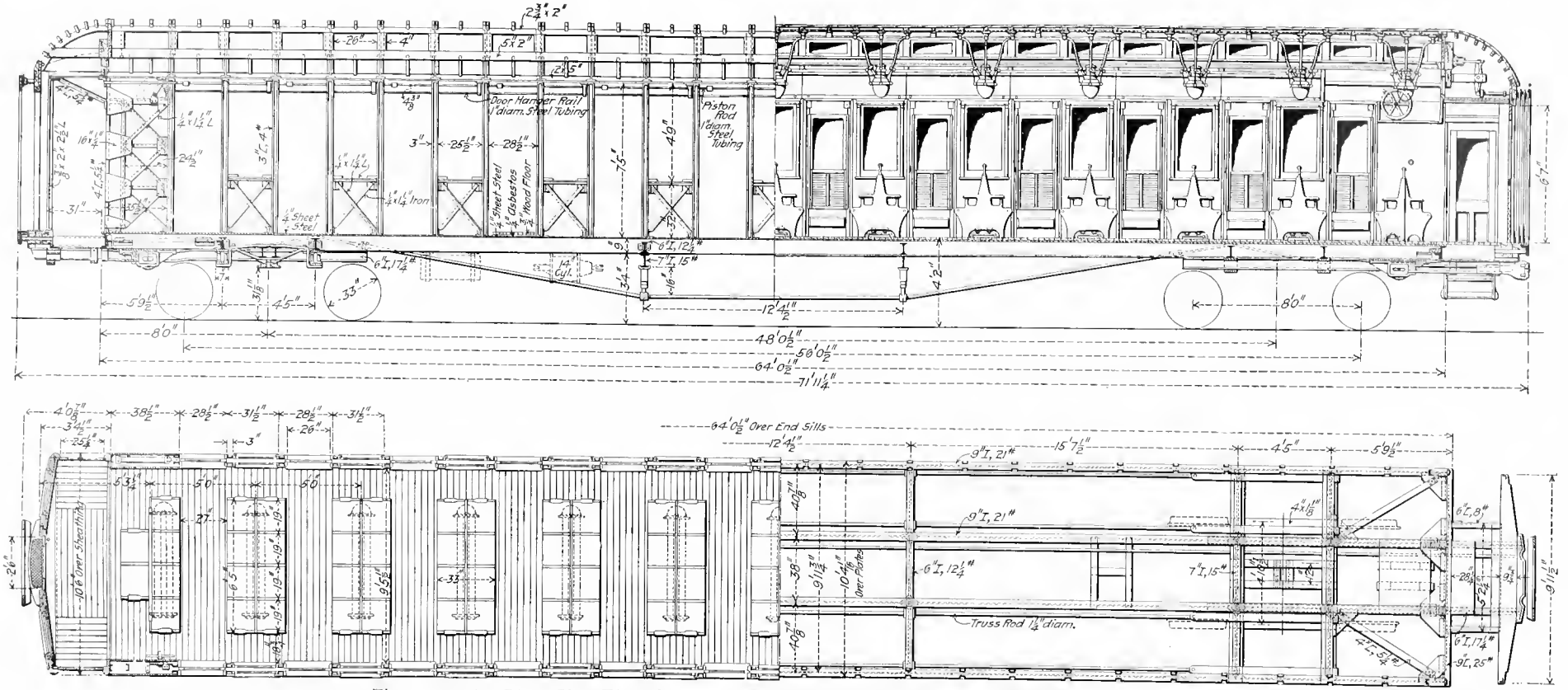
Fig. 624. Floor Plan of 60-ft. Postal Car, Chicago & North Western.



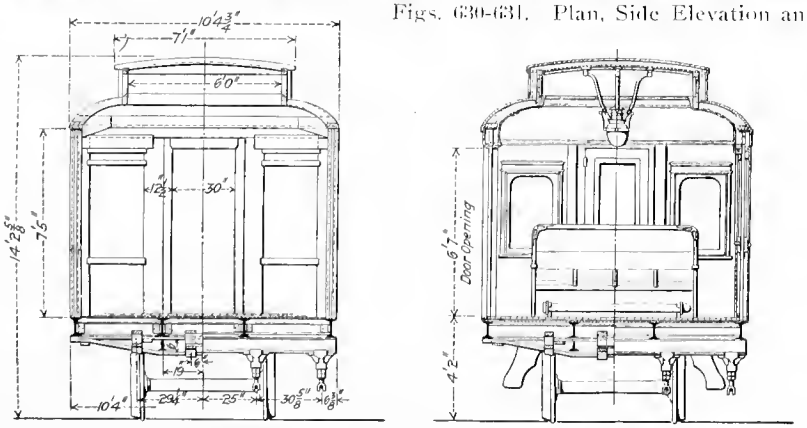
Figs. 625-627. Body Framing of 61-ft. Steel Underframe Postal Car. A., T. & S. F.



Figs. 628-629. Steel Underframe for Postal Car. Atchison, Topeka & Santa Fe.



Figs. 630-631. Plan, Side Elevation and Framing of Side-Door Suburban Car, Steel Framing. Illinois Central.



Figs. 632-633. Cross-Section and End Elevation.

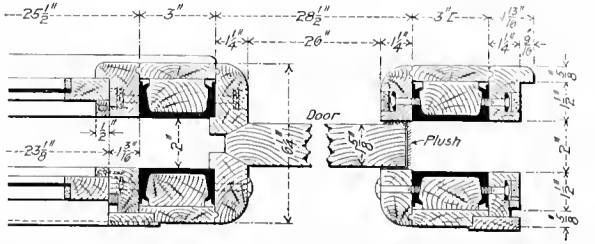
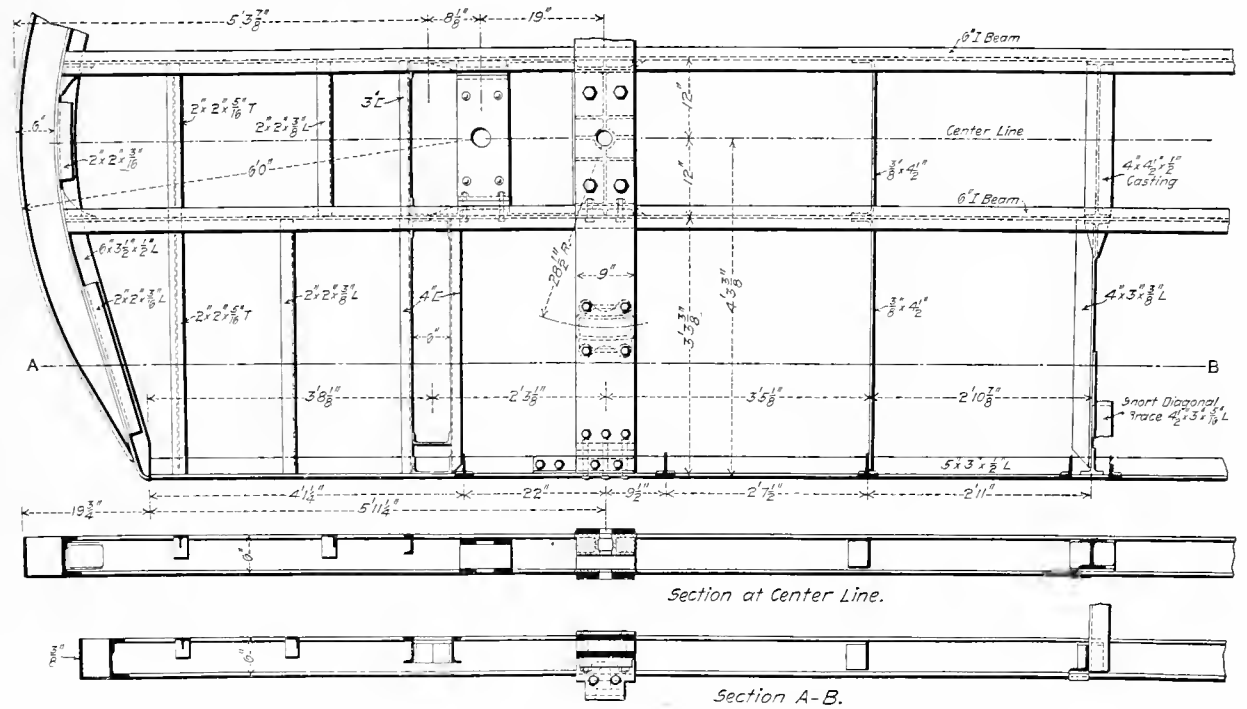
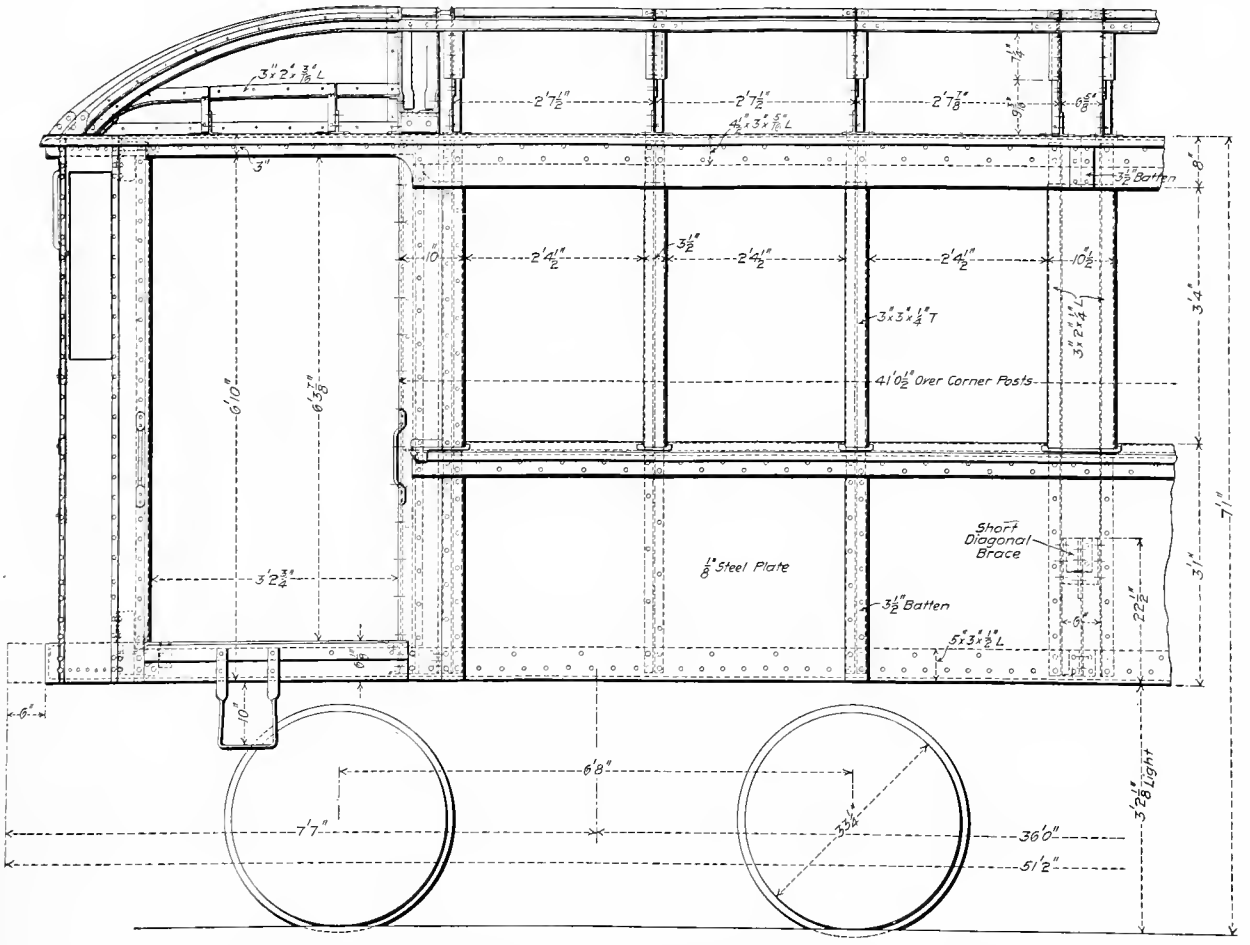


Fig. 634. Detail of Door Posts and Door.

(Interior and exterior views of this car are shown in Figs. 202-205.)





Figs. 635-638. Steel Framing for Interborough Subway Motor Car, Gibbs Patents.

(Interior and exterior views of this car are shown in Figs. 6224-6225.)

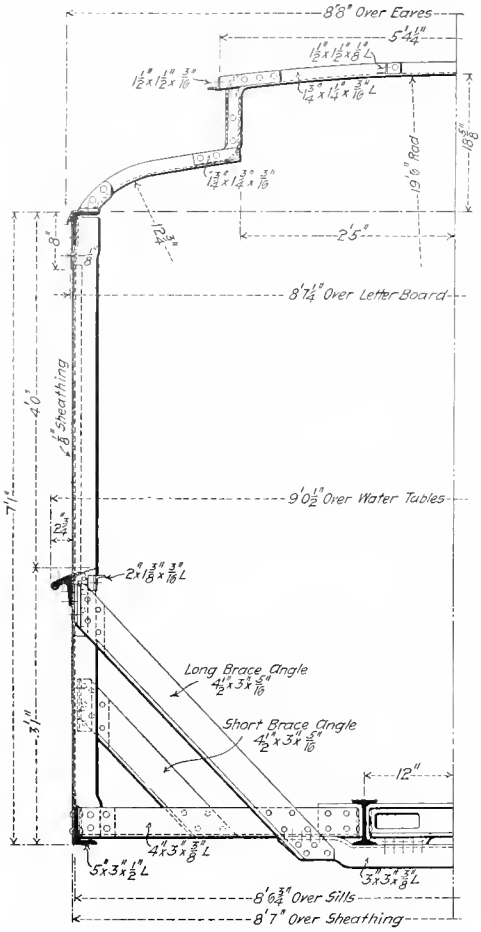


Fig. 639. Half Cross-Section of Interborough Steel (Motor) Car.

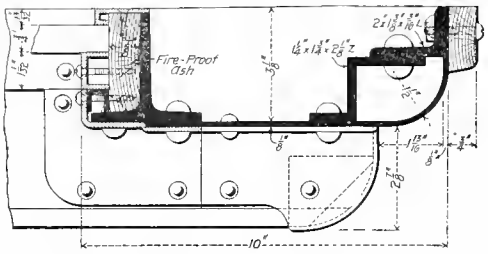


Fig. 640. Detail of End Door Post.

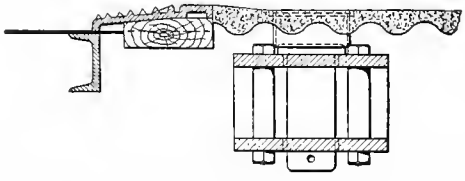


Fig. 641. Detail of Fire-Proof Floor.

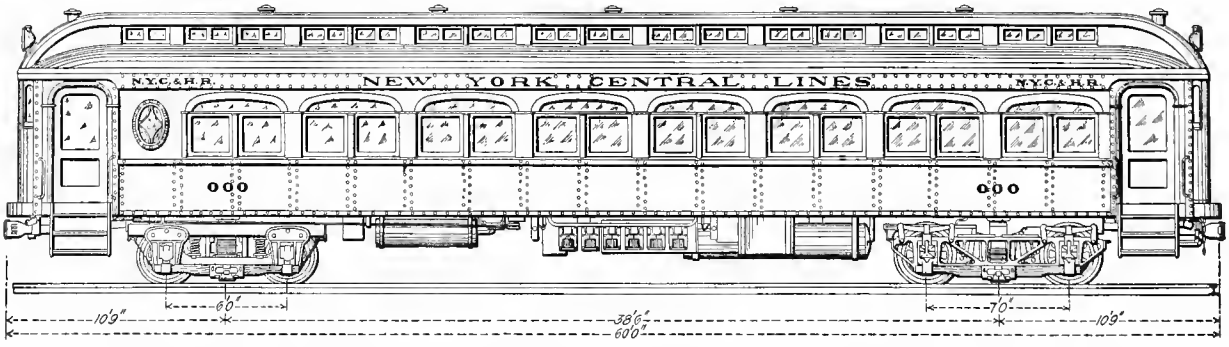
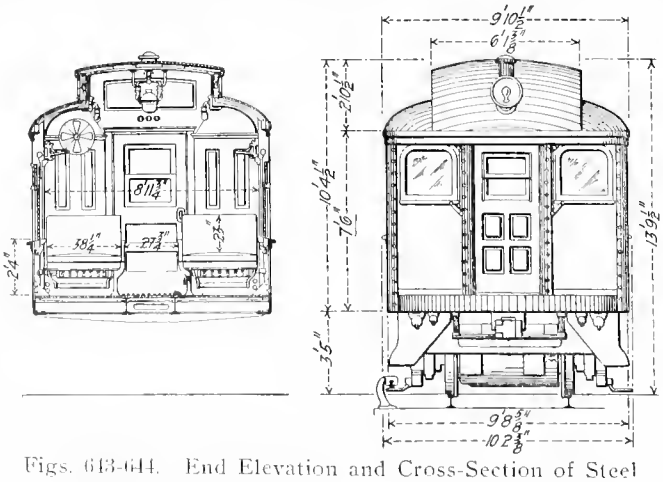


Fig. 642. Side Elevation of Steel (Motor) Suburban Car. New York Central & Hudson River.



Figs. 643-644. End Elevation and Cross-Section of Steel (Motor) Suburban Car. N. Y. C. & H. R.

Names of Parts, Figs. 645-647.

3 *Intermediate Sill*
4 *Center Sill*
6 *Floor Nailing Strip*
20 *Body Truss Rod*
22 *Body Queen Post*
26 *Cross Tie Timber*
26*b* *Cross Tie Timber Truss Rod Bearing*
26*t* *Cross Tie Timber Truss Rod*
27 *Floor*
51 *Brace*
58 *Window Post*
59 *Sheathing Furring*
59*b* *Furring Blocks*
59*e* *End Sheathing or End Panel Furring*
60 *Stud*
60*e* *End Studs*
61 *Corner Post*
62 *Door Post*
63 *Truss Plank*
65 *Belt Rail*
65*a* *Auxiliary Belt Rail*
66 *Sheathing Rail*
81 *Belt Rail Cap*
90 *Window Lintel*
93 *Eaves Molding*
98 *Plate*
99 *Door Lintel*
100 *Compound Carline*
101 *Rafter*
102 *Roof Boards*
108 *Platform Hood Bow*
111 *Deck Sill*
115 *Deck Post*
117 *Deck Plate*
118 *Upper Deck Carline*
137 *Window*
163 *Compression Beam*
164 *Compression Beam Brace*
164*b* *Auxiliary Compression Beam Brace*
165 *Counterbrace*
260 *Deck End Sill*

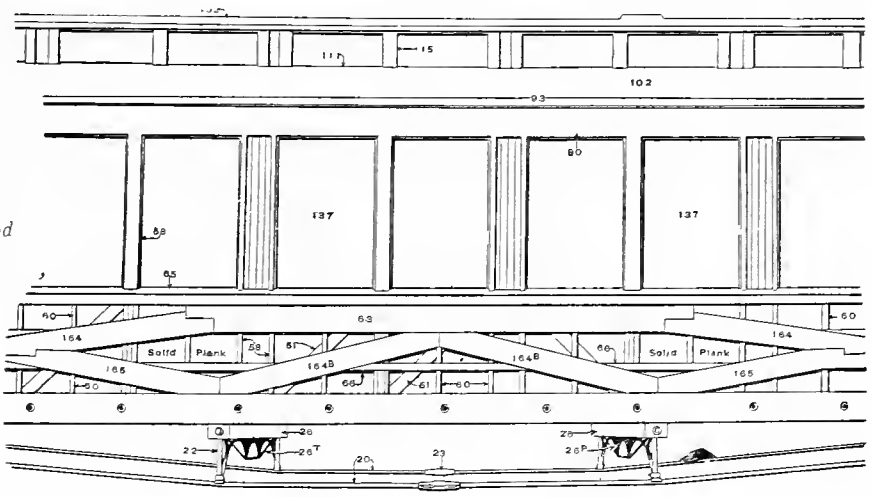


Fig. 645. Part Side Elevation.

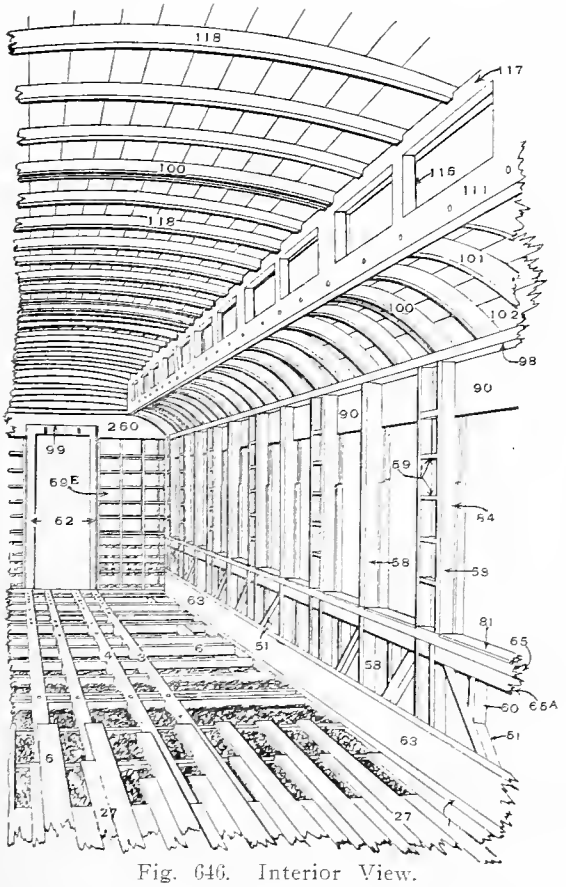


Fig. 646. Interior View.

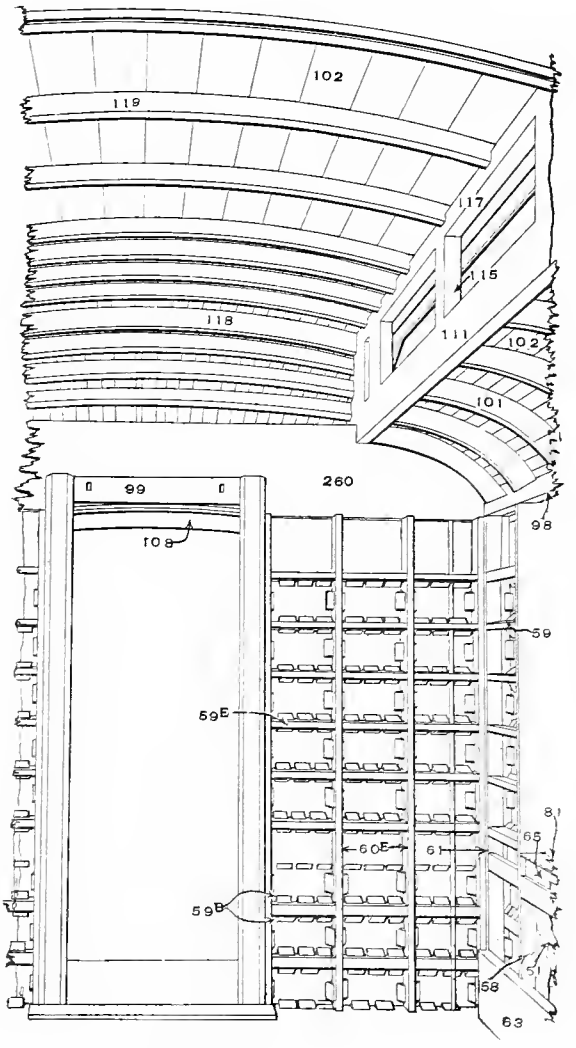


Fig. 647. Interior View.

Passenger Car Framing, Adopted by the Baltimore & Ohio, Wabash and other Railroads.

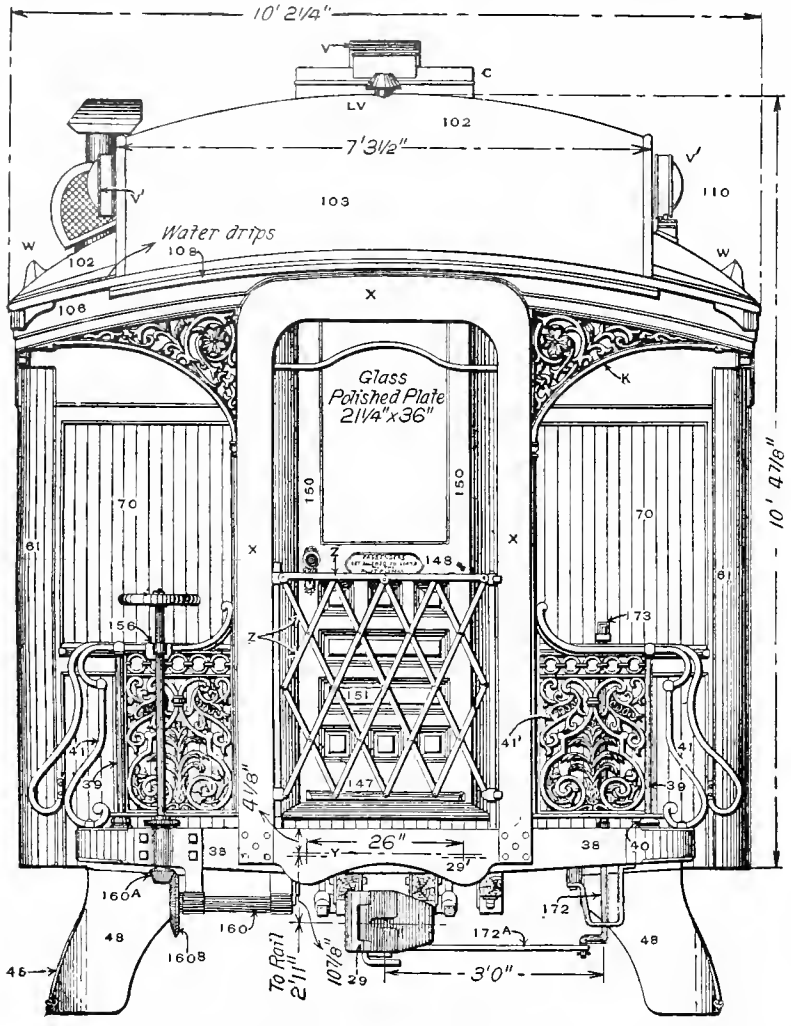


Fig. 648. End Elevation.
First-Class Passenger Coach.

88 *Window Molding*
89 *Inside Window Panel*
90 *Window Lintel*
91 *Letter Board*
92 *Fascia Board*
93 *Eaves Molding*
94 *Inside Cornice*
95 *Inside Cornice Fascia Board*
97 *Inside Lining*
98 *Plate*
99 *Door Lintel*
100 *Compound Carline*
101 *Rafter*
102 *Roof Boards*
103 *Platform Roof*
104 *Platform Roof Carline*
105 *Platform Roof End Carline*
106 *Roof Apron*
108 *Platform Hood Post*
110 *Clear Story or Upper Deck*
111 *Deck Sill*
112 *Deck Bottom Rail*
113 *Deck End Sill*
114 *Deck Sill Facing*
114*a* *Deck Sill Sub-facing*
115 *Deck Post*
116 *Deck End Panel or Ventilator*
117 *Deck Plate*
118 *Upper Deck Carline*
120 *Inside Deck Cornice*
121 *Deck Plate*
121*s* *Deck Soffit Board*
122 *Car Seat*
123 *Seat End or Aisle Seat End*
124 *Seat Stand*
125 *Seat Back*
137 *Window*
140*a* *Window Shade*

Names of Parts, Figs. 648-651.

1 *Side Sill*
2 *End Sill*
3 *Intermediate Sill*
3*a* *Outer Intermediate Sill*
4 *Center Sill*
6 *Bridging*
7 *Floor Timber Brace*
9 *Sill Tie Rod*
10 *Body Bolster*
20 *Body Truss Rod*
22 *Body Queen Post*
22*a* *Same as* **22***b*
22*b* *Body Queen Post Brace*
23 *Turnbuckle*
26 *Cross Tie Timber*
27 *Floor*
28 *Deafening Ceiling*
29 *Drawbar or Coupler*
29′ *Vestibule Buffer Plate*
35 *Platform Sill*
37 *Platform Short Sill*
38 *Platform End Sill*
39 *Platform Railing Post*
40 *Base Washer for Platform Railing Post*
41 *Platform Rail*
44 *Body Hand Rail*
45 *Platform Step*
48 *Step Hanger*
51 *End Brace*
54 *End Sill and Plate Rod*
58 *Window Post*
61 *Corner Post*
62 *Door Post*
63 *Truss Plank*
65 *Belt Rail*
65*a* *Window Sill Cornice Board*
66 *Sheathing Rail*
67 *Outside Panel or Sheathing*
70 *Sheathing*
74 *Lower Wainscot Rail*
75 *Upper Wainscot Rail*
76 *Wainscot Panel*
77 *Outside Window Sill*
78 *Inside Window Sill*
80 *Window Sill Molding*
82 *Upper Belt Rail*
85 *Window Sash*
86 *Window Blind Sash*
87 *Window Cove Molding*

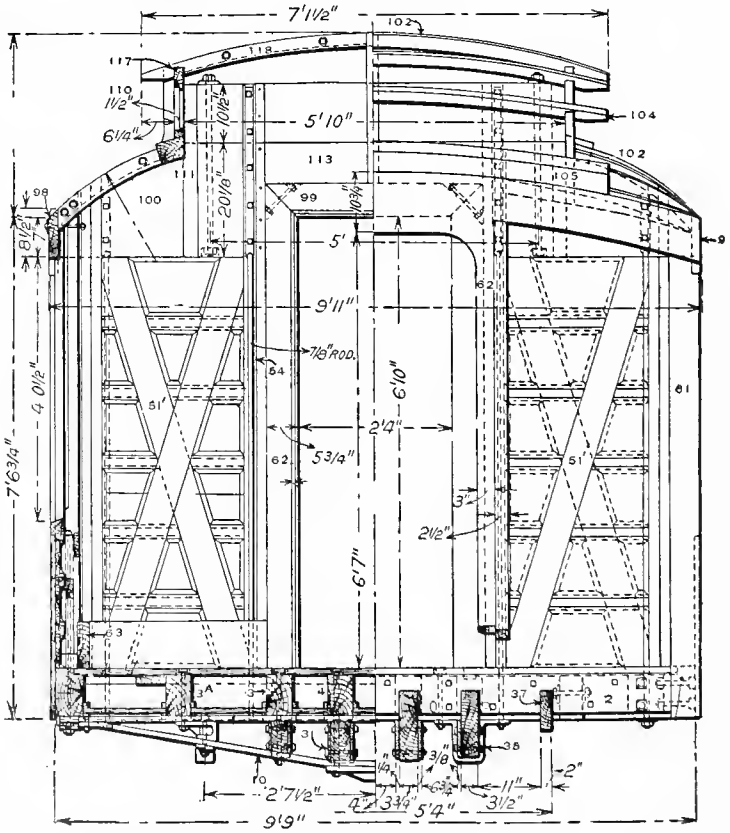
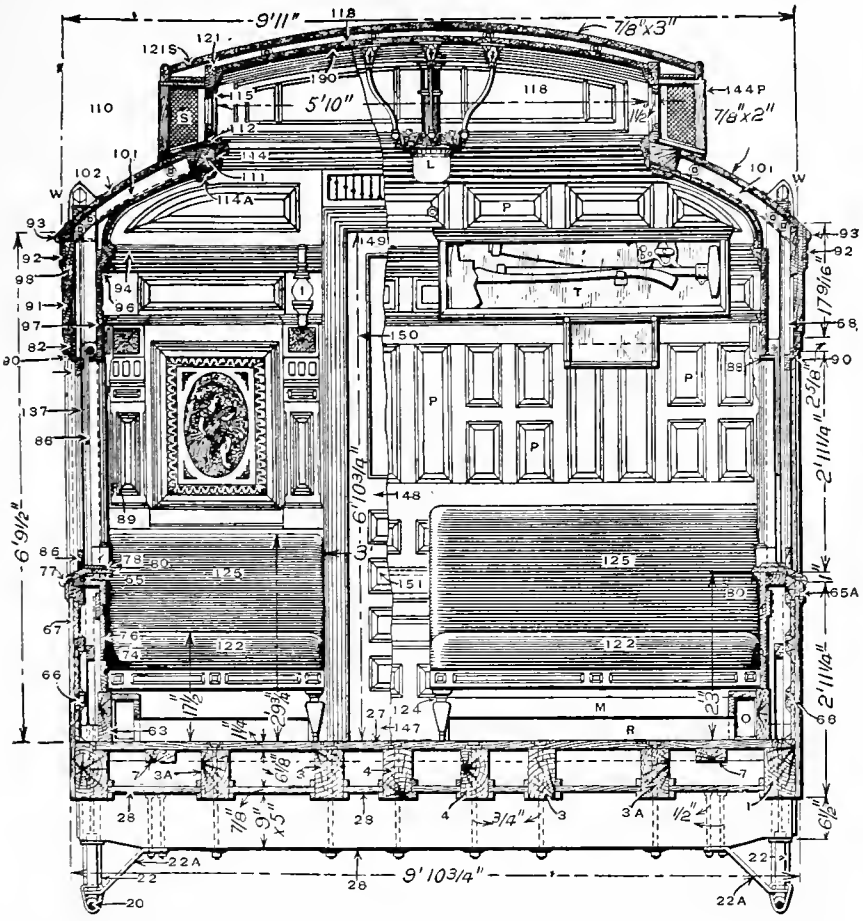


Fig. 649. End Elevation of Framing.
First-Class Passenger Coach.



A *Basket Rack*
B *Bell Cord and Hanger*
C *Frost Carburetor*
D *Deck Sash Window Opener*
E *Base of Pilaster*
F *Cap of Pilaster*
G *Rafter Ribs and Cornices*
H *Heater or Seat Radiator*
J *Sash Lift*
K *Platform End Bracket*
L *Center Lamp*
L.V. *Vestibule Lamp Ventilator*
M *Seat Frame*
O *Box for Heating Pipes*
P *Panels*
R *Seat Radiator, same as* H
S *Deck Window Screens*
T *Emergency Tool Box*
V *Lamp Jack or Ventilator*
V' *Saloon Ventilator*
W *Window Sash Balance*
X *Vestibule Face Plate*
Y *Vestibule Buffer Plate*
Z *Vestibule Gate*

Fig. 650. Cross-Section Showing Interior. First-Class Passenger Coach.

Names of Parts, Figs. 648-651. (Continued.)

144 *Deck Sash or Deck Window*
144*p* *Deck Screen Post*
145 *or* **A** *Continuous Basket Rack*
147 *Bottom Door Rail*
148 *Middle Door Rail*
149 *Top Door Rail*
150 *Door Stile*
151 *Door Panel*
156 *Upper Brake Shaft Bearing*
160 *Brake Chain Worm*
160*a* *Brake Chain Sheave*
160*b* *Brake Shaft Bevel Gear Wheel*
172 *Uncoupling Shaft*
172*a* *Uncoupling Rod*
173 *Uncoupling Lever*
190 *Ceiling*

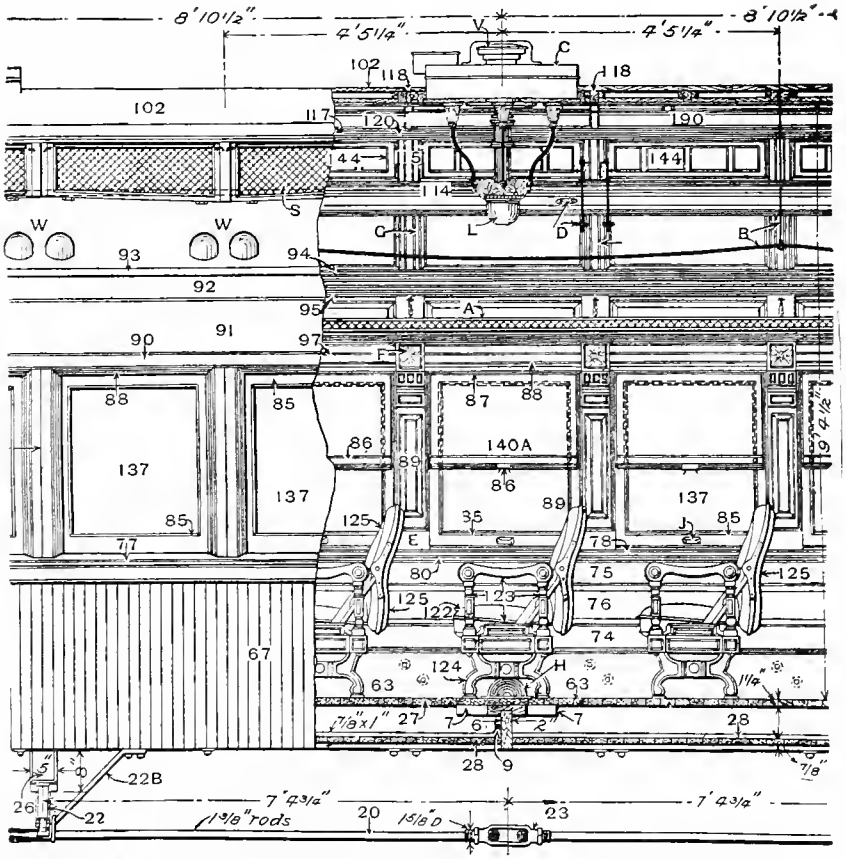


Fig. 651. Sectional Side Elevation, Showing Exterior and Interior. First-Class Passenger Coach.

(The car shown in Figs. 648-651 is not a modern design, but is shown for references only, the parts being practically the same in new cars.)

Names of Parts, Figs. 652-65C.

1 *Side Sill*
3 *Intermediate Sill*
4 *Center Sill*
17 *Door Sill Plate*
27 *Car Floor*
27b *Car Sub-floor*
54 *Sill and Plate Rod*
58 *Window Post*
59 *Window Panel or Sheathing Furring*
63 *Truss Plank*
65 *Belt Rail*
66 *Sheathing Rail*
67 *Sheathing*
76 *Middle Wainscot Rail or Panel*
77 *Outside Window Sill*
78 *Inside Window Sill*
82 *Upper Belt Rail*
85 *Outside Window Sash*
86s *Inside Window Sash*

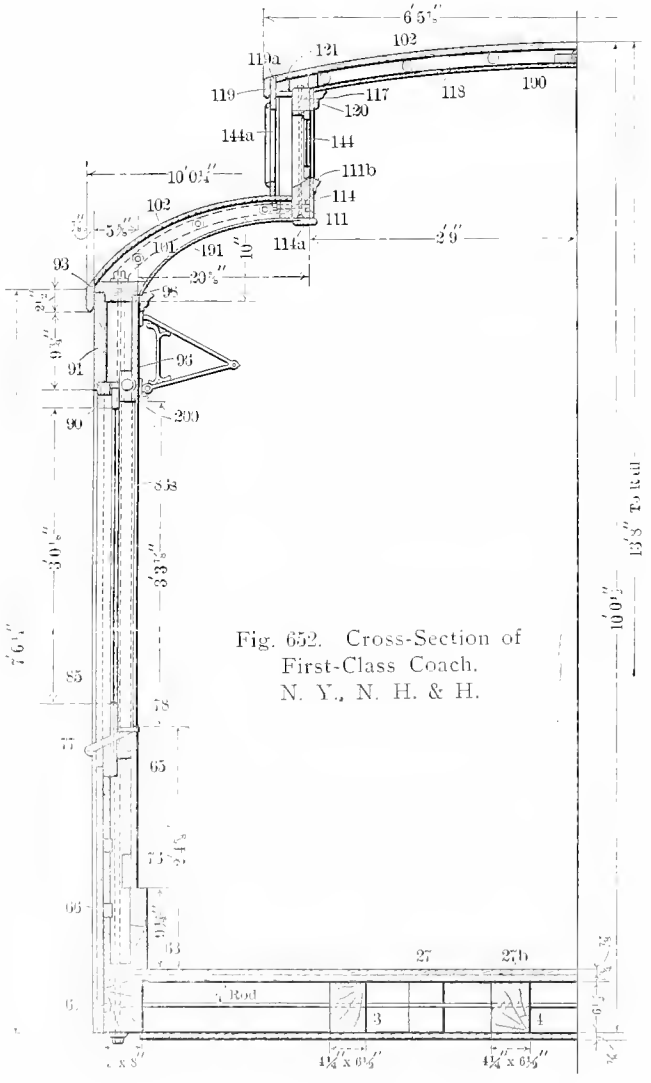


Fig. 652. Cross-Section of First-Class Coach. N. Y., N. H. & H.

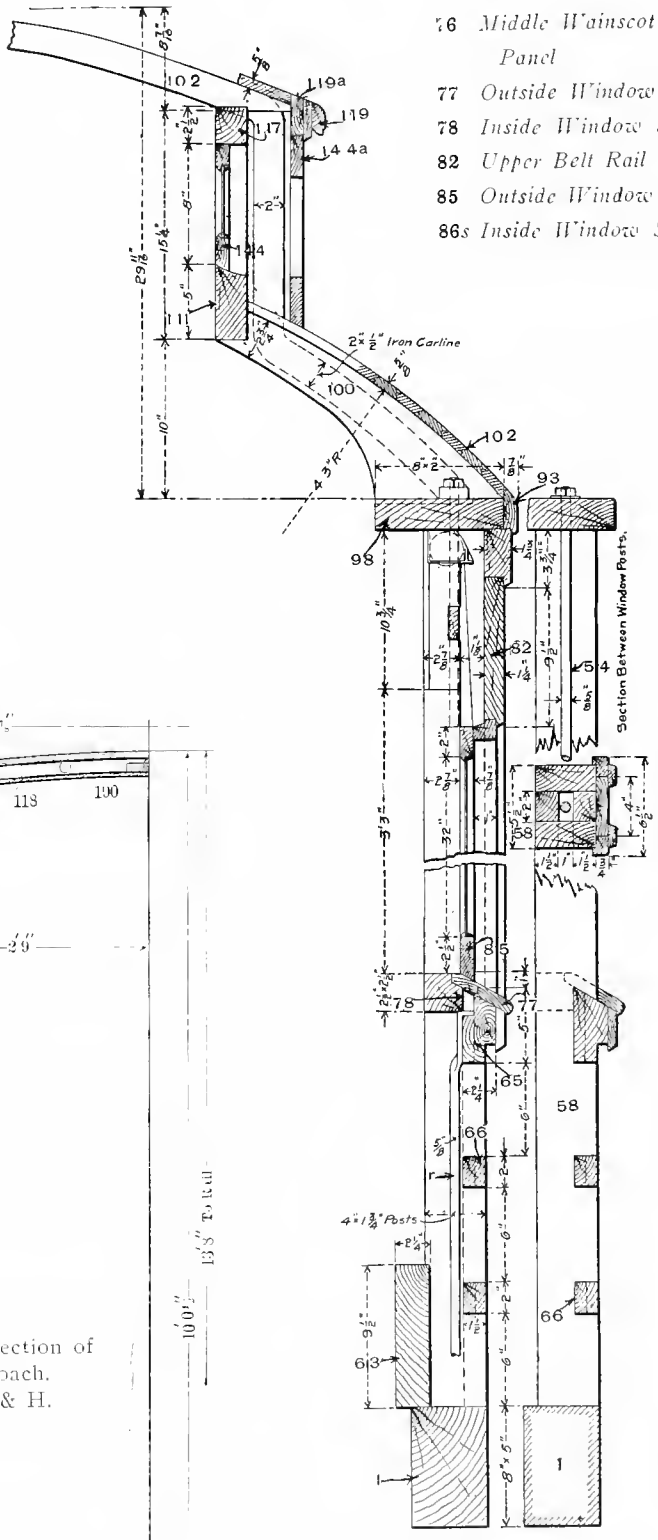


Fig. 653. Cross-Sections of 50-ft. Coach. P. & R.

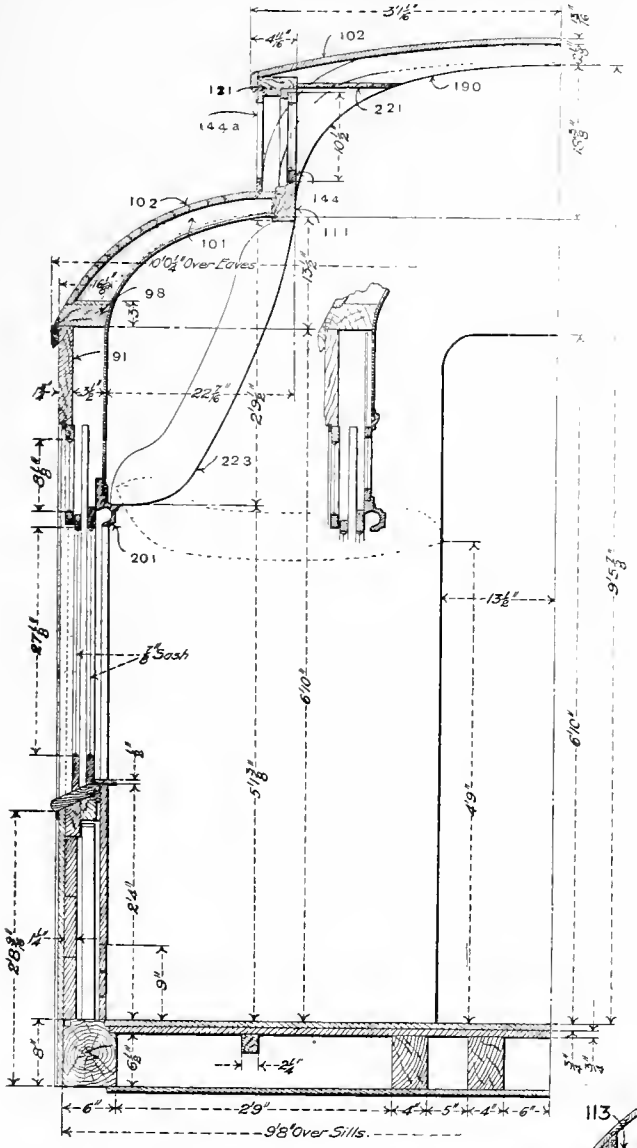
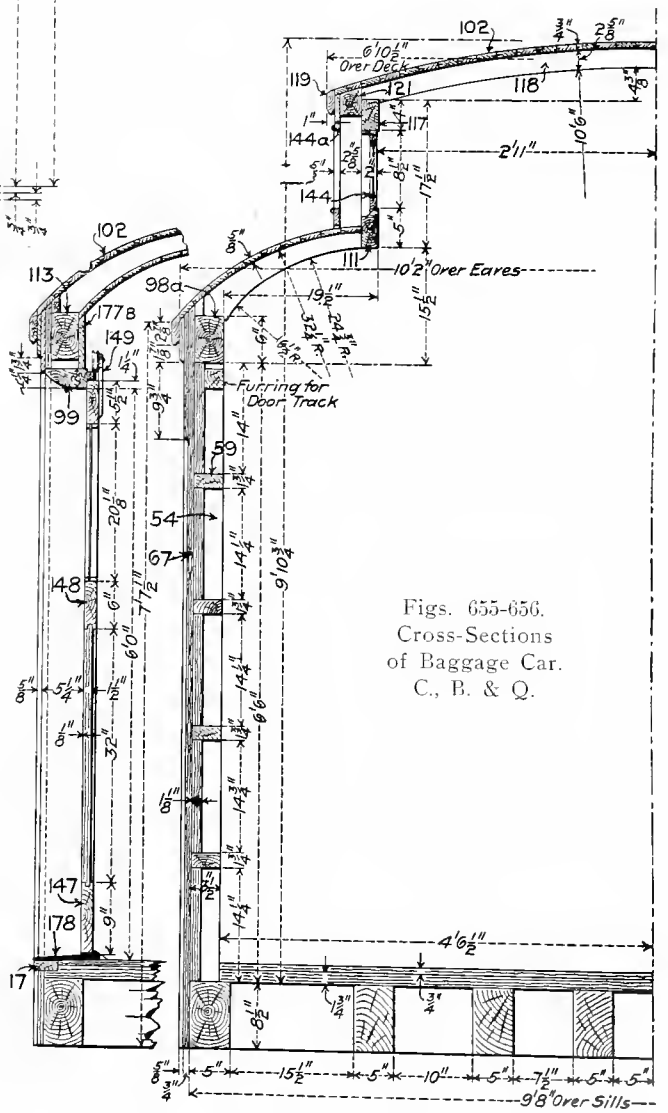


Fig. 654. Cross-Section of Standard Sleeping Car. Pullman Co.

117 *Deck Plate*
118 *Upper Deck Carline*
119 *Deck Eaves Fascia Board*
119*a* *Deck Eaves Sub-fascia Board*
120 *Deck Inside Cornice*
121 *Deck Plate*
144 *Deck Sash or Window*
144*a* *Outer Deck Sash for Screen*
147 *Bottom Door Rail*
148 *Middle Door Rail*
149 *Door Hanger*
177*b* *Inside Lining*
178 *Threshold Plate*
190 *Deck Ceiling, Veneered*
191 *Lower Deck Veneered Ceiling*
200 *Roller for Shade*
201 *Molding for Shade Roller Box*
221 *Ceiling Furring Brace*
223 *Berth Front Panel*
G *Overhang Truss*
R *Overhang Truss Tie Rod*



Figs. 655-656. Cross-Sections of Baggage Car. C., B. & Q.

Names of Parts. Figs. 652-656 (Continued).

86*s* *Window Blind*
90 *Window Lintel*
91 *Letter Board*
93 *Eaves Fascia Board*
96 *Inside Lining*
98 *Plate*
98*a* *Same as* 98
99 *Door Lintel*
100 *Compound Carline*
101 *Rafter*
102 *Roof Boards*
111 *Deck Sill*
111*b* *Deck Sill Top Molding*
113 *Same as* 98
114 *Deck Sill Facing*
114*a* *Deck Sill Bottom Molding*

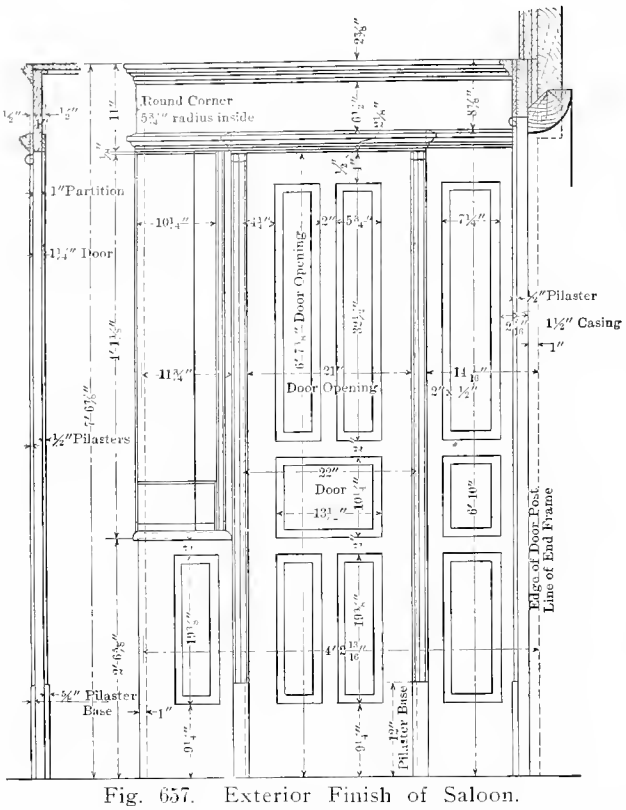
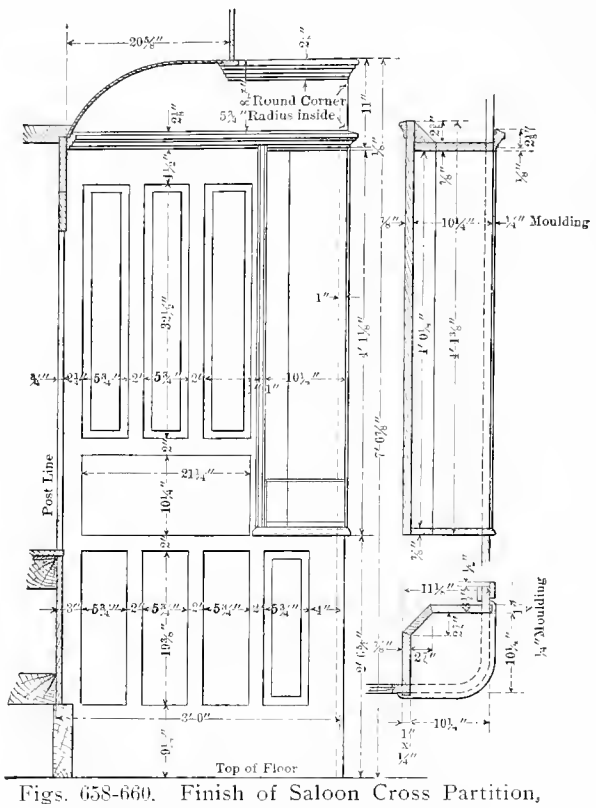
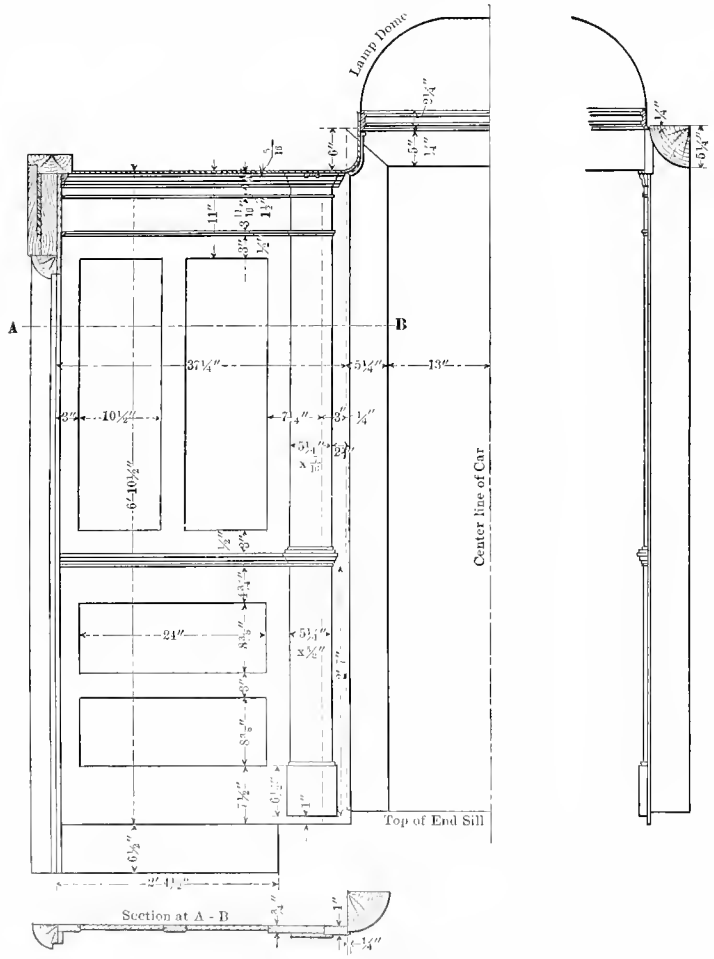


Fig. 657. Exterior Finish of Saloon.
First-Class Coach. N. Y., N. H. & H.



Figs. 658-660. Finish of Saloon Cross Partition,
Ladies' Saloon. First-Class Coach.
N. Y., N. H. & H.



Figs. 661-663. End Finish on Body of Car.
First-Class Coach. N. Y., N. H. & H.

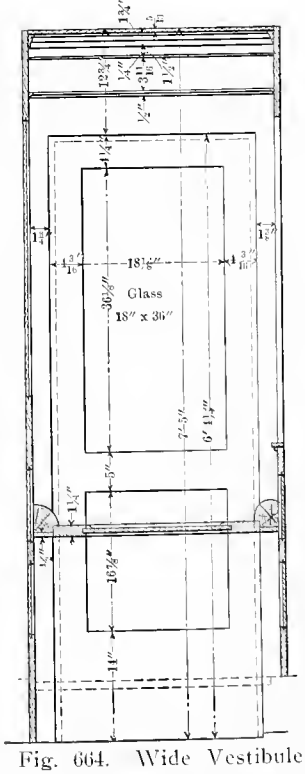


Fig. 664. Wide Vestibule
Side Door and Casing.
First-Class Coach.
N. Y., N. H. & H.

(Note: This car is shown in Figs. 599-601.)

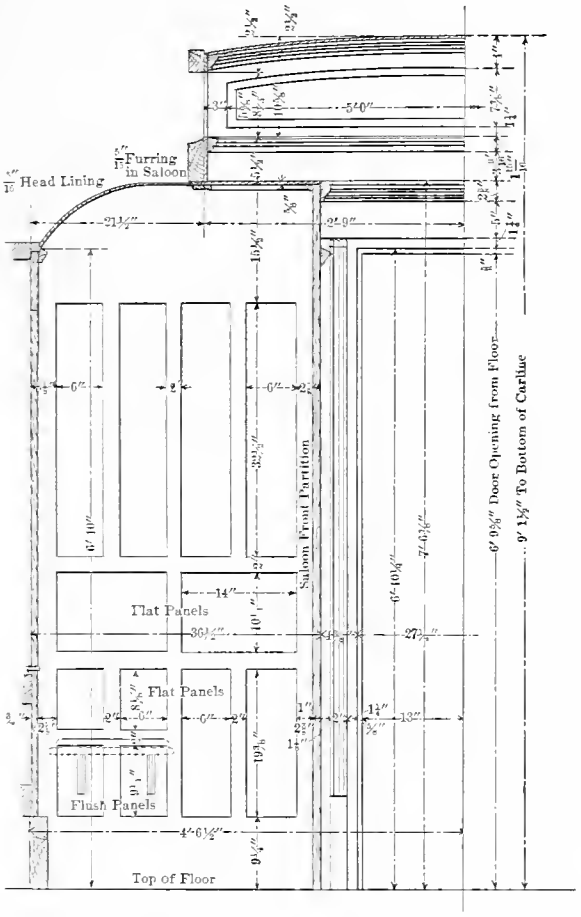
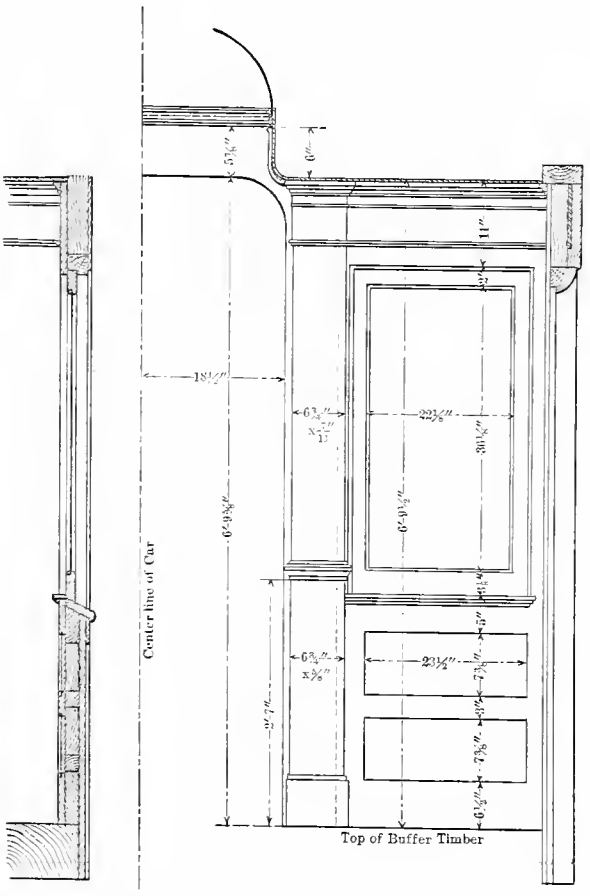
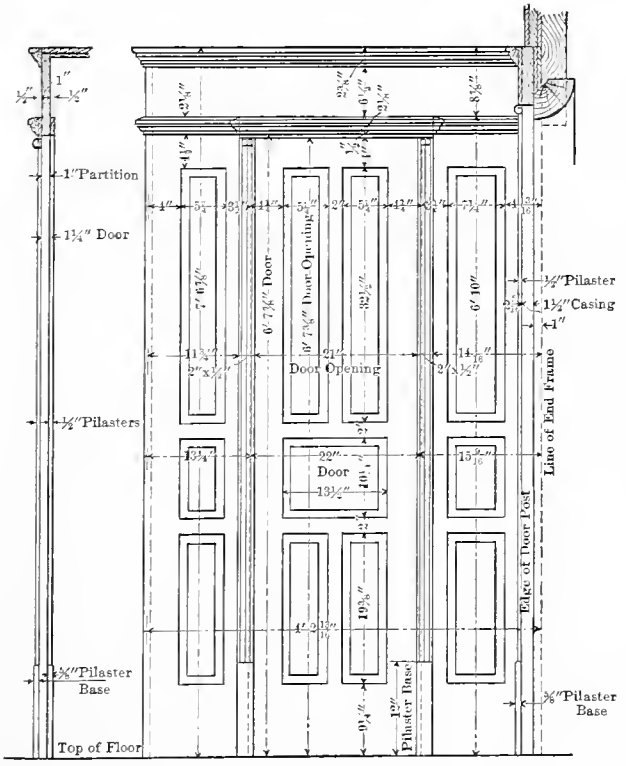


Fig. 665. End Finish, Interior of Saloon.
First-Class Coach. N. Y., N. H. & H.



Figs. 666-667. Finish on Vestibule Frame.
First-Class Coach. N. Y., N. H. & H.



Figs. 668-669. Finish of Saloon Front Partition,
Men's Saloon. First-Class Coach. N. Y., N. H. & H.

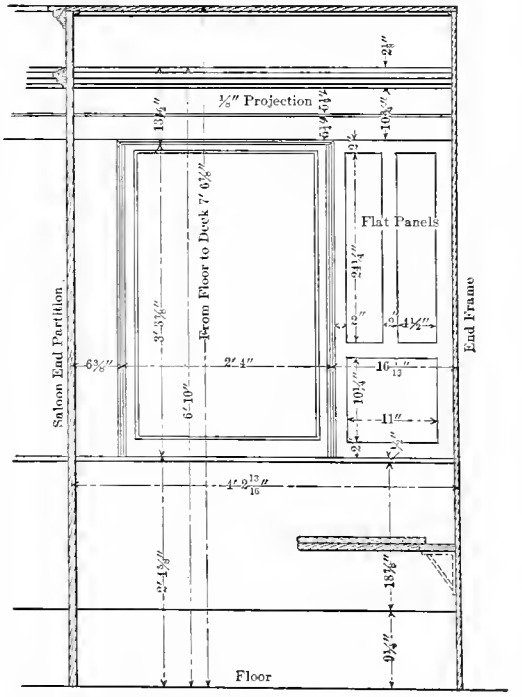


Fig. 670. Side Finish, Interior of Saloon.
First-Class Coach. N. Y., N. H. & H.

(Note: This car is shown in Figs. 599-601.)

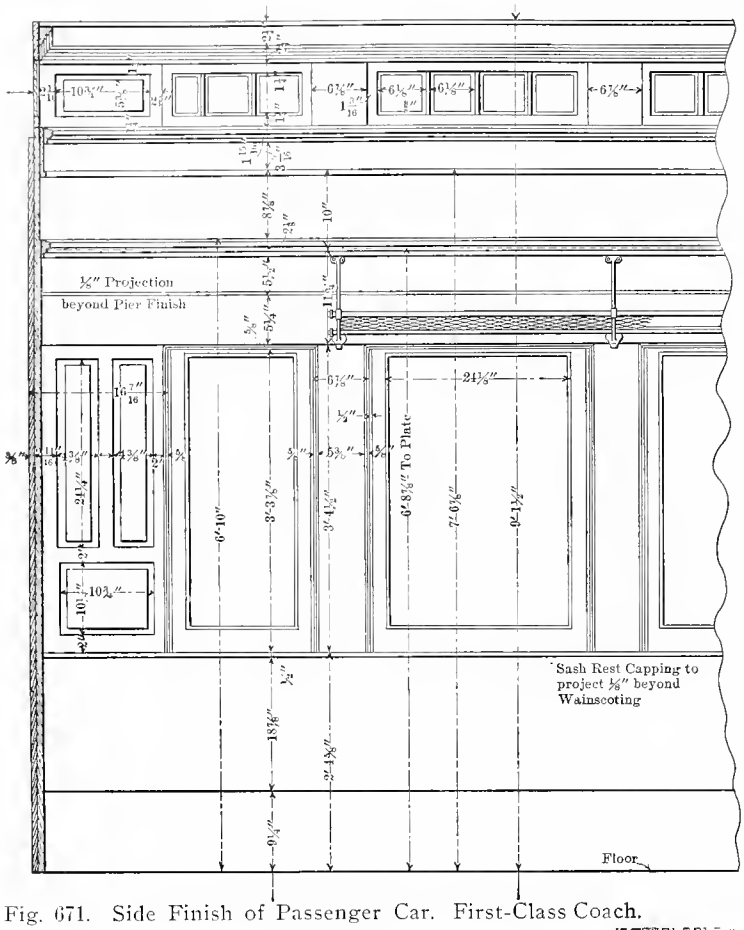


Fig. 671. Side Finish of Passenger Car. First-Class Coach. N. Y., N. H. & H.

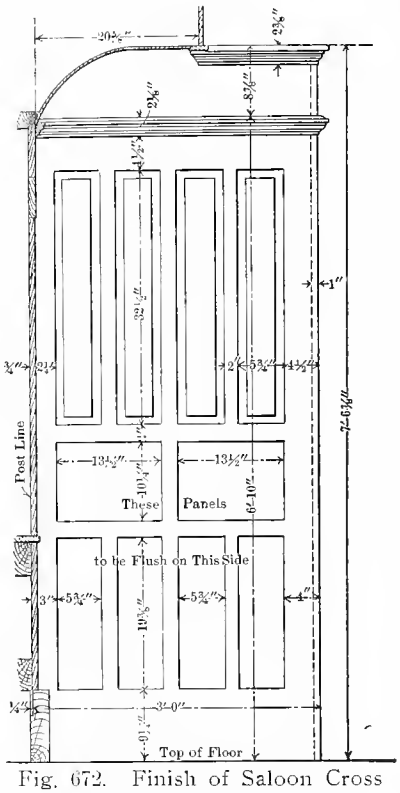
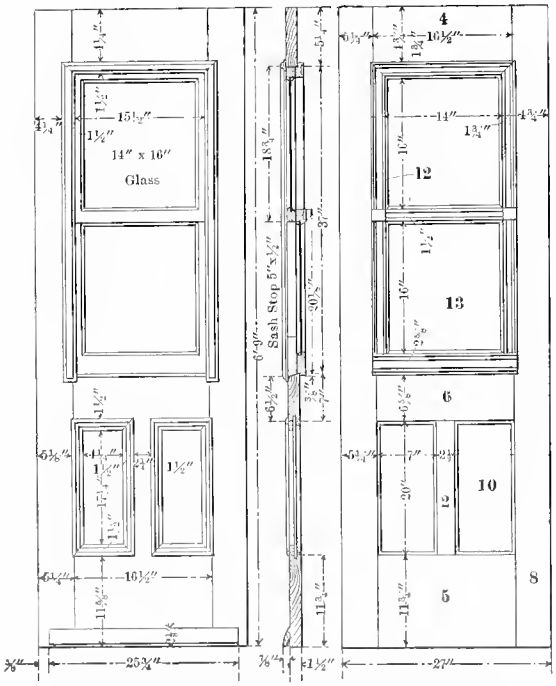
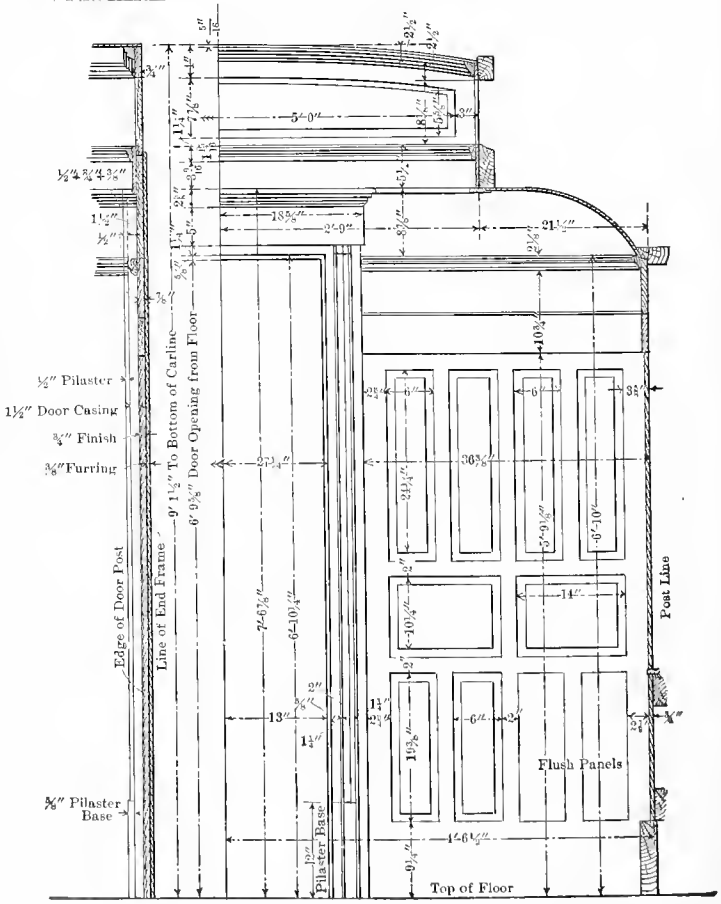


Fig. 672. Finish of Saloon Cross Partition, Men's Saloon. First-Class Coach. N. Y., N. H. & H.

Numbers Refer to List of Names of Parts with Figs. 1326-1327.

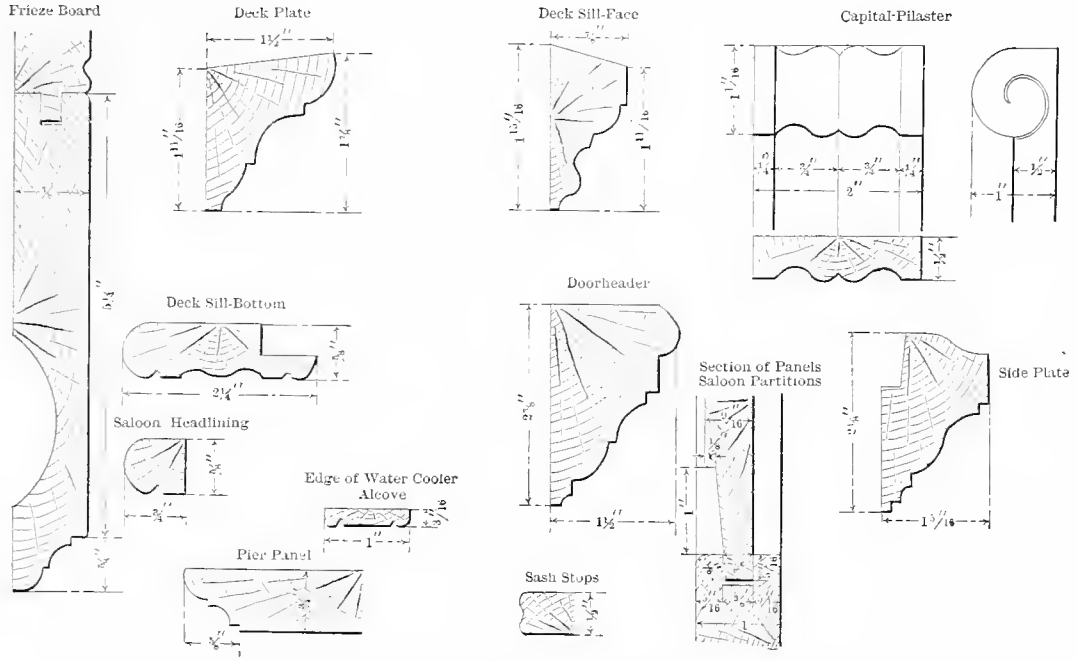


Figs. 673-675. Finish of Standard End Door. First-Class Coach. N. Y., N. H. & H.

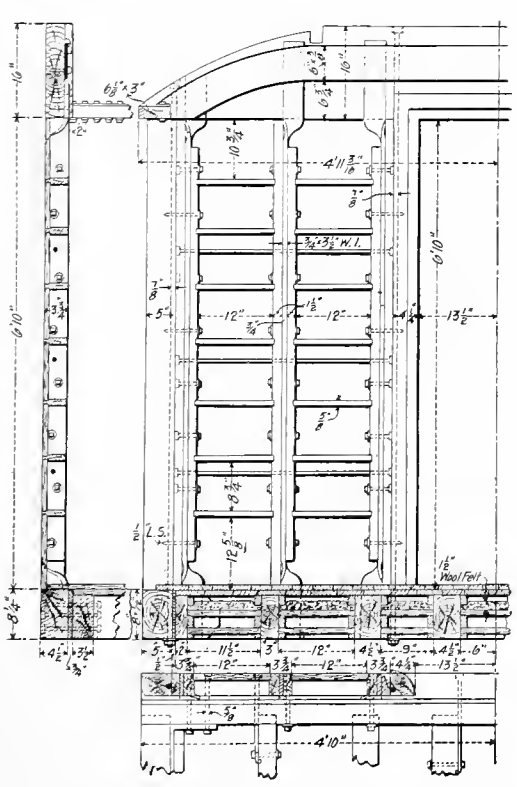


Figs. 676-677. End Finish. First-Class Coach. N. Y., N. H. & H.

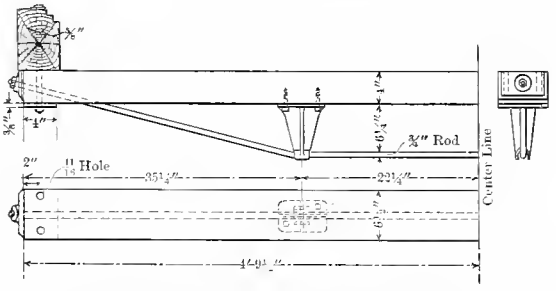
(Note: This car is shown in Figs. 599-601.)



Figs. 678-690. Details of Moldings and Panels. Interior Finish of First-Class Coach. N. Y., N. H. & H.



Figs. 691-693. Standard Composite End Framing. L. S. & M. S. and other Vanderbilt Lines.



Figs. 694-695. Needle Beam Trussing. First-Class Coach. N. Y., N. H. & H.

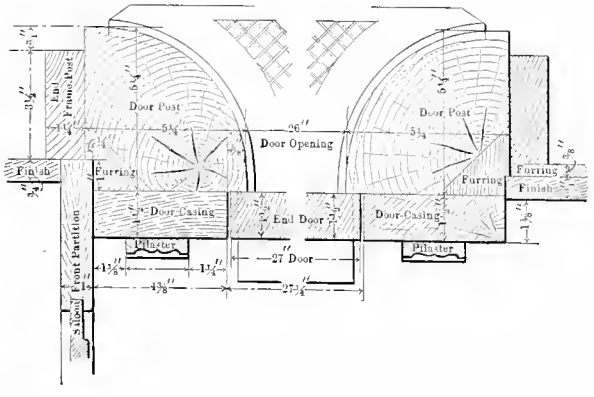
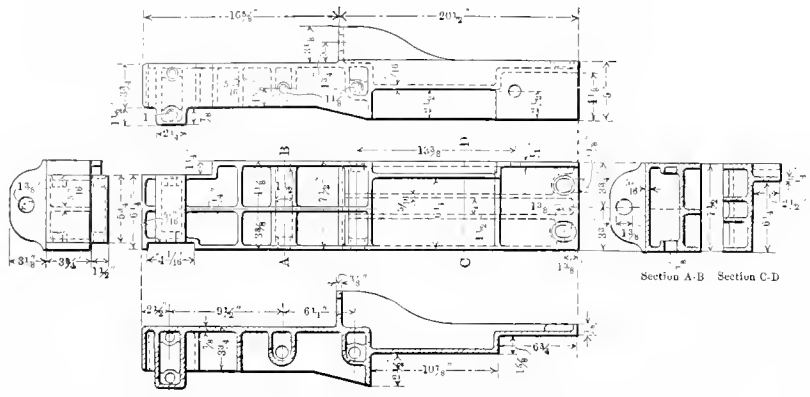
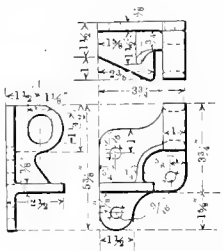


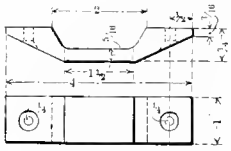
Fig. 696. Horizontal Section Through End Frame at Door. First-Class Coach. N. Y., N. H. & H.



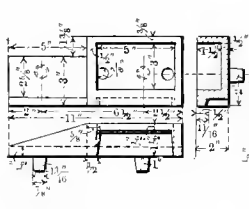
Figs. 697-701. Gould Malleable Iron Draft Beam.



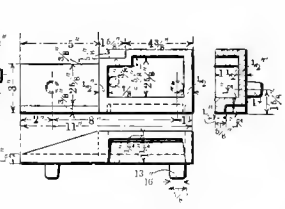
Figs. 702-704. Uncoupling Shaft End Bracket.



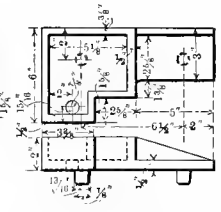
Figs. 705-706. Door Wedge Guide Plate.



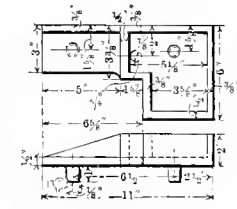
Figs. 707-709. Brace and Post Pocket.



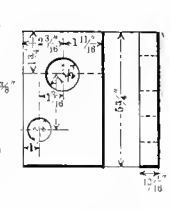
Figs. 710-712. Door Post Pocket, Top.



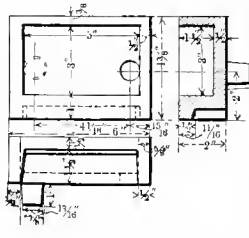
Figs. 713-714. Corner Post Pocket, Bottom.



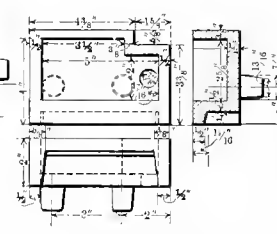
Figs. 715-716. Corner Post and Brace Pocket.



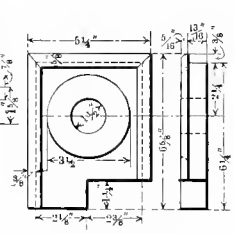
Figs. 717-718. Truss Rod Washer.



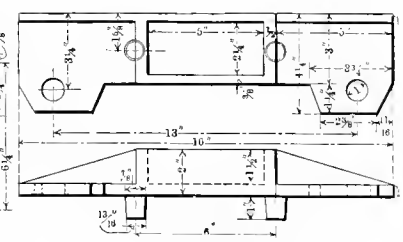
Figs. 719-721. Post Pocket, Bottom.



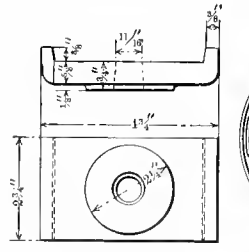
Figs. 722-724. Door Post Pocket. Bottom.



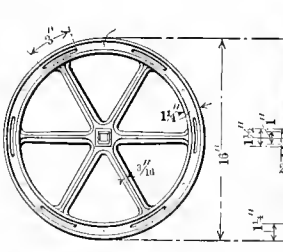
Figs. 725-726. Truss Rod Washer.



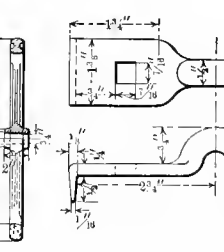
Figs. 727-728. Post and Double Brace Pocket.



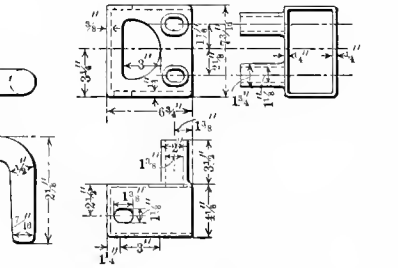
Figs. 729-730. Double Lipped Washer.



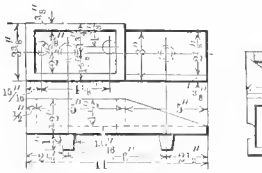
Figs. 731-732. Brake Hand Wheel.



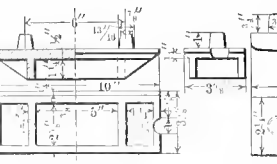
Figs. 733-734. Door Hasp Staple.



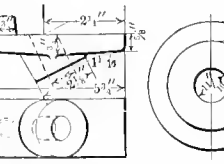
Figs. 735-737. Drawbar Follower Stop.



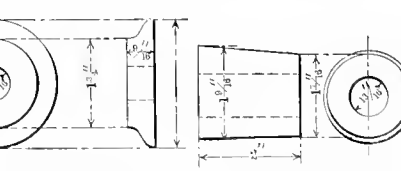
Figs. 738-739. Side Post and Brace Pocket.



Figs. 740-742. Post Pocket.



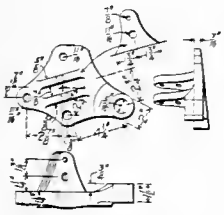
Figs. 743-744. Brace Rod Washer.



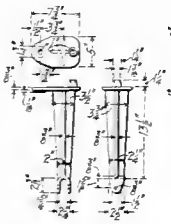
Figs. 745-746. ⅝-in. Washer.

Figs. 747-748. Draft Spring Thimble.

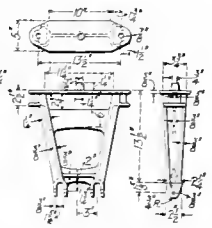
Cast and Malleable Iron Details of 80,000 lbs. Capacity Box Car, New York Central & Hudson River. Shown in Figs. 262-265.



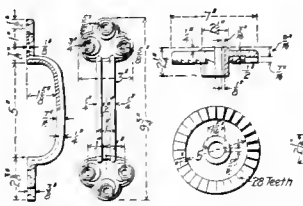
Figs. 749-752. Top Brake Shaft Bearing with Pawl Pivot.



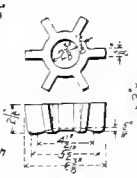
Figs. 753-755. Body Truss Rod Bearing, Single.



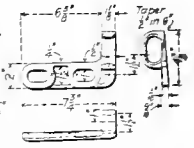
Figs. 756-758. Body Truss Rod Bearing, Double.



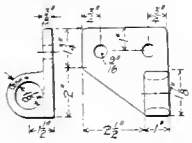
Figs. 759-760. Door Handle. Figs. 761-762. Brake Ratchet Wheel.



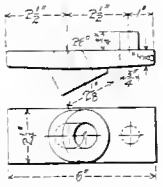
Figs. 763-764. Filling Spider.



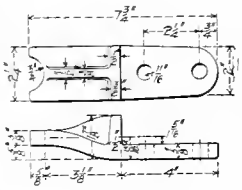
Figs. 765-767, Uncoupling Shaft Center Bracket.



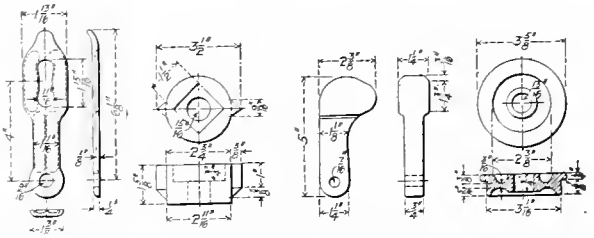
Figs. 768-769. Uncoupling Shaft End Bracket.



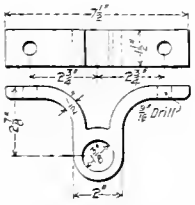
Figs. 770-771. Brace Rod Washer.



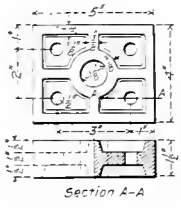
Figs. 772-773. Lower Brake Shaft Bearing.



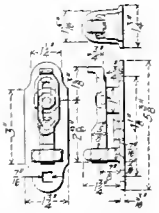
Figs. 774-776. Door Hasp. Figs. 777-778. Floor Washer. Figs. 779-780. Pawl Weight. Figs. 781-782. Door Hanger, Sheave.



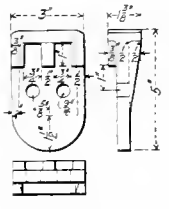
Figs. 783-784. Middle Brake Shaft Bearing.



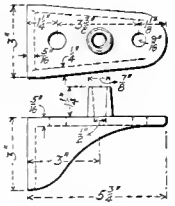
Figs. 785-786. Sill Timber Key.



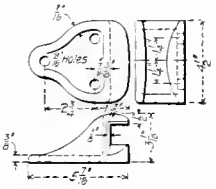
Figs. 787-789. Door Fastener.



Figs. 790-792. Drawbar Pocket Guide.

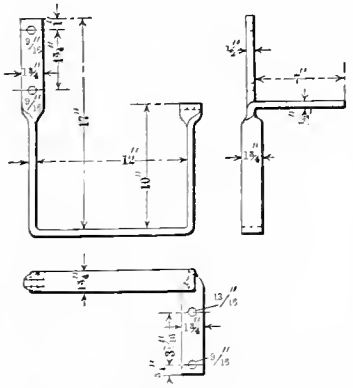


Figs. 793-794. Open Door Stop.

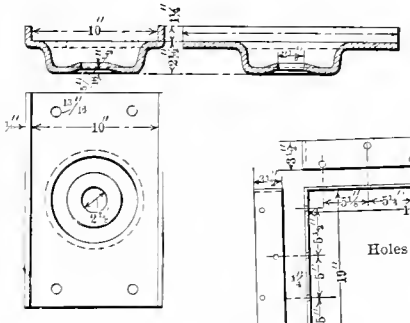


Figs. 795-797. Door Guide Bracket.

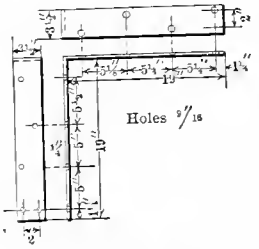
Cast and Malleable Iron Details of 80,000 lbs. Capacity Box Car, N. Y. C. & H. R., Shown in Figs. 262-265.



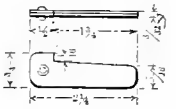
Figs. 798-800. Sill Step.



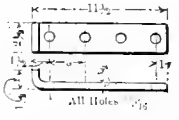
Figs. 801-803. Pressed Steel Center Plate.



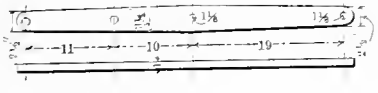
Figs. 804-806. Outside Middle Corner Plate.



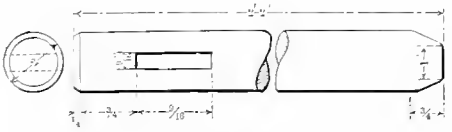
Figs. 807-808, Split Key.



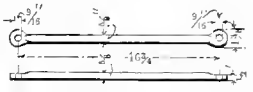
Figs. 809-810, Truss Rod End Plate.



Figs. 811-812. Brake Cylinder Lever.

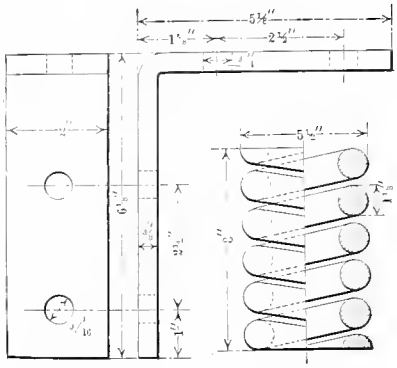


Figs. 813-814. King Bolt or Center Pin.



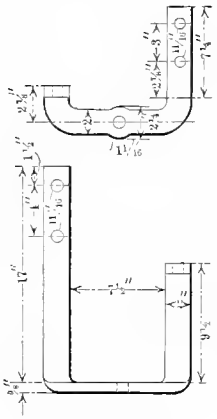
Figs. 815-816. 5/8-in. Ladder Round.

Wrought Iron Details of 80,000 lbs. Capacity Box Car, N. Y. C. & H. R., Shown in Figs. 262-265.

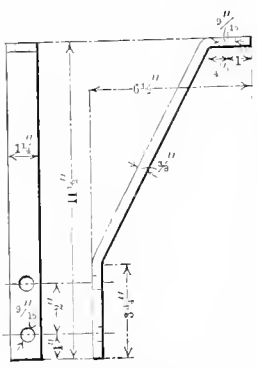


Figs. 817-818. Upper Corner Plate, Inside.

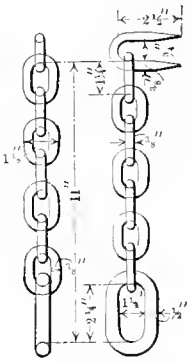
Fig. 819. 5½-in. x 8-in. Draft Spring.



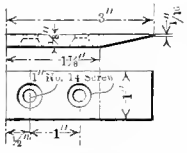
Figs. 820-821. Brake Shaft Step.



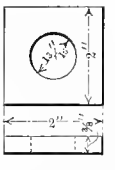
Figs. 822-823. Running Board Extension Bracket.



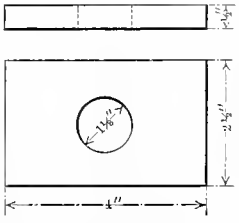
Figs. 824-825. Hand Brake Rod Supporting Chain.



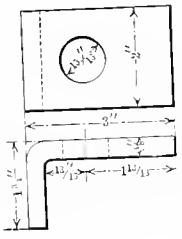
Figs. 826-827. Door Wedge.



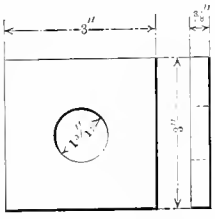
Figs. 828-829. ¾-in. Square Washer.



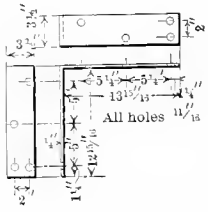
Figs. 830-831. Sill and Plate Rod Washer.



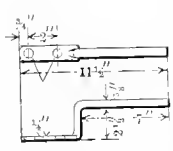
Figs. 832-833. Distance Block, Drawbar Pocket Guide.



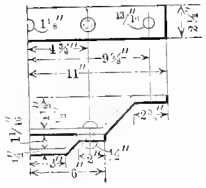
Figs. 834-835. 1¼-in Square Washer.



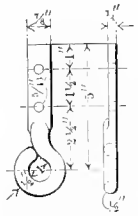
Figs. 836-838. Middle Corner Plate, Inside.



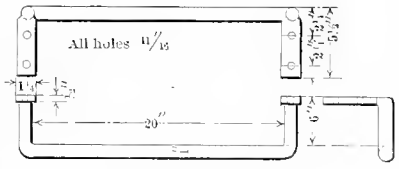
Figs. 839-840. Roof Hand Hold.



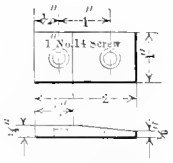
Figs. 841-842. Intermediate Brake Lever Fulcrum.



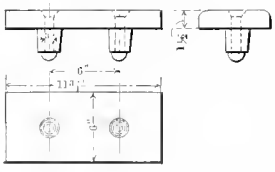
Figs. 843-844. Release Valve Rod Guide.



Figs. 845-847. Brake Lever Guide.



Figs. 848-849. Door Wedge.



Figs. 850-852. Drawbar Follower Plate.

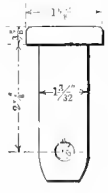
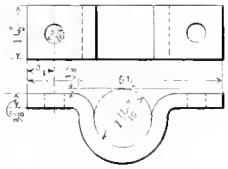
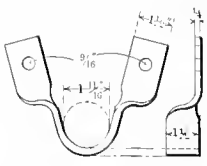


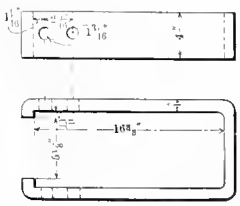
Fig. 853. Brake Connection Pin.



Figs. 854-855. Pipe Clamp.



Figs. 856-857. Pipe Hanger.



Figs. 858-859. Drawbar Yoke.

Wrought Iron Details of 80,000 lbs. Capacity Box Car, N. Y. C. & H. R., Shown in Figs. 262-265.

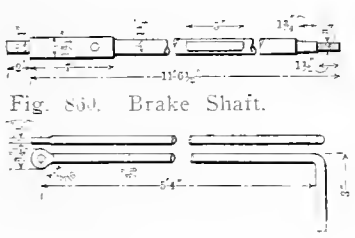
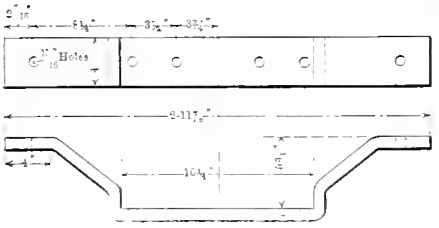
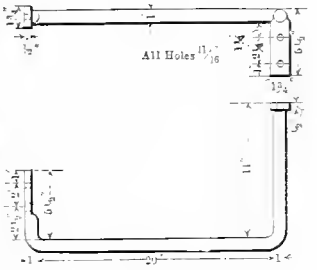


Fig. 860. Brake Shaft.

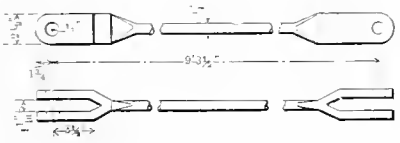
Figs. 861-862. Release Valve Rod.



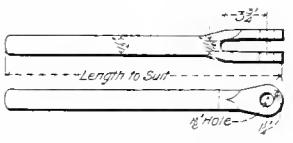
Figs. 863-864. Drawbar Carry Iron.



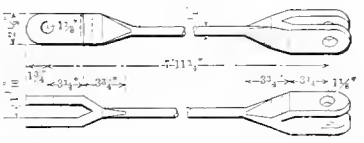
Figs. 865-866. Cylinder Lever Guide.



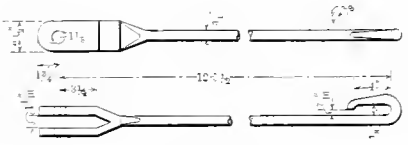
Figs. 867-868. Brake Connection, Cylinder Lever.



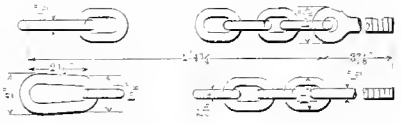
Figs. 869-870. Push Rod, Air Brake Cylinder.



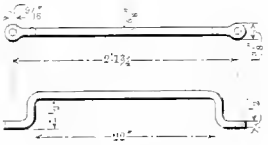
Figs. 871-872. Brake Connection, Intermediate Truck Levers.



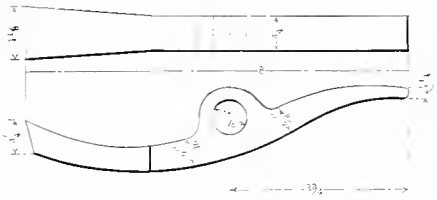
Figs. 873-874. Hand Brake Connection.



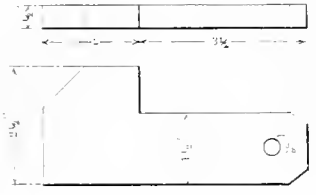
Figs. 875-876. Hand Brake Chains.



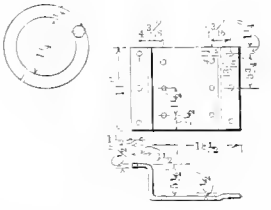
Figs. 877-878. Hand Hold.



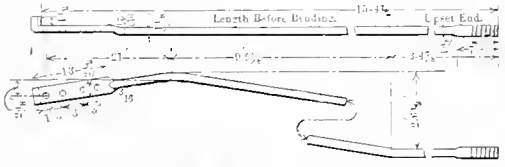
Figs. 879-880. Brake Pawl.



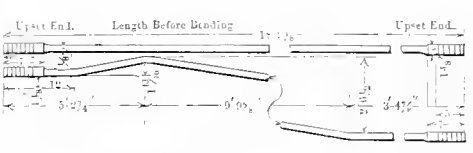
Figs. 881-883. King Bolt. Key and Ring.



Figs. 884-885. Brake Cylinder Plate.



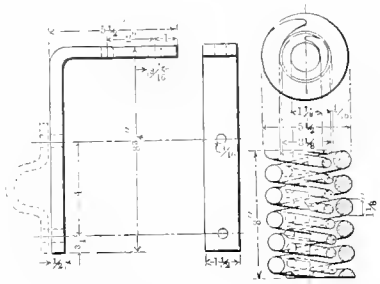
Figs. 886-887. Body Truss Rod, Upset and Strap Ends.



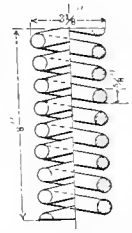
Figs. 888-889. Body Truss Rod, Upset Ends.

Figs. 890-891. Lower Guide for Drawbar Follower.

Wrought Iron Details of 80,000 lbs. Capacity Box Car. New York Central.

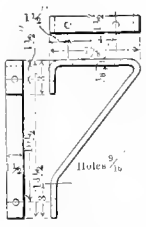


Figs. 892-893. Pipe Clamp Bracket.

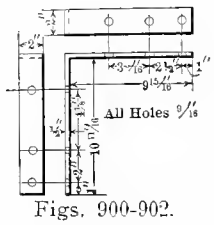


Figs. 894-895. Double Coil Draft Spring.

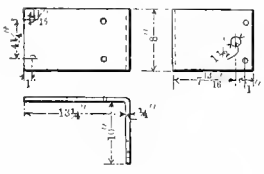
Fig. 896. Inner Draft Spring Coil.



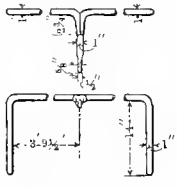
Figs. 897-899. Brake Step Bracket.



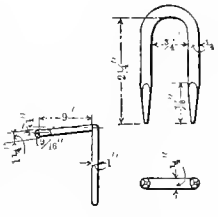
Figs. 900-902. Upper Corner Plate, Outside.



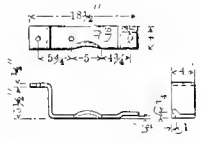
Figs. 903-904. Lower Corner Plate, Outside.



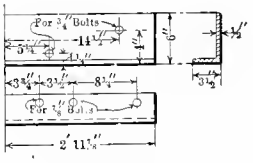
Figs. 905-907. Uncoupling Rod.



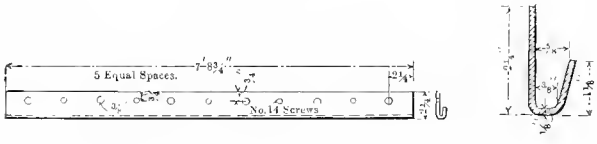
Figs. 908-909. Staple.



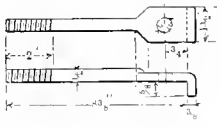
Figs. 910-912. Brake Reservoir Plate.



Figs. 913-915. Buffer Block Angle.



Figs. 916-918. Rear Sheath for Security Door.



Figs. 919-920. ½-in. Strap Bolt.

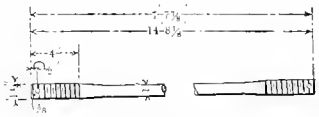
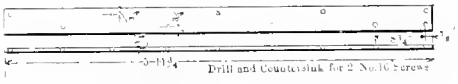


Fig. 921. 1-in. Draft Rod.

Fig. 922. Door Post Plate.



Figs. 923-924. Door Threshold Plate.

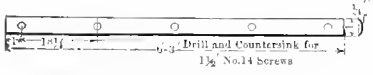
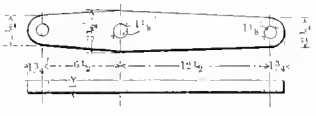


Fig. 925. Door Chafing Strip.



Figs. 926-927. Brake Intermediate Lever.

Fig. 928. Jaw Key, Truss Rod Bearing.

Figs. 929-930. Door Guide Plate, Bottom.

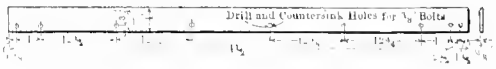
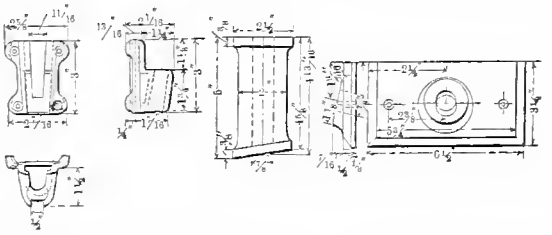


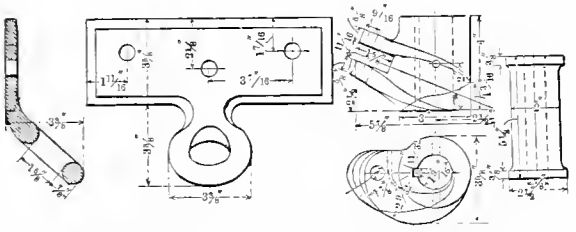
Fig. 931. Door Guide Plate, Top.

Wrought Iron Details of 80,000 lbs. Capacity Box Car. New York Central.

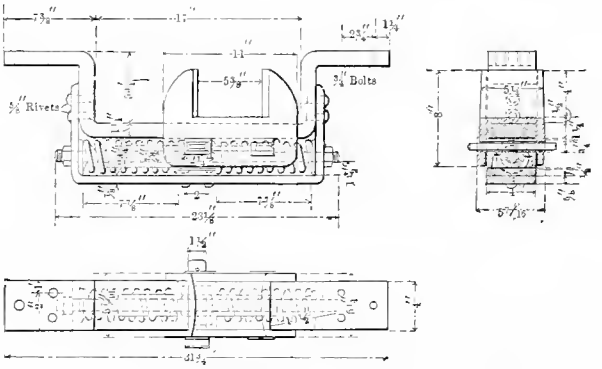
Figs. 932-933. Cap Socket Washer. Fig. 934. Center Pin. Floor Plate. Figs. 935-937. Pipe Clamps.



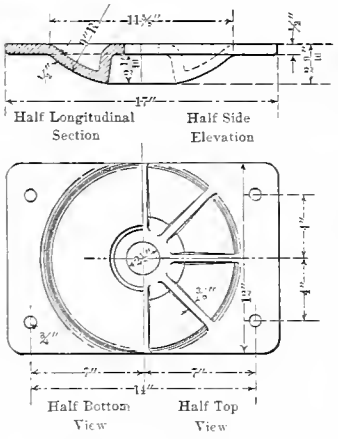
Figs. 938-940. Corner Post Signal Bracket. Fig. 941. Body Boolster. Thimble. Figs. 942-943. Needle Beam End Plate.



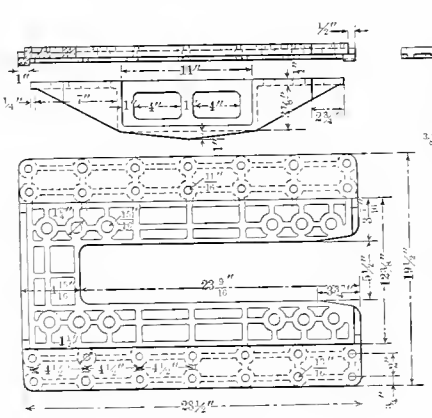
Figs. 944-945. Body Truck Safety Chain Eye. Figs. 946-947. Hand Brake Worm. Fig. 948. Bolster Thimble.



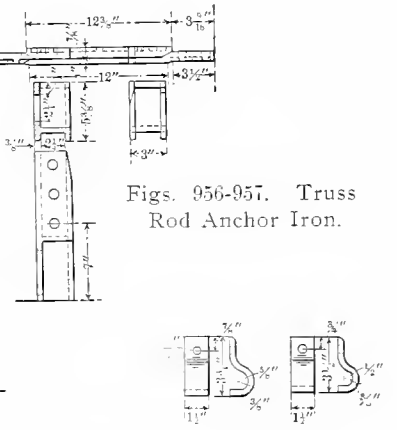
Figs. 949-951. Coupler Stirrup or Drawbar Centering Device.



Figs. 952-953. Body Center Plate.

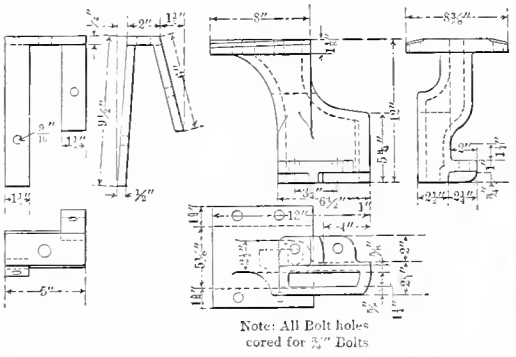


Figs. 954-955. Draft Spring Pocket.

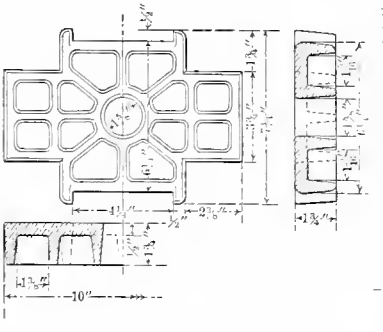


Figs. 956-957. Truss Rod Anchor Iron.

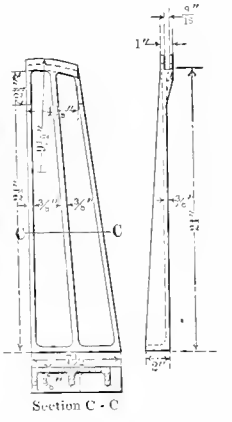
Figs. 958-961. Pipe Clamps.



Figs. 962-964. Pipe Hanger. Figs. 965-967. Coupler Guide.

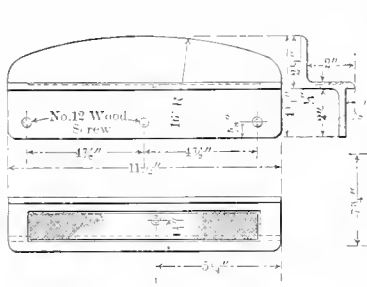


Figs. 968-970. Coupler Follower Plate.

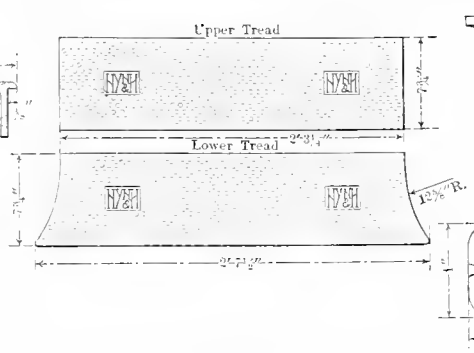


Figs. 971-973. Overhang Truss Rod Strut.

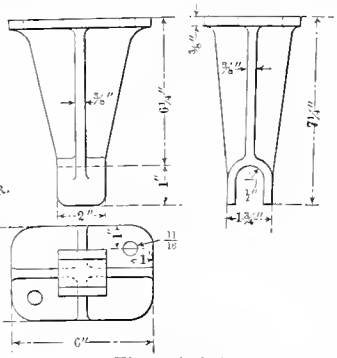
Cast and Malleable Iron Details of First-Class Coach. N. Y., N. H. & H.



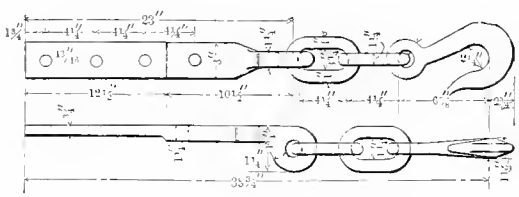
Figs. 974-976.
Foot Bracket for Seat End.



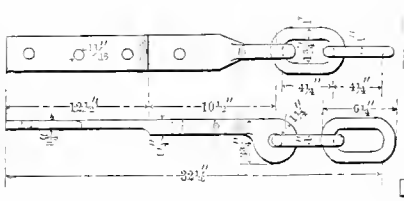
Figs. 977-978.
Step Treads.



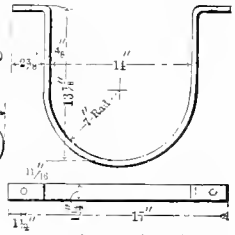
Figs. 979-981.
Body Truss Rod Queen Post.



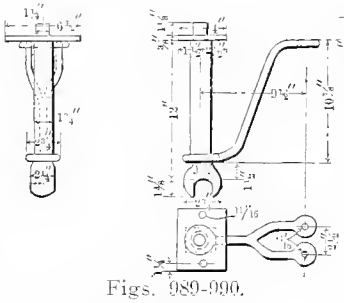
Figs. 982-983.
Platform Safety Chain with Hook.



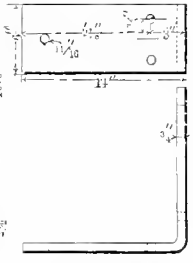
Figs. 984-985.
Platform Safety Chain.



Figs. 986-987.
Auxiliary Reservoir Hanger.



Figs. 989-990.
Body Queen Post and Brace.



Figs. 991-992.
Sill Corner Iron.

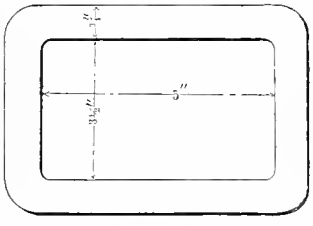
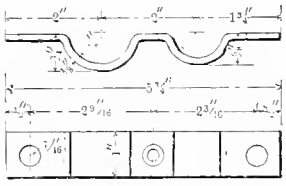
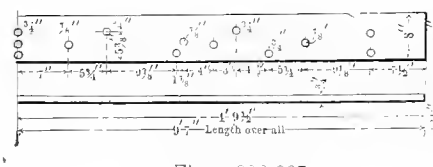


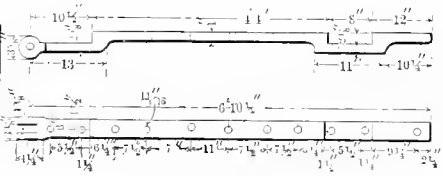
Fig. 993.
Floating Lever Hanger.



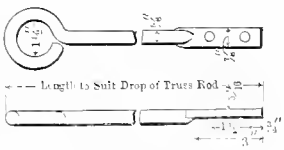
Figs. 994-995.
Pipe Strap.



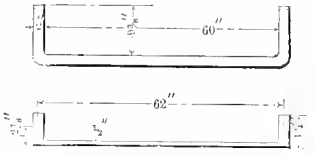
Figs. 996-997.
End Sill Plate.



Figs. 998-999.
Truss Rod Anchor Iron.



Figs. 1000-1001.
Truss Rod Safety Hangers.



Figs. 1002-1003.
Cylinder Lever Guide.

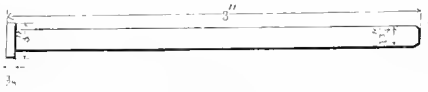
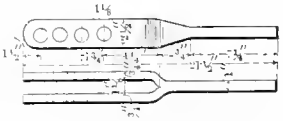
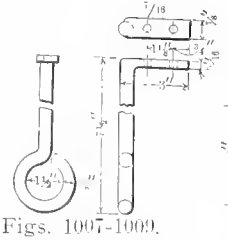


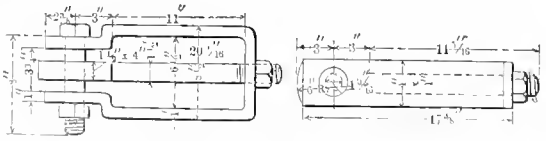
Fig. 1004.
Center Pin.



Figs. 1005-1006.
Brake Connection Jaws.

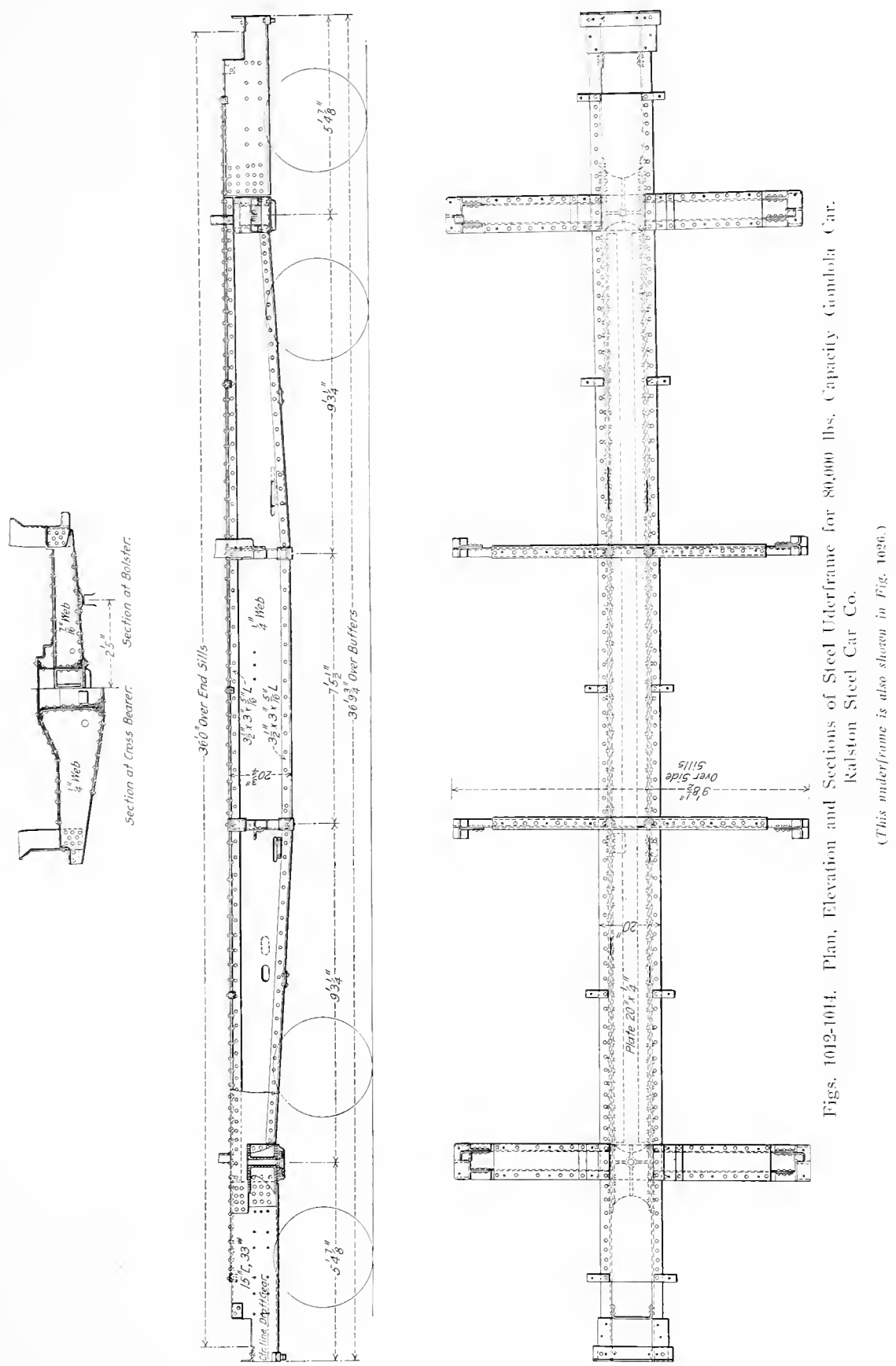


Figs. 1007-1009.
Truss Rod Safety Hanger.

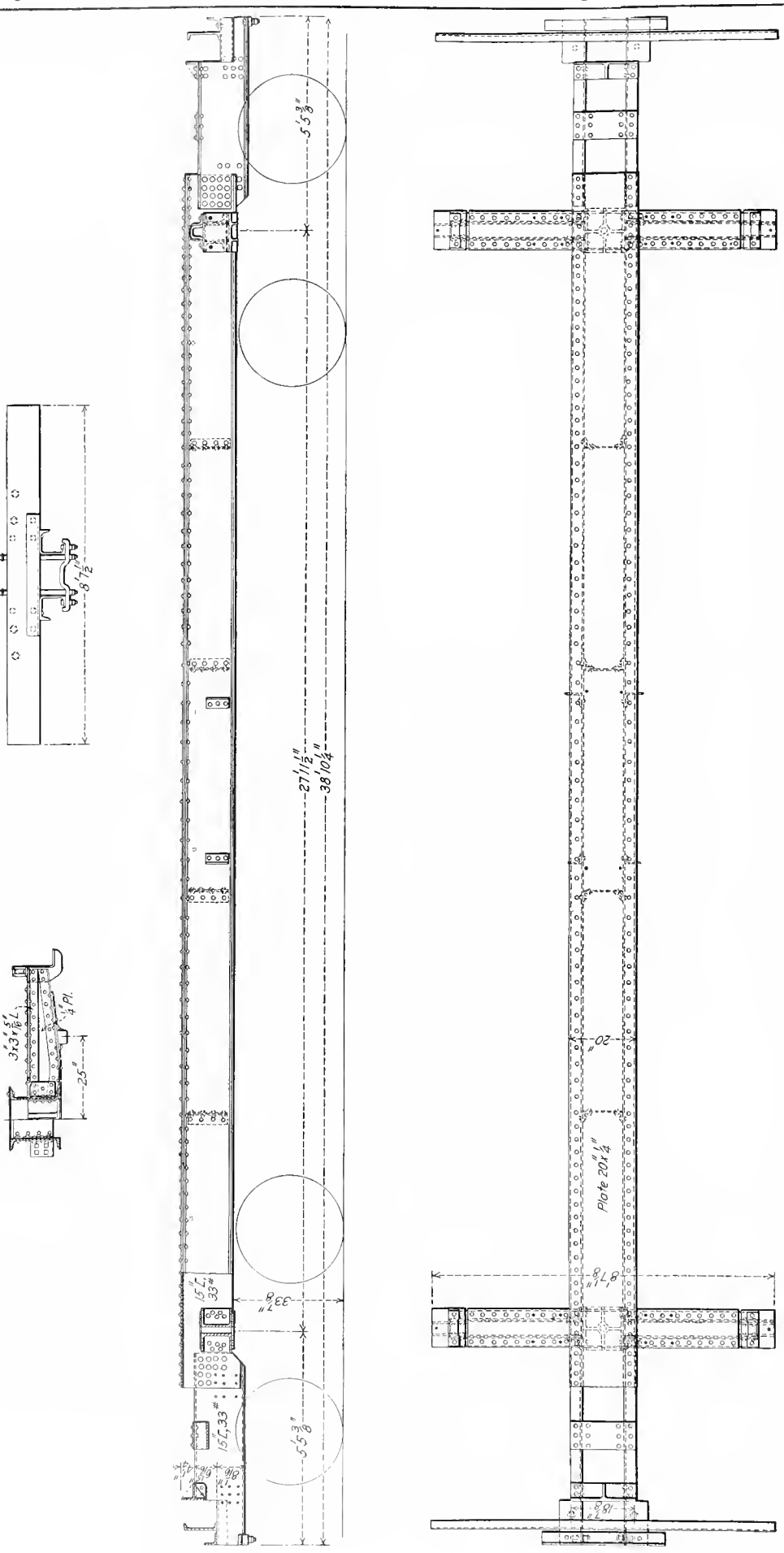


Figs. 1010-1011.
Draft Yoke, Draft Bolt and Tail Pin.

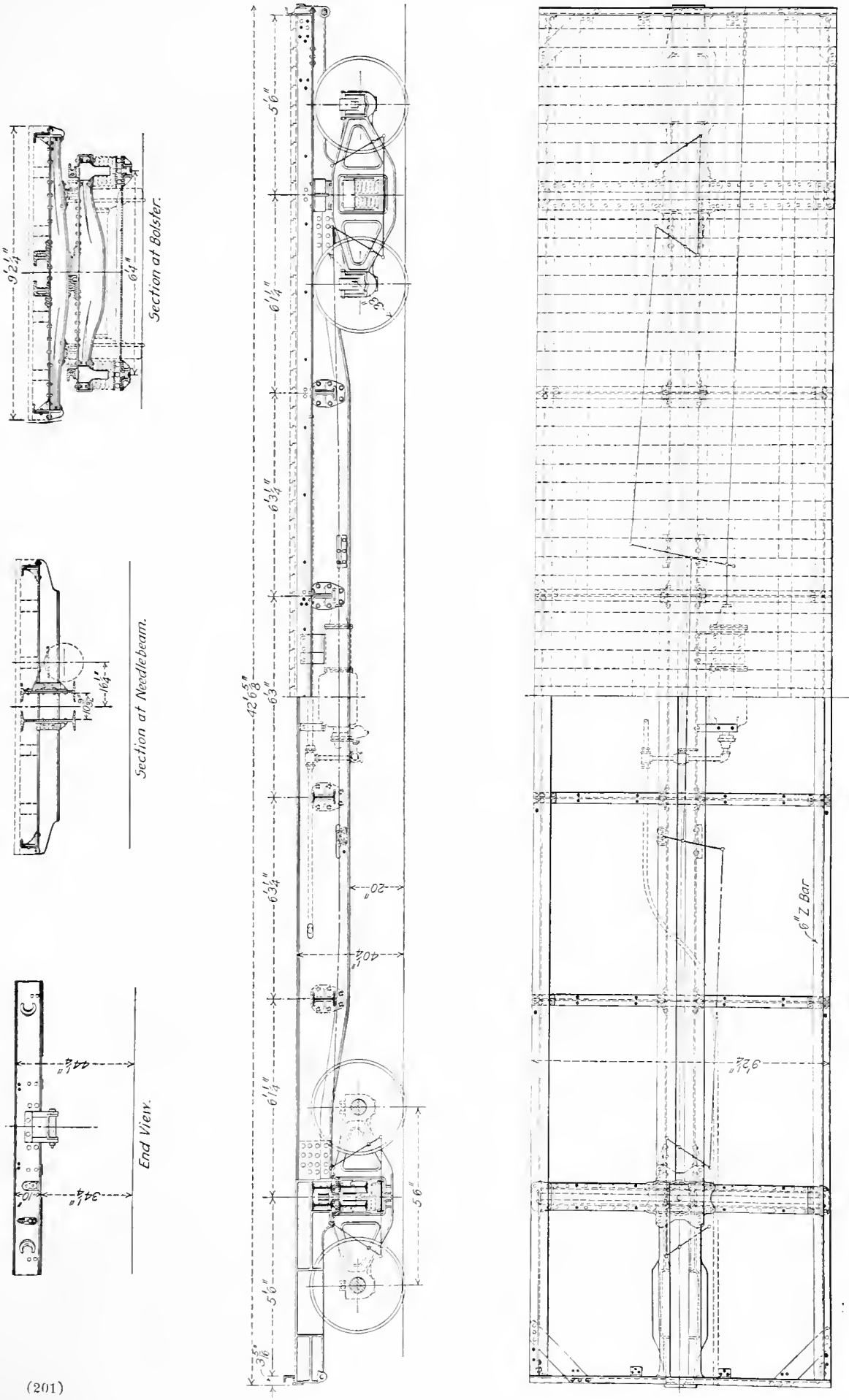
Cast and Wrought Iron Details of First-Class Coach. N. Y., N. H. & H.



Figs. 1012-1014. Plan, Elevation and Sections of Steel Underframe for 80,000 lbs. Capacity Gondola Car.
Ralston Steel Car Co.
(This underframe is also shown in Fig. 1026.)



Figs. 1015-1018. Plan and Elevations of Structural Steel Underframe for 70,000 lbs. Capacity Hopper Gondola Car.
Ralston Steel Car Co.
(This underframe is also shown in Fig. 1024.)



Figs. 1019-1023. Plan, Elevations and Sections of Steel Underframe for 80,000 lbs. Capacity Box Car. C., M. & St. P. Bettendorf Axle Co.

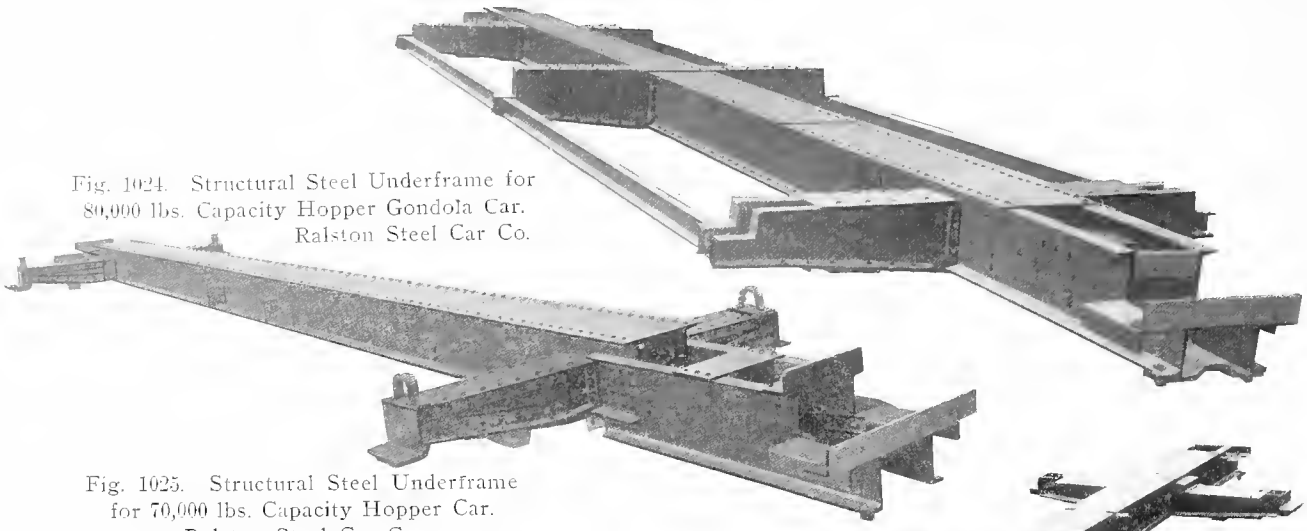


Fig. 1024. Structural Steel Underframe for 80,000 lbs. Capacity Hopper Gondola Car. Ralston Steel Car Co.

Fig. 1025. Structural Steel Underframe for 70,000 lbs. Capacity Hopper Car. Ralston Steel Car Co.

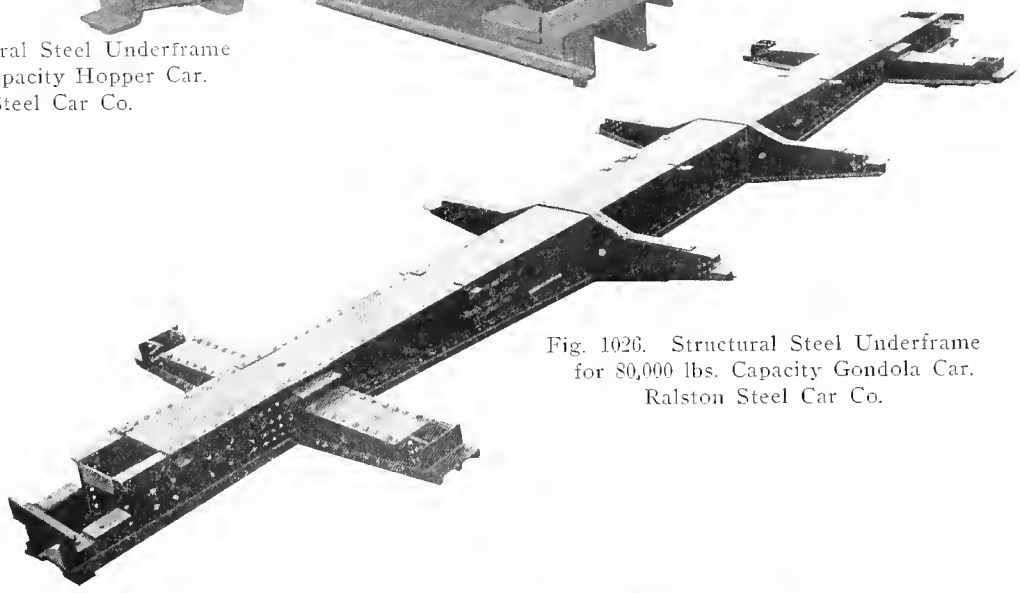


Fig. 1026. Structural Steel Underframe for 80,000 lbs. Capacity Gondola Car. Ralston Steel Car Co.

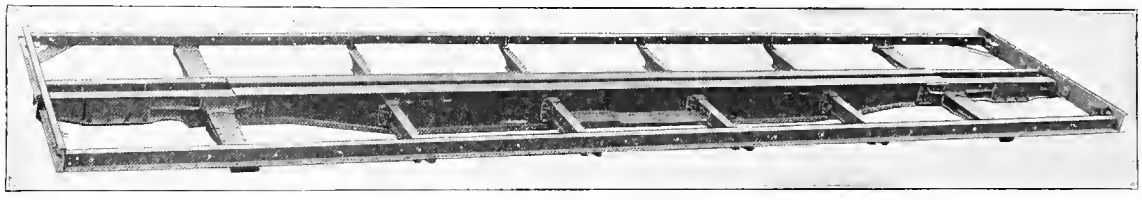


Fig. 1027. Double Center Sill Structural Steel Underframe, with Cast Steel Center Sill Ends for 80,000 lbs. Capacity Box Cars. Bettendorf Axle Co.

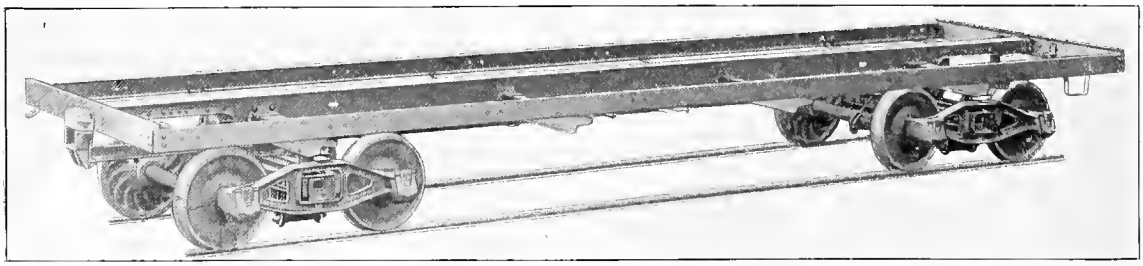


Fig. 1028. Single Center Sill Structural Steel Underframe for 60,000 lbs. Capacity Stock Cars. Bettendorf Axle Co.

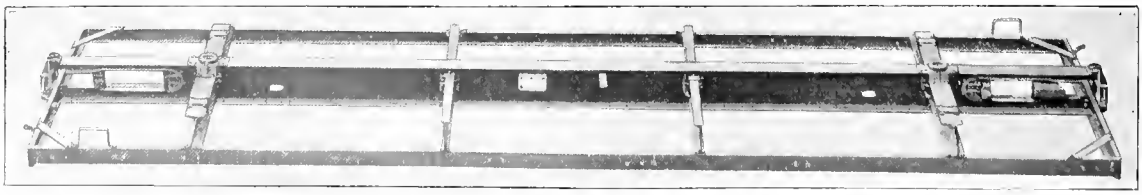


Fig. 1029. Single Center Sill Structural Steel Underframe for 60,000 lbs. Capacity Stock Cars. Bettendorf Axle Co.

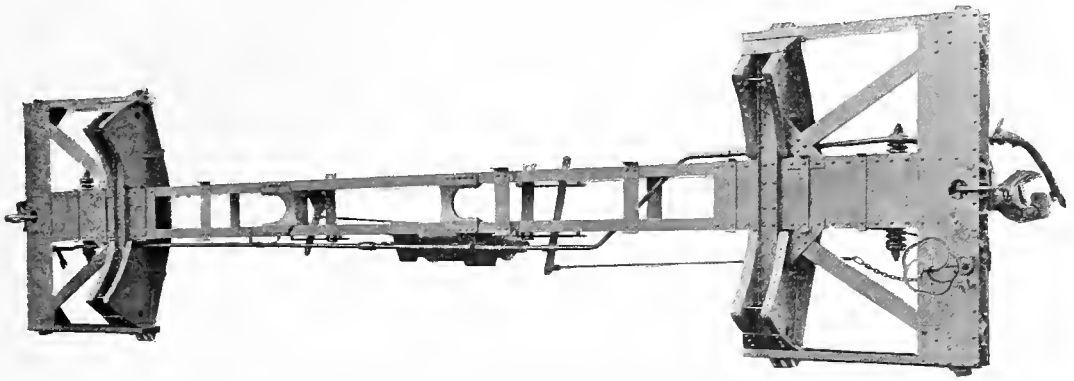


Fig. 1030. Structural Steel Underframing for 100,000 lbs. Capacity Tank Car.
American Car & Foundry Co.

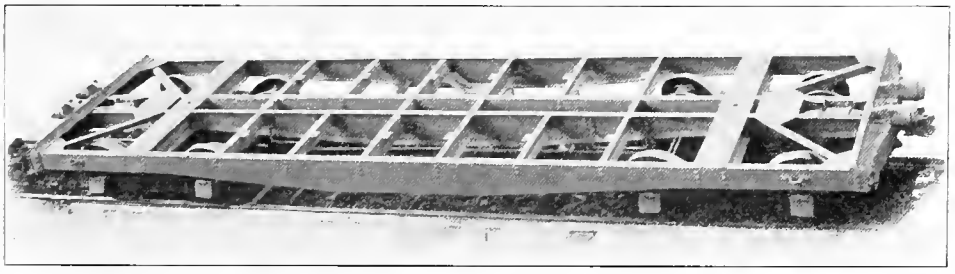


Fig. 1031. Pressed Steel Underframe for 100,000 lbs. Capacity Box Car.
Pressed Steel Car Co.

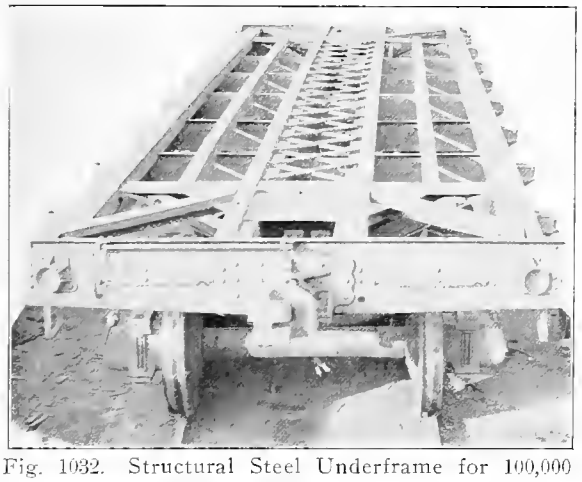


Fig. 1032. Structural Steel Underframe for 100,000 lbs. Capacity Flat Car. Middletown Car Co.

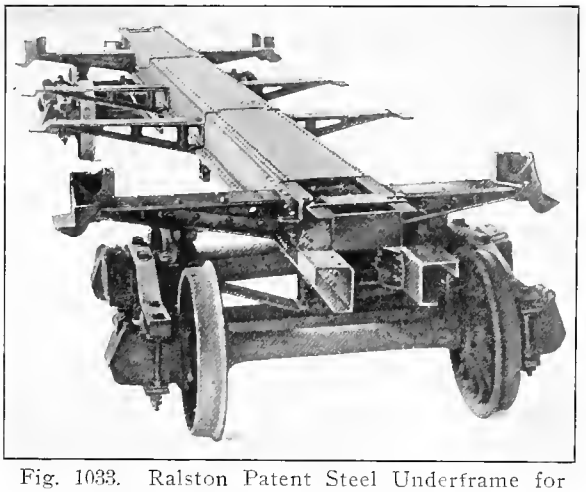


Fig. 1033. Ralston Patent Steel Underframe for Freight Cars. Ralston Steel Car Co.

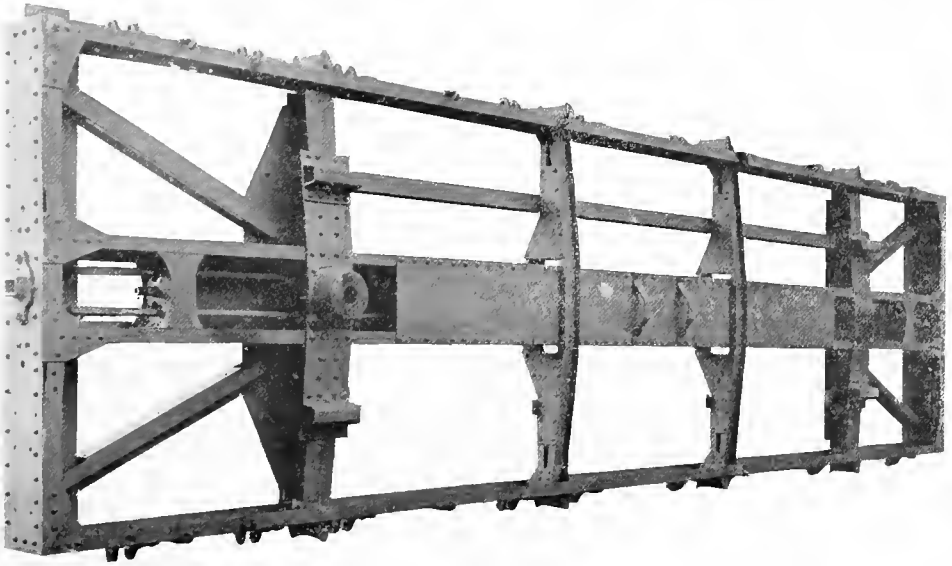


Fig. 1034. Structural Steel Underframe for 66,000 lbs. Capacity Drop-Side Gondola Car.
Middletown Car Co.

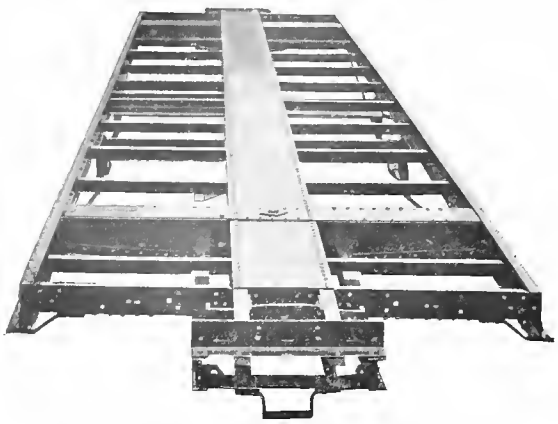


Fig. 1035. Structural Steel Underframe for Passenger Cars.
Harlan & Hollingsworth.

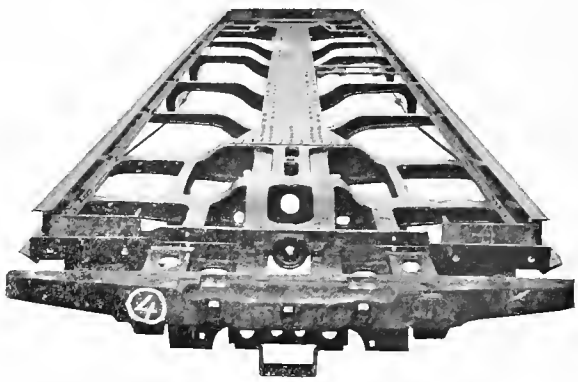


Fig. 1036. Composite Cast and Structural Steel Underframe for Passenger Cars.
Harlan & Hollingsworth.

Fig. 1037. Structural Steel Underframe and Side Frame for 80,000 lbs. Capacity Hopper Bottom Gondola Cars.
Middletown Car Co.

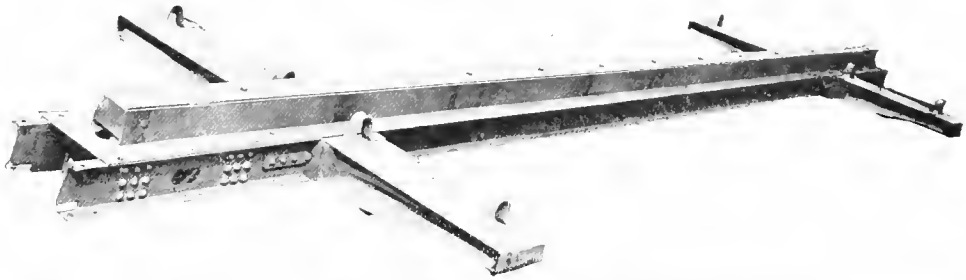


Fig. 1038. Structural Steel Underframe as Applied to Old Cars.
Chicago Steel Car Co.

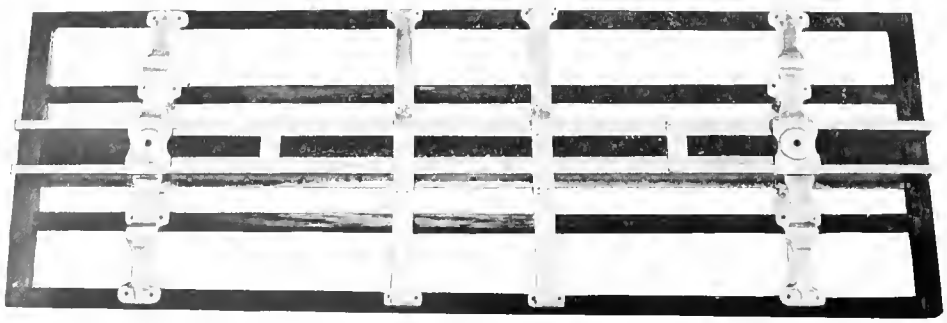
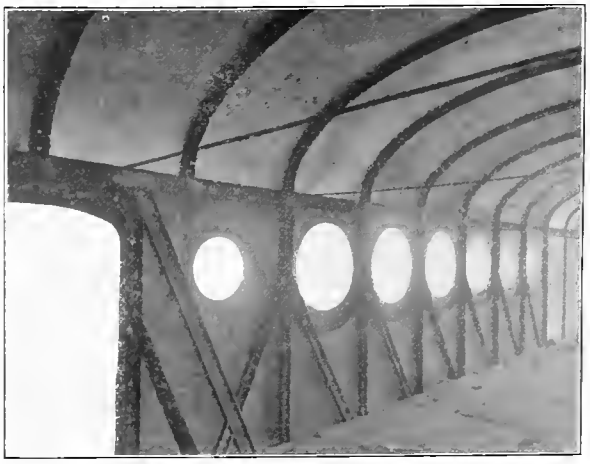


Fig. 1039. Structural Steel Underframe as Applied to New Cars.
Chicago Steel Car Co.



Figs. 1040-1041. Interior Views of Partially Completed All Steel Union Pacific Passenger Coach, No. 499.
(Exterior view of this car shown in Fig. **140.***)*

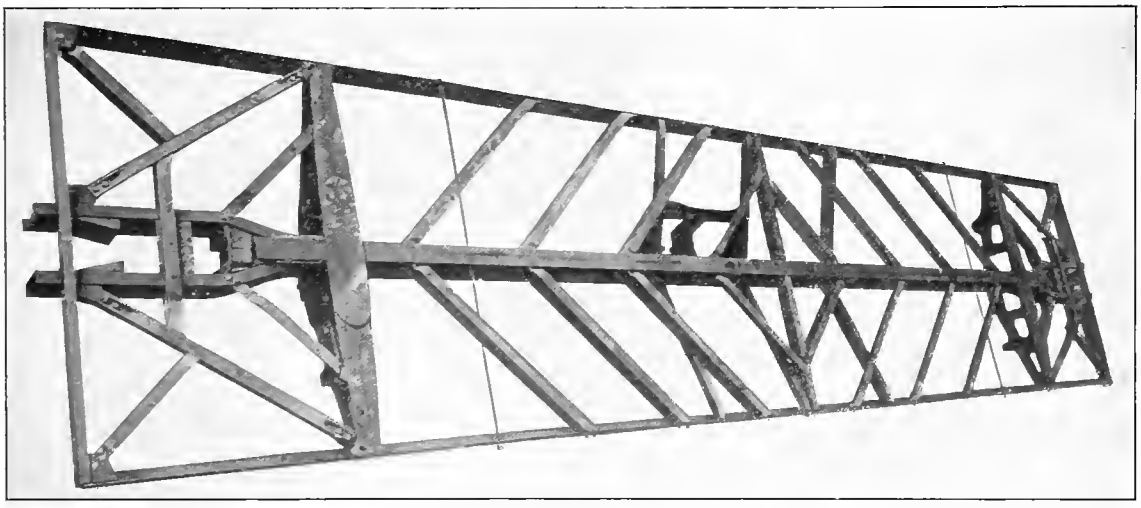


Fig. 1042. Structural Steel Underframe of Union Pacific All Steel Box Car, No. 100006.
(Exterior view of this car shown in Fig. 2.)

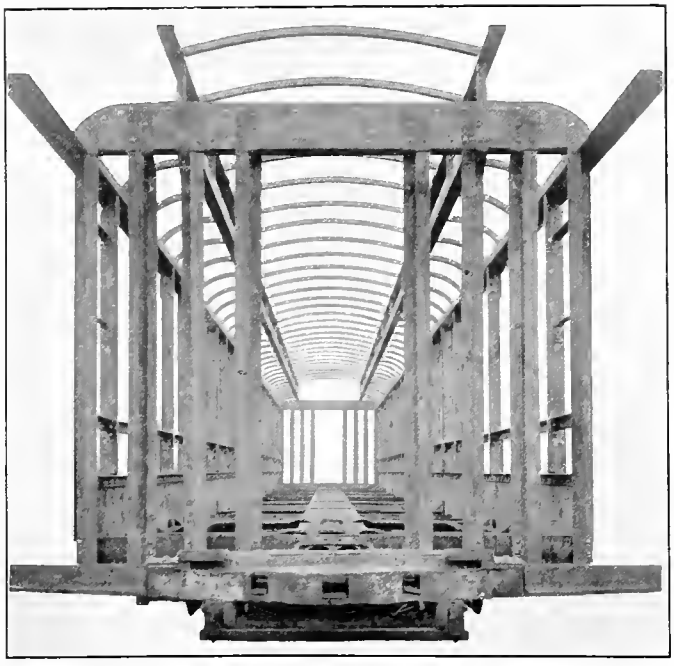


Fig. 1043. Steel Framing of C., M. & St. P. Library Buffet Car "Winneconne."

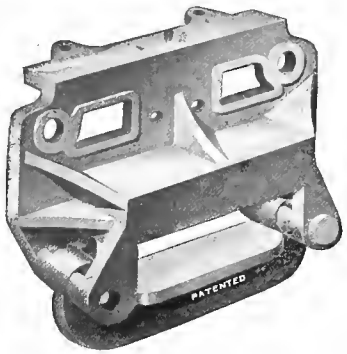
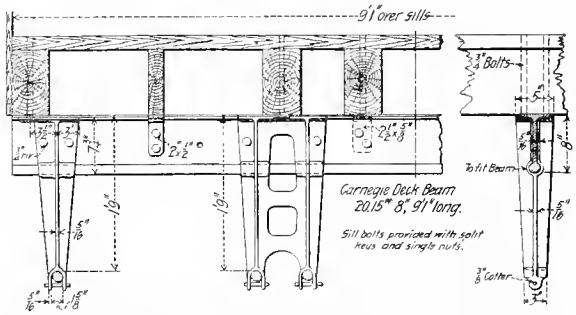
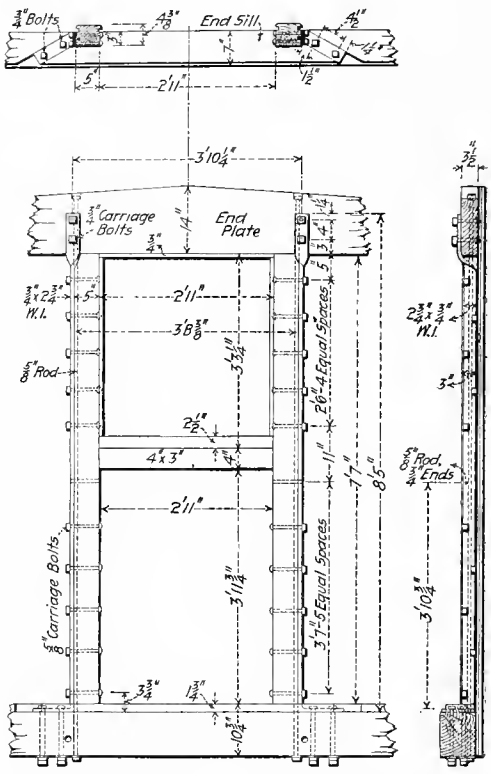


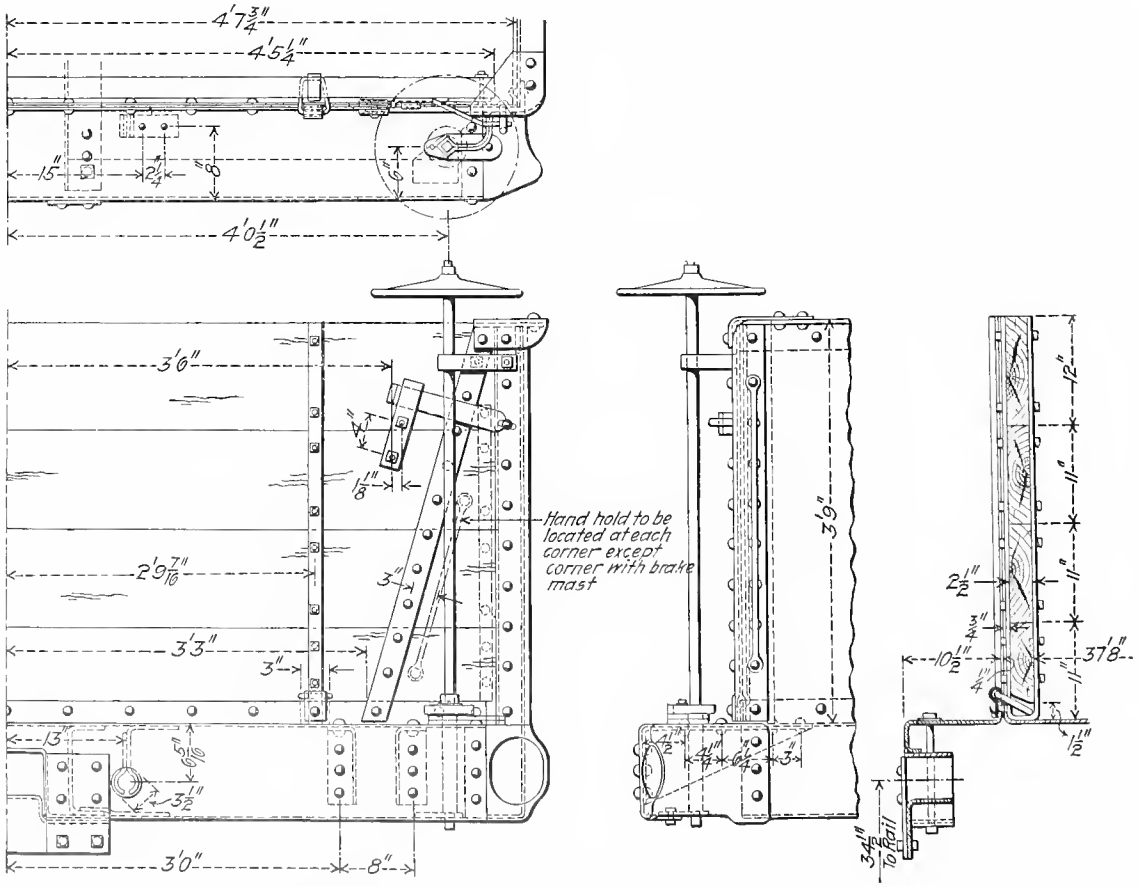
Fig. 1044. Flory Cast Steel Carry Iron. Commonwealth Steel Co.



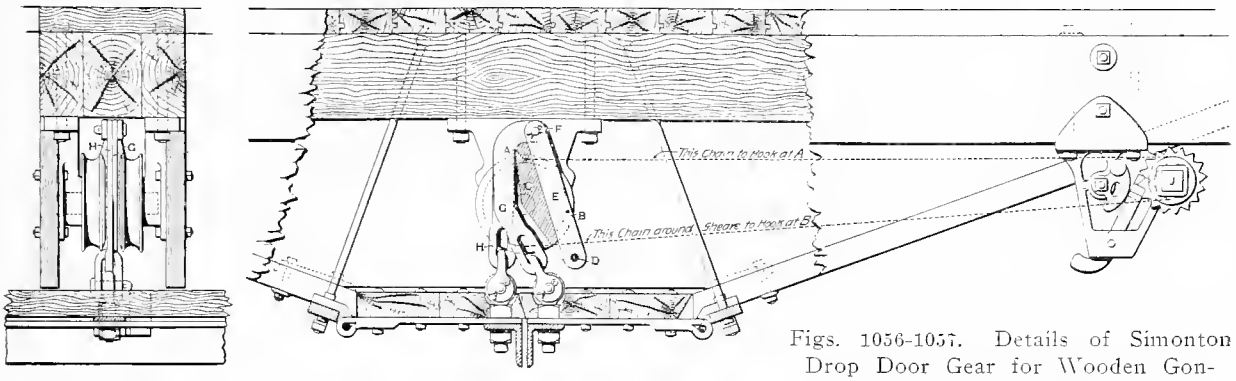
Figs. 1048-1049. Detail of Deck Beam Cross Tie, or Needlebeam. C., B. & Q. 80,000 lbs. Capacity Box Car.



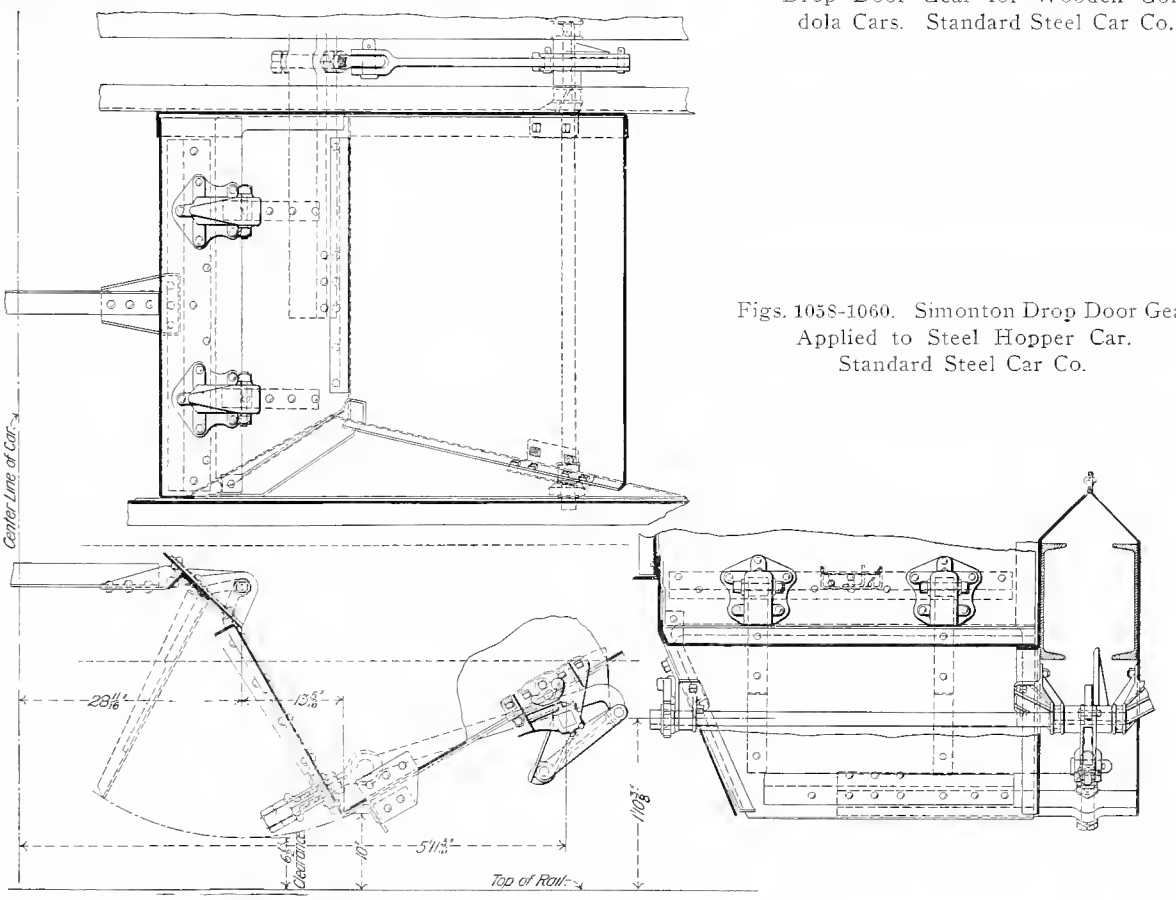
Figs. 1045-1047. End Post Reinforcement for Box Cars. Chicago & Alton.



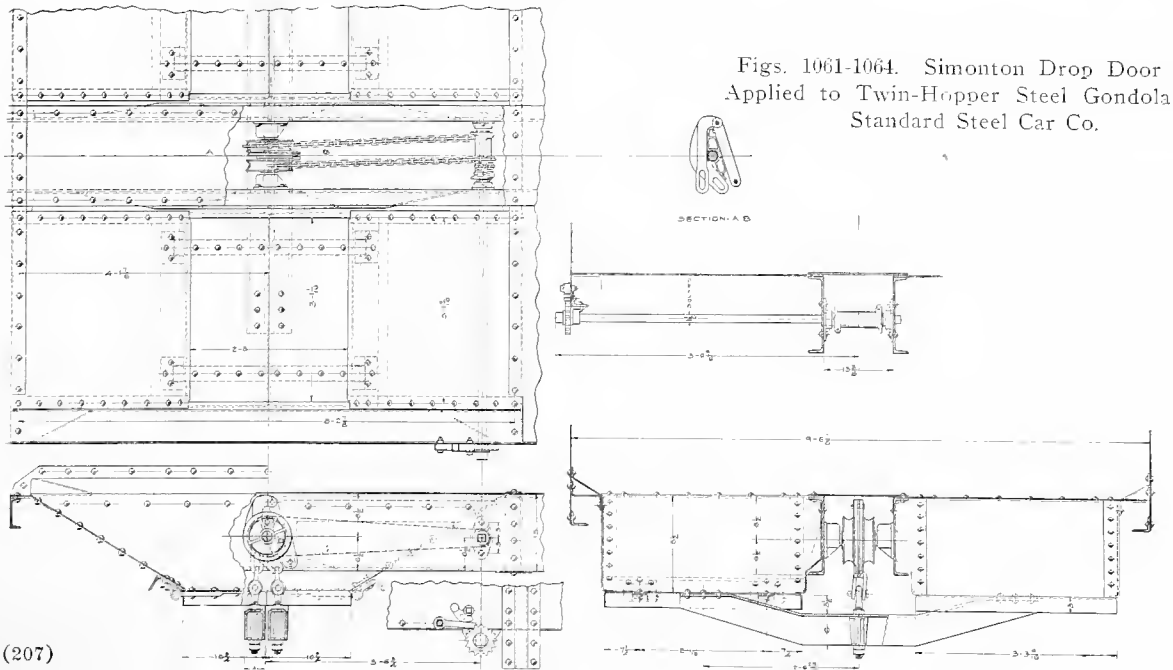
Figs. 1050-1055. Details of Drop End Door for Class Gsa Steel Gondola Cars. Pennsylvania Railroad.



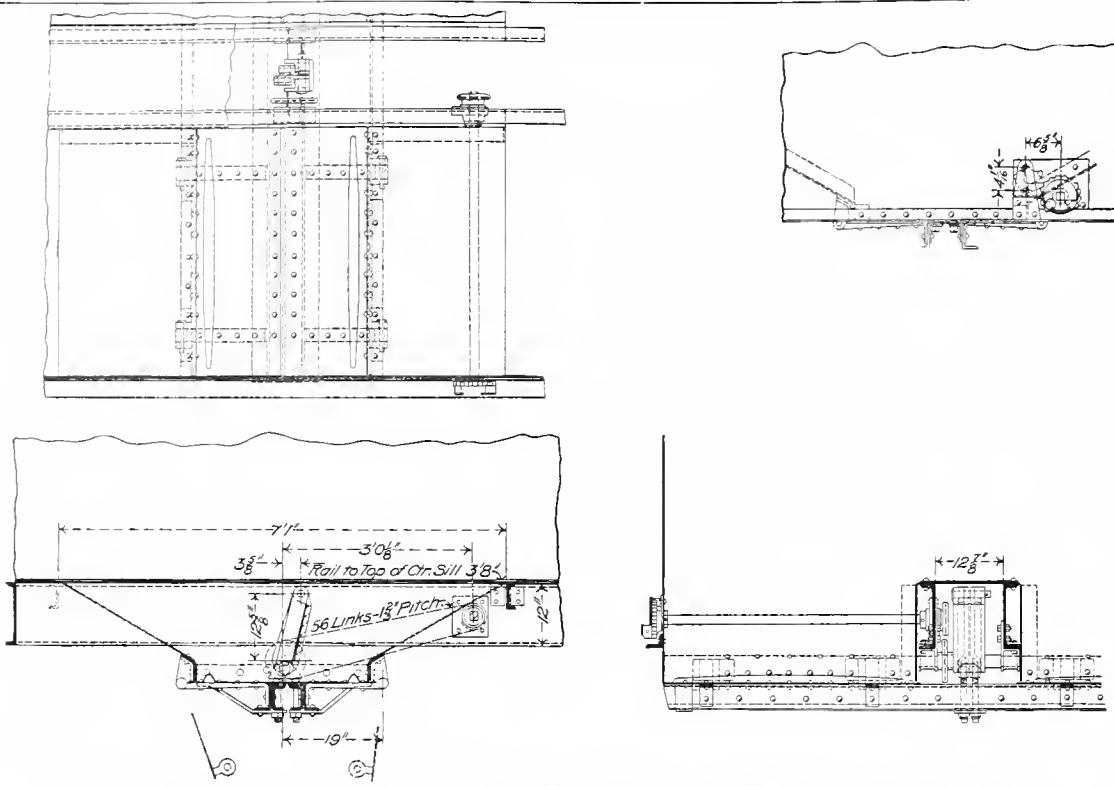
Figs. 1056-1057. Details of Simonton Drop Door Gear for Wooden Gondola Cars. Standard Steel Car Co.



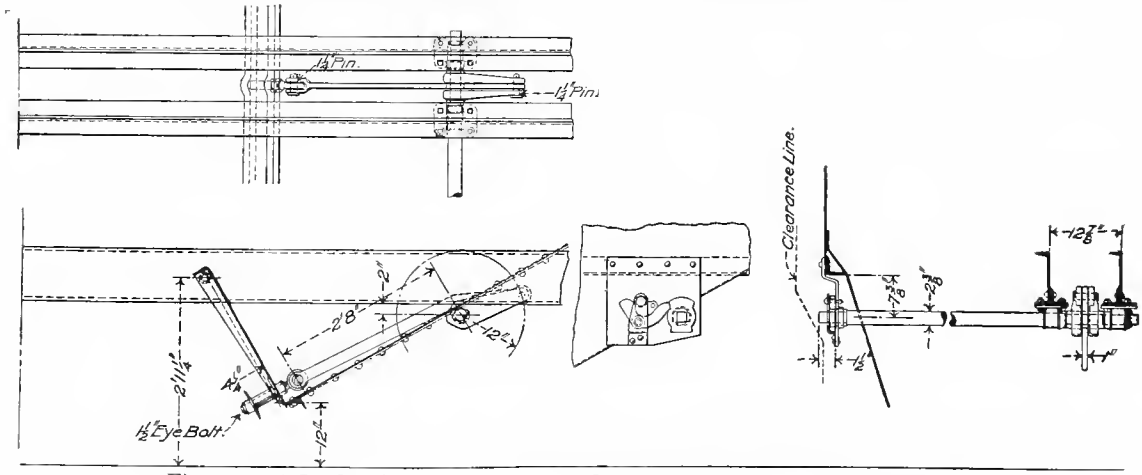
Figs. 1058-1060. Simonton Drop Door Gear Applied to Steel Hopper Car. Standard Steel Car Co.



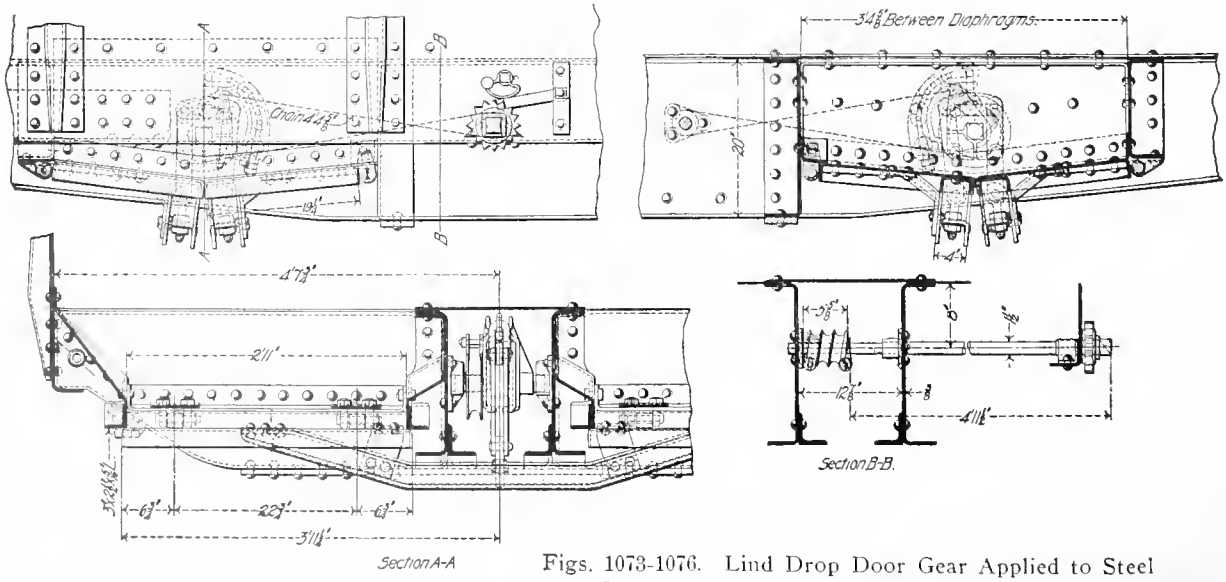
Figs. 1061-1064. Simonton Drop Door Gear Applied to Twin-Hopper Steel Gondola Car. Standard Steel Car Co.



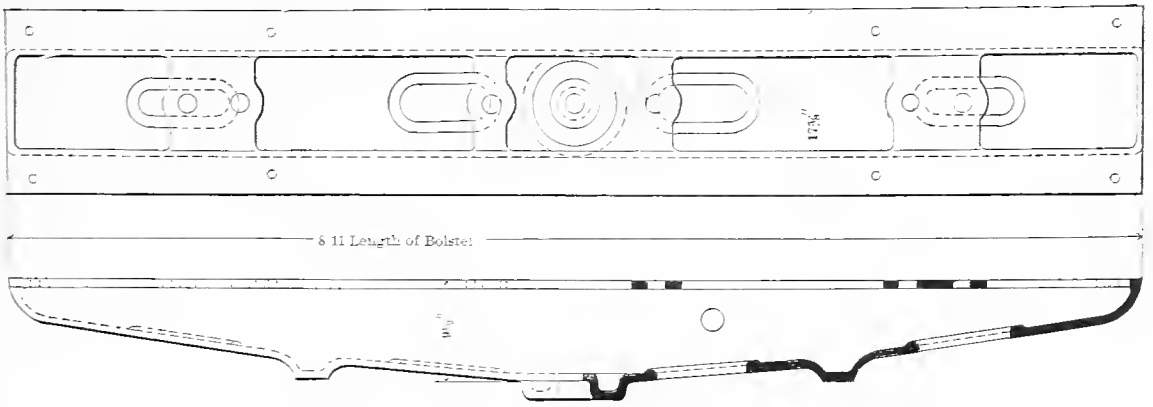
Figs. 1065-1068. Dunham Drop Door Gear Applied to L. S. & M. S. 100,000 lbs. Capacity Steel Hopper-Bottom Gondola Car. U. S. Metal & Manufacturing Co.



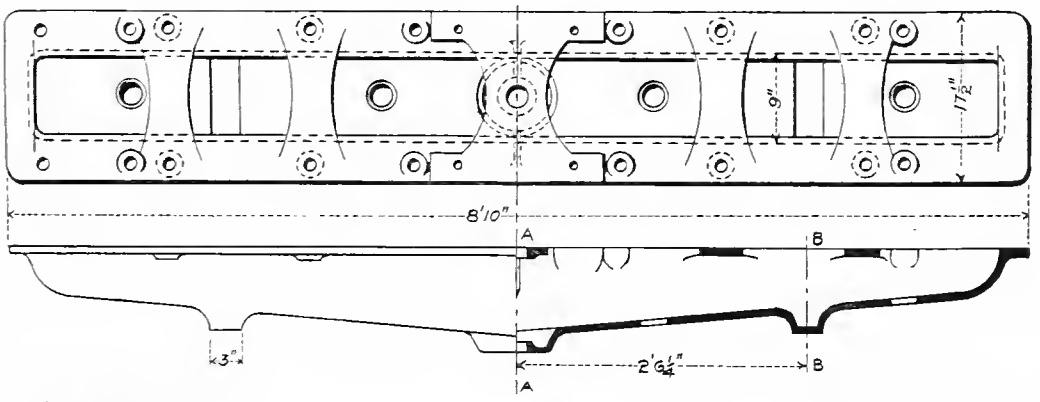
Figs. 1069-1072. Dunham Hopper Door Gear Applied to Pennsylvania Railroad Class G1a Steel Hopper Car. U. S. Metal & Manufacturing Co.



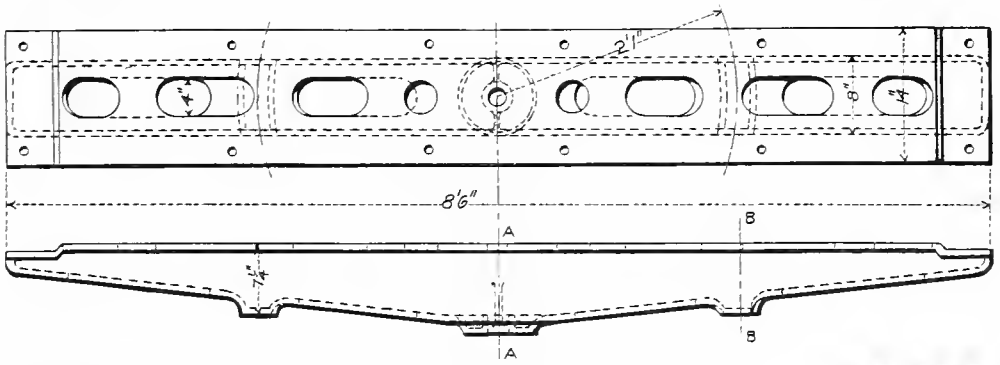
Figs. 1073-1076. Lind Drop Door Gear Applied to Steel Hopper Gondola Car. Pressed Steel Car Co.



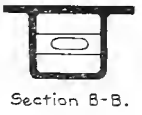
Figs. 1077-1078. Cast Steel Body Bolster. American Steel Foundries.



Figs. 1079-1082. Cast Steel Body Bolster, Channel Section. American Steel Foundries.



Figs. 1083-1086. Cast Steel Body Bolster, Box Section. American Steel Foundries.



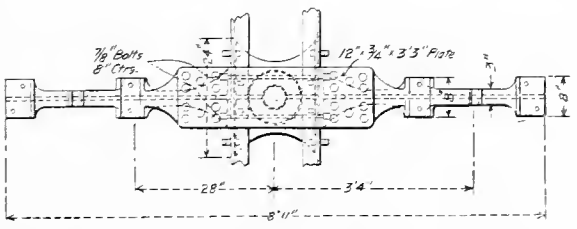


Fig. 1087. Plan.

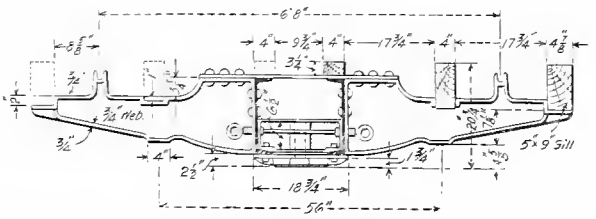
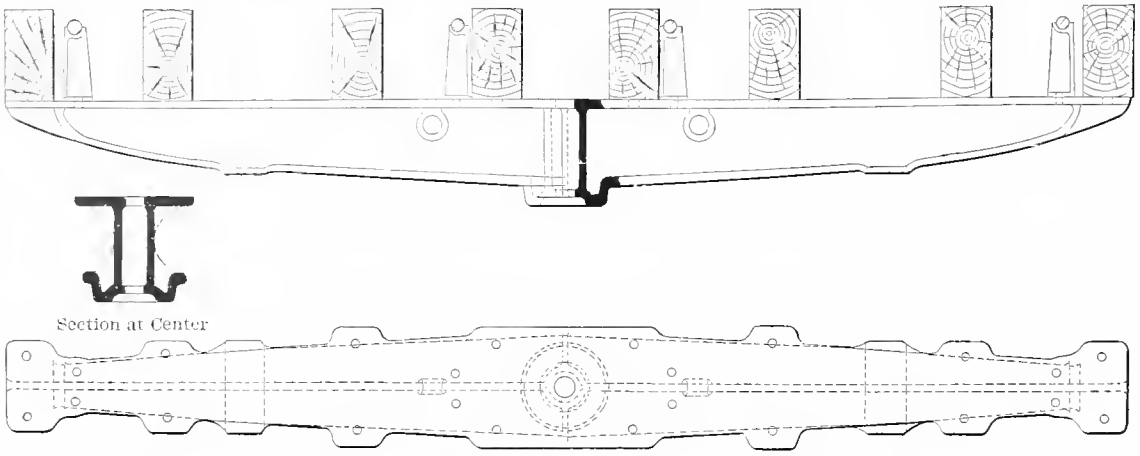
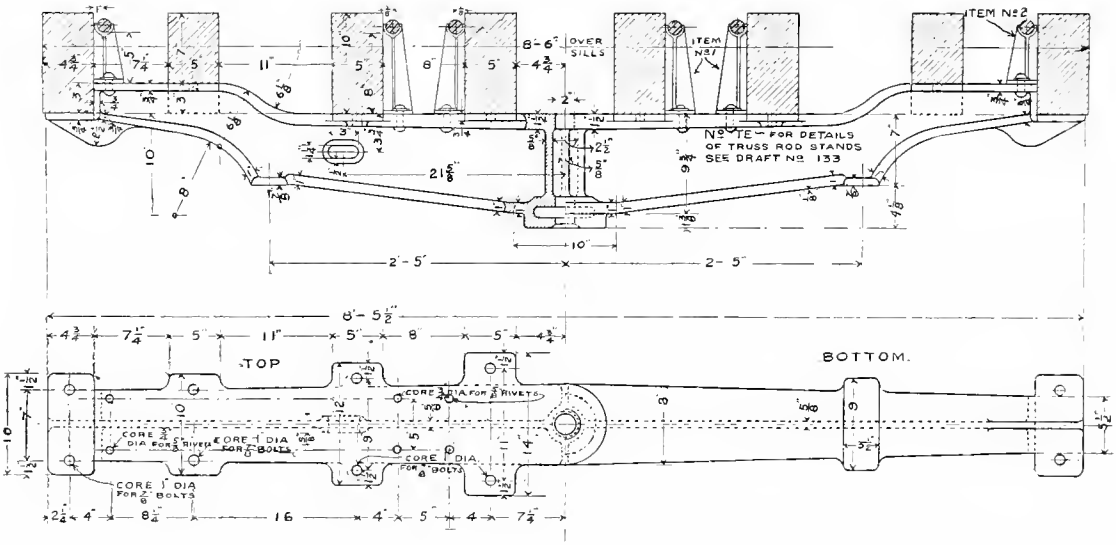


Fig. 1088. Side Elevation.

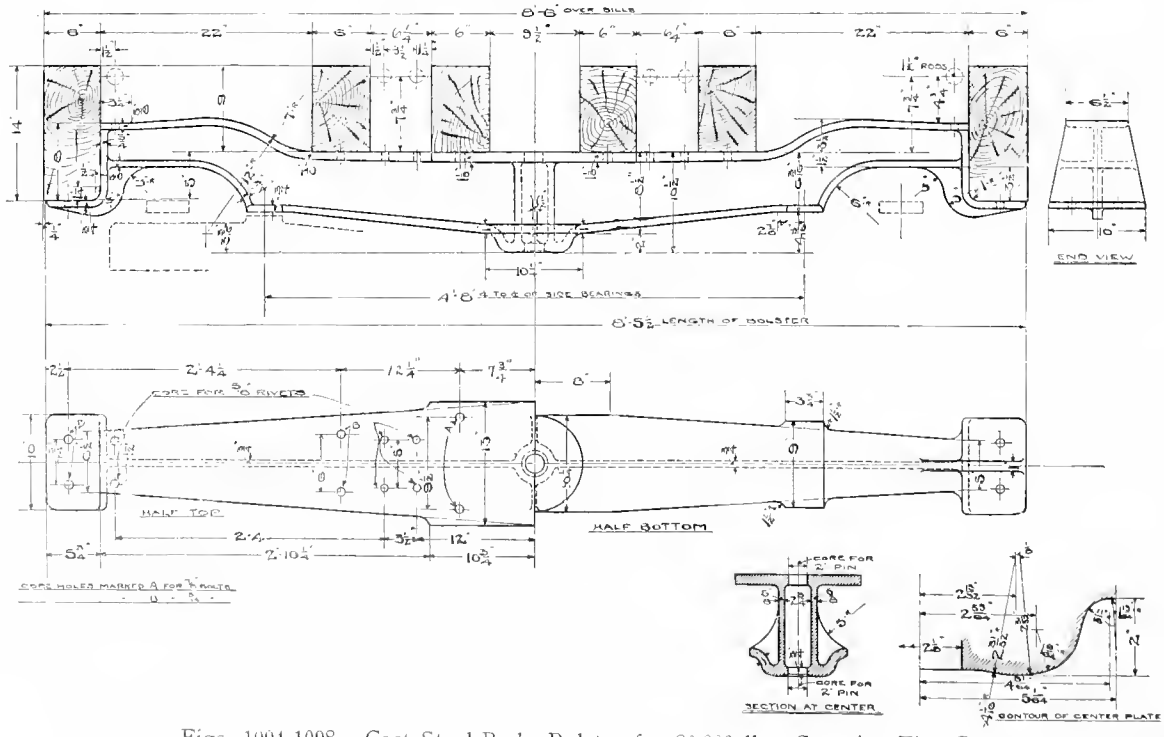
Two-Piece, Cast Steel Body Bolster for 80,000 lbs. Capacity Box Car with Channel Center Sills. American Steel Foundries.



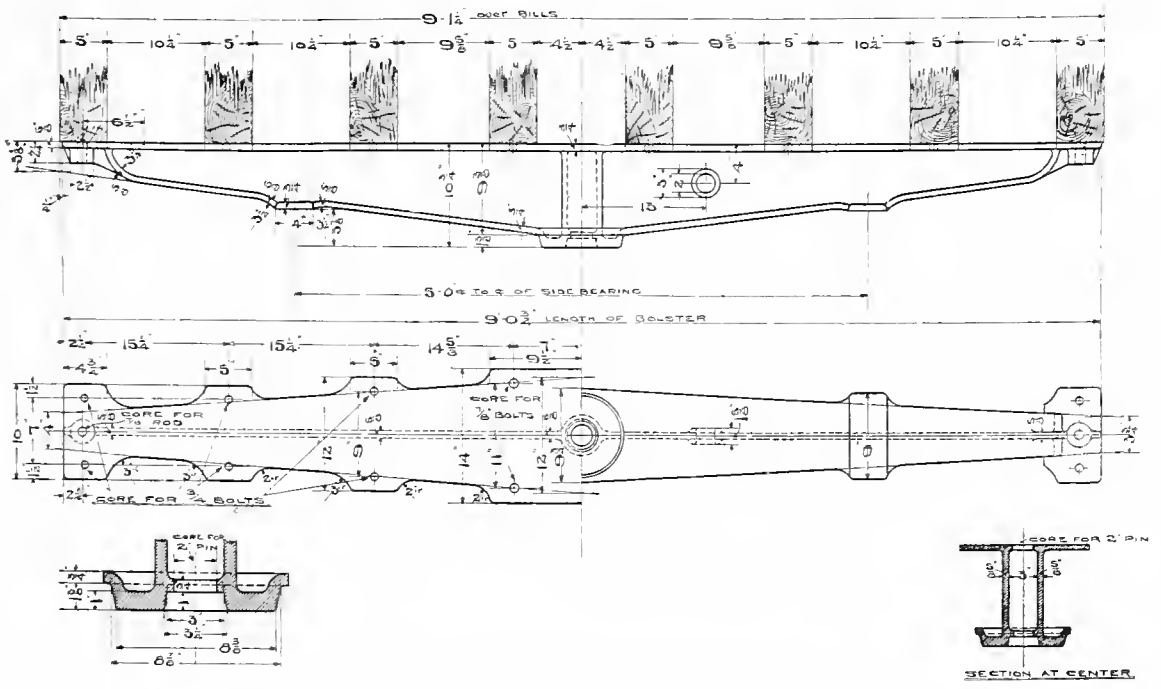
Figs. 1089-1091. Cast Steel Body Bolster, I-Beam Section. American Steel Foundries.



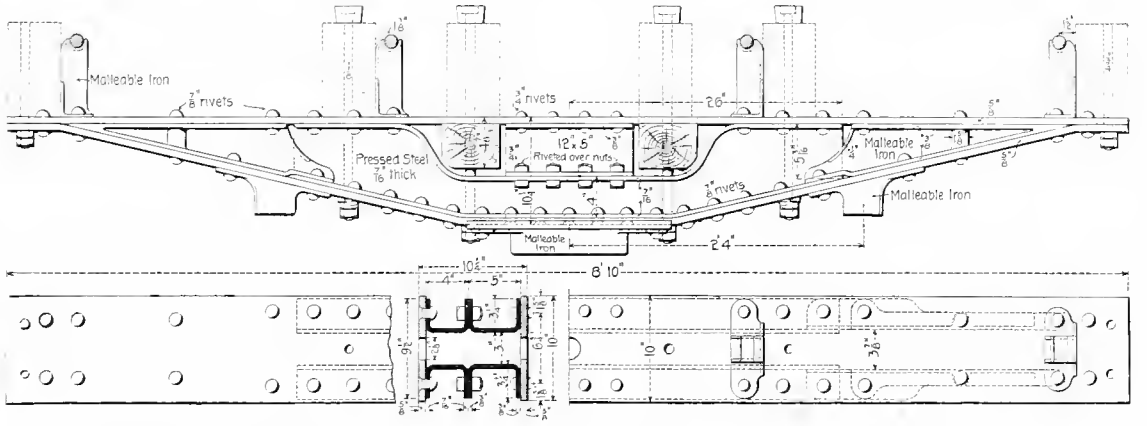
Figs. 1092-1093. Cast Steel Body Bolster for 80,000 lbs. Capacity Coal Car.
American Steel Foundries.



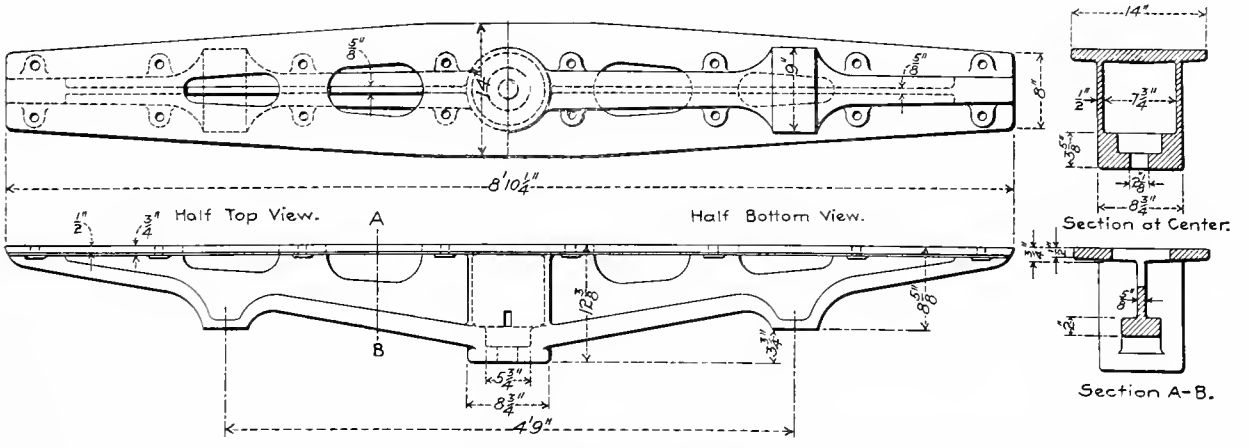
Figs. 1094-1098. Cast Steel Body Bolster for 80,000 lbs. Capacity Flat Car.
American Steel Foundries.



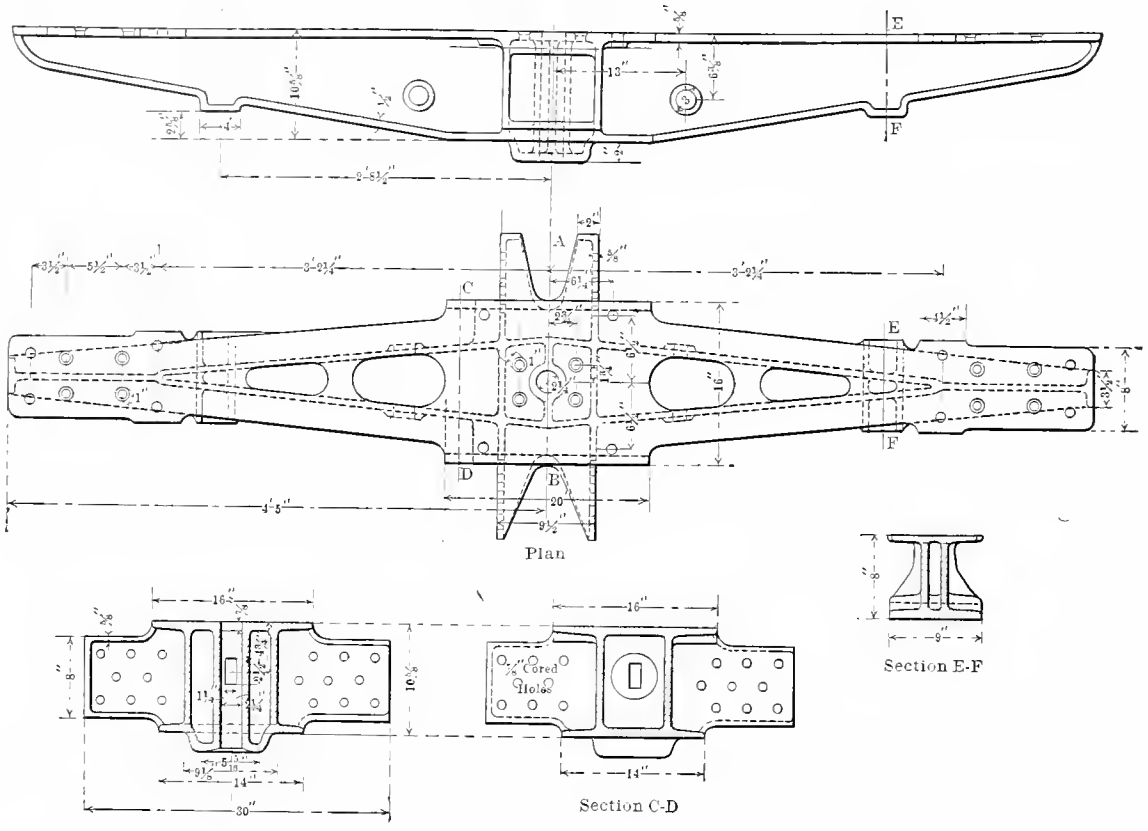
Figs. 1099-1102. Cast Steel Body Bolster for 80,000 lbs. Capacity Box Car.
American Steel Foundries.



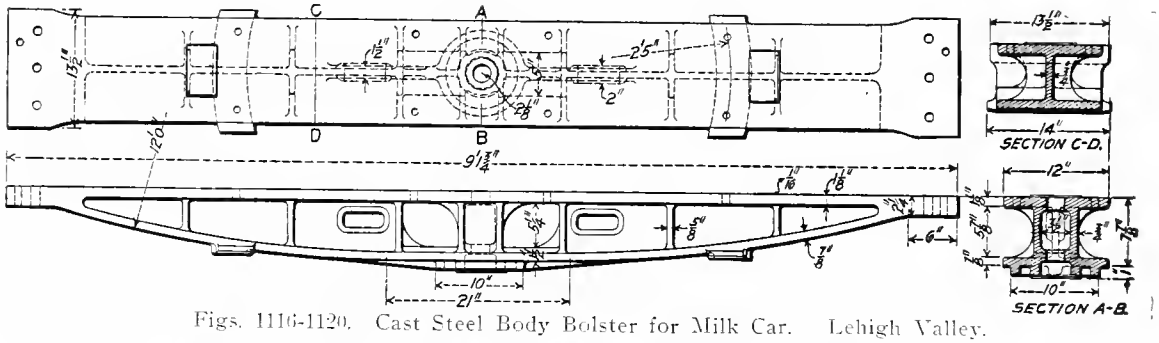
Figs. 1103-1105. Metal Body Bolster for Box Car, 70,000 lbs. Capacity. Northern Pacific.



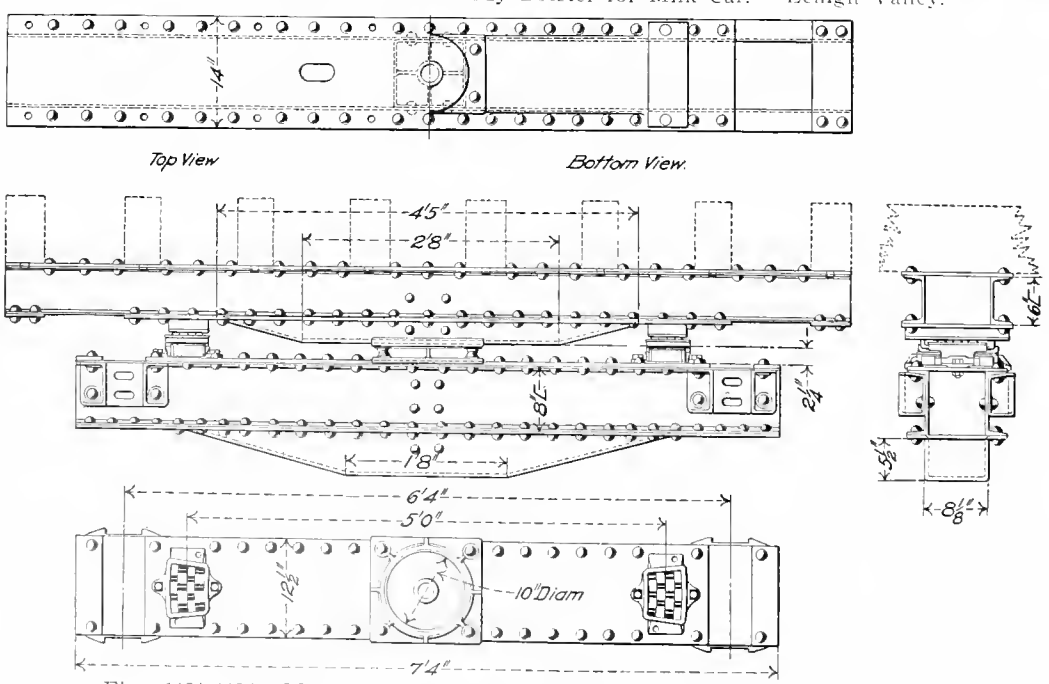
Figs. 1106-1110. Cast Steel Body Bolster for 60,000 lbs. Capacity Box Car.
Commonwealth Steel Co.



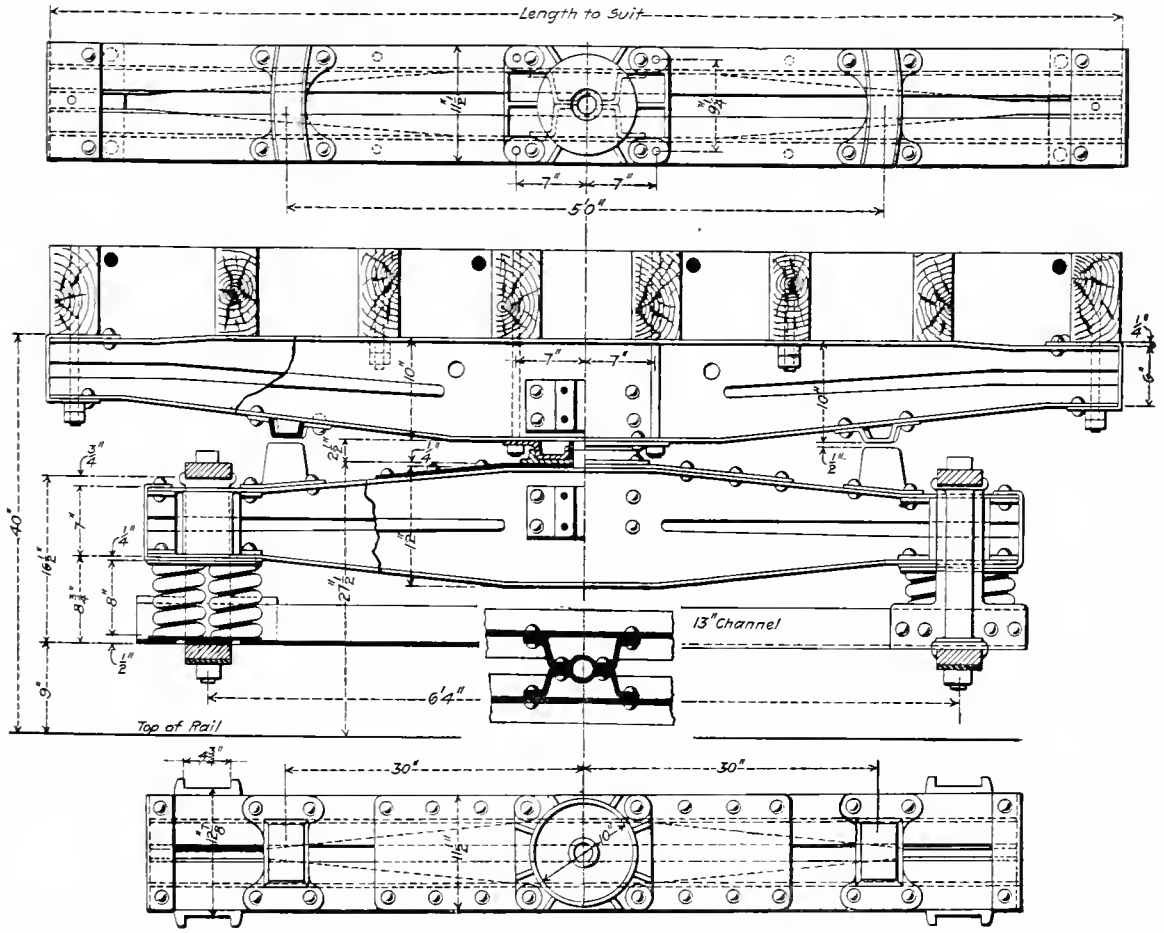
Figs. 1111-1115. Cast Steel Body Bolster. Gould Coupler Co.



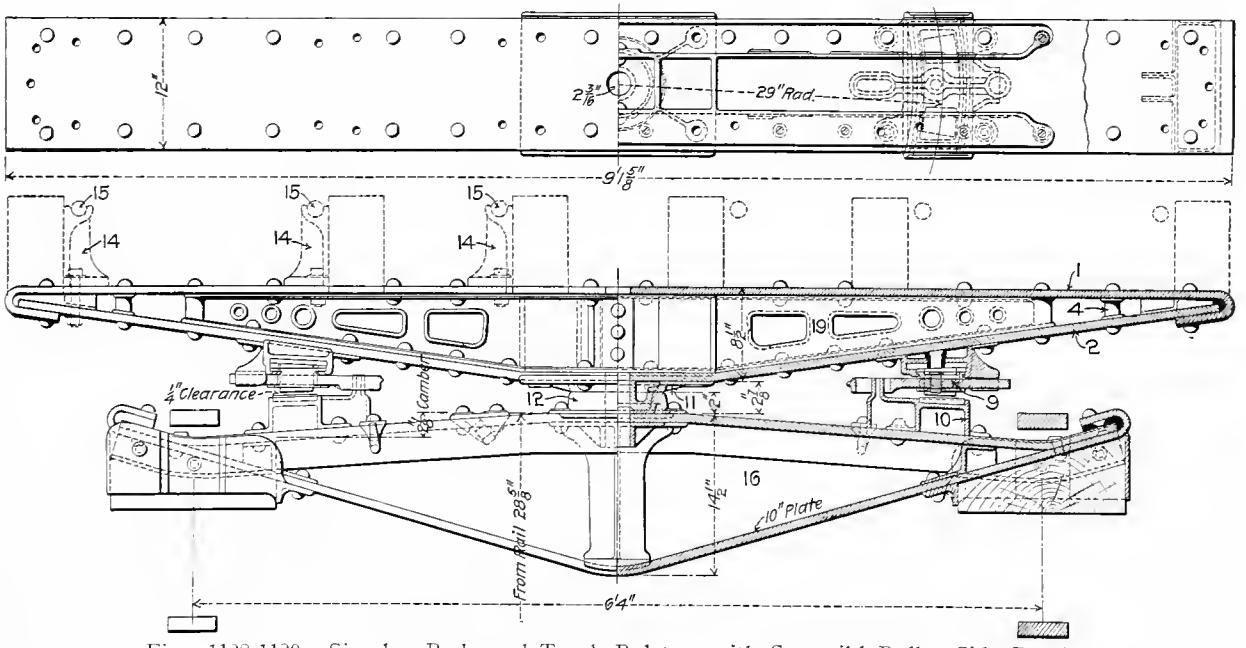
Figs. 1116-1120. Cast Steel Body Bolster for Milk Car. Lehigh Valley.



Figs. 1121-1124. Monitor Body and Truck Bolster with Creco Side Bearings. Chicago Railway Equipment Co.



Figs. 1125-1127. Bettendorf I-Beam Body and Truck Bolsters for 80,000 lbs. Capacity Cars. Bettendorf Axle Co.



Figs. 1128-1129. Simplex Body and Truck Bolsters with Susemihl Roller Side Bearings. Simplex Railway Appliance Co.

Names of Parts of Bolsters. Figs. 1128-1129.

1 *Top Plate of Body Bolster*
2 *Bottom Plate of Body Bolster*
4 *Thimble*
9 *Body Side Bearing*
10 *Truck Side Bearing*
11 *Body Center Plate*
12 *Truck Center Plate*
14 *Body Truss Rod Saddle*
15 *Body Truss Rod*
16 *Truck Bolster*
19 *Filling Spider*

Fig. 1130. Cast Steel Body Bolster.
Atha Steel Castings Co.

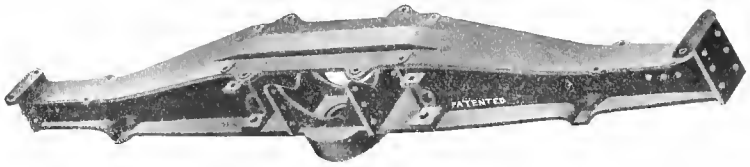


Fig. 1131. Cast Steel Separable Body Bolster for Wood Freight Cars.
Commonwealth Steel Co.

Fig. 1132. Cast Steel Separable Body Bolster for Steel Freight Cars.
Commonwealth Steel Co.

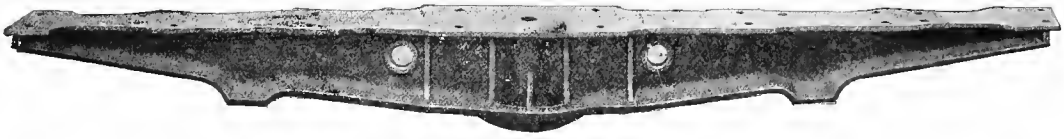


Fig. 1133. I-Shape Cast Steel Body Bolster. American Steel Foundries.

Fig. 1134. Cast Steel Body Bolster. American Steel Foundries.

Fig. 1135. Simplex Body Bolster. American Steel Foundries.

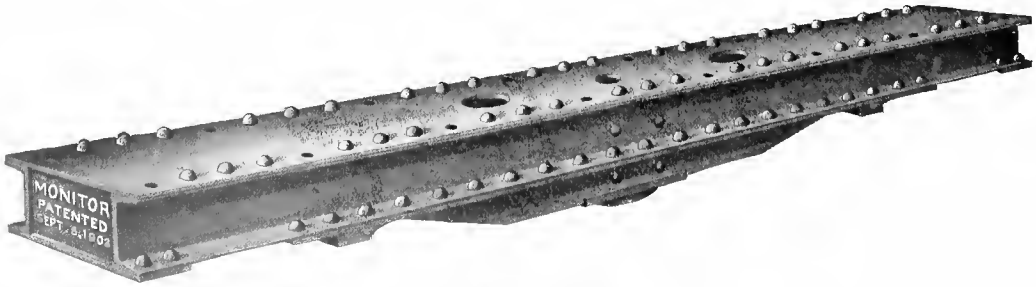
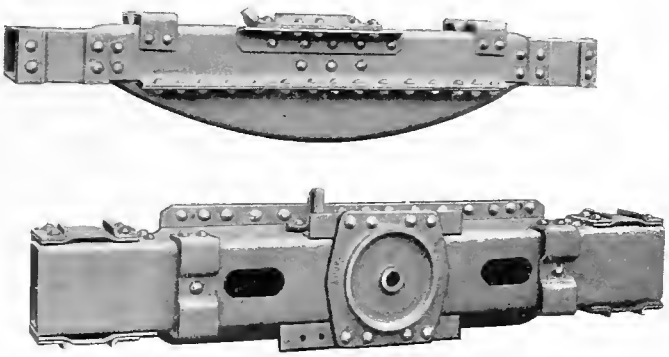


Fig. 1136. Monitor Body Bolster.
Chicago Railway Equipment Co.



Figs. 1137-1138. "Penn" Body and Truck Bolsters.
American Car & Foundry Co.

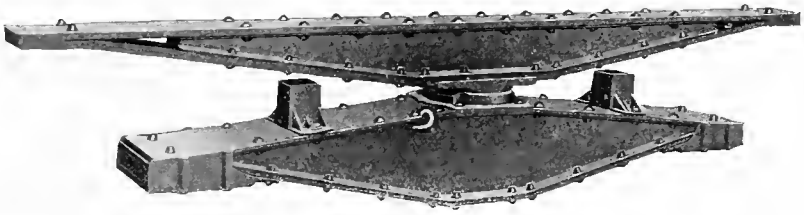


Fig. 1139. "Common-Sense" Body and Truck Bolsters.
American Car & Foundry Co.

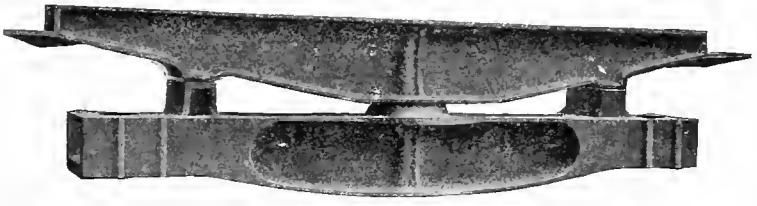


Fig. 1140. Cast Steel Body and Truck Bolsters.
Atha Steel Castings Co.

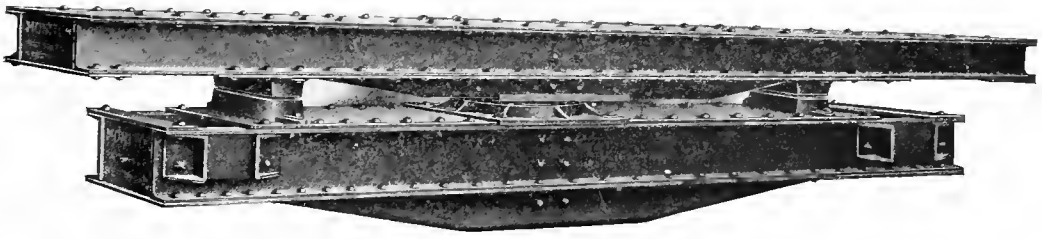


Fig. 1141. Monitor Body and Truck Bolsters.
Chicago Railway Equipment Co.

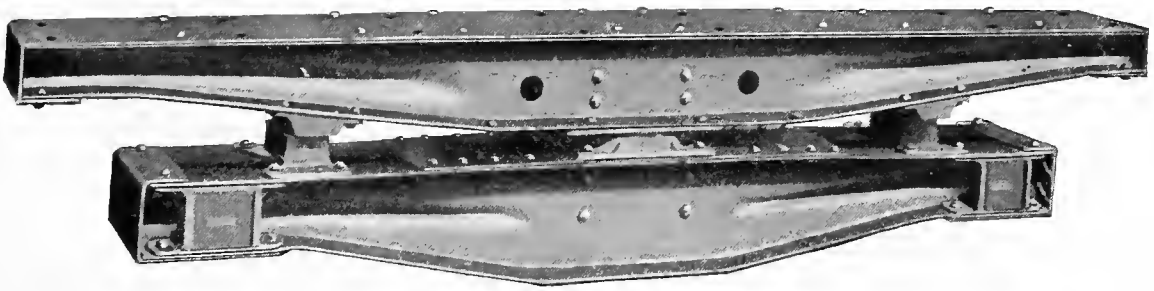


Fig. 1142. Bettendorf Body and Truck Bolsters.
Bettendorf Axle Co.

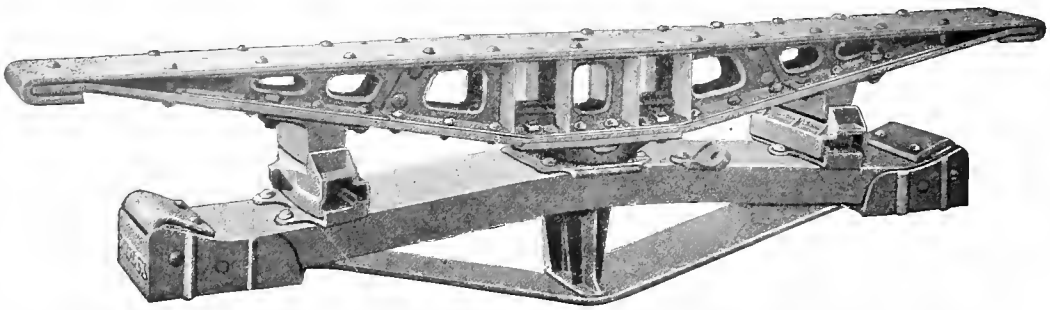


Fig. 1143. Simplex Body and Truck Bolsters with Susemihl Roller Side Bearings. Simplex Railway Appliance Co.

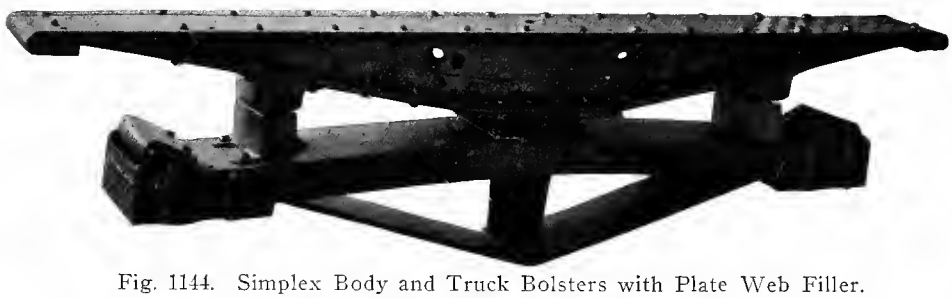


Fig. 1144. Simplex Body and Truck Bolsters with Plate Web Filler. Simplex Railway Appliance Co.

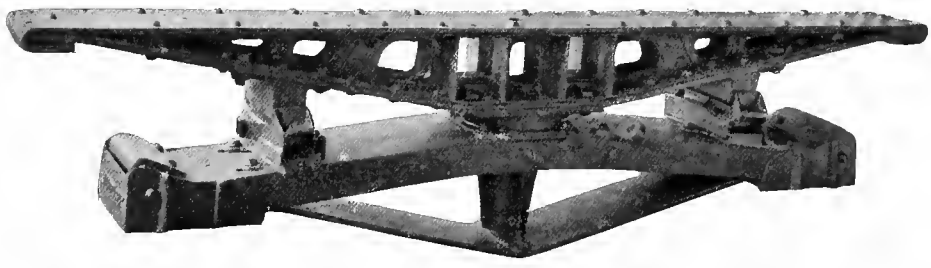


Fig. 1145. Simplex Body and Truck Bolsters with Malleable Iron Web Filler and Susemihl Roller Side Bearings. Simplex Railway Appliance Co.

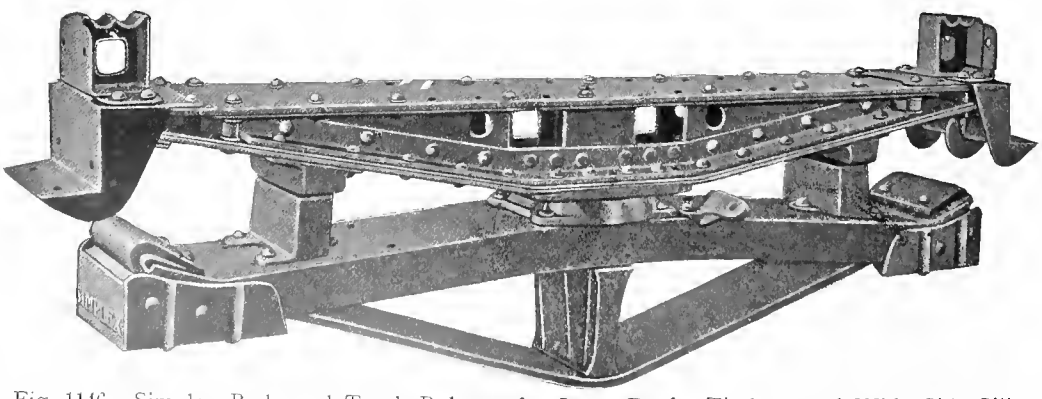
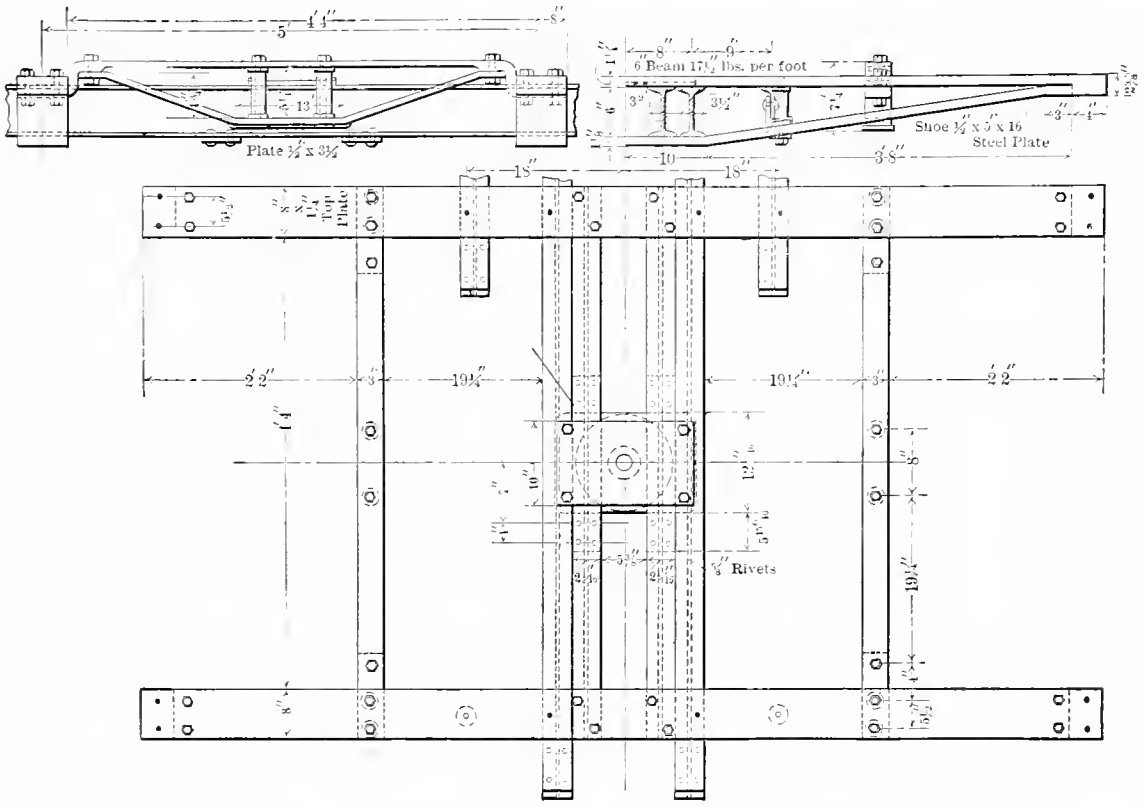


Fig. 1146. Simplex Body and Truck Bolsters for Long Draft Timbers and Wide Side Sills. Simplex Railway Appliance Co.



Figs. 1147-1149. Double Metal Body Bolster for First-Class Coach. N. Y., N. H. & H.

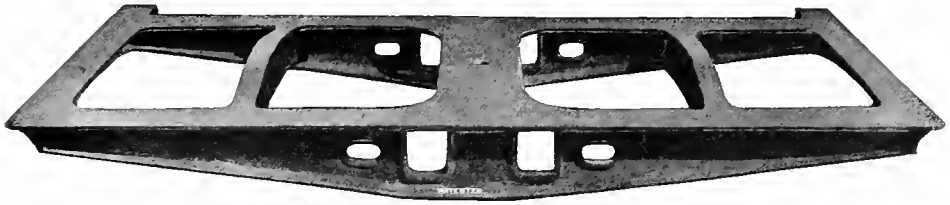
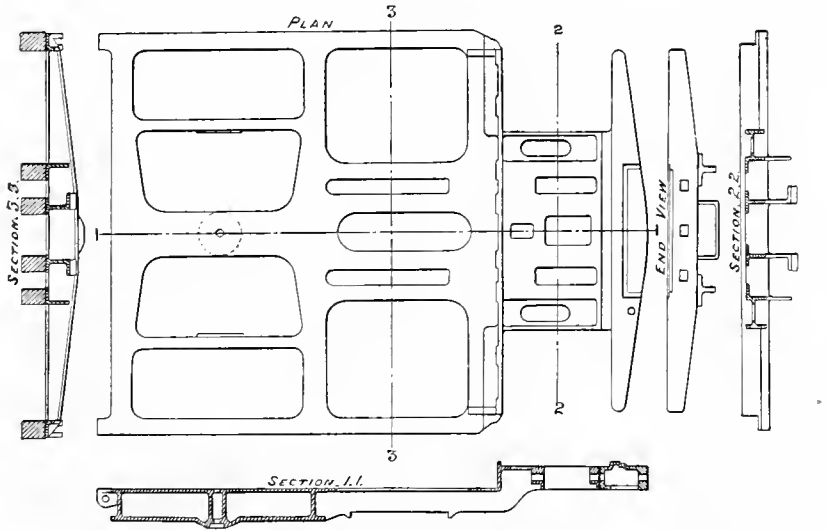


Fig. 1150. One-Piece Cast Steel Double Body Bolster for Passenger Cars. Commonwealth Steel Co.



Figs. 1151-1155. Plan and Sections of Cast Steel Combined Platform and Double Body Bolster. Commonwealth Steel Co.

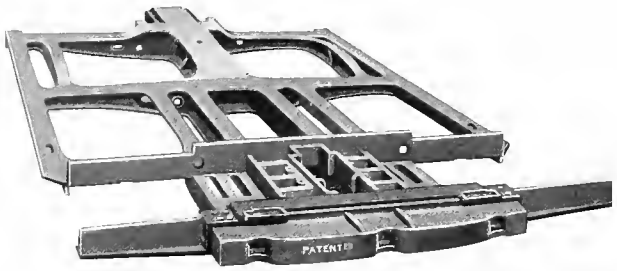


Fig. 1156. Cast Steel Combined Platform and Double Body Bolster for Steel Passenger Cars.
Commonwealth Steel Co.

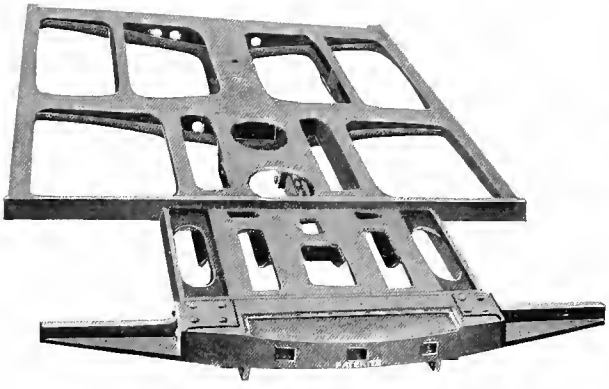
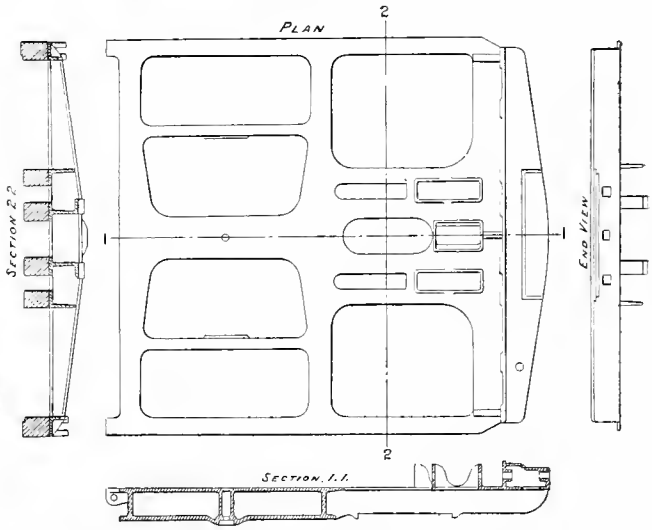


Fig. 1157. Cast Steel Combined Platform and Double Body Bolster for Wood Passenger Cars.
Commonwealth Steel Co.



Figs. 1158-1161. Plan and Sections of Combined Platform and Double Body Bolster for Blind-End Cars.
Commonwealth Steel Co.

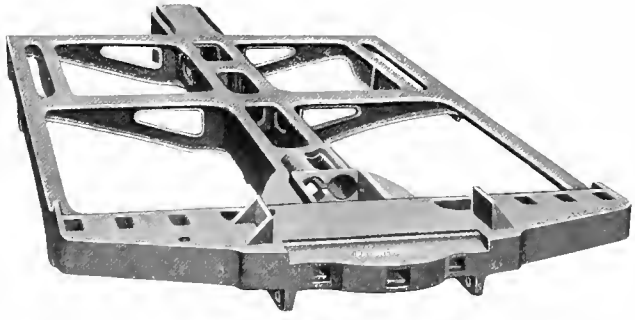
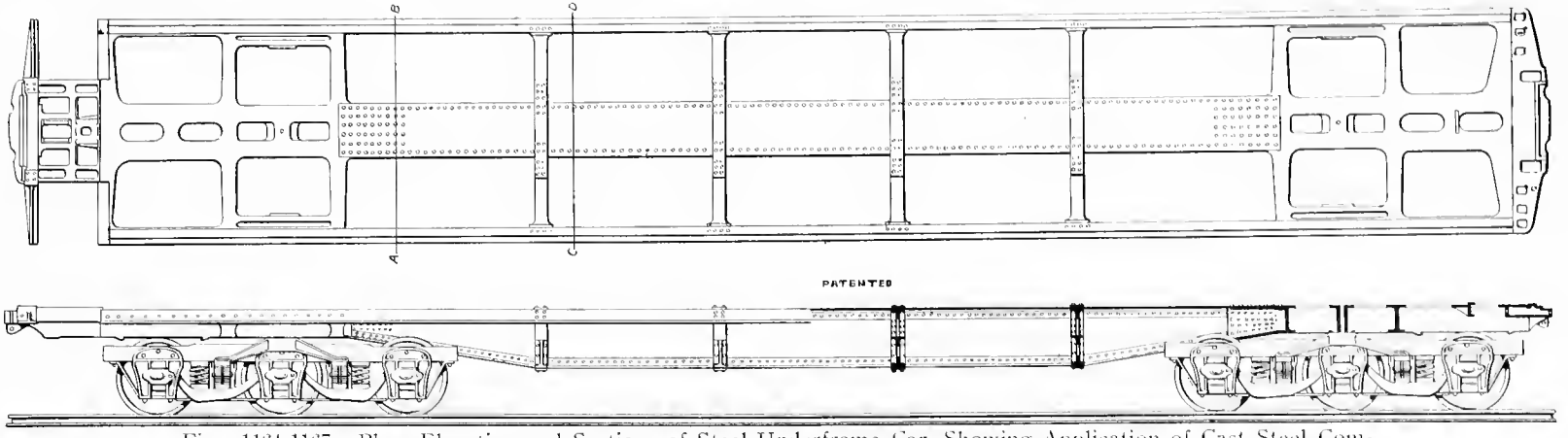


Fig. 1162. Cast Steel Combined Platform and Double Body Bolster for Blind-End Steel Cars.
Commonwealth Steel Co.

Fig. 1163. Cast Steel Combined Platform and Double Body Bolster for Blind-End Wood Cars.
Commonwealth Steel Co.

Section at A B, Showing Double Body Bolster.

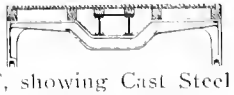
Section at C D, Showing Cast Steel Cross Tie Beam.



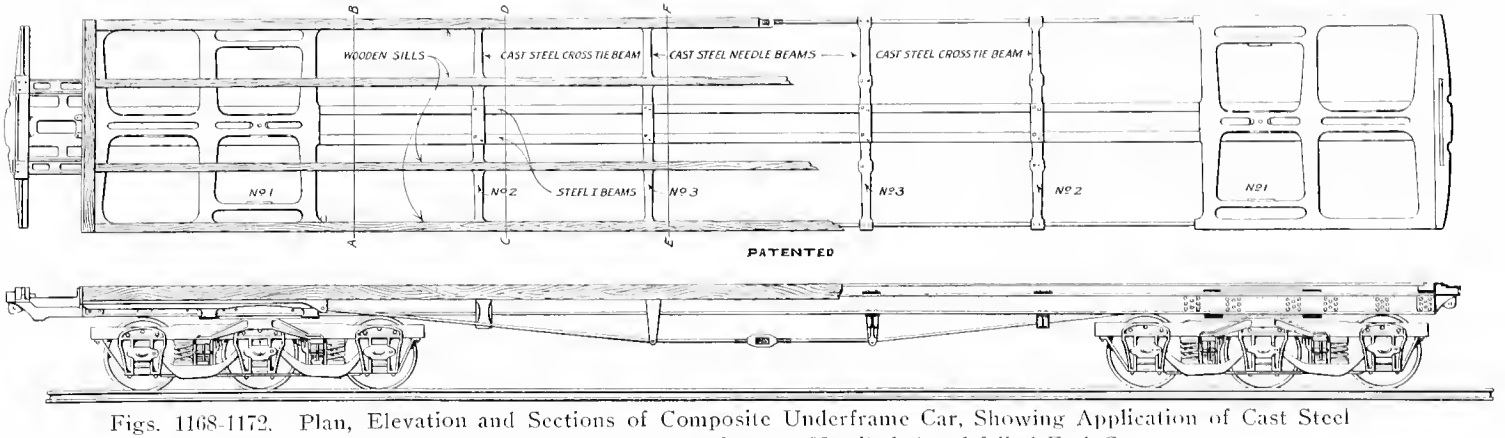
Figs. 1164-1167. Plan, Elevation and Sections of Steel Underframe Car, Showing Application of Cast Steel Combined Body Bolster and Platform to Vestibuled and Blind-End Cars.

Section at A B, showing Double Body Bolster.

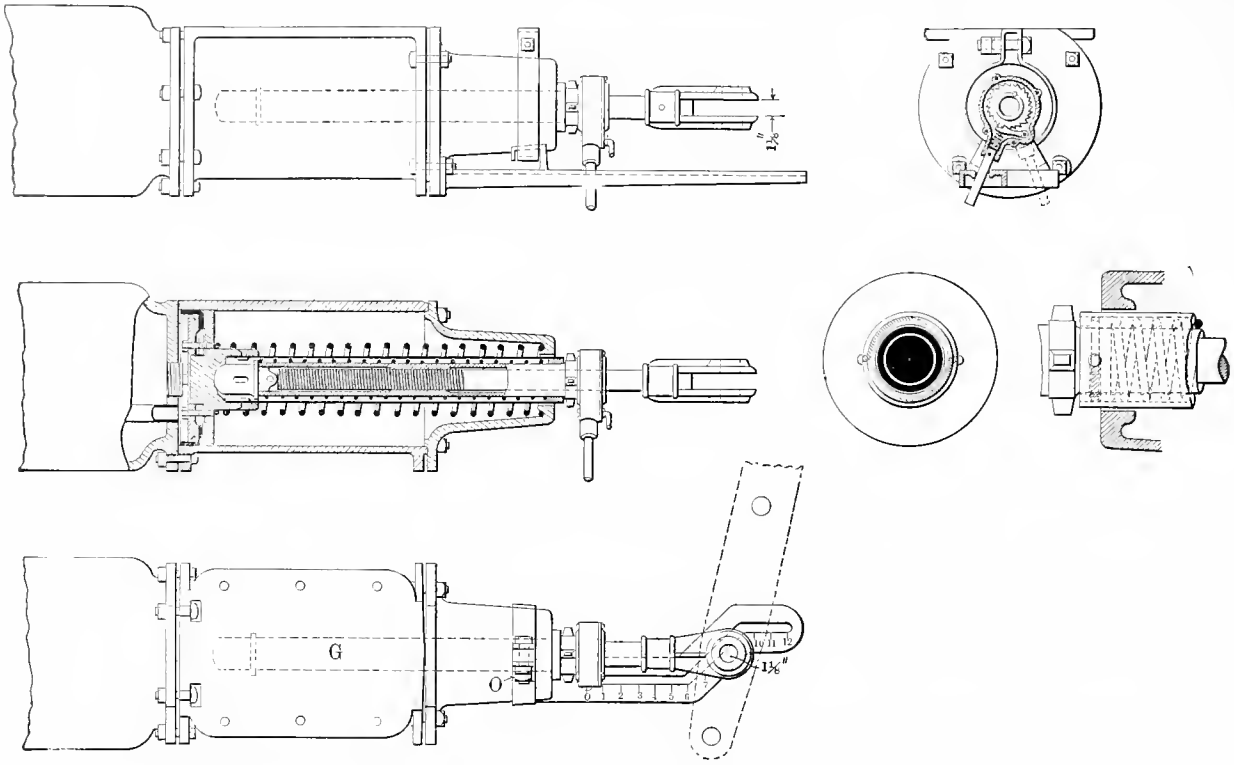
Section at C D, showing Cast Steel Cross Tie Beam.



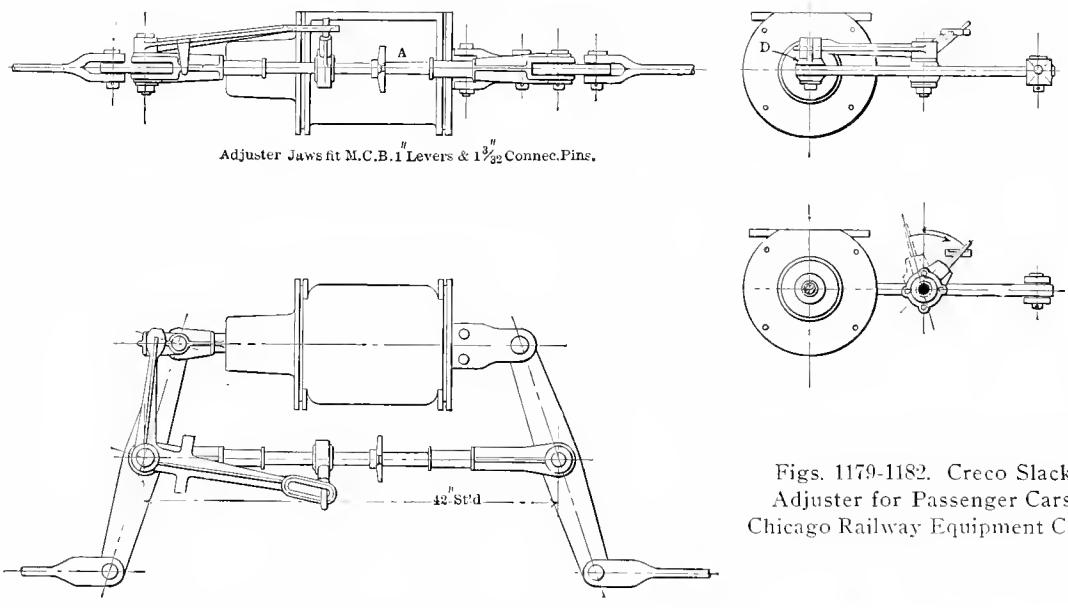
Section at E F, showing Cast Steel Needle Beam.



Figs. 1168-1172. Plan, Elevation and Sections of Composite Underframe Car, Showing Application of Cast Steel Combined Body Bolster and Platform to Vestibuled and Blind-End Cars.
Commonwealth Steel Co.



Figs. 1173-1178. Creco Combined Slack Adjuster and Brake Release for Freight Cars and Tenders.
Chicago Railway Equipment Co.



Figs. 1179-1182. Creco Slack Adjuster for Passenger Cars.
Chicago Railway Equipment Co.

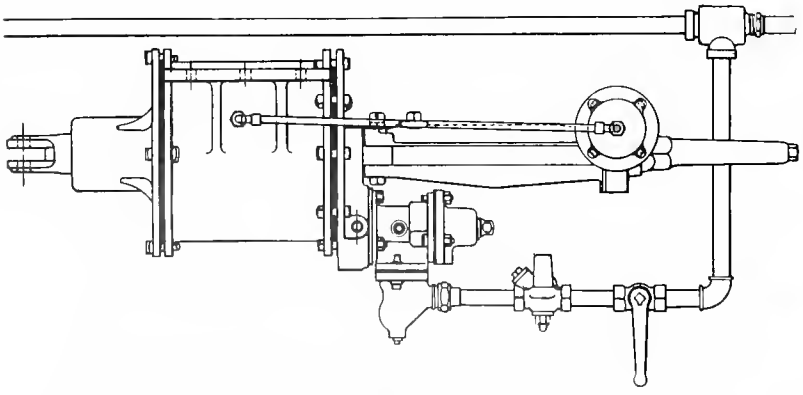
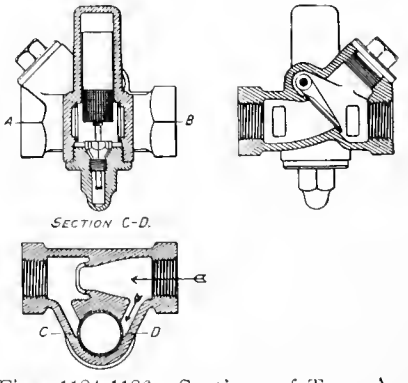
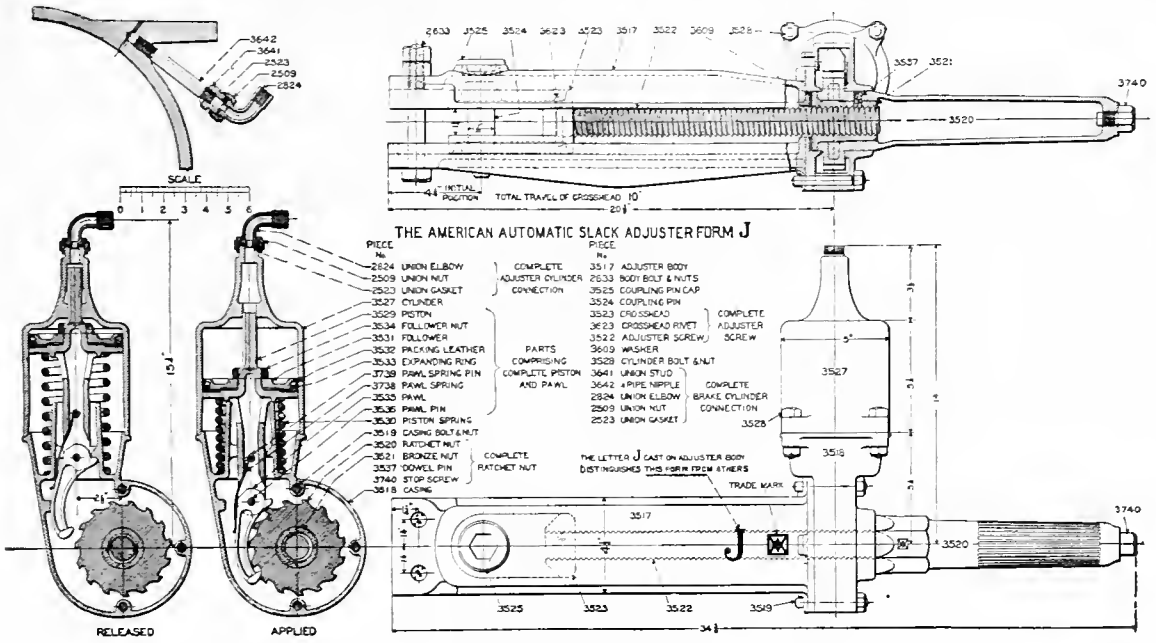


Fig. 1183. Application of Emery Lubricator to Passenger Car Equipment.
Emery Pneumatic Lubricator.



Figs. 1184-1186. Sections of Type A. Lubricator Parts.



Figs. 1187-1191. American Automatic Slack Adjuster. American Brake Co.

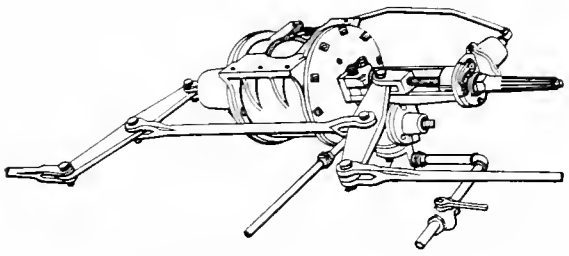
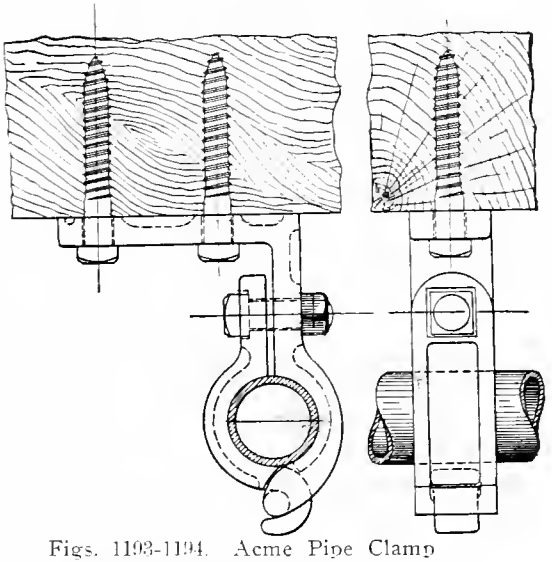
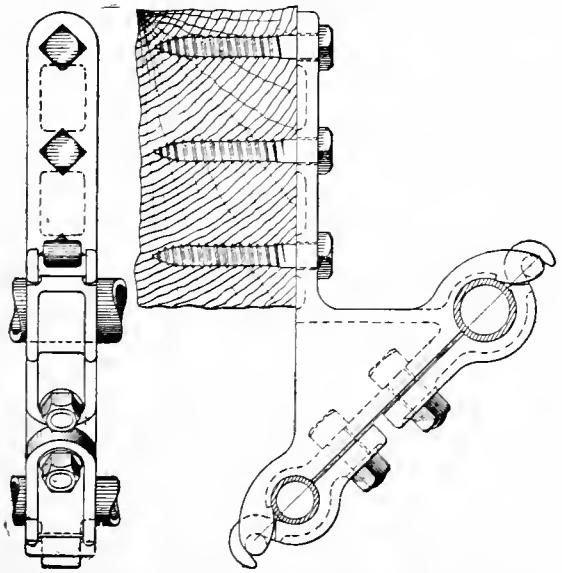


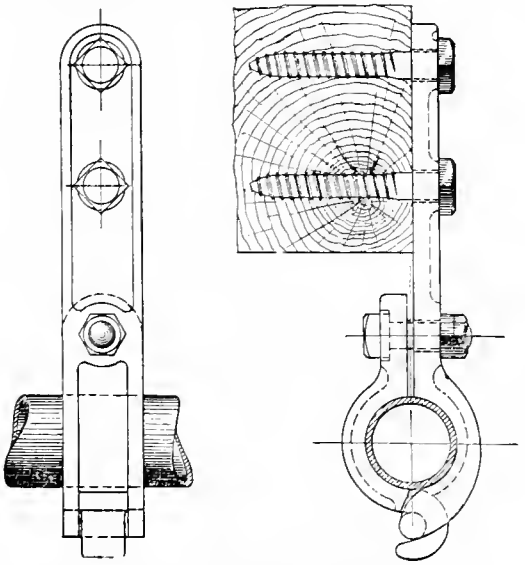
Fig. 1192. Application of American Automatic Slack Adjuster to Passenger Car Brake Cylinder.



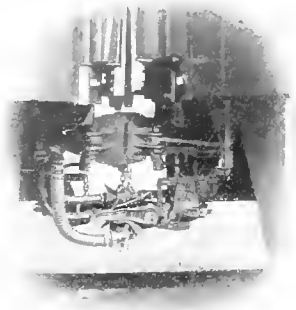
Figs. 1193-1194. Acme Pipe Clamp for Attachment to Bottom of End Sill. Western Railway Equipment Co.

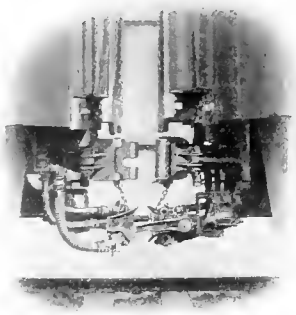


Figs. 1195-1196. Acme Double Pipe Clamp for Attachment to Side of Longitudinal Sills. Western Railway Equipment Co.

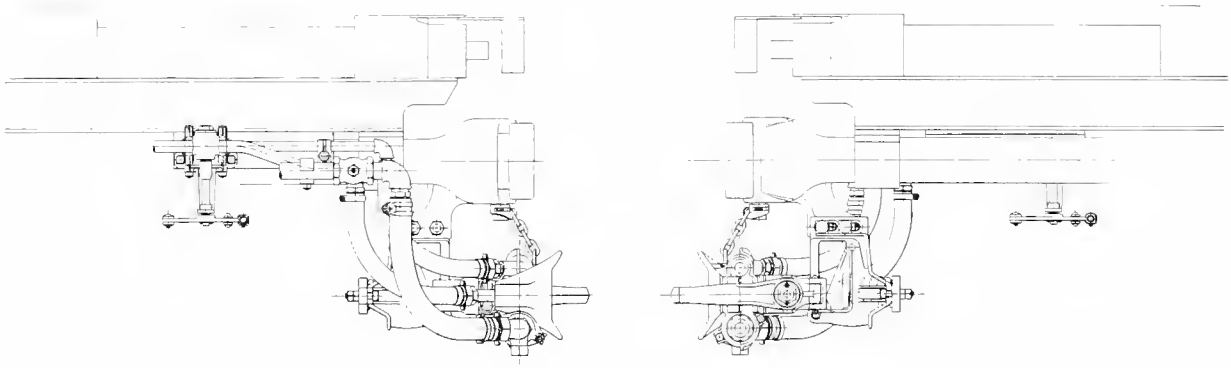


Figs. 1197-1198. Acme Pipe Clamp for Attachment to Side of Longitudinal Sills. Western Railway Equipment Co.

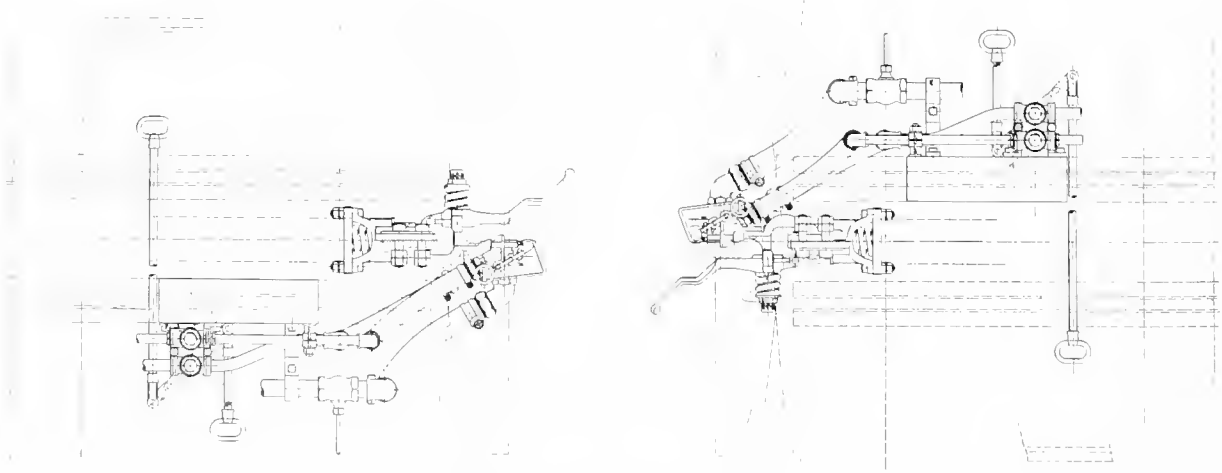




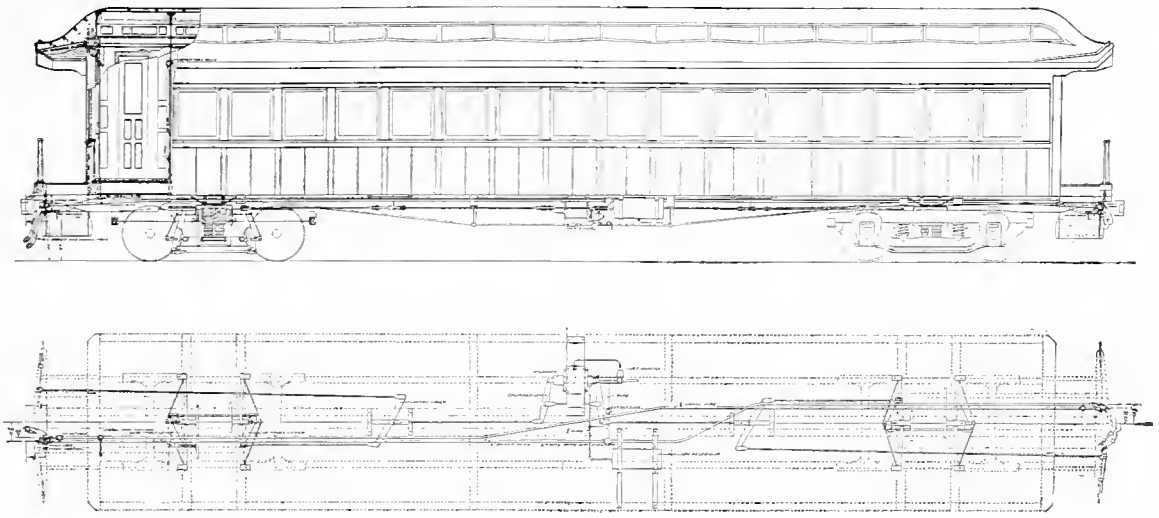
Figs. 1199-1200. Westinghouse Automatic Air and Steam Coupler, Applied to Passenger Car.



Figs. 1201-1202. Elevation of Westinghouse Automatic Air and Steam Coupler, with Cut-Out Device, Applied to Passenger Car.



Figs. 1203-1204. Plan of Westinghouse Automatic Air and Steam Coupler, with Cut-Out Device, Applied to Passenger Car.
Westinghouse Automatic Air & Steam Coupler Co.



Figs. 1205-1206. Application of Westinghouse Air Brake and Train Air Signal Apparatus to Passenger Car.

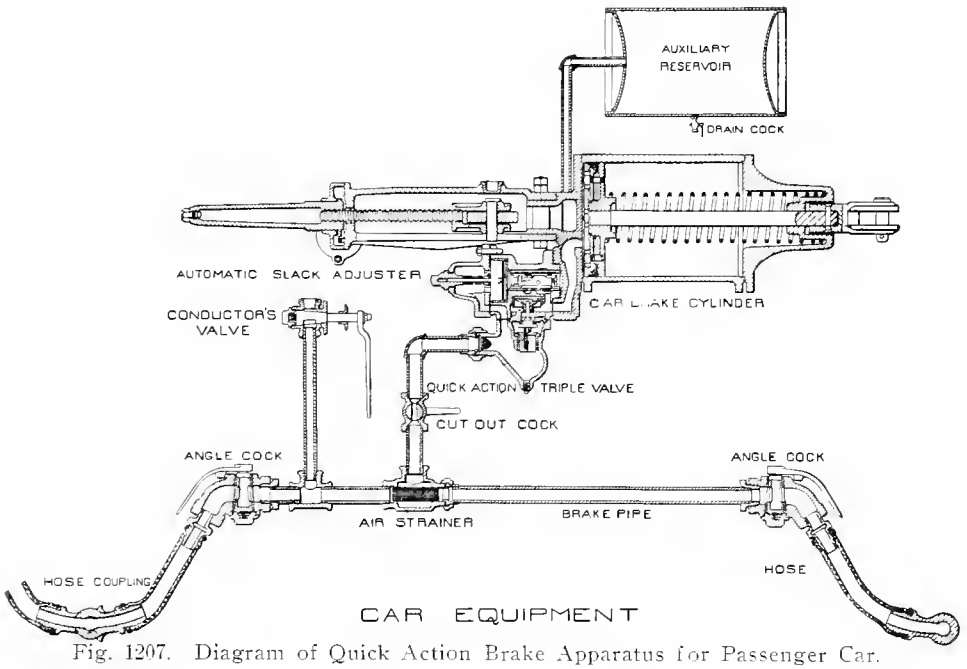
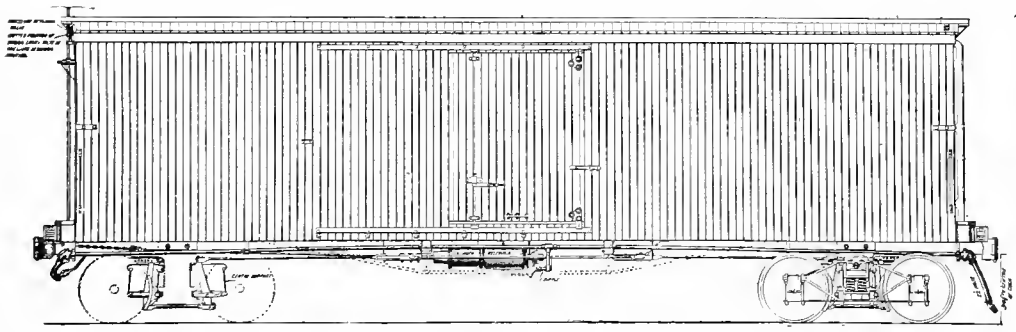
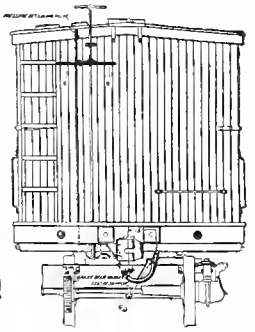


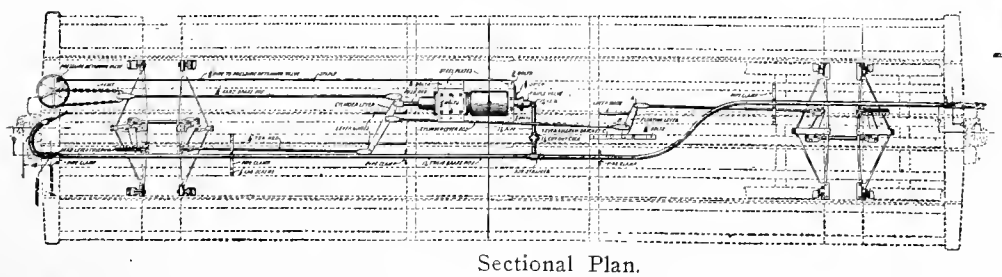
Fig. 1207. Diagram of Quick Action Brake Apparatus for Passenger Car.



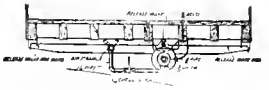
Side Elevation.



End Elevation.



Sectional Plan.



Cross Section of Underframe.

Figs. 1208-1211. Application of Westinghouse Air Brake to Freight Car.

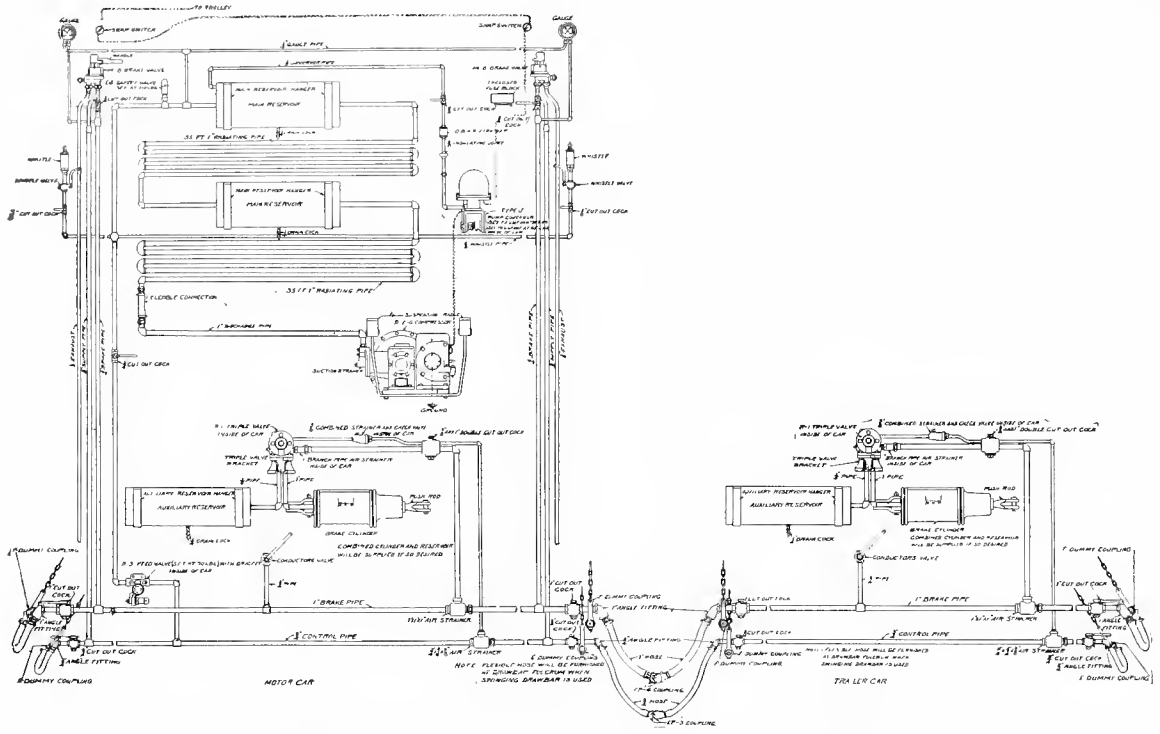


Fig. 1212. Diagram of Westinghouse Air Brake Equipment. Schedule AMR, for Electric Trains.

Quick Action Automatic Brake, with Graduated Release, Quick Service and Quick Recharge Features on Every Car. For Trains of Any Length, Consisting of all Motor Cars or Motor Cars and Trailers.

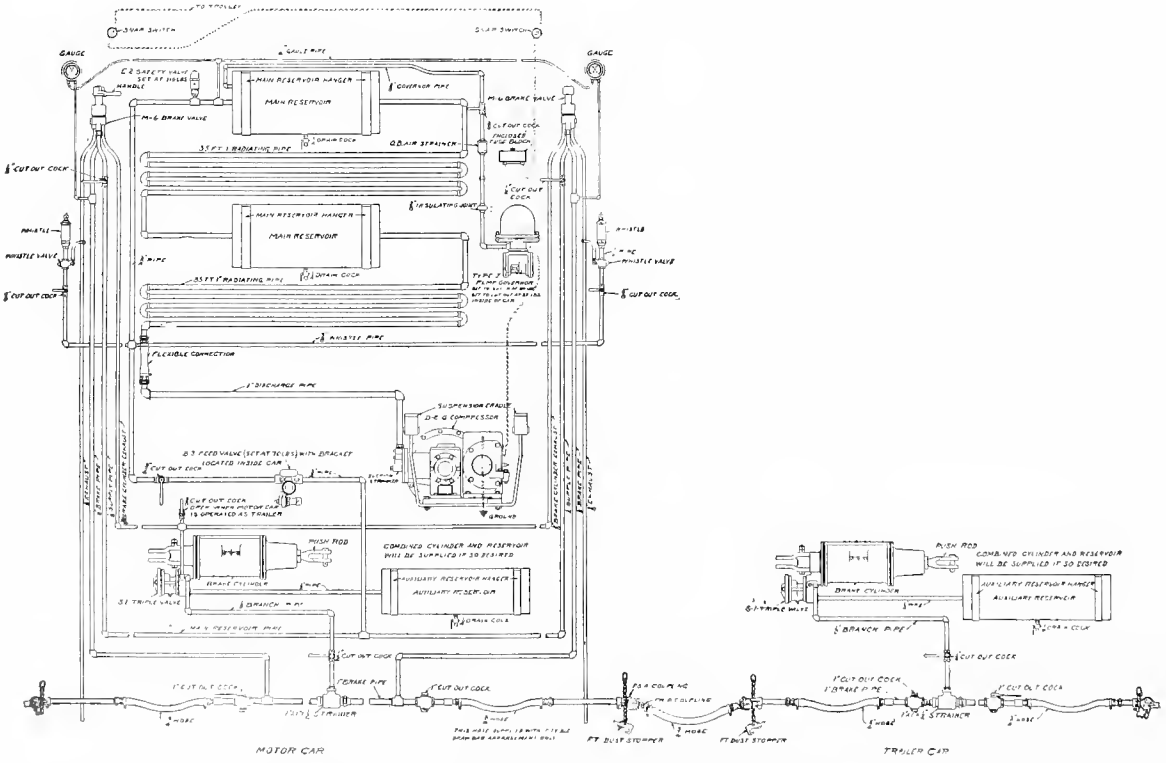


Fig. 1213. Diagram of Westinghouse Air Brake Equipment, Schedule AMS, for Electric Trains.

Plain Automatic Brake with Straight Air Release on First Car. For Two and Three-Car Trains Consisting of Motor Cars and Trailers which Operate Together Most of the Time.

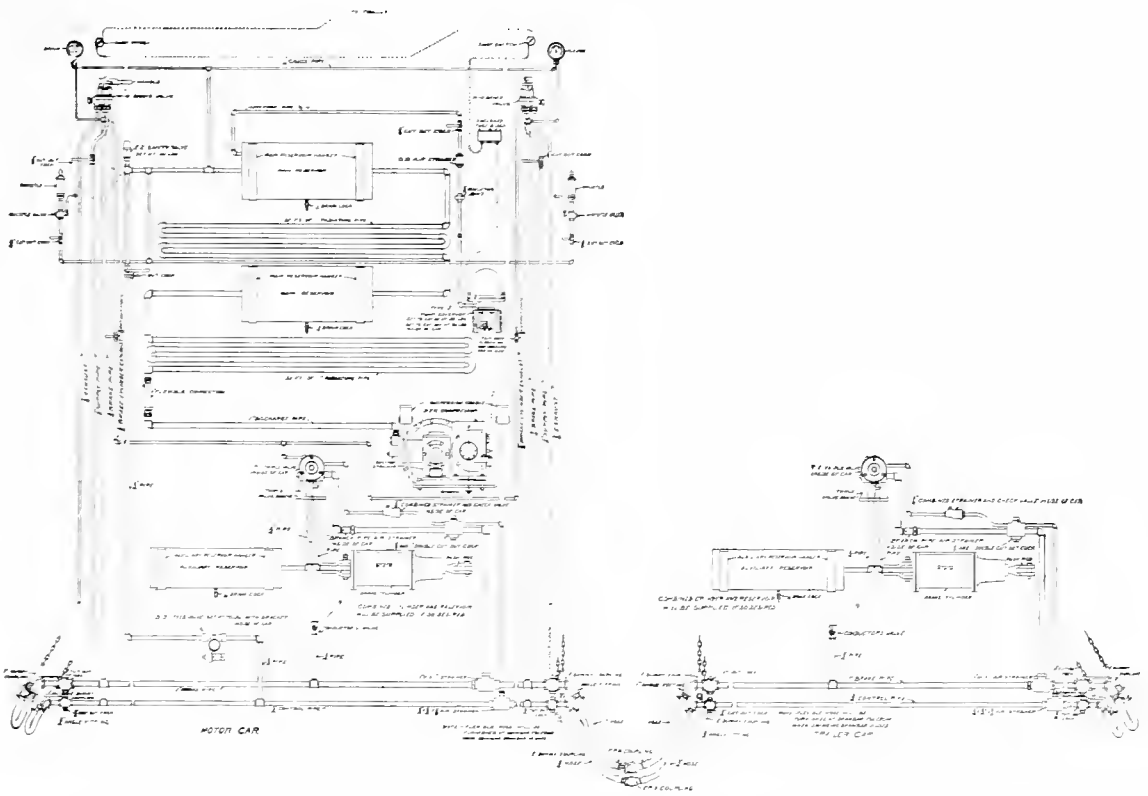


Fig. 1214. Diagram of Westinghouse Air Brake Equipment, Schedule AMT, for Electric Trains.

Plain Automatic Brake with Graduated Release on Each Car or Straight-Air Release on Front Car as Desired. For Trains Consisting of All Motor-Cars, which May at Times be Operated Singly, or of Motor-Cars and Trailers. The Length of the Train Should Not Exceed Five Cars.

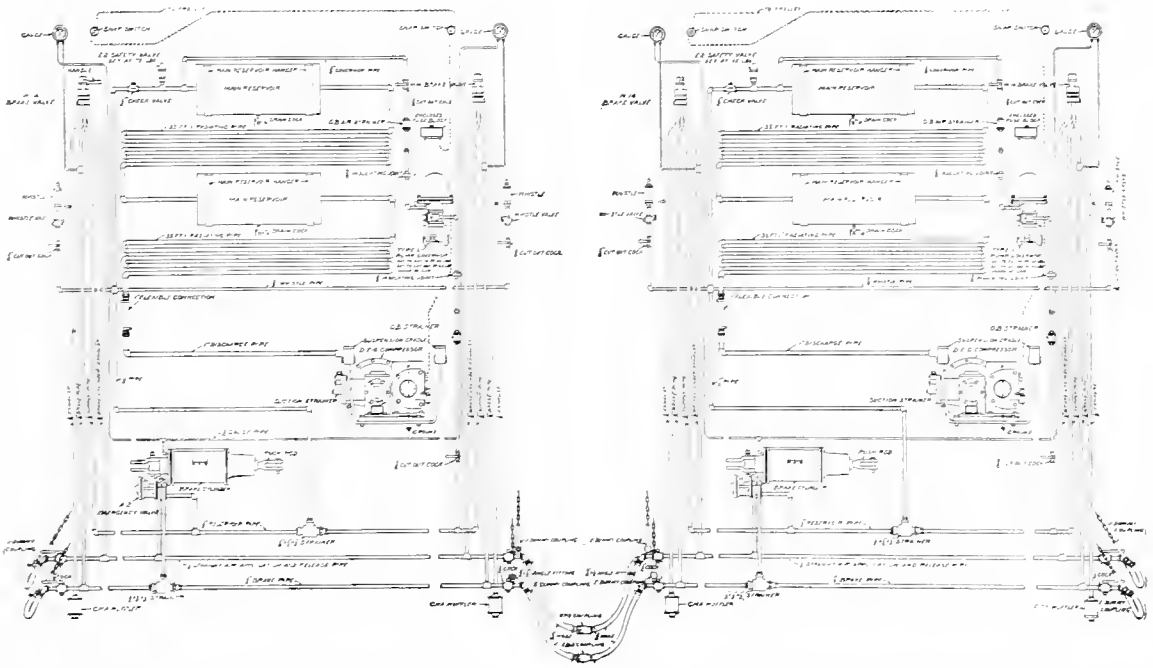


Fig. 1215. Diagram of Westinghouse Air Brake Equipment, Schedule SME, for Electric Trains.

Straight-Air Brake with an Automatic Emergency Feature for Two-Car and, Under Some Conditions, Three-Car Trains, Consisting of Motor-Cars and Trailers, Where the Motor-Car Operates Singly Most of the Time.

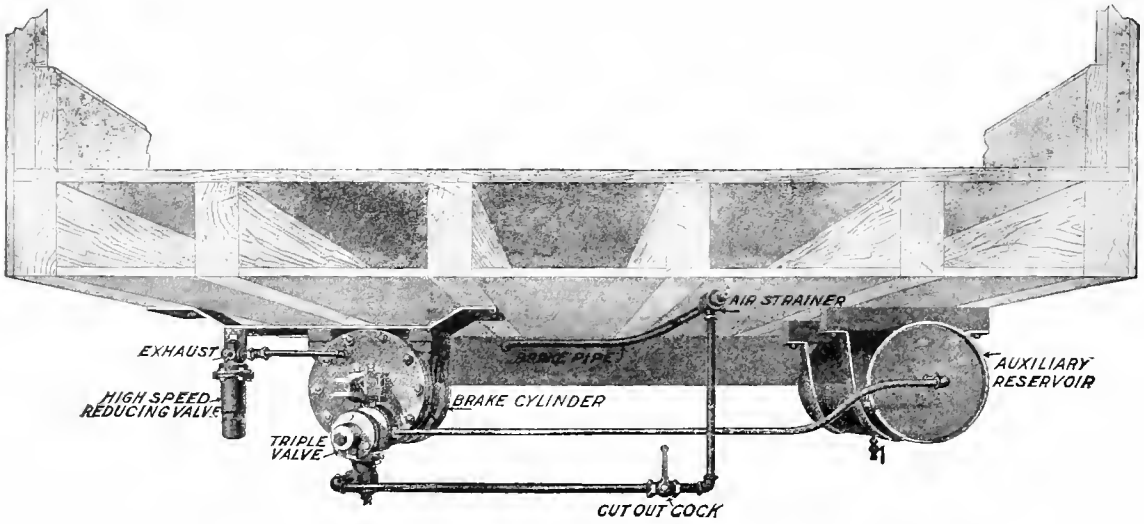
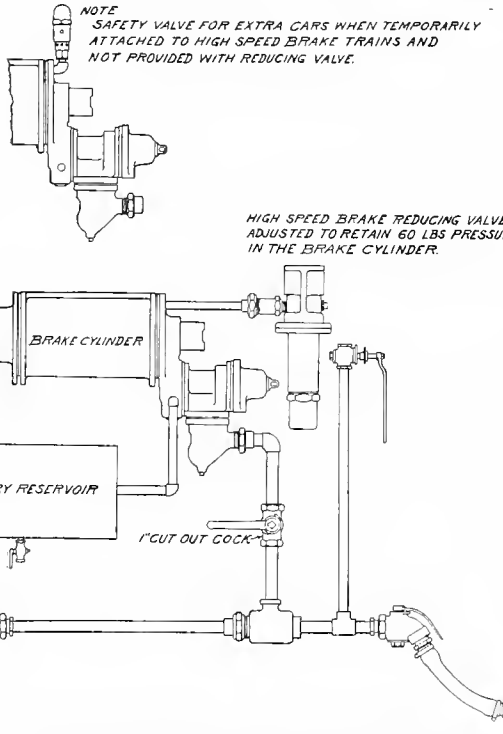


Fig. 1216. Arrangement of Westinghouse High-Speed Brake Under Car.



Figs. 1217-1218. Diagram of Apparatus for High-Speed Brake on Passenger Car.

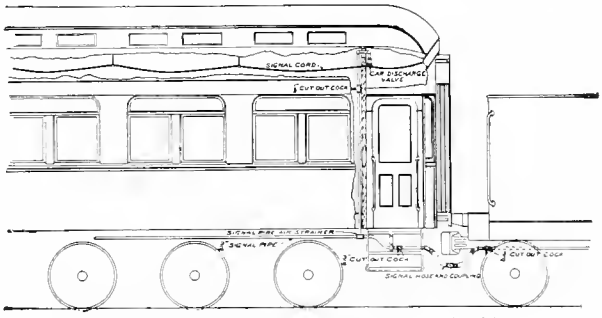


Fig. 1219. Arrangement of Train Air Signal on Passenger Car.

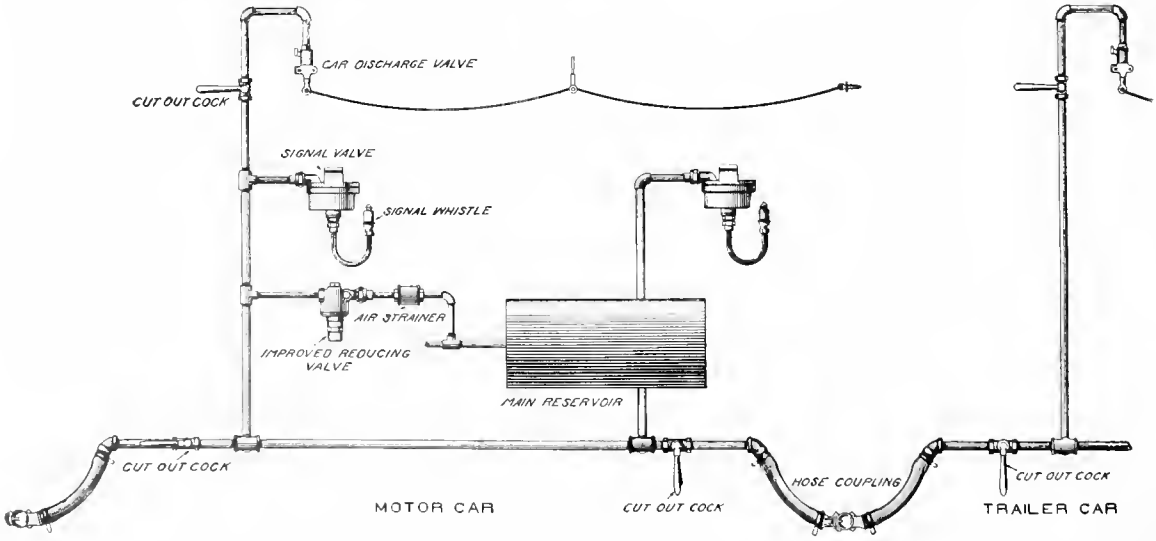
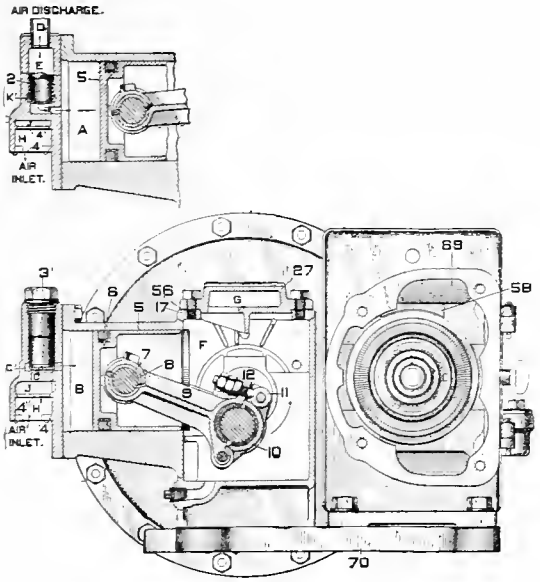


Fig. 1220. Diagram of Train Air Signal for Electric Car Trains.

Numbers Refer to List of Names of Parts Below.



Figs. 1221-1222. Side View.

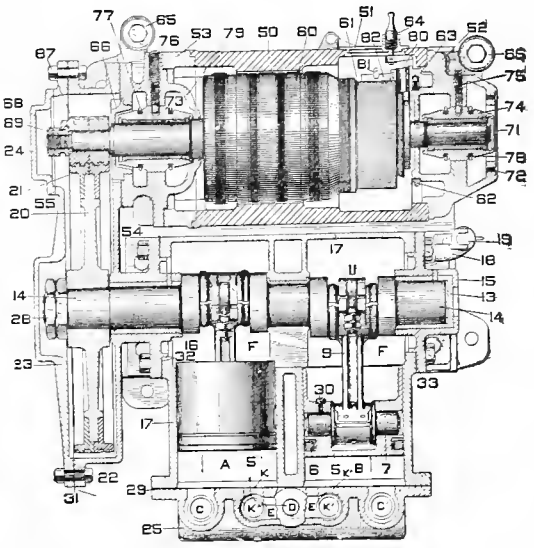


Fig. 1223. Top View.

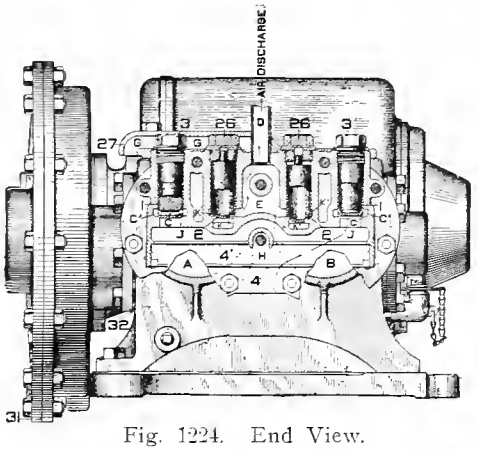


Fig. 1224. End View.

Figs. 1221-1224. Motor-Driven Air Compressor for Electric Cars.

Names of Parts of Figs. 1221-1224.

1 *Suction Valve*
2 *Discharge Valve*
3 *Suction Valve Chamber Cap*
4 *Perforated Plate for Suction Box*
5 *Piston*
6 *Piston Packing Ring*
7 *Wrist Pin with Special Dowel*
8 *Connecting Rod Bush*
9 *Connecting Rod*
10 *Connecting Rod Cap*
11 *Connecting Rod Eye Bolt*
12 *Connecting Rod Liners*
13 *Shaft Bearing Bush*
14 *Crank Shaft*
15 *Crank Case Cover and Shaft Bearing*
16 *Gear Case Shaft Bearing Bush*
17 *Cylinders and Crank Case*
18 *Crank Case Oil Fitting*
19 *Cap Nut for* 18
20 *Large Gear*
22 *Gear Case*
23 *Gear Case Cover*
24 *Gear Case Cover Cap*
25 *Cylinder Cover*
26 *Discharge Valve Chamber Cap*
27 *Crank Case Top Cover*
28 *Cronk Shaft Nut*
29 *Cylinder Cover Gasket*
31 *Gear Case Cover Gasket*
32 *Shaft Bearing Gasket*
33 *Crank Case End Gasket*
50 *Field Yoke with Pole Pieces*
51 *Commutator Door*
52 *Front Bearing Housing*
53 *End Bell*
54 *Motor Gasket*
55 *Gear Case Cover Cap Gasket*
56 *Crank Case Top Gasket*
59 *Field Coil*
60 *Armature*
61 *Commutator*
62 *Rocker Arm*
63 *Set Screw for Rocker Arm*
64 *Commutator Door Latch*
65 *Oil Filling Elbow Cap Nut*
66 *Nut for Rear Bearing Housing*
67 *Pinion for Motor Shaft*
68 *Nut for Removing Pinion*
69 *Motor Shaft Jam Nut*
70 *Bed Plate*
71 *Front Bearing Housing Dust Plate*
72 *Screw for Dust Plate*
73 *Rear Bearing*
74 *Front Bearing*
75 *Front Bearing Housing Headless Screw*
76 *Rear Bearing Housing Headless Screw*
77 *Rear Bearing Oil Ring*
78 *Front Bearing Oil Ring*
79 *Rear Bearing Housing*
80 *Carbon Holder*
81 *Carbon Holder Spring*
82 *Carbon Brush*

Numbers Refer to List of Names of Parts Below.

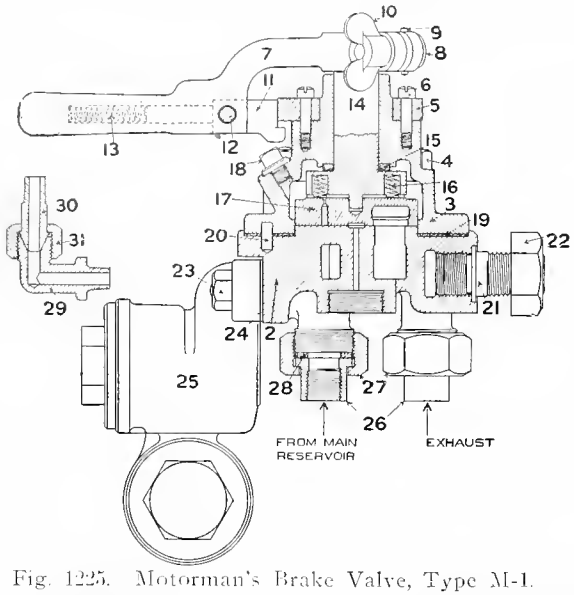


Fig. 1225. Motorman's Brake Valve, Type M-1.

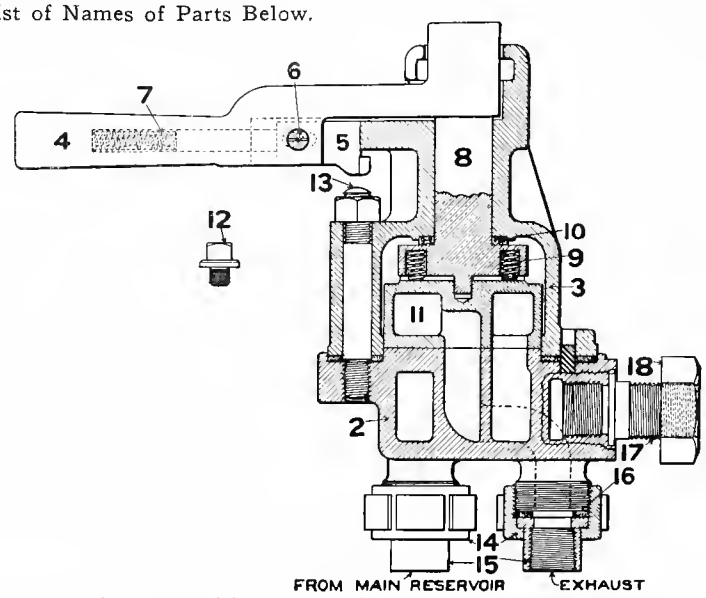
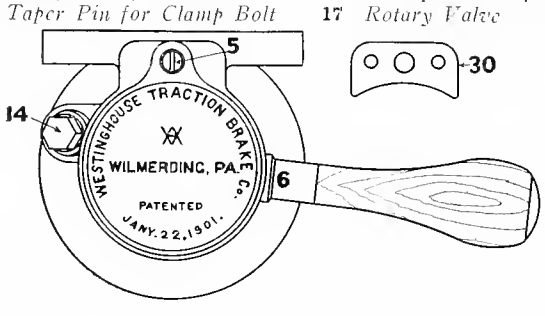
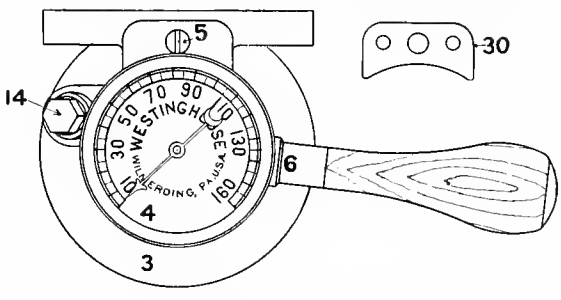


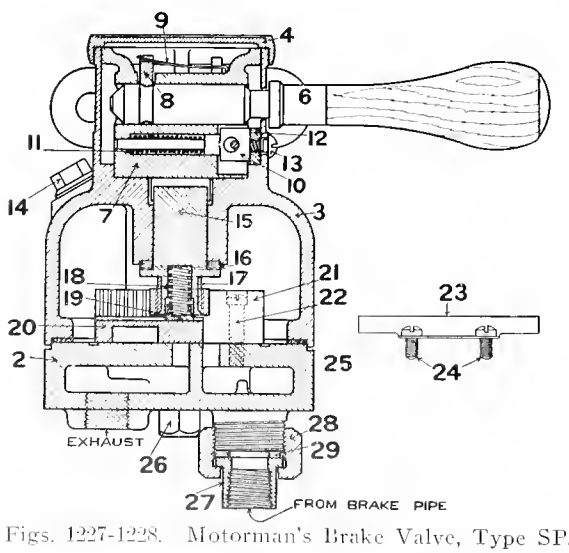
Fig. 1226. Motorman's Brake Valve, Type M-8.

Names of Parts of Figs. 1225-1226.

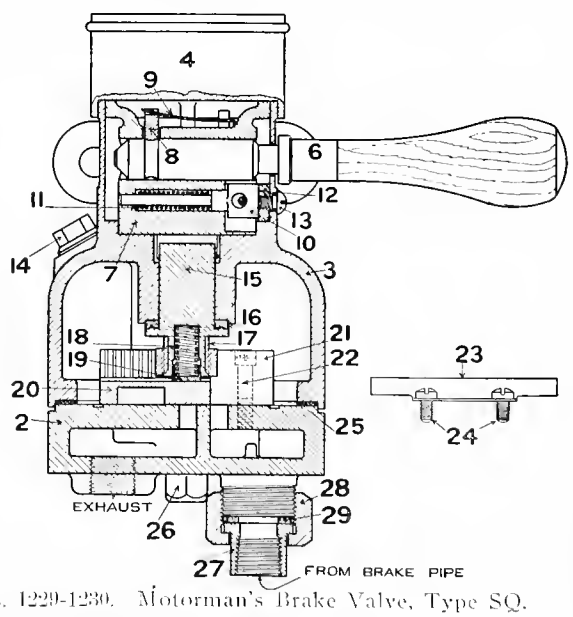
2 *Rotary Valve Seat*
3 *Body*
4 ½-in. x 2⅜-in. *Stud and Nut*
5 *Index Plate*
6 *Index Plate Screw*
7 *Handle*
8 *Clamp Bolt for Handle*
9 *Taper Pin for Clamp Bolt*
10 *Thumb Nut for Clamp Bolt*
11 *Handle Latch*
12 *Handle Latch Screw*
13 *Handle Latch Spring*
14 *Rotary Valve Key*
15 *Rotary Valve Key Washer*
16 *Rotary Valve Spring*
17 *Rotary Valve*
18 *Oil Plug*
19 *Rotary Valve Seat Gasket*
20 *Dowel Pin*
21 *Holding Stud*
22 *Holding Stud Nut*
23 *Feed Valve Stud and Nut*
24 *Feed Valve Case Gasket*
25 *Slide Valve Feed Valve*
26 ½-in. *Union Swivel*
27 ½-in. *Union Nut*
28 ½-in. *Union Gasket*
29 *Gage Pipe Fitting*
30 ¼-in. *Union Swivel*
31 ¼-in. *Union Nut*







Figs. 1227-1228. Motorman's Brake Valve, Type SP.



Figs. 1229-1230. Motorman's Brake Valve, Type SQ.

Names of Parts of Figs. 1227-1230.

2 *Valve Seat*
3 *Body*
4 *Air Gage, Single Pointer*
5 *Gage Screw*
6 *Handle*
7 *Handle Socket*
8 *Handle Latch*
9 *Handle Latch Spring*
10 *Socket Latch*
11 *Socket Latch Spring*
12 *Index Plate*
13 *Index Plate Screw*
14 *Oil Plug*
15 *Slide Valve Spindle*
16 *Slide Valve Washer*
17 *Pinion*
18 *Slide Valve Spring*
19 *Slide Valve Wearing Plate*
20 *Slide Valve*
21 *Rear Guide*
22 *Rear Guide Screw*
23 *Front Guide*
24 *Front Guide Screw*
25 *Valve Seat Gasket*
26 *Cap Screw*
27 *Union Swivel*
28 *Union Nut*
29 *Union Gasket*

Numbers Refer to List of Names of Parts Below.

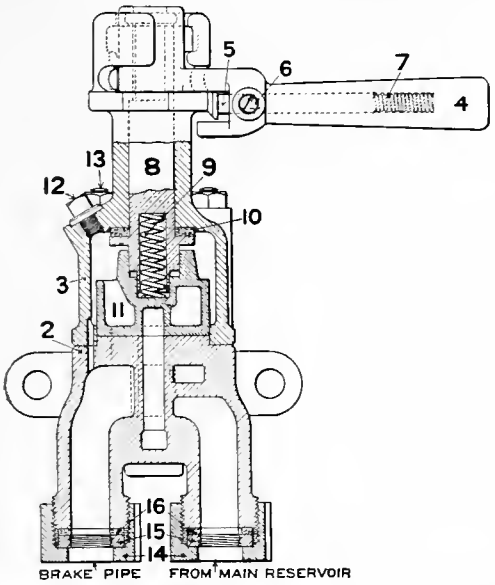


Fig. 1231. Motorman's Brake Valve, Type M-6.

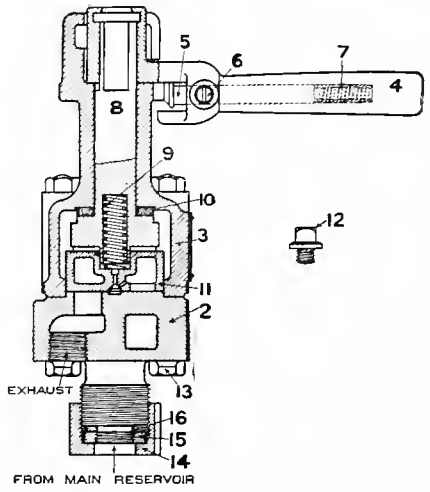


Fig. 1232. Motorman's Brake Valve, Type SX.

Names of Parts of Figs. 1231-1232.

2 *Rotary Valve Seat*
3 *Body*
4 *Handle*
5 *Handle Latch*
6 *Handle Latch Screw*
7 *Handle Latch Spring*
8 *Rotary Valve Key*
9 *Rotary Valve Spring*
10 *Rotary Valve Key Washer*
11 *Rotary Valve*
12 *Oil Plug*
13 *Bolt and Nut*
14 *Union Nut*
15 *Union Swivel*
16 *Union Gasket*

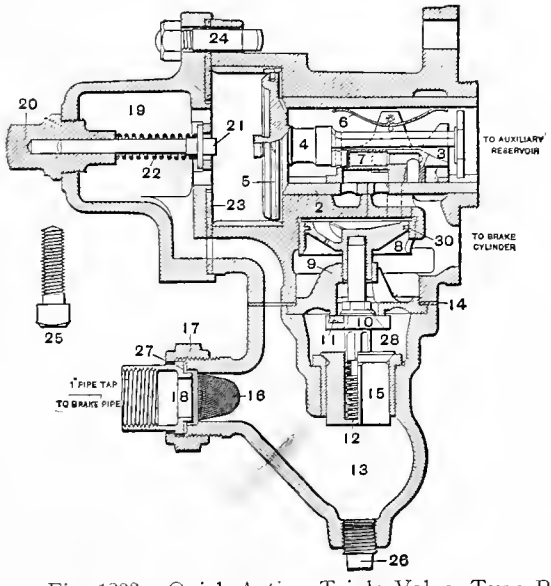


Fig. 1233. Quick-Action Triple Valve, Type P-2.

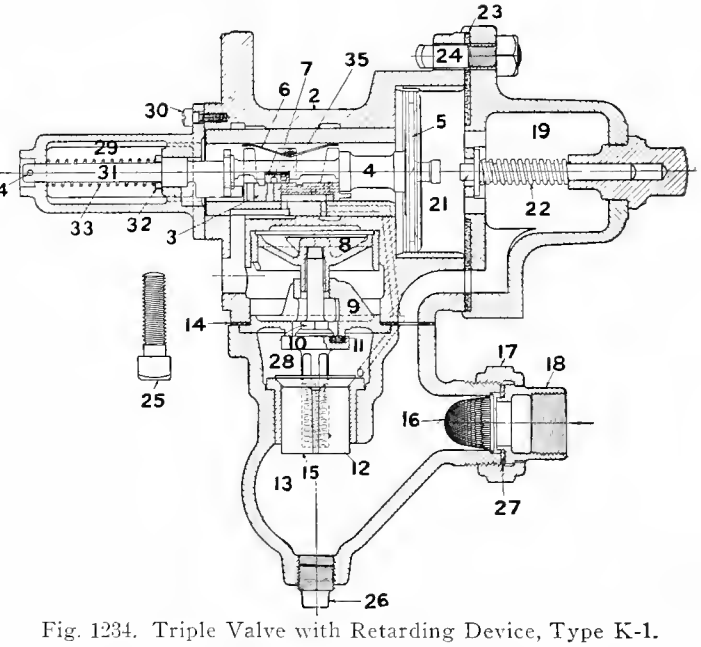


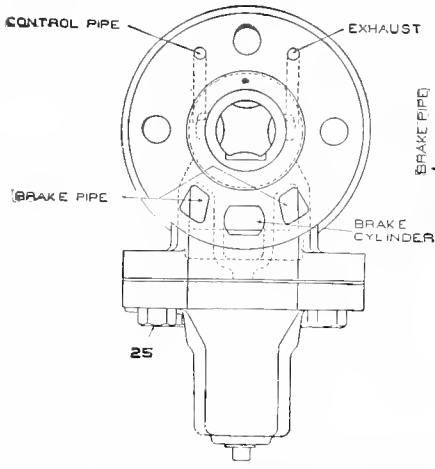
Fig. 1234. Triple Valve with Retarding Device, Type K-1.

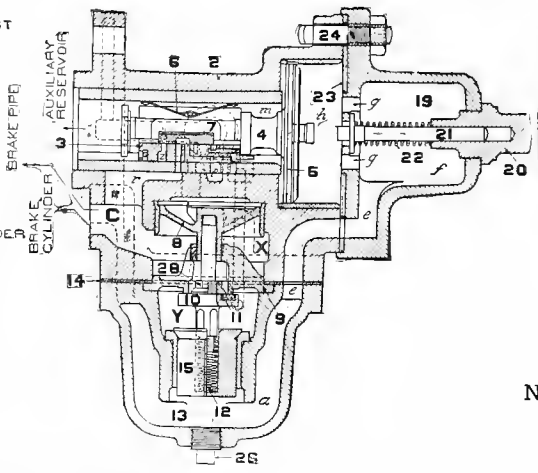
Names of Parts of Fig. 1233.

2 *Triple Valve Body*
3 *Slide Valve*
4 *Piston*
5 *Packing Ring*
6 *Slide Valve Spring*
7 *Graduating Valve*
8 *Emergency Valve Piston*
9 *Emergency Valve Seat*
10 *Emergency Valve*
11 *Rubber Seat*
12 *Check Valve Spring*
13 *Check Valve Case*
14 *Check Valve Case Gasket*
15 *Check Valve*
16 *Strainer*
17 *Union Nut*
18 *Union Swivel*
19 *Cylinder Cap*
20 *Graduating Stem Nut*
21 *Graduating Stem*
22 *Graduating Spring*
23 *Cylinder Cap Gasket*
24 *Bolt and Nut*
25 *Half-inch Cap Screw*
26 *Half-inch Plug*
27 *Union Gasket*
28 *Emergency Valve Nut*
29 *Cotter Pin*
30 *Emergency Valve Piston Packing Ring*

Names of Parts of Fig. 1234.

2 *Triple Valve Body*
3 *Slide Valve*
4 *Piston*
5 *Packing Ring*
6 *Slide Valve Spring*
7 *Graduating Valve*
8 *Emergency Valve Piston*
9 *Emergency Valve Seat*
10 *Emergency Valve*
11 *Rubber Seat*
12 *Check Valve Spring*
13 *Check Valve Case*
14 *Check Valve Case Gasket*
15 *Check Valve*
16 *Strainer*
17 *Union Nut*
18 *Union Swivel*
19 *Cylinder Cap*
20 *Graduating Stem Nut*
21 *Graduating Stem*
22 *Graduating Spring*
23 *Cylinder Cap Gasket*
24 *Bolt and Nut*
25 *Half-inch Cap Screw*
26 *Half-inch Pipe Plug*
27 *Union Gasket*
28 *Emergency Valve Nut*
29 *Retarding Device Body*
30 *Retarding Device Screw*
31 *Retarding Device Stem*
32 *Retarding Device Spring Collar*
33 *Retarding Device Spring*
34 *Retarding Device Stem Pin*





Figs. 1235-1236. Triple Valve, Type R-1.

Names of Parts of Figs. 1235-1236.

2 *Triple Valve Body*
3 *Slide Valve*
4 *Piston*
5 *Packing Ring*
6 *Slide Valve Spring*
7 *Graduating Valve*
8 *Emergency Valve Piston*
9 *Emergency Valve Seat*
10 *Emergency Valve*
11 *Rubber Seat*
12 *Check Valve Spring*
13 *Check Valve Case*
14 *Check Valve Case Gasket*
15 *Check Valve*
16 *Strainer*
17 *Union Nut*
18 *Union Swivel*
19 *Cylinder Cap*
20 *Graduating Stem Nut*
21 *Graduating Stem*
22 *Graduating Spring*
23 *Cylinder Cap Gasket*
24 *Bolt and Nut*
25 *Half-inch Cap Screw*
26 *Half-inch Pipe Plug*
27 *Union Gasket*
28 *Emergency Valve Nut*
30 *Emergency Valve Piston Packing Ring*

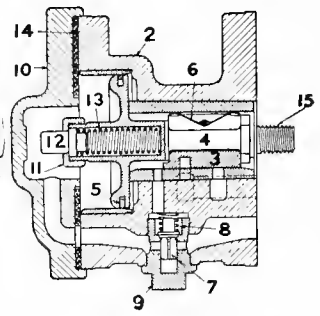


Fig. 1237.
Triple Valve, Type S-1.

Names of Parts of Fig. 1237.

2 *Triple Valve Body*
3 *Slide Valve*
4 *Piston*
5 *Packing Ring*
6 *Slide Valve Spring*
7 *Check Valve*
8 *Check Valve Spring*
9 *Check Valve Seat*
10 *Cylinder Cap*
11 *Graduating Stem Nut*
12 *Graduating Stem*
13 *Graduating Spring*
14 *Cylinder Cap Gasket*
15 *Supporting Stud and Nut*

Names of Parts of Fig. 1238.

2 *Triple Valve Body*
3 *Slide Valve*
4 *Piston*
5 *Packing Ring*
6 *Slide Valve Spring*
7 *Graduating Valve*
8 *Check Valve*
9 *Check Valve Seat*
10 *Check Valve Cap Nut*
11 *Check Valve Washer*
12 *Check Valve Spring*
13 *Graduating Valve Spring*
14 *Cylinder Cap*
15 *Graduating Stem Nut*
16 *Graduating Stem*
17 *Graduating Spring*
18 *Cylinder Cap Gasket*
19 *Bolt and Nut*

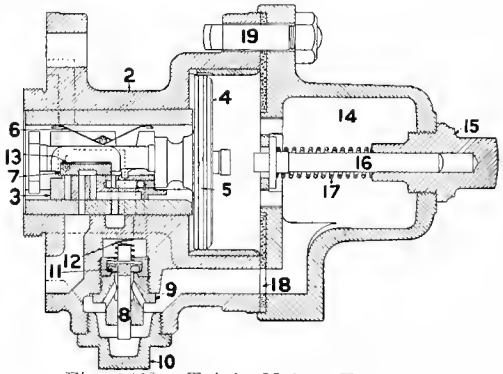
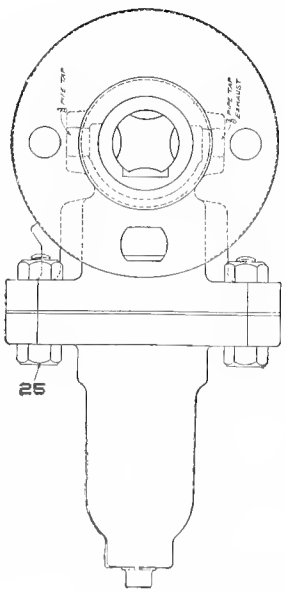
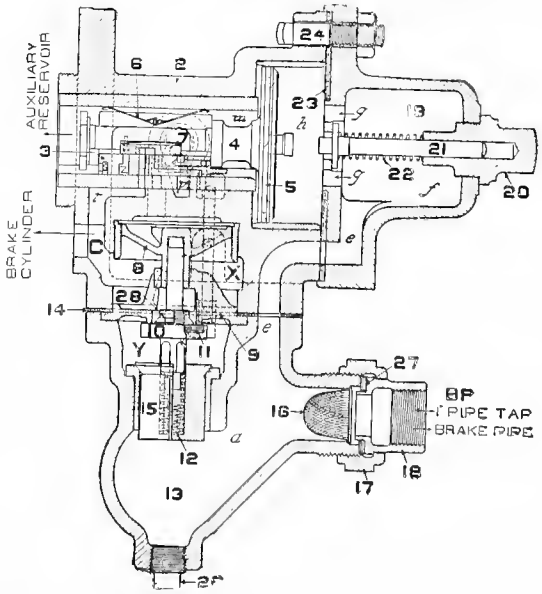
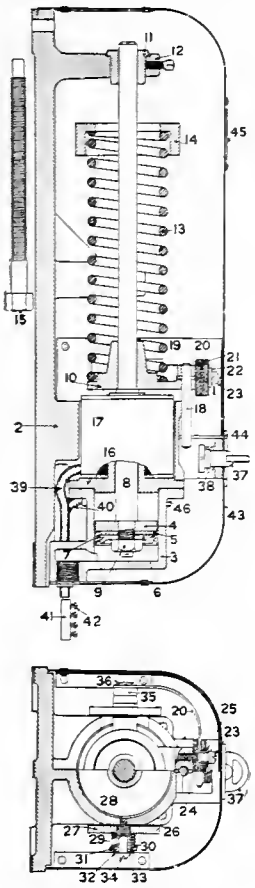


Fig. 1238. Triple Valve, Type T-1.

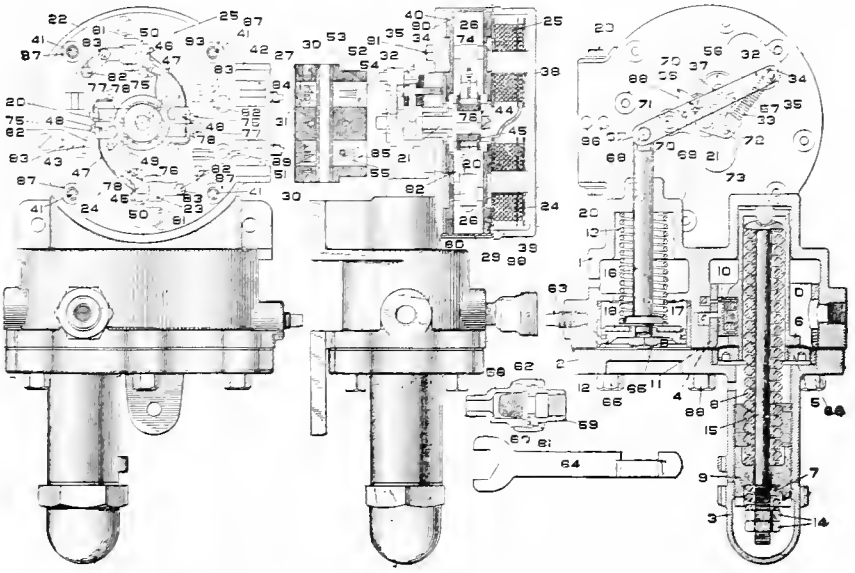




Figs. 1239-1240. Triple Valve, Type Q-1.
Numbers Refer to List of Names of Parts with Fig. 1234.



Figs. 1241-1242.
Electric Pump Governor,
Type G-1-A.



Figs. 1243-1245. Electric Pump Governor, Type E.

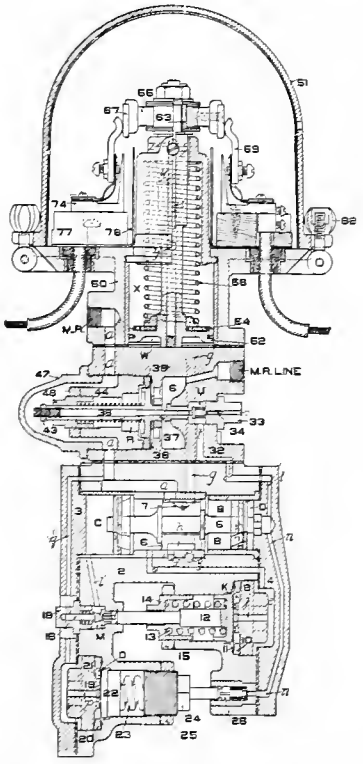


Fig. 1246. Electric Pump Governor, Type L.

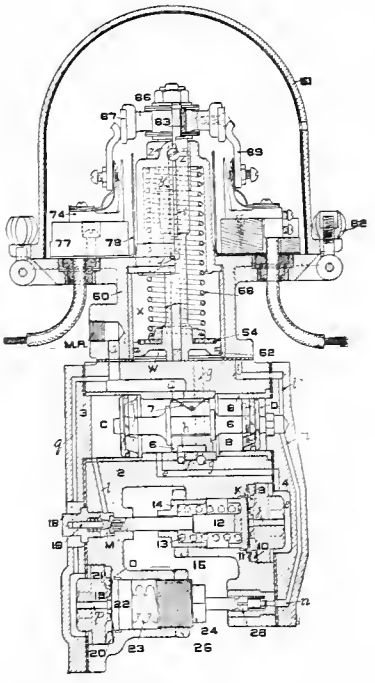


Fig. 1247. Electric Pump Governor, Type J.

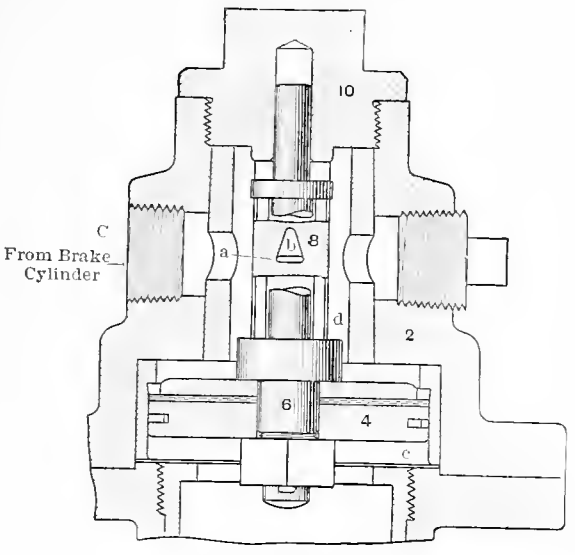
Numbers Refer to List of Names on Next Page.

Names of Parts of Figs. 1241-1242.

1 *Base*
2 *Cylinder*
3 *Piston*
4 *Packing Leather*
5 *Follower*
6 *Piston Rod*
7 *Piston Rod Nut*
8 *Piston Rod Guide*
9 *Set Screw for Piston Rod Guide*
10 *Armature*
11 *Pressure Spring*
12 *Spring Yoke*
13 *Adjusting Bolts*
14 *Adjusting Posts (Part of No. 1)*
15 *Guide Posts (Part of No. 1)*
16 *Magnet Shell (Part of No. 1)*
17 *Magnet Coil (State Voltage Desired)*
18 *Magnet Core*
19 *Armature Guide Pin*
20 *Circuit Closer*
21 *Circuit Closer Insulator*
22 *Circuit Closer Insulator*
23 *Circuit Closer Screws*
24 *Circuit Closer Tips*
25 *Contacts*
26 *Contact Screws*
27 *Terminal Clips*
28 *Arc Shields*
29 *Cylinder Screws*
30 *Cover*
31 *Latch Plate*
32 *Thumb Latch*
33 *Latch Spring*
34 *Shield Insulator*
35 *Bushing for Leads*
36 *Positive Lead*
37 *Motor Lead*
38 *Packing Leather Expander*
39 *Contact Screw Insulator*
40 *Contact Insulator*
41 *Cover Insulation*
44 *Screws for Tips No. 24*

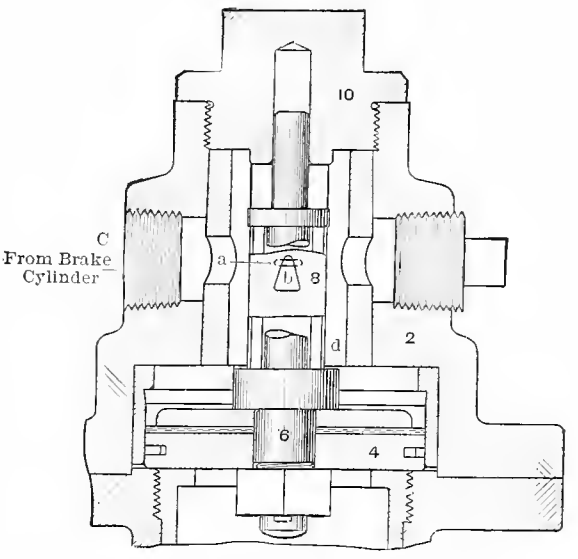
Names of Parts of Figs. 1243-1245.

1 *Body*
2 *Cylinder Head*
3 *Lock Nut for Adjusting Nut*
4 *Diaphragm*
5 *Diaphragm Guide Nut*
6 *Diaphragm Guide*
7 *Retarding Spring*
8 *Regulating Spring*
9 *Adjusting Nut for Regulating Spring*
10 *Slide Valve*
11 *Bush with Slide Valve Seat*
12 *Operating Piston*
13 *Operating Piston Spring*
14 *Adjusting Nut for Retarding Spring*
15 *Regulating Spring Spindle*
16 *Operating Piston Rod*
17 *Packing Ring for Operating Piston*
18 *Leather Disc for Operating Piston*
20 *Switch Arm*
21 *Switch Rocker Shaft*
22 *Switch Terminal*
23 *Switch Terminal*
24, 25 } *Blowout Coils, complete*
26 *Pole Piece for Blowout*
27 *Main Terminal*
23 *Bolt and Nut for Switch Case Band*
29 *Switch Case Band, complete*
30 *Binding Screw for Terminal Block*
32 *Operating Lever, complete*
33 *Quick Break Spring*
34 *Stem for Quick Break Spring*
35 *Guide Pin for Quick Break Spring Stem*
36 *Operating Lever Detent*
37 *Special Pin for Rocker Shaft Arm*
38 *Switch Cover*
39 *Insulating Disc on Switch Cover*
40 *Insulating Disc on Body*
41 *Stud and Nut for Switch Cover*
42, 43 } *Connector for Blowout Coils*
44 *Insulating Bush for Switch Arm*
45 *Insulating Washer for Switch Arm*
46 *Contact Finger*
47 *Contact Finger Spring*
48 *Clamp for Contact Finger Spring*
49 *Contact Finger Shunt*
50 *Contact for Switch Terminal*
51 *Main Terminal*
52 *Terminal Block, complete*
53 *Insulating Tube for Switch Case Band Bolt*



Service
Pressure Exceeding 60 Lbs. in Brake Cylinder

Fig. 1248. High-Speed Reducing Valve, Service Position.



Emergency

Fig. 1249. High-Speed Reducing Valve, Emergency Position.

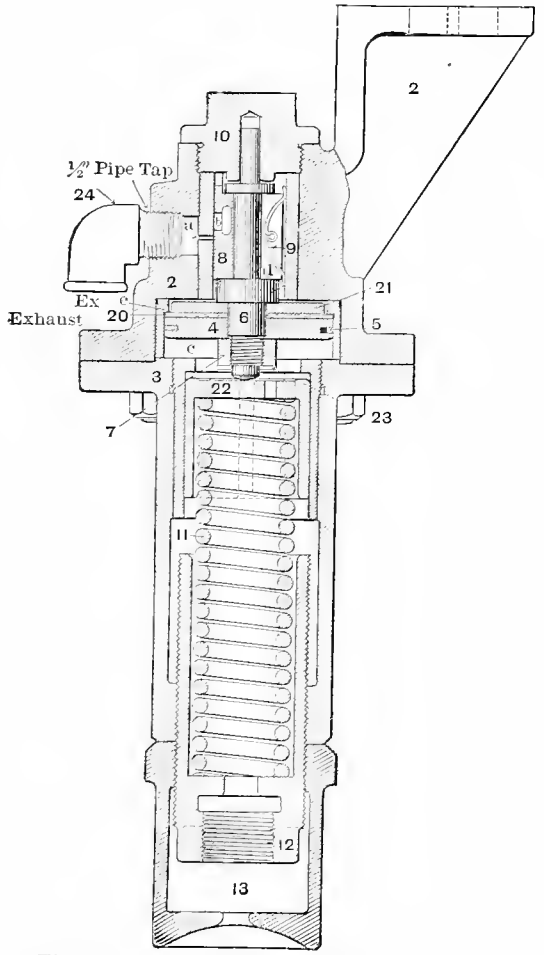
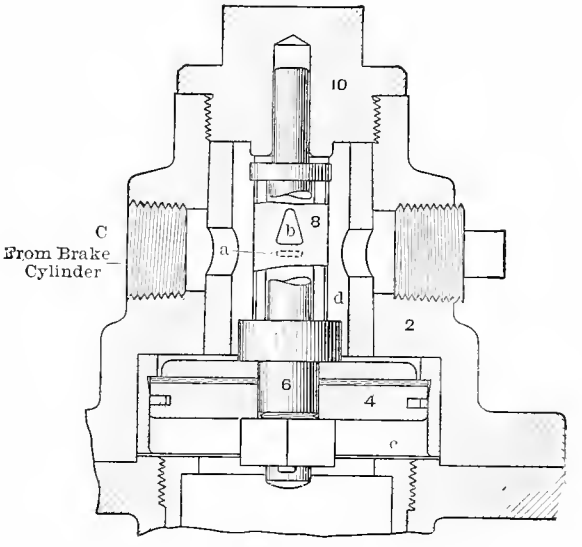


Fig. 1250. High-Speed Reducing Valve, Side View in Section.



Release

Fig. 1251. High-Speed Reducing Valve, Release Position.

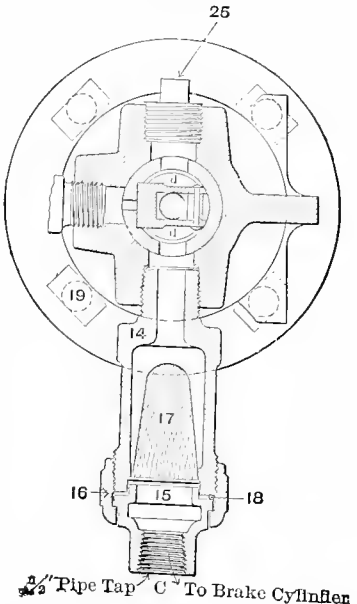


Fig. 1252. High-Speed Reducing Valve, Top View in Section.

Names of Parts, Figs. 1248-1252.

2	*Valve Body*	10	*Cap Nut*	18	*Union Gasket*
3	*Spring Box*	11	*Regulating Spring*	19	*Bolt and Nut*
4	*Valve Piston*	12	*Regulating Nut*	20	*Piston Seat*
5	*Packing Ring*	13	*Check Nut*	21	*Piston Disc*
6	*Piston Stem*	14	*Union Stud*	22	*Spring Abutment*
7	*Piston Stem Nut*	15	*Union Swivel*	23	*Cotter Pin*
8	*Slide Valve*	16	*Union Nut*	24	*½-in. Galvanized Ell*
9	*Slide Valve Spring*	17	*Air Strainer*	25	*¾-in. Pipe Plug*

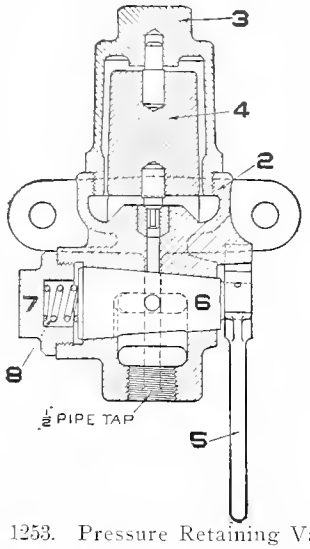


Fig. 1253. Pressure Retaining Valve for 12-in., 14-in. and 16-in. Cylinders.

Names of Parts. Fig. 1253.

2 *Valve Body*
3 *Valve Case*
4 *Valve Weight*
5 *Valve Handle*
6 *Valve Cock Key*
7 *Valve Cock Cap Nut*
8 *Valve Cock Key Spring*

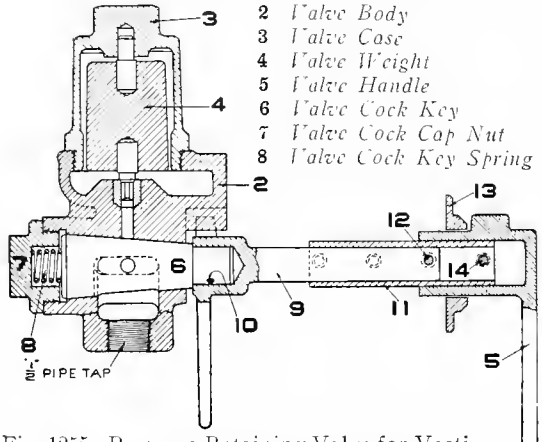


Fig. 1255. Pressure Retaining Valve for Vestibule Cars with 12-in., 14-in. and 16-in. Cylinders.

Names of Parts. Fig. 1255.

2 *Valve Body*
3 *Valve Case*
4 *Valve Weight*
5 *Valve Handle*
6 *Valve Cock Key*
7 *Valve Cock Cap Nut*
8 *Valve Cock Key Spring*
9 *Valve Extension Socket*
10 *Valve Extension Socket Cotter*
11 *Valve Extension Socket Sleeve*
12 *Valve Extension Socket Sleeve Rivet*
13 *Valve Handle Plate*
14 *Valve Handle Pin*

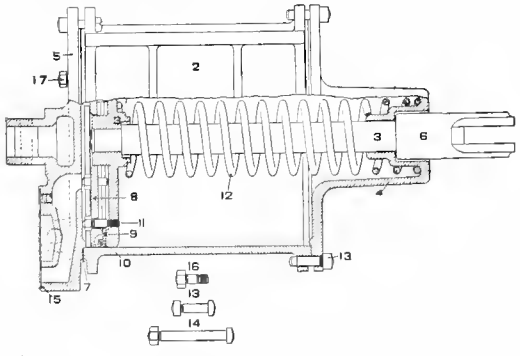


Fig. 1257. Twelve-Inch Passenger Car Brake Cylinder, Old Style.

Names of Parts. Fig. 1257.

2 *Cylinder Body*
3 *Piston and Rod*
4 *Non-Pressure Head*
5 *Pressure Head*
6 *Crosshead*
7 *Cylinder Gasket*
8 *Follower*
9 *Packing Leather*
10 *Packing Expander*
11 *Follower Stud and Nut*
12 *Release Spring*
13 *Cylinder Head Bolt and Nut*
14 *Triple Valve Bolt and Nut*
15 *Triple Valve Gasket*
16 *Triple Valve Stud and Nut*
17 ½-*in. Plug*

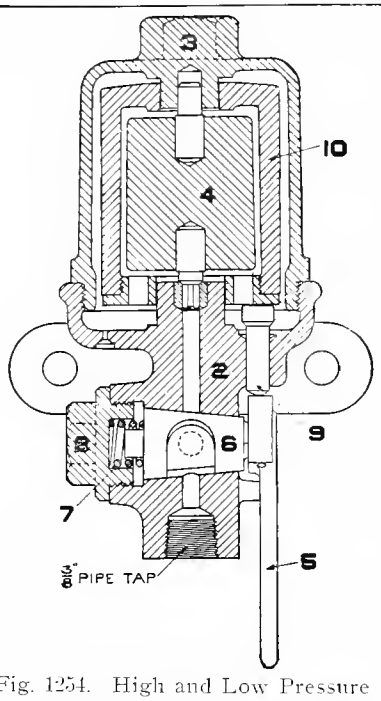


Fig. 1254. High and Low Pressure Retaining Valve.

Names of Parts. Fig. 1254.

2 *Valve Body*
3 *Valve Case*
4 *Inside Valve Weight*
5 *Valve Handle*
6 *Valve Cock Key*
7 *Valve Cock Cap Nut*
8 *Valve Cock Key Spring*
9 *Valve Weight Lifting Rod*
10 *Outside Valve Weight*

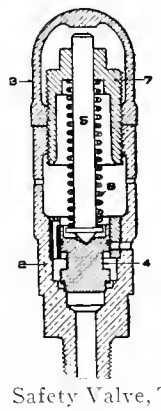


Fig. 1256. Safety Valve, Type E.

Names of Parts. Fig. 1256.

2 *Safety Valve Body*
3 *Cap Nut*
4 *Valve*
5 *Valve Stem*
6 *Safety Valve Spring*
7 *Regulating Nut*

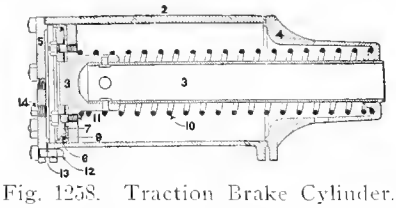


Fig. 1258. Traction Brake Cylinder.

Names of Parts. Fig. 1258.

2 *Cylinder Body*
3 *Piston Head and Rod*
4 *Back Head*
5 *Front Head*
7 *Follower*
8 *Packing Leather*
9 *Packing Expander*
10 *Release Spring*
11 *Follower Stud and Nut*
12 *Cylinder Head, Bolt and Nut*
13 *Gasket*
14 *Oiling Plug*

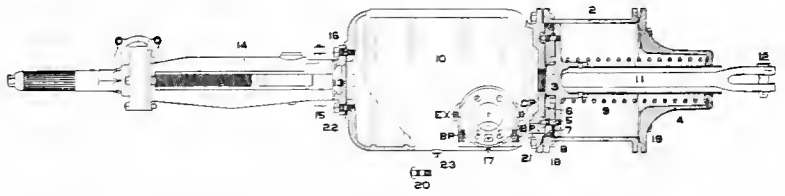
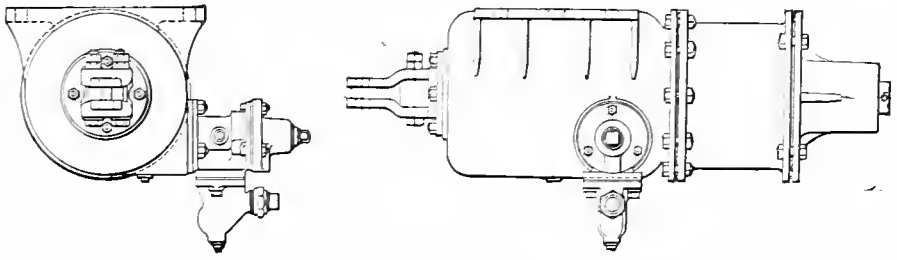


Fig. 1259. 12-in. x 8-in. Brake Cylinder, with Slack Adjuster.



Figs. 1260-1261. 12-in. x 8-in. Brake Cylinder and Auxiliary Reservoir, Combined, with Standard Triple Valve.

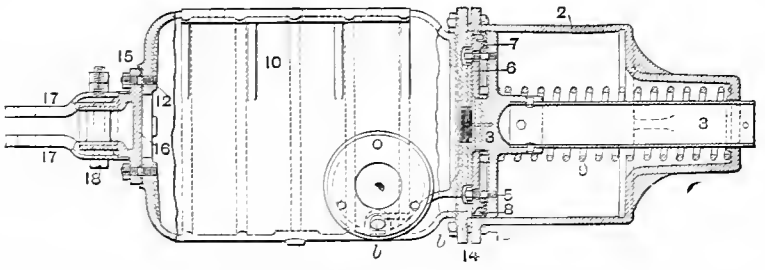


Fig. 1262. Section of 12-in. x 8-in. Brake Cylinder and Auxiliary Reservoir Combined.

Names of Parts. Fig. 1262.

2 *Cylinder Body*
3 *Piston and Rod*
5 *Follower Stud and Nut*
6 *Follower*
7 *Packing Leather*
8 *Packing Expander*
9 *Release Spring*
10 *Reservoir*
12 *Reservoir Stud and Nut*
13 *Reservoir Cylinder Bolt and Nut*
14 *Cylinder Gasket*
15 *End Cover Gasket*
16 *Reservoir End Cover*
17 *Detachable Bracket*
18 *Detachable Bracket Bolt and Nut*

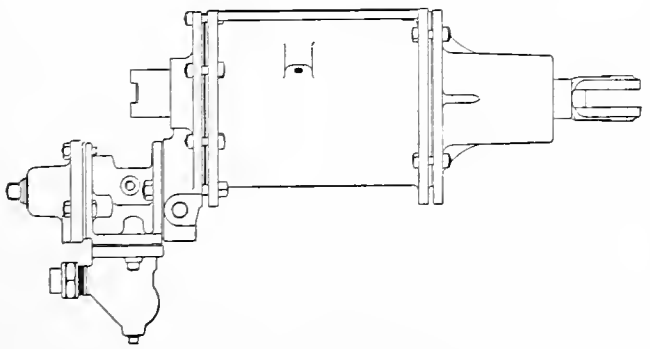


Fig. 1263. 10-in. Passenger Brake Cylinder.

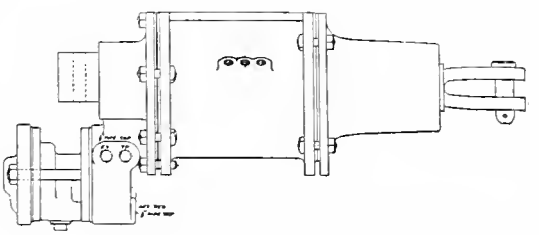


Fig. 1264. 8-in. x 8-in. Car Brake Cylinder, with Type S-1 Triple Valve.

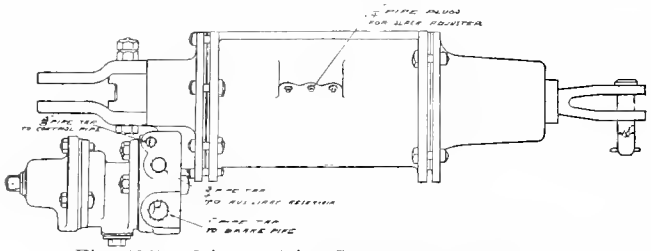


Fig. 1265. 8-in. x 12-in. Car Brake Cylinder, with Type T-1 Triple Valve.

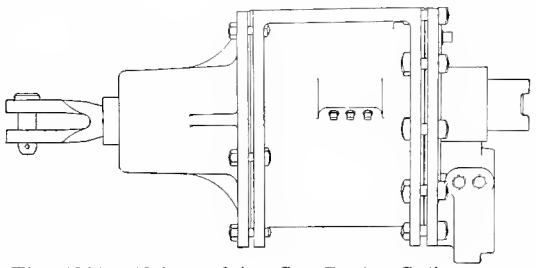
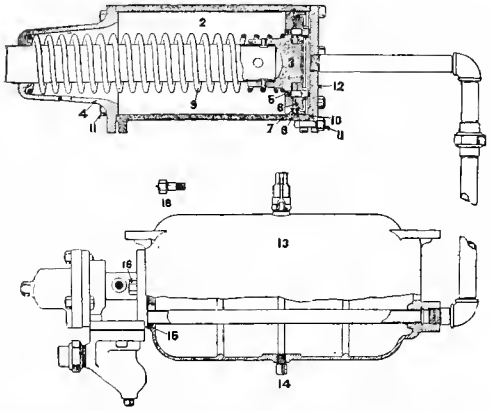
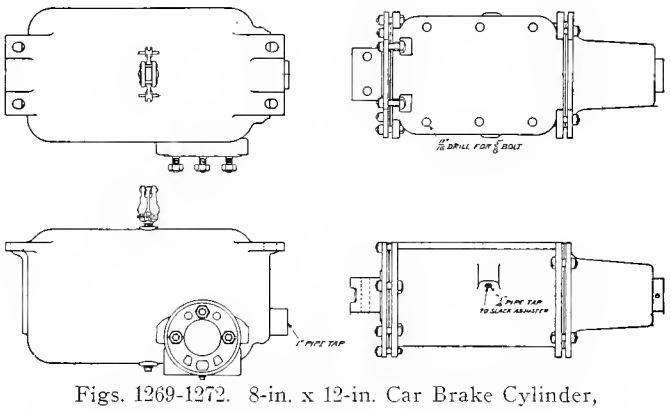


Fig. 1266. 12-in. x 8-in. Car Brake Cylinder.



Figs. 1267-1268. Standard Special Freight Brake Cylinder, with Detached Auxiliary Reservoir and Triple Valve.



Figs. 1269-1272. 8-in. x 12-in. Car Brake Cylinder, with Detached Auxiliary Reservoir.

Names of Parts of Freight Brake Cylinder.

Figs. 1267-1268.

2	*Cylinder Body*	9	*Release Spring*
3	*Piston Head and Rod, Follower Studs and Nut*	10	*Gasket*
		11	*Cylinder Head Bolt and Nut*
4	*Back Head*	12	*Front Head*
5	*Follower Stud and Nut*	13	*Special Auxiliary Reservoir*
6	*Follower*	14	*Drain Plug*
7	*Piston Packing Leather*	15	*Triple Valve Gasket*
8	*Packing Expander*	16	*Reservoir Stud and Nut*

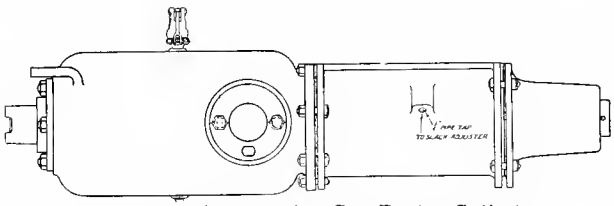


Fig. 1273. 8-in. x 12-in. Car Brake Cylinder and Auxiliary Reservoir Combined.

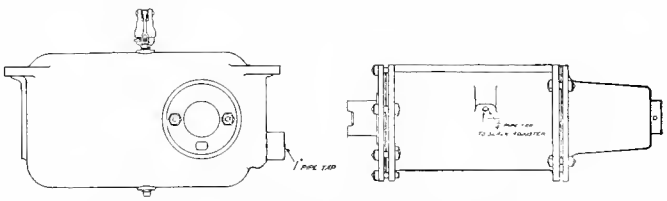


Fig. 1274. 8-in. x 12-in. Car Brake Cylinder, with Auxiliary Reservoir Detached.

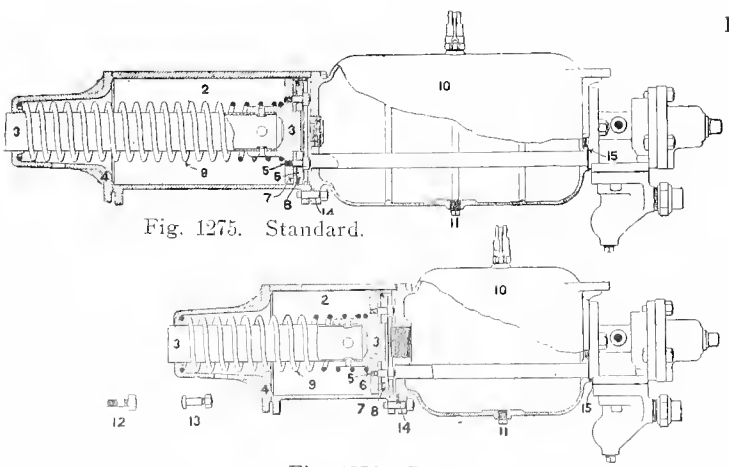


Fig. 1275. Standard.

Fig. 1276. Special Freight Brake Cylinders, Reservoirs and Triple Valves.

Names of Parts of Freight Brake Cylinders.

Figs. 1275-1276.

2	*Cylinder Body*
3	*Piston Head and Rod*
4	*Back Cylinder Head*
5	*Follower Stud and Nut*
6	*Follower*
7	*Piston Packing Leather*
8	*Packing Expander*
9	*Release Spring*
10	*Reservoir*
11	*Drain Plug*
12	*Reservoir Stud and Nut*
13	*Cylinder Head Bolt and Nut*
14	*Cylinder Gasket*
15	*Triple Valve Gasket*

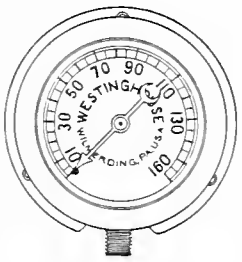


Fig. 1277.
3½-in. Air Gage,
with Single Pointer.

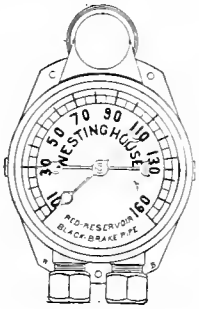


Fig. 1278.
3½-in. Duplex Air Gage,
Illuminated.

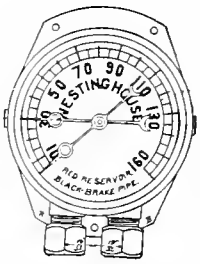


Fig. 1279.
3½-in. Duplex Air Gage,
Ordinary.

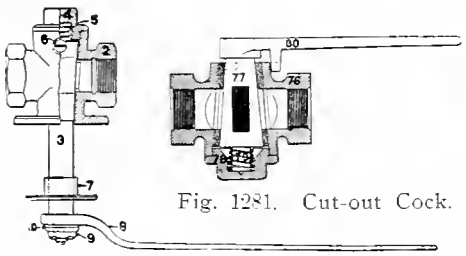


Fig. 1280. Conductor's Valve.

Fig. 1281. Cut-out Cock.

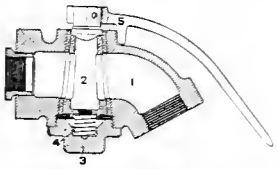


Fig. 1282. Angle Cock.

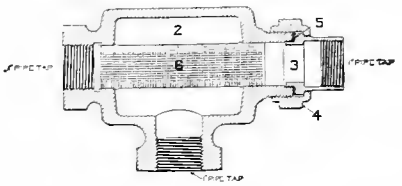


Fig. 1283.
1-in. Brake Pipe Air Strainer.

Names of Parts.
Fig. 1280.

2 *Valve Body*
3 *Valve Key*
4 *Valve Cap*
5 *Key Spring*
6 *Key Stop*
7 *Key Escutcheon*
8 *Valve Handle*
9 *Key Nut*
10 *Key Washer*

Names of Parts.
Fig. 1281.

76 *Cock Body*
77 *Cock Key*
78 *Cock Cap*
79 *Key Spring*
80 *Handle*

Names of Parts.
Fig. 1282.

1 *Angle Cock Body*
2 *Angle Cock Key*
3 *Angle Cock Cap*
4 *Angle Cock Key Spring*
5 *Angle Cock Handle*

Names of Parts
Fig. 1283.

2 *Strainer Body*
3 *1-in. Union Swivel*
4 *Union Nut*
5 *Union Gasket*
6 *Strainer*

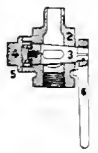


Fig. 1284.
½-in. Reservoir
Drain Cock.

Names of Parts.
Fig. 1284.

2 *Cock Body*
3 *Cock Key*
4 *Cock Cap Nut*
5 *Cock Key Spring*
6 *Cock Handle*

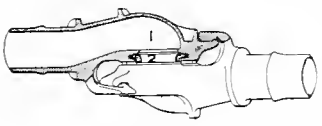


Fig. 1285.
Hose Coupling, Freight.

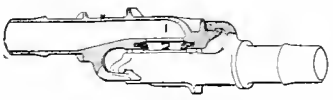


Fig. 1286.
Hose Coupling, Passenger.

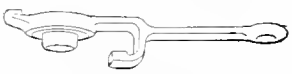


Fig. 1288.
Dummy Coupling.

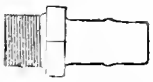


Fig. 1287.
Hose Nipple.

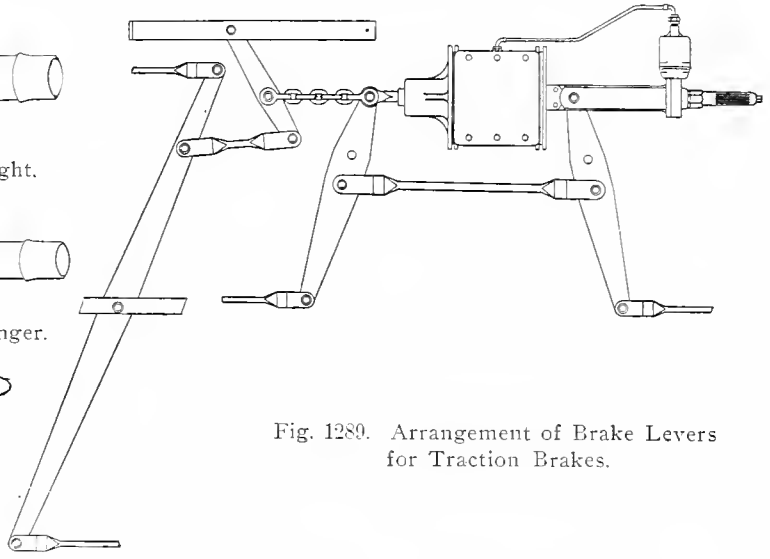


Fig. 1289. Arrangement of Brake Levers
for Traction Brakes.

Fig. 1290.
Brake Hose and Coupling.

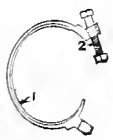


Fig. 1291.
Hose Clamp.

Fig. 1292.
Auxiliary Reservoir for 10-in.
Cylinder.

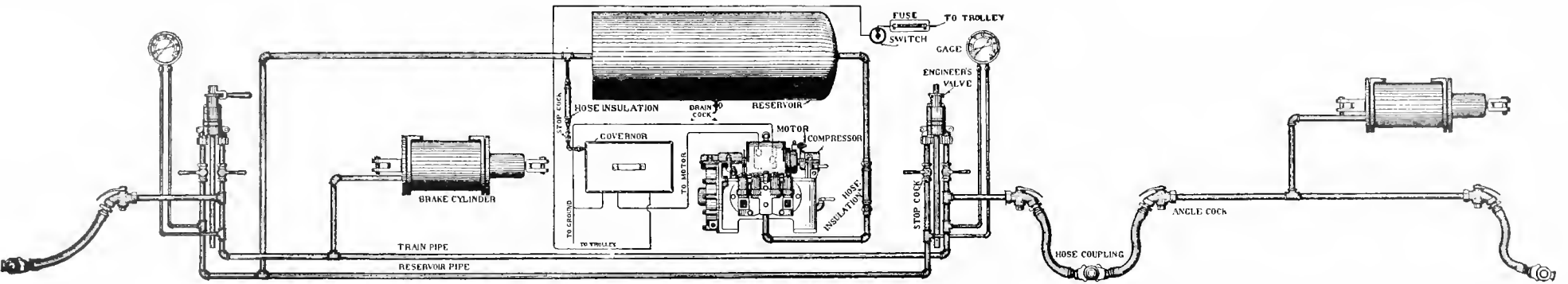


Fig. 1293. Diagram of Piping and Connections for Christensen Straight-Air Brake Equipment for Electric Cars.

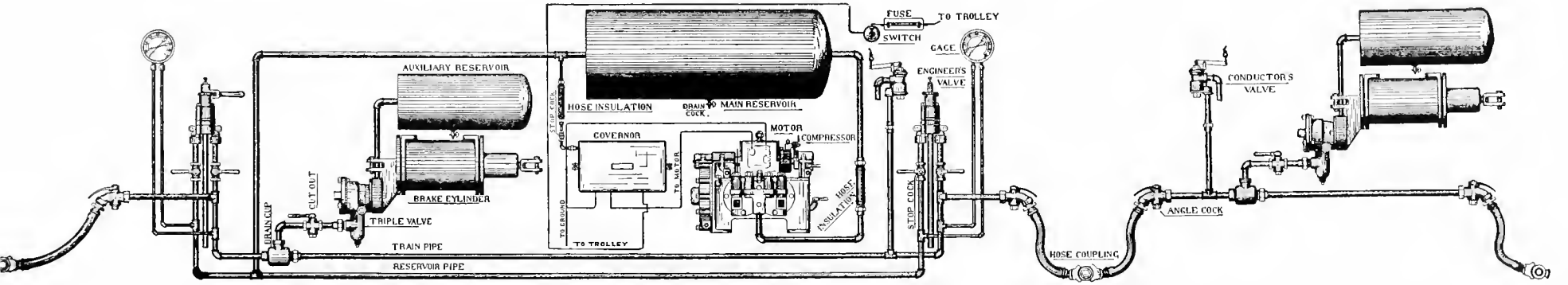


Fig. 1294. Diagram of Piping and Connections for Christensen Automatic Quick-Action Air Brake Equipment for Electric Cars. National Electric Co.

Table of Sizes, Motor-Driven Air Compressors, Figs. 1293-1294.

Pump No.	Cylinder size, inches.	Gear speed. r.p.m.	Displacement cubic feet free air per minute.	Armature speed. r.p.m.	H.P. at 90 lbs.	Amperes. Amount.	Amperes. Fuse.	Dimensions, inches. Length.	Width.	Height.	Weights, pounds. Pump.	Motor.	Total.
D-1.....	5 x 2.17	238	11.71	1,300	3.3	5	5	25.5	23.00	18.37	363	237	600
D-2.....	5.5x 4.25	183	21.44	1,200	5.3	8	10	31.88	27.06	21.00	493	392	885
D-3.....	7 x 5	131	29.1	875	7.15	11	12	34.31	27.69	22.06	675	550	1,225

NOTE.—D-1 and D-2 pumps have ¾-inch suction and ½-inch discharge; D-3 pumps have 1-inch suction and ¾-inch discharge. Standard motors are wound for 550 volts direct current.

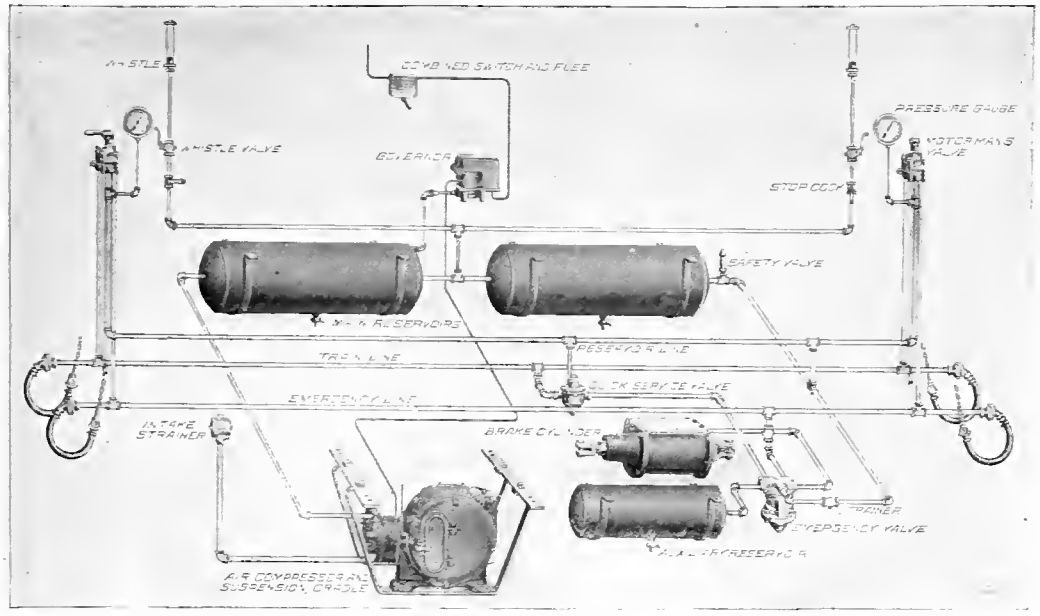


Fig. 1295. Diagram of Piping and Electrical Connections for General Electric Emergency, Straight-Air Brake Equipment for Electric Cars.

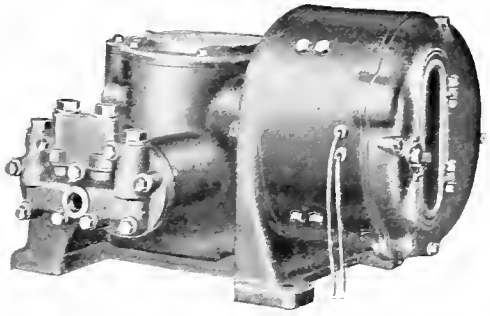


Fig. 1296. Motor-Driven Air Compressor, Type C.P.-27.

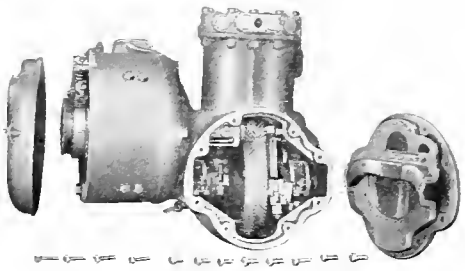


Fig. 1297. Motor-Driven Air Compressor, Type C.P.-27 with Covers Removed.

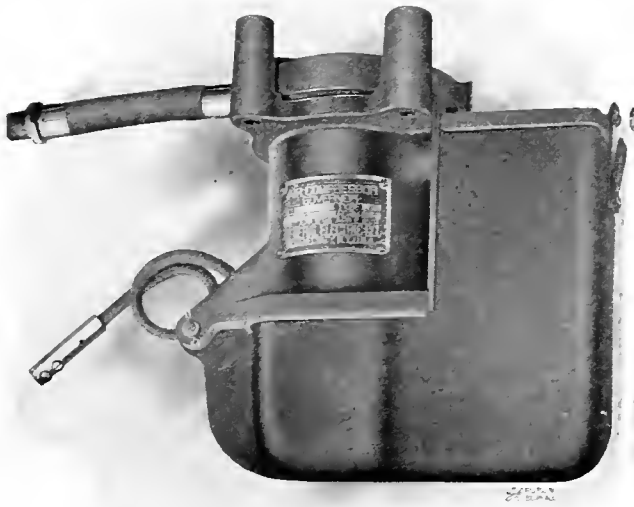


Fig. 1298. Air Compressor Governor.

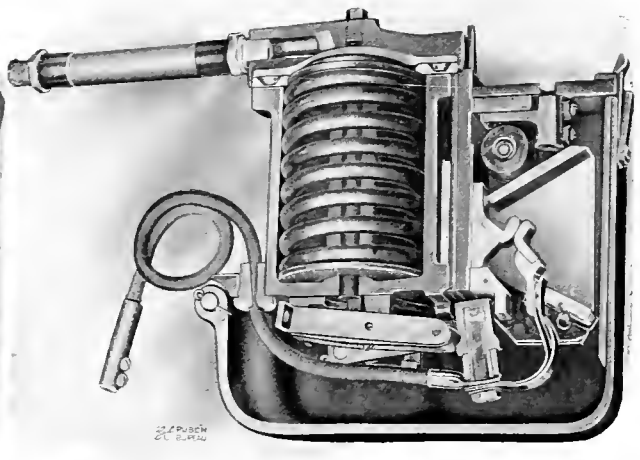


Fig. 1299. Air Compressor Governor, with Cover Removed.

General Electric Co.

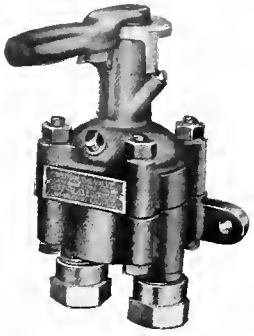
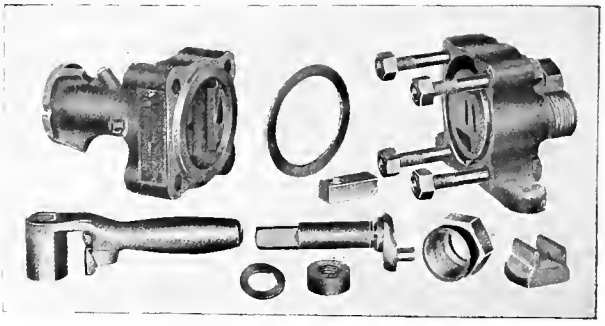
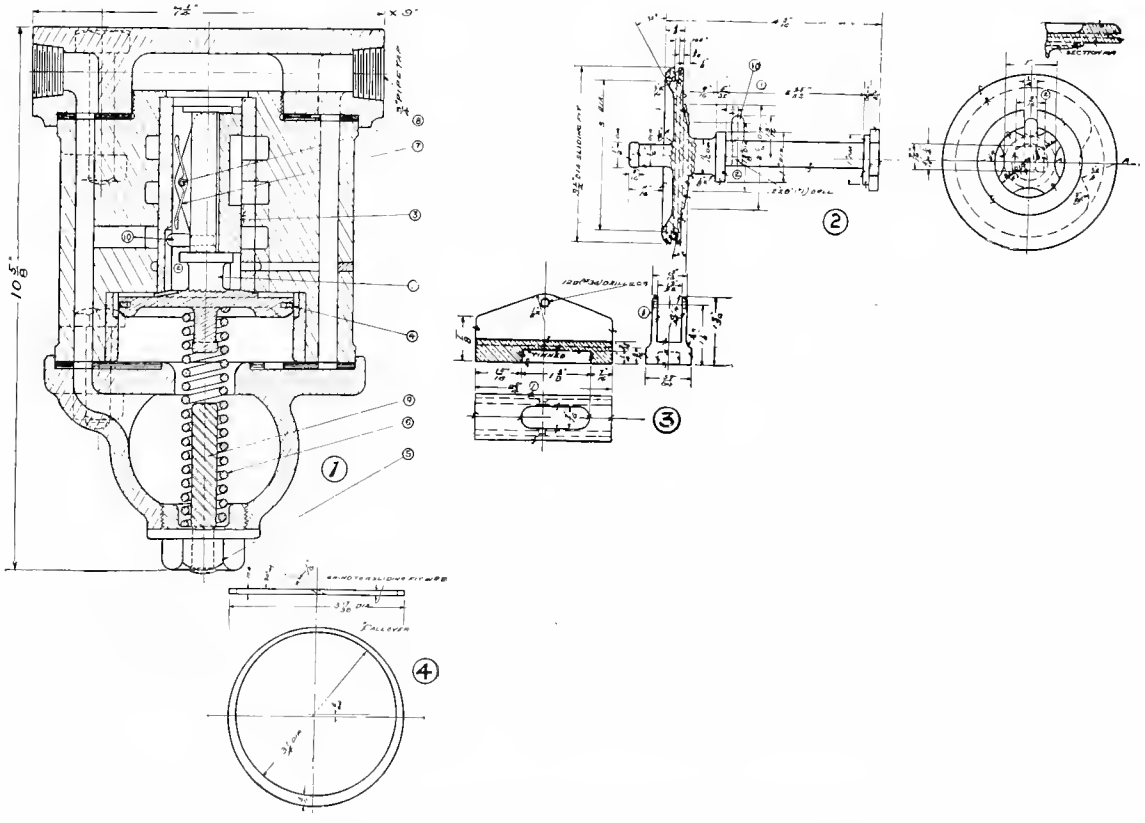


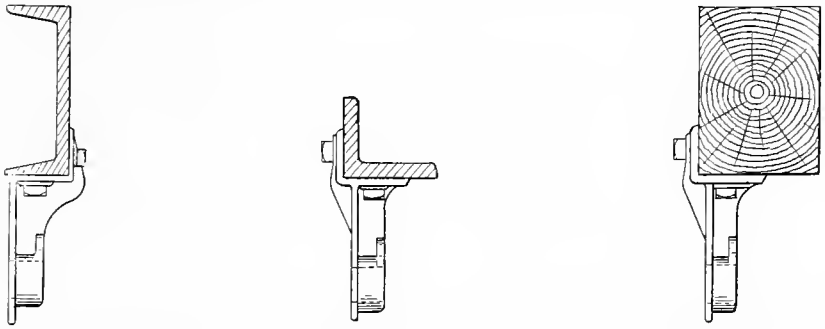
Fig. 1300. Motorman's Valve.



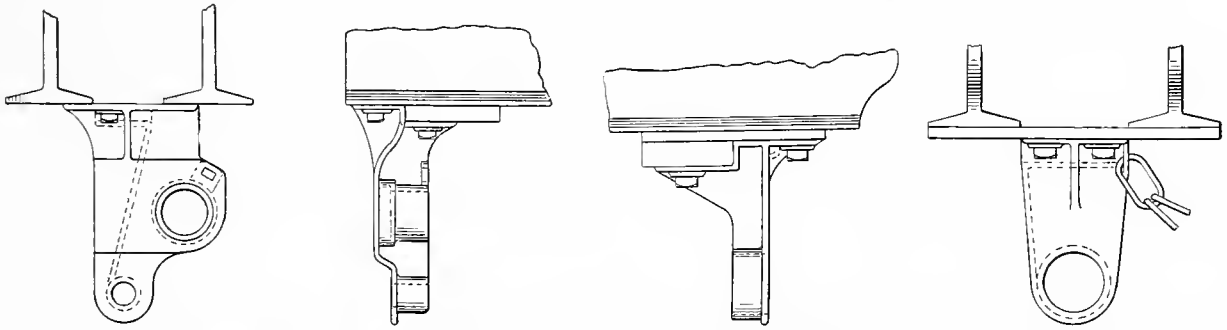
Figs. 1301-1310. Parts of Motorman's Valve.



Figs. 1311-1314. Cross-Section of Emergency Valve and Parts.
General Electric Co.



Figs. 1315-1317. Monogram Air Hose Brackets for Metal and Wood End Sills.



Figs. 1318-1321. Monogram Steam, Air and Signal Hose Brackets for Metal End Sills. Passenger Cars.

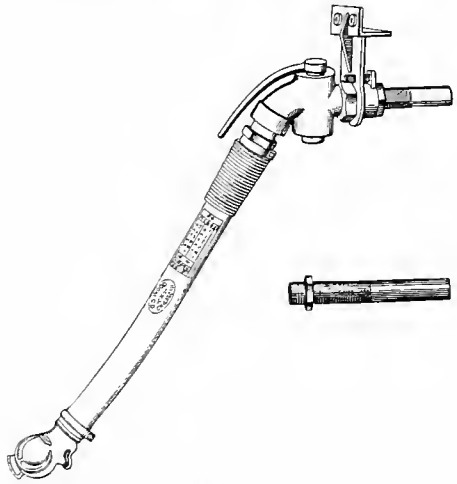


Fig. 1322. Train Pipe Nipple, Bracket, Angle Lock and Hose with Flexible Nipple End Protector.

Fig. 1323. Air Brake Hose with Wood's Flexible Nipple End Hose Protector.

Guleford S. Wood.

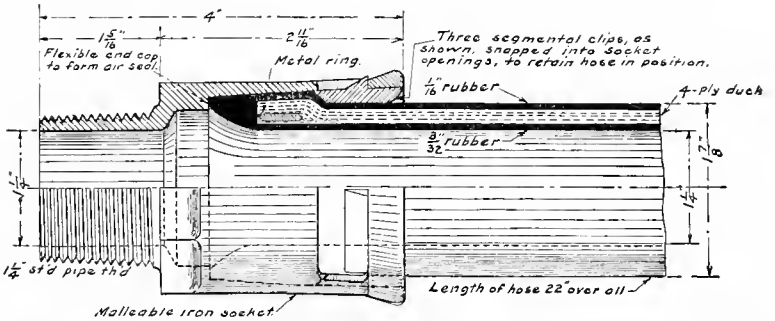


Fig. 1324. Section Through "NB" Air Brake and Signal Hose Connection.

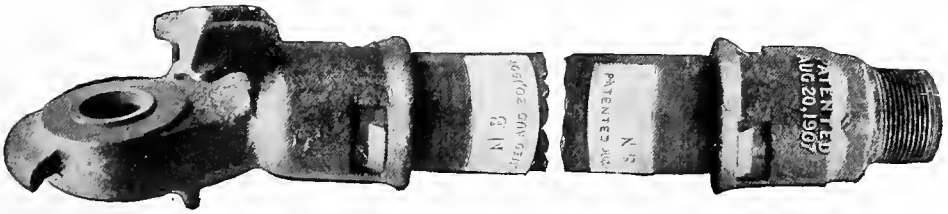
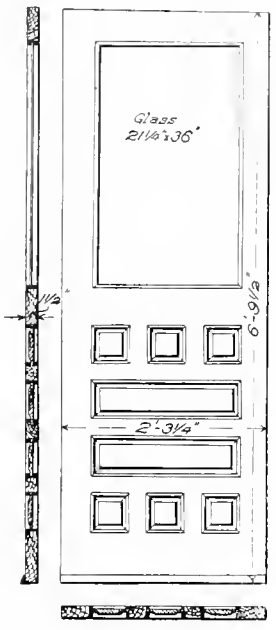
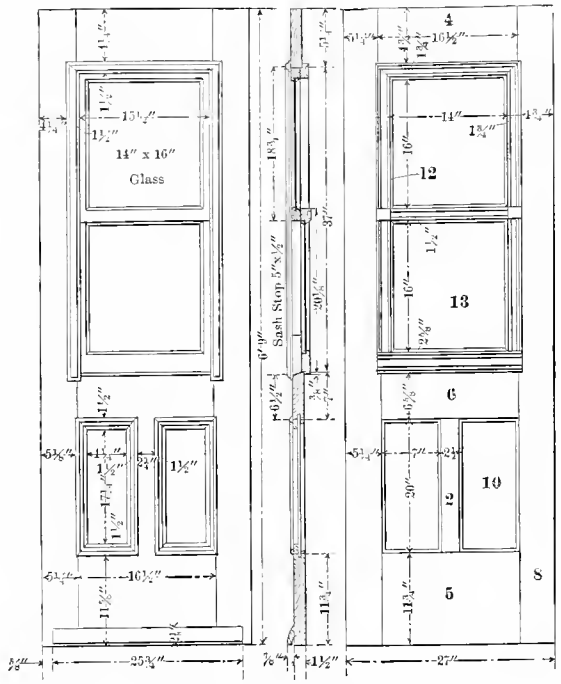


Fig. 1325. Air Brake or Signal Hose with "NB" Connection.

G. M. Newhall Eng. Co.



Figs. 1326-1328.
End Door of Coach.
N. & W.



Figs. 1329-1331. Standard End Door of Coach.
N. Y., N. H. & H.

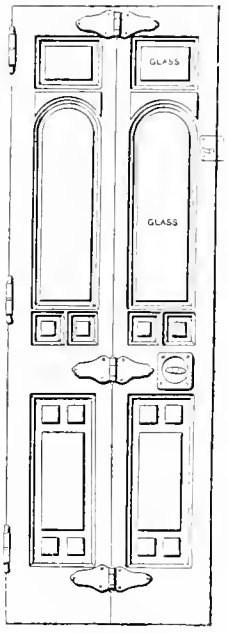


Fig. 1332.
Door for Gould
Narrow Vestibule.

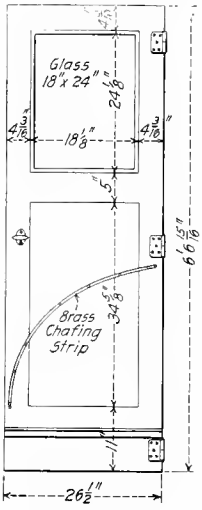


Fig. 1333.
Door for Pullman
Wide Vestibule.

Names of Parts of Doors.
Figs. 1329-1337.

1	*Door Post or Jamb*
2	*Door Mullion*
4	*Top Door Rail*
5	*Bottom Door Rail*
6	*Middle or Lock Door Rail*
7	*Parting Door Rail*
8	*Door Stile*
10	*Lower or Twin Door Panels*
11	*Middle Door Panel*
12	*Upper Door Sash*
13	*Lower Door Sash*
21	*Door Hanger*
22	*Door Hook*
23	*Door Guards*

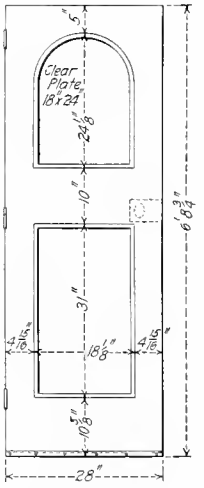


Fig. 1334.
Standard End Door for
Pullman Cars.

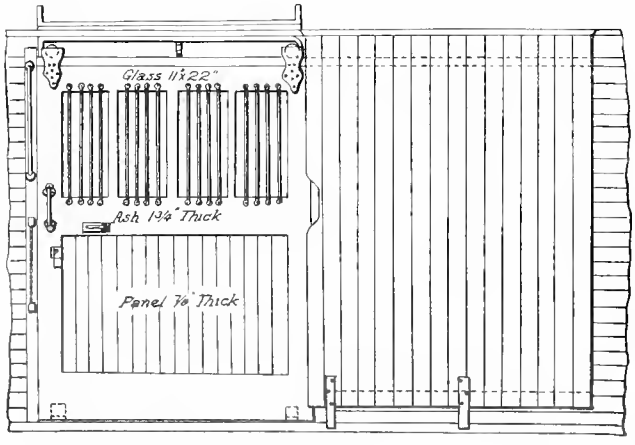
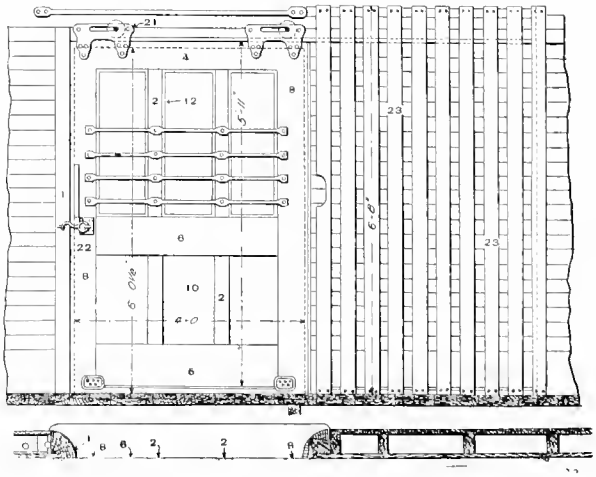


Fig. 1335. Baggage Car Side Door. N. Y. C. & H. R.



Figs. 1336-1337. Baggage Car Side Door. N. & W.

Fig. 1338.
Steel Vestibule Door.
Interior.

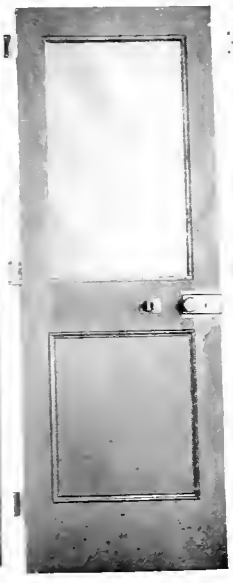


Fig. 1339.
Steel End Door.
Interior.

Fig. 1340.
Steel Saloon Door.
Interior.

Figs. 1341-1342. Steel Sliding Doors. Hudson & Manhattan Steel Tunnel Car Doors.

P. R. R. Standard Steel Coach Doors.

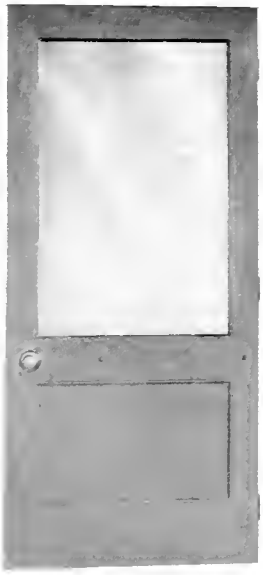


Fig. 1343.
Steel Vestibule Door.
Exterior.

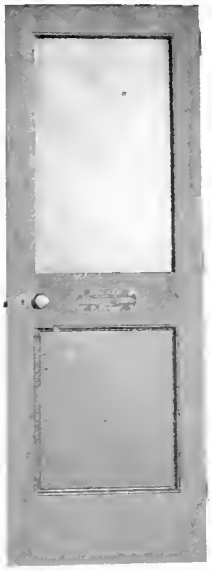


Fig. 1344.
Steel End Door.
Exterior.

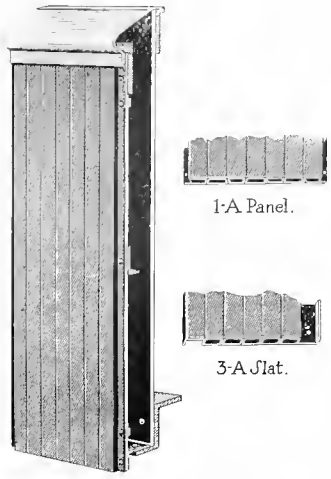
Fig. 1345.
Steel Saloon Door.
Exterior.

Fig. 1346. Steel End Door. Hudson & Manhattan Steel Tunnel Car Doors.

Fig. 1347. Steel End Door. Harriman Lines Standard Steel Coach Door.

P. R. R. Standard Steel Coach Doors.

Hale & Kilburn Mfg. Co.



Figs. 1348-1350.
Metallic Steel Sheathing,
for Steel Cars.
General Railway Supply Co.

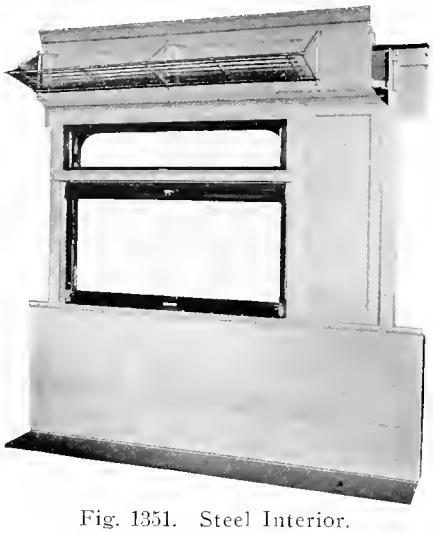
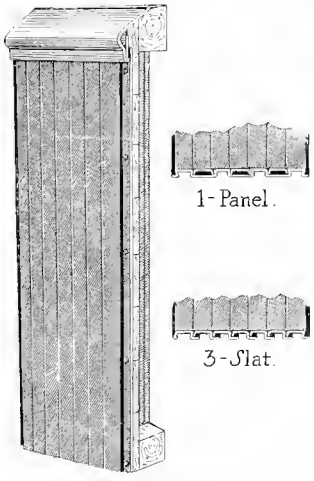
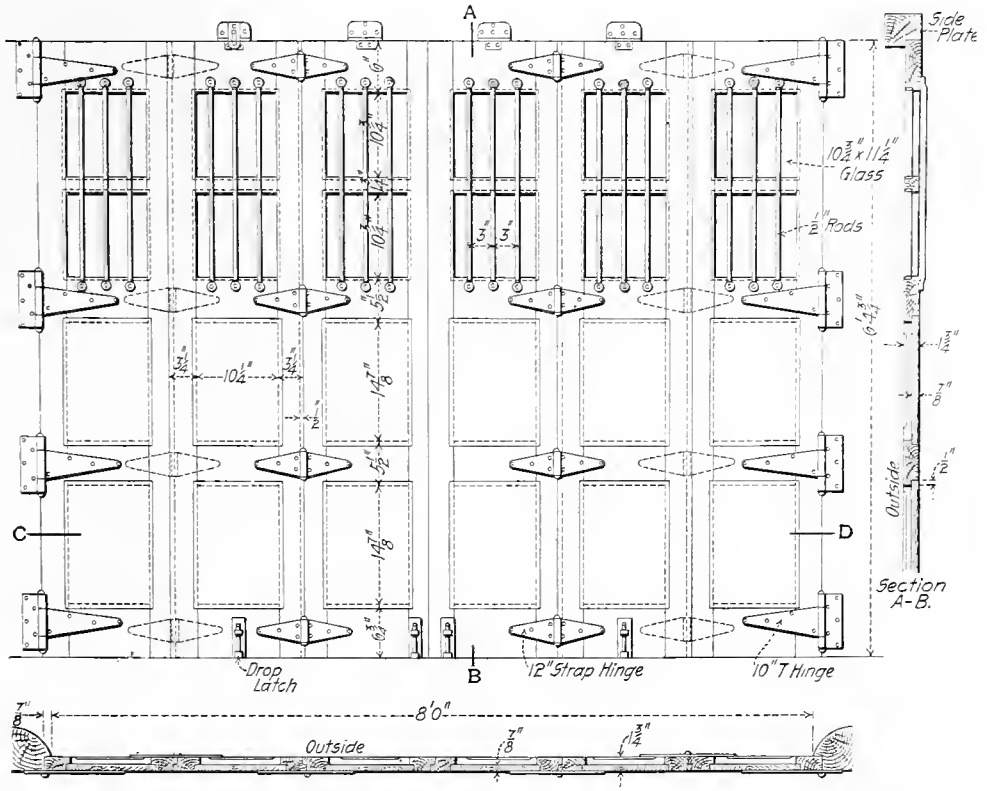


Fig. 1351. Steel Interior,
Finish and Steel Sash.
Hale & Kilburn Mfg. Co.

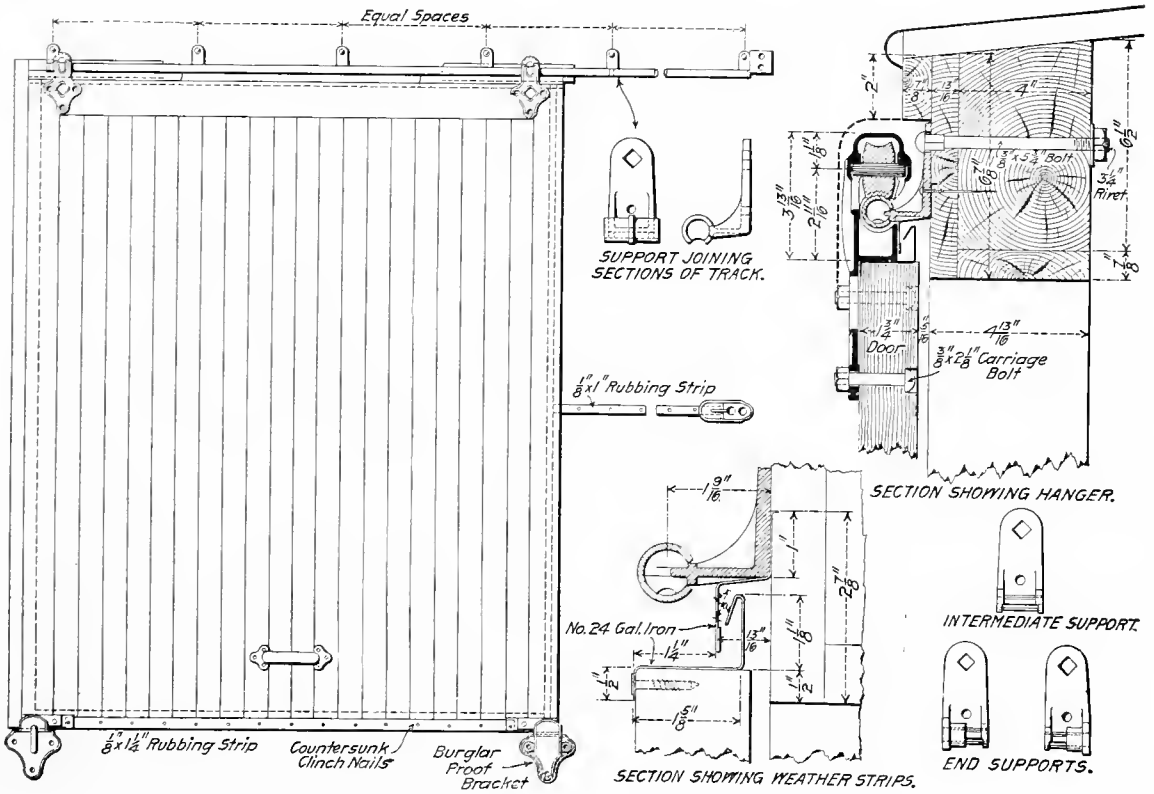


Figs. 1352-1354.
Metallic Steel Sheathing,
for Wood Cars.
General Railway Supply Co.

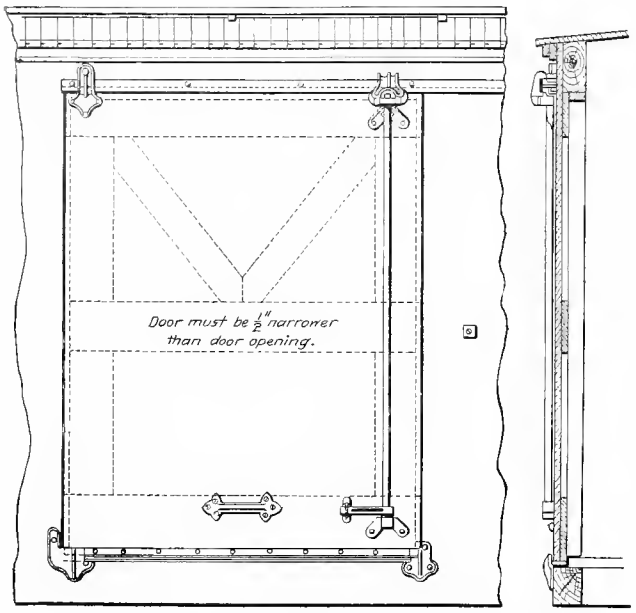
Fig. 1355. Steel Bulkhead, Saloon, Etc., Harriman Lines Standard Steel Coaches.
Hale & Kilburn Mfg. Co.



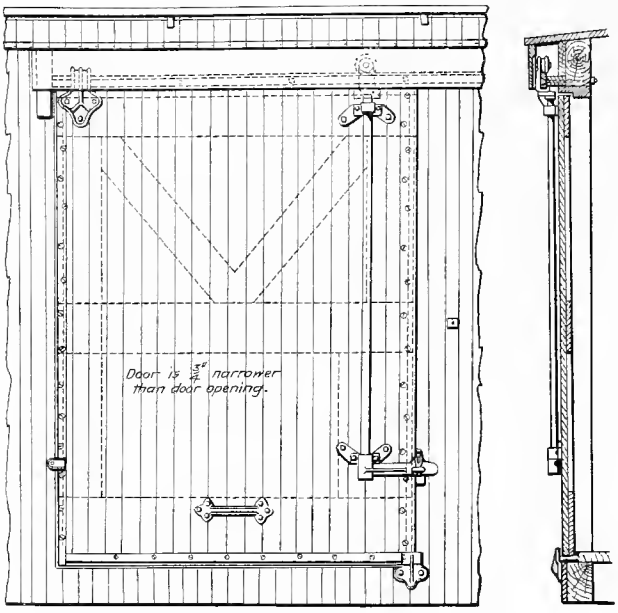
Figs. 1356-1358. 8-ft. Folding Side Door for Special Horse Car. C. R. R. of N. J.



Figs. 1359-1364. Smith No. 2 Car Door. Jones Car Door Co.

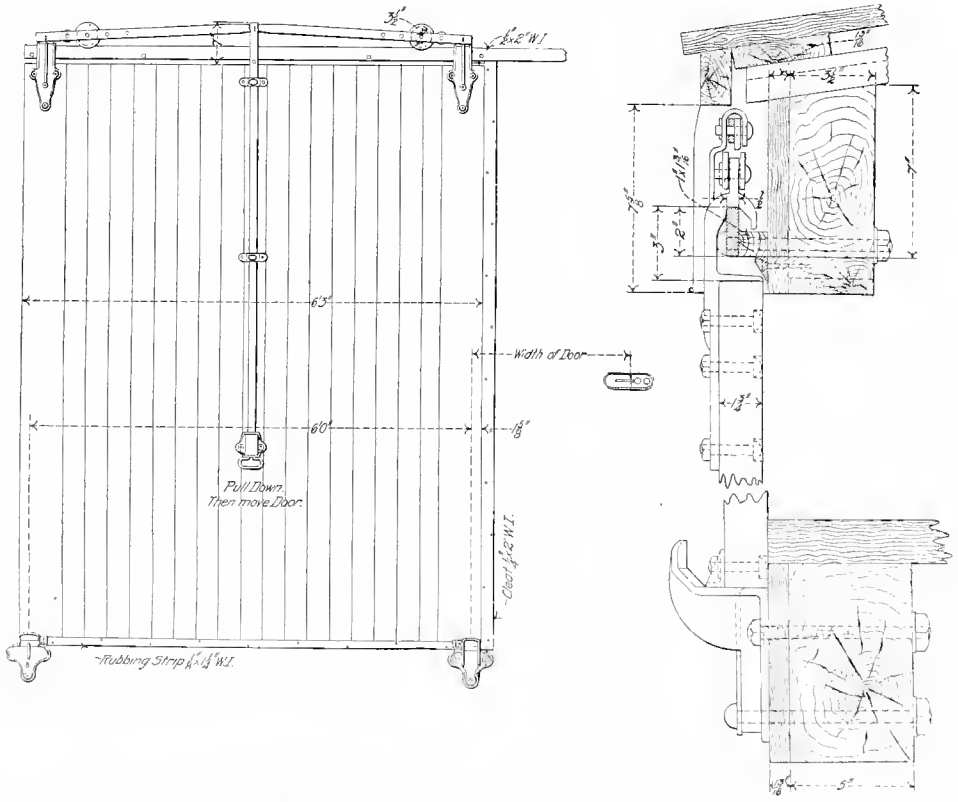


Figs. 1365-1366. Western Flush Car Door.



Figs. 1367-1368. St. Louis Flush Car Door.

Western Railway Equipment Co.



Figs. 1369-1370. Jones Car Door. Jones Car Door Co.

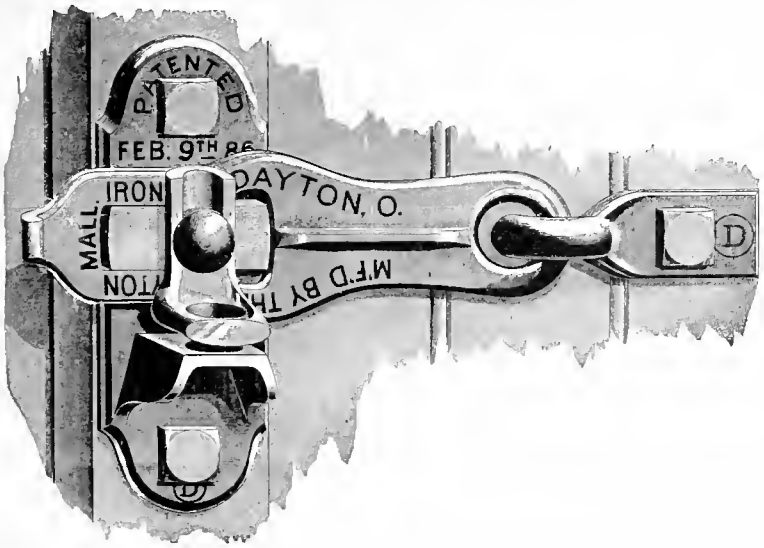


Fig. 1371. Lock Closed, Ready for Pin or Seal.
Dayton Freight Door Lock. Malleable Iron.
Dayton Malleable Iron Co.

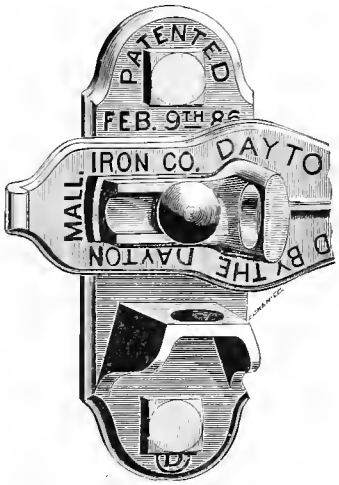


Fig. 1372. Lock in Position to Release Hasp.

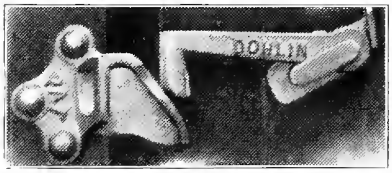


Fig. 1374. Dohlin Automatic Car Door Fastener.
National Railway Devices Co.

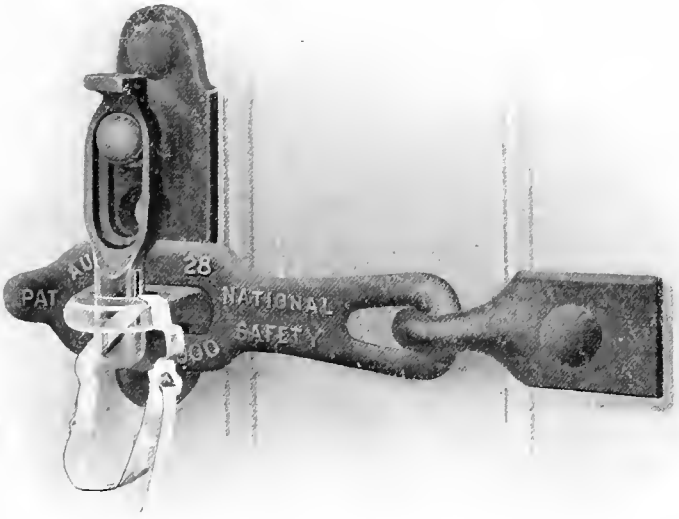


Fig. 1373. National Safety Car Door Fastener.
Complete with Seal.

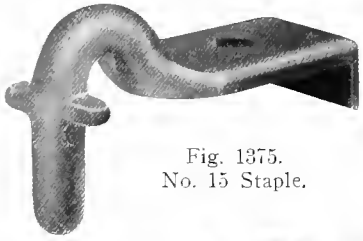


Fig. 1375.
No. 15 Staple.

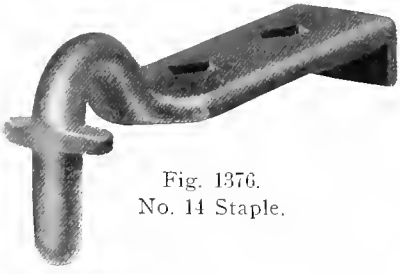


Fig. 1376.
No. 14 Staple.

Fig. 1377. A 114 Hasp.

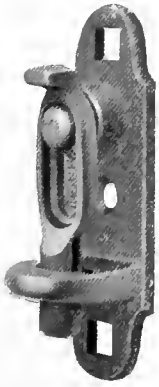


Fig. 1378.
No. 189 Lock.

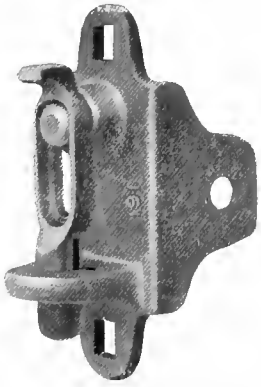


Fig. 1379.
No. 191 Lock with Flange.
The National Malleable Castings Co.

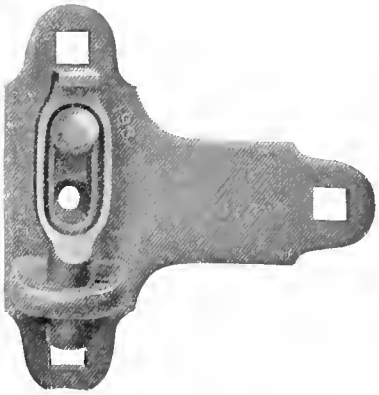


Fig. 1380. No. 193 Lock with Wing.

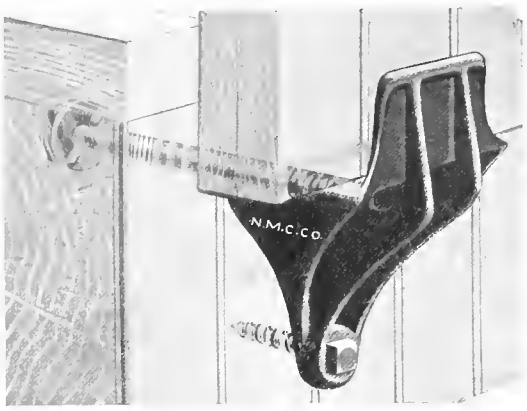


Fig. 1381. National Burglar-Proof Car Door Bracket.
The National Malleable Castings Co.

Fig. 1382.

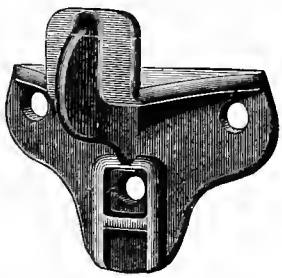
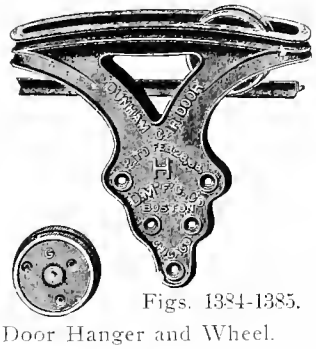


Fig. 1383.

Security Door Brackets.
Chicago Grain Door Co.



Figs. 1384-1385.
Door Hanger and Wheel.

Fig. 1386.
Wedge Stop.

Fig. 1387.
Double Door Wedge.

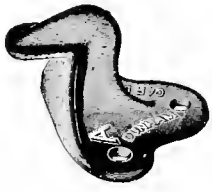


Fig. 1388.
Door Guide.

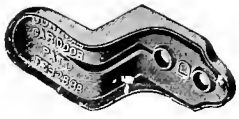
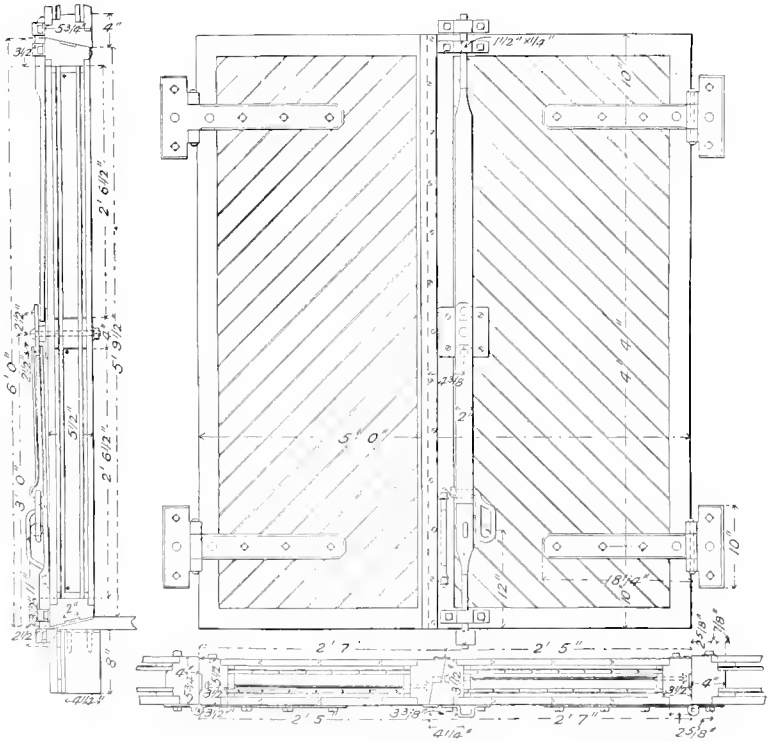
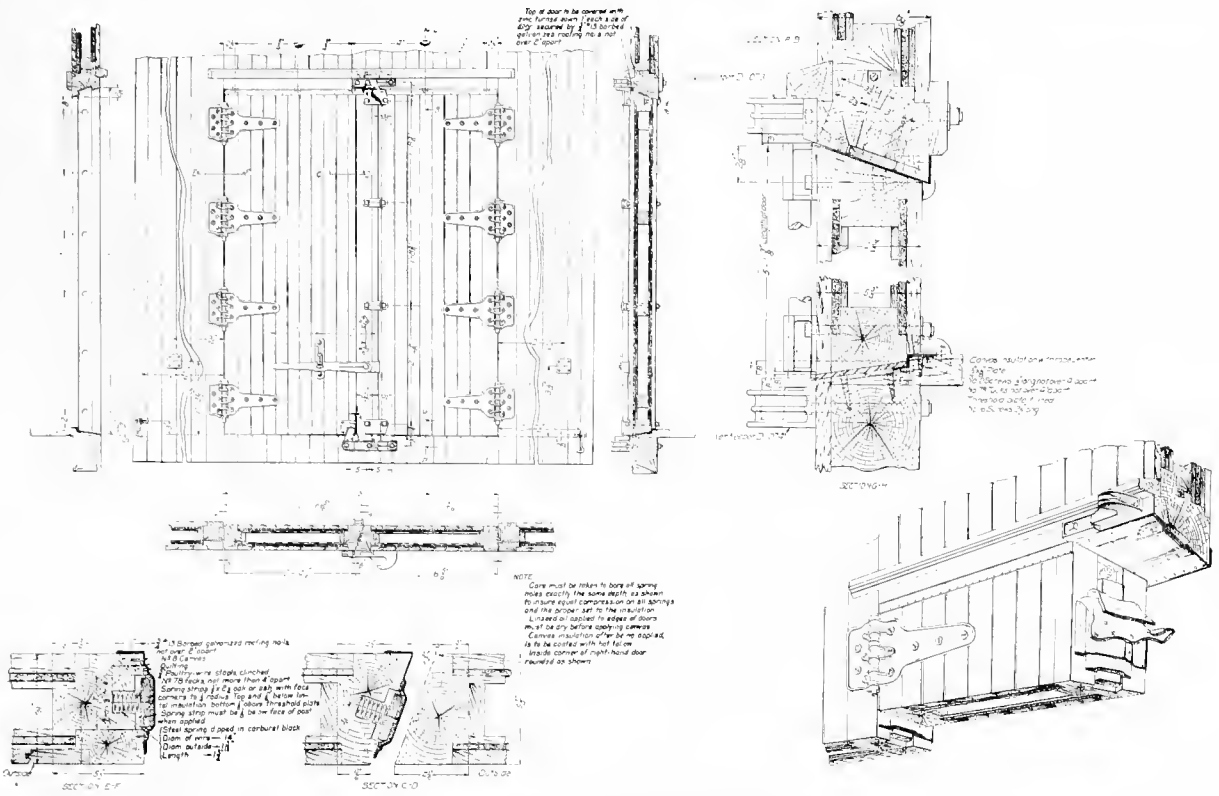


Fig. 1389.
Door Stop Bracket.



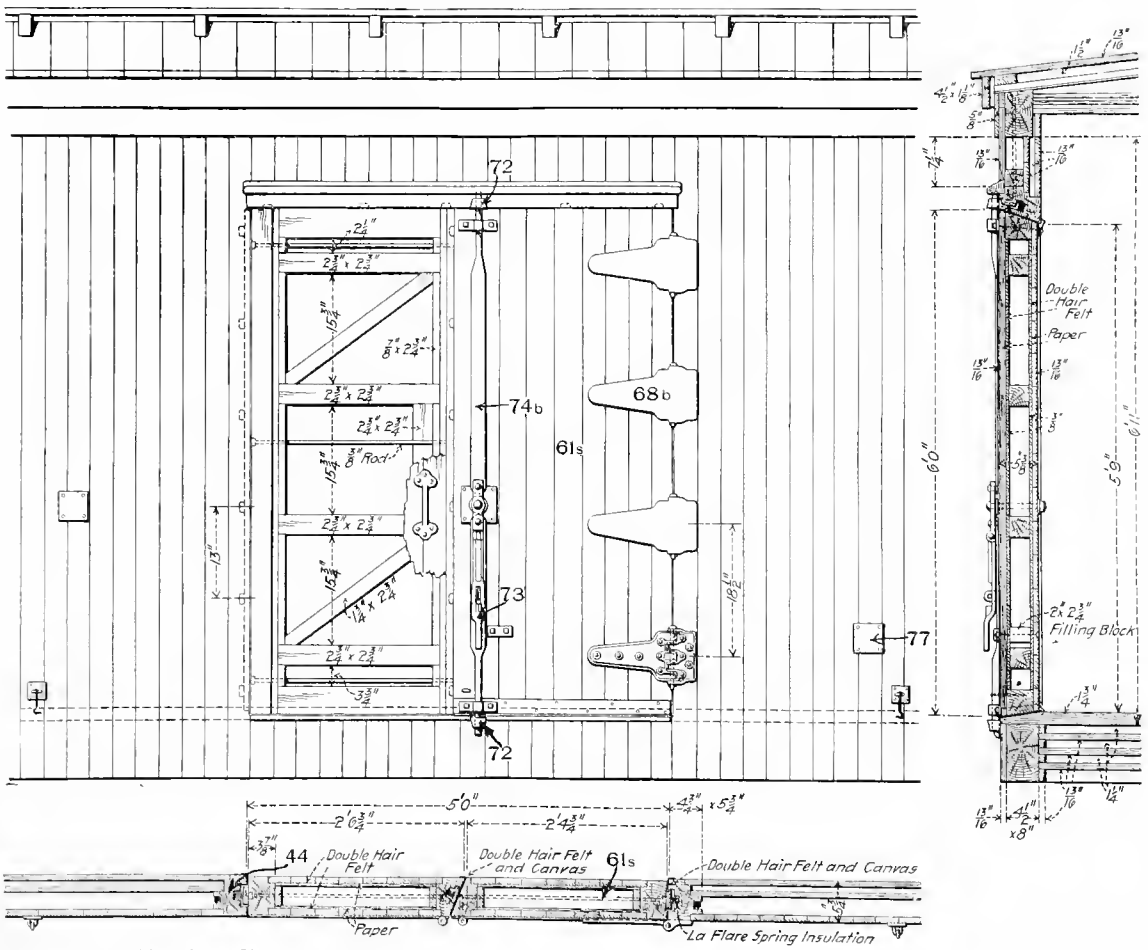
Figs. 1390-1392. Refrigerator Car Door. Wickes Patent.



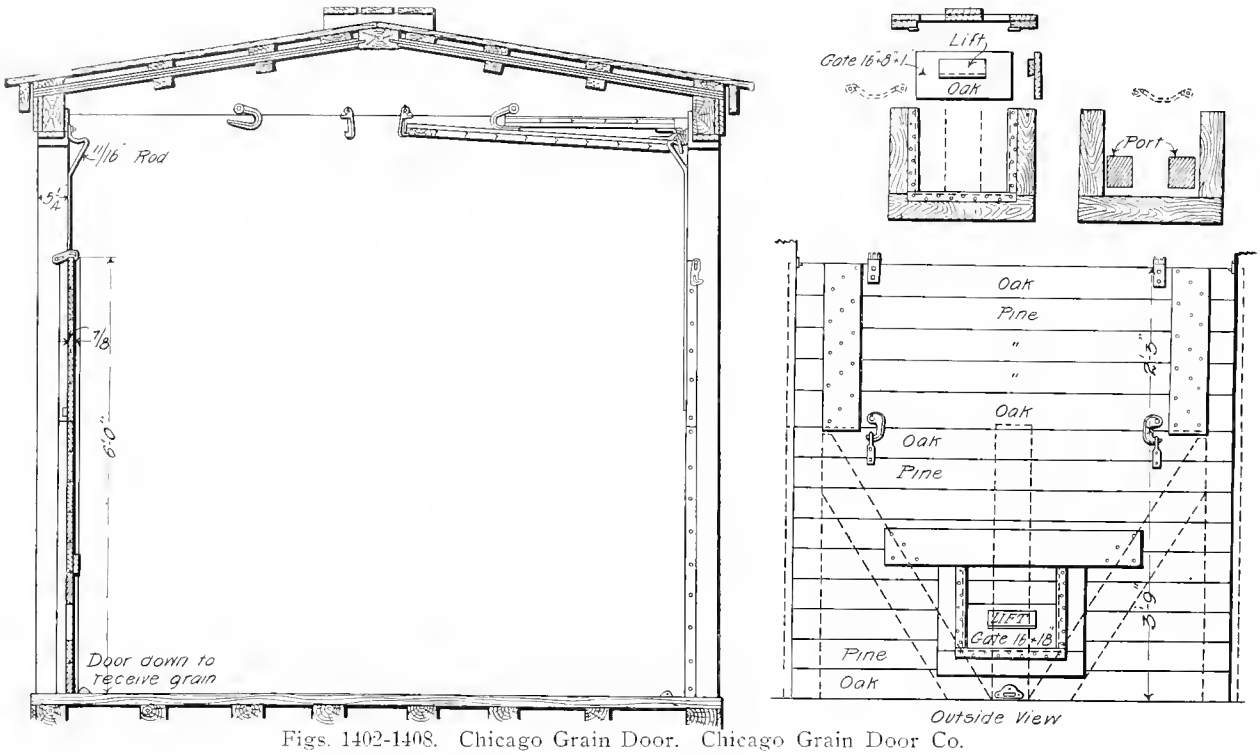
Figs. 1393-1398. La Flare Refrigerator Insulation and Miner Refrigerator Car Door Fasteners, Applied to M. D. T. Co. Refrigerator Cars. W. H. Miner Co.

Names of Parts of Refrigerator Car Doors. Figs. 1399-1401.

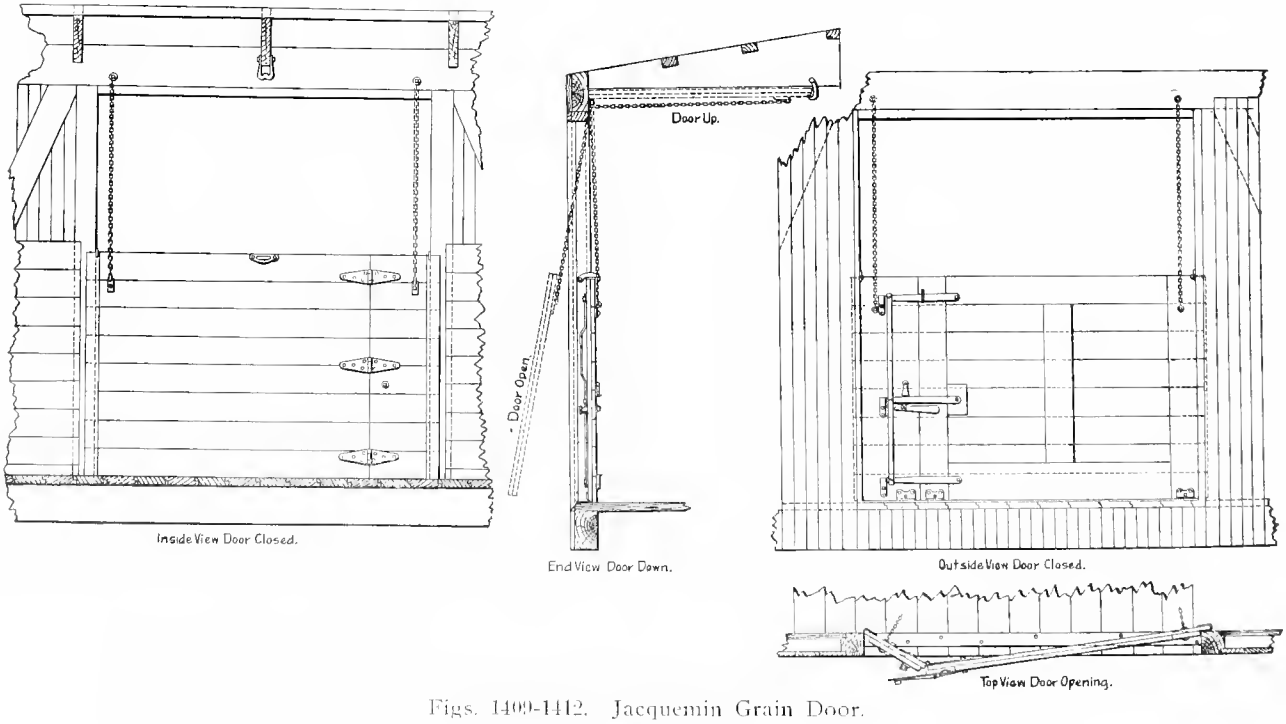
44 *Door Post*
61*s* *Door*
68*b* *Door Hinge*
72 *Door Bolt Bracket*
73 *Door Hasp*
74*b* *Door Bolt or Bar*
77 *Door Stop*



(249) Figs. 1399-1401. Side Door with La Flare Spring Insulation. Produce Car. N. Y. C. & H. R.



Figs. 1402-1408. Chicago Grain Door. Chicago Grain Door Co.



Figs. 1409-1412. Jacquemin Grain Door.
Standard Railway Equipment Co.

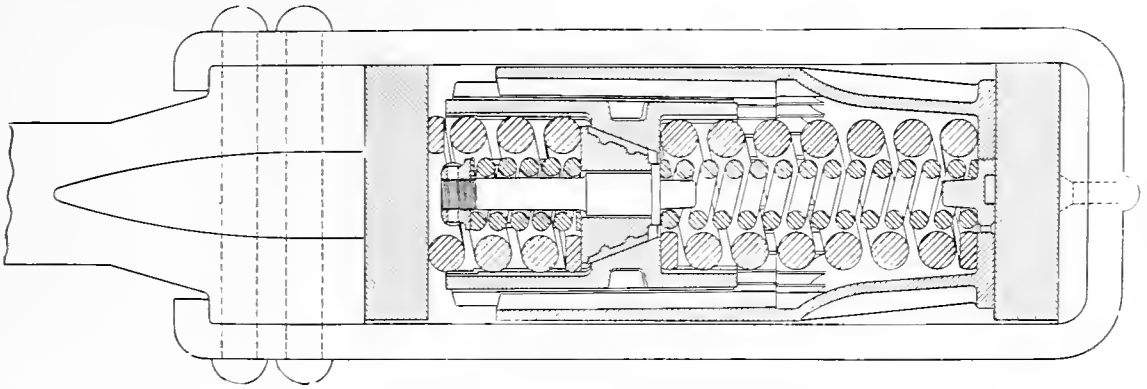
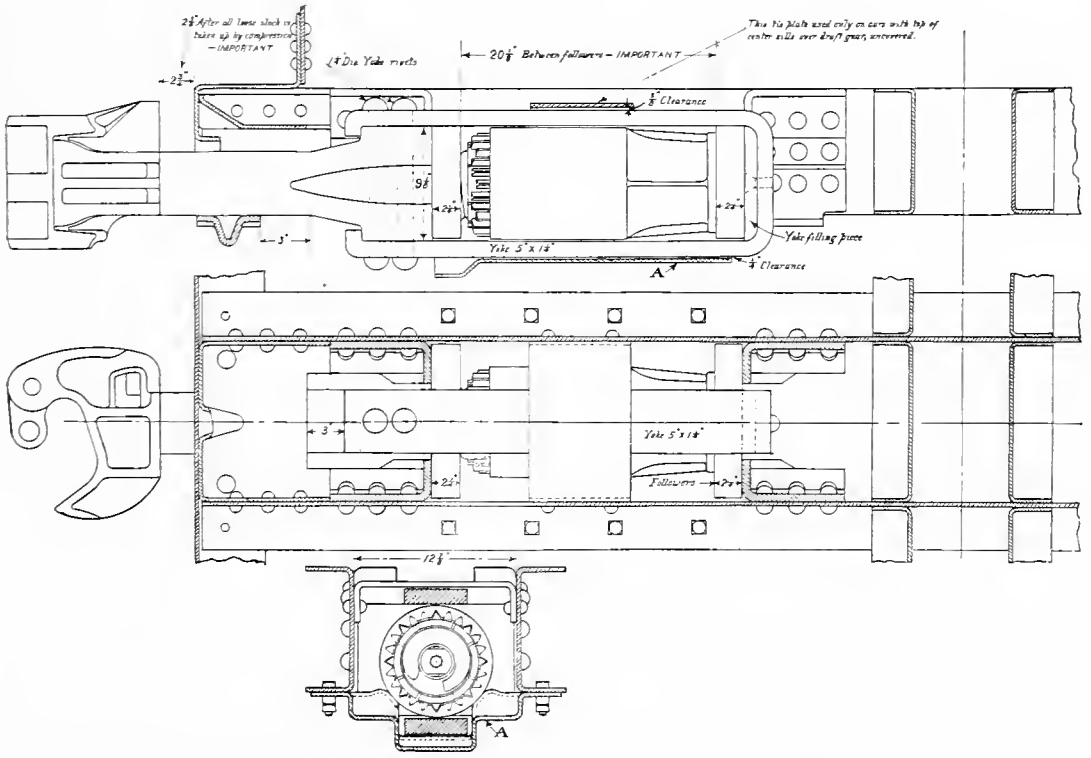
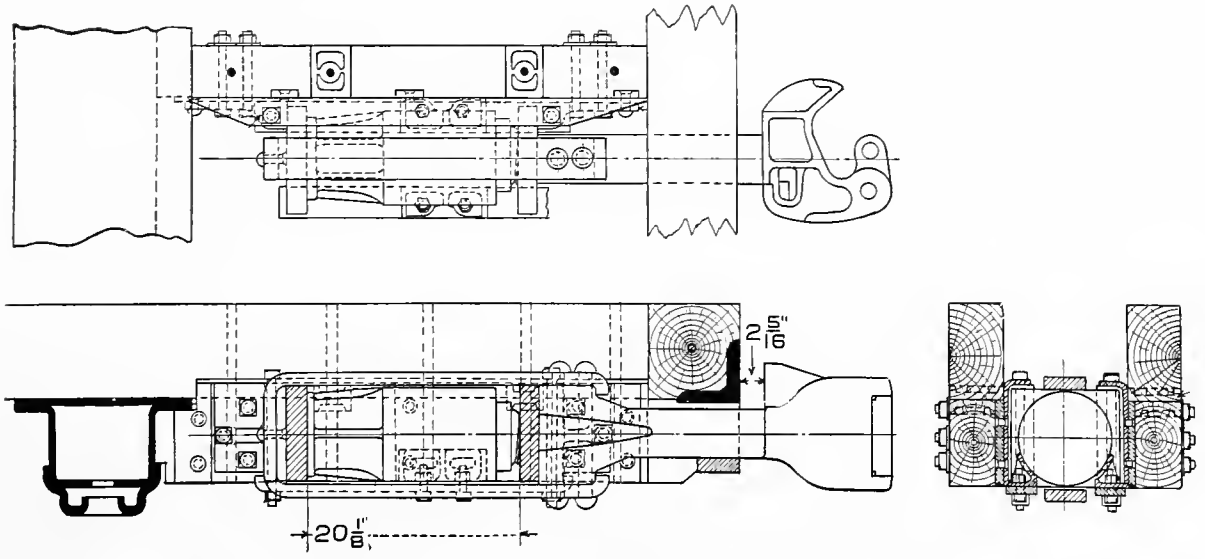


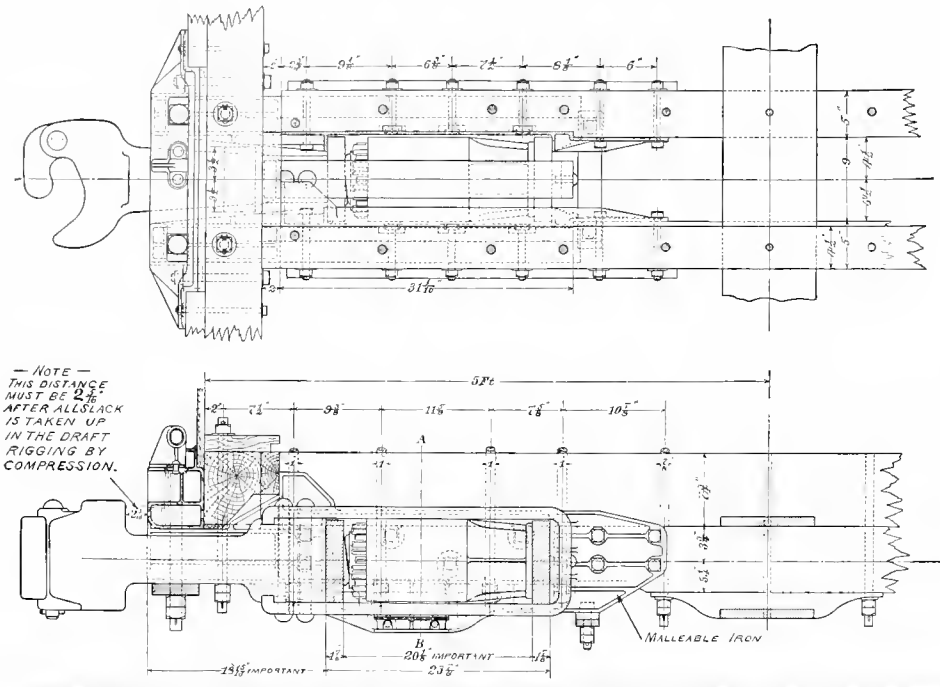
Fig. 1413. Sectional View of Westinghouse Friction Draft Gear.



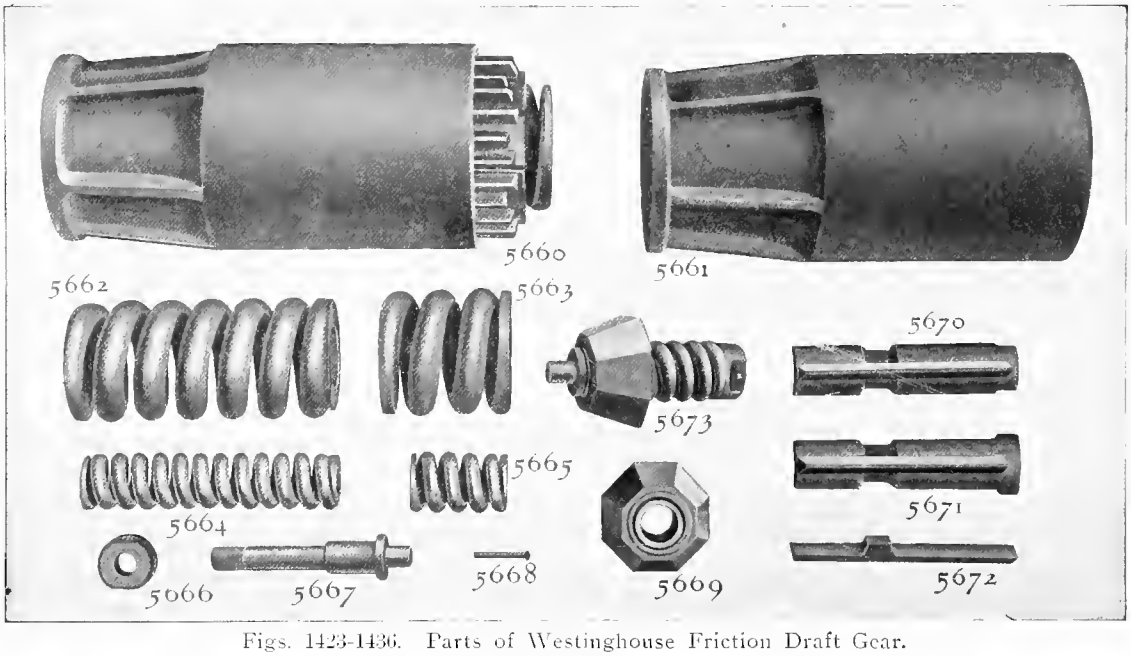
Figs. 1414-1416. Application of Westinghouse Friction Draft Gear to Car with Steel Center Sills.



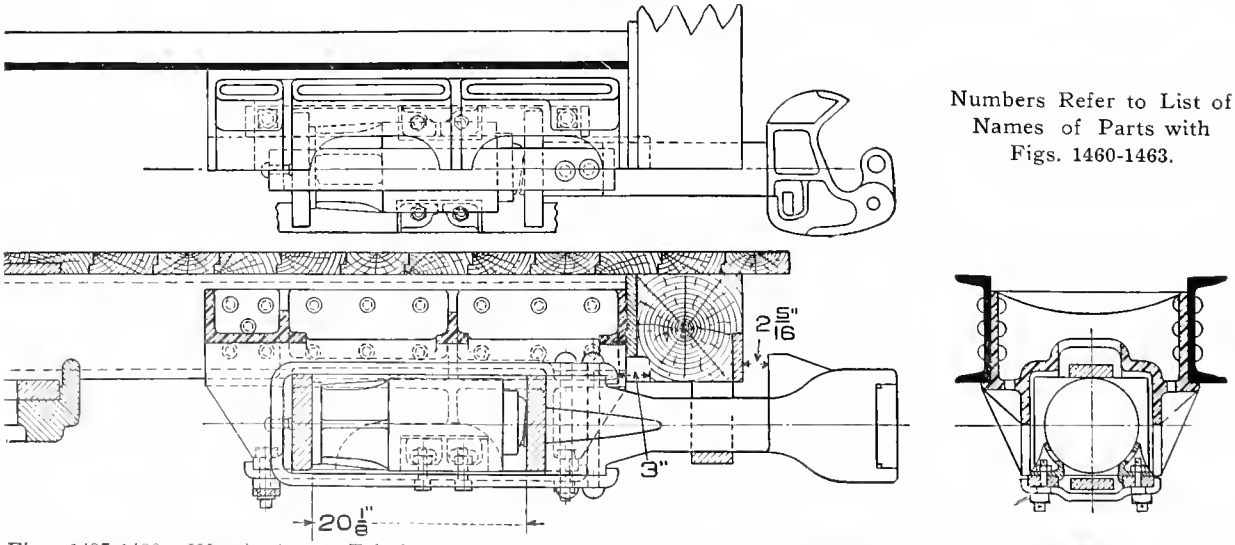
Figs. 1417-1418. Westinghouse Friction Draft Gear. Pressed Steel and Forging Attachment for Freight Cars with Wooden Sills.
Westinghouse Air Brake Co.



Figs. 1419-1422. Application of Westinghouse Friction Draft Gear to Car with Wooden Center Sills and Malleable Iron Draft Sills.

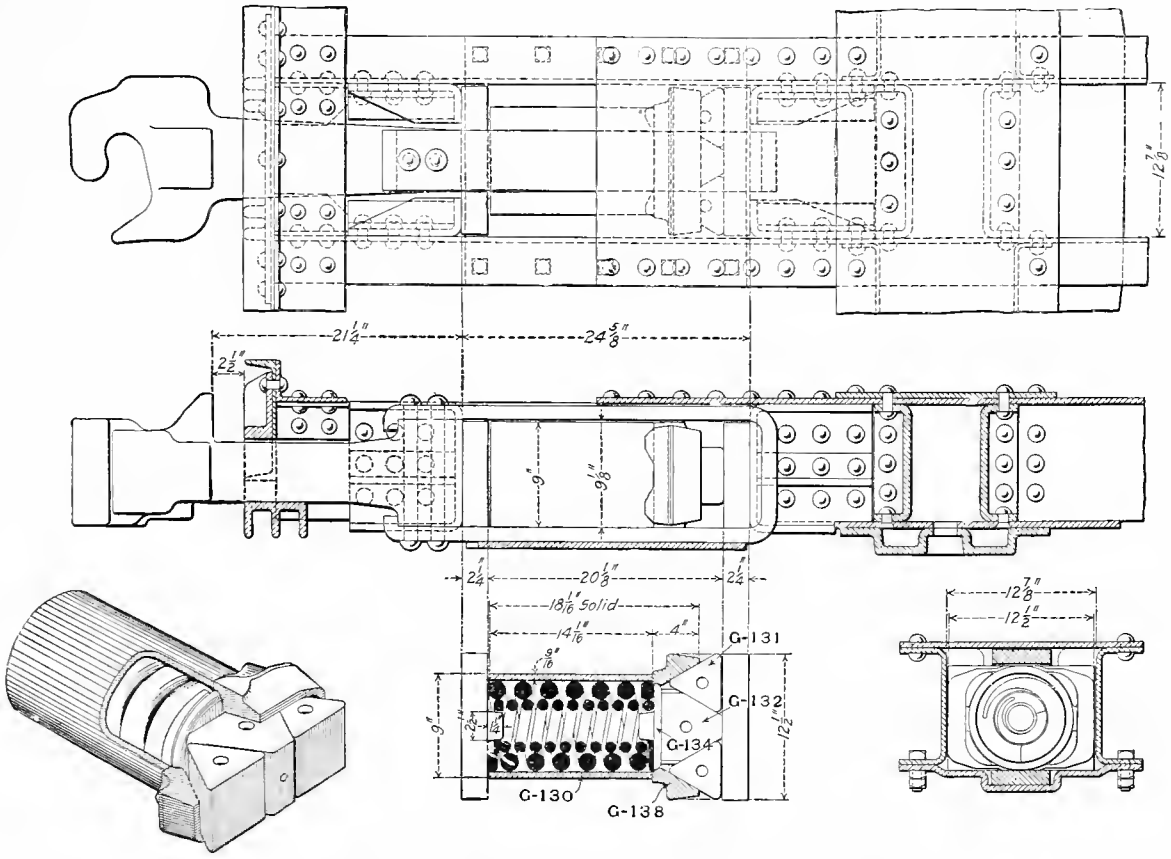


Figs. 1423-1436. Parts of Westinghouse Friction Draft Gear.

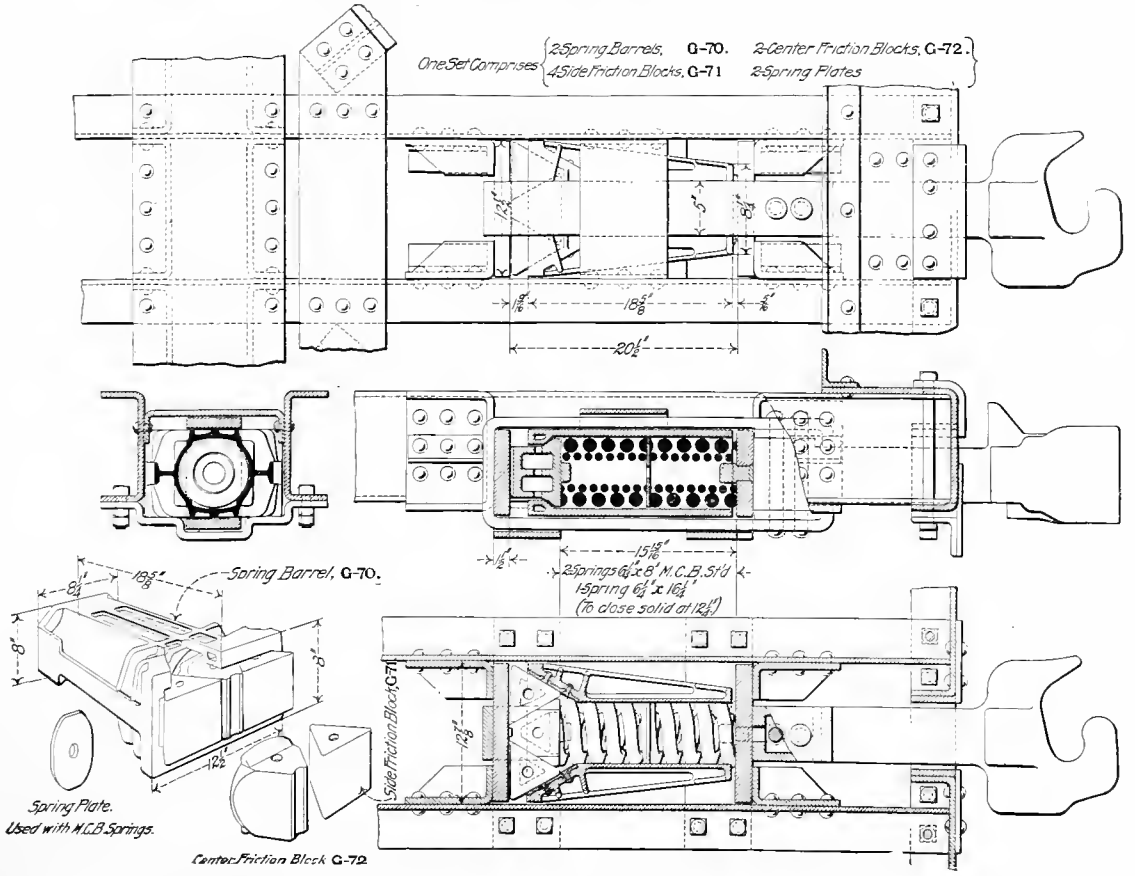


Numbers Refer to List of Names of Parts with Figs. 1460-1463.

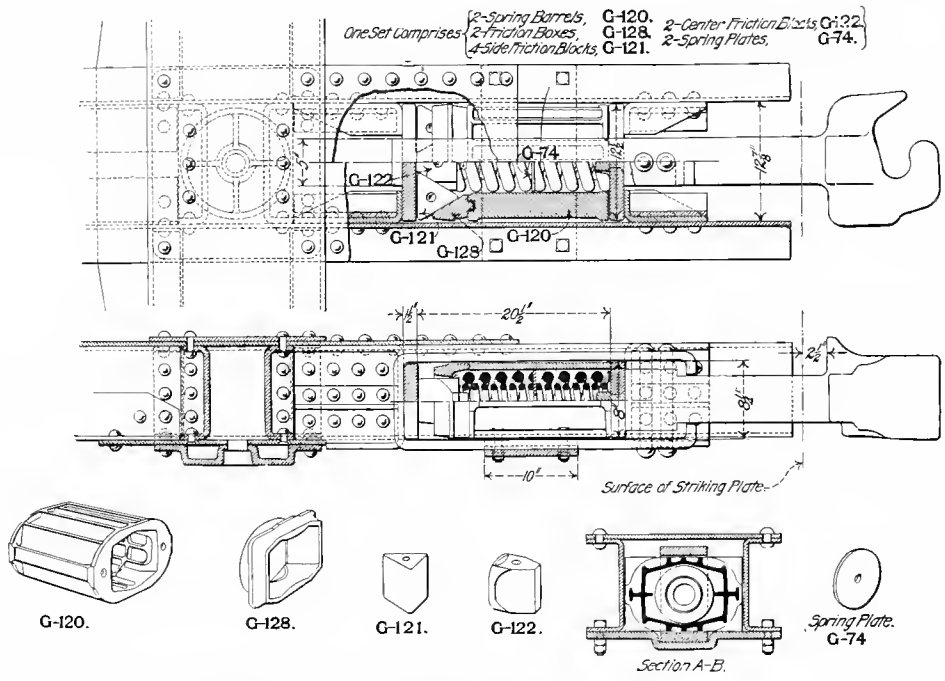
Figs. 1437-1439. Westinghouse Friction Draft Gear. Steel Casting Attachment for Tenders, with Metal Sills.



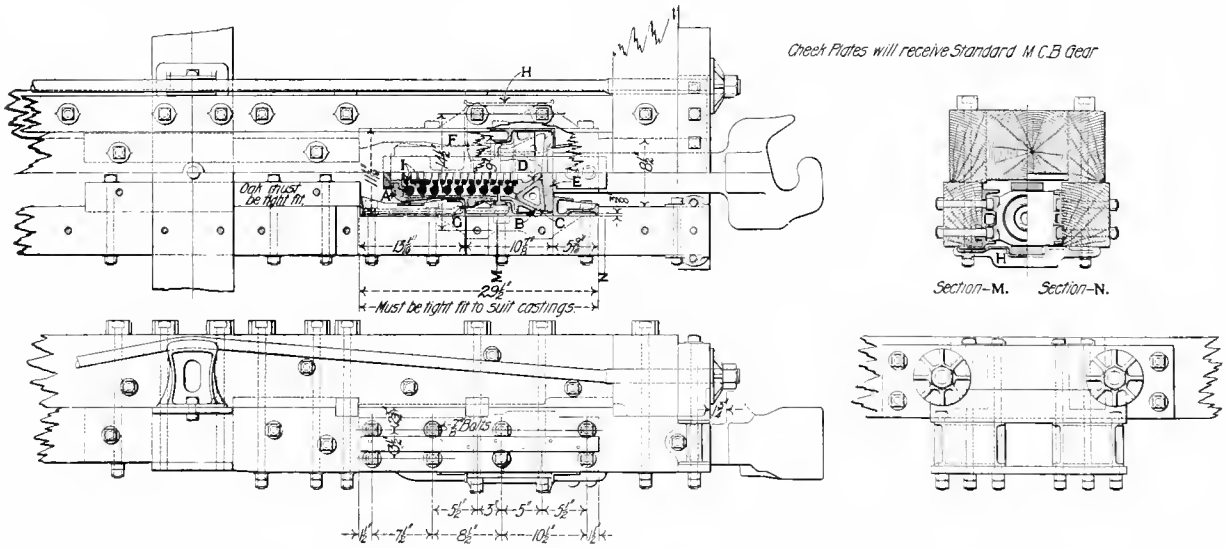
Figs. 1440-1443. Sessions-Standard Friction Draft, Type K. Standard Coupler Co.



Figs. 1444-1451. Sessions-Standard Friction Draft Gear, Type C, Applied to Car with Pressed Steel Underframe. Standard Coupler Co.



Figs. 1452-1459. Sessions-Standard Friction Draft Gear, Type H, Applied to Car with Pressed Steel Center Sills.



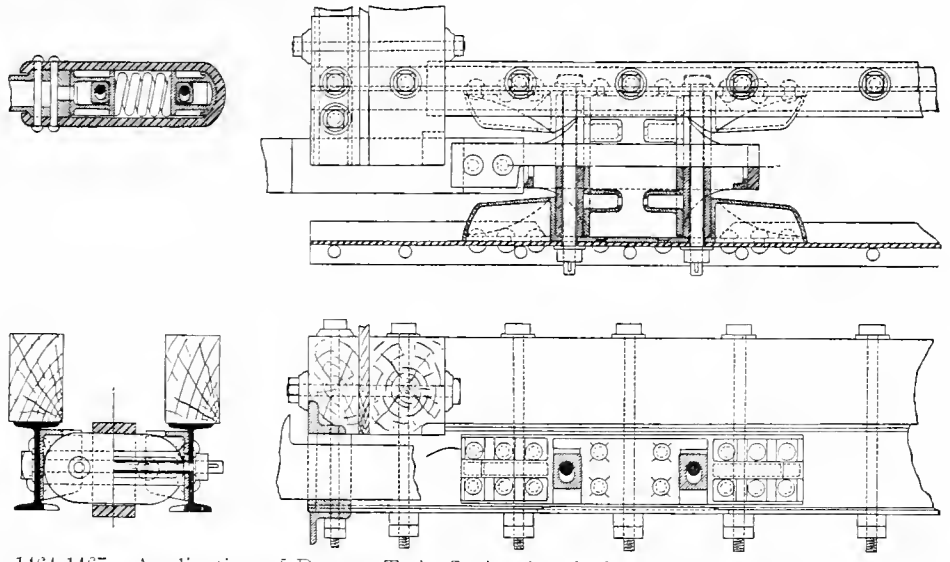
Figs. 1460-1463. Sessions-Standard Friction Draft Gear, Type E, Applied to Car with Wooden Center Sills.

Names of Parts of Figs. 1460-1463.

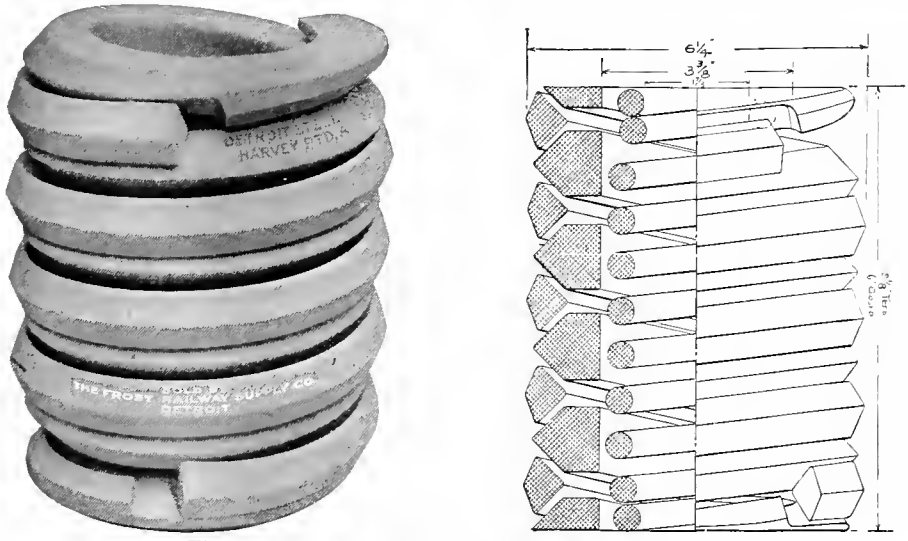
A	*Spring Barrel*
B	*Friction Box*
C	*Side Friction Blocks*
D	*Center Friction Blocks*
E	*Follower Plate*
F	*Cheek Plate, right*
G	*Cheek Plate, left*
H	*Draft Gear Carrier.*
I	*Double Coil Draft Spring*

Names of Parts of Figs. 1423-1436.

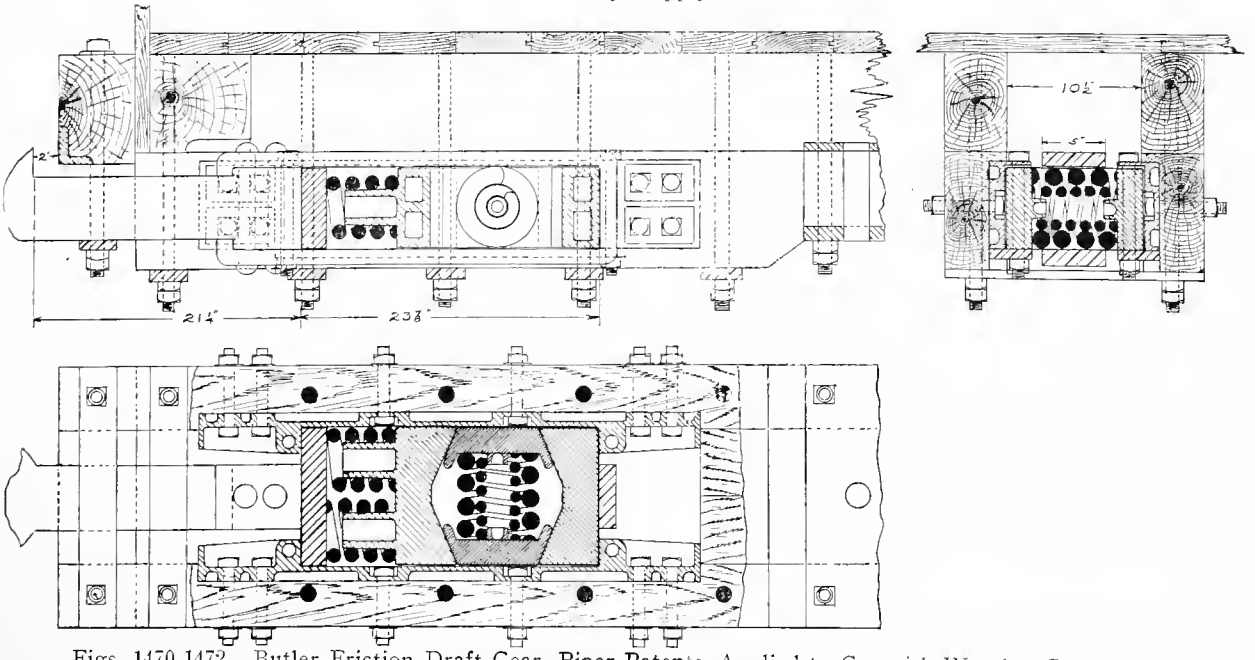
5660	*Standard Friction Draft Gear, complete*
5661	*Draft Gear Cylinder Body*
5662	*Release Spring*
5663	*Preliminary Spring*
5664	*Auxiliary Release Spring*
5665	*Auxiliary Preliminary Spring*
5666	*Nut for Release Pin*
5667	*Release Pin*
5668	*Rivet for Securing Release Pin Nut*
5669	*Wedge*
5670	*Female Segment*
5671	*Male Segment*
5672	*Friction Strip*
5673	*Wedge and Release Pin with Auxiliary Preliminary Spring, complete*



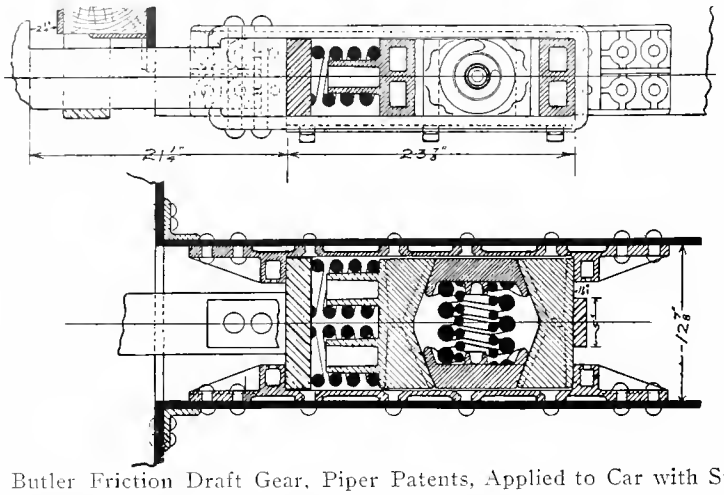
Figs. 1464-1467. Application of Dayton Twin Spring Draft Gear to Car with Steel Underframe.
Dayton Malleable Iron Co.



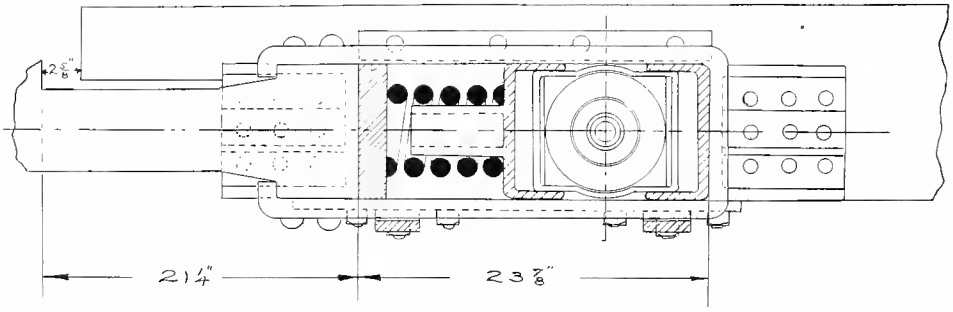
Figs. 1468-1469. Harvey Friction Draft Spring.
Frost Railway Supply Co.

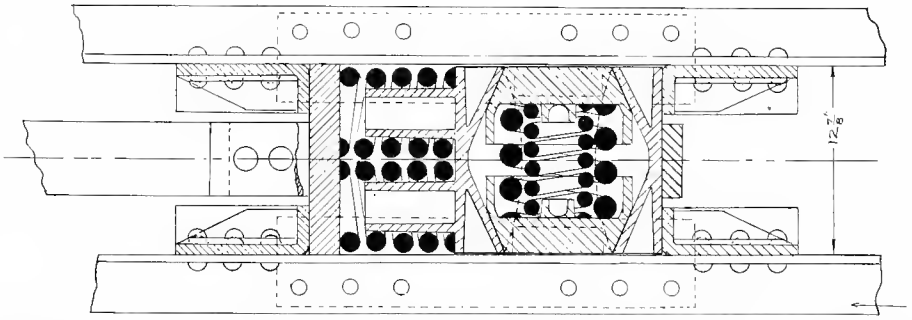


Figs. 1470-1472. Butler Friction Draft Gear, Piper Patents, Applied to Car with Wooden Center Sills.
Butler Drawbar Attachment Co.

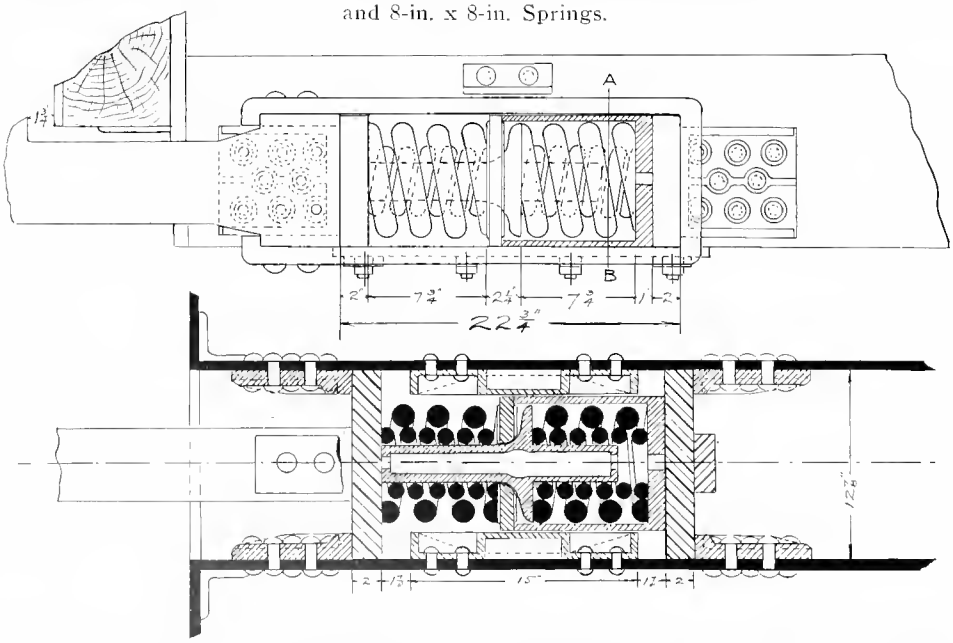


Figs. 1473-1474. Butler Friction Draft Gear, Piper Patents, Applied to Car with Steel Center Sills.





Figs. 1475-1476. Butler Friction Draft Gear, No. 330. Piper Patents, with Standard 6¼-in. x 8-in. and 8-in. x 8-in. Springs.



Figs. 1477-1478. Butler Tandem Spring Draft Gear with 8-in. x 8-in., Class G, Springs, Applied to Car with Steel Center Sills.
Butler Drawbar Attachment Co.

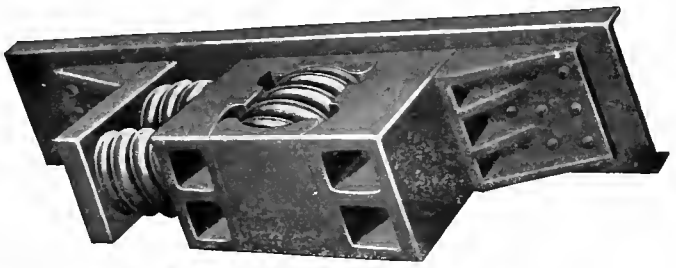
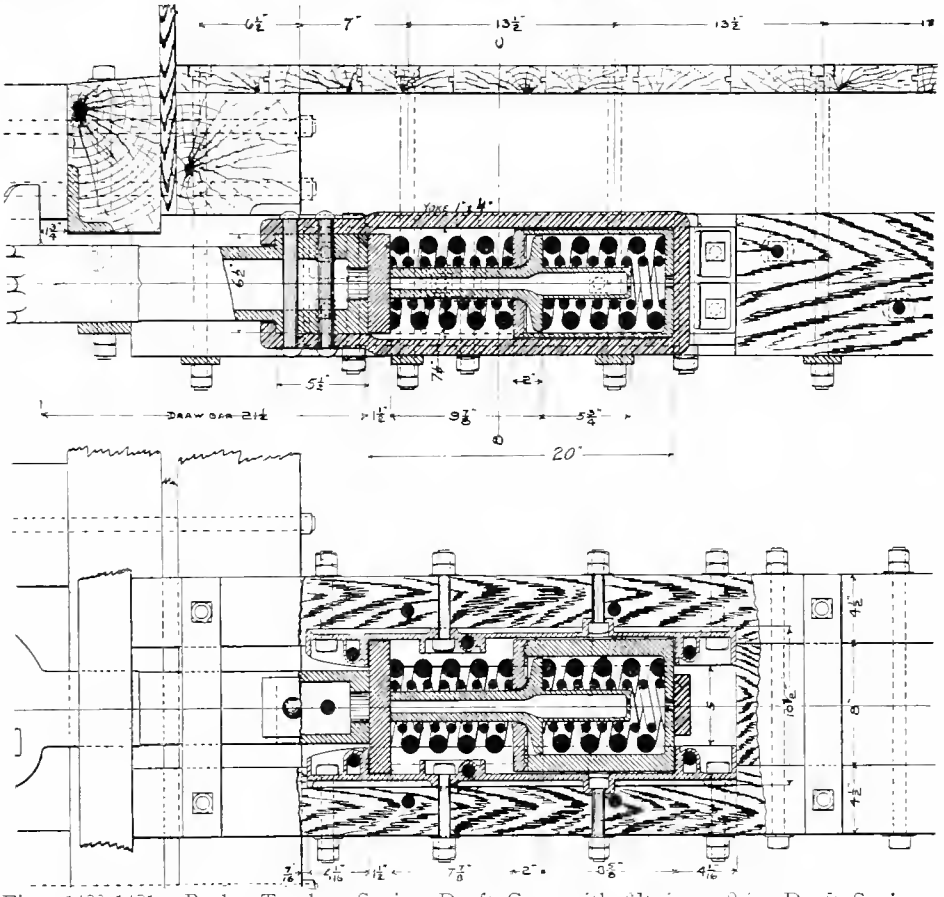
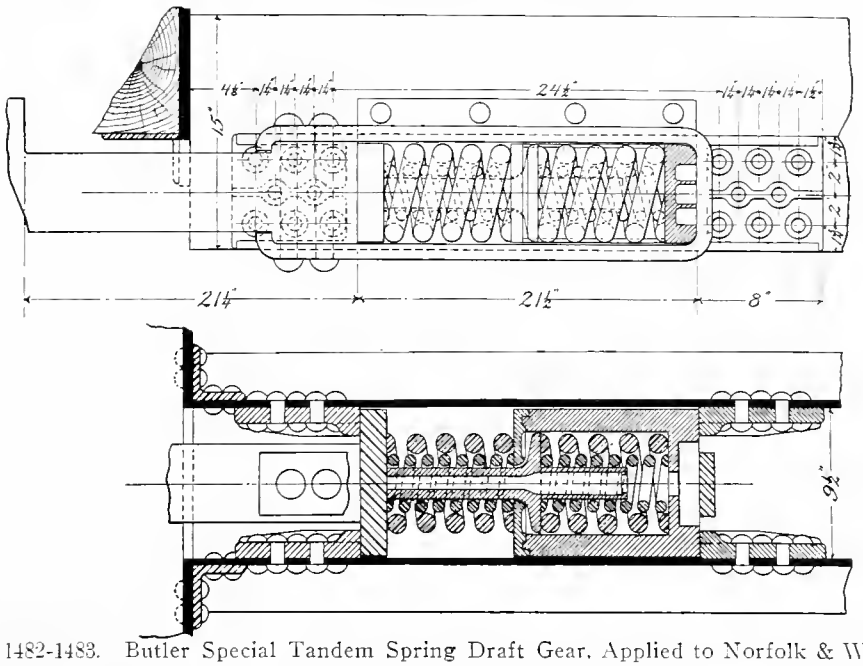


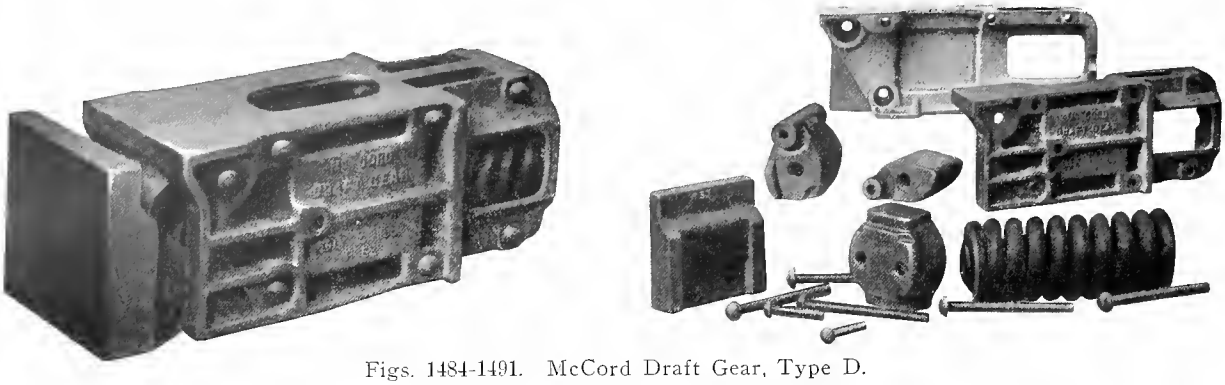
Fig. 1479. Butler Friction Draft Rigging.



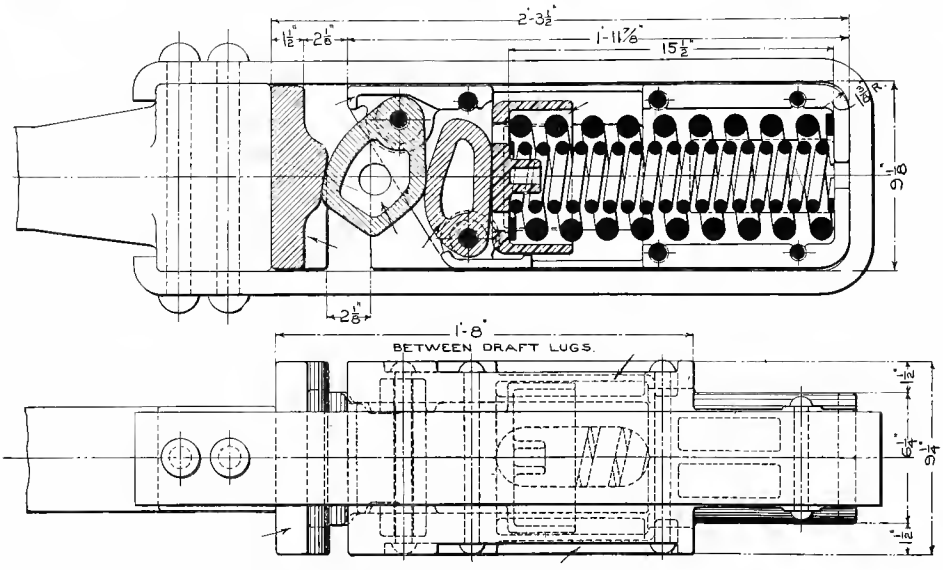
Figs. 1480-1481. Butler Tandem Spring Draft Gear with 6¼-in. x 8-in. Draft Springs, Applied to Car with Wooden Center Sills.



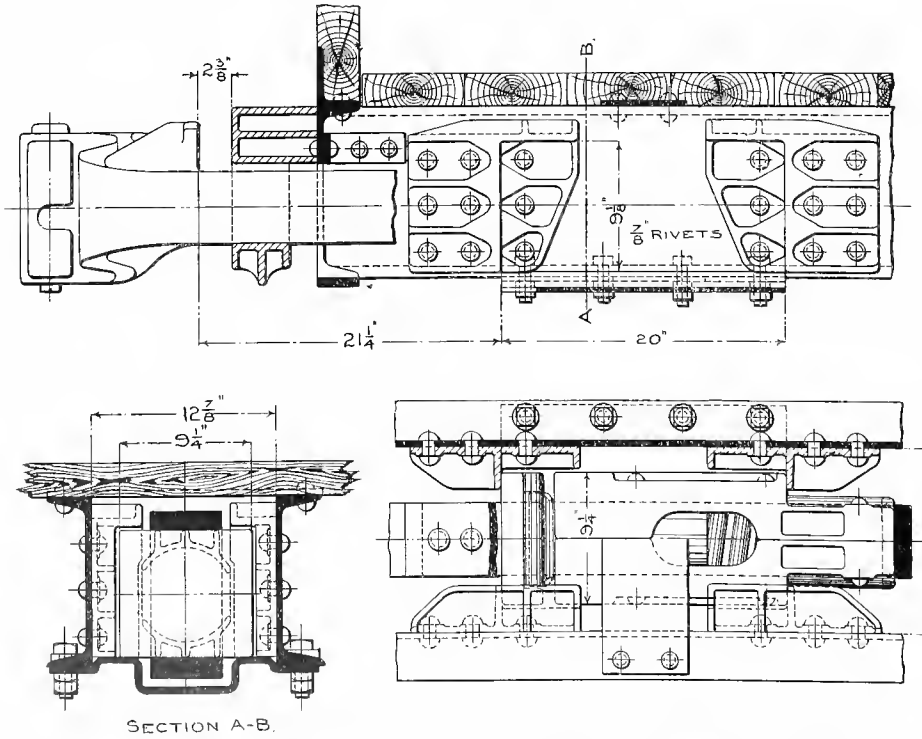
Figs. 1482-1483. Butler Special Tandem Spring Draft Gear, Applied to Norfolk & Western Steel Underframe Cars.
Butler Drawbar Attachment Co.



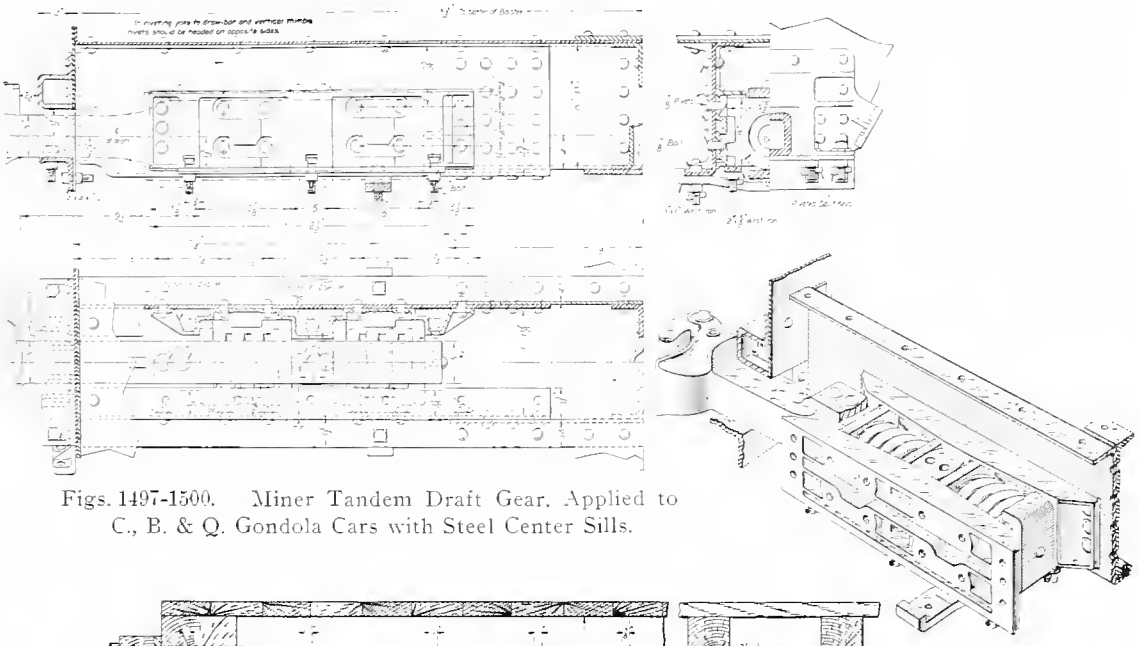
Figs. 1484-1491. McCord Draft Gear, Type D.



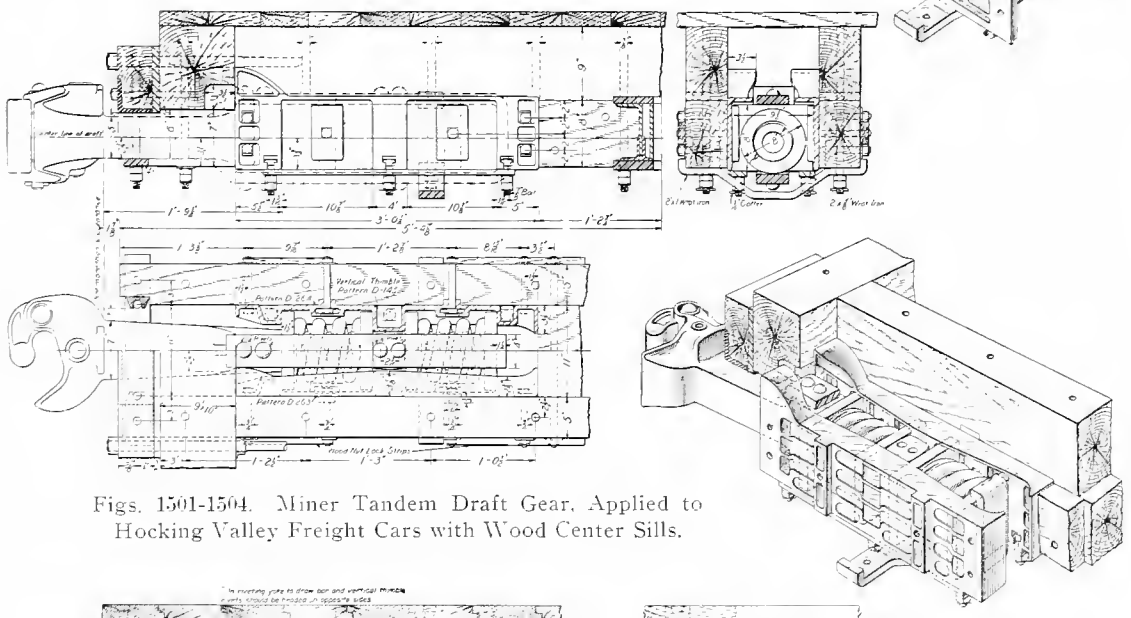
Figs. 1492-1493. McCord Draft Gear, Type D.



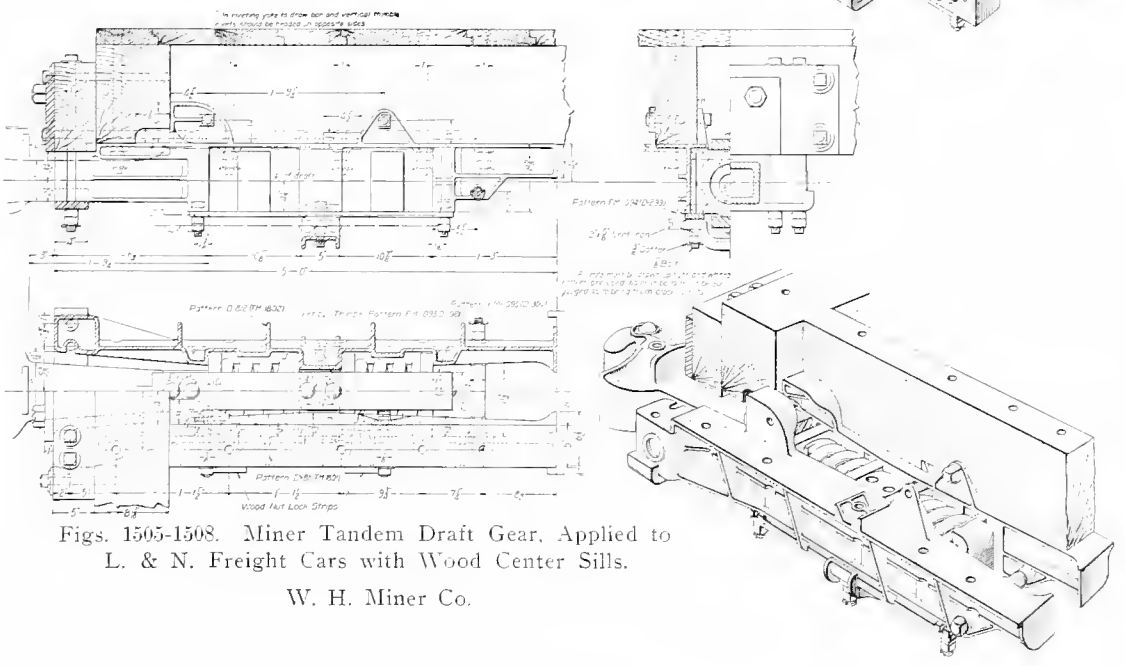
Figs. 1494-1496. Application of Type D Gear to 100,000-lb. Steel Underframe Car. McCord & Company.



Figs. 1497-1500. Miner Tandem Draft Gear, Applied to C., B. & Q. Gondola Cars with Steel Center Sills.

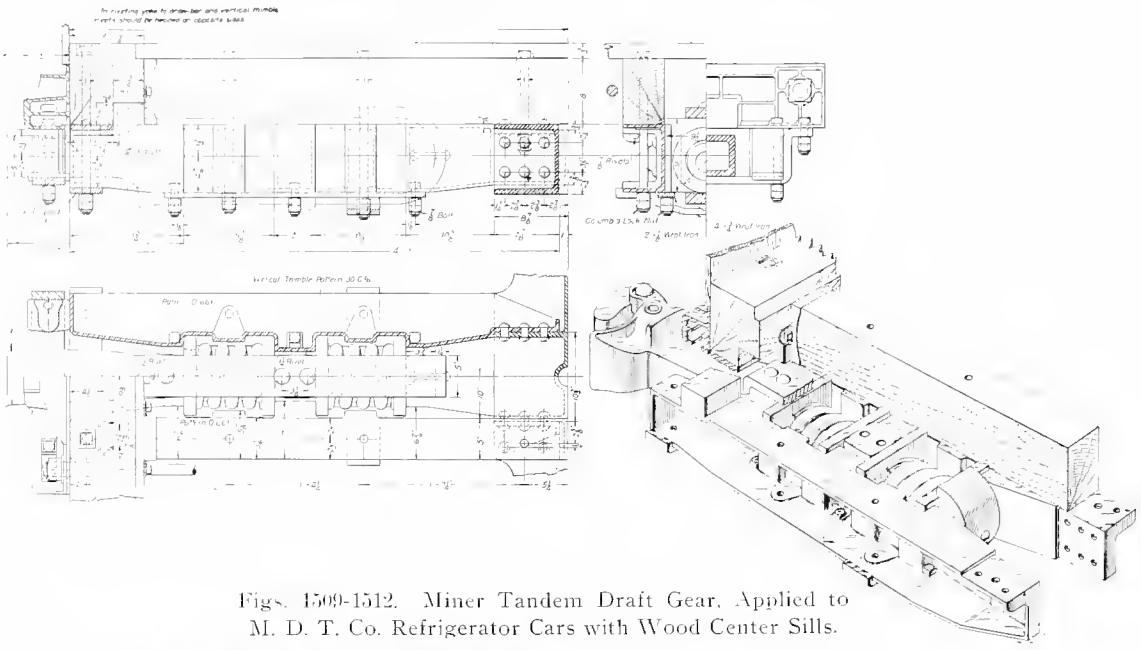


Figs. 1501-1504. Miner Tandem Draft Gear, Applied to Hocking Valley Freight Cars with Wood Center Sills.

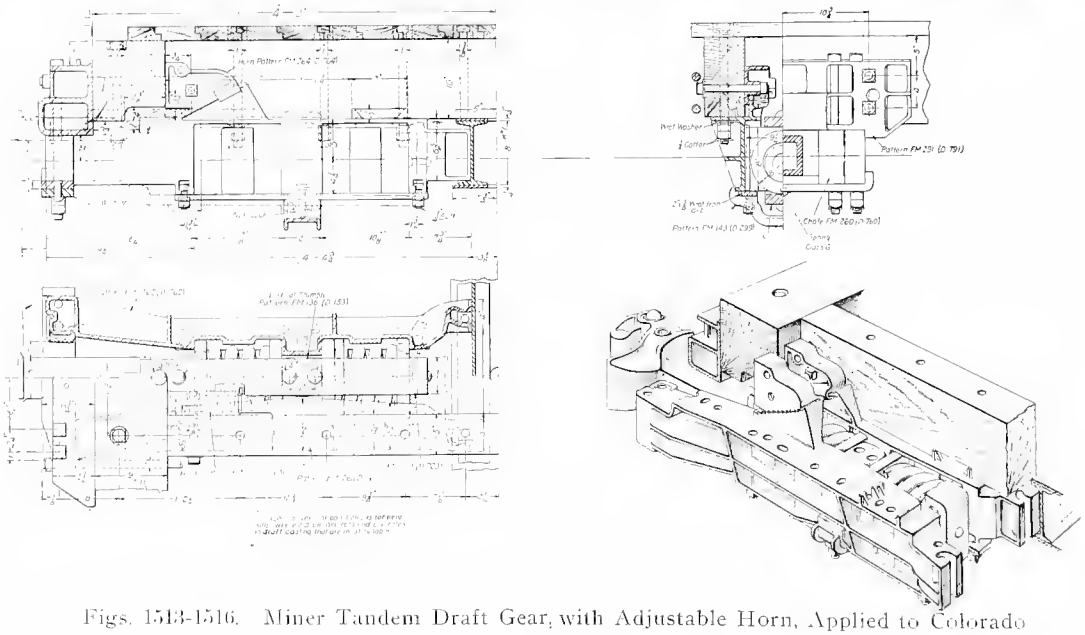


Figs. 1505-1508. Miner Tandem Draft Gear, Applied to L. & N. Freight Cars with Wood Center Sills.

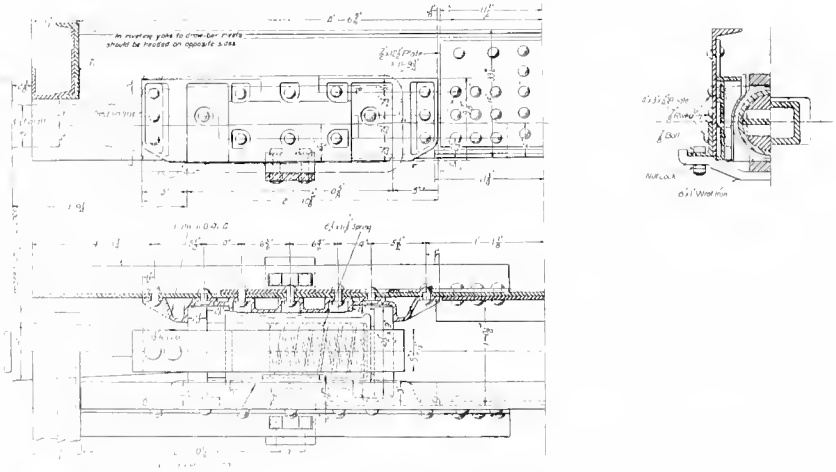
W. H. Miner Co.



Figs. 1509-1512. Miner Tandem Draft Gear, Applied to M. D. T. Co. Refrigerator Cars with Wood Center Sills.

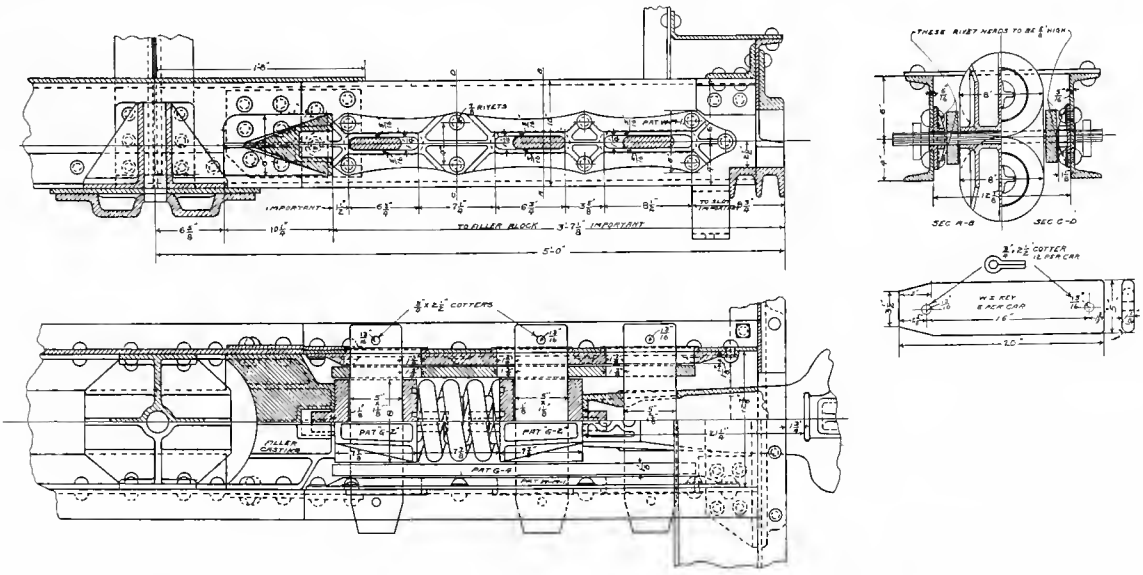


Figs. 1513-1516. Miner Tandem Draft Gear, with Adjustable Horn, Applied to Colorado & Southern Cars with Wood Center Sills.

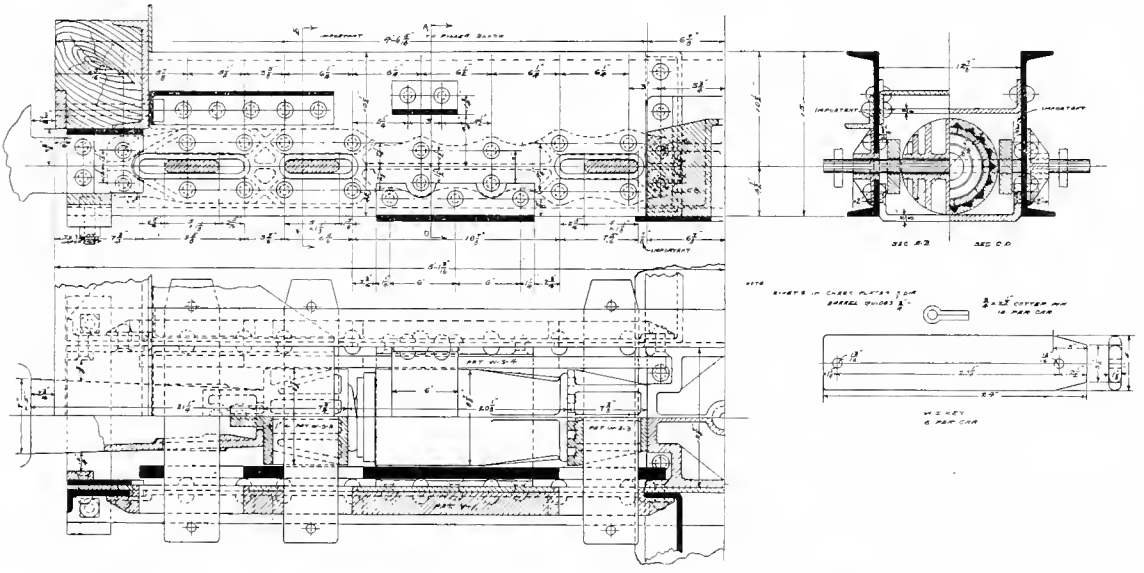


Figs. 1517-1519. Miner Friction Draft Gear, Applied to D., L. & W. Cars with Steel Center Sills.

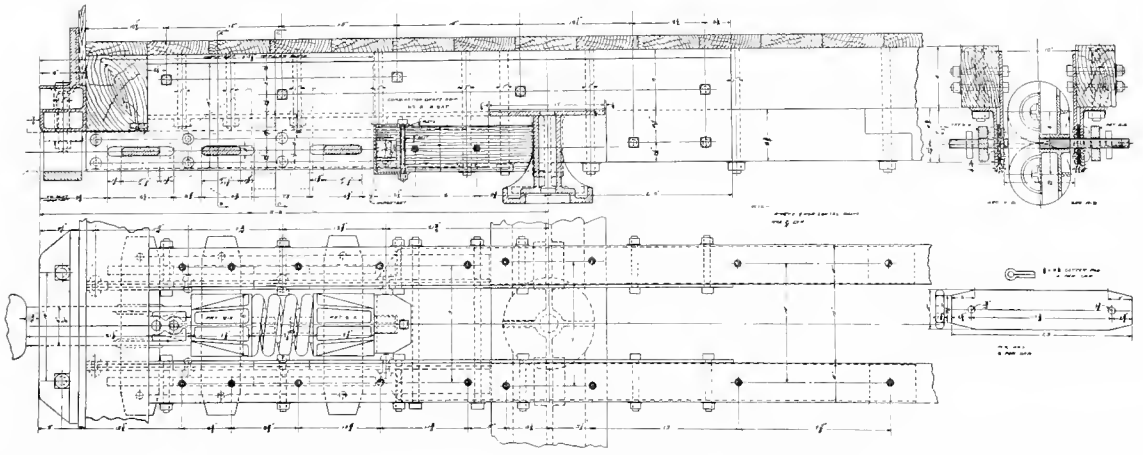
W. H. Miner Co.



Figs. 1520-1523. Farlow Twin, Class G, Spring Draft Gear, Applied to 50-Ton Steel Cars.



Figs. 1524-1527. Combination of Farlow Draft Gear Attachments and Westinghouse Friction Barrel, Applied to 50-Ton Steel Cars.



Figs. 1528-1531. Farlow Twin, Class G, Spring Draft Gear, with Combination Plate and Angle Draft Arms, Applied to 40-Ton Wood Underframe Cars.

Farlow Draft Gear Co.

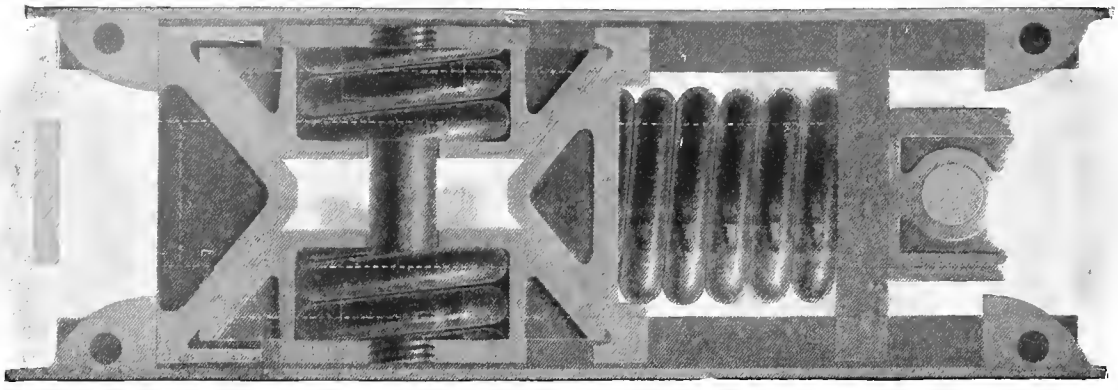
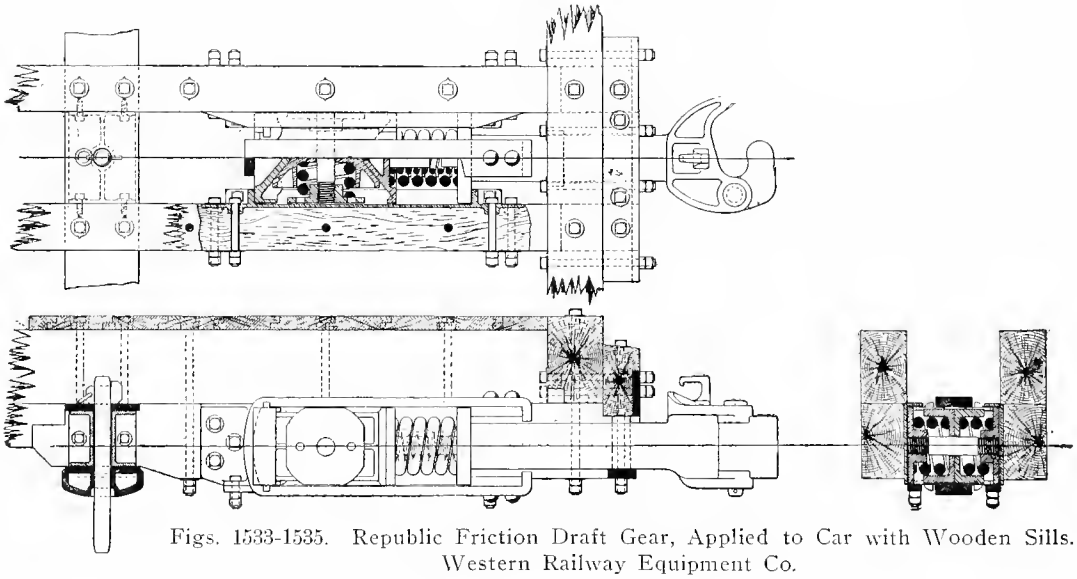
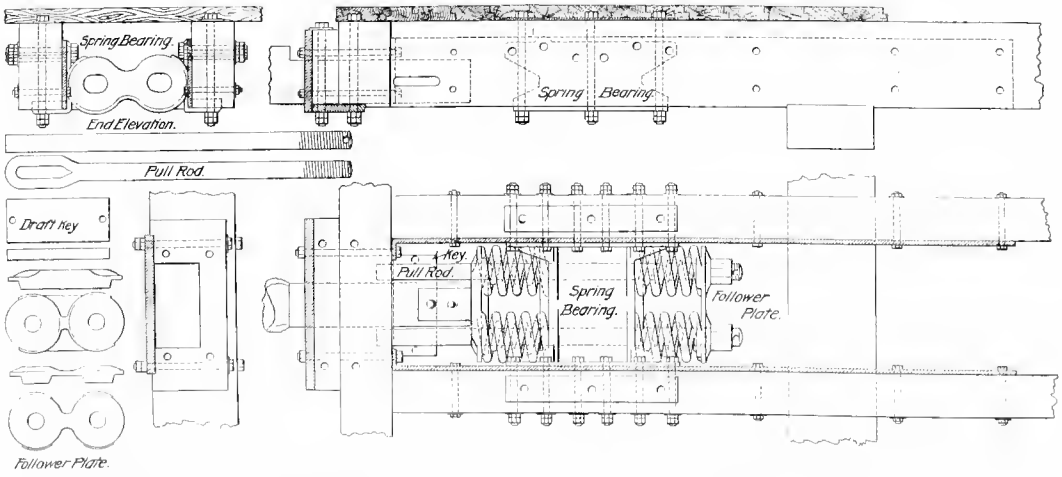


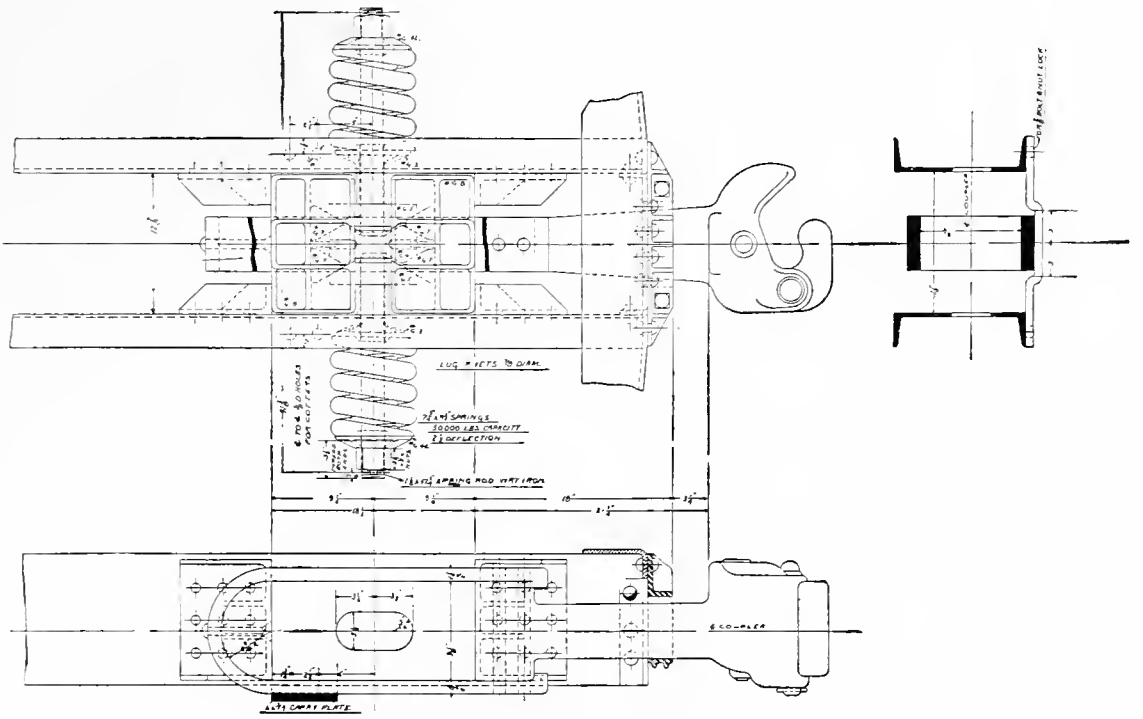
Fig. 1532. Sectional Plan of Republic Friction Draft Gear.



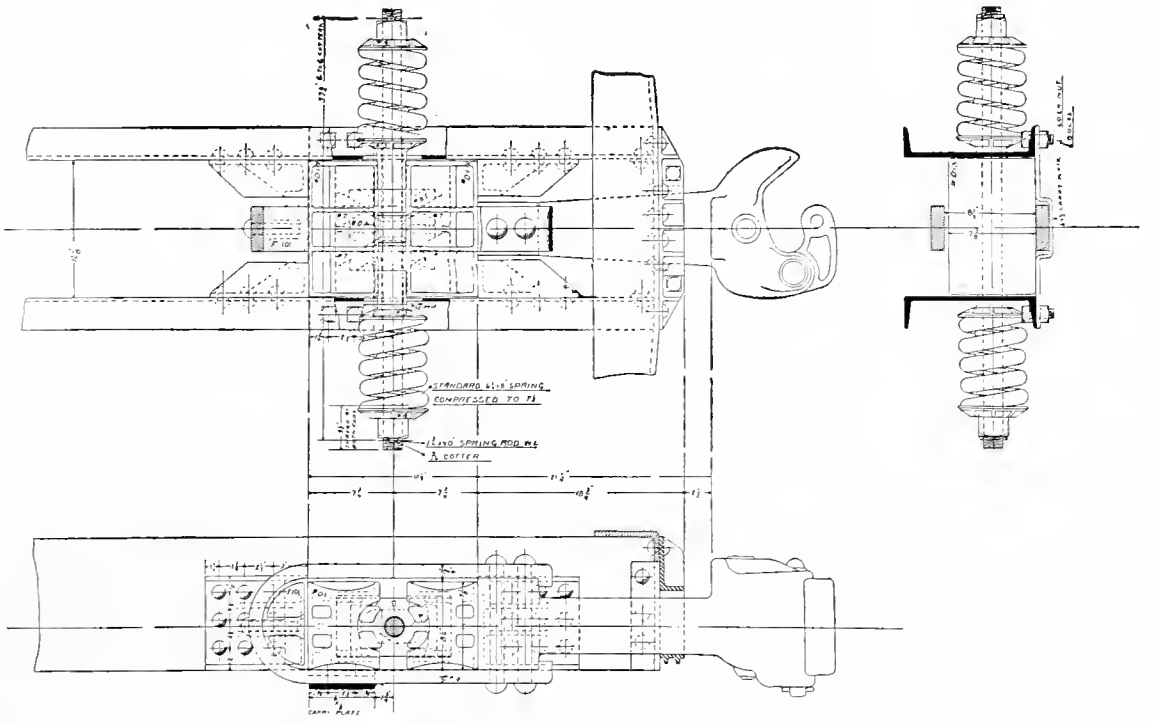
Figs. 1533-1535. Republic Friction Draft Gear, Applied to Car with Wooden Sills. Western Railway Equipment Co.



Figs. 1536-1539. Solid Draft Gear, Four Springs, Applied to Car with Wooden Underframes.



Figs. 1540-1542. Cardwell Friction Draft Gear, Type G-8.



Figs. 1543-1545. Cardwell Friction Draft Gear, Type D.
Union Draft Gear Co.

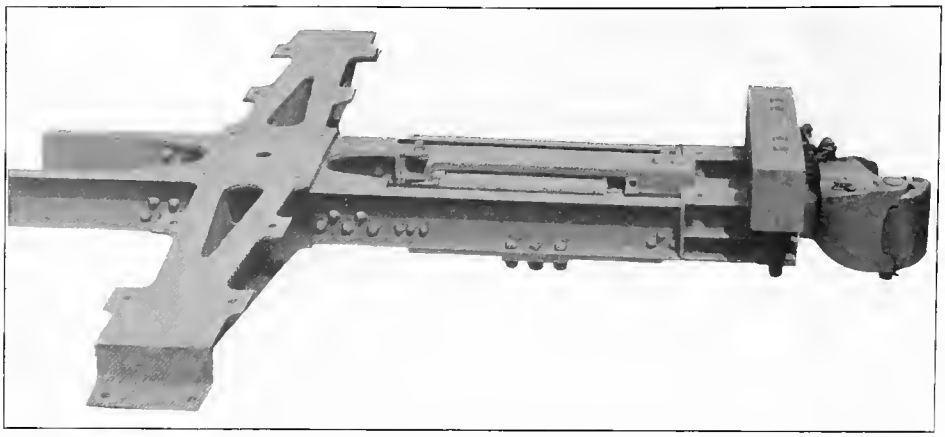
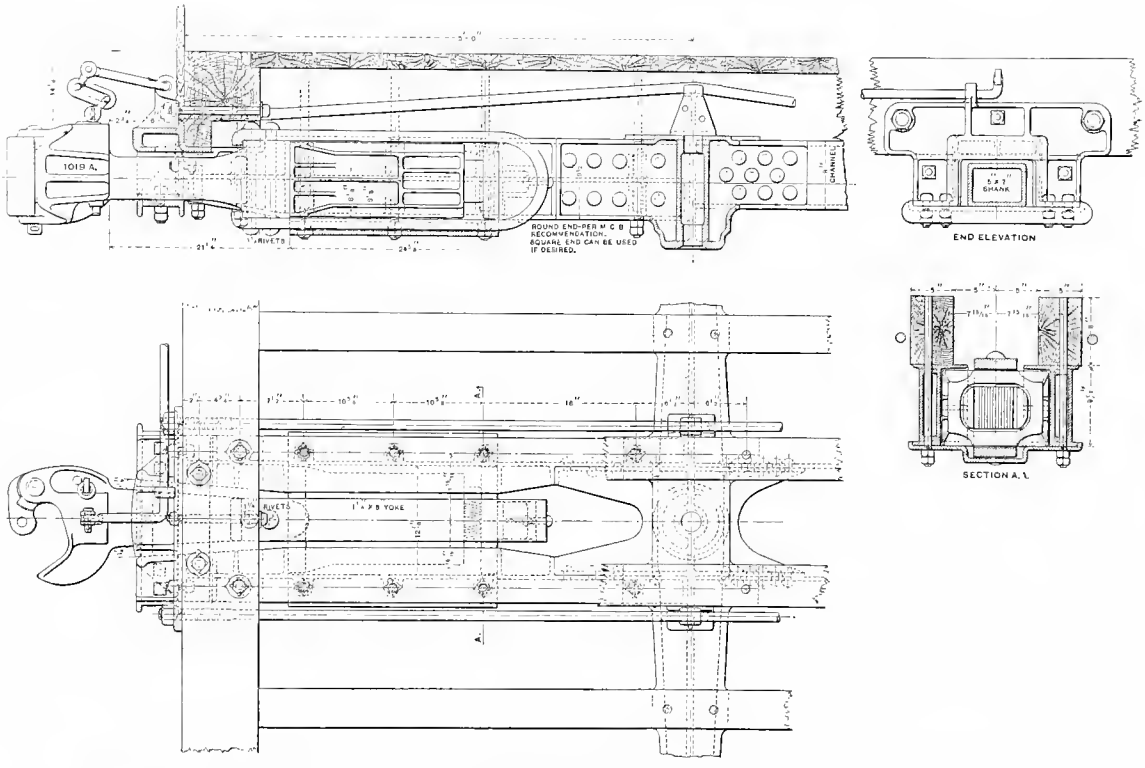


Fig. 1546. Cast Steel Bolster and Channel Draft Beams. Gould Coupler Co.



Figs. 1547-1550. Friction Draft Gear, Application with Cast Steel Body Bolster. Gould Coupler Co.

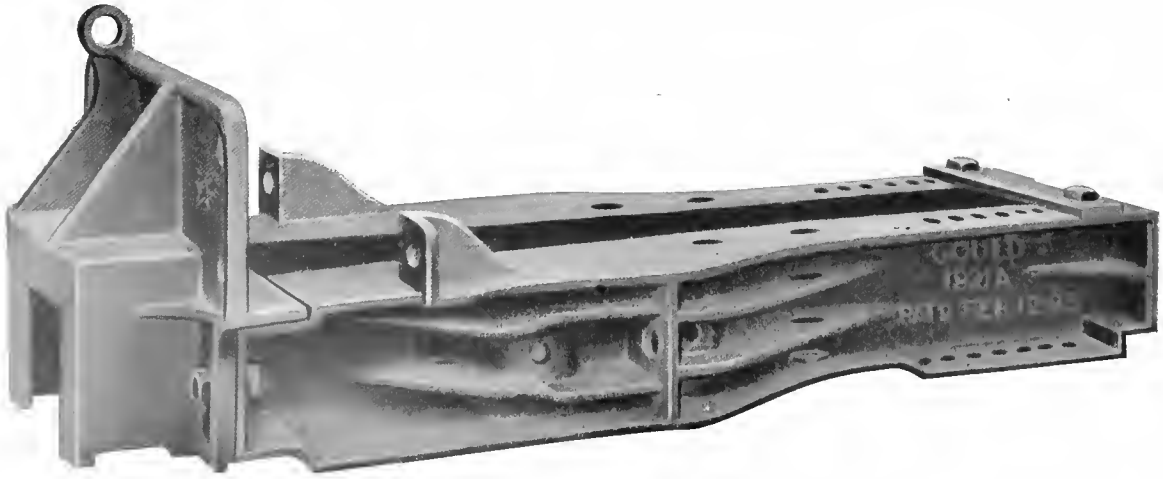
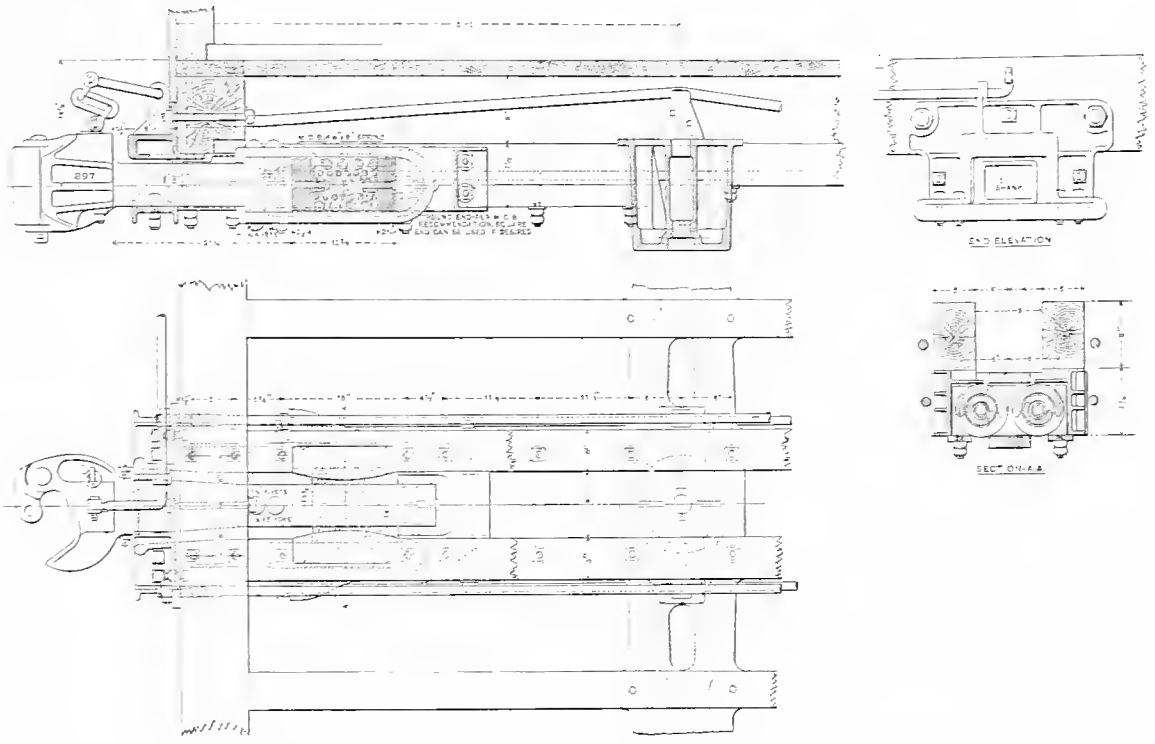
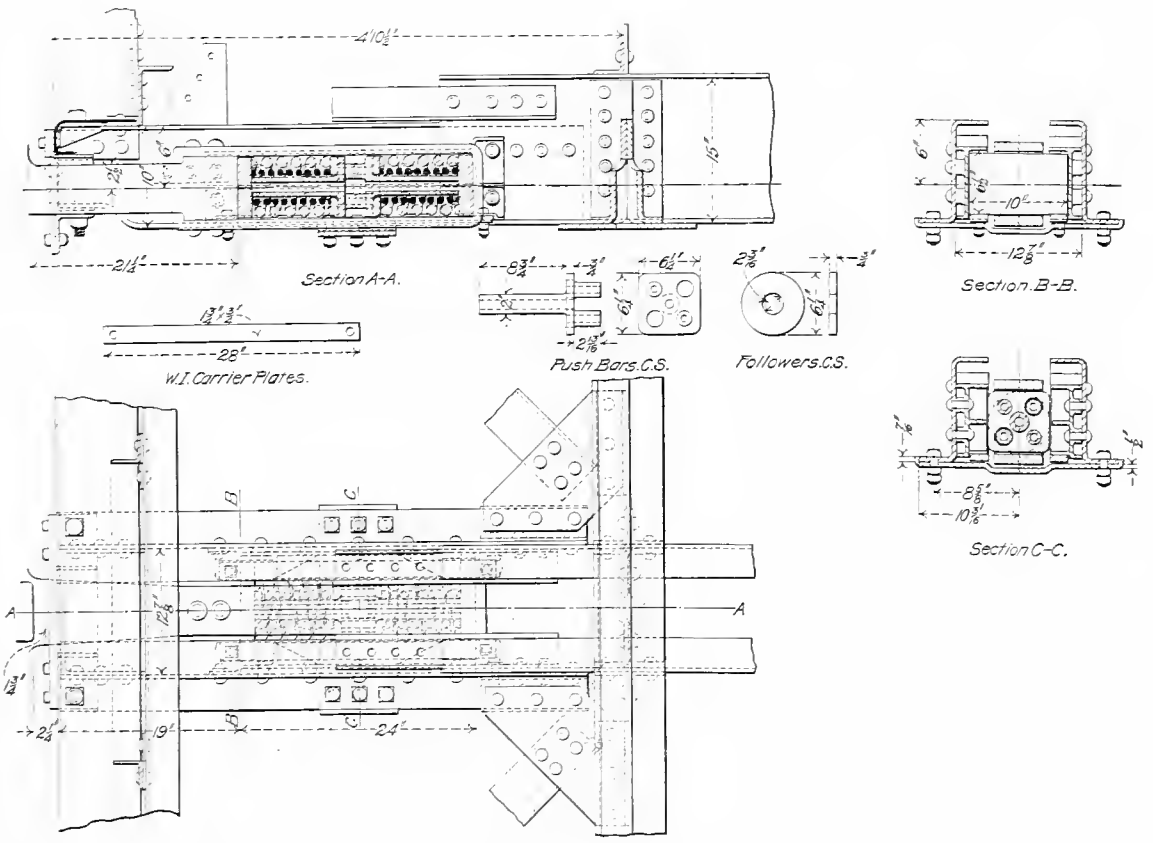


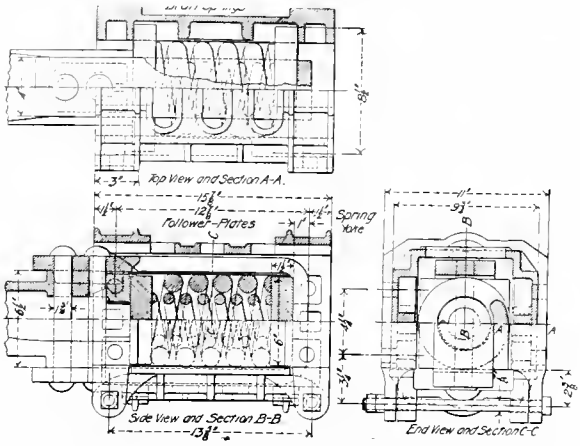
Fig. 1551. Extended Steel Draft Beams from End Sill to Body Bolster. Gould Coupler Co.



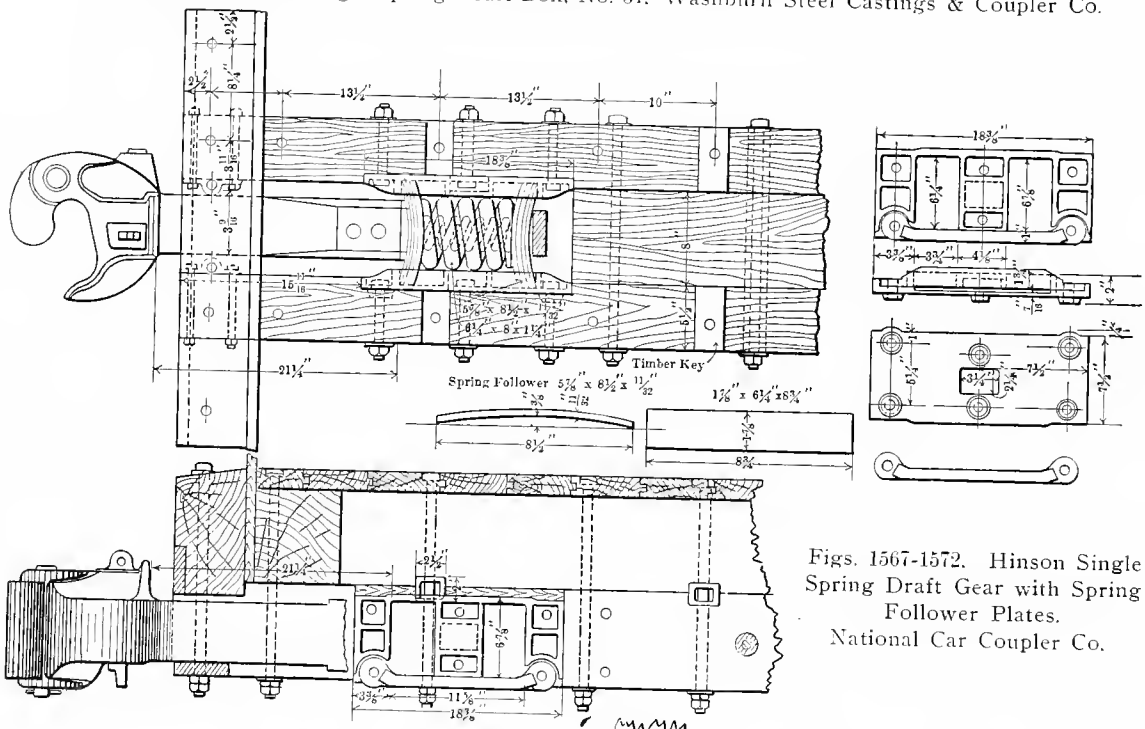
Figs. 1552-1555. Application of Metal Draft Beam for Twin Spring Draft Gear.
Gould Coupler Co.



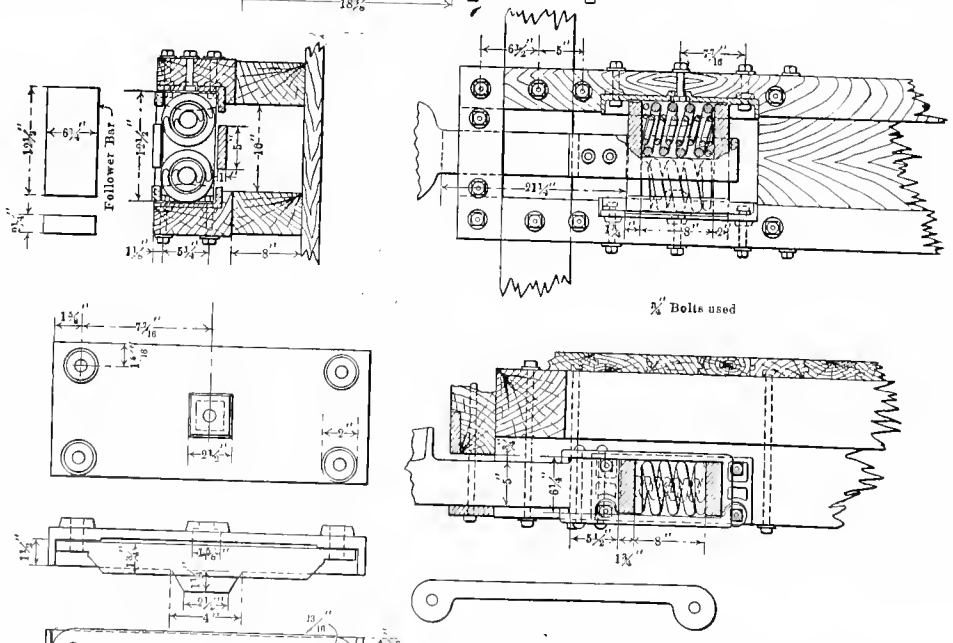
Figs. 1556-1563. Application of Push-Bar Tandem Spring Draft Gear to Steel Car.
Gould Coupler Co.



Figs. 1564-1566. Single Spring Draft Box, No. 51. Washburn Steel Castings & Coupler Co.



Figs. 1567-1572. Hinson Single Spring Draft Gear with Spring Follower Plates. National Car Coupler Co.



Figs. 1573-1579. Hinson Twin Spring Draft Gear Applied to Cars with Wooden Sills. National Car Coupler Co.

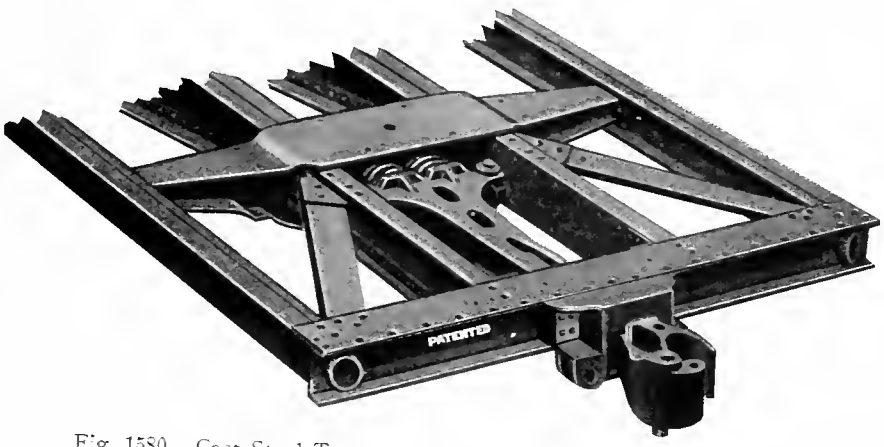


Fig. 1580. Cast Steel Transom Draft Gear for Steel Freight Cars.

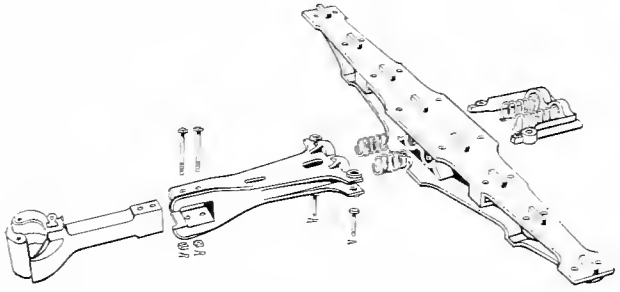


Fig. 1581. Details of Cast Steel Transom Draft Gear for Wood Freight Cars.

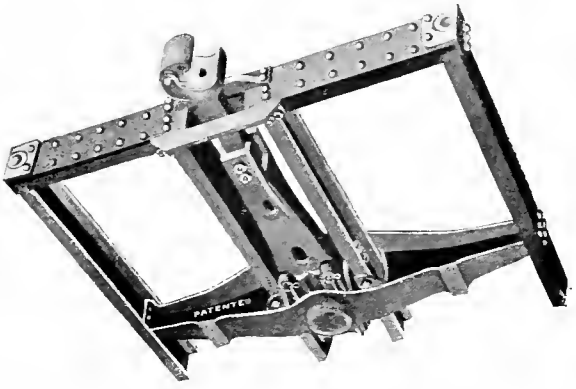


Fig. 1581a. Cast Steel Transom Draft Gear for Steel Freight Cars.

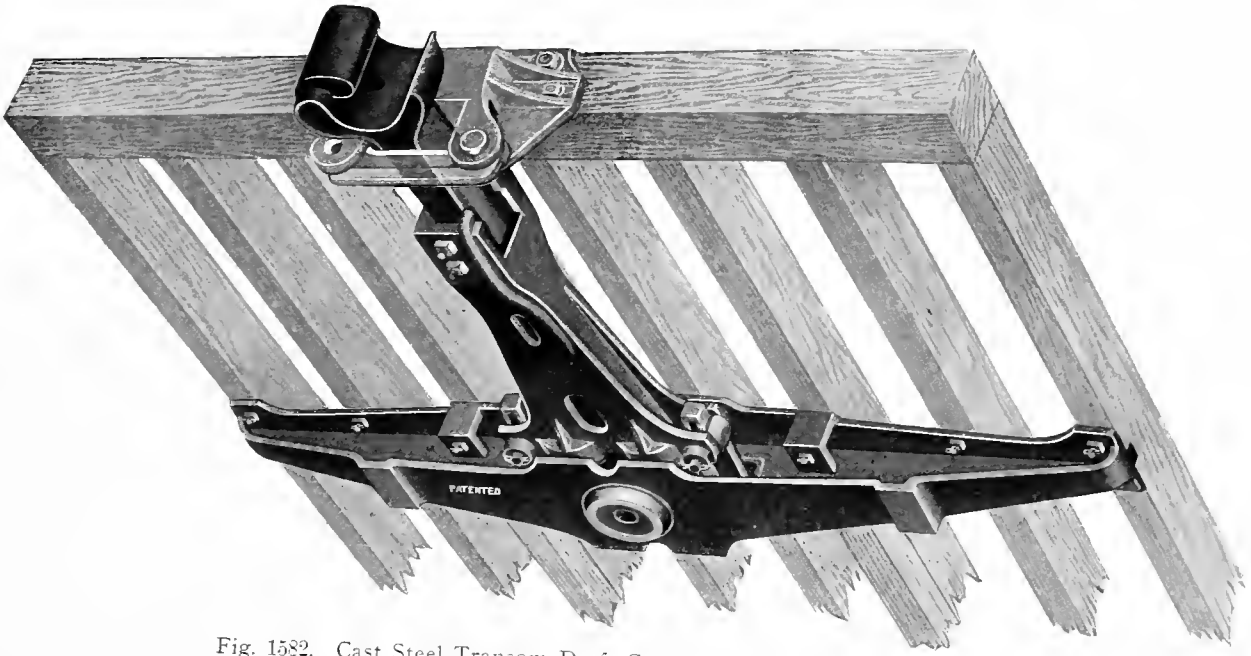


Fig. 1582. Cast Steel Transom Draft Gear for Wood Freight Cars.

Commonwealth Steel Co.

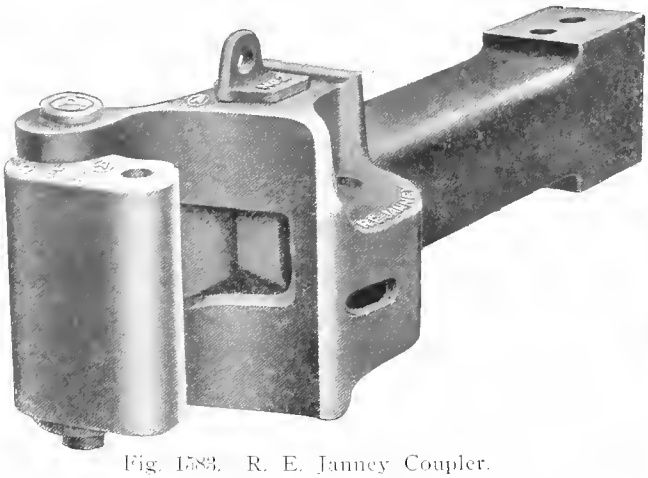


Fig. 1583. R. E. Janney Coupler.

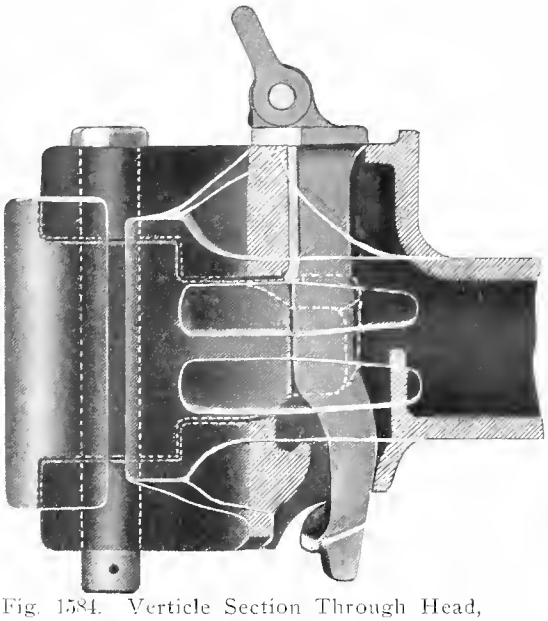
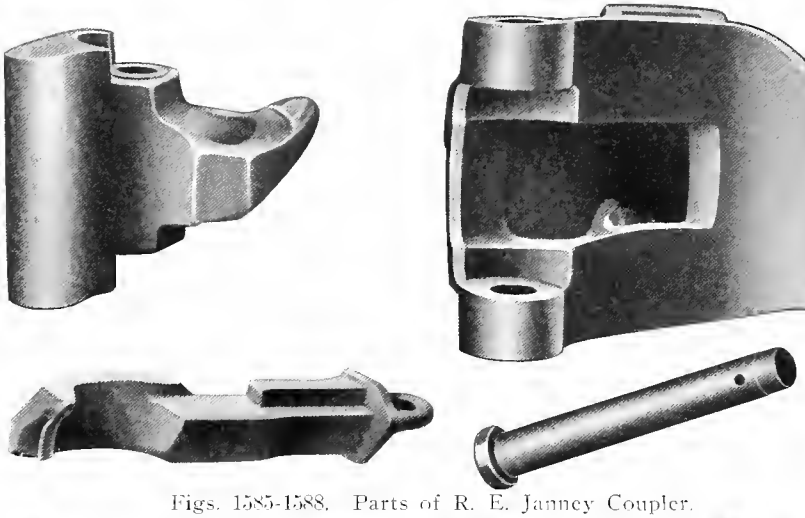


Fig. 1584. Verticle Section Through Head, R. E. Janney Coupler.



Figs. 1585-1588. Parts of R. E. Janney Coupler.

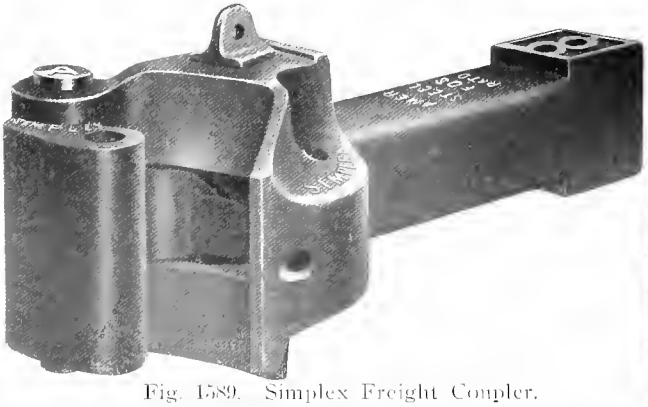


Fig. 1589. Simplex Freight Coupler.

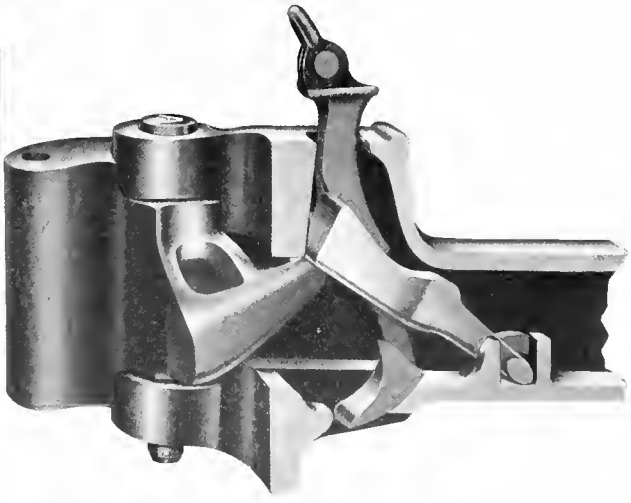


Fig. 1590. Verticle Section Through Head, Simplex Freight Coupler.

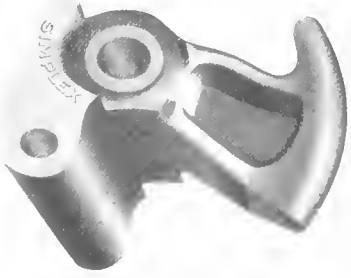
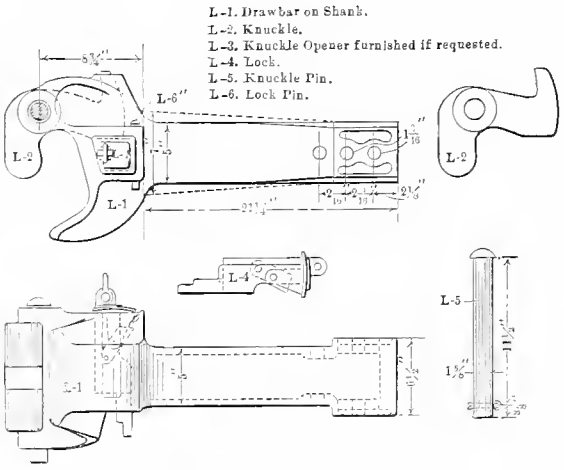


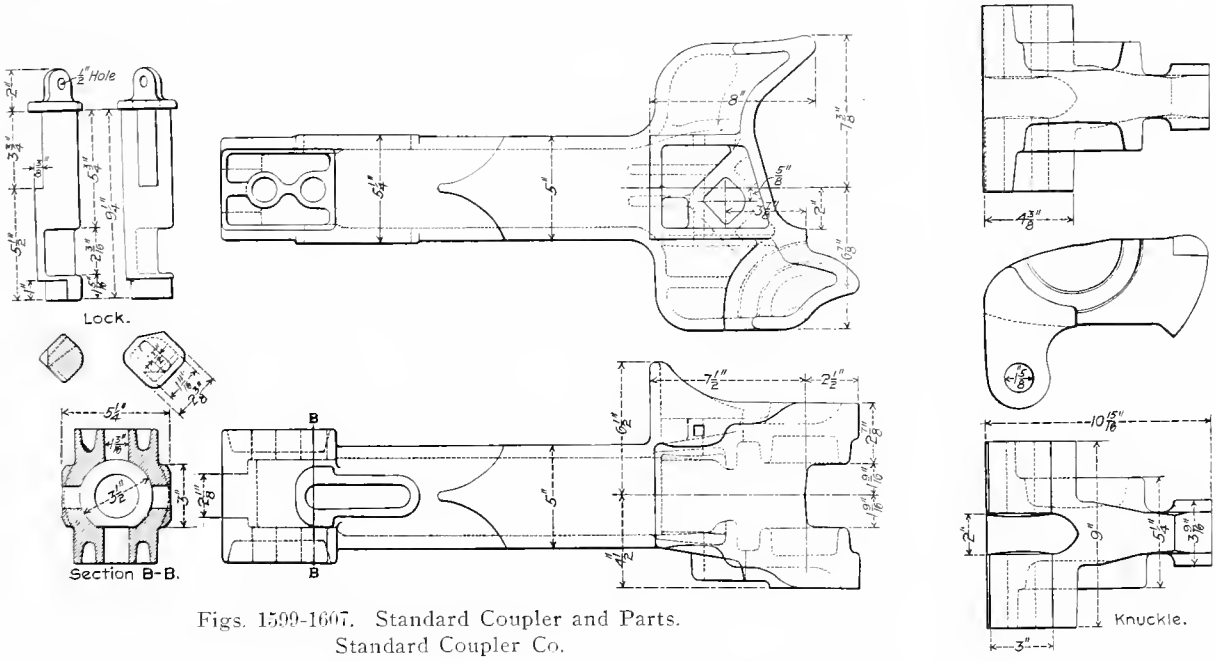
Fig. 1591. Knuckle.

Fig. 1592. Lifter.

Fig. 1593. Gould Freight Coupler.
Gould Coupler Co.

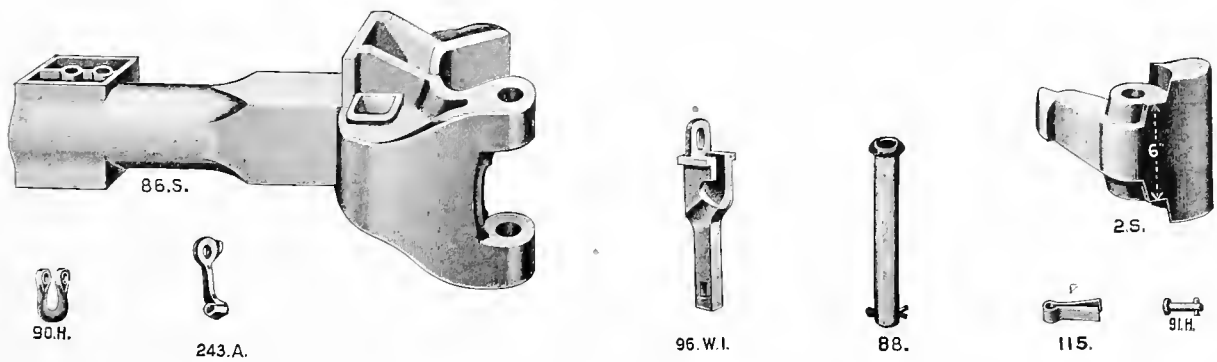


Figs. 1594-1598. National Freight Coupler.
National Car Coupler Co.

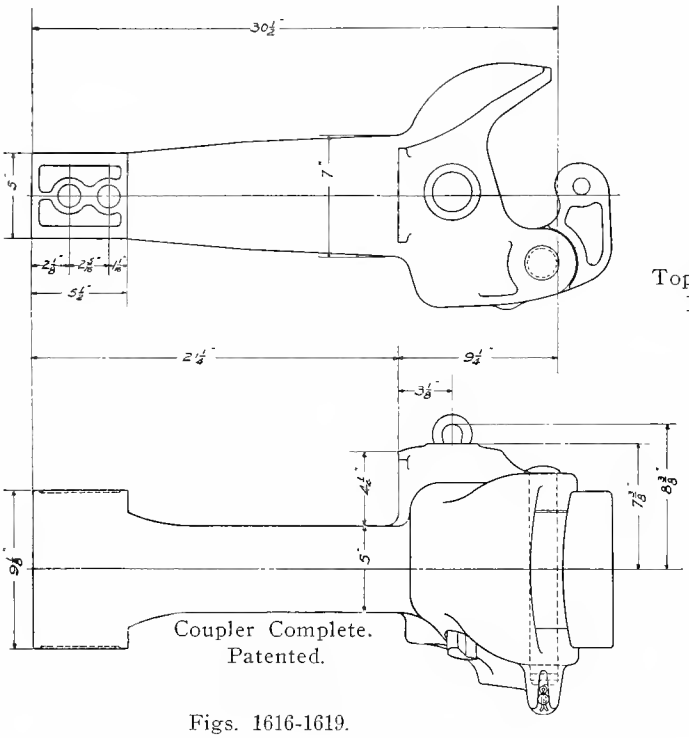


Figs. 1599-1607. Standard Coupler and Parts.
Standard Coupler Co.

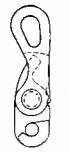
Numbers Refer to List of Names of Parts on Page 274.



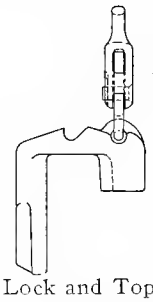
Figs 1608-1615. Janney Coupler and Parts. McConway & Torley Co.



Figs. 1616-1619.
Sharon Top Operating Freight Coupler.

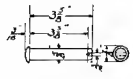


Top Lock Lift.
Patented.



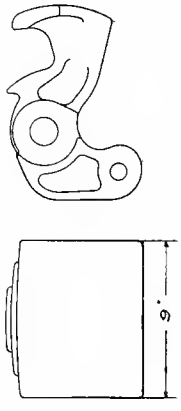
Top Lock Lift can be detached if bottom operation is desired.

Lock and Top Lift.
Patented.



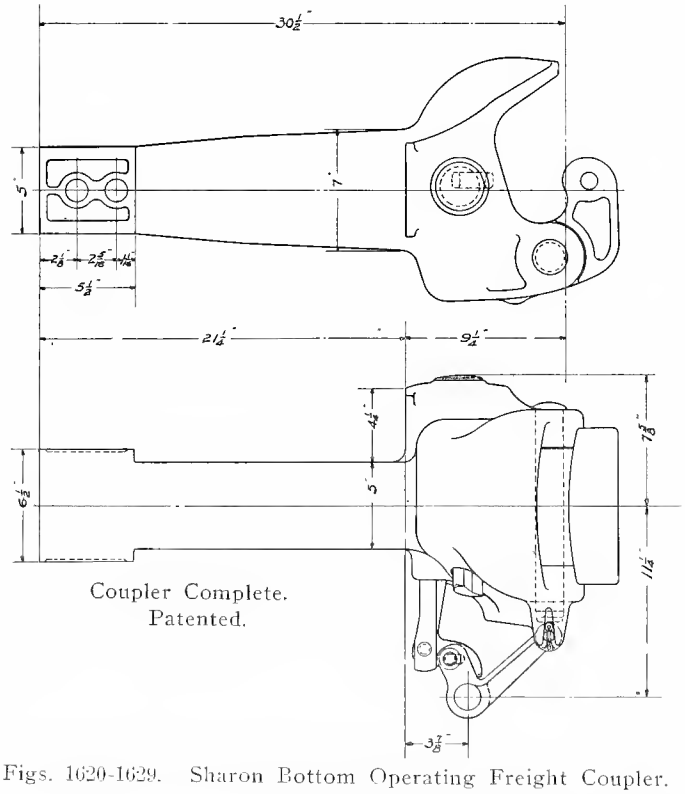
Support Pin.

Knuckle Pin.

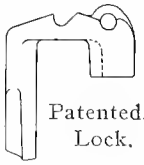


Knuckle.
Patented.

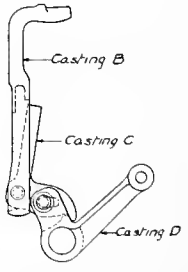
Parts Common to Both Couplers.



Chain Hole Cap.
Patented.



Patented.
Lock.

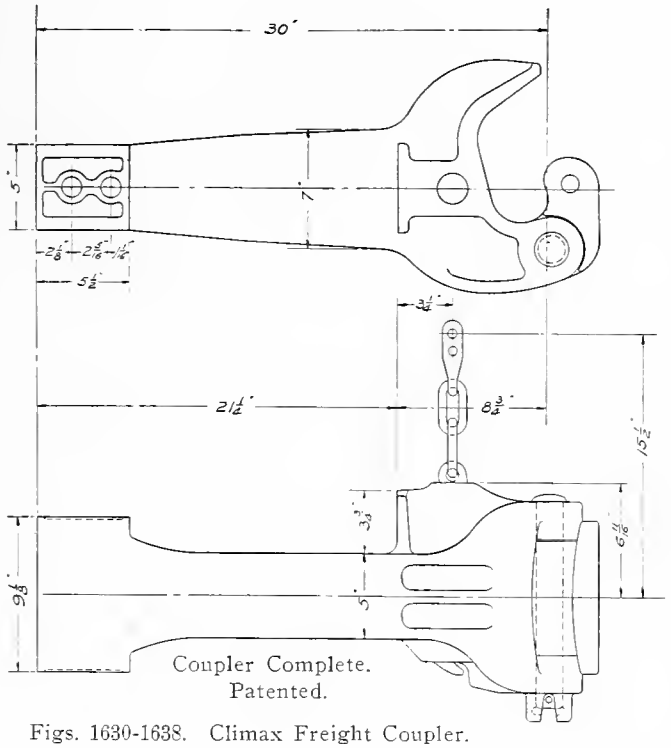


Bottom Lock Lift.
Patented.

Figs. 1620-1629. Sharon Bottom Operating Freight Coupler.

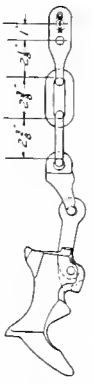
(Finished with any style of shank. Common styles of shanks, Figs. 1658-1705.)

The National Malleable Castings Co.

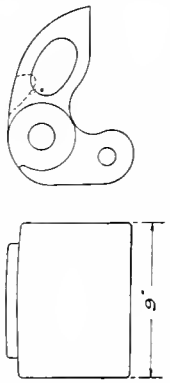


Coupler Complete.
Patented.

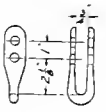
Figs. 1630-1638. Climax Freight Coupler.



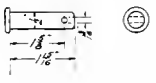
Lock and Chain.
Patented.



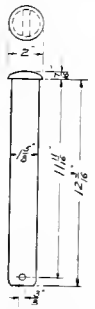
Knuckle.
Patented.



Clevis.

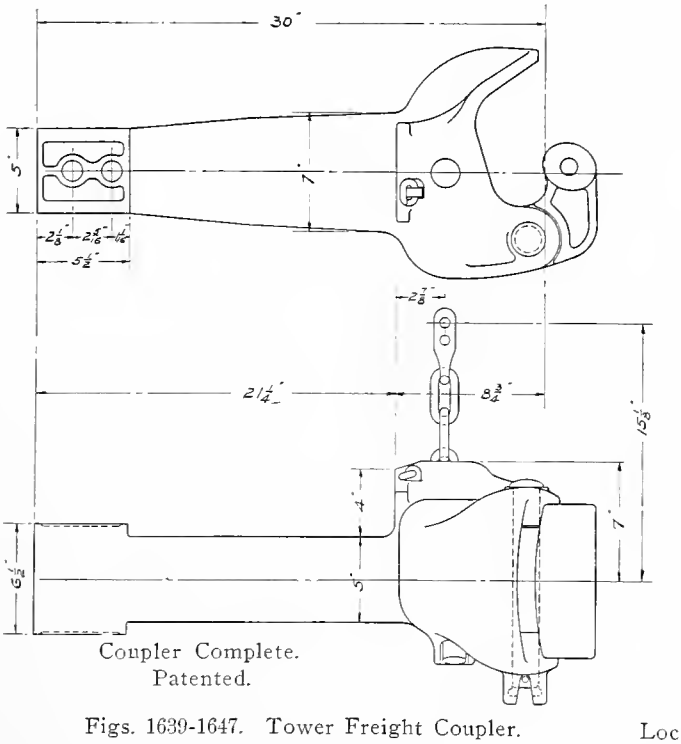


Clevis Pin.



Knuckle Pin.

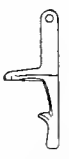
Parts Common to Both Couplers.



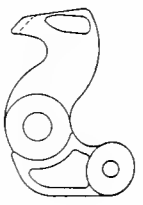
Coupler Complete.
Patented.

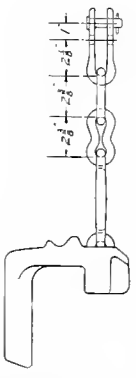
Figs. 1639-1647. Tower Freight Coupler.

Lock Set Ring.

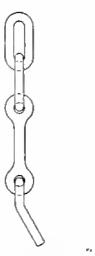


Lock Set.
Patented.

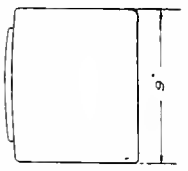


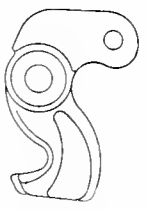


Lock and Chain.
Patented.



Chain.
Patented.

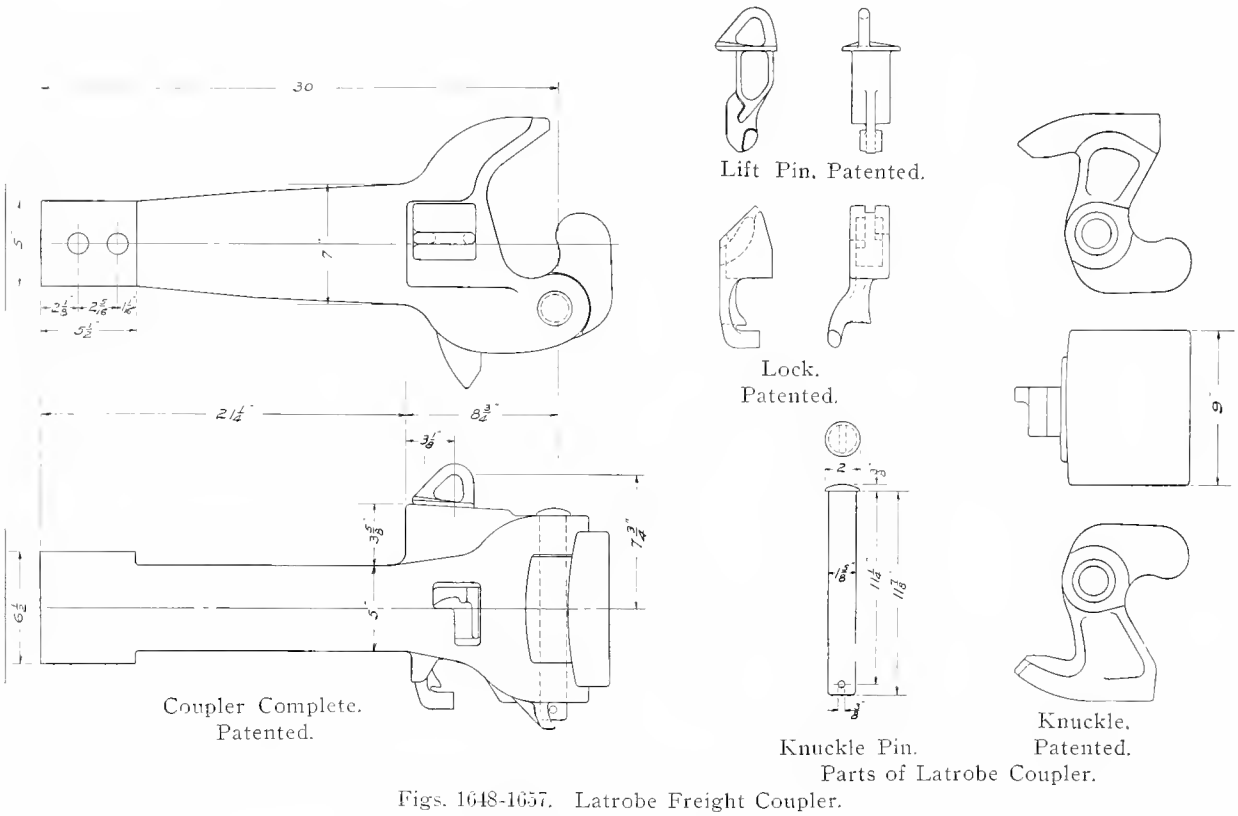




Knuckle.
Patented.

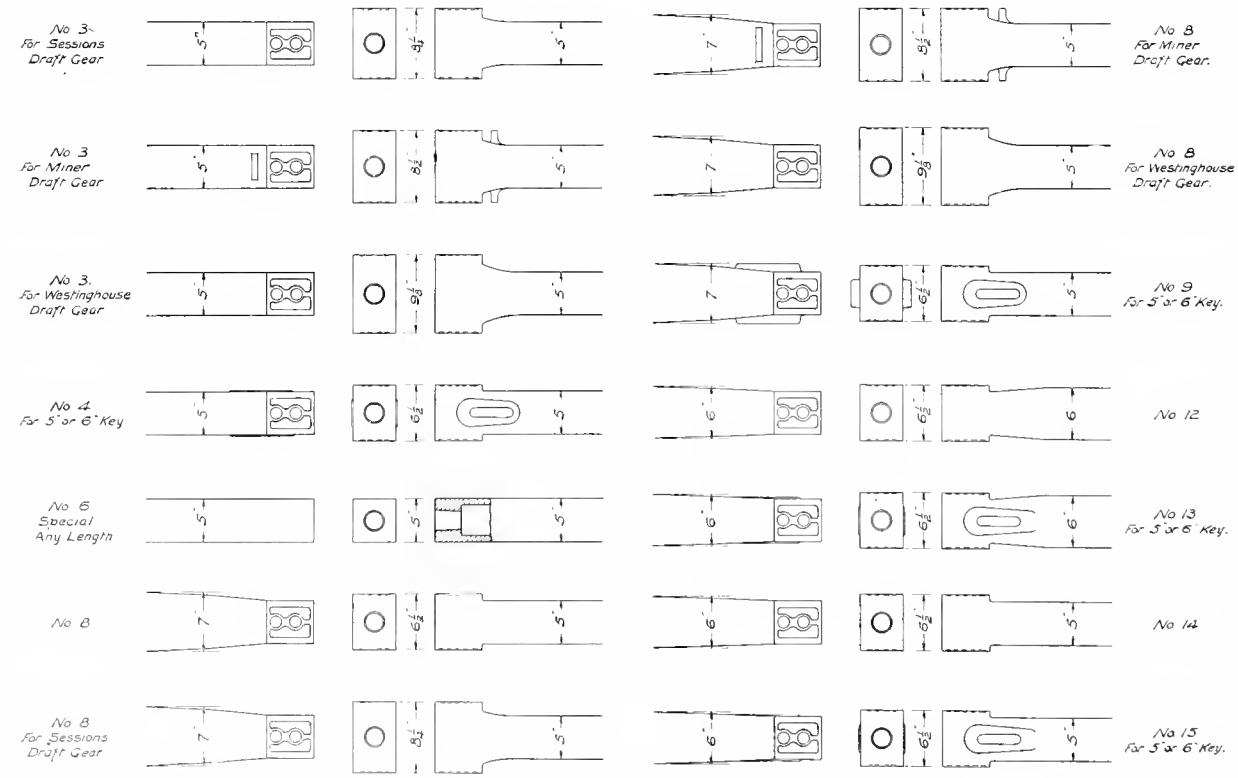
(Finished with any style of shank. Common styles of shanks, Figs. 1658-1705.)

The National Malleable Castings Co.



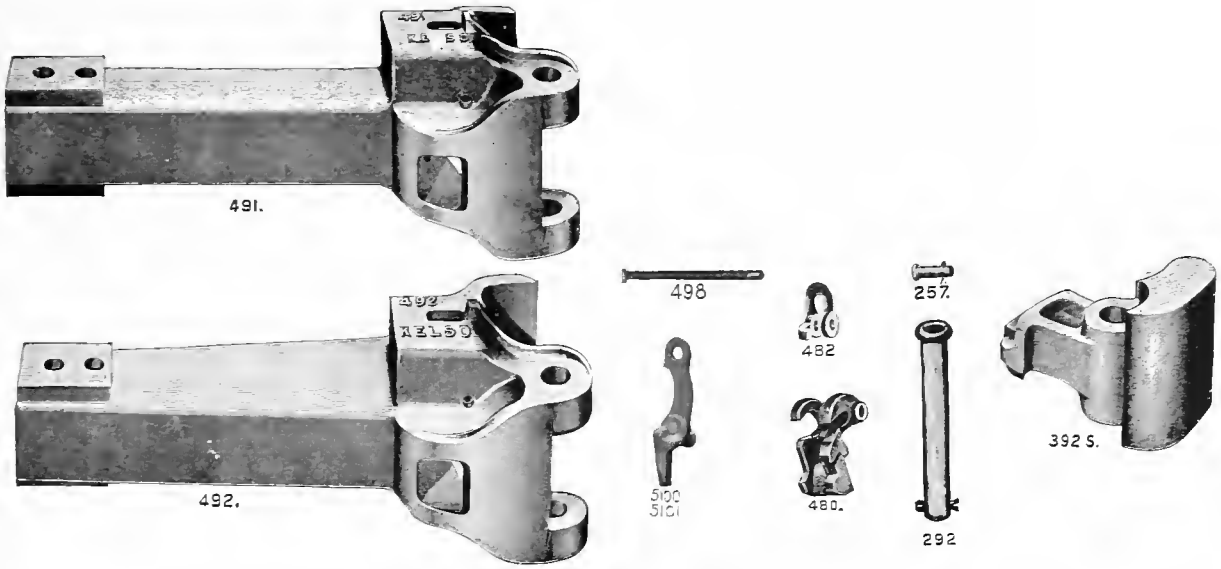
Figs. 1648-1657. Latrobe Freight Coupler.

(Finished with any style of shank.)

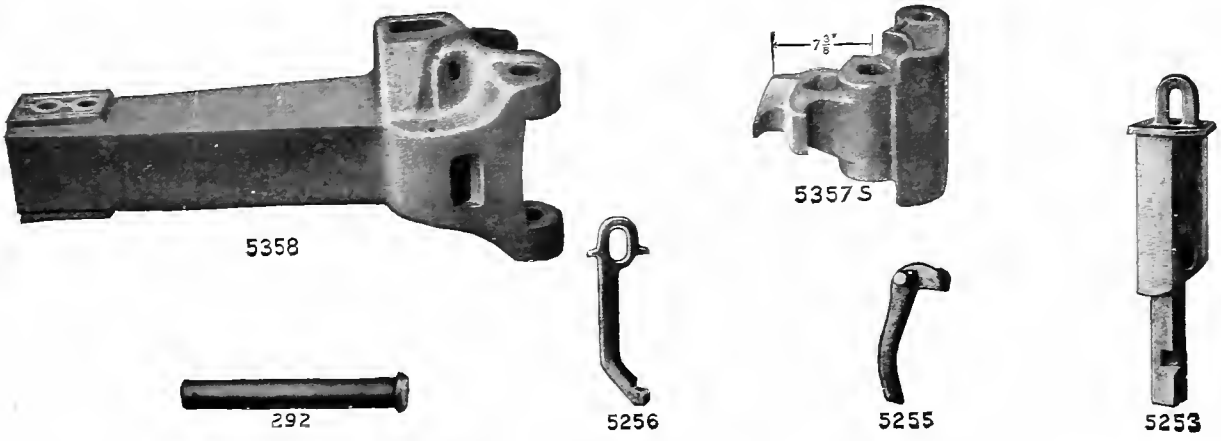


Figs. 1658-1705. Common Styles of Coupler Shanks for Different Draft Gear Arrangements.
The National Malleable Castings Co.

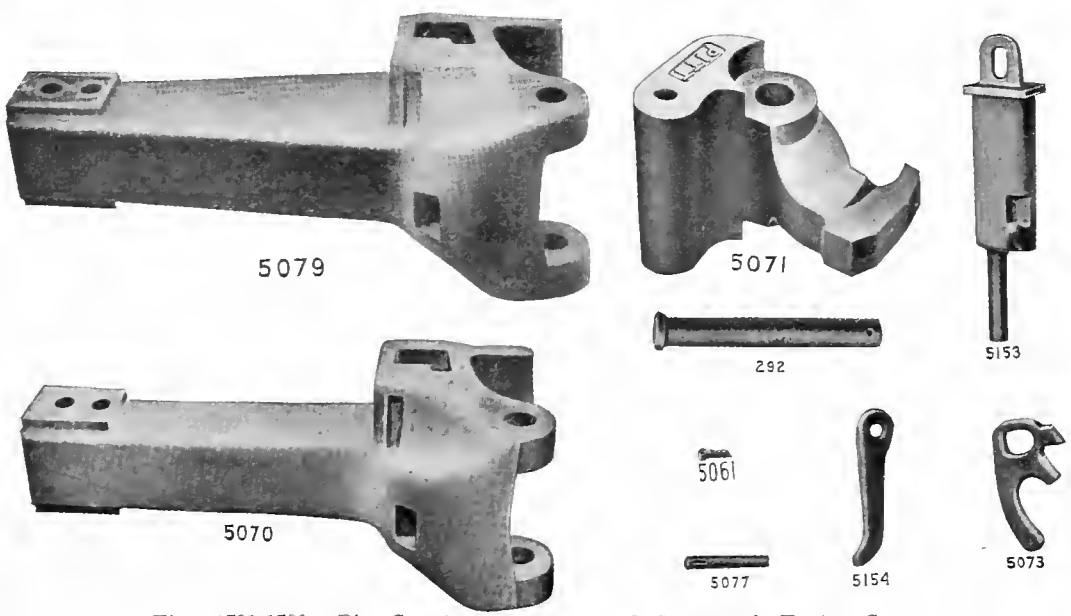
Numbers Refer to List of Names of Parts on Next Page.



Figs. 1706-1714. Kelso Coupler and Parts.



Figs. 1715-1720. Janney "X" Coupler and Parts.



Figs. 1721-1729. Pitt Coupler and Parts. McConway & Torley Co.

Names of Parts of Figs. 1608-1615.

2S *Knuckle*
86S *Coupler Casting*
88 *Knuckle Pin*
90H *Clevis*
91H *Clevis Pin*
96WI *Locking Pin*
115 *Split Key*
243A *Trigger for Unlocking Pin*

Names of Parts of Figs. 1706-1714.

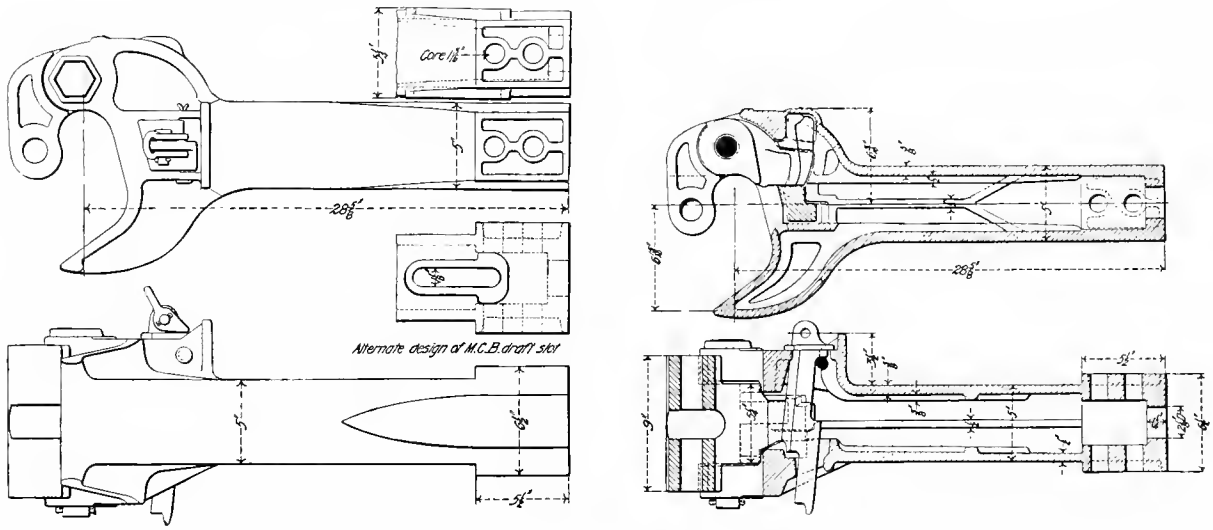
257 *Clevis Pin*
292 *Knuckle Pin*
392S *Knuckle*
480 *Locking Block*
482 *Clevis*
491 *Coupler Casting, 5-in. x 5-in. Shank*
492 *Coupler Casting, 5-in. x 7-in. Shank*
498 *Locking Block Pin*
5101, 5100 *Locking Block Lifter*

Names of Parts of Figs. 1715-1720.

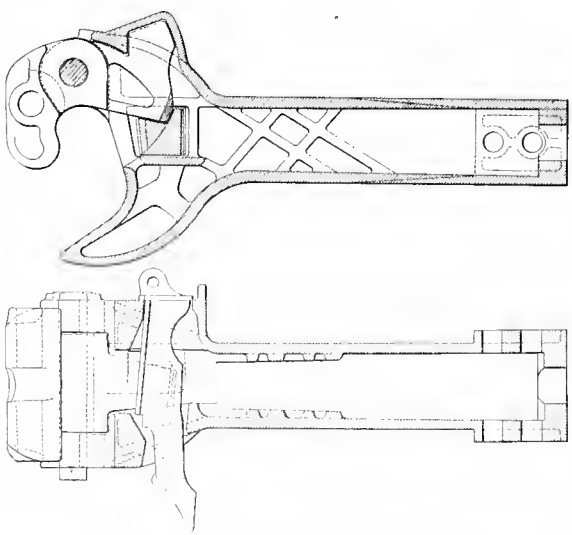
5357S *Knuckle*
292 *Knuckle Pin*
5253 *Locking Pin*
5255 *Knuckle Opener*
5256 *Locking Pin Trigger*
5358 *Coupler*

Names of Parts of Figs. 1721-1729.

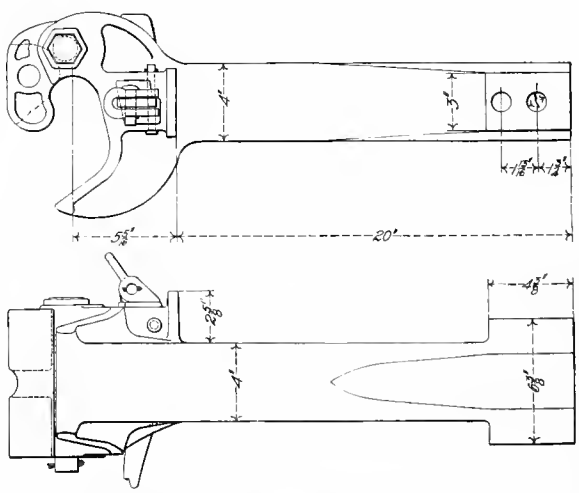
292 *Knuckle Pin*
5061 *Split Key*
5070 *Coupler Casting, 5-in. x 5-in. Shank*
5071 *Knuckle*
5073 *Knuckle Opener*
5077 *Knuckle Opener Pin*
5079 *Coupler Casting, 5-in. x 7-in. Shank*
5153 *Locking Pin*
5154 *Locking Pin Trigger*



Figs. 1730-1734. Washburn Coupler, Type A.

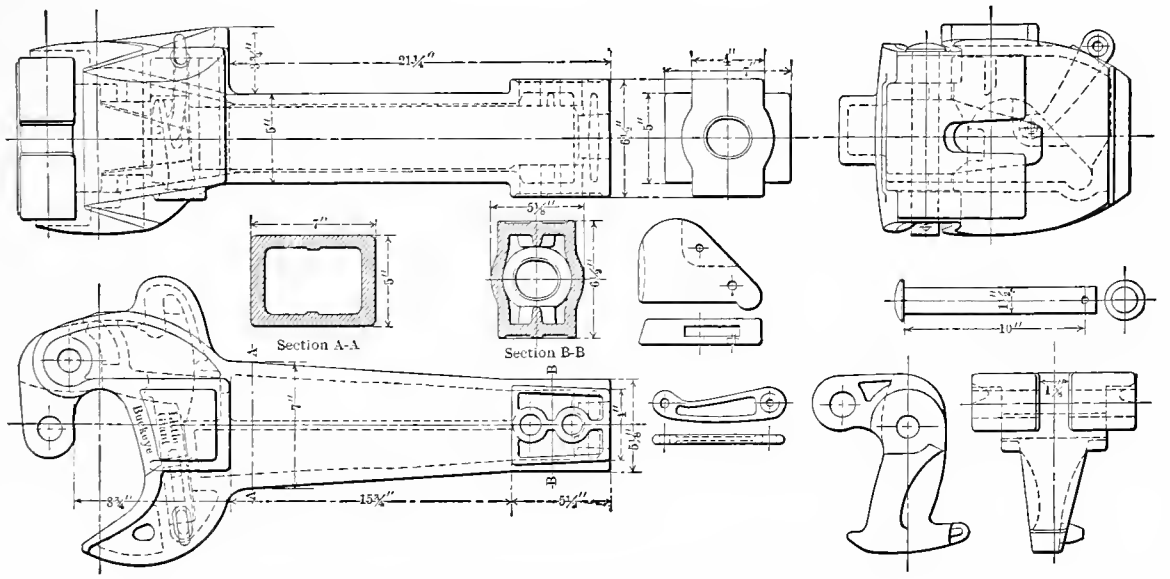


Figs. 1735-1736. Sections of Washburn International Coupler.

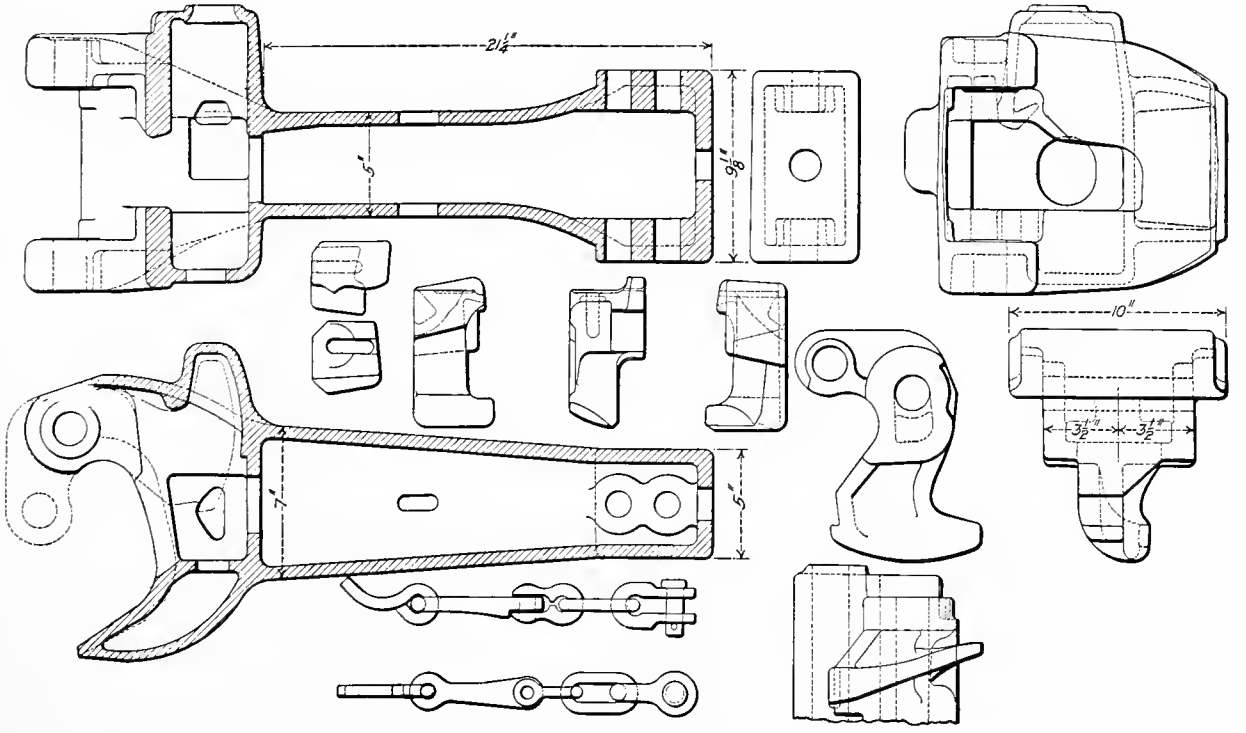


Figs. 1737-1738. Washburn Coupler. Type 1-F, for Narrow Gage Cars.

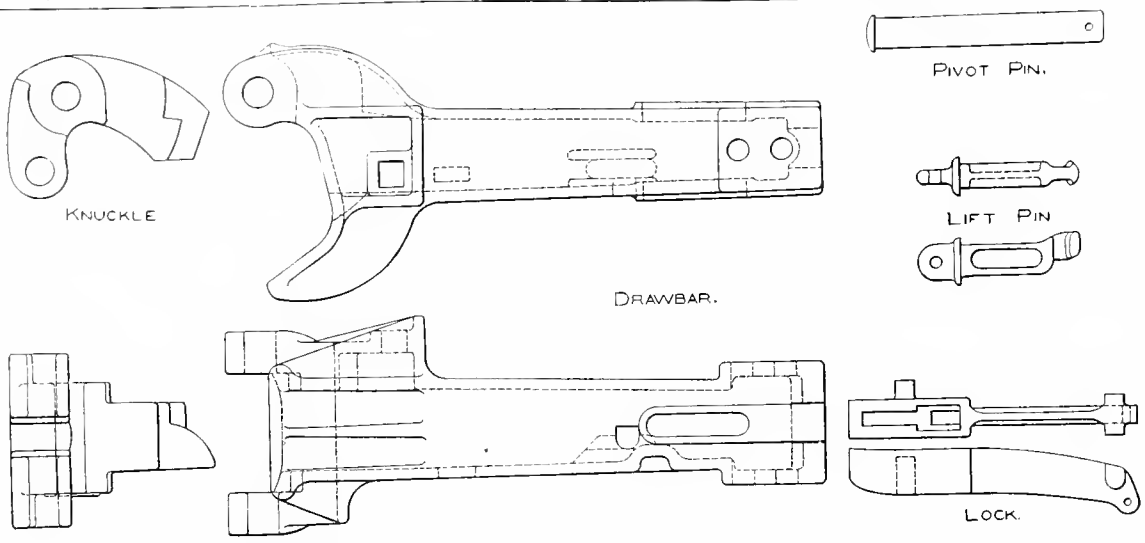
Washburn Steel Castings & Coupler Co.



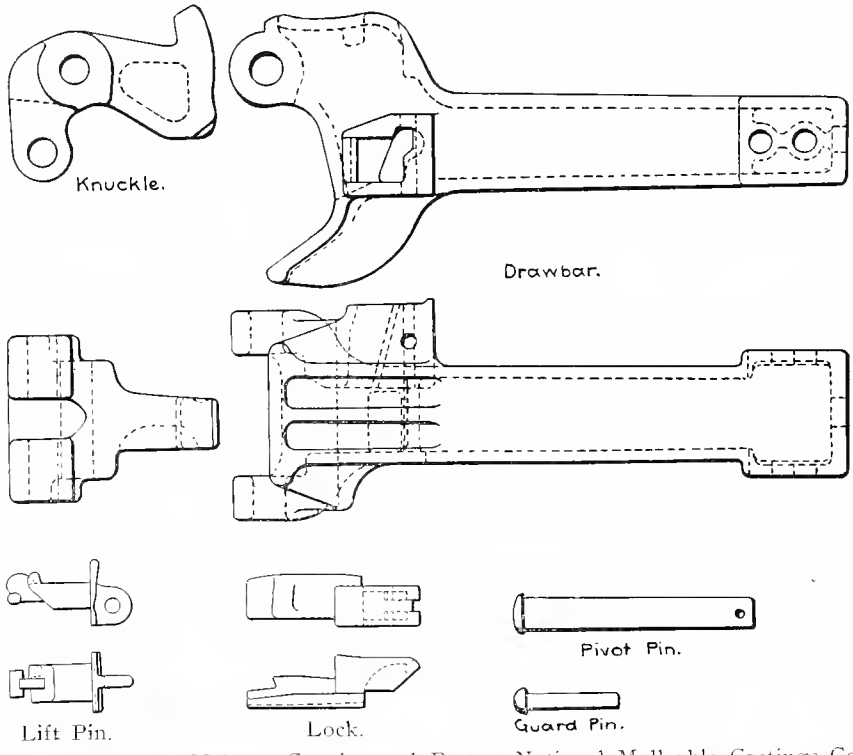
Figs. 1739-1742. Buckeye, "Little Giant" Coupler and Parts, 5-in. x 7-in. Shank.
Buckeye Steel Castings Co.



Figs. 1743-1756. Major Coupler and Parts, 5-in. x 7-in. Shank. Buckeye Steel Castings Co.



Figs. 1757-1765. Chicago Coupler and Parts. National Malleable Castings Co.



Figs. 1766-1774. Melrose Coupler and Parts. National Malleable Castings Co.

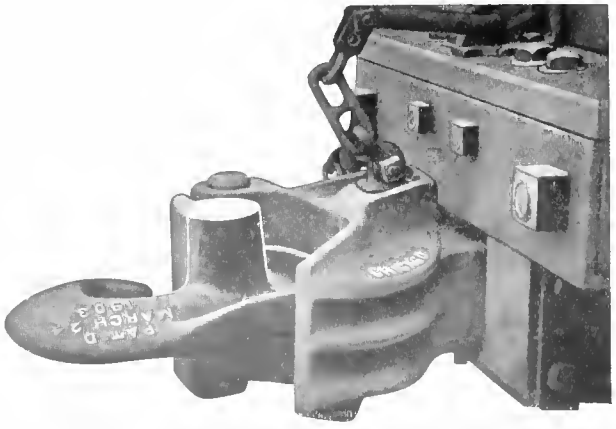


Fig. 1775. Goodman Wrecking Hook Applied to Coupler.

Fig. 1776. Goodman Wrecking Hook.

The National Malleable Castings Co.

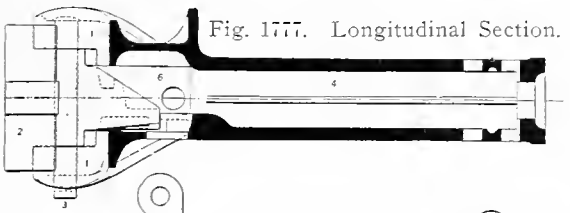


Fig. 1777. Longitudinal Section.

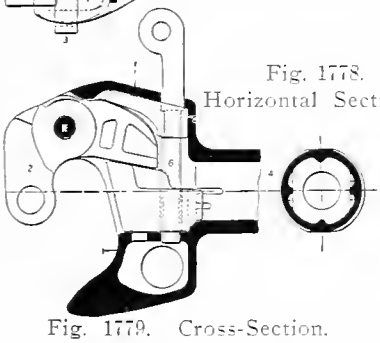


Fig. 1778. Horizontal Section.

Fig. 1779. Cross-Section.

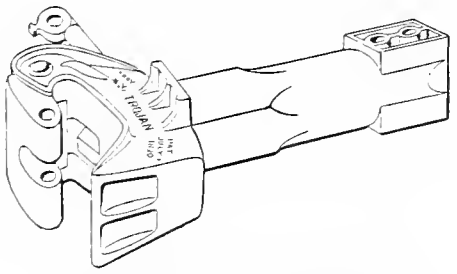


Fig. 1780. Perspective View.

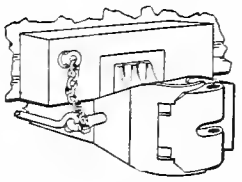


Fig. 1781. Perspective View of Coupler and Hand Rod.

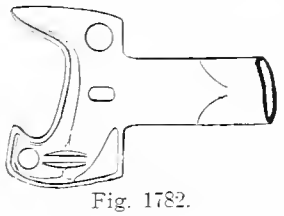


Fig. 1782. Bottom Plan of Head.

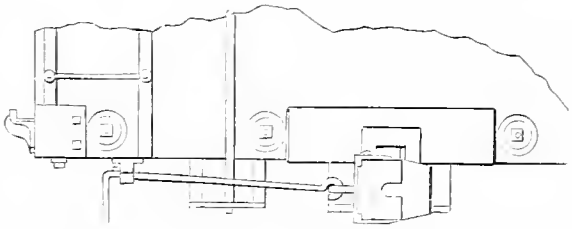


Fig. 1783. Coupler, Hand Rod and Bracket.

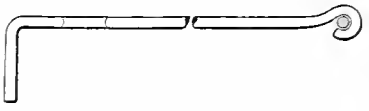


Fig. 1784. Hand Rod.

Fig. 1785. Bracket for Face of End Sill.

Fig. 1786. Bracket for Corner of Sill.

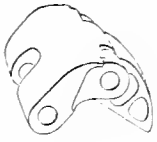


Fig. 1787. Knuckle.

Fig. 1788. Knuckle Lock.

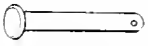


Fig. 1789. Knuckle Pin.

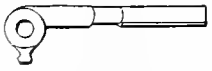


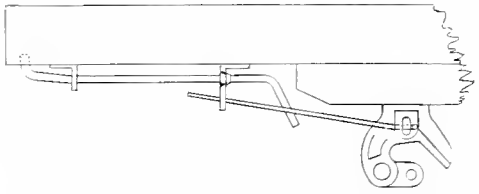
Fig. 1790. Operating Rod.

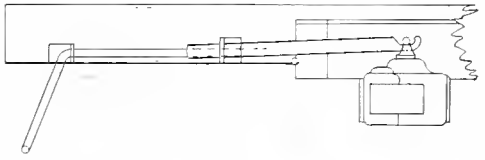
Fig. 1791. Finger.

Fig. 1792. Bracket for Face of Sill.

Fig. 1793. Bracket for Under-side of Sill.

Trojan Coupler and Parts. Trojan Coupler Co.

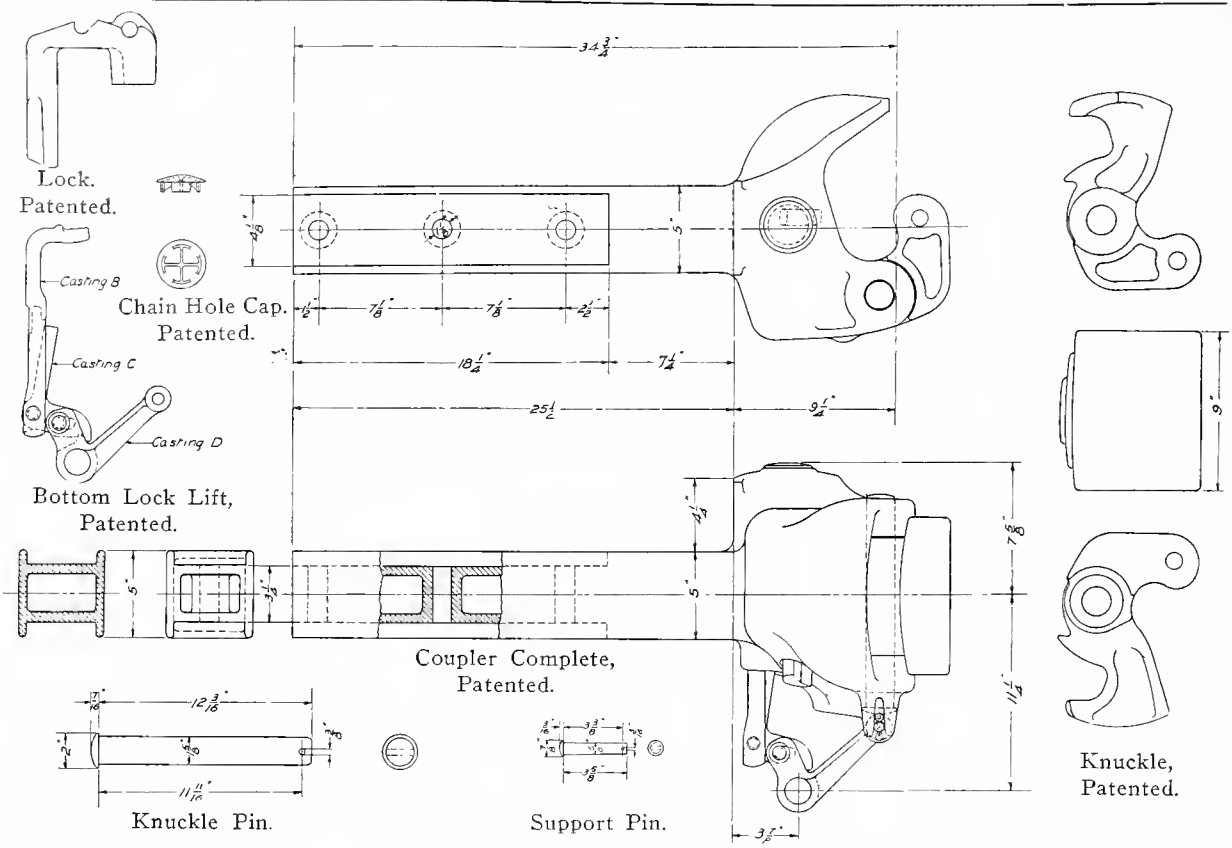




Figs. 1794-1795. Plan and Elevation of Schroyer Uncoupling Apparatus. National Railway Devices Co.

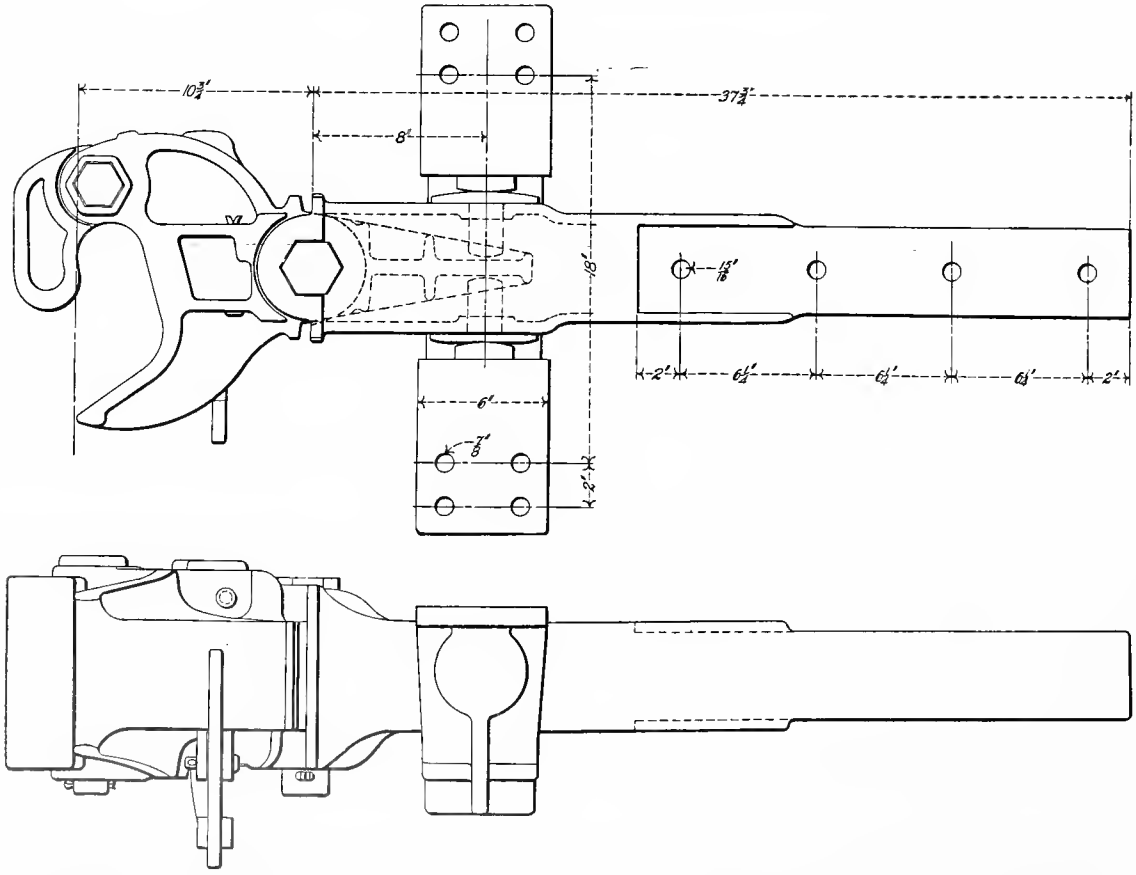
Fig. 1796. Hinson Emergency Knuckle. National Car Coupler Co.

Fig. 1797. Gilman-Brown Emergency Knuckle. Quincy, Manchester, Sargent Co.

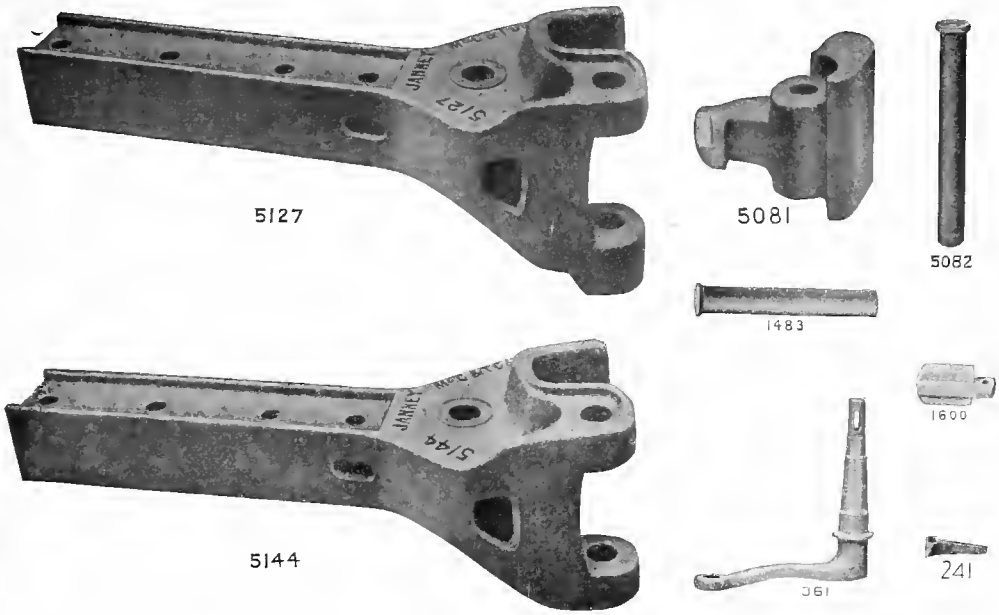


(Furnished with any style of shank required.)

Figs. 1798-1809. Sharon Passenger Coupler.
The National Malleable Castings Co.



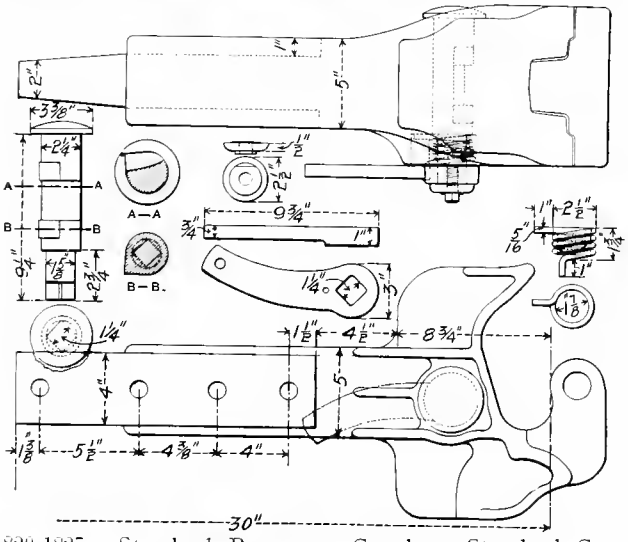
Figs. 1810-1811. Washburn Flexible Head Passenger Coupler. Washburn Steel Castings & Coupler Co.



Names of Parts of Figs. 1812-1819.

241	*Split Key*
362	*Catch Lever*
1483	*Knuckle Pin*
1600	*Knuckle Pin Plate*
5081	*Knuckle*
5082	*Knuckle Pin*
5127	*Coupler Casting*
5144	*Coupler Casting*

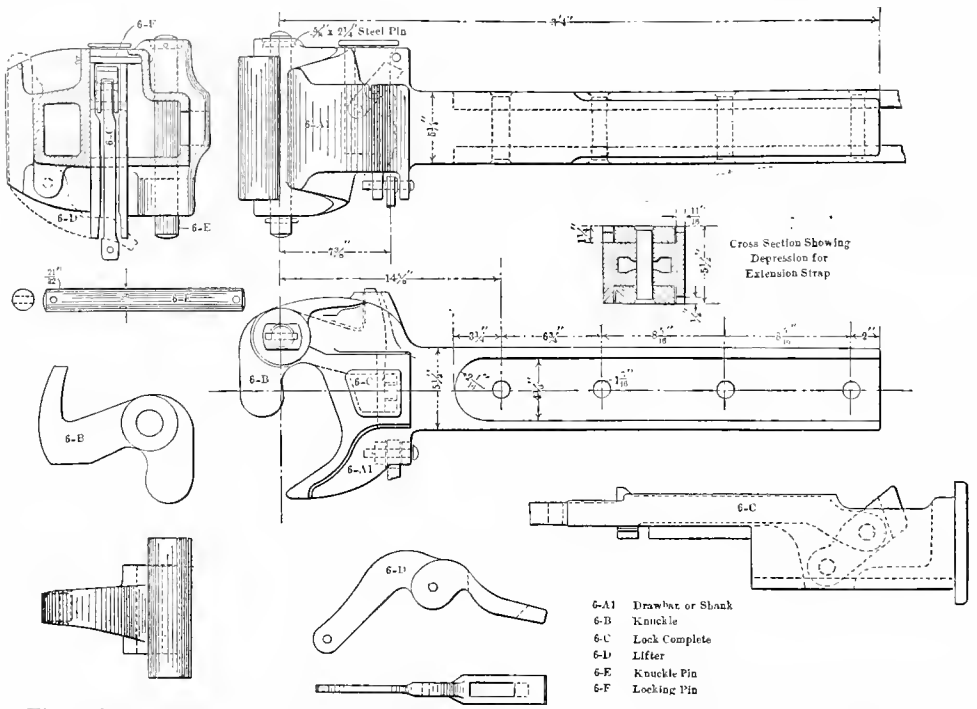
Figs. 1812-1819. Janney Coupler and Parts. McConway & Torley Co.



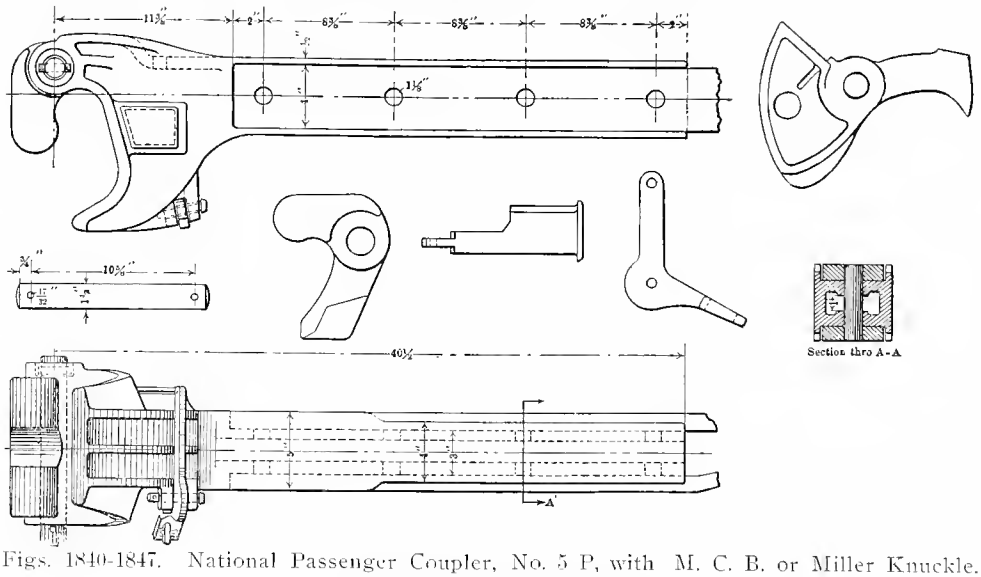
Figs. 1820-1827. Standard Passenger Coupler. Standard Coupler Co.

Fig. 1828. Gould No. 1515. Steel Passenger Coupler. Gould Coupler Co.

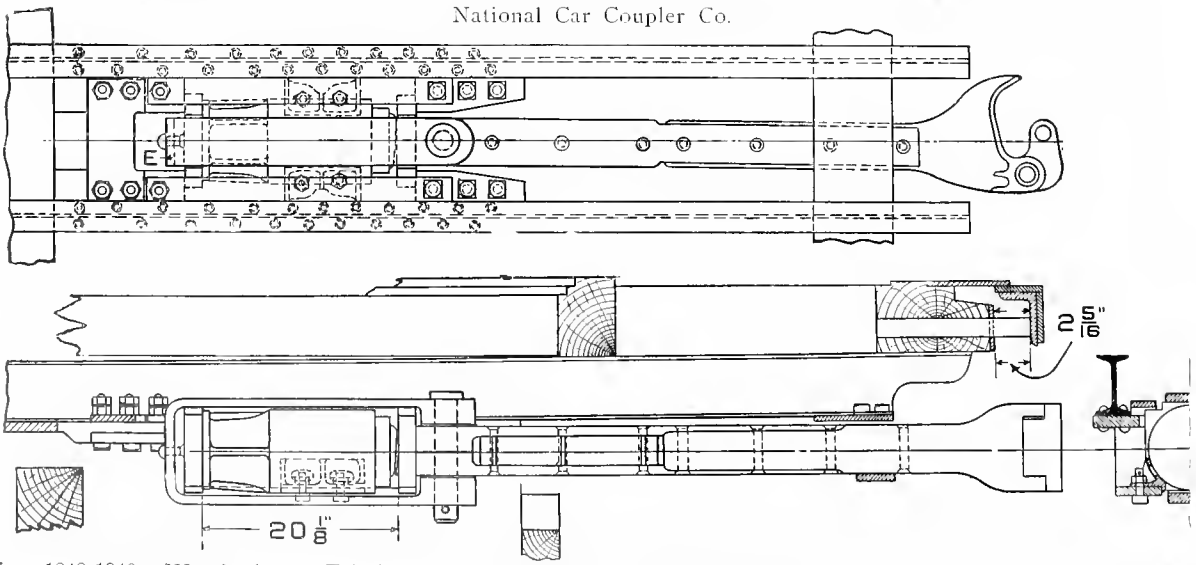
Figs. 1829. Gould Improved 1909 Model Steel Passenger Coupler. Gould Coupler Co.



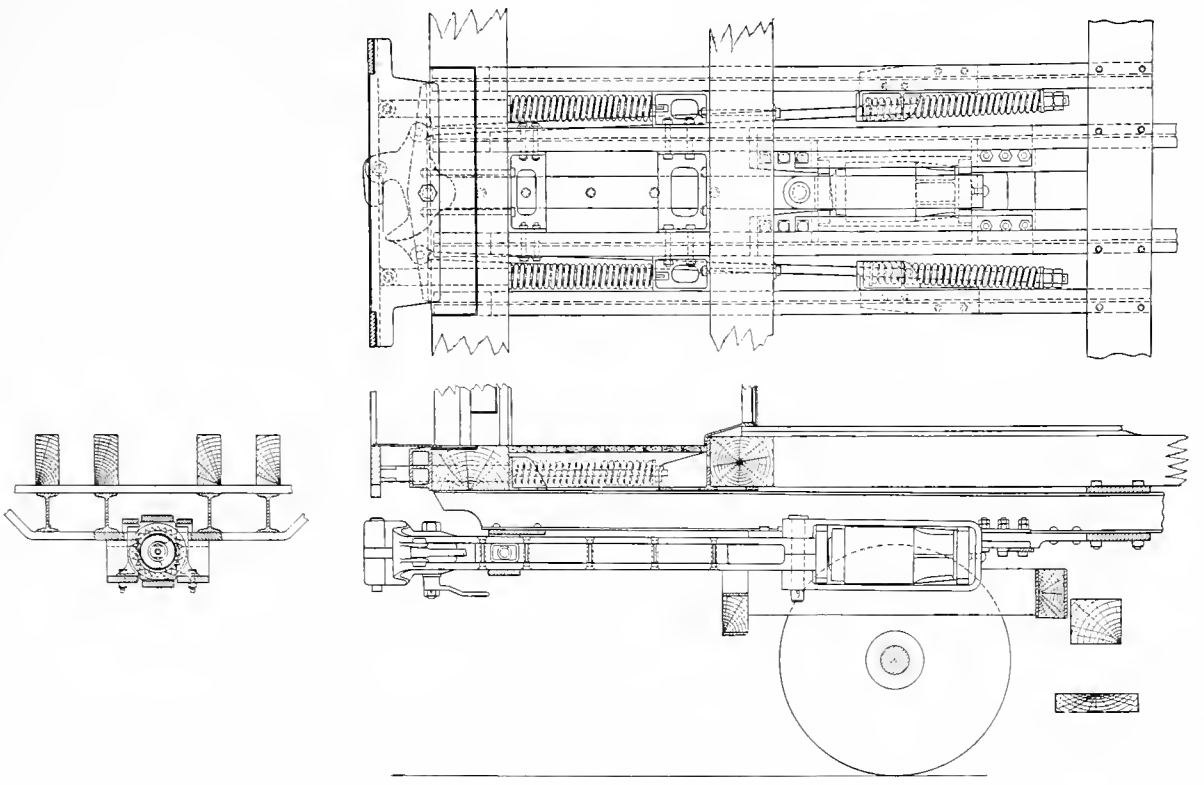
Figs. 1830-1839. National Passenger Coupler. No. 6 A-1. National Car Coupler Co.



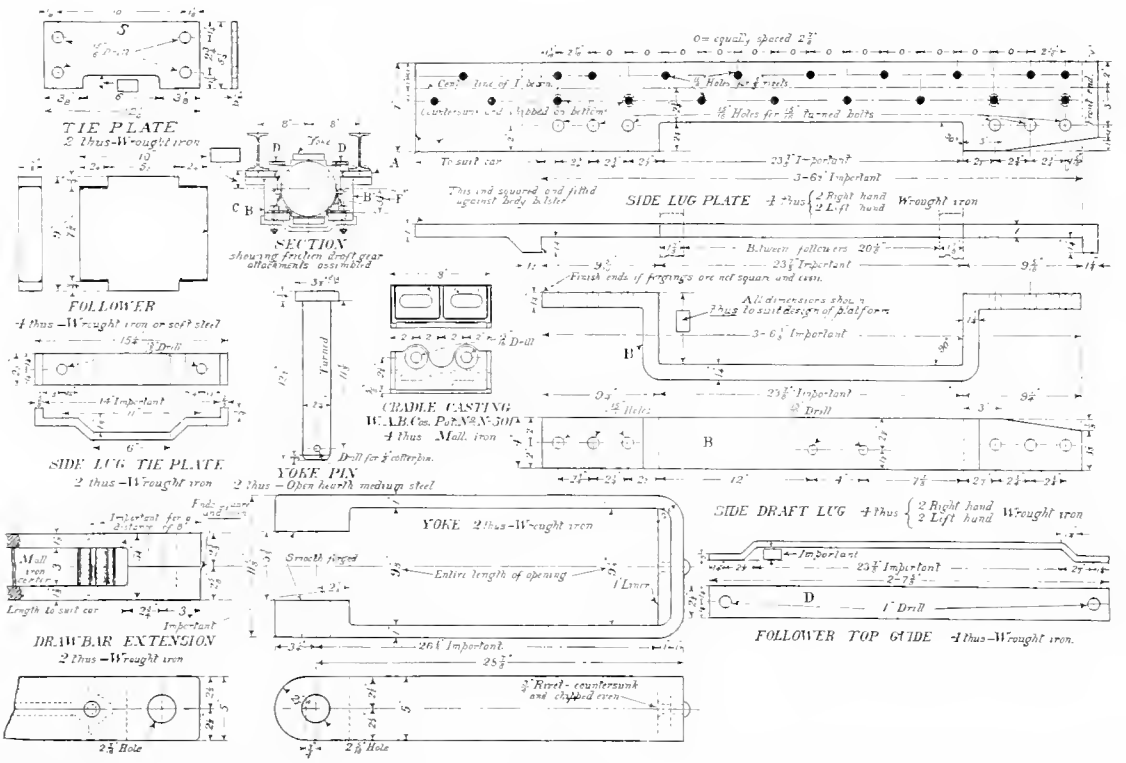
Figs. 1840-1847. National Passenger Coupler, No. 5 P, with M. C. B. or Miller Knuckle. National Car Coupler Co.



Figs. 1848-1849. Westinghouse Friction Draft Gear. Forging Attachment for Passenger Equipment Cars with Standard Steel Platforms and National Couplers. Westinghouse Air Brake Co.

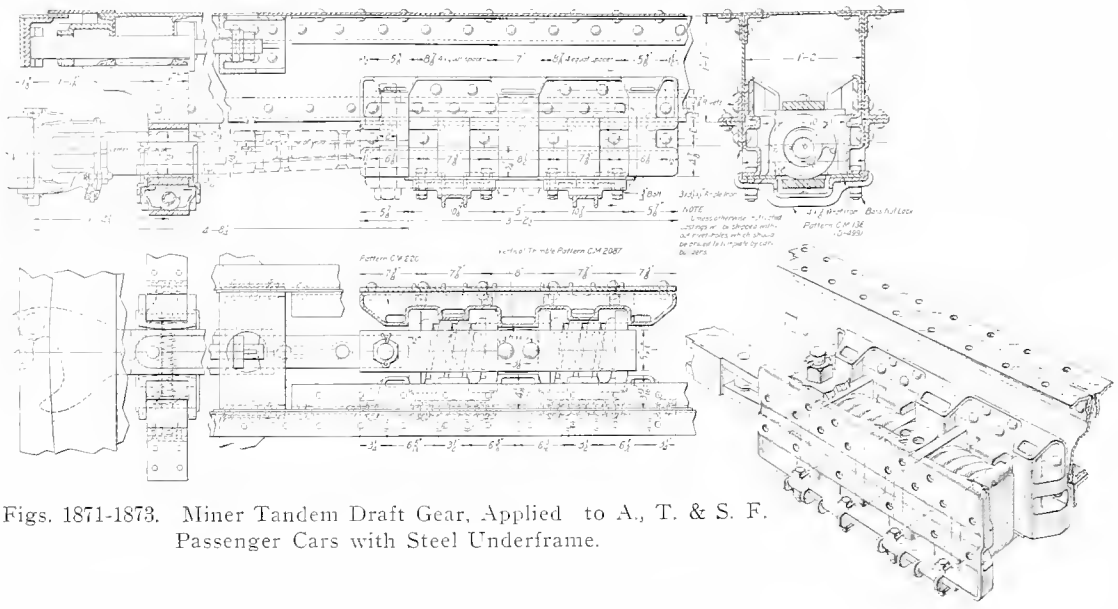


Figs. 1850-1853. Westinghouse Friction Draft Gear on Passenger Equipment Cars with Standard Steel Platform and Three-Stem Couplers.

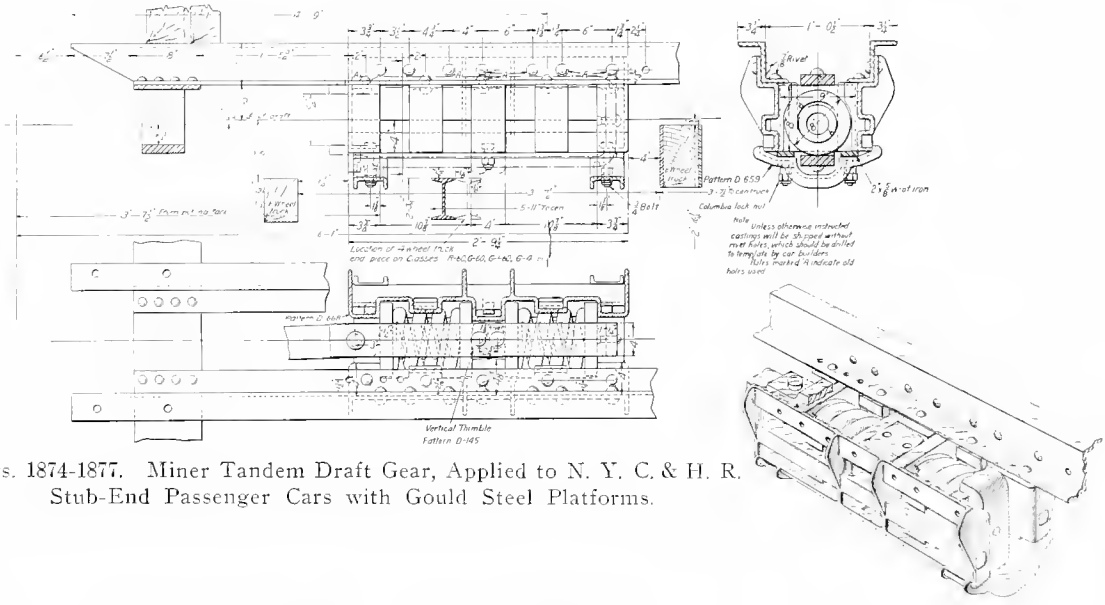


Figs. 1854-1870. Detail Parts used in Application of Westinghouse Friction Draft Gear to Passenger Equipment Cars with Standard Steel Platforms and Three-Stem Couplers.

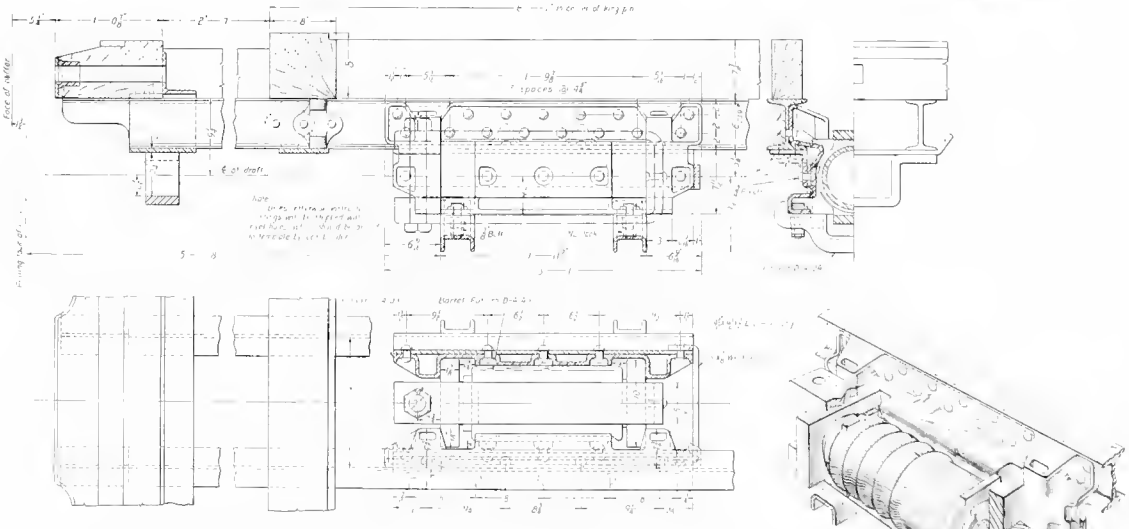
Westinghouse Air Brake Co.



Figs. 1871-1873. Miner Tandem Draft Gear, Applied to A., T. & S. F. Passenger Cars with Steel Underframe.

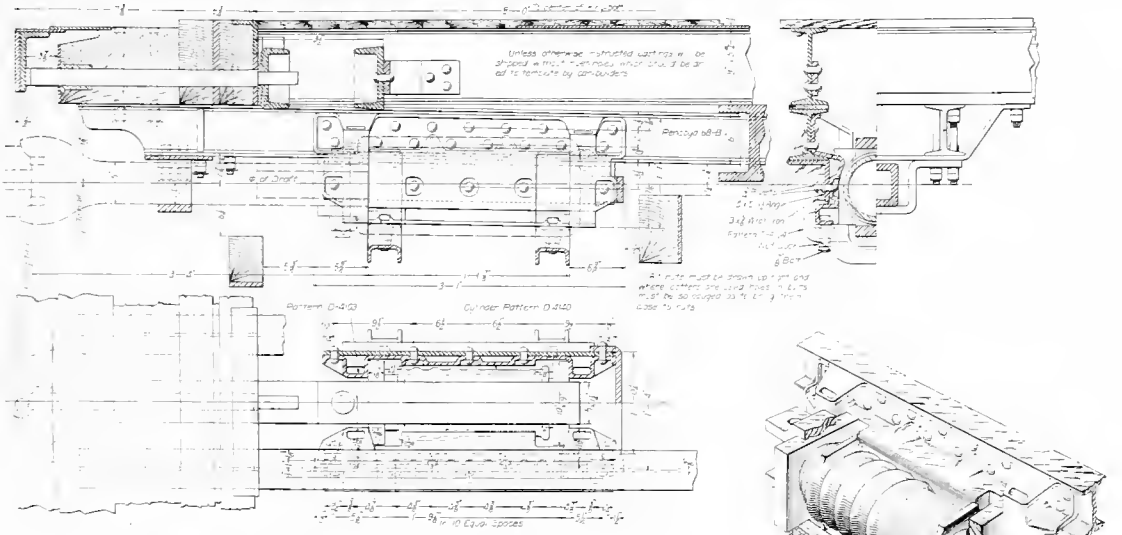


Figs. 1874-1877. Miner Tandem Draft Gear, Applied to N. Y. C. & H. R. Stub-End Passenger Cars with Gould Steel Platforms.

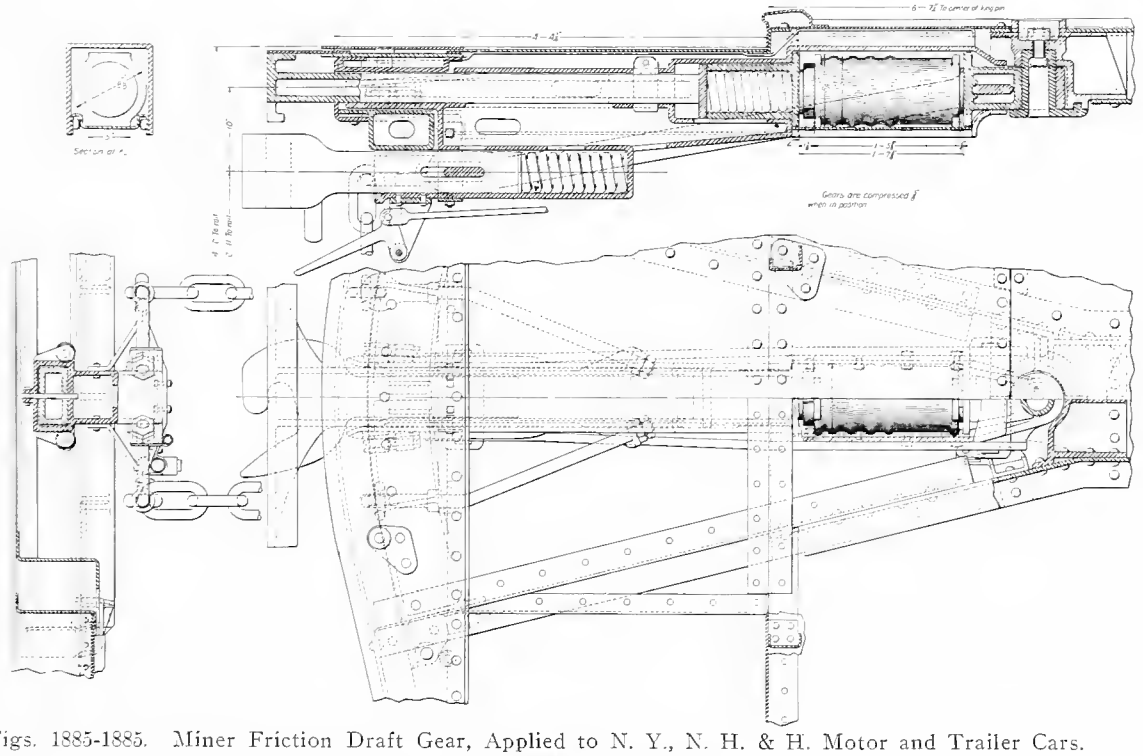


Figs. 1878-1880 Miner Friction Draft Gear, Applied to C., M. & St. P. Passenger Cars with Standard Steel Platforms.

W. H. Miner Co.



Figs. 1881-1884. Miner Friction Draft Gear, Applied to I. C. Combination Postal and Baggage Cars.

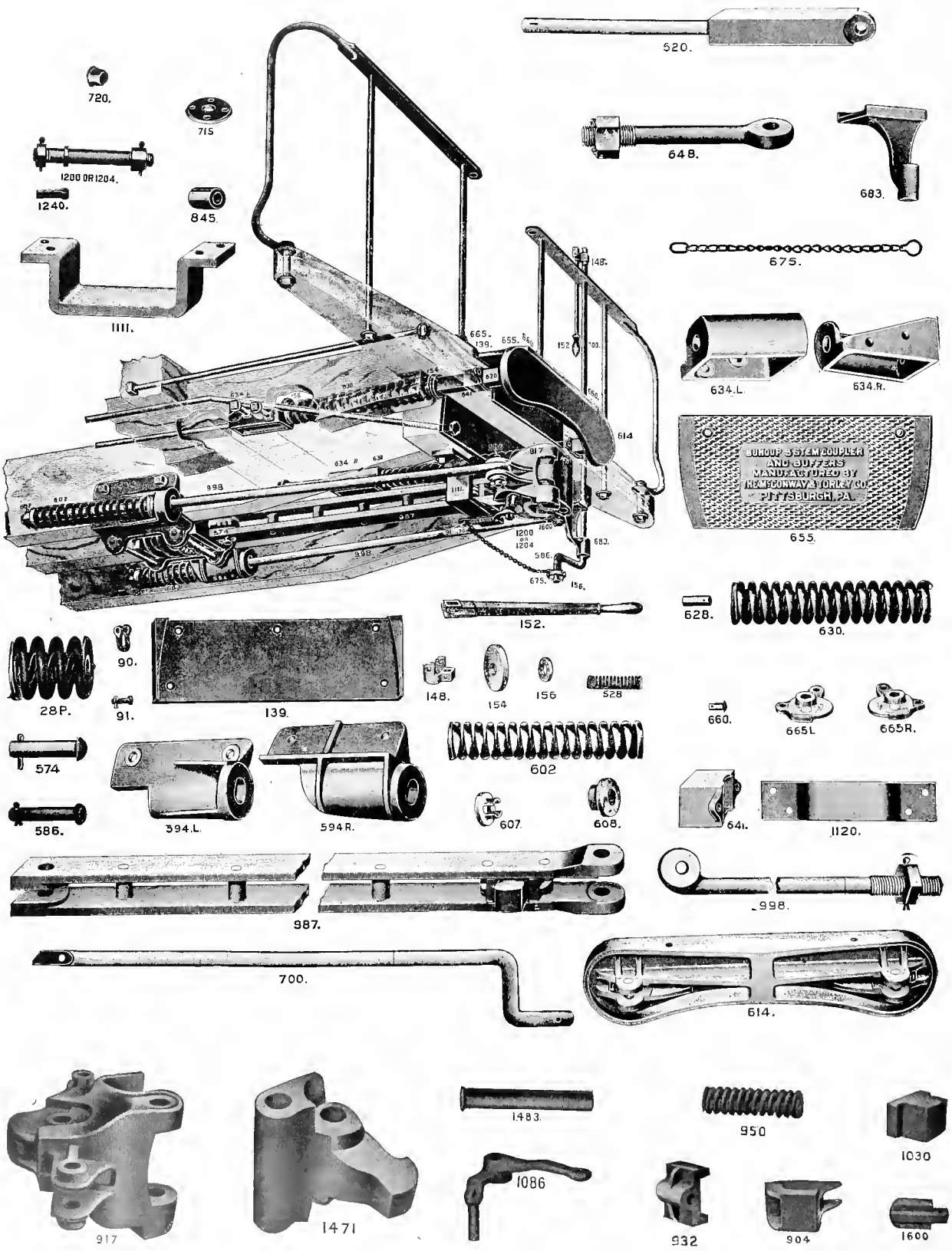


Figs. 1885-1885. Miner Friction Draft Gear, Applied to N. Y., N. H. & H. Motor and Trailer Cars. W. H. Miner Co.

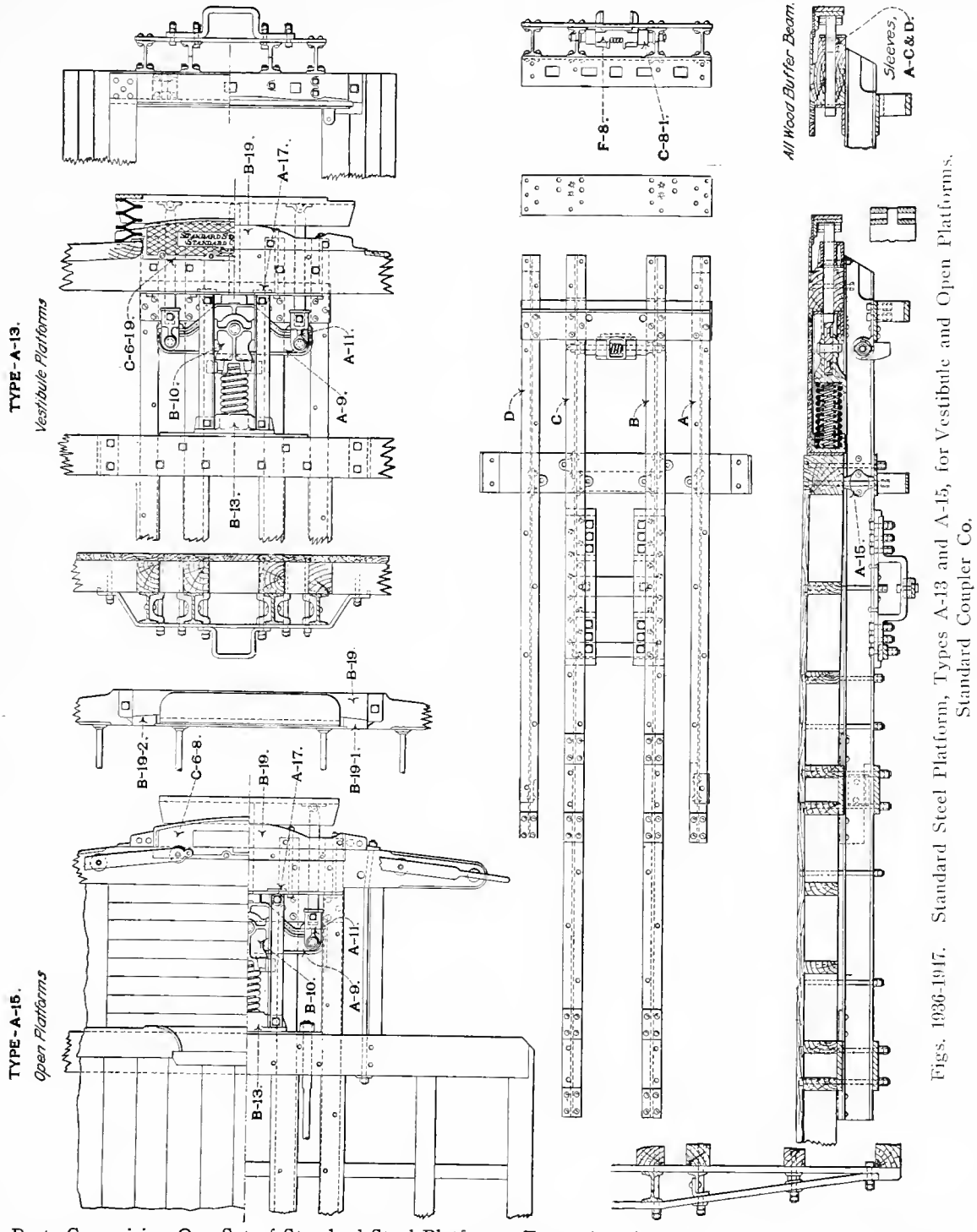
Names of Parts of Figs. 1886-1935.

28P	*Draft Spring, 6 in. x 8 in.*	620	*Buffer Stem*	917	*Coupler Head Casting*
90	*Clevis*	628	*Buffer Pin*	920	*Side Motion Spring, 2⅜ in. x 8 in.*
91	*Clevis Pin*	630	*Buffer Spring, 4 in. x 18 in.*	932	*Spring Box Holder*
139	*Foot Plate Housing*	634	*Buffer Stem Bracket, R. & L.*	987	*Center Stem*
148	*Lever Hinge Bracket*	641	*Buffer Stem Guide*	998	*Side Stem*
152	*Lever Handle*	648	*Draft Bolt*	1030	*Spring Box*
154	*Buffer Stem Ring Washer*	655	*Foot Plate*	1086	*Catch Lever*
156	*Buffer Stem End Washer*	660	*Foot Plate Bolt*	1111	*Stirrup*
528	*Catch Spring*	665	*Foot Plate Stop, R. & L.*	1120	*Chafing Plate*
574	*Tail Pin*	675	*Uncoupling Lever Chain*	1200	*Center Stem Pivot Pin, 1½ in.*
586	*Side Stem Pivot Pin*	683	*Uncoupling Lever Guide*	1204	*Center Stem Pivot Pin, 1¾ in.*
594	*Side Stem Bracket, L. & R.*	700	*Uncoupling Lever*	1240	*Split Key for Buffer Stem*
602	*Side Stem Spring, 3½ in. x 18 in.*	715	*Uncoupling Lever Plate*	1471	*Knuckle*
607	*Side Stem Lug Washer*	720	*Uncoupling Lever Collar*	1483	*Knuckle Pin*
608	*Side Stem Bevel Washer*	845	*Center Stem Thimble*	1600	*Knuckle Pin Plate*
614	*Buffer Plate*	904	*Catch*		

Numbers Refer to List of Names on Page 283.



Figs. 1886-1935. Buhoup 3-Stem Passenger Coupler and Draft Gear.
McConway & Torley Co.

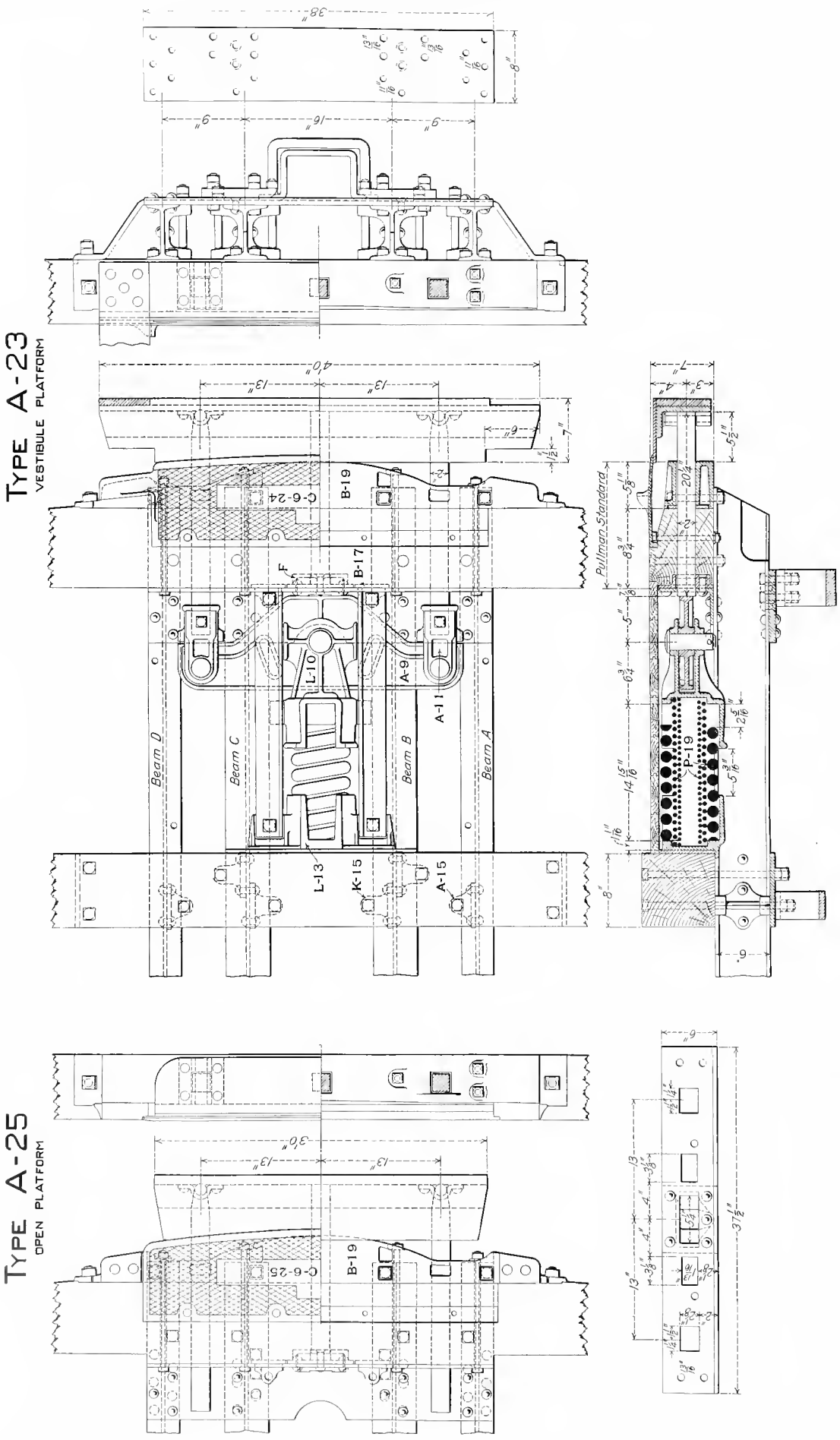


Figs. 1936-1947. Standard Steel Platform, Types A-13 and A-15, for Vestibule and Open Platforms. Standard Coupler Co.

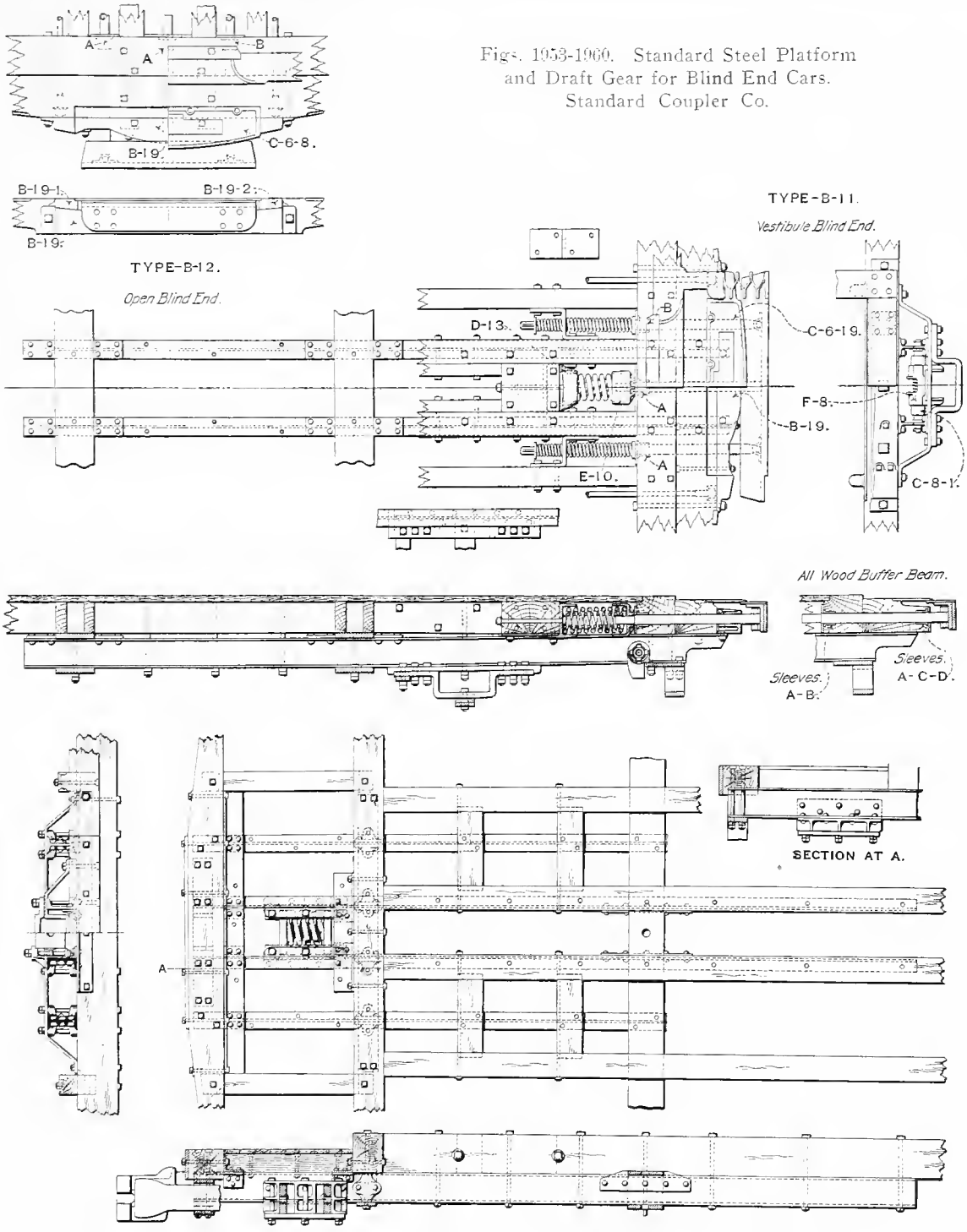
Parts Comprising One Set of Standard Steel Platforms, Types A-3, A-5, A-13 and A-15, A-23 and A-25.

No. Pieces	Description
2	*I-Beams, Each A and D, 14.75 lbs., 17.25 lbs. or 23.90 lbs. per ft., as required, machined to suit car framing*
2	*I-Beams, Each B and C, 17.25 lbs. or 23.90 lbs. per ft., as required, machined to suit car framing*
12 or 16	*I-Beam Brackets, A-15 or K-15, riveted to beams*
2	*Buffer Beam Angles, 6 x 6 x 37½ in. to suit*
2	*Buffer Face Angles, for Open or Vestibule Platforms*
2	*Buffer Face Plates, for Vestibule Platforms Only*
2	*Buffer Tread Plates*
4	*Buffer Stems, Side, Length to Suit*
2	*Buffer Stems, Center, Length to Suit*
4	*Buffer Stem Hinges*
4	*Buffer Stem Clevises, A-11*
4	*Buffer Stem Clevis Bolts, ⅝ x 4 in.*
4	*Buffer Stem Clevis Pins, 1¼ x 4⅛ in.*
6	*Buffer Stem Sleeves, 2 Each, A, C and D, not required with buffer beam extensions*
2	*Buffer Springs, Double or Triple Coil, to Suit*
2	*Equalizers, A-9*
2	*Equalizer Pivot Pins, 1¾ x 4⅞ in.*
4	*Equalizer Guide Bars*
4	*Equalizer Guide Angles*
4	*Equalizer Guide Anchors, A-17 ar B-17*
8	*Equolizer Guide Bolts, ¾ x 3¾ in.*
2	*Spring Cups, Front, B-10 or L-10.*
2	*Spring Cups, Back, B-13 or L-13.*
2	*Name Plates, as required*
2	*Buffer Beam Extensions, as required*
2	*Drawbar Guide Yokes, F-8*
2	*Drawbar Guide Sleeves, C-8-1*
2	*Drawbar Guide Springs*
2	*Drawbar Guide Rods*

NOTE.—*Buffer beam extensions are extra.* Drawbar guides F-8 are for central draft couplers only; lateral movement 2 in. either way.



Figs. 1948-1952. Standard Steel Platforms, Types A-23 and A-25, for Vestibule and Open Platforms. Standard Coupler Co.



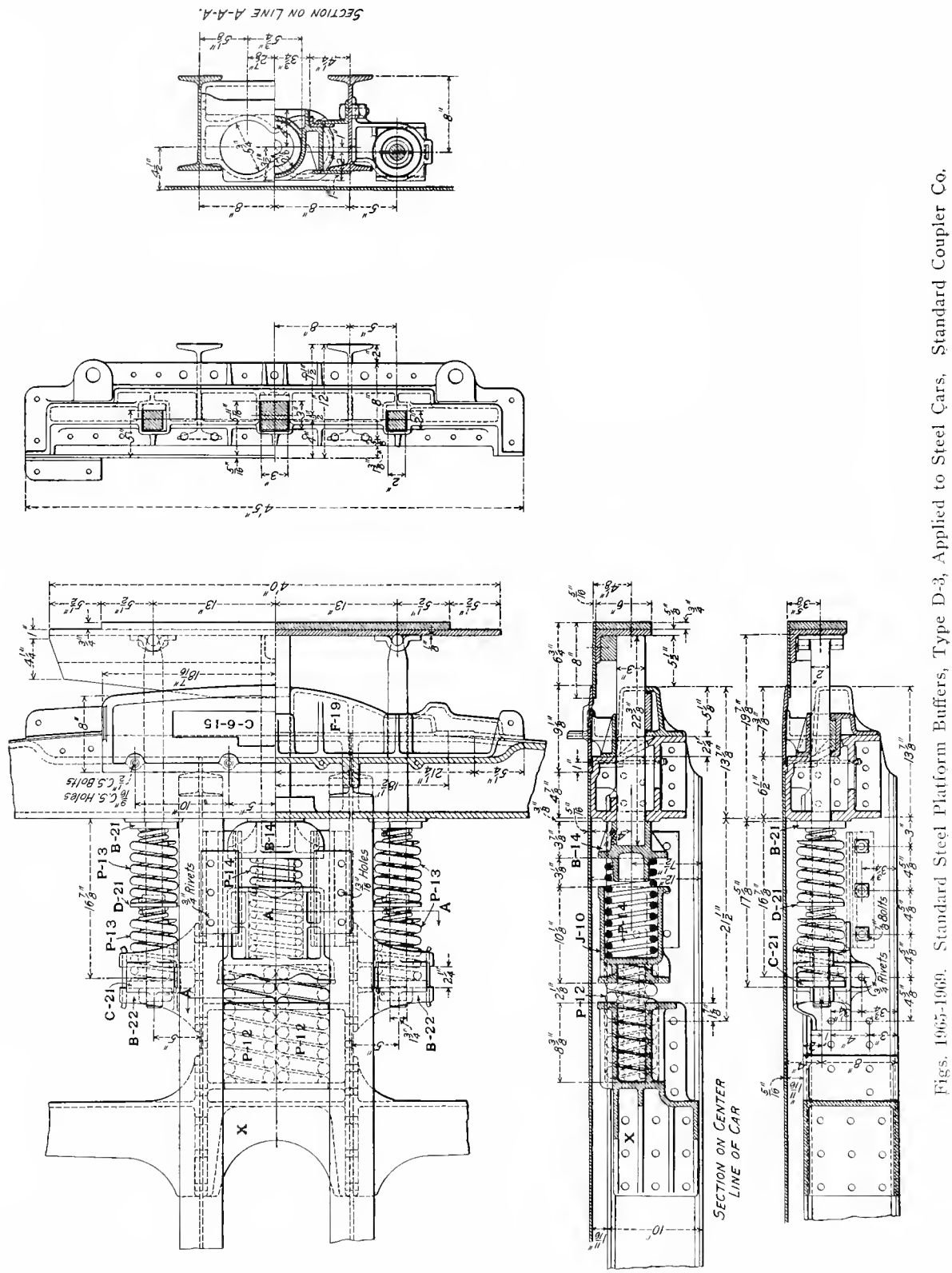
Figs. 1953-1960. Standard Steel Platform and Draft Gear for Blind End Cars. Standard Coupler Co.

Figs. 1961-1964. Standard Steel Platform, Type C, for Caboose Cars. Standard Coupler Co.

Parts Comprising One Set of Standard Steel Platforms for Blind End Cars.

No. Pieces	Description
4	*I-Beams, 17.25 lbs. or 23.90 lbs. per ft., as required, machined to suit car framing*
2	*Buffer Face Angles, for Vestibule Blind Ends of Non-Vestibule Blind Ends*
2	*Buffer Face Plates, for Vestibule Blind Ends Only*
2	*Buffer Tread Plates*
4	*Buffer Stems, Side, Length to Suit*
2	*Buffer Stems, Center, Length to Suit*
4	*Buffer Stem Hinges*
12	*Buffer Stem Sleeves, 6 A, 2 each B, C and D (2 each A, C and D not used with buffer beam extensions)*
4	*Buffer Stem Washers, Front*
4	*Buffer Stem Washers, Back*
4	*Buffer Stem Keys*
2	*Buffer Springs for Center Stem*
2	*Spring Cups, Front*
2	*Spring Cups, Back*
4	*Buffer Springs for Side Stems*
4	*Hold-back Springs for Side Stems*
4	*End Sill Plates, Side, as required*
2	*End Sill Plates, Center, as required*
2	*Name Plates*
2	*Buffer Beam Extensions*
2	*Drawbar Guide Yokes, F-8*
4	*Drawbar Guide Sleeves, C-8-1*
2	*Drawbar Guide Springs*
2	*Drawbar Guide Rods*

Note.—*Buffer Beam extensions are extra.* Drawbar Guides F-8 are for central draft couplers only; lateral movement 2 in. either way.

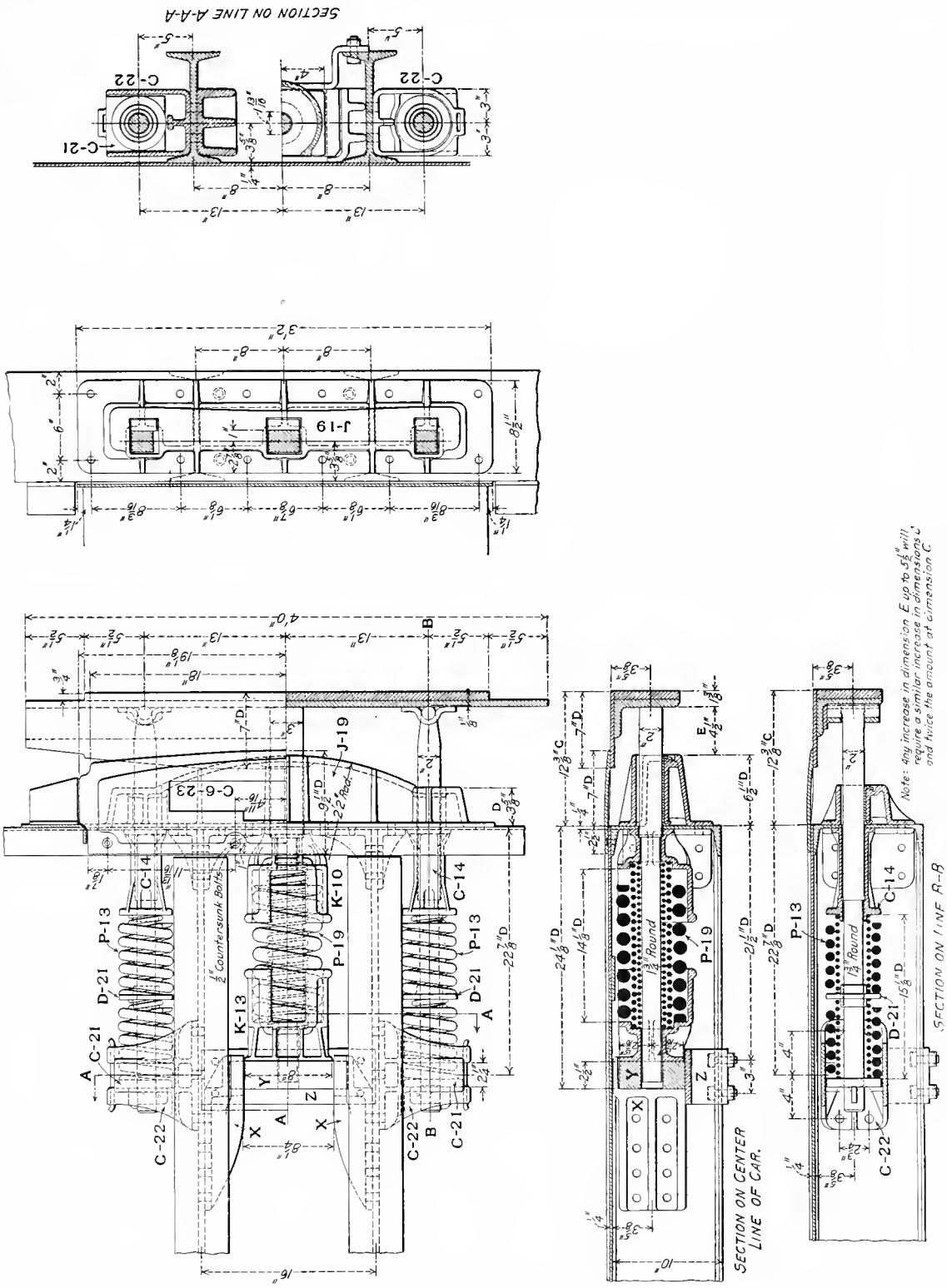


Figs. 1965-1969. Standard Steel Platform Buffers, Type D-3, Applied to Steel Cars, Standard Coupler Co.

Parts Comprising One Set of Standard Steel Platform Buffers, Type D-3. Adapted to Steel Cars.

No. Pieces.	Description.
2	*Buffer Beam Extensions, with Inserts*
2	*Name Plates*
2	*Buffer Spring Followers*
2	*Buffer Spring Casings*
4	*Side Stem Brackets, with Keys*
12	*Side Stem Washers*
2	*Buffer Center Stems*
2	*Buffer Face Angles*
2	*Buffer Face Plates*
2	*Buffer Tread Plates*
4	*Buffer Side Stems*
4	*Side Stem Keys and Cotters*
4	*Hinge Plates*
6	*Chafing Plates*
2	*Single Coil Buffer Springs, P-14*
4	*Double Coil Buffer Springs, P-12*
8	*Double Coil Buffer Springs, P-13*

Back Spring Cup, "X," may be furnished by Car Builder to Suit Car Construction.

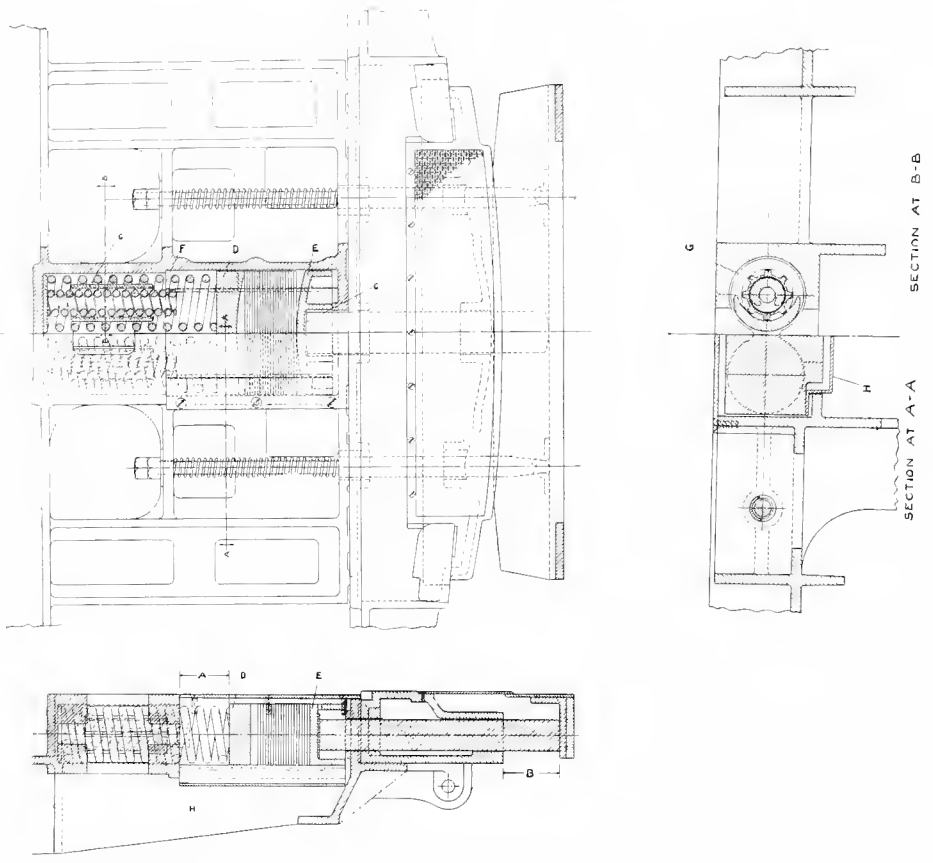


Figs. 1970-1974. Standard Steel Platform Buffers, Type E-3, Applied to Steel Cars. Standard Coupler Co.

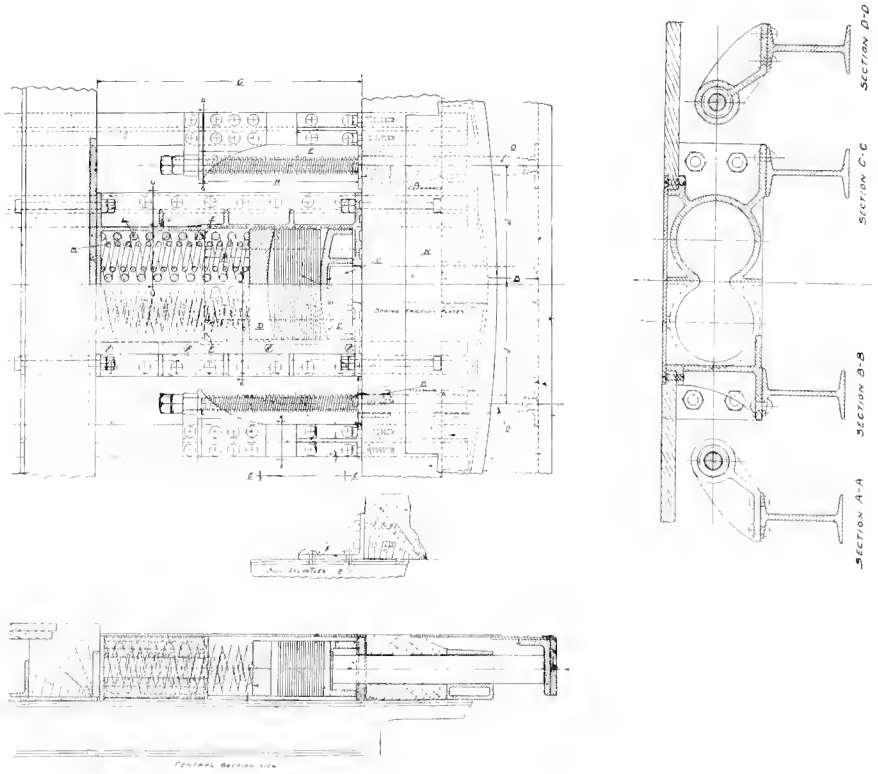
Parts Comprising One Set of Standard Steel Platform Buffers, Type E-3. Adapted to Steel Cars.

No. Pieces.	Description.
2	*Buffer Beam Extensions and Inserts*
2	*Name Plates*
2	*Front Spring Cups*
2	*Back Spring Cups*
4	*Side Stem Brackets, with Keys*
8	*Side Stem Washers*
4	*Side Stem Followers*
2	*Buffer Center Stems*
2	*Buffer Face Angles*
2	*Buffer Face Angle Plates*
2	*Buffer Tread Plates*
4	*Buffer Side Stems*
4	*Side Stem Keys and Cotters*
4	*Hinge Plates*
4	*Chafing Plates*
8	*Double Coil Buffer Springs, P-13*
2	*Triple Coil Buffer Springs, P-19*

Back Stops, "X," "Y," "Z," may be furnished by Car Builders to Suit Car Construction.



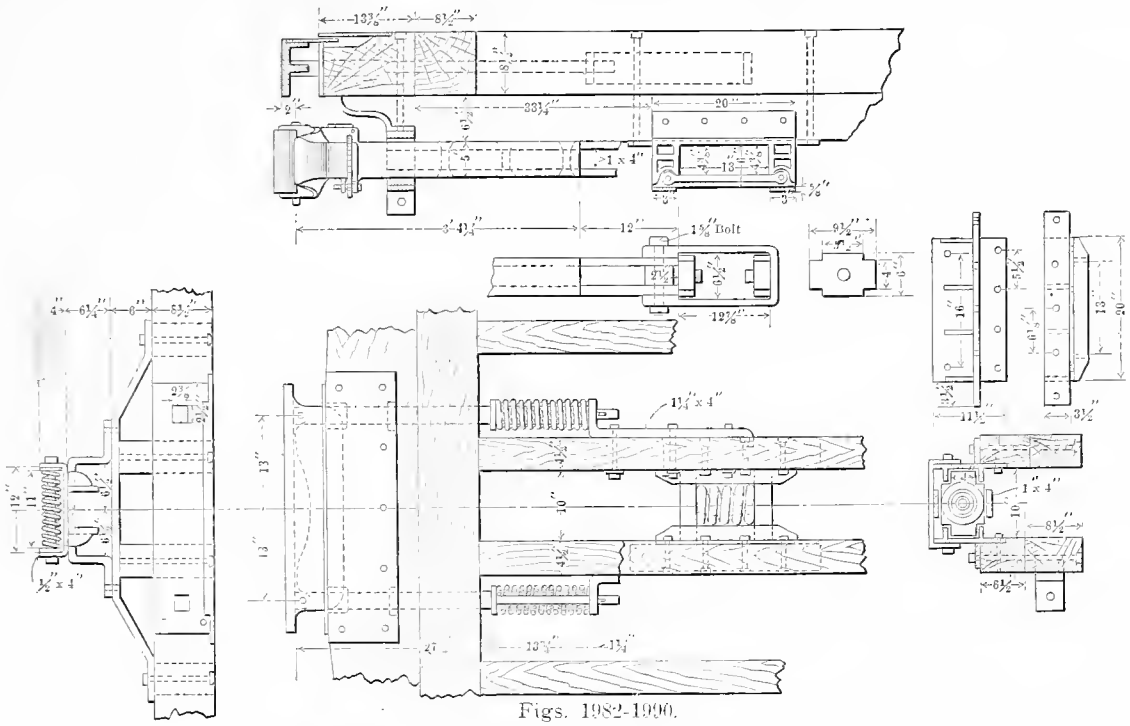
Figs. 1975-1977. Forsyth Buffing Device, Applied to Cast Steel Platform.



Figs. 1978-1981. Forsyth Buffing Device, Applied to Built-up Platform.

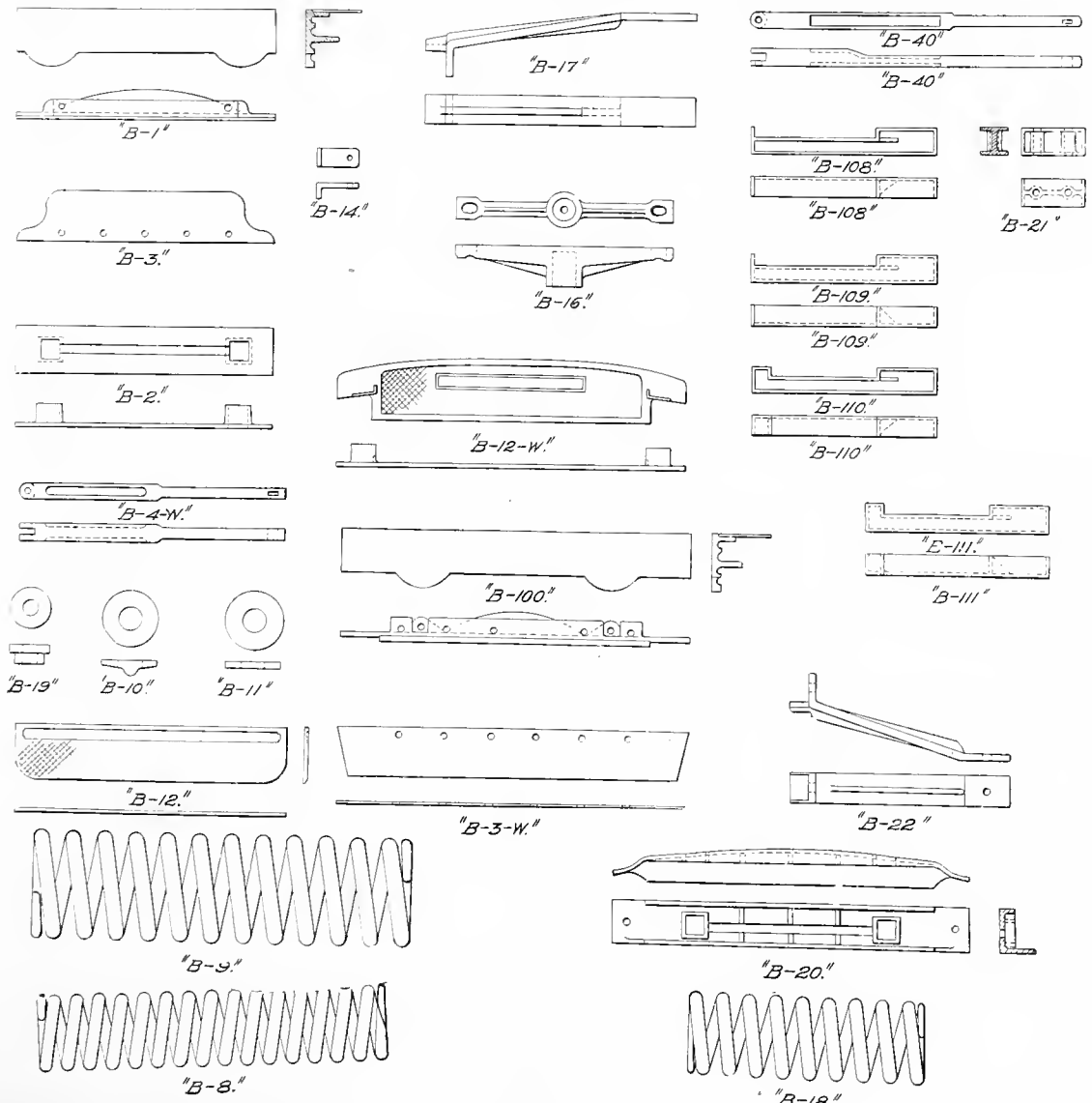
Forsyth Brothers Co.

Numbers Refer to List of Names on Page 292.

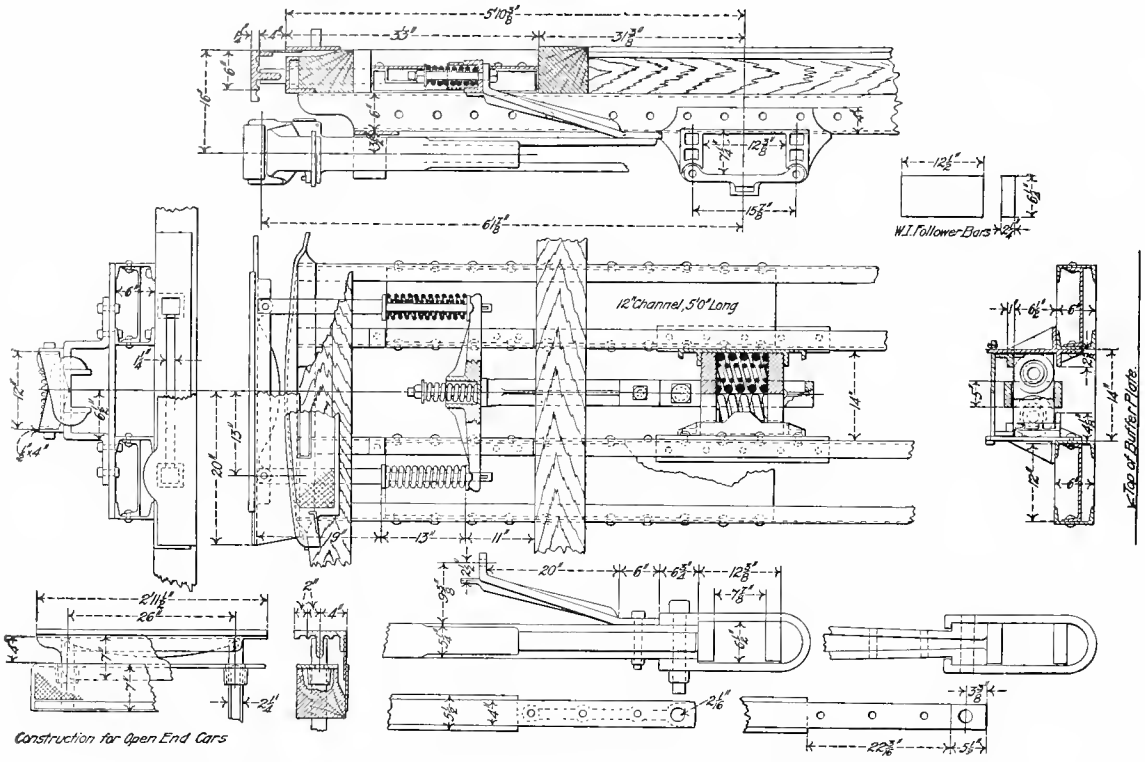


Figs. 1982-1990.

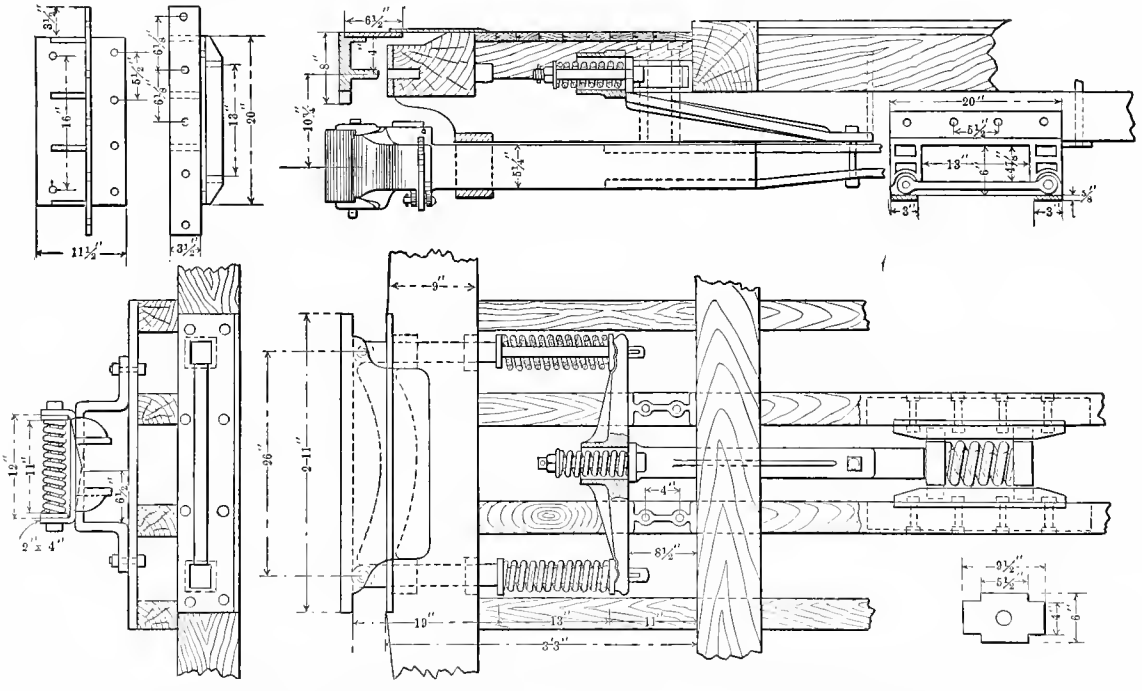
Hinson Single Spring Draft Gear and National Buffer, Applied to Passenger Car with Wooden Draft Sills.



 Figs. 1991-2041. Parts of National Steel Platform and Buffer. National Car Coupler Co.



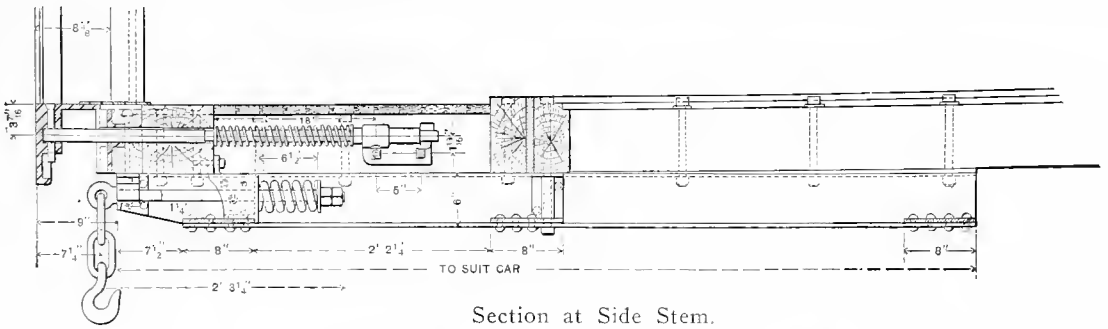
Figs. 2042-2052. Application of National Steel Platform and Buffer and Hinson Twin Spring Passenger Draft Gear to Vestibule and Open End Cars.



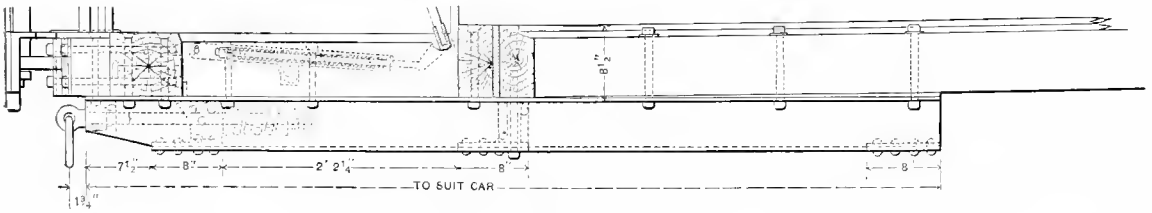
Figs. 2053-2058. National Continuous Platform Buffer and Equalizing Yoke with Hinson Single Spring Draft Gear. National Car Coupler Co.

Names of Parts of Figs. 1991-2041.

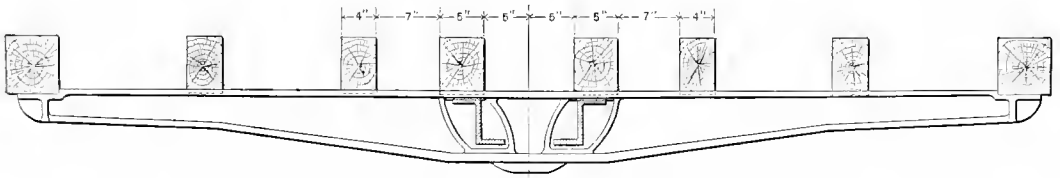
B-1 *Buffer Plate*
B-2 *Buffer Face Plate*
B-3 *Sliding Foot Plate*
B-3-W *Sliding Foot Plate*
B-4-W *Buffer Stem*
B-8 *Buffer Spring*
B-9 *Buffer Spring*
B-10 *Buffer Stem Washer*
B-11 *Buffer Stem Washer*
B-12 *Buffer Foot Plate*
B-12-W *Buffer Foot Plate*
B-14 *Buffer Stem Key*
B-16 *Buffer Yoke*
B-17 *Push Bar or Strut Beam*
B-18 *Buffer Yoke Spring*
B-19 *Buffer Yoke Spring Washer*
B-20 *Buffer Face Plate*
B-21 *Buffer Yoke Stop Block*
B-22 *Buffer Push Bar*
B-40 *Buffer Stem*
B-108 *Buffer Yoke Stop Block*
B-109 *Buffer Yoke Stop Block*
B-110 *Buffer Yoke Stop Block*
B-111 *Buffer Yoke Stop Block*



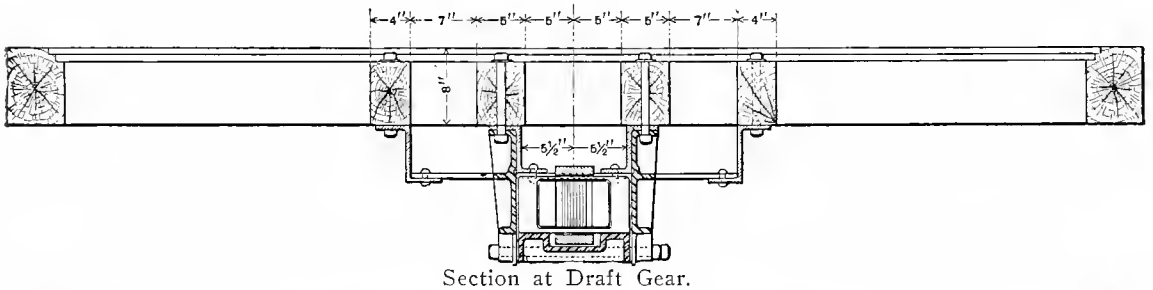
Section at Side Stem.



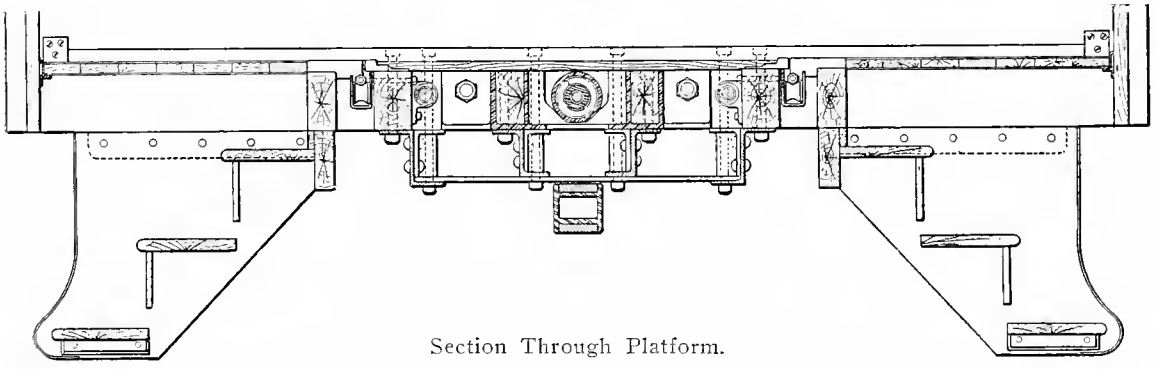
Section Through Trap Door.



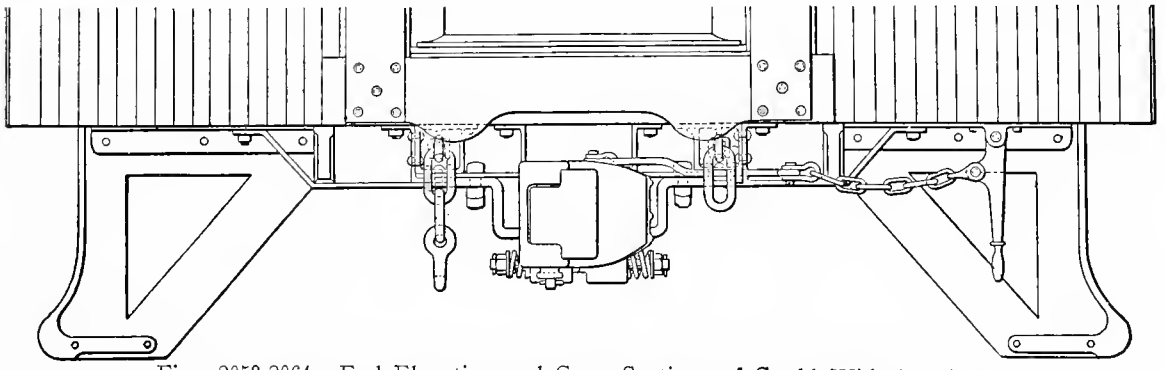
Section Through Bolster.



Section at Draft Gear.



Section Through Platform.



Figs. 2059-2064. End Elevation and Cross-Sections of Gould Wide Vestibule Steel Platform with Friction Buffer and Draft Gear.
Gould Coupler Co.

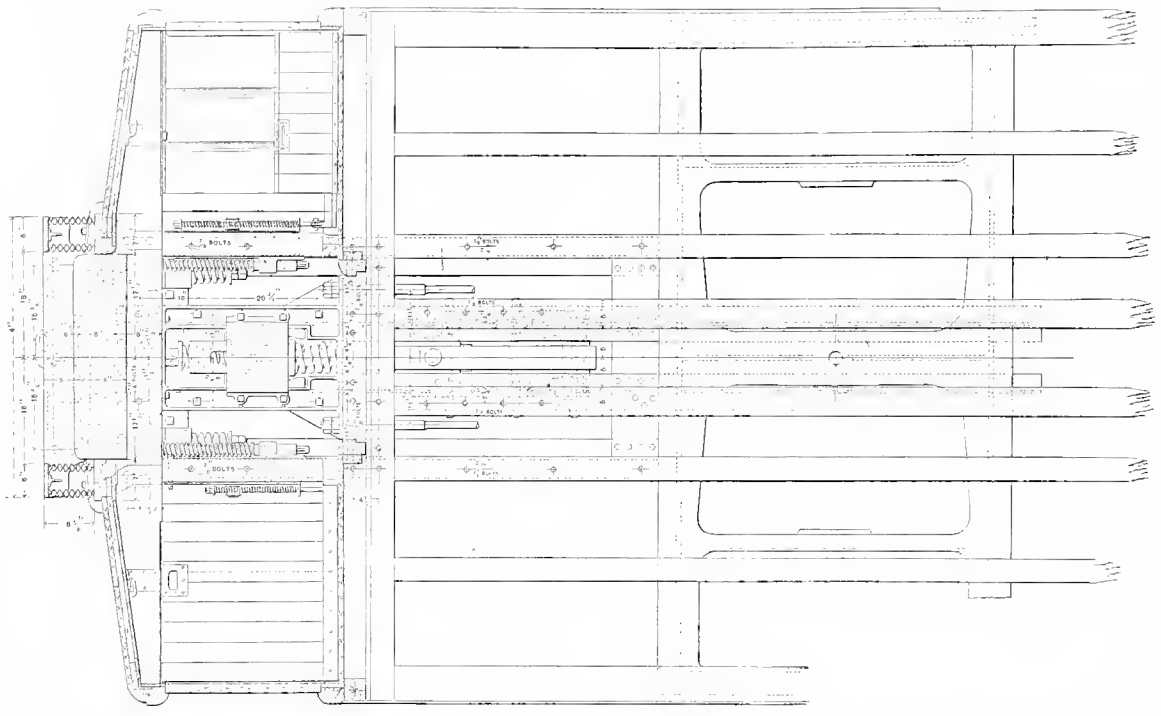


Fig. 2065. Plan of Gould Wide Vestibule Steel Platform, with Friction Buffer and Draft Gear.

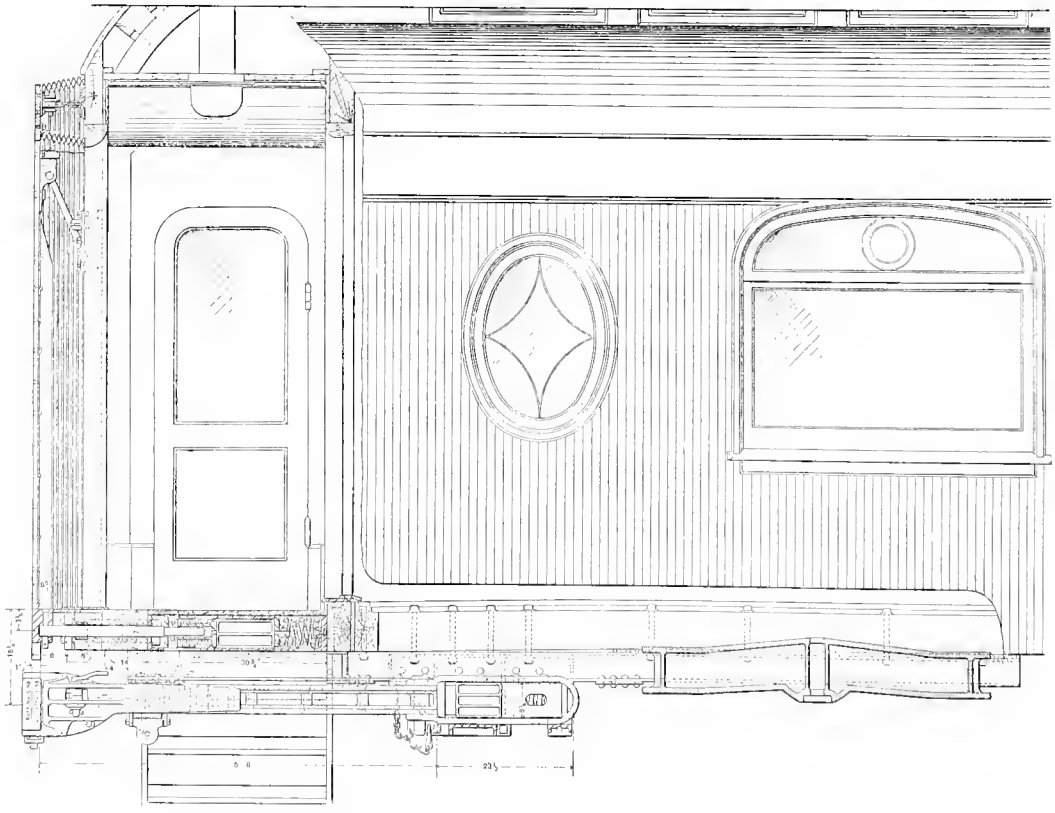


Fig. 2066. Side Elevation of Gould Wide Vestibule Steel Platform, with Friction Buffer and Draft Gear.

Gould Coupler Co.

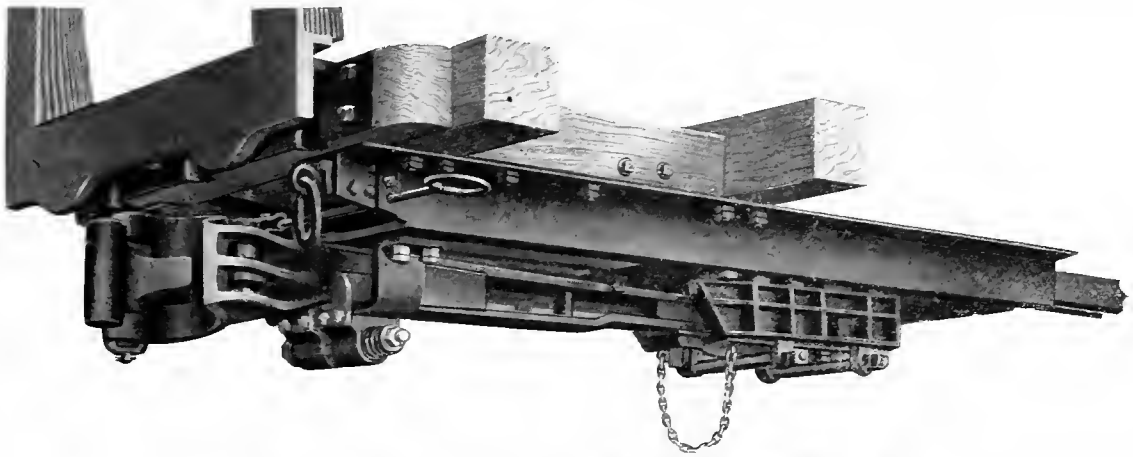


Fig. 2067. Gould Steel Platform, with Friction Buffer and Draft Gear.

Fig. 2068. Gould Friction Draft Gear.

Figs. 2069-2071. Gould Friction Draft Gear, Dismantled.

Fig. 2072. Gould Friction Draft Gear, Assembled.

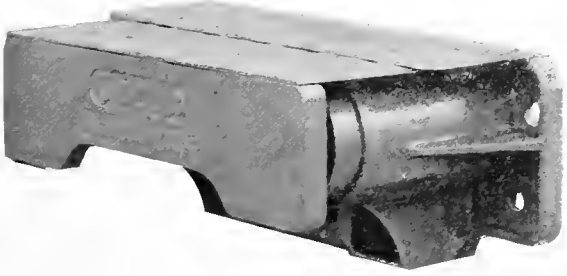


Fig. 2073. Gould Spring Buffer for Stub-end Cars.

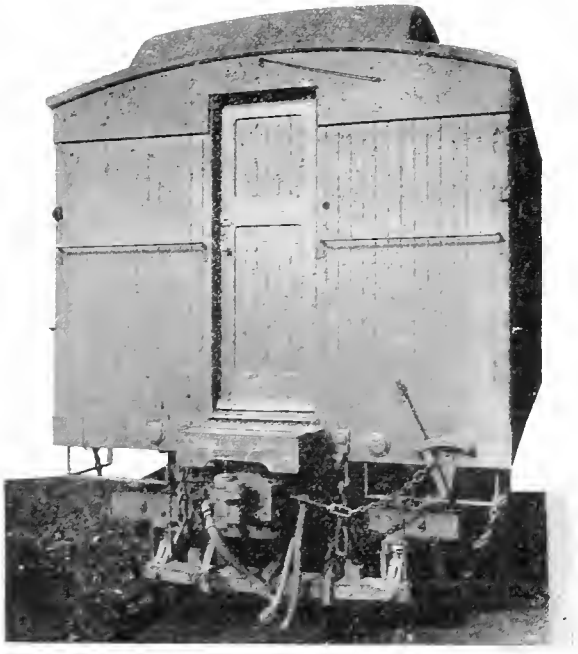
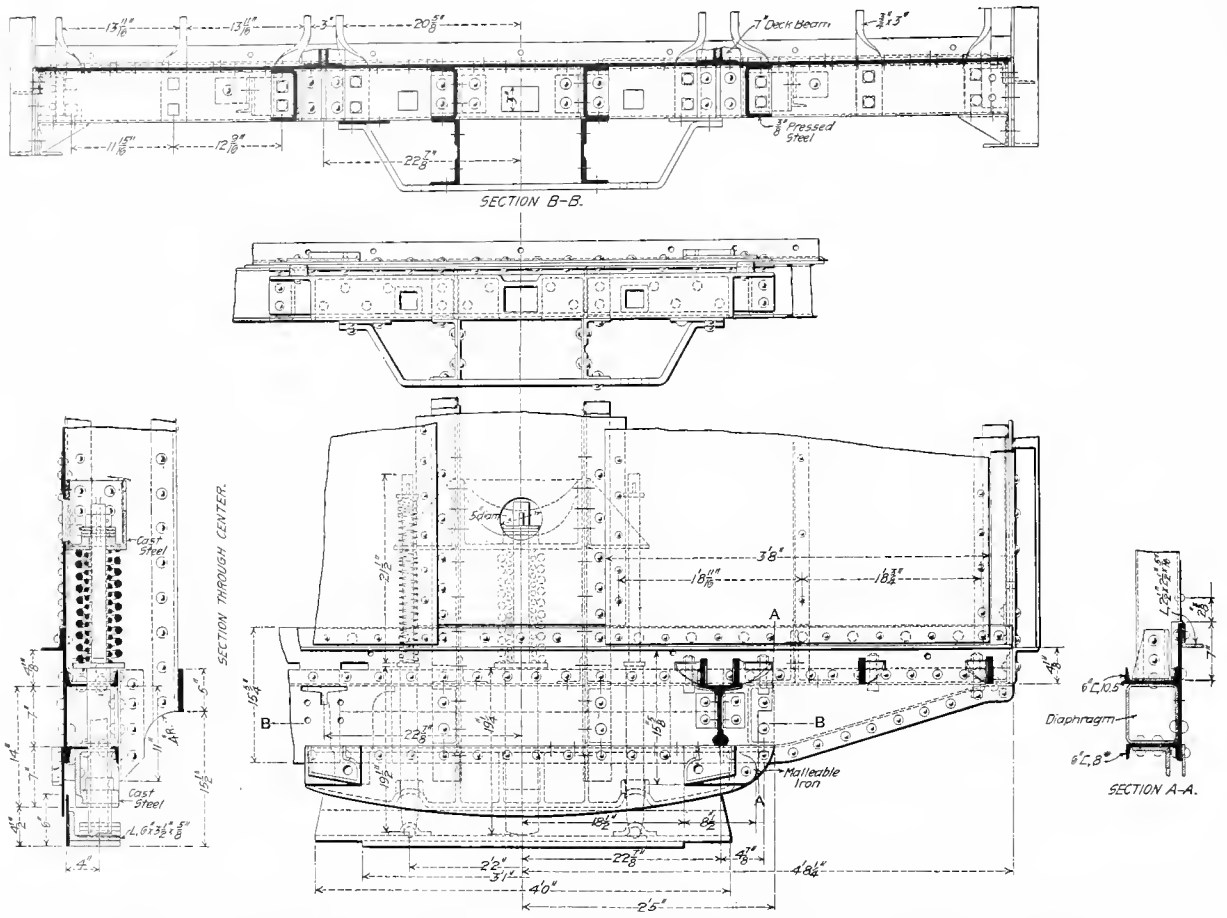
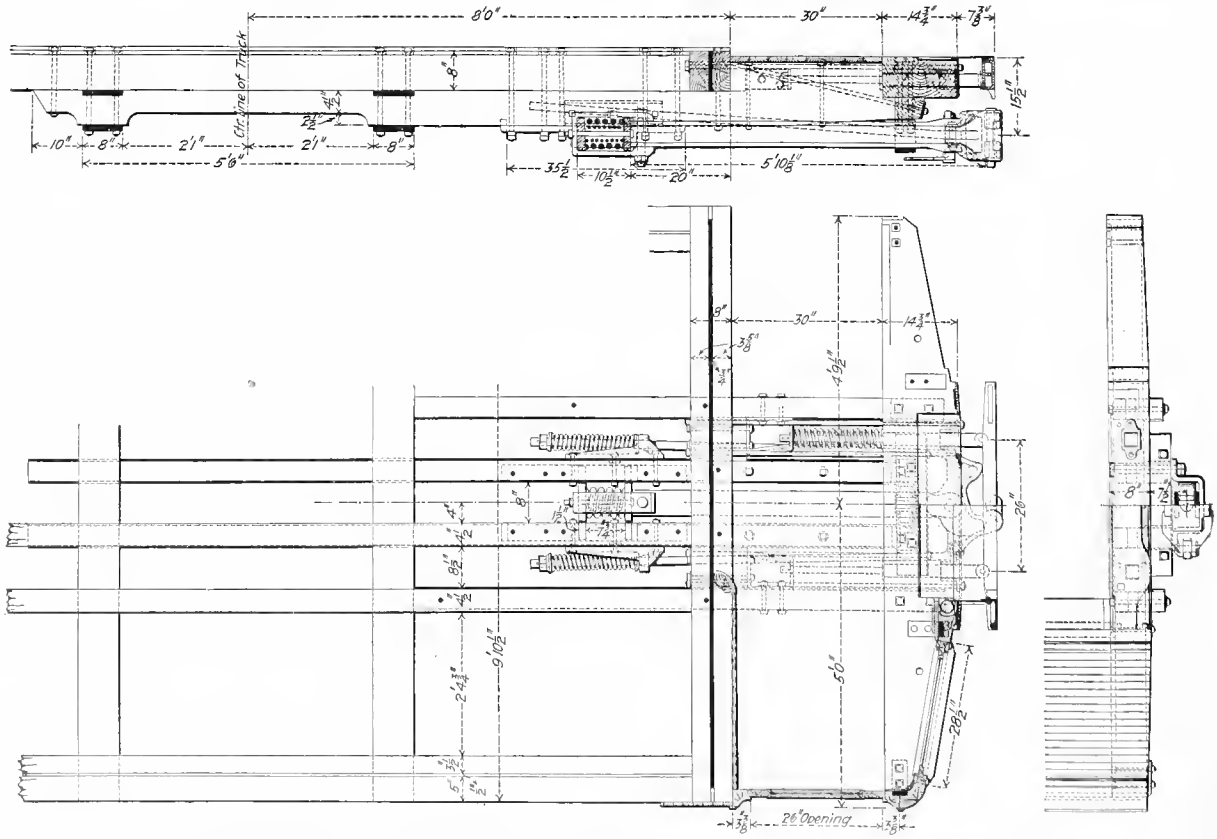


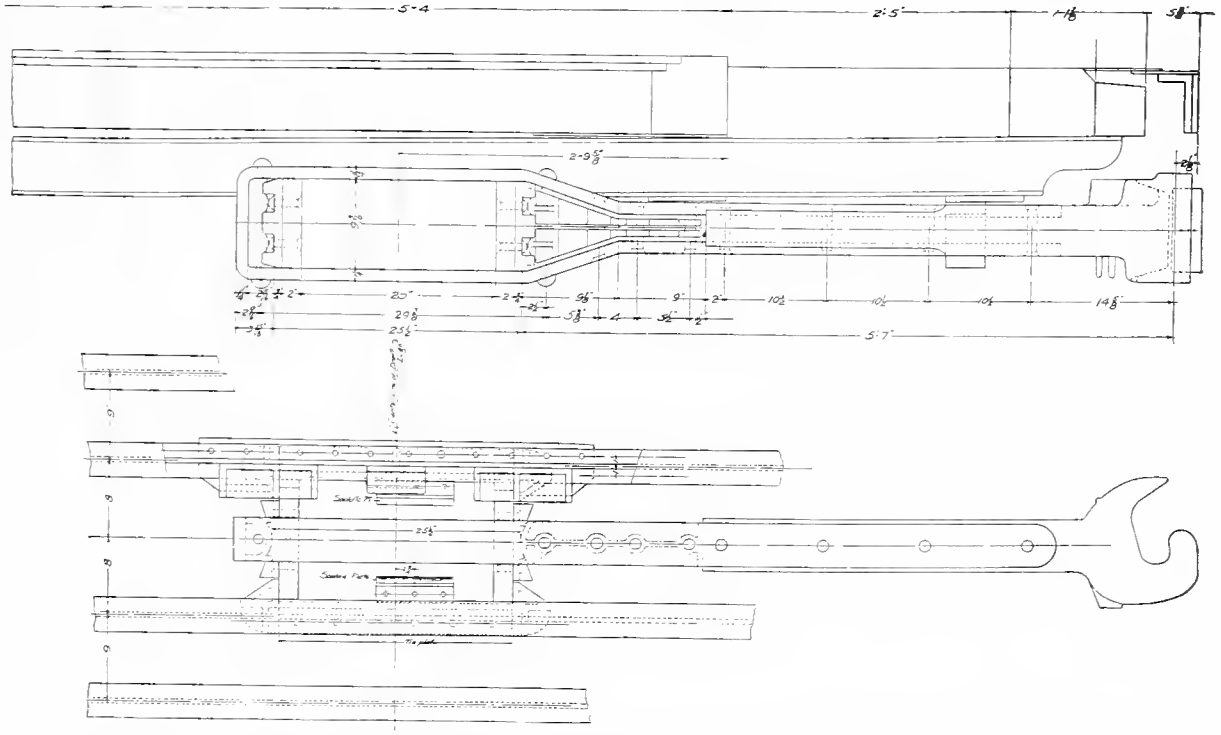
Fig. 2074. Application of Gould Spring Buffer to Stub-end Milk and Express Cars.



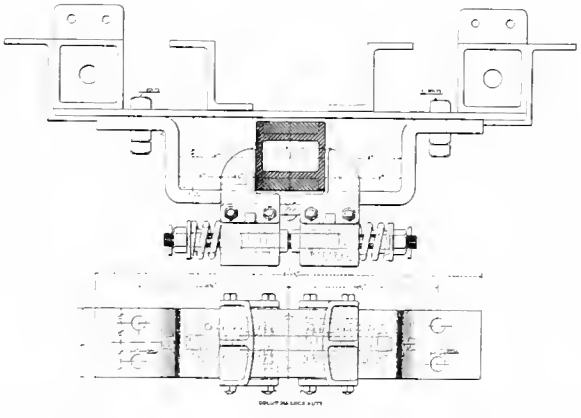
Figs. 2075-2079. Draft Gear Attachments for Vestibuled Steel Postal Car. Atchison, Topeka & Santa Fe.



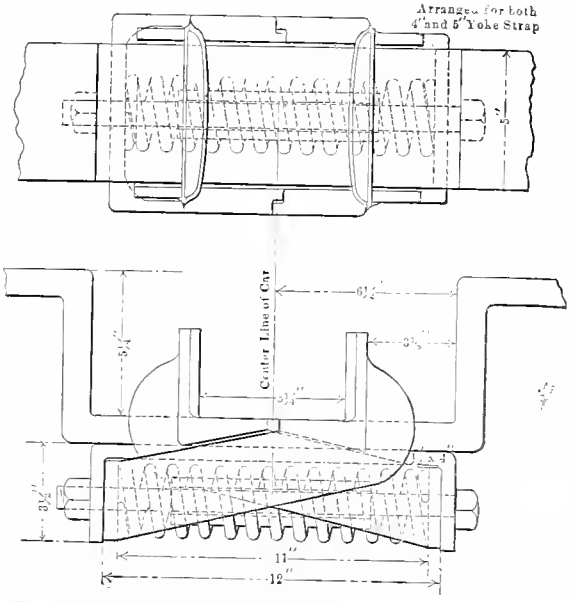
Figs. 2080-2082. Standard Platform and 3-Stem Draft Gear for Wide Vestibule Passenger Cars. C., C., C. & St. L.



Figs. 2083-2084. Stucki Radial Drawbar Controlling Device as Applied by the Pullman Co. and Others. For Freight and Passenger Equipment. Forsyth Bros. Co.



Figs. 2085-2086. Passenger Drawbar Centering Device. Gould Coupler Co.



Figs. 2087-2088. National Centering Yoke. National Car Coupler Co.

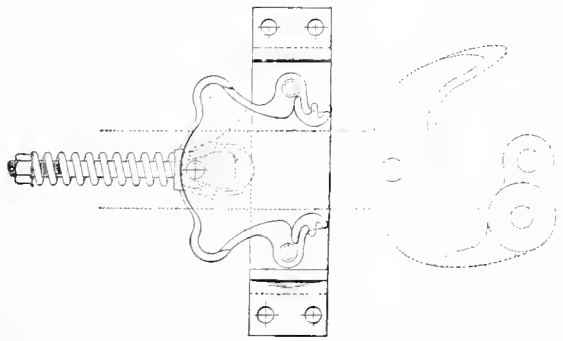


Fig. 2089. On Straight Track.

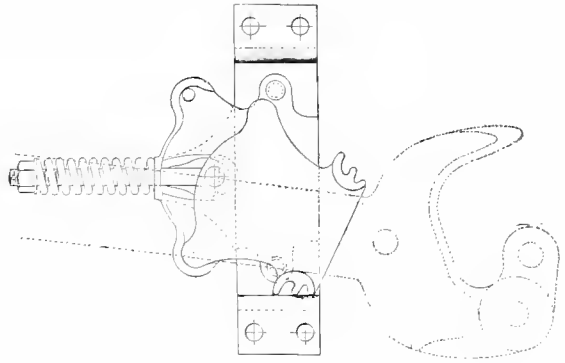
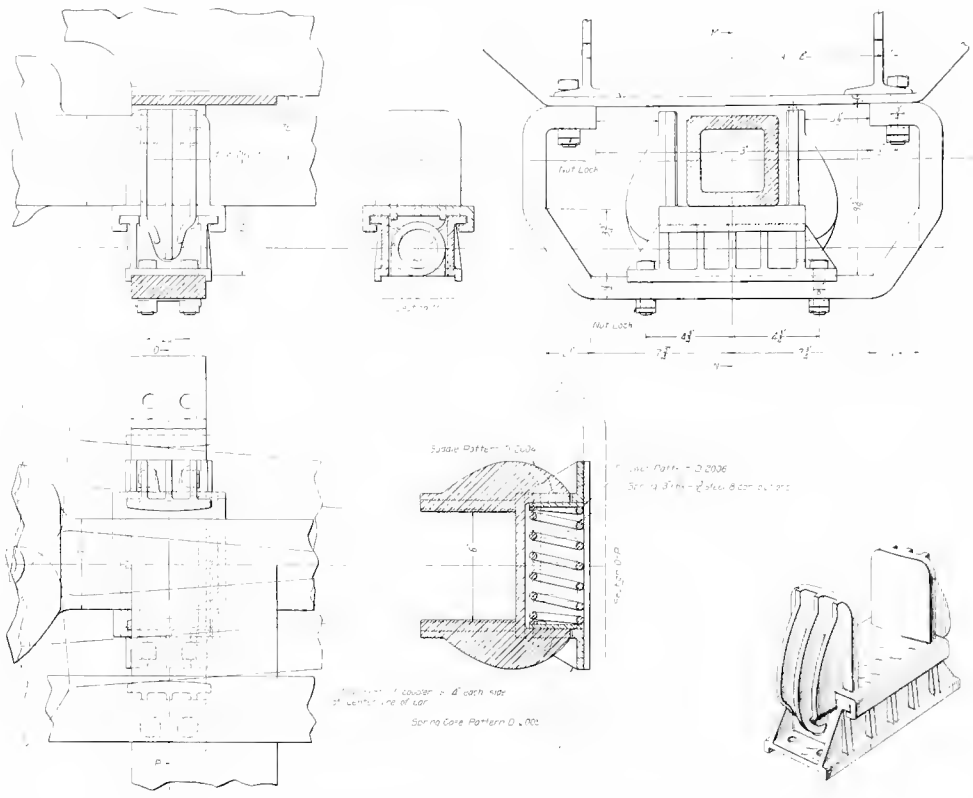


Fig. 2090. On Curve.

Chaffee Drawbar Centering Device. Forsyth Bros. Co.



Figs. 2091-2096. Cory Drawbar Centering Device. W. H. Miner Co.

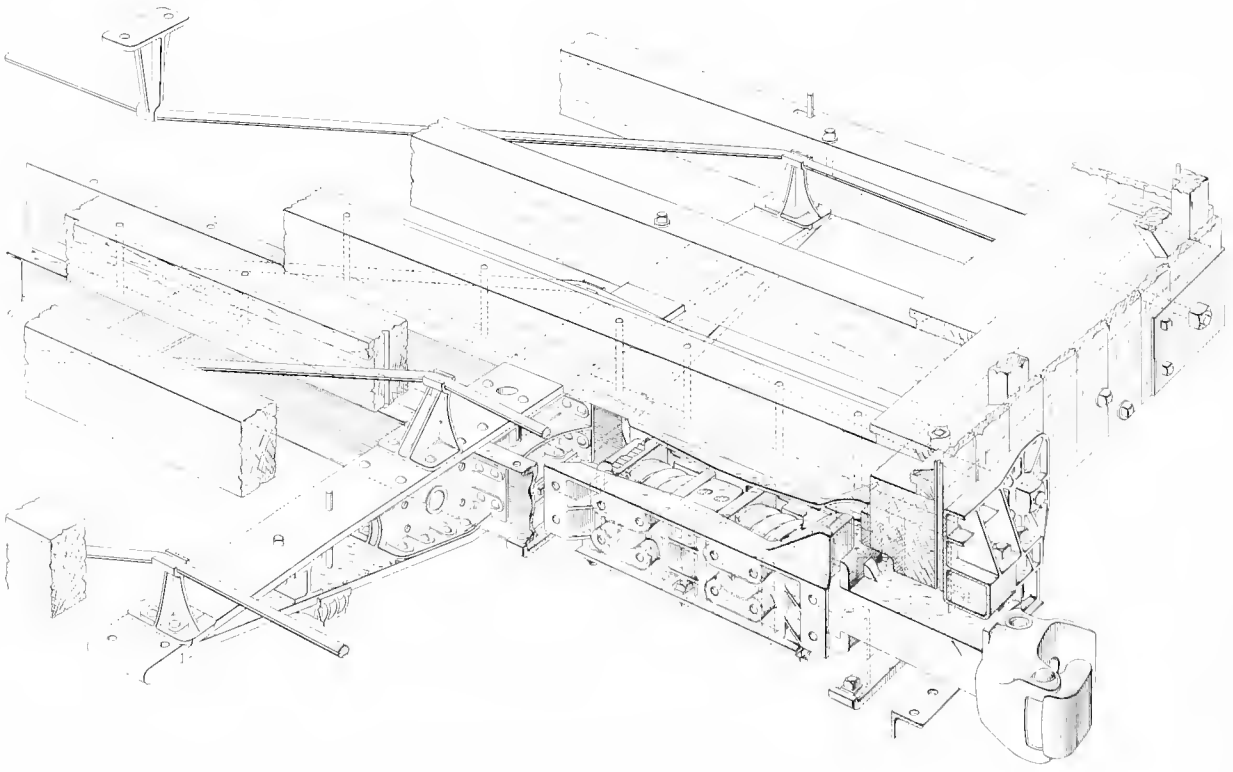


Fig. 2097. Miner Tandem Draft Gear and Posson Reinforcing Underframe for Increasing Freight Car Capacity.

W. H. Miner Co.

Letters Refer to List of Names of Parts on Page 302.

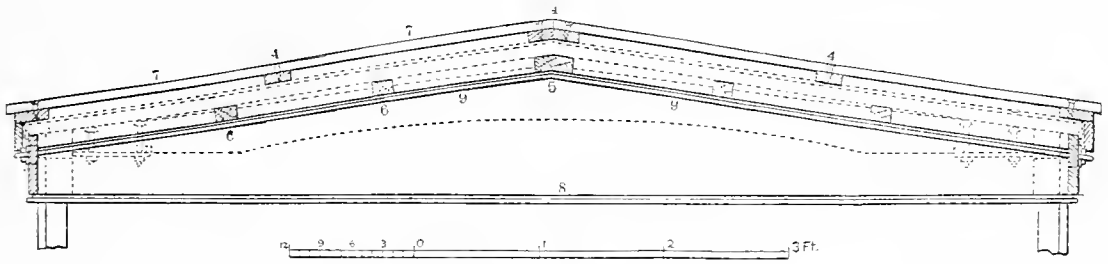


Fig. 2098. Transverse Section.

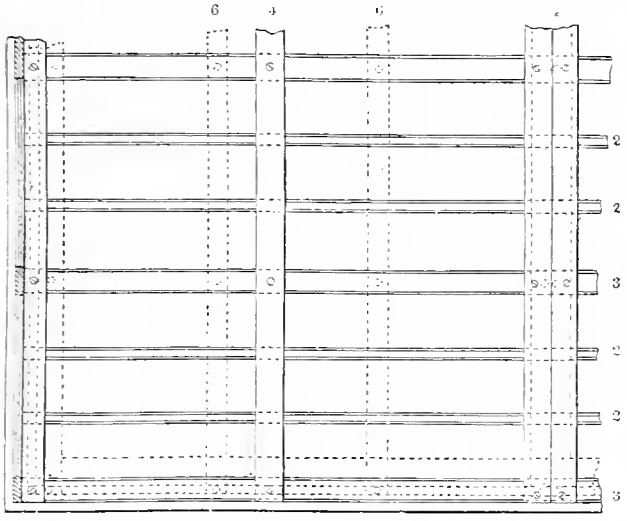


Fig. 2099. Plan.

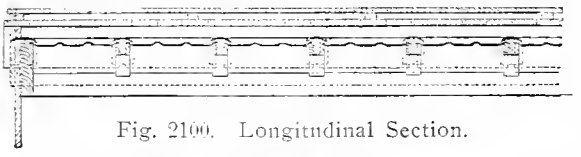


Fig. 2100. Longitudinal Section.

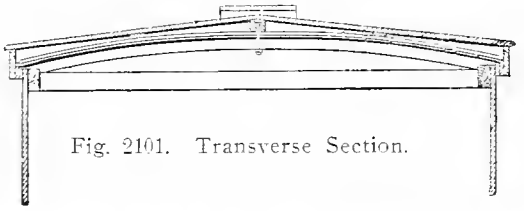


Fig. 2101. Transverse Section.

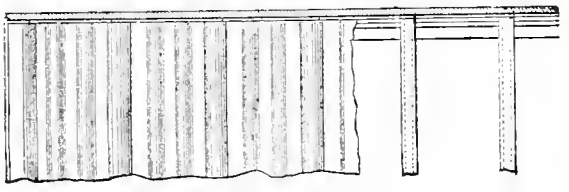


Fig. 2102. Plan. Winslow Car Roof.
(With Curved Roof Sheets.)

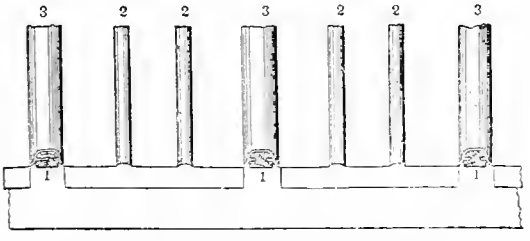


Fig. 2103. Longitudinal Section.
The Winslow Car Roof.

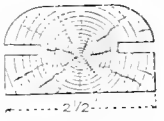


Fig. 2104.
Section of Joint
Strip.

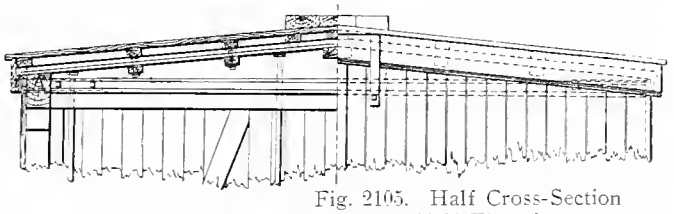


Fig. 2105. Half Cross-Section
and Half Elevation.

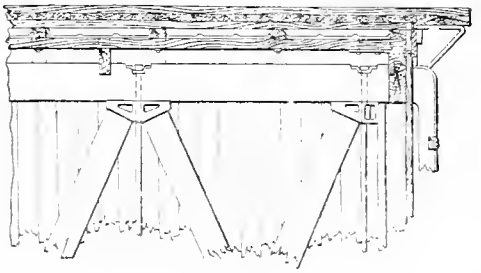


Fig. 2108.
Part Longitudinal Section.

Figs. 2106-2107.
Strap Bolts for
Ridge Pole.

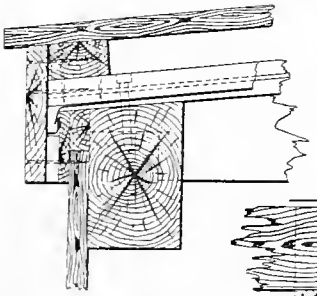
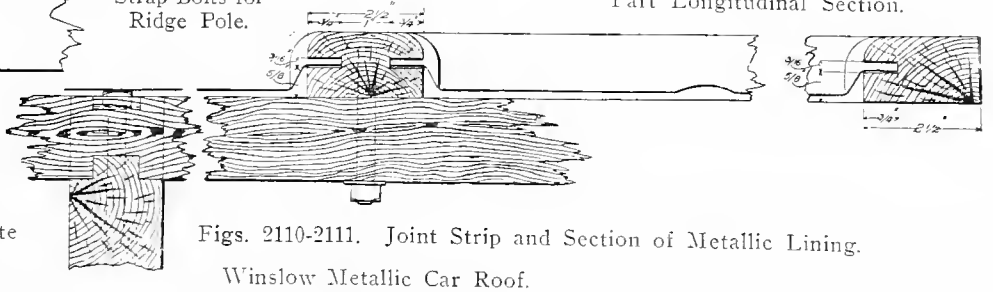


Fig. 2109.
Cross-Section of Plate
and Eaves.



Figs. 2110-2111. Joint Strip and Section of Metallic Lining.
Winslow Metallic Car Roof.

Letters Refer to List of Names of Parts on Page 302.

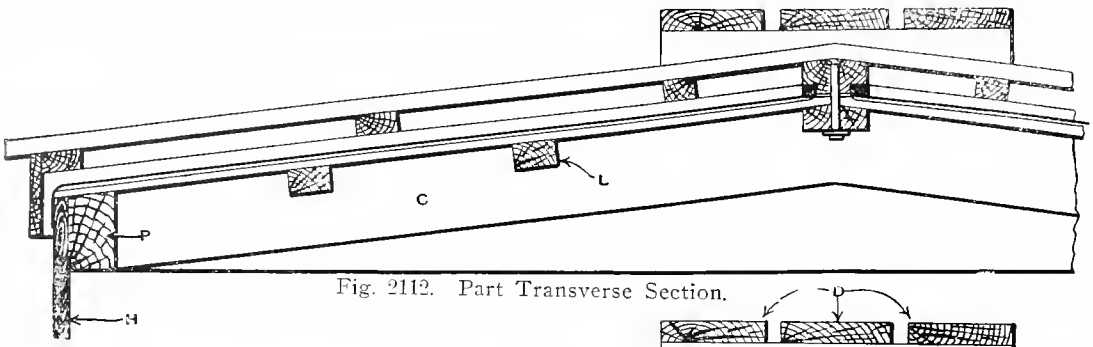


Fig. 2112. Part Transverse Section.

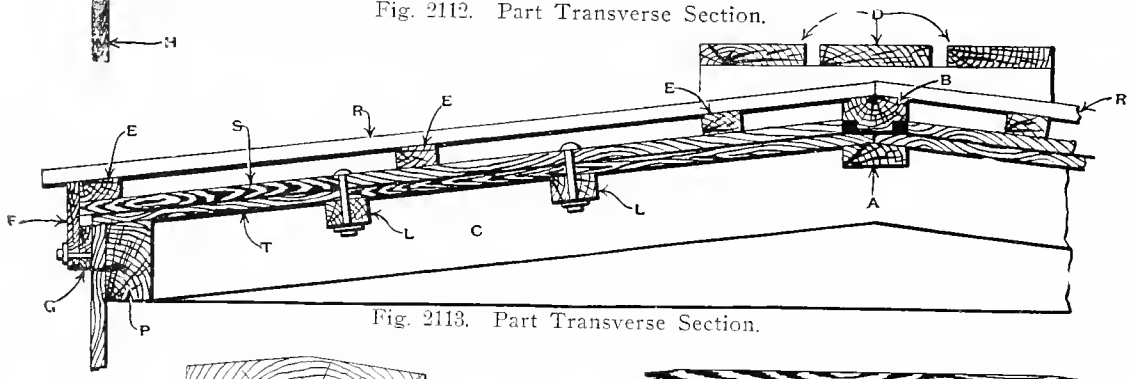


Fig. 2113. Part Transverse Section.

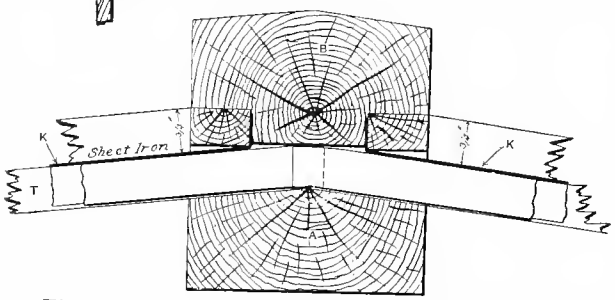


Fig. 2114. Cross-Section of Ridge Pole.

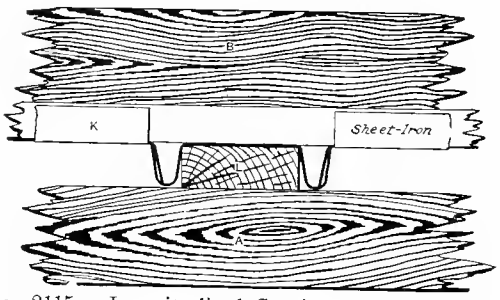


Fig. 2115. Longitudinal Section of Ridge Pole.

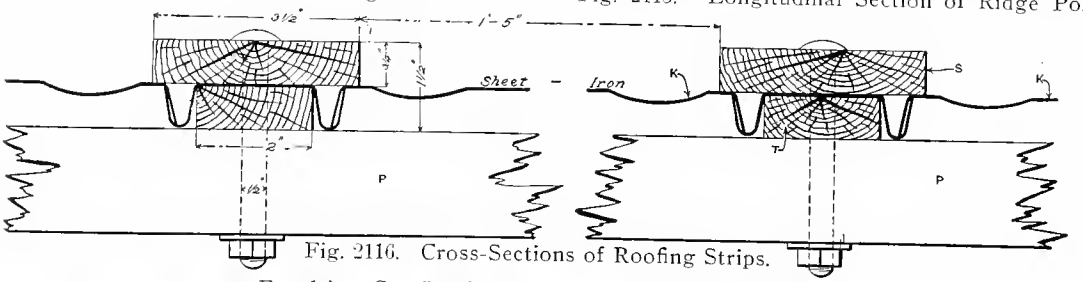


Fig. 2116. Cross-Sections of Roofing Strips.

Excelsior Car Roof, an Inside Metallic Car Roof.

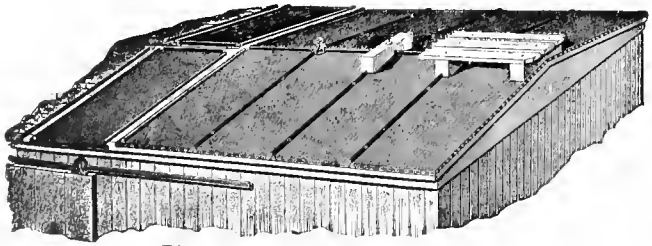


Fig. 2117. Exterior View.

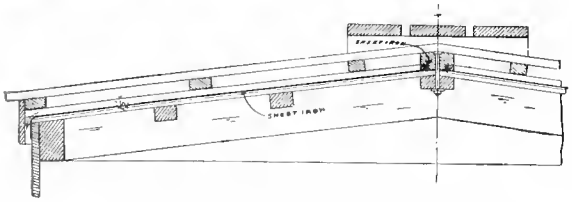


Fig. 2118. Transverse Section.

Fig. 2119. Malleable Iron Integral Corner Cap.

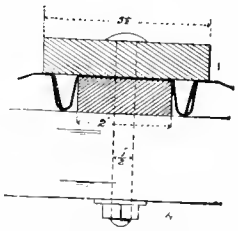
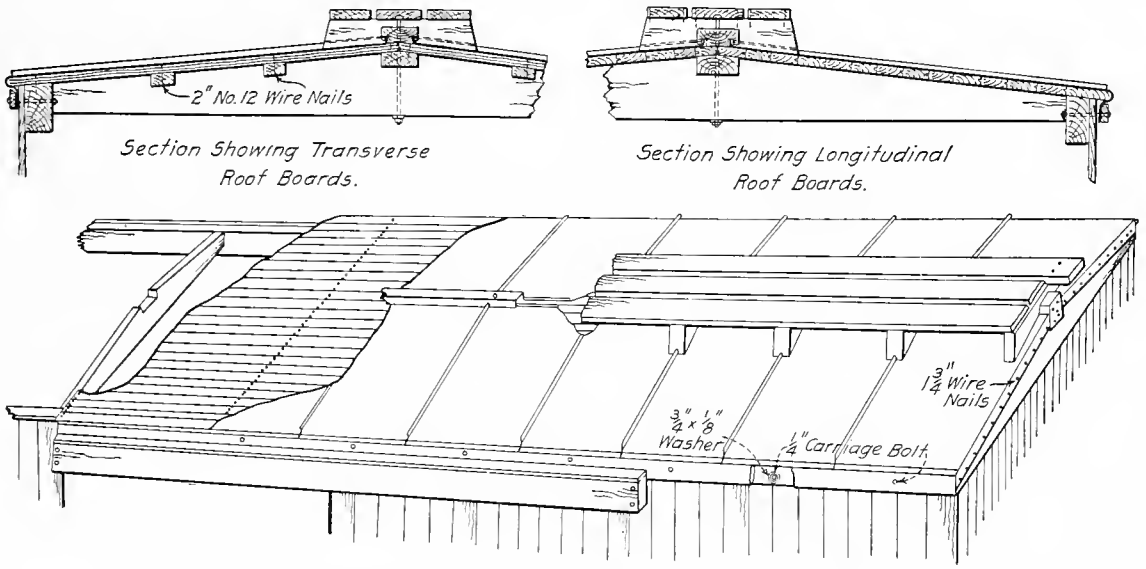
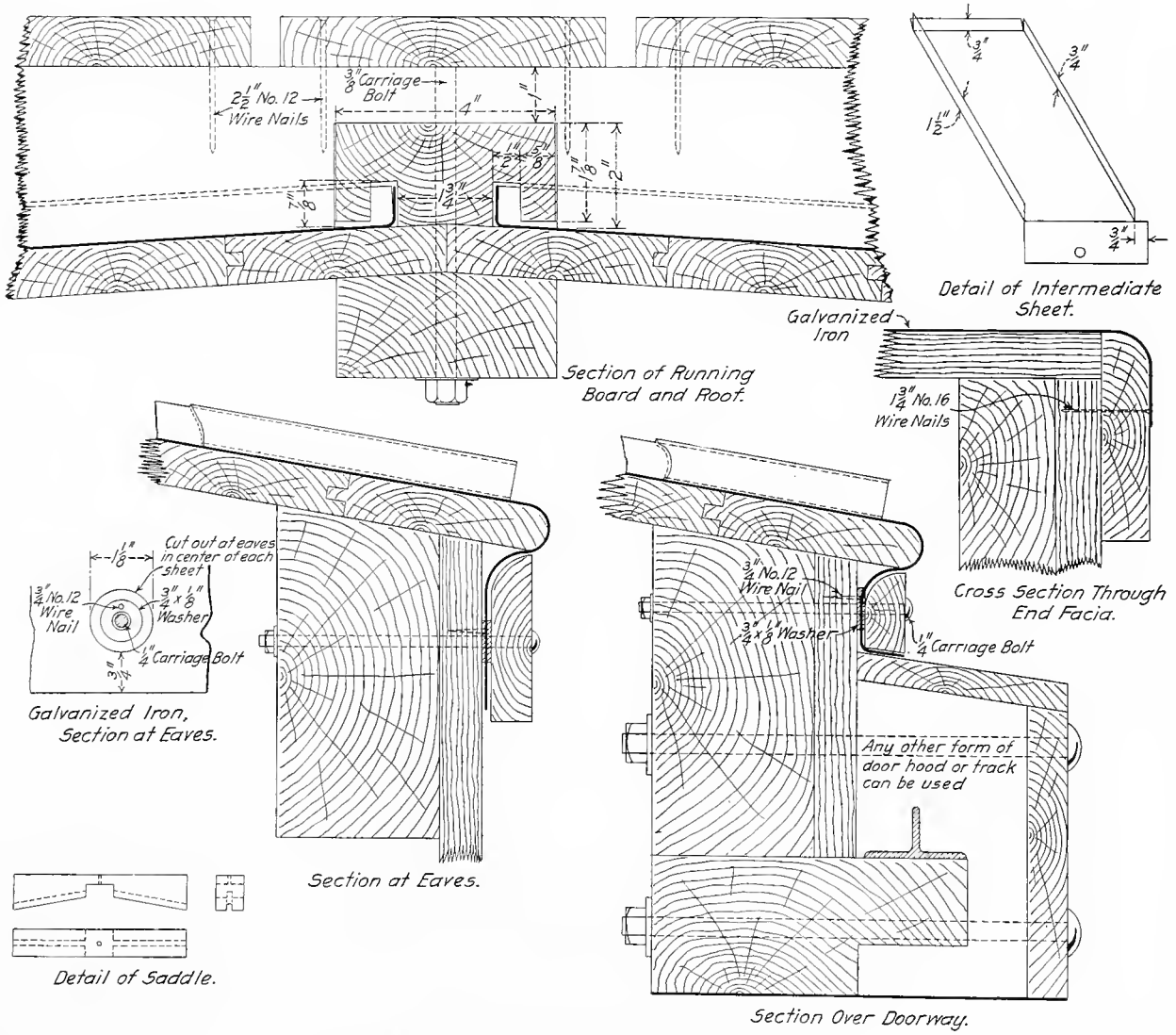


Fig. 2120. Section Through Ridge Pole.

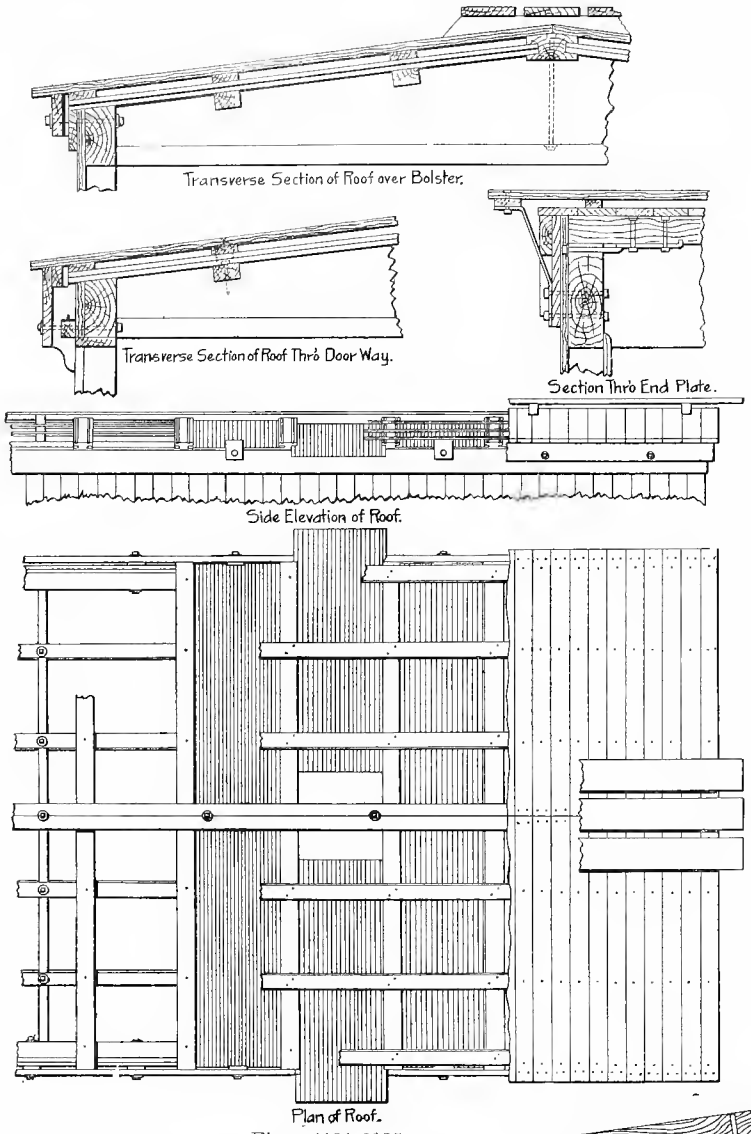
Excelsior Galvanized Car Roof. An Outside Metallic Roof.
Excelsior Car Roof Co.



Figs. 2121-2123. Application of No. 4 Outside Iron Roof.
Chicago-Cleveland Car Roofing Co.



Figs. 2124-2130. Details of No. 4 Outside Iron Roof.
Chicago-Cleveland Car Roofing Co.



Figs. 2131-2135.

Names of Parts of Winslow Roof.
Figs. 2098-2103.

1 *Joint Strip*
2 *Corrugations*
3 *Cover Strip*
4 *Roof Strips*
5 *Ridge Pole*
6 *Purlins*
7 *Roof Boards*
8 *Eaves Fascia Board*
9 *Carline*

Names of Parts of the Excelsior Roof.
Figs. 2112-2116.

A *Lower Ridge Pole*
B *Upper Ridge Pole*
C *Carline*
D *Running Boards*
E *Roof Strips*
F *Eaves Fascia Board*
G *Sub-fascia Board*
K *Galvanized Iron Lining*
L *Purlins*
P *Plate*
R *Roof Board*
S *Sub-rafter*
T *Cover Strip for Sub-rafter*

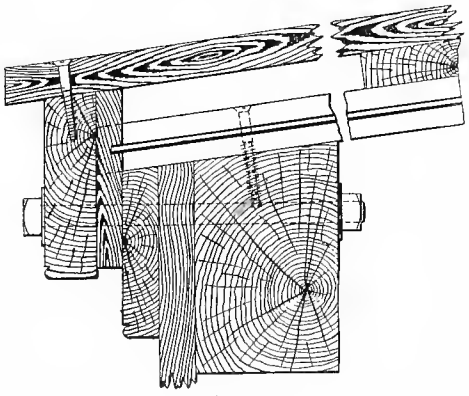


Fig. 2136.
Cross-Section Through Plate and Eaves.

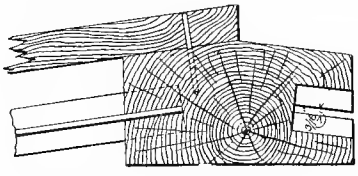


Fig. 2137. Part Side Elevation of Ridge Pole, Showing Mortise.

Fig. 2138.
Cross-Section of Ridge Pole.

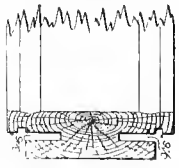


Fig. 2139.
Section Through Cover Strips.

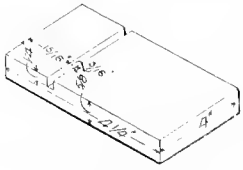


Fig. 2140.
Stop Block.

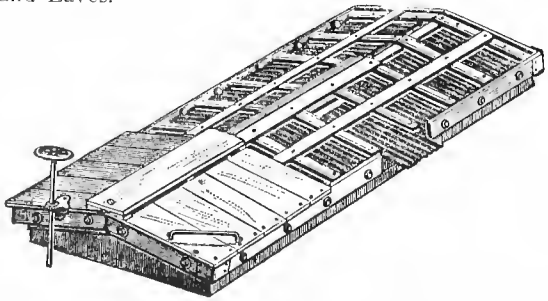
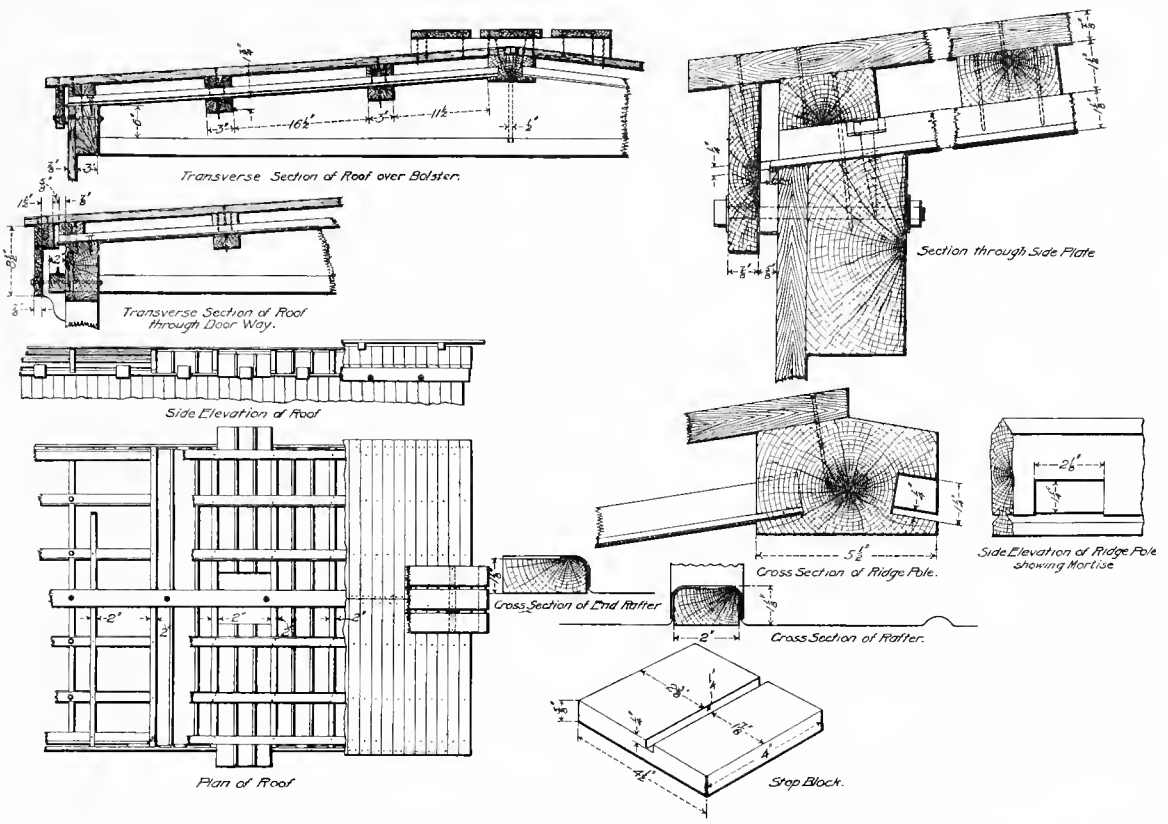
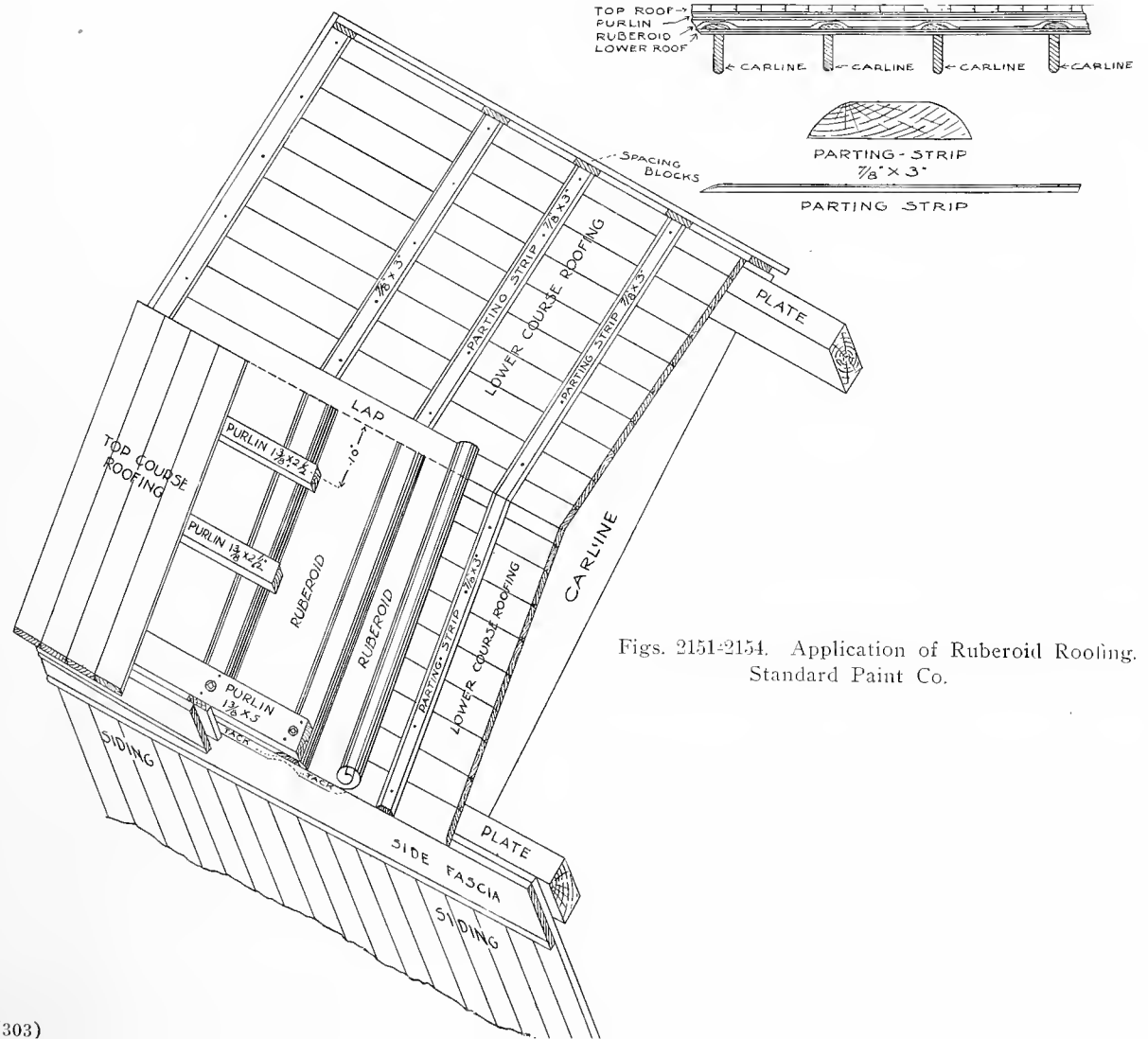


Fig. 2141. Sectional View of Roof.

Figs. 2131-2141. Improved Chicago Car Roof. Chicago-Cleveland Car Roofing Co.



Figs. 2142-2150. Chicago Improved Winslow Roof. Chicago-Cleveland Car Roofing Co.



Figs. 2151-2154. Application of Ruberoid Roofing. Standard Paint Co.

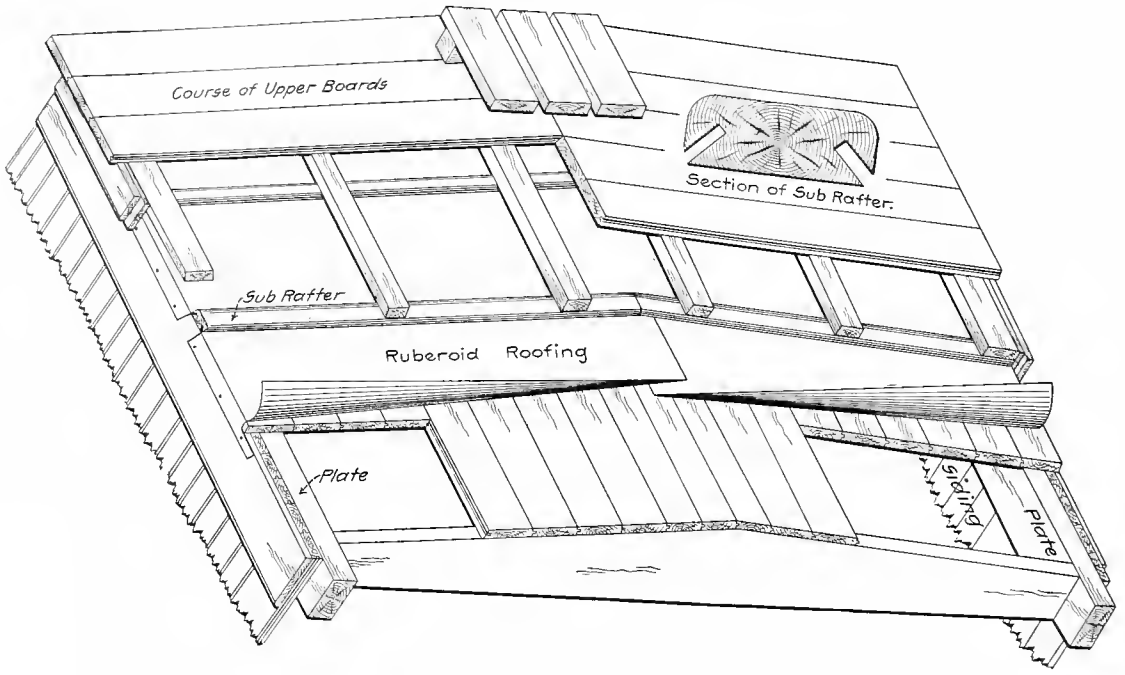
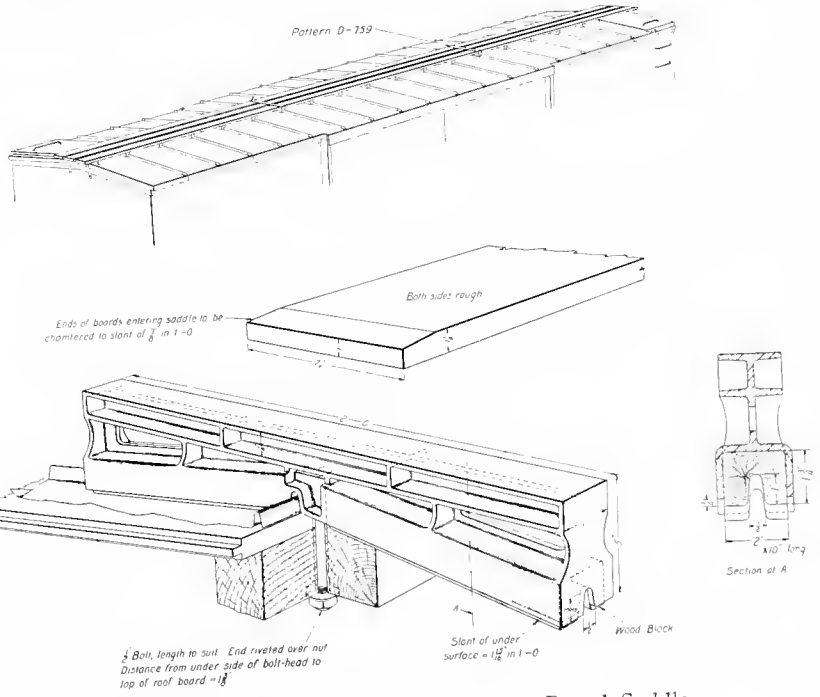
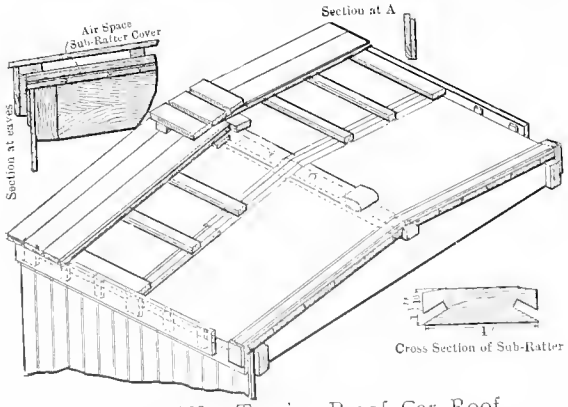


Fig. 2155. Ruberoid Torsion-Proof Car Roof. Standard Paint Co.



Figs. 2156-2159. Miner Metallic Running Board Saddle.



Figs. 2160-2163. Torsion-Proof Car Roof. F. W. Bird & Son.

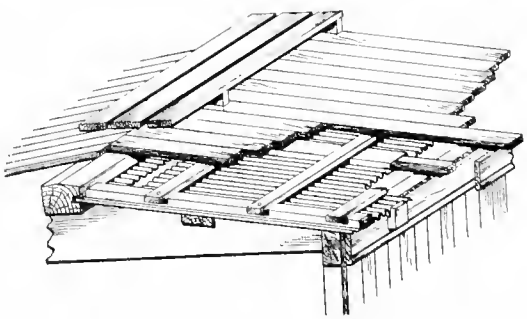
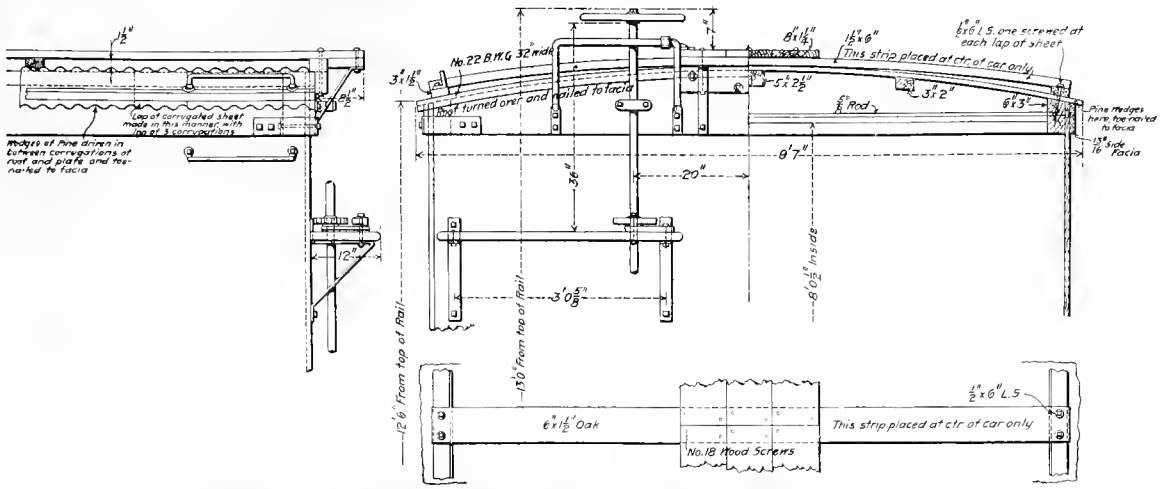


Fig. 2164. Corrugated Inside Iron Roof. Drake & Weirs Co.



Figs. 2165-2167. Application of Corrugated Iron Roof to Mexican Central Box Car.

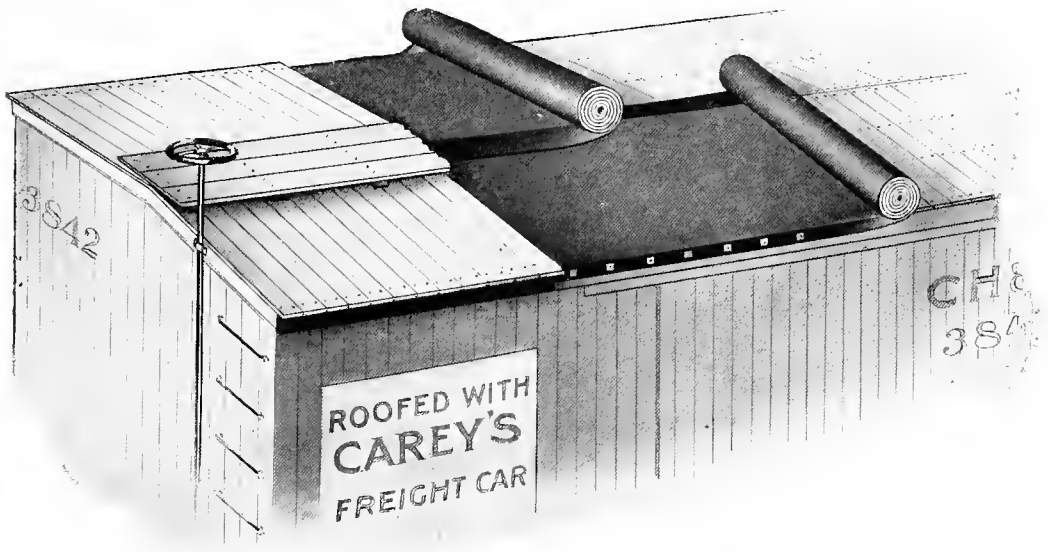


Fig. 2168. Application of Carey's 3-Ply, Burlap Center Freight Car Roofing. Philip Carey Mfg. Co.

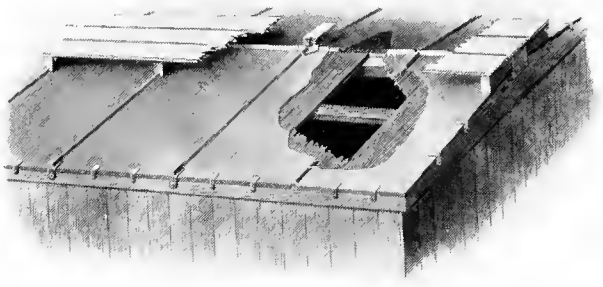
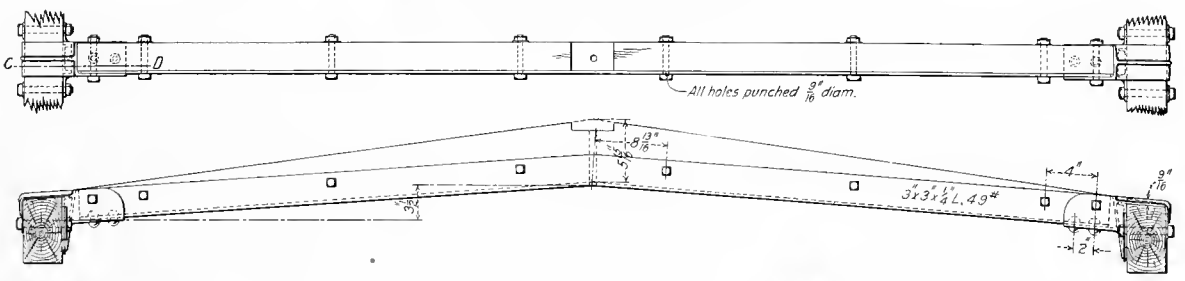


Fig. 2169. Murphy's Improved Winslow Car Roof. Murphy's American Car Roof. Outside Metallic Roof. Standard Railway Equipment Co.

Fig. 2170.



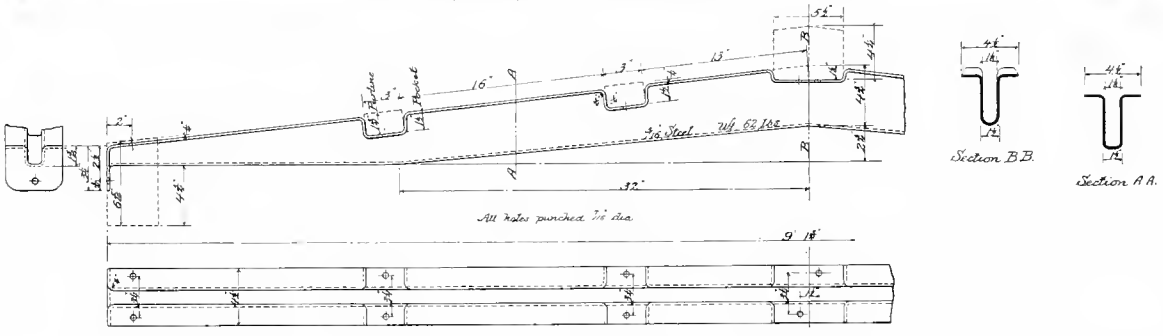
Figs. 2171-2172. Steel Channel Roof Carline. Standard Railway Equipment Co.

Fig. 2173. Cleveland Pressed Steel Roof Carline.

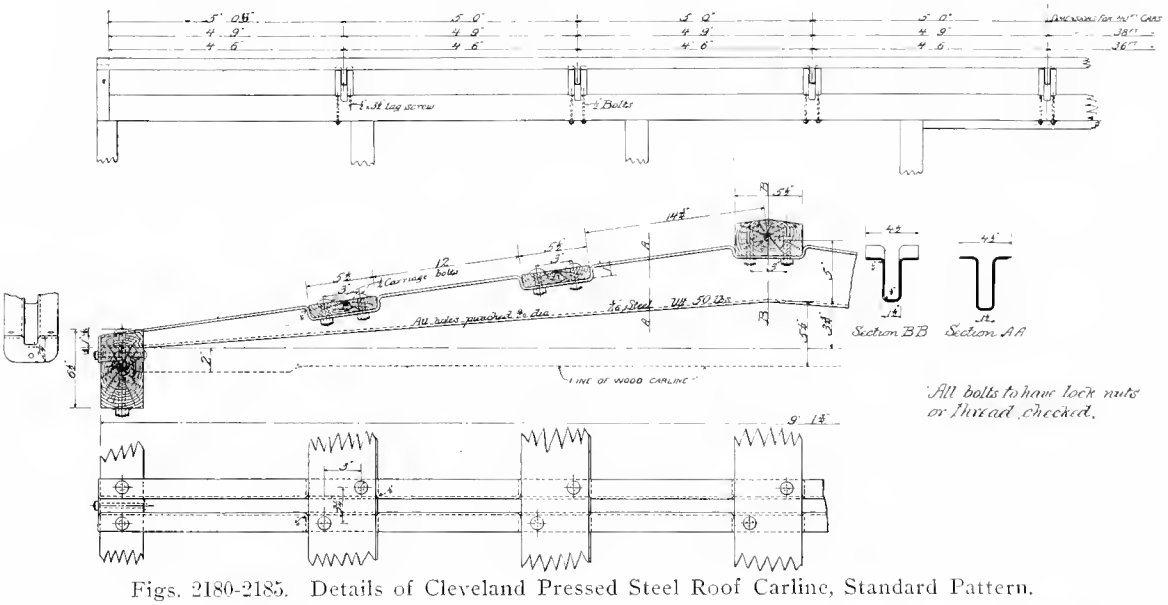
Fig. 2174. Cleveland Pressed Steel Channel Carline for Outside Roof.

Fig. 2175. Cleveland Pressed Steel End Tie Band.

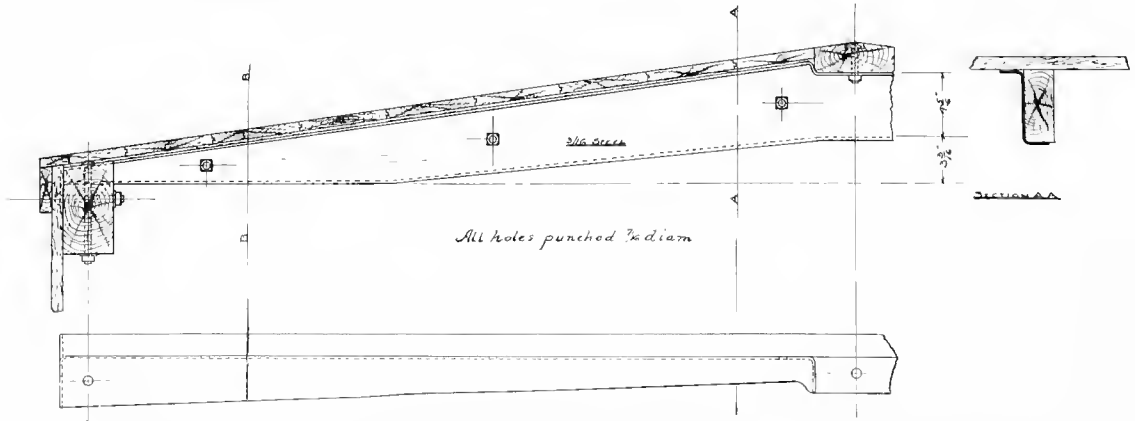
(For Strengthening Ends of Box and Stock Cars.)



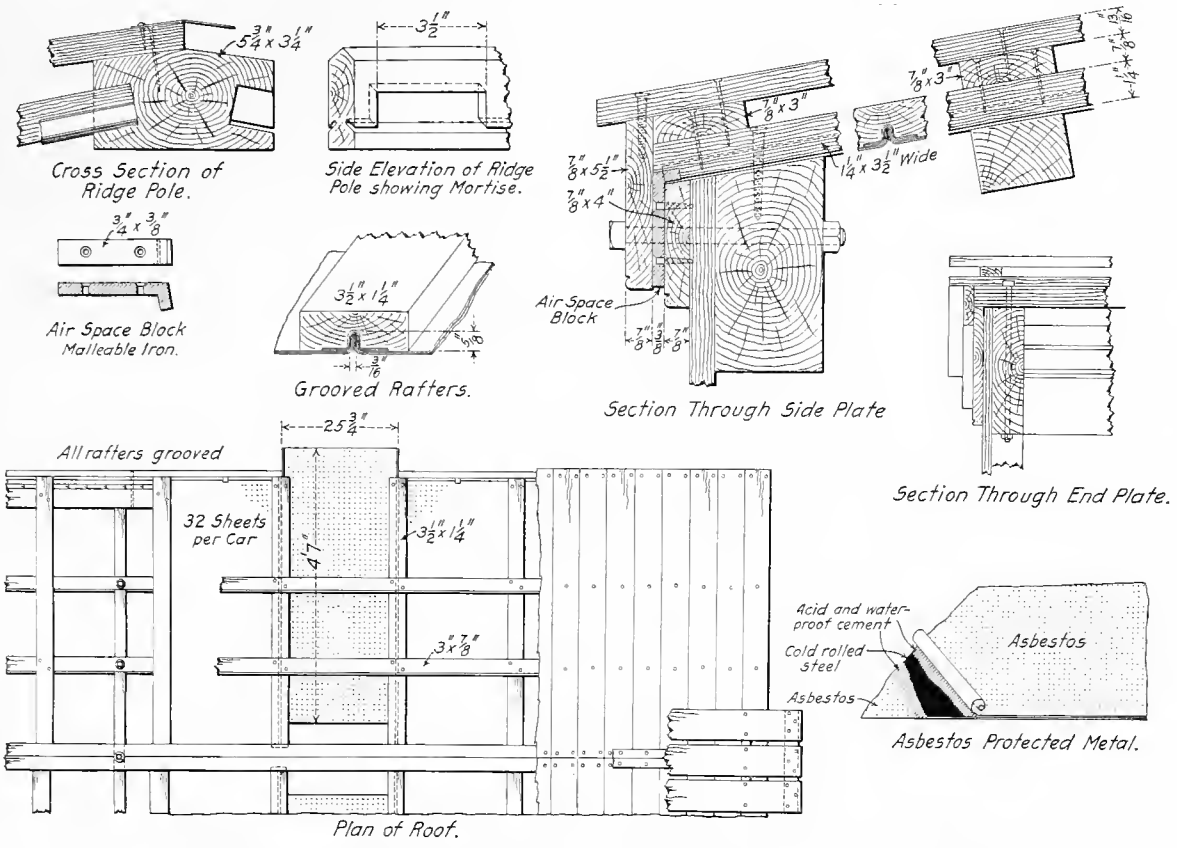
Figs. 2176-2179. Details of Cleveland Pressed Steel Roof Carline, Type B, Heavy Pattern.



Figs. 2180-2185. Details of Cleveland Pressed Steel Roof Carline, Standard Pattern.



Figs. 2186-2188. Cleveland Pressed Steel Roof Carline, Type C, with Nailing Strip for Outside Metallic Roof.
Cleveland Car Specialty Co.



Figs. 2189-2197. Robertson Standard Box Car Roof. Asbestos Protected Metal Co.

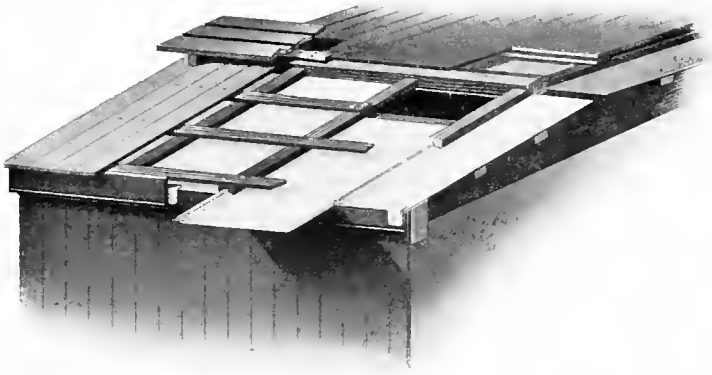


Fig. 2198. Robertson Standard Box Car Roof. Asbestos Protected Metal Co.

Fig. 2199. Batted Flax Fibre for Use in Linofelt Car Lining. Union Fibre Co.

Fig. 2200. Linofelt Car Lining. Union Fibre Co.

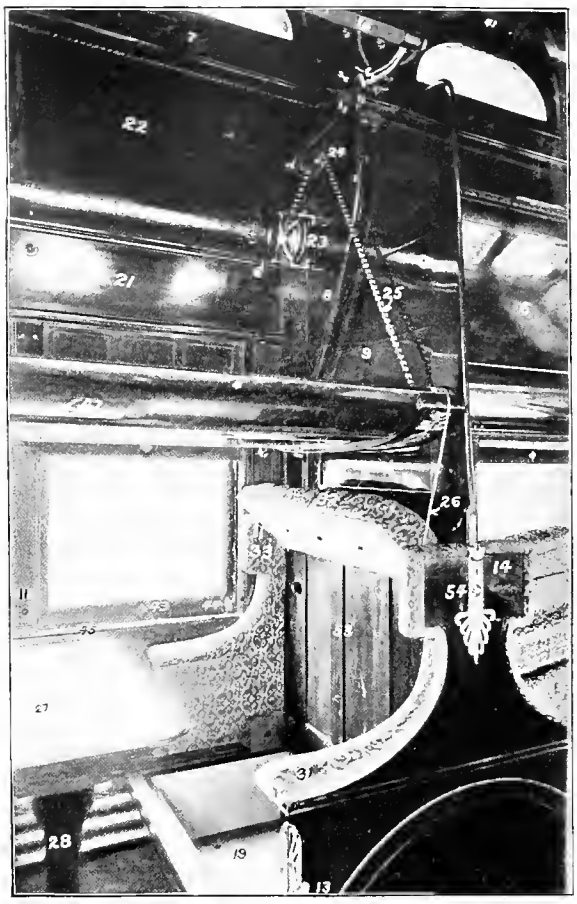


Fig. 2201. Section of a Sleeping Car, with Cushions Removed, Showing Pillow Box, Upper Berth Hangings, Head Board and Table.

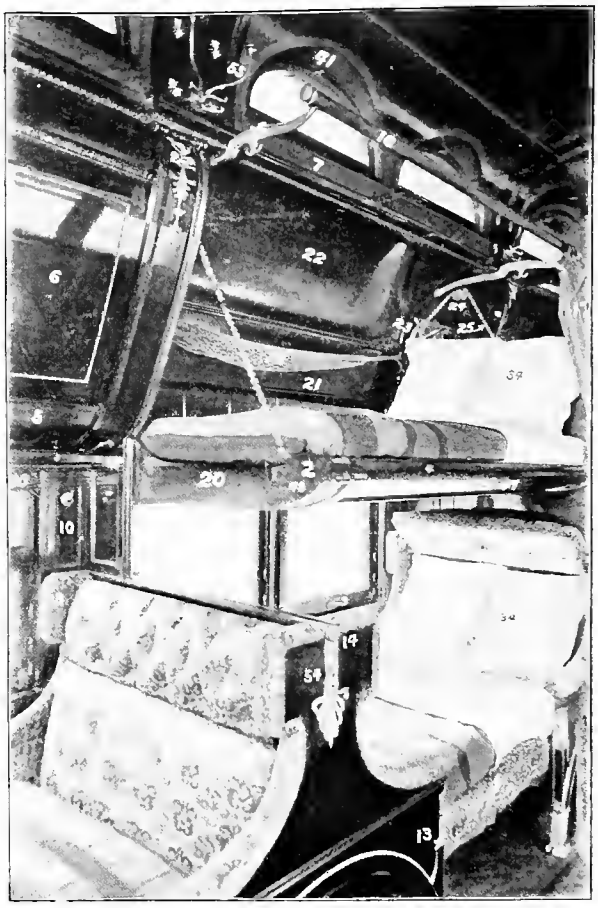


Fig. 2202. Section of a Sleeping Car, with the Upper and Lower Berths Made Up, Except the Head Board and Curtains.

Sleeping Car Sections and Berths. Pullman Co.

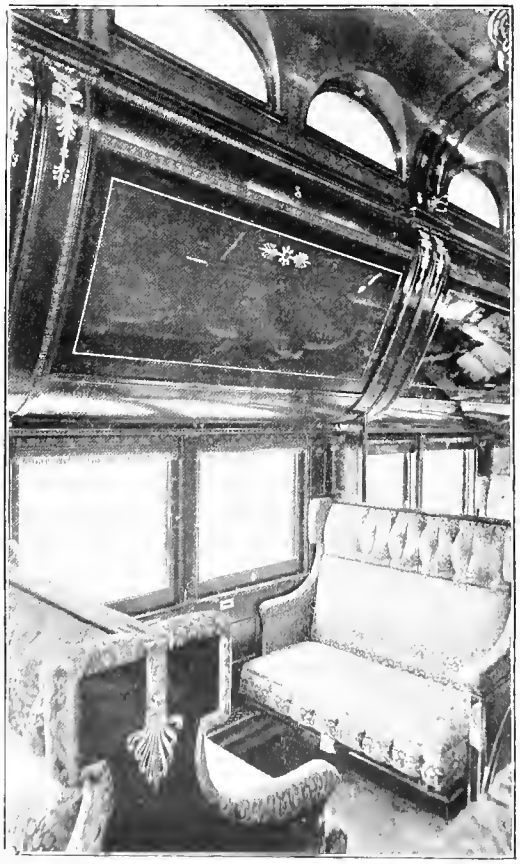


Fig. 2203. Section of a Sleeping Car, Arranged for Day Travel.

Pullman Co. Fig. 2204. Parlor Car Window.

Numbers Refer to List of Names on Next Page.

Numbers Refer to List of Names of Parts Below.

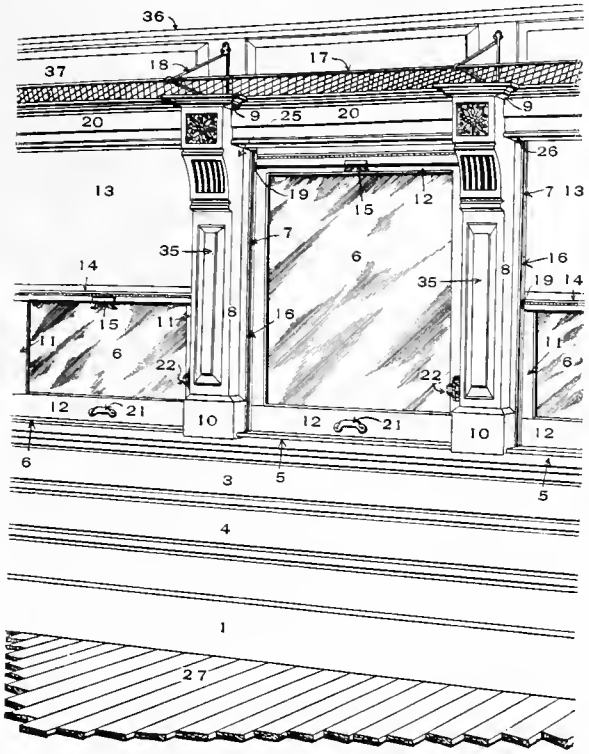


Fig. 2205. Coach Window.

Names of Parts of Sleeping Car Sections
Figs. 2201-2202, 2206.

1 *Lower Berth*
2 *Upper Berth*
3 *Upper Berth (folded up)*
4 *Berth Front, Upper Part*
5 *Berth Front, Lower Part*
6 *Berth Front Panel*
7 *Bunk Apron, or Deck Sill Facing*
8 *Berth Partition*
9 *Head Board*
10 *Inside Window Panel*
11 *Pilaster, between Windows*
12 *Wainscot Panel*
13 *Seat End*
14 *Seat Head End*
15 *Curtain Rod Folding Bracket*
16 *Berth Curtain Rod or Pole*
17 *Berth Curtain*
18 *Berth Mattresses*
19 *Pillow Box*
20 *Bunk End*
21 *Bunk Panel*
22 *Lower Deck Ceiling*
23 *Berth Spring and Frame*
24 *Berth Chain Pulley*
25 *Berth Chain*
26 *Berth Safety Rope*
27 *Card or Writing Table*
28 *Table Leg*
29 *Seat Cushion. (The cushion pulls out, and the back takes the place of the cushion, and together they form the lower berth)*
30 *Seat Back*
31 *Seat Arm, Upholstered*
32 *Head Rest and Head Board Pocket. (The upholstered head rest lifts up about its hinged top and forms a pocket for day wearing apparel)*
33 *Upholstered Inner Seat End*
34 *Pillow*
35 *Blankets*
36 *Deck Window Screen*
37 *Vaulted Compound Carline Decorations*
38 *Vaulted Deck Ceiling*
39 *Lamp Dome*
40 *Center Lamp*
41 *Vaulted Deck Window*
42 *Cross-Section of Car Side*
43 *Window Sash Lift*
44 *Window Stop*
45 *Table Hook*
46 *Table Hook Plate*
47 *Berth Catch Handle*
48 *Berth Catch*
49 *Lower Berth Stop Bar*
50 *Window Shade*
51 *Window Shade Thumb Latch*
52 *Hammock*
53 *Seat Back Paneling*
54 *Head Board Bolt and Lock*
55 *Hat Posts*

Names of Parts of Windows. Fig. 2204.

B *Window Valances*
C *Drapery Curtain*
D *Lower Wainscot Rail*
E *Upper Wainscot Rail*
F *Wainscot Panel*
G *Wood Grille*
H *Inside Window Cornice*
J *Inside Window Sill*
L *Mullion of Upper Sash*
M *Molding of Window Post*
N *Window Sash Stile*
O *Window Sash Rail*
P *Hot Water Pipes*
Q *Hot Water Pipe Guard Rail*
R *Basket or Bundle Rack*
S *Lower Sash*
T *Upper Sash, Leaded Glass*
U *Window Lift*
V *Window Stop*
W *Electric Push Button*
X *Table Hook Plate*
Y *Curtain Hook*
Z *Inside Cornice Sub-Fascia Board*

Names of Parts of Coach Window. Fig. 2205.

1 *Truss Plank*
2 *Lower Wainscot Rail*
3 *Upper Wainscot Rail*
4 *Wainscot Panel*
5 *Inside Window Sill*
6 *Window, or Window Glass*
7 *Window Casing, or Inside Window Stop*
8 *Window Pilaster*
9 *Pilaster Cap*
10 *Base of Pilaster*
11 *Window Stile*
12 *Window Rail, or Sash*
13 *Shade*
14 *Bottom Bar of Shade*
15 *Shade Thumb Latch or Lift*
17 *Continuous Basket Rack*
18 *Basket Rack Bracket*
19 *Window Shade Stop*
20 *Window Casing or Cap Molding*
21 *Window Lift*
22 *Window Latch*
25 *Pilaster Cap Bracket*
26 *Window Cove Molding*
27 *Car Floor*
36 *Inside Cornice*
37 *Inside Cornice Sub-Fascia Board, or Paneling*

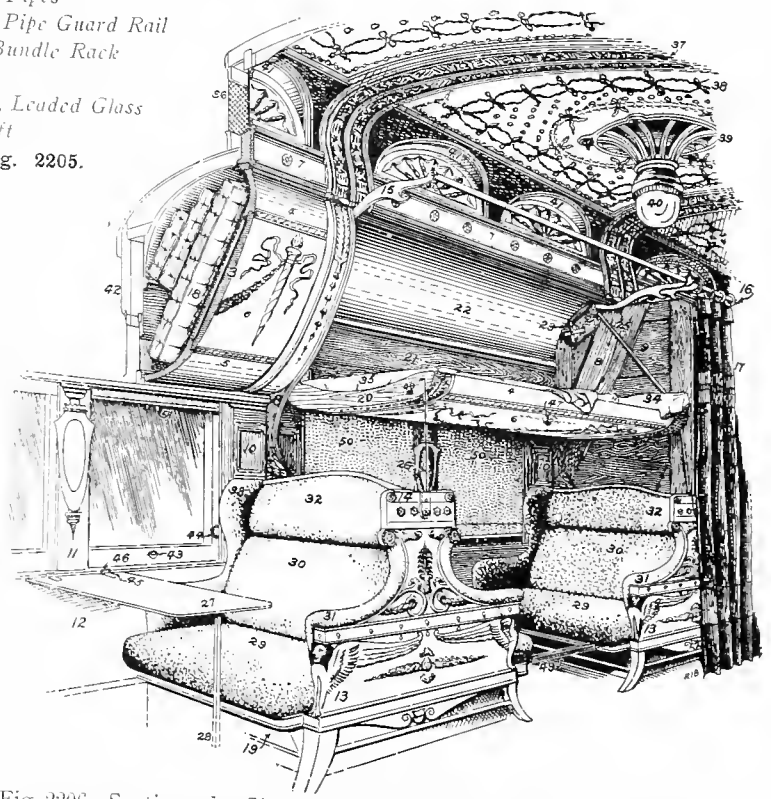
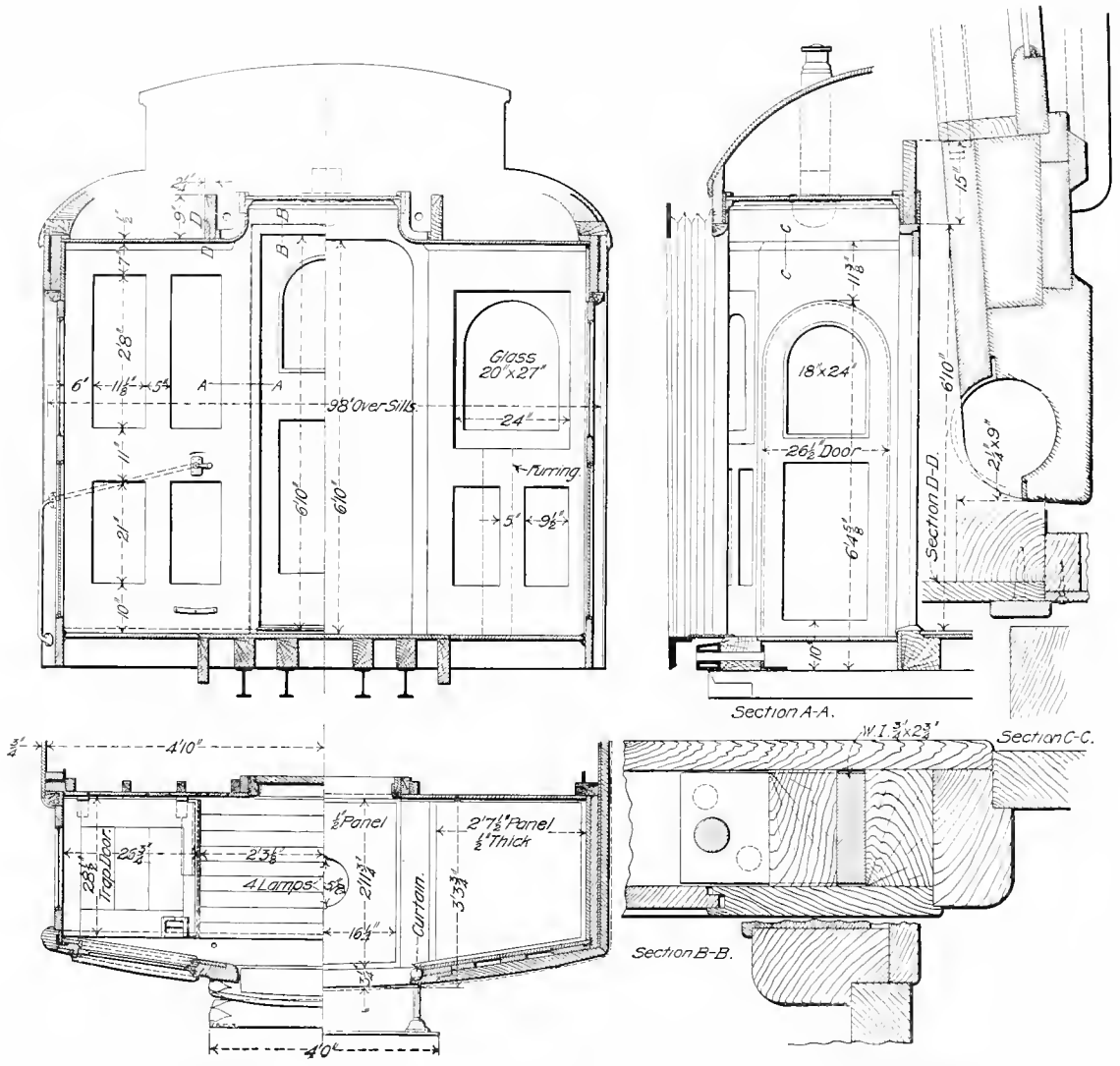
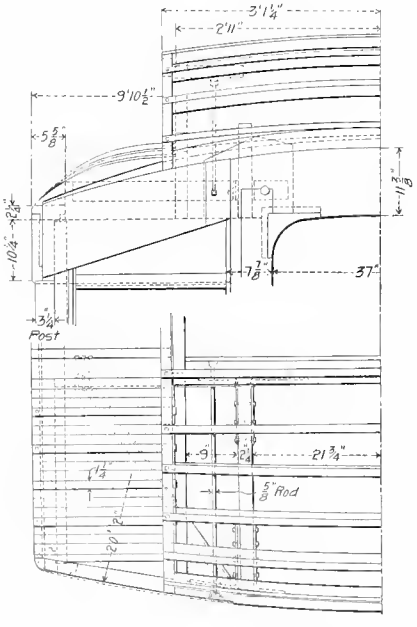


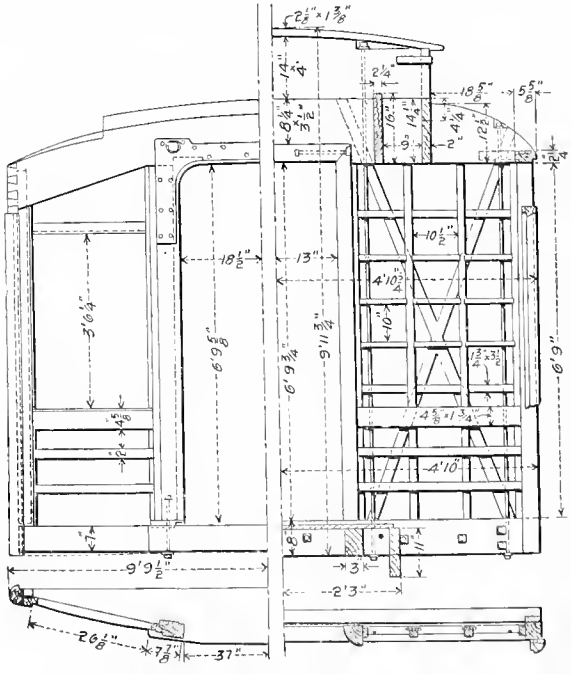
Fig. 2206. Section of a Sleeping Car, the Upper Berth Partly Made Up.
The Columbian Style of Sleeping Car Section. Pullman Co.



Figs. 2207-2210. Framing and Interior Finish of Standard Pullman Wide Vestibule.
Pullman Co.



Figs. 2211-2212. Roof Framing.



Figs. 2213-2214. End Framing.

Vestibule Framing, First-Class Coach. N. Y., N. H. & H.

Names of Parts of Buhoup Wide Vestibule. Figs. 2215, 2263.

4 *Foot Plate*
6 *Spanner Bar, Lower*
8 *Curtain Plate, Front*
9 *Curtain Plate, Rear*
10 *Curtain Roller*
11 *Curtain*
12NP *Post Plate, L. & R.*
20 *Curtain Bearing, Lower*
20A *Curtain Bearing, Lower, Used with Standard Steel Platform*
21 *Curtain Bearing, Upper*
23 *Curtain Socket*
40 *Patent Plate*
44 *Curtain Spring, L. & R.*
45 *Curtain Roller Plug*
46 *Arch Plate and Buffer Spring*
49 *Arch Plate Band*
50 *Shield*
52 *Curtain Spring Plug, Large*
53 *Curtain Spring Plug, Small*
54 *Piston Stem*
79 *Buffer Plate for Standard Steel Platform*
80 *Foot Plate for Standard Steel Platform*
81 *Buffer Plate Spring*
91 *Arch Plate*
94 *Spanner Bar, Upper*
95 *Angle Connection, Top, R.*
96 *Angle Connection, Top, L.*
100 *Foot Plate Housing*
101 *Bulb Angle*
111 *Spanner Bar Bolt*
115 *Angle Connection, Bottom, R.*
116 *Angle Connection, Bottom, L.*
119 *Piston Stem Bracket*
120 *Piston Stem Guide*
123 *Accordion Hood Band*
124 *Accordion Hood*
125 *Hood Brace Bracket, Front, R.*
126 *Hood Brace Bracket, Front, L.*
127 *Hood Brace Bracket, Rear, R.*
128 *Hood Brace Bracket, Rear, L.*
129 *Hood Brace*
130 *Buffer Plate*
134 *Foot Plate Bolt*
154 *Piston Stem Spring*
155 *Piston Stem Washer*
156 *Piston Stem Ferrule*
628 *Buffer Plate Pin*

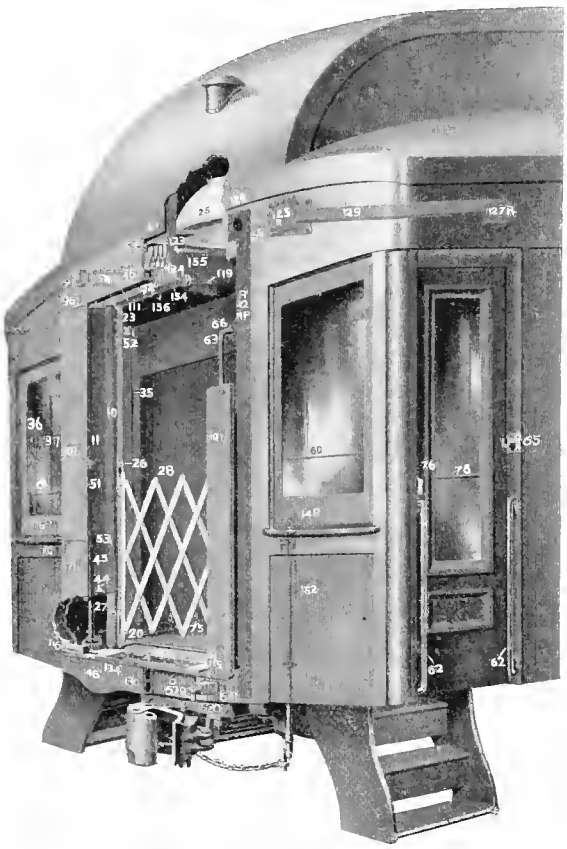
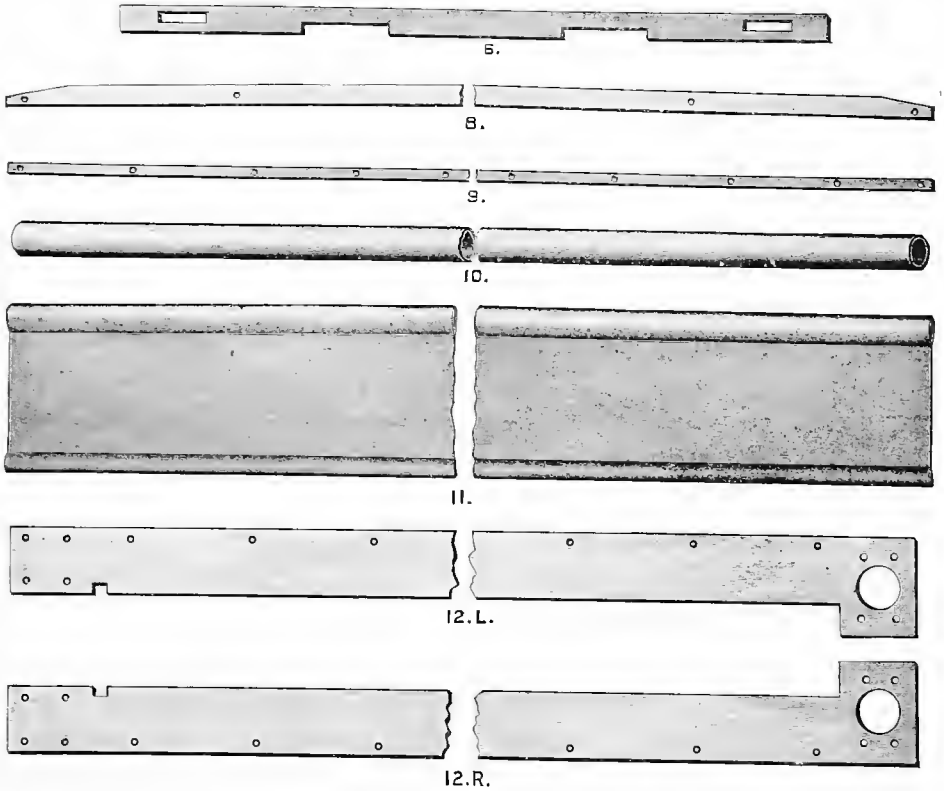
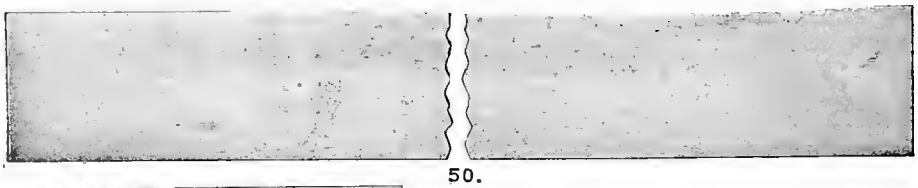


Fig. 2215. Buhoup Wide Vestibule. McConway & Torley Co.



Figs. 2216-2222. Details of Buhoup Wide Vestibule. McConway & Torley Co.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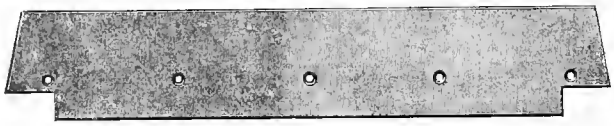
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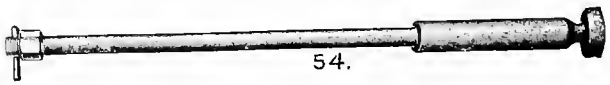
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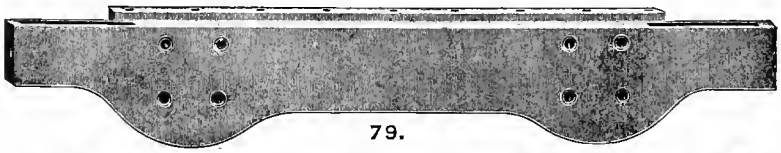
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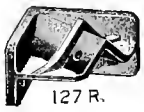
125 R.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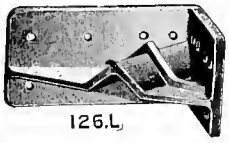
91.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128.L.


94


101.


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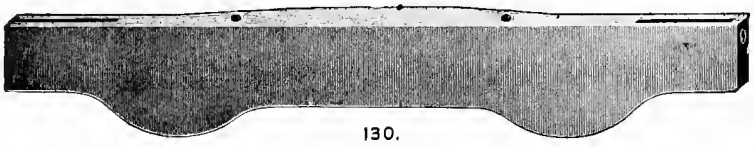
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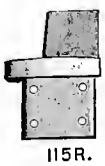
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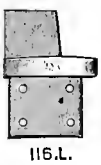
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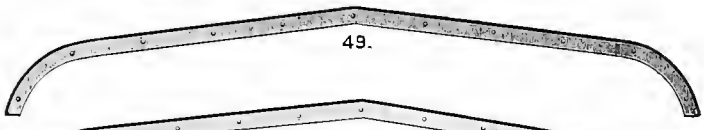
134.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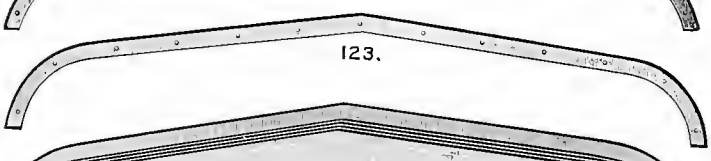
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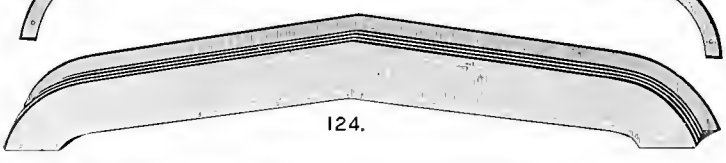
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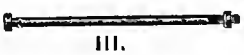

111.

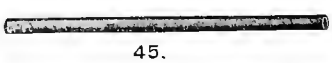

155.


129.


156.


628.

4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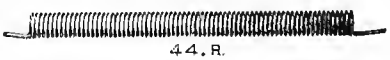
44.L.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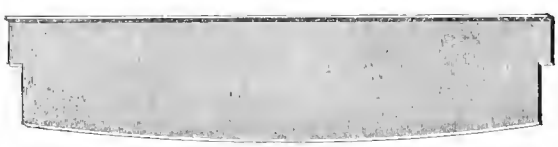
96.L.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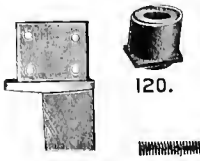

95.R.


120.


154.

81


52.


53.


20.


20A.


21.


23.


40.

Figs. 2223-2263. Details of Buhoup Wide Vestibule. McConway & Torley Co. (312)

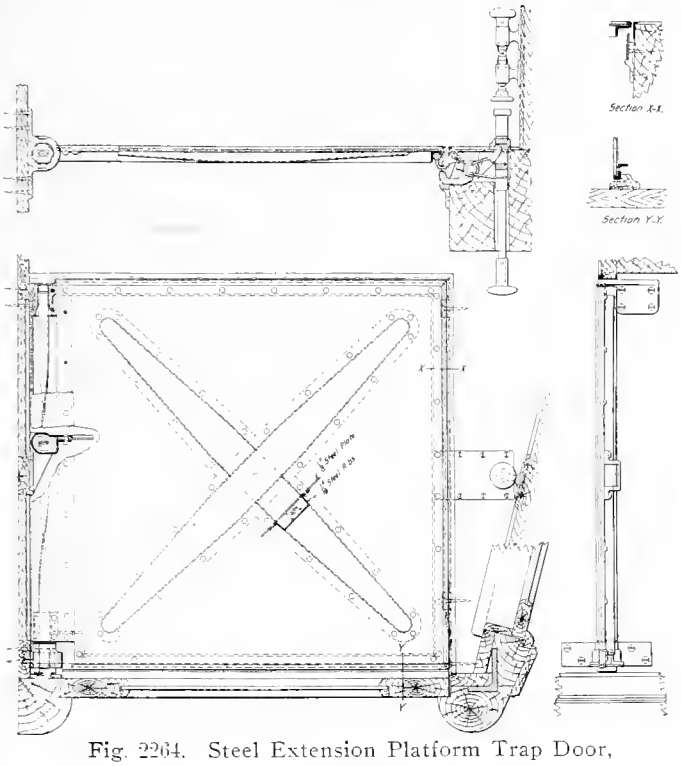
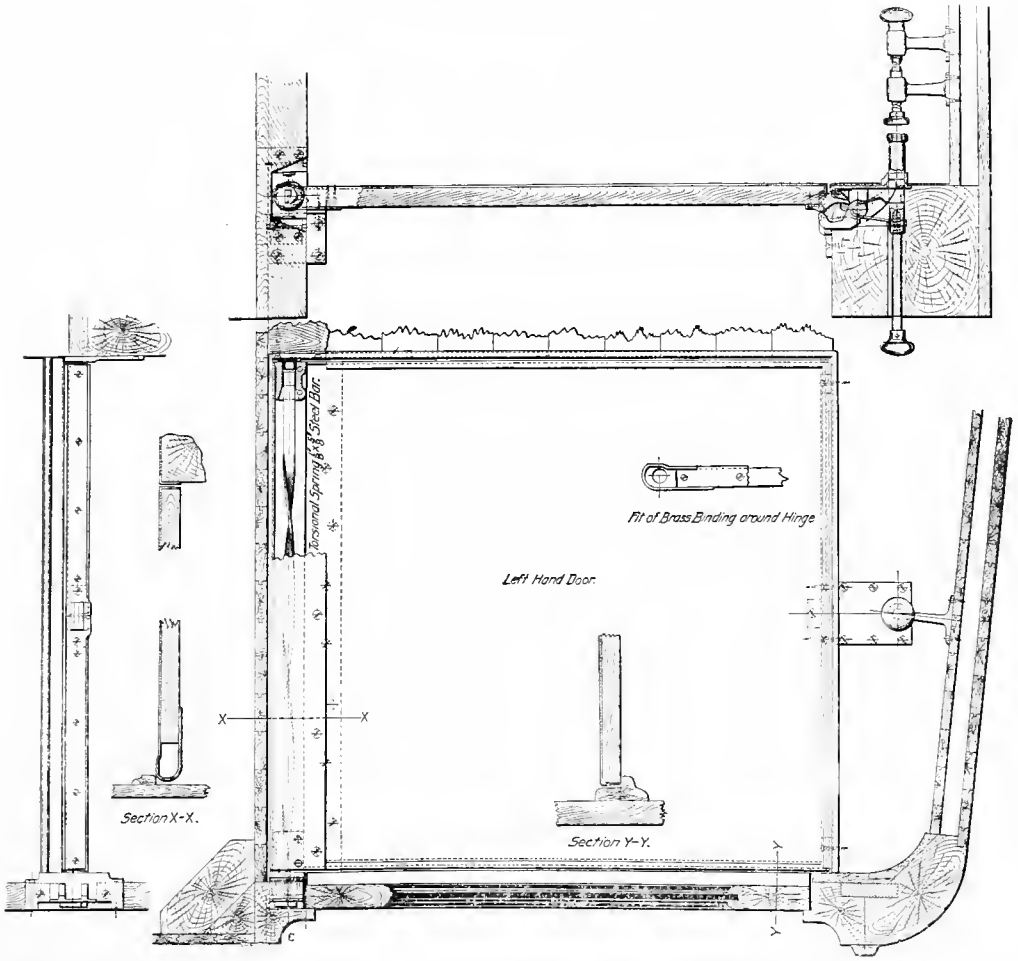


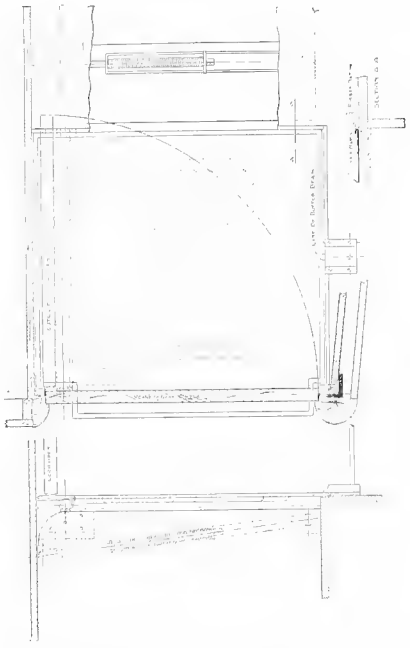
Fig. 2264. Steel Extension Platform Trap Door, Applied to Wood Platform.

Fig. 2265. Steel Extension Platform Trap Door.

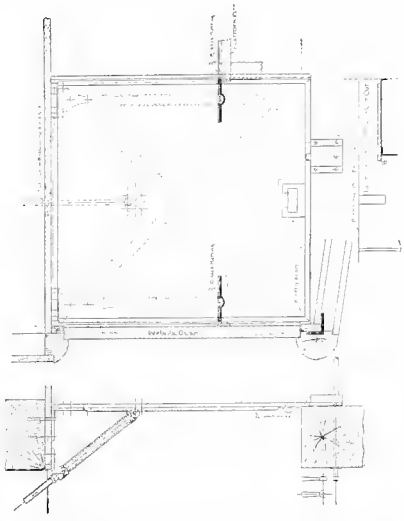
O. M. Edwards Co.



Figs. 2266-2271. Extension Platform Trap Door, Design G. O. M. Edwards Co

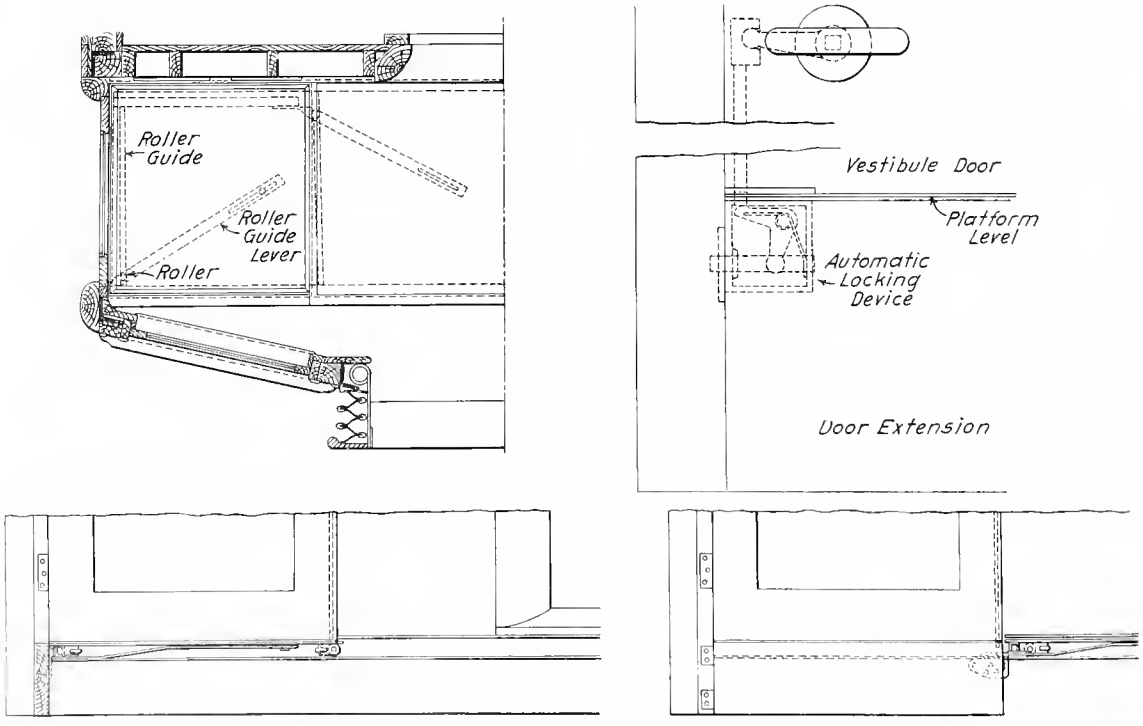


Figs. 2272-2273. National Steel Trap Door for Grade Level Platforms.



Figs. 2274-2275. National Steel Trap Door for Elevated Station Platforms.

General Railway Supply Co.



Figs. 2276-2279. King Automatic Car Platform Extension.

King Automatic Car Platform Co.

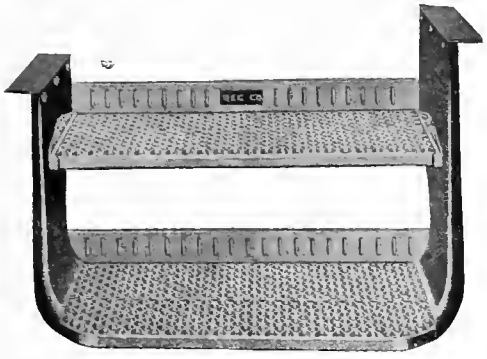


Fig. 2280. Double Car Step with Stanwood Safety Tread. Quincy, Manchester, Sargent Co.

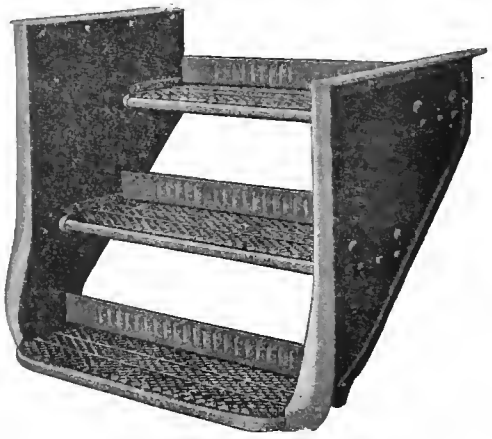


Fig. 2281. Triple Car Step. with Stanwood Safety Tread.

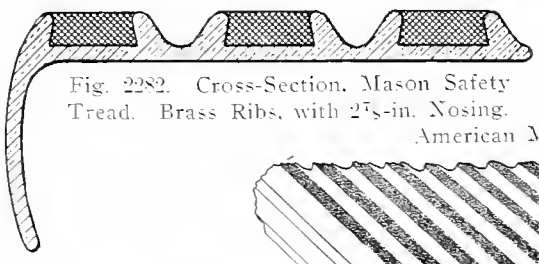


Fig. 2282. Cross-Section, Mason Safety Tread. Brass Ribs, with 2⅞-in. Nosing.

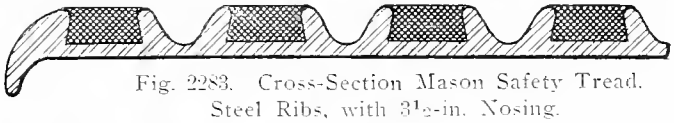


Fig. 2283. Cross-Section Mason Safety Tread. Steel Ribs, with 3⅛-in. Nosing.

American Mason Safety Tread Co.

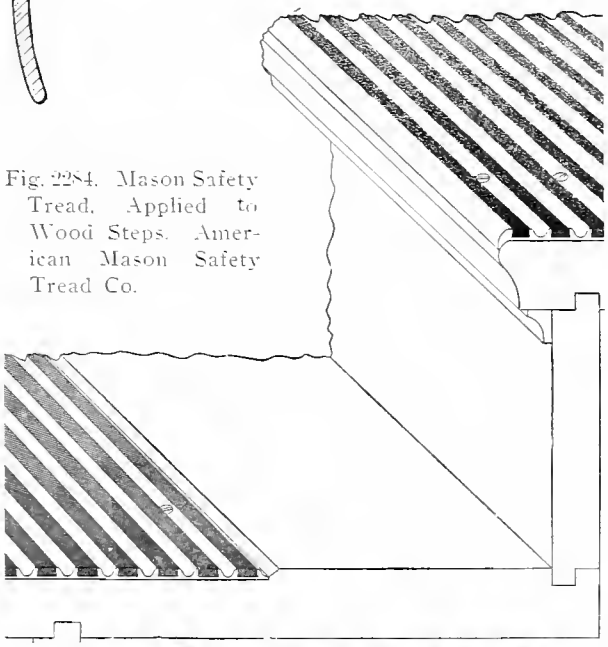


Fig. 2284. Mason Safety Tread. Applied to Wood Steps. American Mason Safety Tread Co.

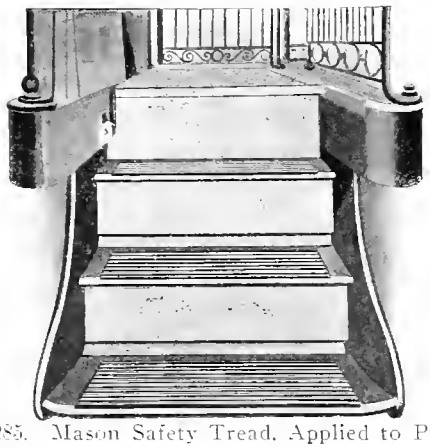
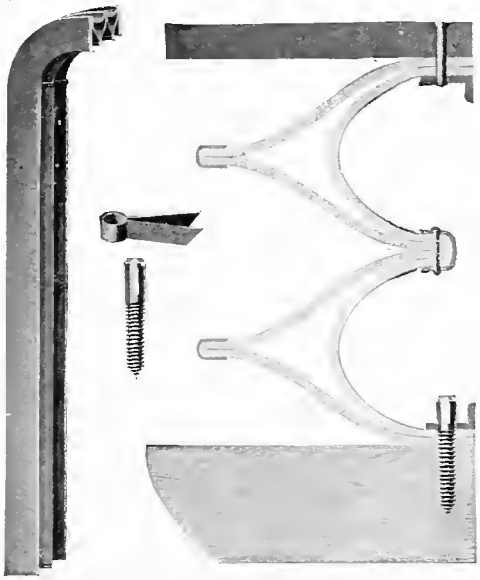


Fig. 2285. Mason Safety Tread, Applied to Pullman Car Steps.
American Mason Safety Tread Co.



Figs. 2286-2288. Acme Improved Fireproof Diaphragm and Attachment.
Acme Supply Co.

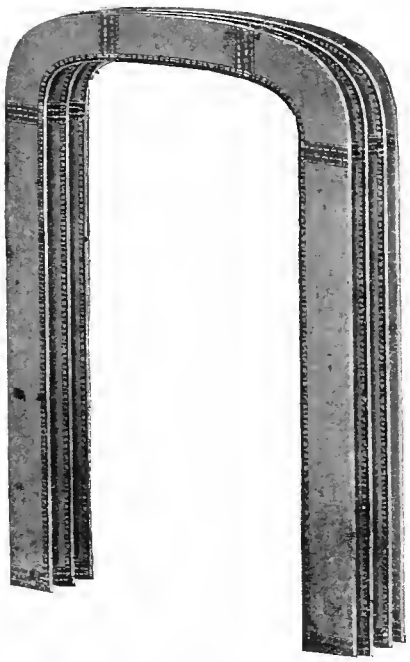
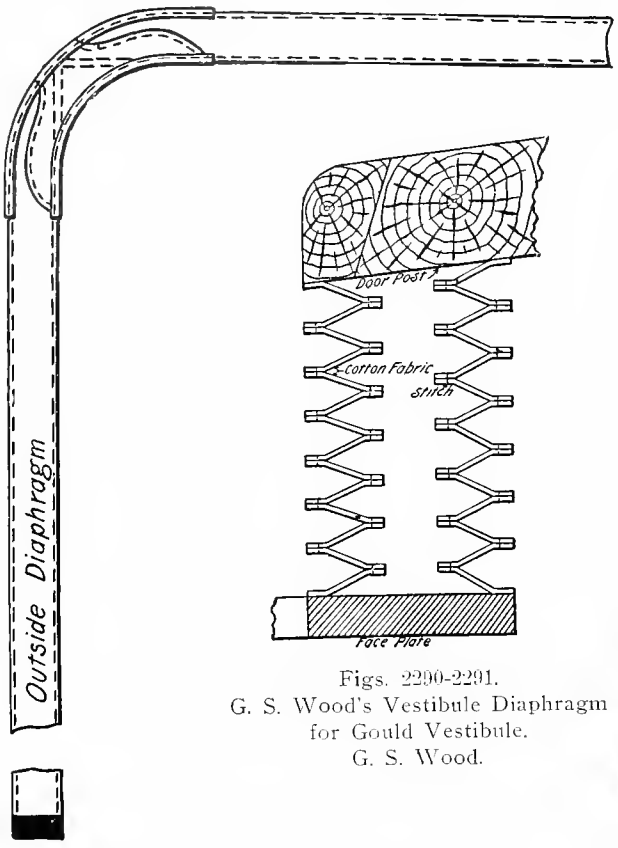
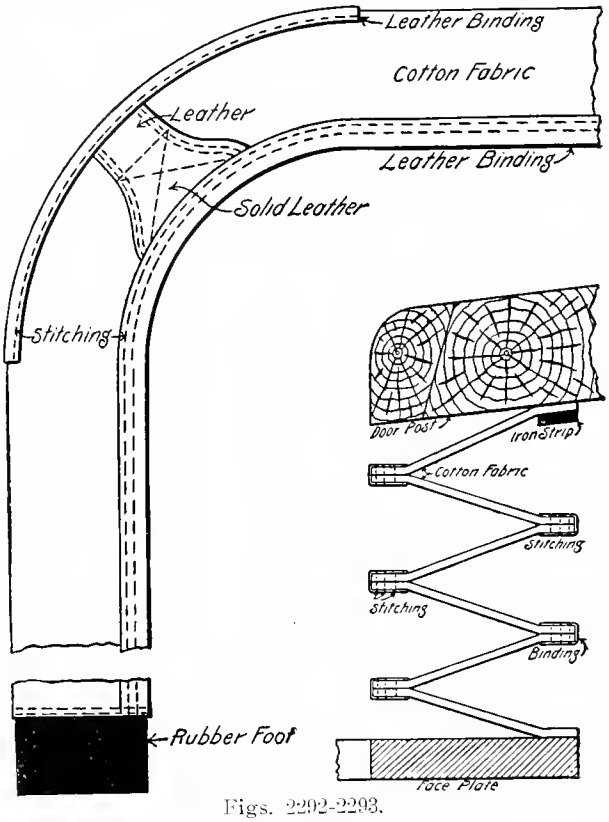


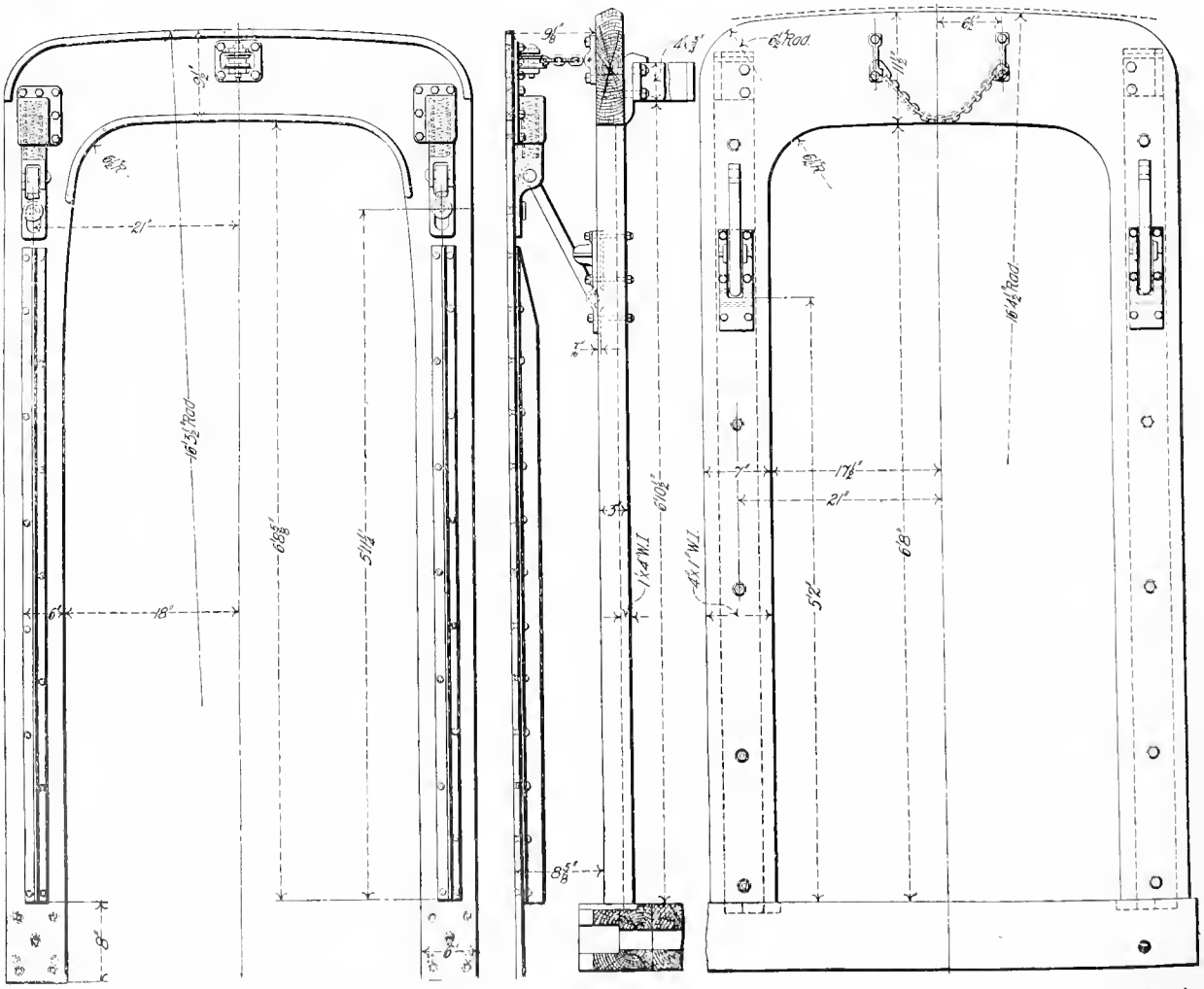
Fig. 2289.
G. S. Wood's Vestibule Diaphragm, Pullman Pattern.
G. S. Wood.



Figs. 2290-2291.
G. S. Wood's Vestibule Diaphragm
for Gould Vestibule.
G. S. Wood.



Figs. 2292-2293.
G. S. Wood's Vestibule Diaphragm
for Pullman Vestibule. G. S. Wood.



Figs. 2294-2296. Gould Vestibule Face Plate. Gould Coupler Co.

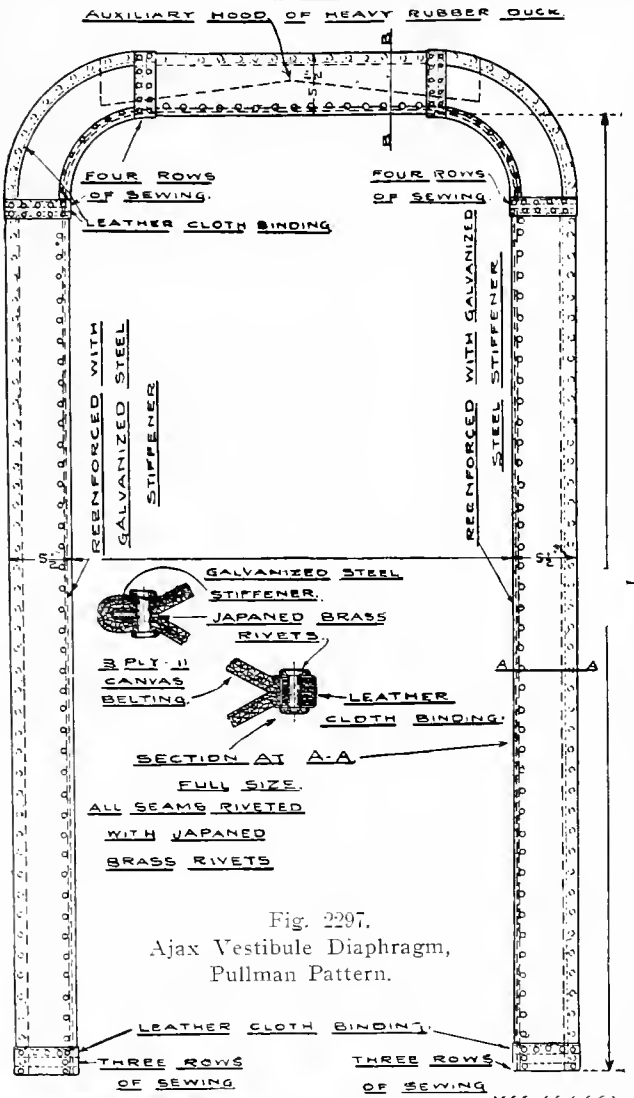


Fig. 2297.
Ajax Vestibule Diaphragm,
Pullman Pattern.

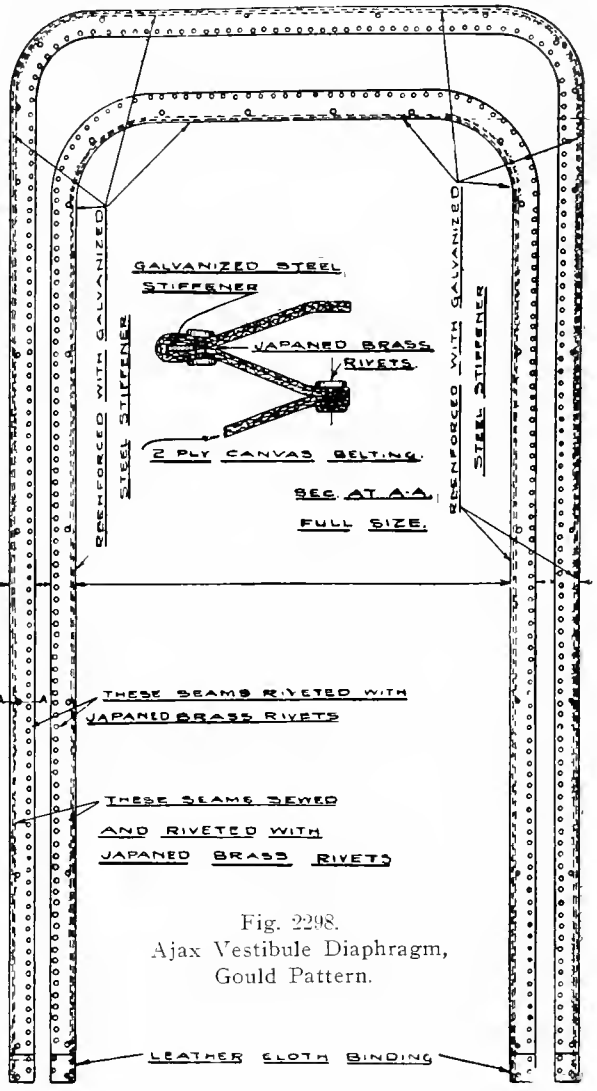


Fig. 2298.
Ajax Vestibule Diaphragm,
Gould Pattern.

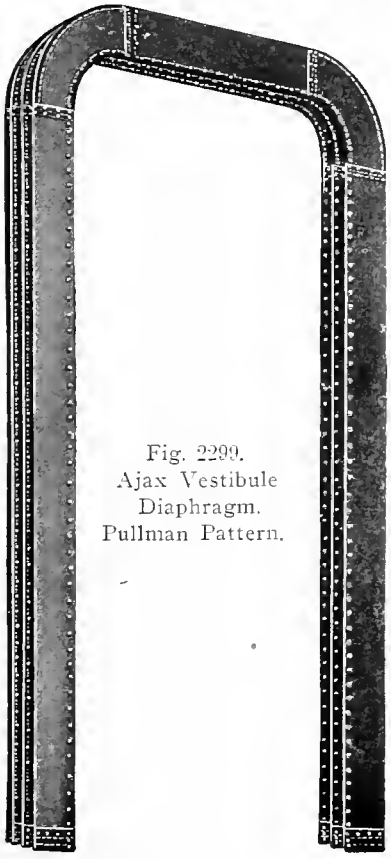
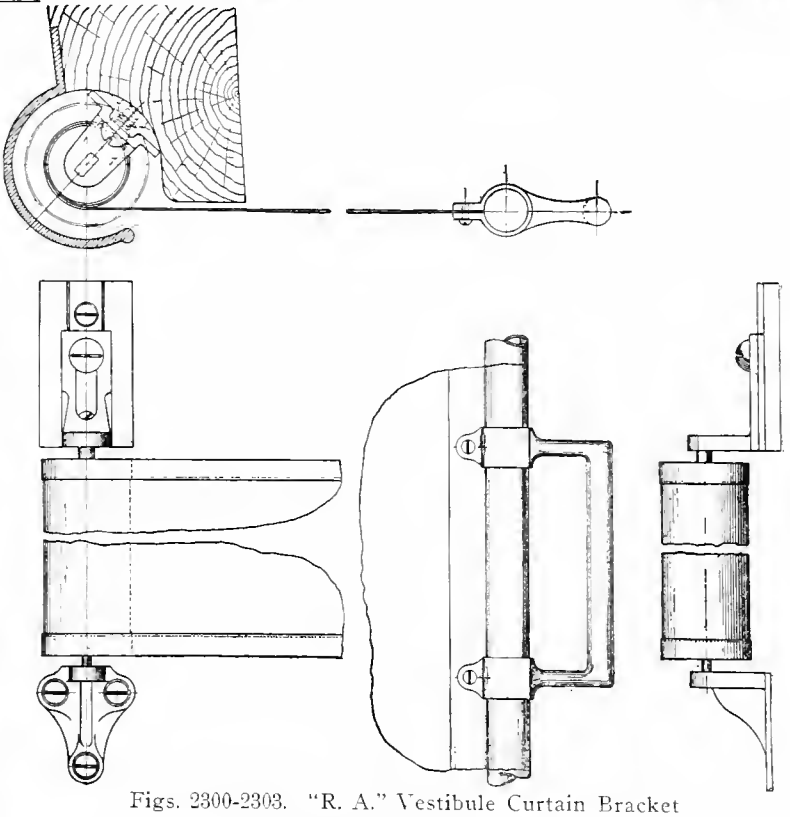


Fig. 2299.
Ajax Vestibule
Diaphragm.
Pullman Pattern.



Figs. 2300-2303. "R. A." Vestibule Curtain Bracket
and Roller Curtain.
Quincy, Manchester, Sargent Co.

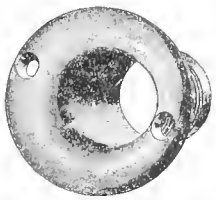


Fig. 2304.

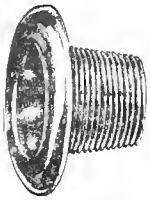


Fig. 2305.

Fig. 2306.

Bell Cord Bushings. A. & W.

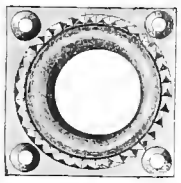


Fig. 2307.

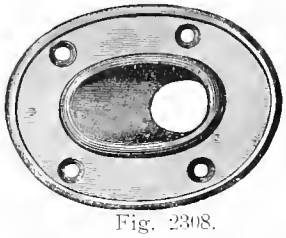


Fig. 2308. Beveled Bell Cord Bushing. A. & W.

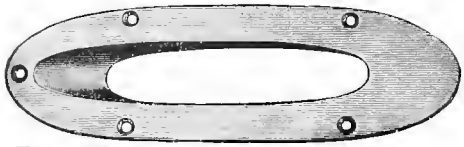
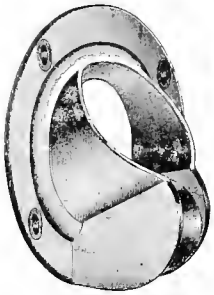
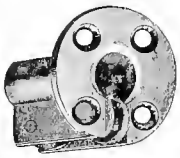


Fig. 2309. Beveled Bell Cord Bushing. A. & W.

Fig. 2310. Valve Cord Hook. Samson Cordage Works.





Figs. 2311-2313. Bell Cord Bushings with Pulley. A. & W.

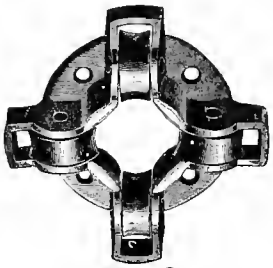


Fig. 2314. Quartet Bell Cord Bushing. A. & W.

Fig. 2315. Socket Snap. Samson Cordage Works.

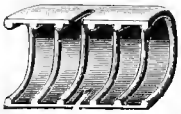


Fig. 2316. Double Connector. Samson Cordage Works.

Fig. 2317. Samson Spot Trolley Cord. Samson Cordage Works.

Fig. 2318. Coupling.

Fig. 2319. Splice. A. & W.

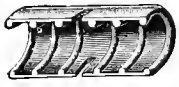


Fig. 2320. Single Connector. Samson Cordage Works.

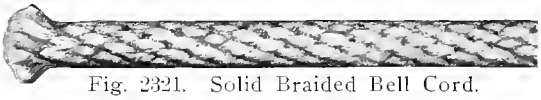


Fig. 2321. Solid Braided Bell Cord. Samson Cordage Works.

Fig. 2324. Bell Cord Coupling. D. M. Co.

Fig. 2325. Bell Cord Coupling. A. & W.

Fig. 2322. Samson Wire Center Bell Cord. Samson Cordage Works.

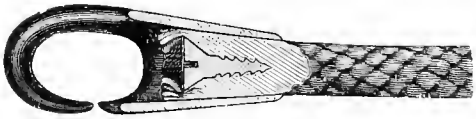


Fig. 2326. Attachment of Bell Cord to Coupling. Samson Cordage Works.

Fig. 2328. A. & W.

Fig. 2329. D. M. Co.

Fig. 2330. Guide with Screw and Flange.

Fig. 2331. Guide with Screw. A. & W.

Fig. 2332. Guide with Flange. D. M. Co.

Guides with Screw.

Fig. 2341. Overhead Swing Guide with Two Pulleys. D. M. Co.

Fig. 2335. D. M. Co. Overhead Guides with Screw and Pulley.

Fig. 2337. D. M. Co

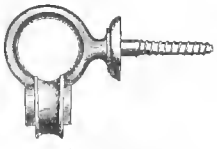


Fig. 2338. A. & W.

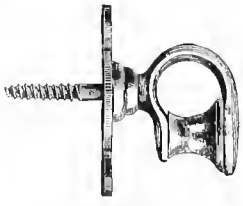


Fig. 2339. A. & W.

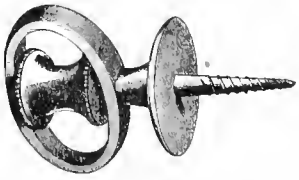


Fig. 2340. D. M. Co.

Side Guides with Screw and Pulley.

(Note: The Abbreviations, A. & W. and D. M. Co. on this and following pages, are for The Adams & Westlake Co. and The Dayton Mfg. Co., respectively, who are the makers.)

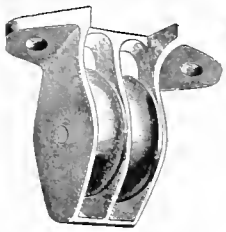


Fig. 2342.

Fig. 2343.

Fig. 2344.

Pulley Guides with Flanges.

Fig. 2345. D. M. Co.

Fig. 2346. D. M. Co.

Fig. 2347. A. & W.

Side Pulley Guides with Flanges.

Fig. 2348. Overhead Guide with Pulley, Flange and Stem. D. M. Co.

Fig. 2349. Corner Guide with Pulley. A. & W.

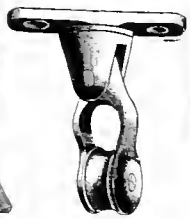


Fig. 2350.

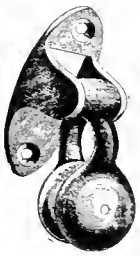


Fig. 2351.

Swing Guides with Pulleys. D. M. Co.

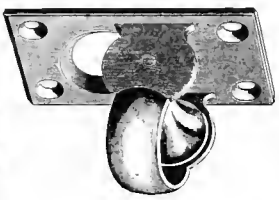


Fig. 2352. A. & W.

Fig. 2353. D. M. Co.

Angle Guides with Flange and Pulleys.

Fig. 2355. A. & W.

Fig. 2356. A. & W.

Fig. 2359. D. M. Co.

Fig. 2360. A. & W.

Fig. 2362. A. & W.

Fig. 2363. D. M. Co.

Fig. 2364. A. & W.

Fig. 2365. D. M. Co.

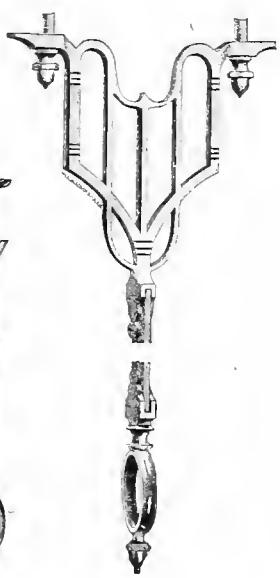


Fig. 2366. D. M. Co.

Bell Cord Strap Hangers.

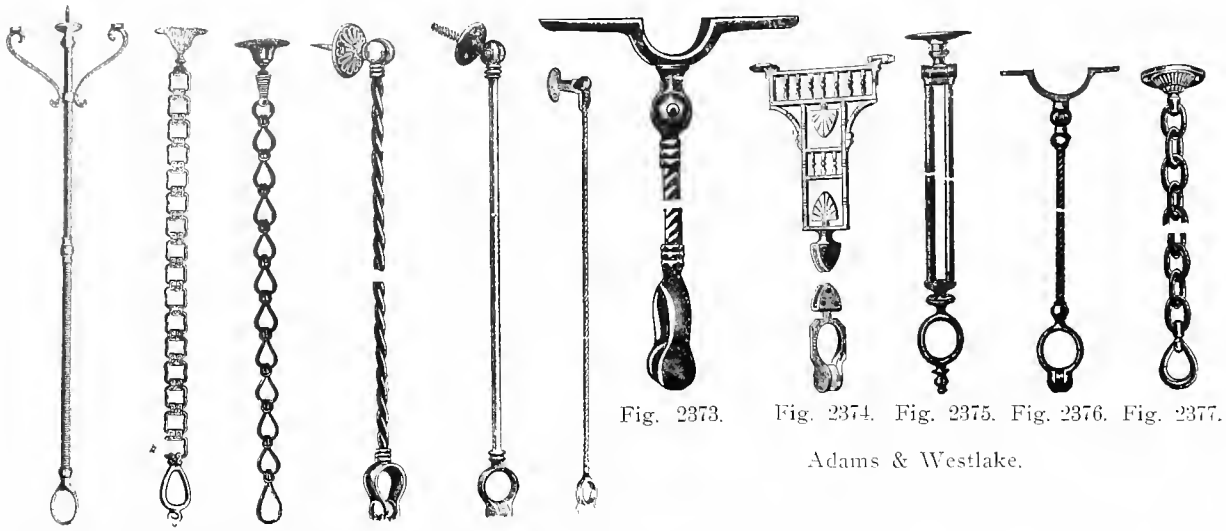


Fig. 2373. Fig. 2374. Fig. 2375. Fig. 2376. Fig. 2377.

Adams & Westlake.

Fig. 2367. Fig. 2368. Fig. 2369. Fig. 2370. Fig. 2371. Fig. 2372.
D. M. Co. A. & W. A. & W. A. & W. A. & W. A. & W.

Bell Cord Band, Chain and Rod Hangers.

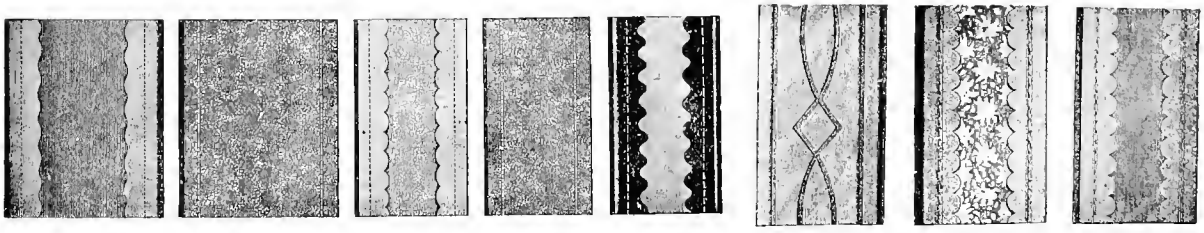


Fig. 2378. Fig. 2379. Fig. 2380. Fig. 2381. Fig. 2382. Fig. 2383. Fig. 2384. Fig. 2385.

A. & W. D. M. Co.

Bell Cord Hanger Straps.

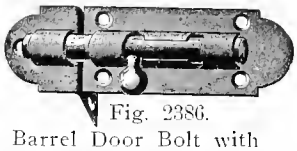


Fig. 2386.
Barrel Door Bolt with Bent Staple Plate.

Fig. 2387.
Barrel Door Bolt and Keeper.

Fig. 2388.
Barrel Door Bolt with Necked Staple.

Figs. 2389-2390.
Round Necked Door Bolt and Plate.

Fig. 2391. Square Door Bolt and Keeper.

Fig. 2392. Keeper.

Figs. 2393-2394.
Square Neck Door Bolt and Plate.

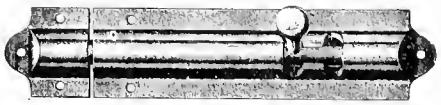


Fig. 2395. Barrel Door Bolt with Keeper. A. & W.

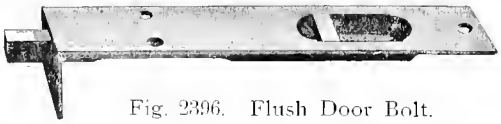
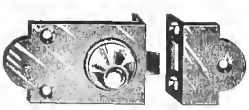


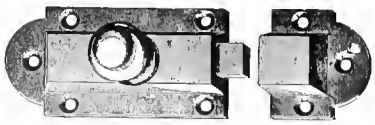
Fig. 2396. Flush Door Bolt.

Fig. 2397.
Staple with Bent Striking Plate.

Fig. 2398.
Flush Door Bolt. A. & W.

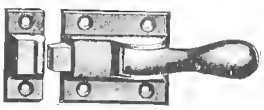


Figs. 2399-2400.

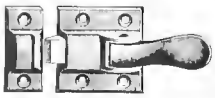


Figs. 2401-2402. A. & W.

Cupboard Catches and Bolts.

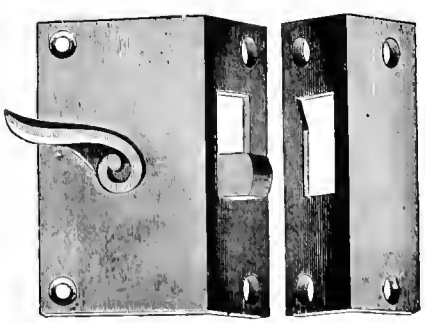


No. 0342.

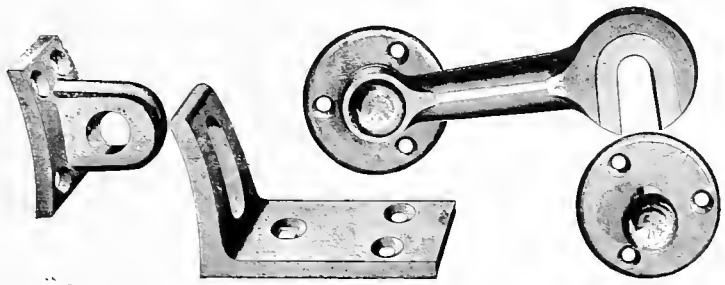


No. 0341.

Figs. 2403-2404. Refrigerator Catches.
Russell & Erwin Mfg. Co.

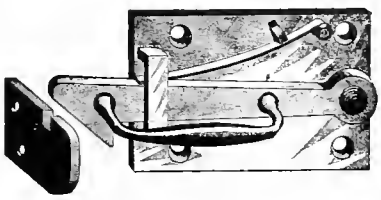


Figs. 2405-2406. Vestibule Door Bolt.
A. & W.



Figs. 2407-2408. Sliding Door Hasp and Staple for Mail Car. A. & W.

Figs. 2409-2410. Sliding Door Hook and Button for Baggage Car. A. & W.



Figs. 2411-2412. Spring Latch and Keeper for Baggage Car Sliding Door. A. & W.

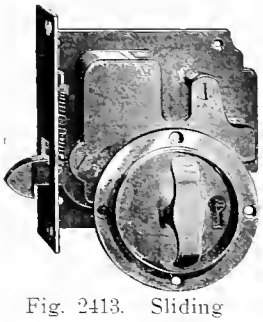


Fig. 2413. Sliding Door Flush Lock.

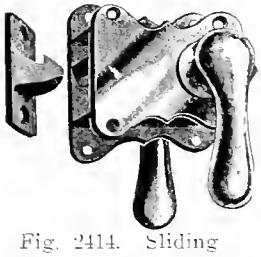
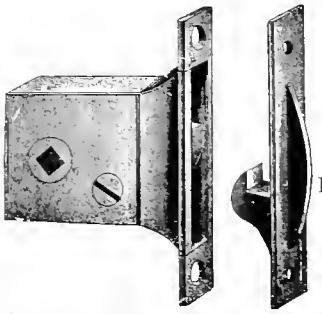


Fig. 2414. Sliding Door Latch. D. M. Co.

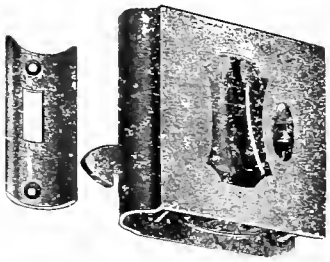


Figs. 2415-2416. Sliding Door Mortise Latch. D. M. Co.

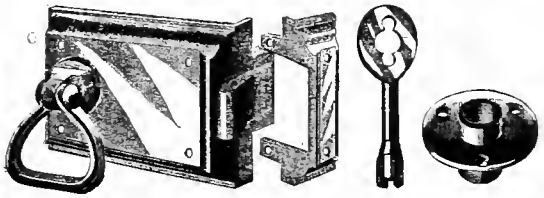
Fig. 2417. Elbow Catch. R. & E. Mfg. Co.

Fig. 2418. Spring Latch.

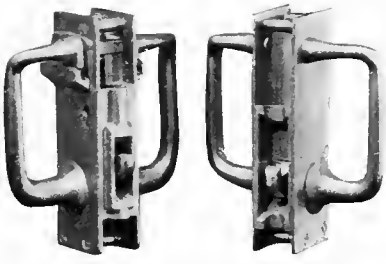
Figs. 2419-2420. Sliding Door Flush Handle Lock and Keeper. A. & W.



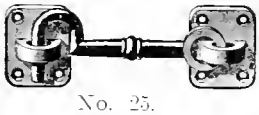
Figs. 2421-2422. Flush Sliding Door Mortise Latch and Keeper for Round Edge Door. A. & W.



Figs. 2423-2425. Baggage Car Door Lock, Keeper, Key and Escutcheon. D. M. Co.



Figs. 2426-2427. Double Sliding Door Lock, No. 72. J. L. Howard & Co.



No. 25.

No. 2.

No. 125.

No. 00.

Figs. 2828-2831. Cabin Door Hooks. Russell & Erwin Mfg. Co.

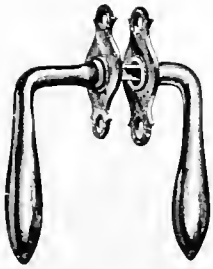


Fig. 2434. Door Handle for Sliding Doors. D. M. Co.

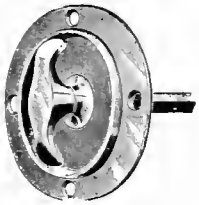
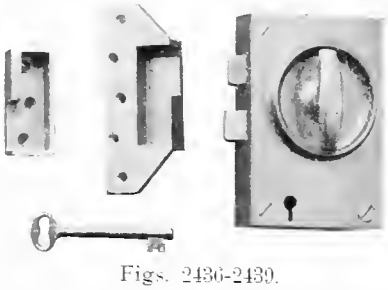
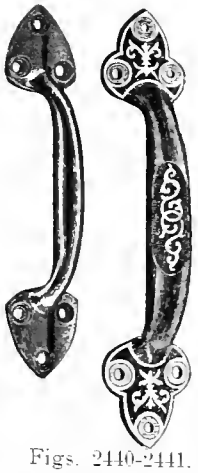


Fig. 2435. Flush Door Handle. A. & W.



Figs. 2436-2439. Motorman's Cab Door Lock, No. 48. J. L. Howard & Co.



Figs. 2440-2441. Saloon Door Handles. A. & W.

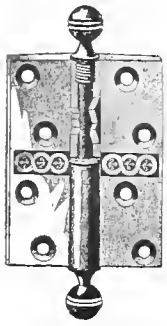
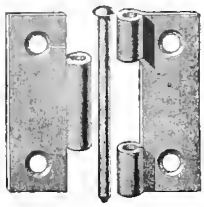


Fig. 2442. Acorn Butt Hinge. D. M. Co.



Figs. 2443-2445. Loose Pin Reversible Butt Hinge.

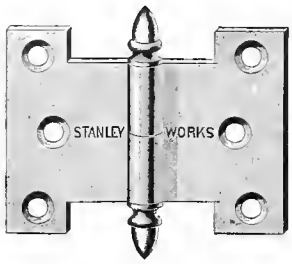


Fig. 2446. Parliament Hinge.

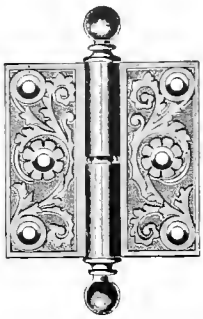


Fig. 2447. A. & W.

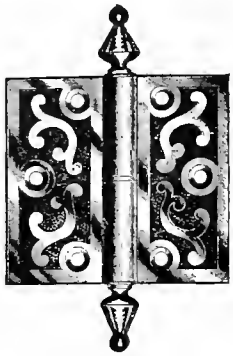


Fig. 2448. D. M. Co.

Loose Joint Acorn Butt Hinges with Washer.

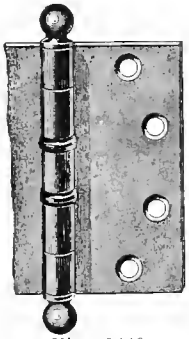
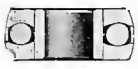


Fig. 2449.



2450. Washer Complete.

Fig. 2451. Washer Base.

Fig. 2452. Ball Guide.

Loose Pin Butt Hinge with Ball Bearing Washer.

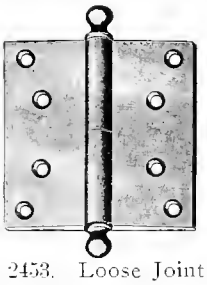


Fig. 2453. Loose Joint Butt Hinge, No. 50. Russell & Erwin Mfg. Co.

Fig. 2456. Hopper Butt Hinge.

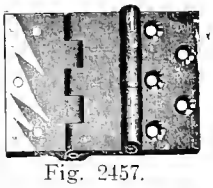


Fig. 2457. Table Hinge. A. & W.

Fig. 2458. A. & W.

Fig. 2459. D. M. Co.

Vestibule Door Hinges Covered with Brass.

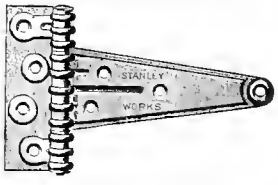


Fig. 2460. T-Hinge.

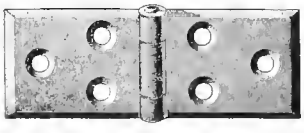


Fig. 2461. Butt Hinge, Riveted Joint.

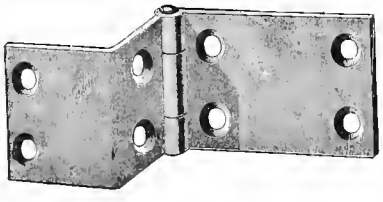


Fig. 2462. Offset Riveted Joint Butt Hinge.

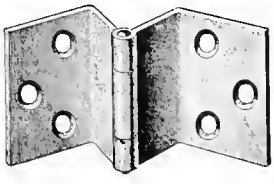


Fig. 2463. Pocket Hinge.

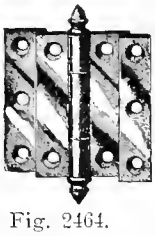


Fig. 2464. Vestibule Hinge for Rabbeted Door. A. & W.

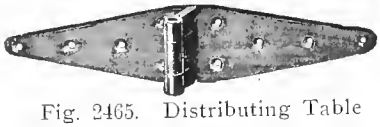
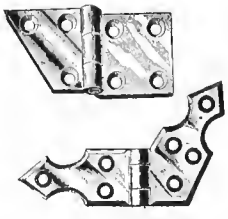


Fig. 2465. Distributing Table Hinge for Postal Cars. D. M. Co.



Figs. 2466-2467. Lamp House Hinges. D. M. Co.

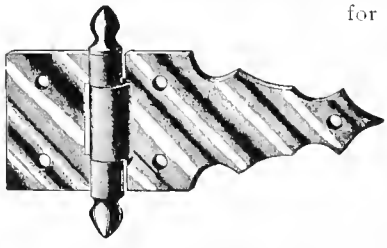


Fig. 2468. Refrigerator Door Hinge. D. M. Co.

Fig. 2469. Lamp House Hinge. D. M. Co.

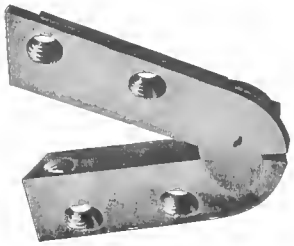


Fig. 2470. Step-Ladder Hinge. A. & W.

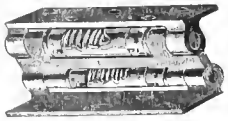


Fig. 2471. Double Acting Spring Hinge. D. M. Co.

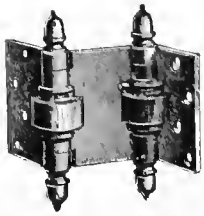


Fig. 2472. Double Acting Spring Hinge. A. & W.

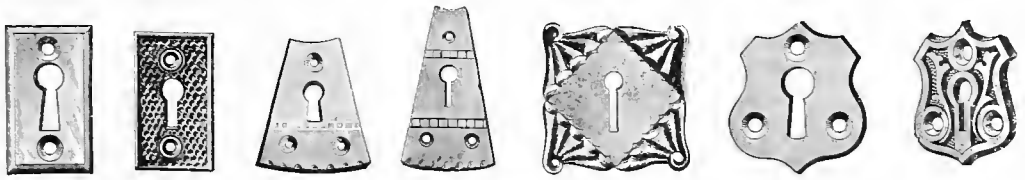
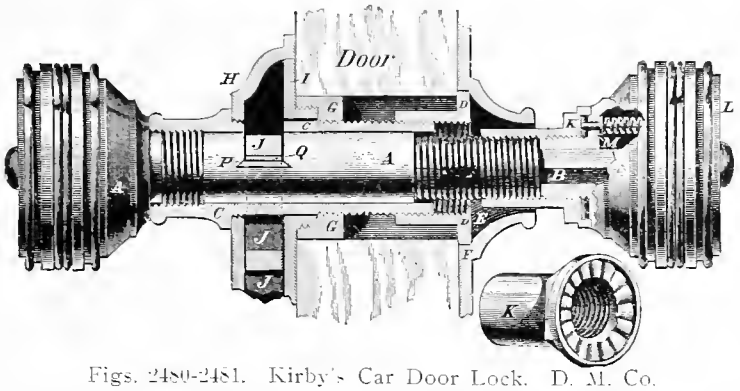


Fig. 2473. Fig. 2474. Fig. 2475. Fig. 2476. Fig. 2477. Fig. 2478. Fig. 2479.
Key Hole Escutcheons. A. & W.



Figs. 2480-2481. Kirby's Car Door Lock. D. M. Co.

Names of Parts of Car Door Lock. Figs. 2480-2481.

A	*Inside Door Knob*	E	*and* F *Door Latch Rose*	K	*Coupling Sleeve*
A′	*Shank*	G	*Lock Nut*	L	*Outside Knob*
B	*Spindle*	H	*Inside Shell*	M	*Ratchet Bolt*
C	*Sleeve*	I	*Back Plate*	P	*Shank Facing*
D	*Outside Sleeve Collar*	J	*Latch Pull*	Q	*Latch Bolt Facing*

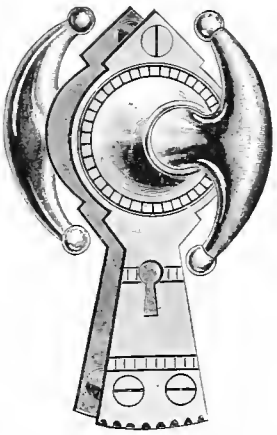


Fig. 2482. Door Handle, Escutcheon Plate and Rose. A. & W.

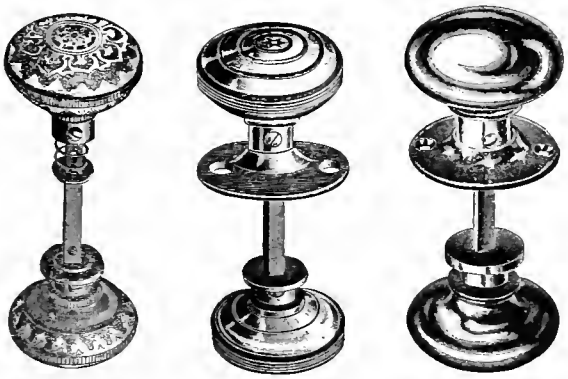
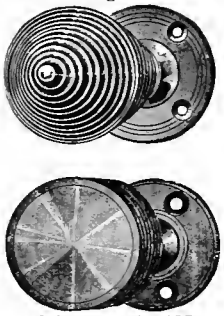
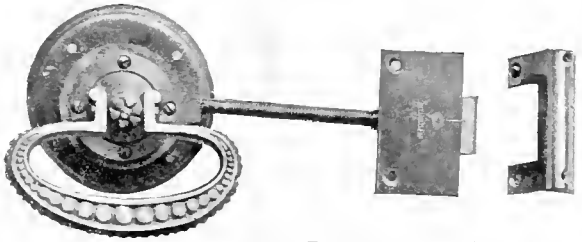


Fig. 2483. Fig. 2484. Fig. 2485.
Door Knobs, Spindles and Roses. A. & W.

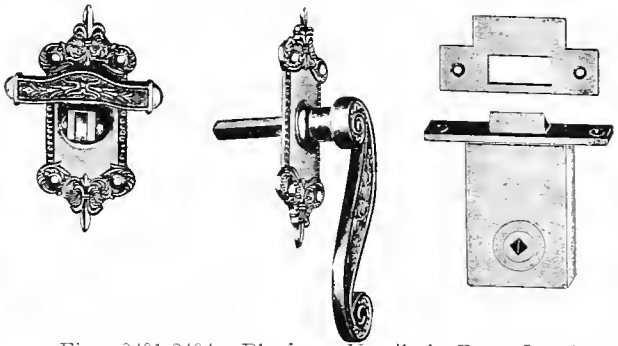


Figs. 2486-2487. Door Knobs and Rosettes.

Fig. 2488. Flush Door Handle and Escutcheon.
A. & W.



Figs. 2489-2490. Vestibule Door Latch and Keeper. A. & W.



Figs. 2491-2494. Platform Vestibule Door Latch, Handles and Keeper. A. & W.

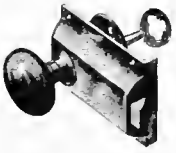
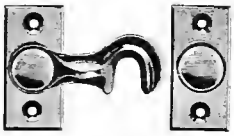
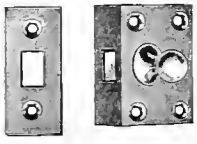


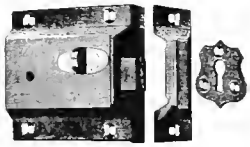
Fig. 2495. Baggage Car Door Latch. A. & W.



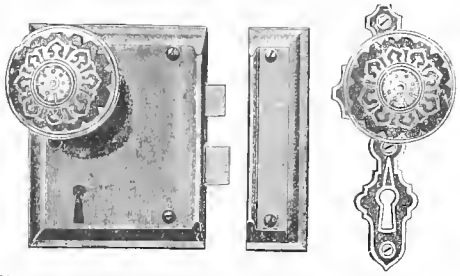
Figs. 2496-2497. Cabin Door Hook and Button. A. & W.



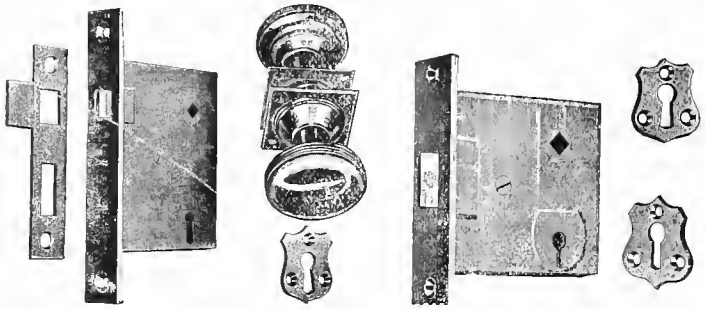
Figs. 2498-2499. Cupboard Catch. A. & W.



Figs. 2500-2502. Door Dead Lock with Slide Bolt. A. & W.

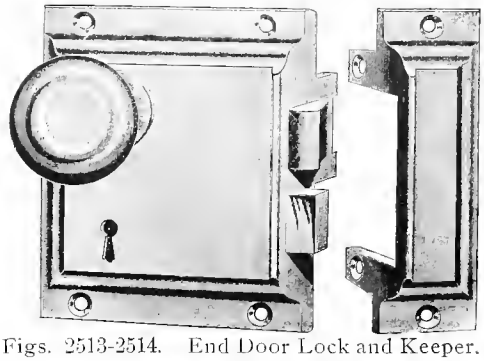


Figs. 2503-2505. End Door Lock, Keeper, Rose and Escutcheon.



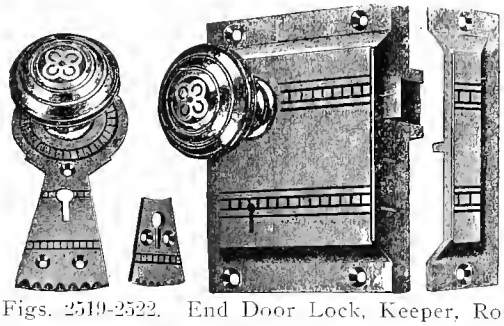
Figs. 2506-2509. Partition Door Lock, Keeper, Knobs and Escutcheon.

Figs. 2510-2512. Mortise Door Lock and Escutcheons.

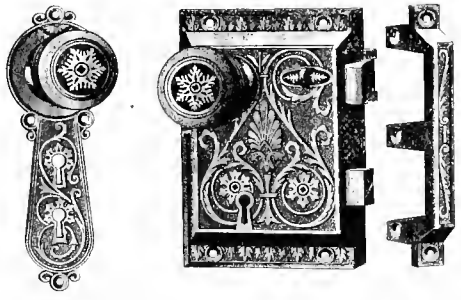


Figs. 2513-2514. End Door Lock and Keeper.

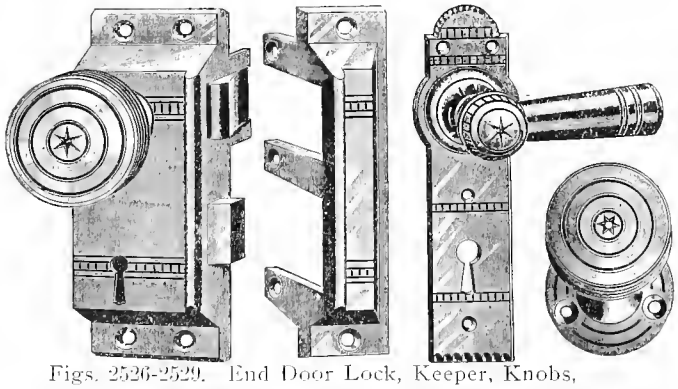
Figs. 2515-2518. End Door Lock, Keeper, Knob and Escutcheon.



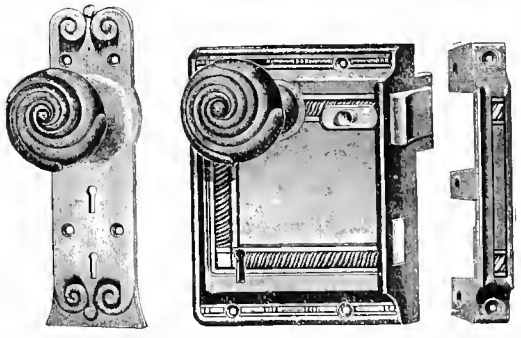
Figs. 2519-2522. End Door Lock, Keeper, Rose and Escutcheon.



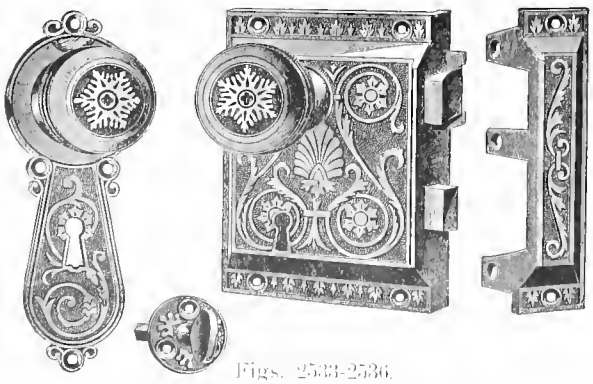
Figs. 2523-2525. End Door Lock, Keeper and Rose.



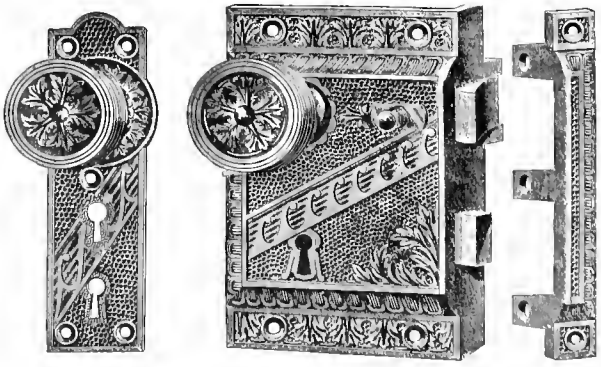
Figs. 2526-2529. End Door Lock, Keeper, Knobs, Escutcheon and Rose.



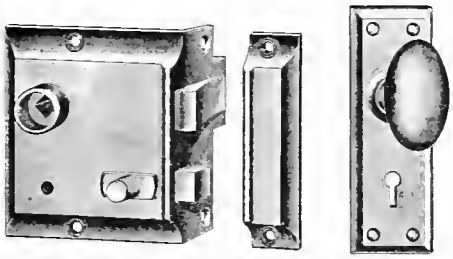
Figs. 2530-2532. Combined End Door Lock and Night Latch, Keeper and Escutcheon Plate.



Figs. 2533-2536. End Door Lock, Keeper, Escutcheon Plate and Thumb Latch

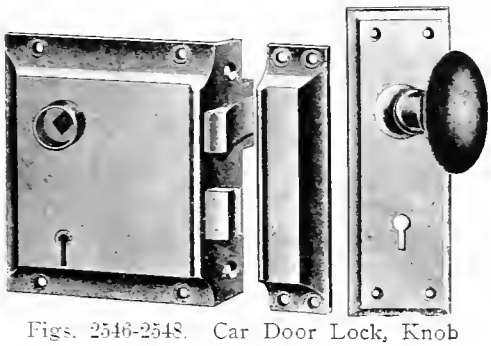


Figs. 2537-2539. Combined End Door Lock and Keeper and Escutcheon.

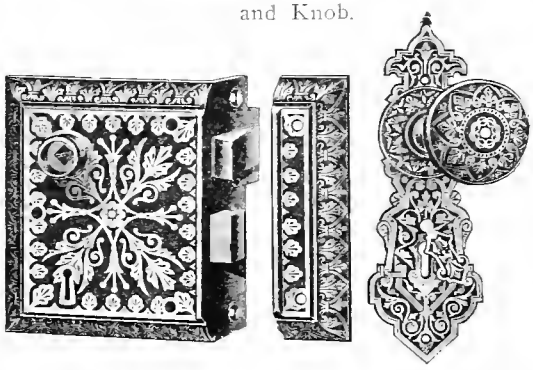


Figs. 2540-2542. Car Door Lock, Keeper, Knob and Escutcheon.

Figs. 2543-2545. Car Door Lock, Keeper and Knob.

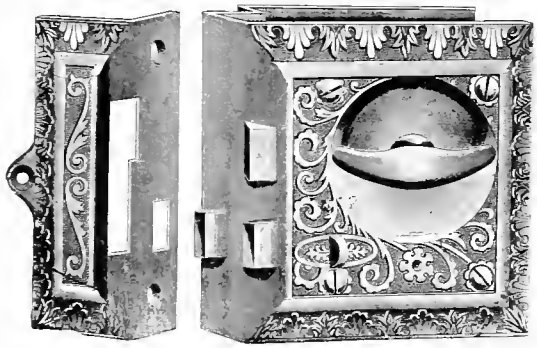


Figs. 2546-2548. Car Door Lock, Knob and Escutcheon.

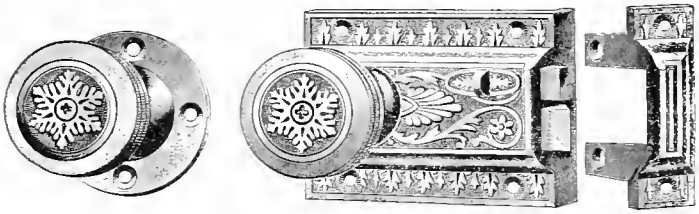


Figs. 2549-2551. Car Door Lock, Keeper, Knob and Escutcheon.

Rim Knob Latches and Locks. Russell & Erwin Mfg. Co.

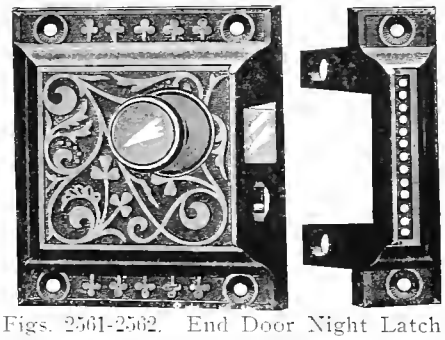


Figs. 2553-2554. Saloon Door Lock and Keeper with Extra Bolt. A. & W.

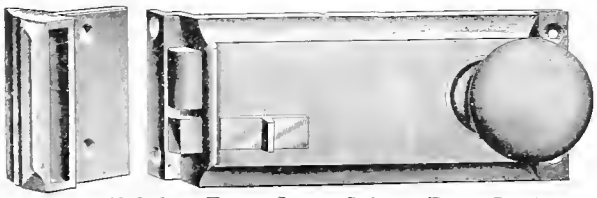


Figs. 2555-2557. Saloon Door Lock, Keeper and Knob. A. & W.

Figs. 2558-2560. Saloon Door Lock, Keeper and Flush Handle. A. & W.



Figs. 2561-2562. End Door Night Latch and Keeper. A. & W.



Figs. 2563-2564. Extra Long Saloon Door Lock and Keeper. A. & W.

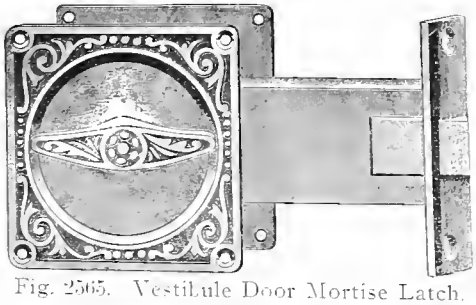
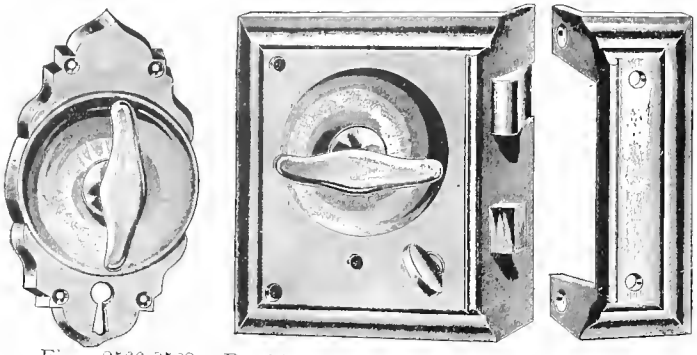
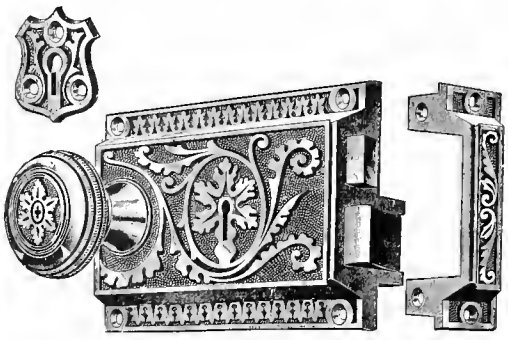


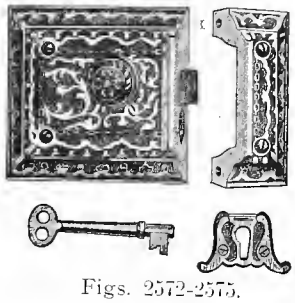
Fig. 2565. Vestibule Door Mortise Latch. A. & W.



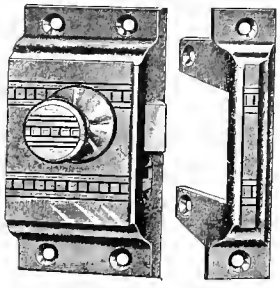
Figs. 2566-2568. Double Flush Handle Saloon Door Lock and Keeper. A. & W.



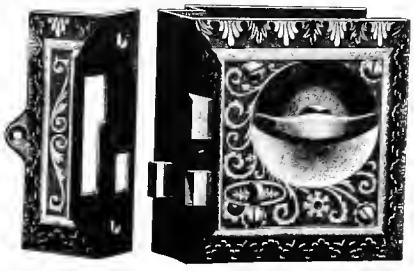
Figs. 2569-2571. End Door Lock, Keeper and Escutcheon. A. & W.



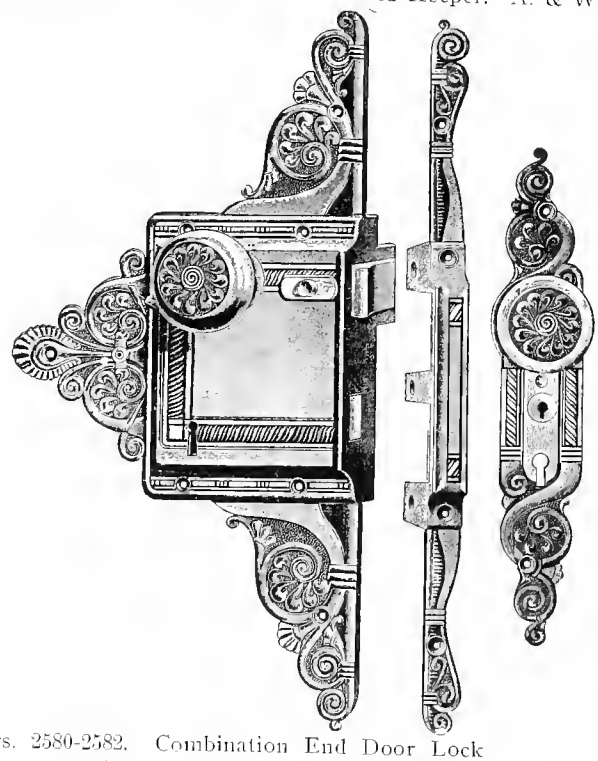
Figs. 2572-2575. Night Latch, Keeper, Key and Escutcheon. A. & W.



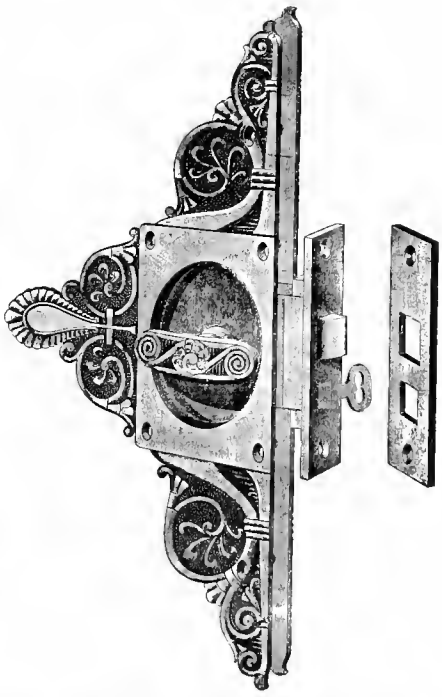
Figs. 2576-2577. Night Latch and Keeper. A. & W.



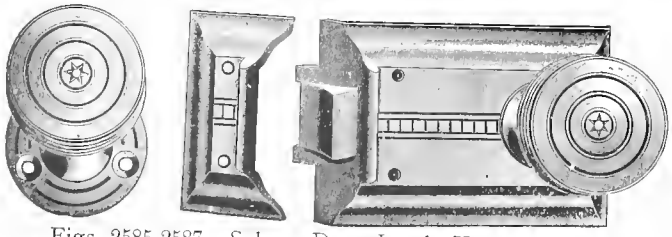
Figs. 2578-2579. Partition Door Latch and Keeper. A. & W.



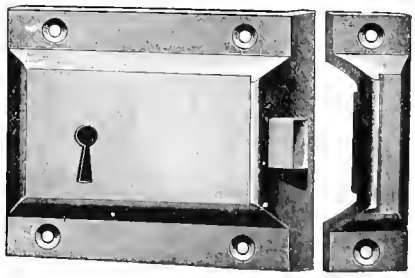
Figs. 2580-2582. Combination End Door Lock and Night Latch. A. & W.



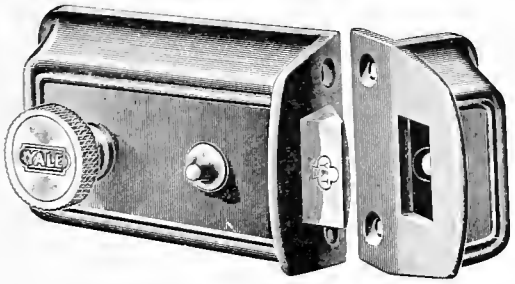
Figs. 2583-2584. Double Flush Handle Saloon Door Lock. A. & W.



Figs. 2585-2587. Saloon Door Latch, Keeper, Knob and Rose. A. & W.



Figs. 2588-2589. Dead Lock with Keeper. A. & W.



Figs. 2590-2591.

Fig. 2592.

Fig. 2593.

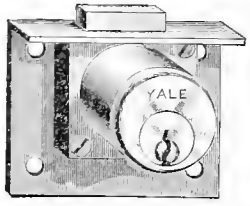
Yale & Towne Rim Night Latch, Cylinder and Keys.

Figs. 2594-2595.

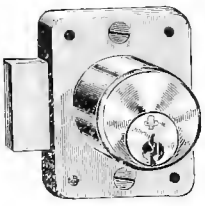
Figs. 2596-2597.

Figs. 2598-2599.

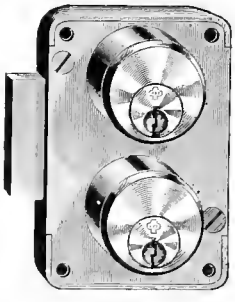
Yale & Towne Padlocks and Keys.



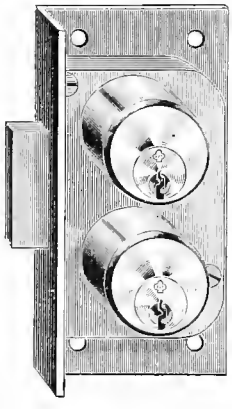
Figs. 2600-2602.
Yale & Towne Cabinet Lock, Keys and Master Key.



Figs. 2603-2604.
Yale & Towne Cabinet Lock and Keys.



Figs. 2605-2607.



Figs. 2608-2609.

Yale & Towne Cabinet Locks, Keys and Master Keys.
Yale & Towne Manufacturing Co.

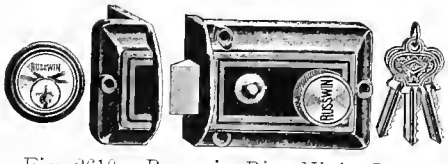


Fig. 2610. Russwin Rim Night Latch.
Russell & Erwin Mfg. Co.

Fig. 2611. A. & W.
Size, 2⅝ x 10½ ins.

Fig. 2612. A. & W.
Size, 4 x 12⅞ ins.

Fig. 2613. A. & W.
Size, 4 x 13¾ ins.

Fig. 2614. A. & W.
Size, 3⅛ x 12 ins.

Fig. 2615. A. & W.
Size, 3¾ x 11⅝ ins.

Fig. 2616. A. & W
Size, 3⅞ x 11⅝ ins.

Fig. 2617. A. & W.
Size, 3⅜ x 12⅞ ins.

Fig. 2618. A. & W.
Size, 5 x 14⅝ ins.

Fig. 2619. A. & W.
Size, 5¼ x 12⅞ ins.

Fig. 2620. A. & W.
Size, 4 x 9¾ ins.

Fig. 2621. D. M. Co.
Size, 2⅜ x 11 ins.

Fig. 2622. D. M. Co.
Size, 2⅜ x 8⅝ ins.

Fig. 2623. D. M. Co.
Size, 2⅜ x 9 ins.

Platform Notice Plates.

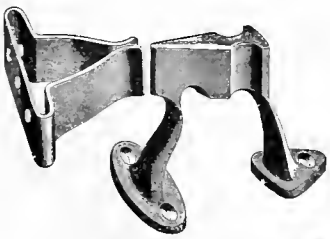
Fig. 2624. A. & W.
Size, 2 x 7½ ins.

Fig. 2625. A. & W.
Size, 2 x 6½ ins.

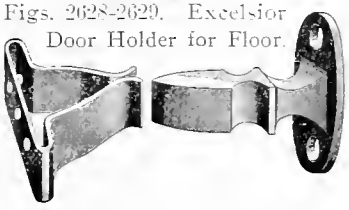
Fig. 2626. A. & W.
Size, 3 x 11½ ins.

Fig. 2627. A. & W.
Size, 3 x 11½ ins.

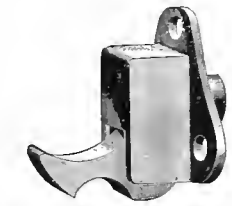
Door Notice Plates.



Figs. 2628-2629. Excelsior Door Holder for Floor.



Figs. 2630-2631. Excelsior Door Holder for Partition.



Figs. 2632-2633. Door Holder.

Figs. 2634-2635. Door Holder.

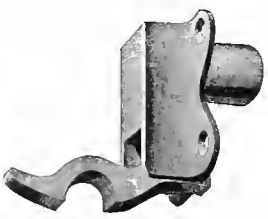
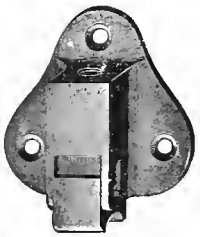


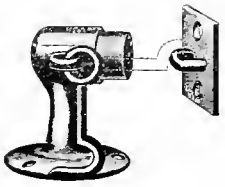
Fig. 2636. Door Holder For Sliding Door.



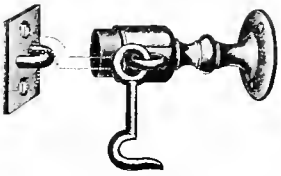
Figs. 2637-2638. Door Holder.

Door Holders and Stops. A. & W.

Nos. 7270 to 8270.

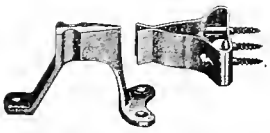


No. 250.



No. 255.

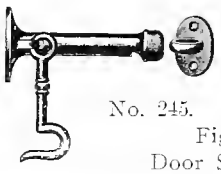
No. 2501½.



Nos 112 to 8112.

Figs. 2639-2642. Door Stops and Holders.
Russell & Erwin Mfg. Co.

Fig. 2647. Gem Door Spring.



No. 245.

Nos. 111 to 8112.

Figs. 2643-2646.
Door Stops and Holders.
Russell & Erwin Mfg. Co.

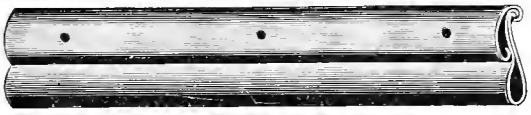


Fig. 2648.

Fig. 2650.

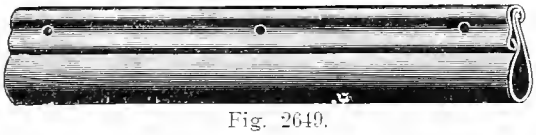


Fig. 2649.

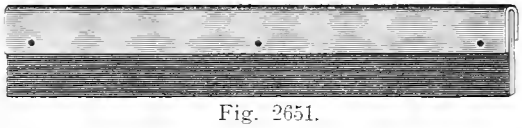


Fig. 2651.

Weather Strips. D. W. Bosley Co.

Fig. 2652. Blount Door Check.
Yale & Towne Mfg. Co.

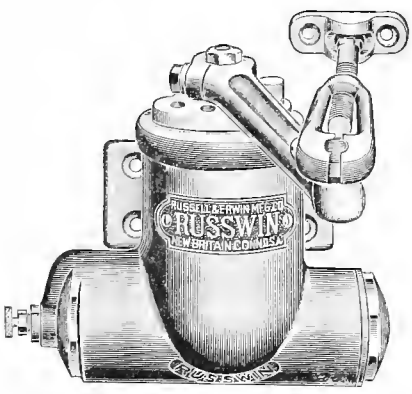


Fig. 2653. Russwin Liquid Door Check.
Russell & Erwin Mfg. Co.

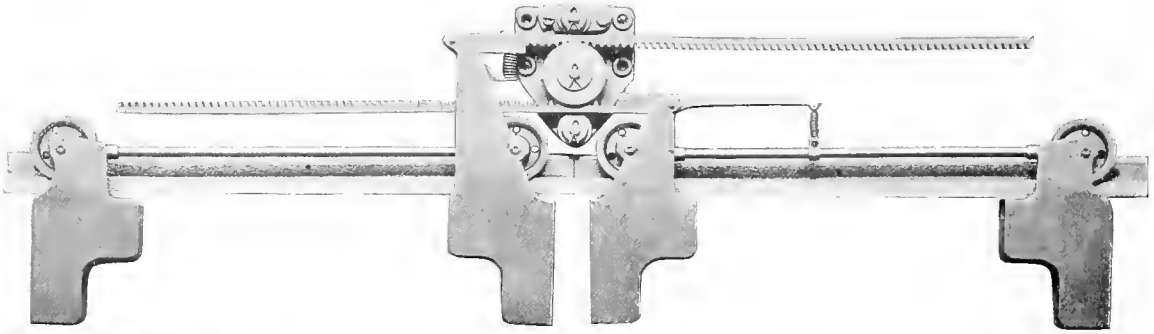
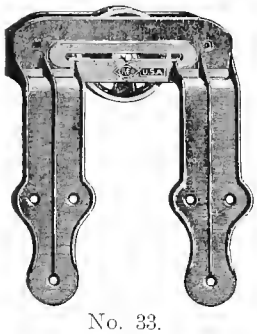


Fig. 2654. Double Sliding Door Gear. Jas. L. Howard & Co.



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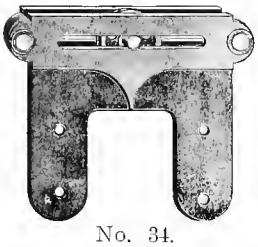

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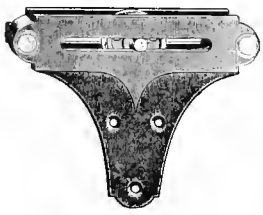


No. 34. For Inside Doors.

No. 32.

Figs. 2655-2658. Hanging Sliding Door Sheeves. Russell & Erwin Mfg. Co.

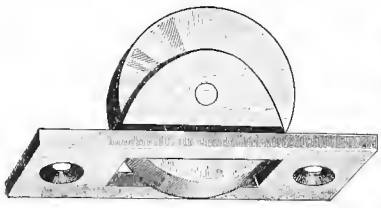
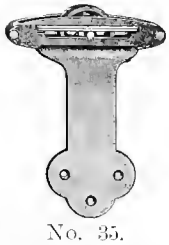
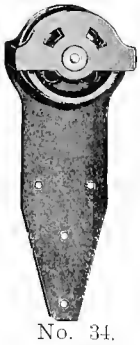


Fig. 2659. Bottom Door Roller. D. M. Co.

Fig. 2660. Corner Door Roller. D. M. Co.



No. 35.



No. 34. For Baggage and Freight Cars.

Figs. 2661-2662. Hanging Sliding Door Sheaves. Russell & Erwin Mfg. Co.

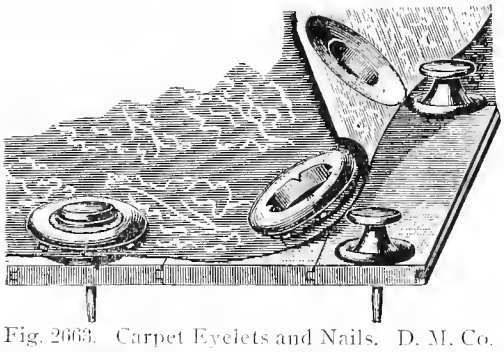
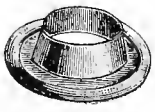


Fig. 2663. Carpet Eyelets and Nails. D. M. Co.



Figs. 2664-2665. Upper and Lower Gromets for Carpet Eyelets. A. & W.

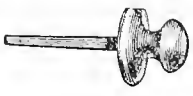
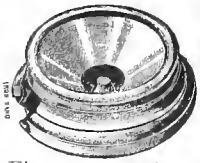


Fig. 2666. Wire Eyelet Nail. A. & W.



Figs. 2667-2668. Spittoon. D. M. Co.

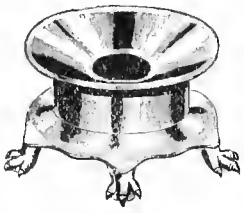


Fig. 2669. Cast Spittoon.

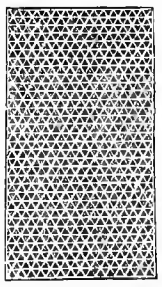


Fig. 2670. Corrugated Rubber Floor Mat.

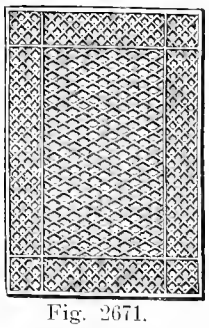


Fig. 2671. Perforated Rubber Floor Mat.

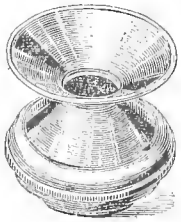


Fig. 2672. Cuspidor. D. M. Co.

Fig. 2673. Spittoon. D. M. Co.

Fig. 2674.

Fig. 2675. Protection Cuspidor with Mat.

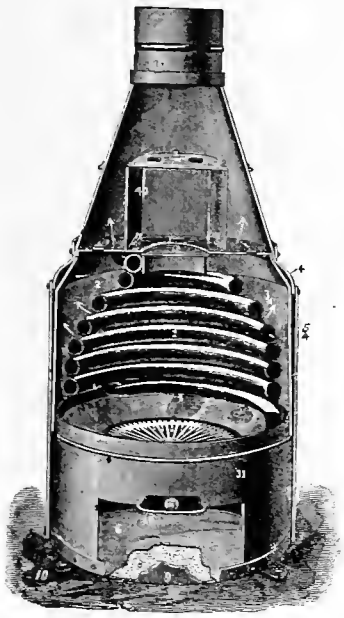


Fig. 2676. Sectional View.

Fig. 2677. Exterior View.

The "Fire-Proof" Heater.

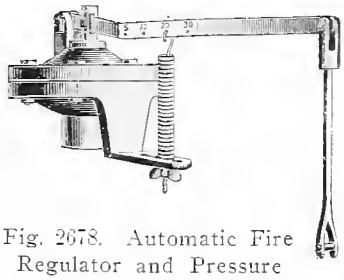


Fig. 2678. Automatic Fire Regulator and Pressure Indicator Combined.

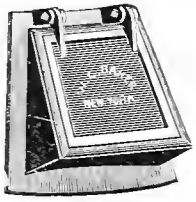


Fig. 2679. Draft Door and Frame.

Fig. 2683. Ring for Russia Iron.

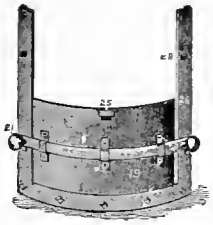


Fig. 2680. Ash Pit Door Frame.

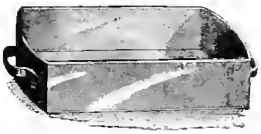


Fig. 2681. Removable Ash Can.

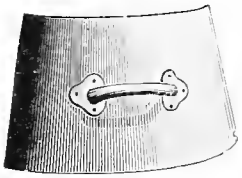


Fig. 2682. Feed Door.

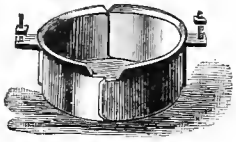


Fig. 2684. Coal Feed Chute.

Fig. 2685. Ash Pit.

Fig. 2686. Regulator Diaphragm.

Fig. 2687. Cast Iron Smoke Screen.

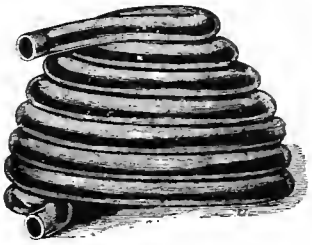


Fig. 2688. Generator Coil of 30 feet of Continuous Extra Heavy Wrought Iron Pipe.

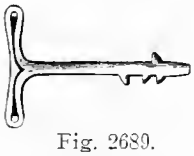


Fig. 2689. Grate Shaker.

Fig. 2690. Fire Grate.

Fig. 2691. Ash Pit Ring.

Fig. 2692. Fire Grate Support.

Fig. 2693. Safety Plate and Wooden Handle.

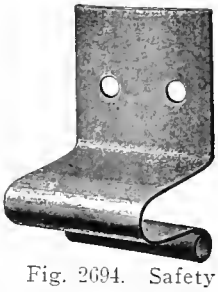


Fig. 2694. Safety Plate Spring.

Fig. 2695. Base of Smoke Flue.

Baker's Single-Coil "Fire-Proof" Heater and Parts Specially Belonging to It.

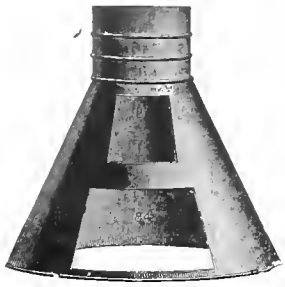


Fig. 2696.
Smoke Flue Base.

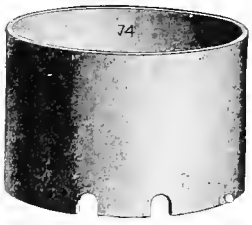


Fig. 2697. Fire Pot.

Fig. 2700. Ash Pit Ring.

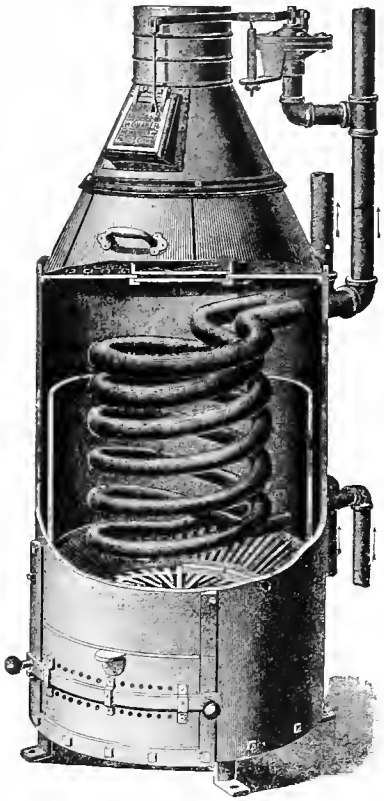


Fig. 2698. Sectional View.
Baker's Improved Two-Coil Fire-Proof Heater.

Fig. 2699. Exterior View.

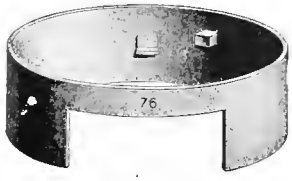


Fig. 2701. Ash Pit.

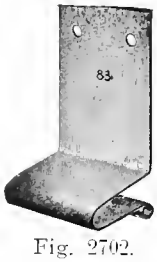


Fig. 2702.
Safety Plate
Spring.

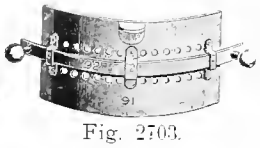


Fig. 2703.
Ash Pit Door.

Fig. 2704.
Circulating Drum.

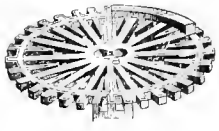


Fig. 2705.
Fire Grate.

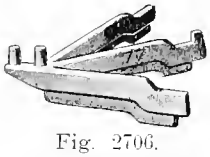


Fig. 2706.
Fire Grate
Support.

Fig. 2707.
Draft Door
and Frame.

Fig. 2708.
Grate Shaker.

Fig. 2709. Ring for
Russia Iron Top.

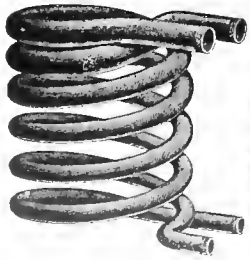


Fig. 2710.
Double Expanding
Generator Coil.

Fig. 2711.
Ash Pit
Door Frame.

Fig. 2712.
Safety Plate
Guides.

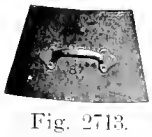


Fig. 2713.
Feed Door.

Fig. 2715.
Smoke Screen.

Fig. 2714. Safety Plate
and Handle.

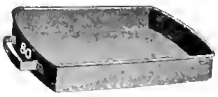


Fig. 2716.
Removable
Ash Pan.

Baker's Two-Coil, "Fire-Proof" Heater and Parts Specially Belonging to It.

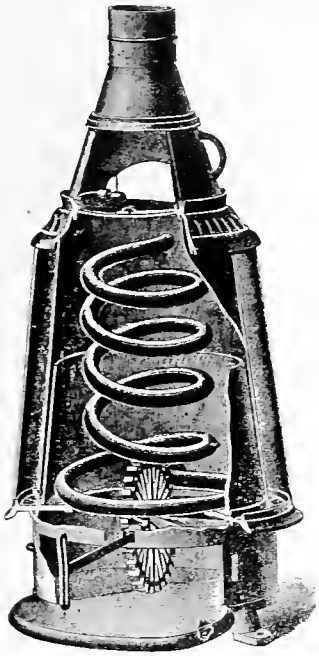


Fig. 2717. The "Perfected" Heater.

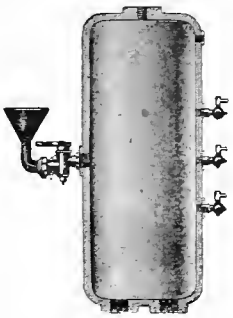


Fig. 2718. Upright Circulating Drum.

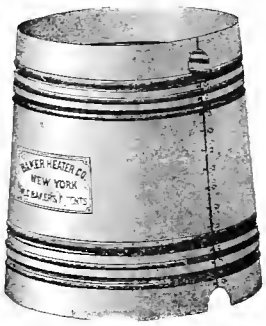


Fig. 2719. Outside Casing, Removable.

Fig. 2720. Ring for Russia Iron Top.

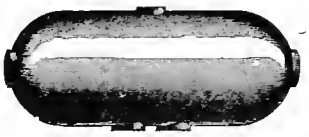


Fig. 2721. Circulating Drum and Expansion Chamber.

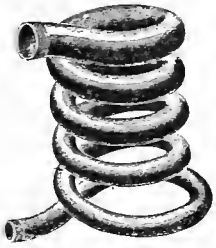


Fig. 2722. Expanding Generator Coil.

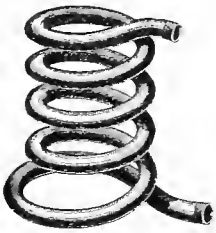


Fig. 2723. Generator Coil.

Fig. 2724. Smoke Flue Base.

Fig. 2725. Inside Casing, Removable.

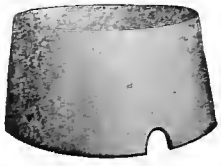


Fig. 2726. High Fire Pot.

Fig. 2727. Ash Pit.

Fig. 2728. Ash Pit Top, Grate and Door.

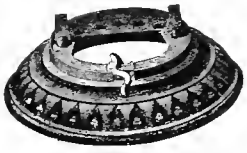


Fig. 2729. Top of Heater and Part of Smoke Preventer.

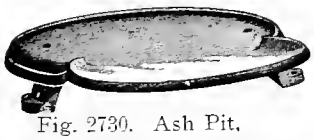


Fig. 2730. Ash Pit, Bottom and Hearth.

Fig. 2731. Safety Latch.

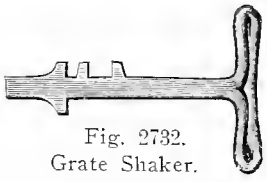


Fig. 2732. Grate Shaker.

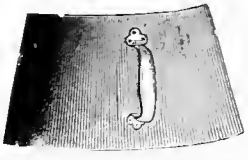


Fig. 2733. Feed Door.

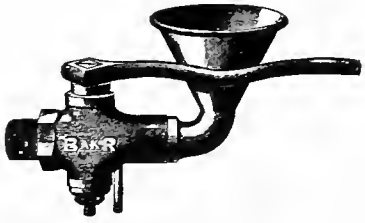


Fig. 2734. Filling Funnel and Combination Cock with Drip.

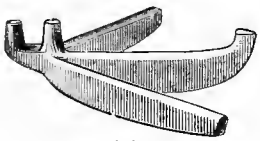


Fig. 2735. Grate Support.

Baker's "Perfected" Heater and Parts Belonging to It.

Fig. 2736. "Mighty Midget" Heater.

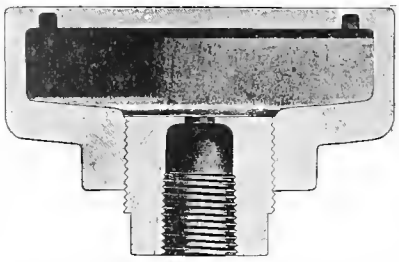


Fig. 2737. Cast Iron Safety Vent and Bushing.

Fig. 2738. Ash Pit Bottom.

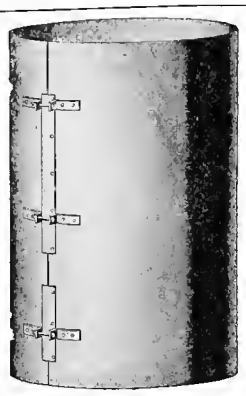


Fig. 2739. Outside Case.

Fig. 2740. Safety Latch.

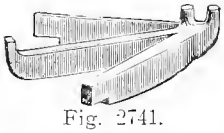


Fig. 2741. Grate Support.

Fig. 2742. Heater Coil.

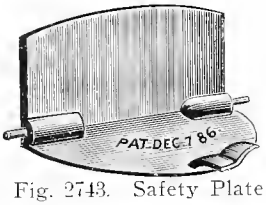


Fig. 2743. Safety Plate and Gas Preventer Combined.

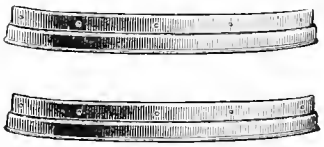


Fig. 2744. Ash Pit Door Guides.

Fig. 2745. Top of Heater.

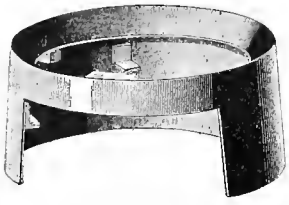


Fig. 2746. Ash Pit.

Fig. 2747. Fire Pot.

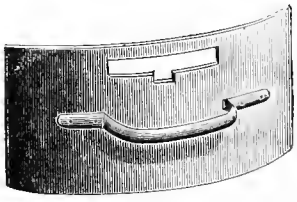


Fig. 2748. Ash Pit Door.

Baker's "Mighty Midget" Heater and Parts Belonging to It.

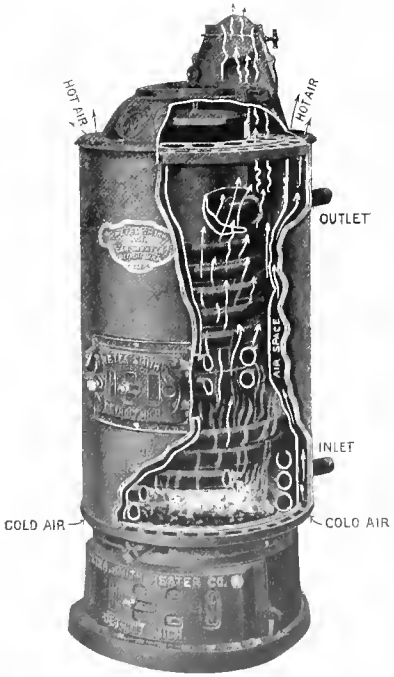


Fig. 2749. Magazine Coil Heater, No. 1 "C." Peter Smith Heater Co.

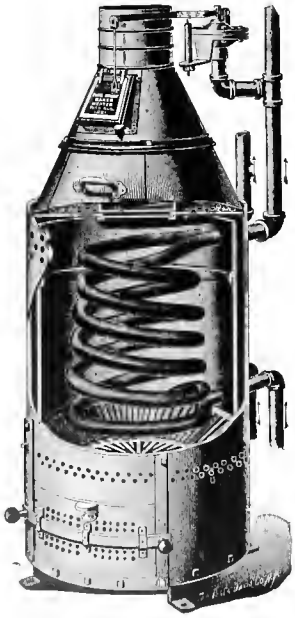
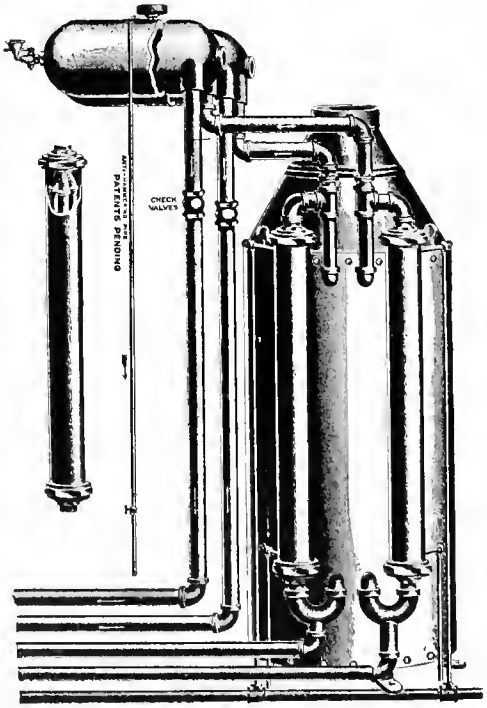


Fig. 2750. Double-Coil Fire-Proof Heater. Solid Steel Shell.



Figs. 2751-2752. Baker Heater with Steam Attachment.


Fig. 2753. Four-Pipe Strap.


Fig. 2754. Two-Pipe Strap and Back.


Fig. 2755. Back for Four-Pipe Strap.


Fig. 2756. Single Pipe Strap.


Fig. 2757 Pipe and Radiator Support.


Fig. 2758. Radiator Stand.


Fig. 2759. Ball for Safety Valve.


Fig. 2760. Safety Valve.


Fig. 2761. Plug.


Fig. 2762. Bushing.


Fig. 2763. Filling Funnel.

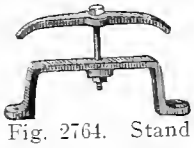


Fig. 2764. Stand for Open Return Bend Radiator.


Fig. 2765. Drum Cover.


Fig. 2766. Pet Cock.

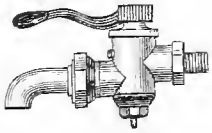


Fig. 2767. Combination Cock.

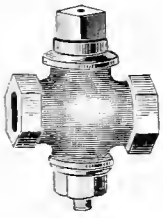


Fig. 2768. Stop Cock.


Fig. 2769. Radiator. Placed Under Seats.


Fig. 2770. Double Radiator. Placed Under Seats.

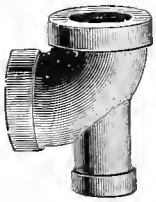


Fig. 2771. Ell with Outlet.


Fig. 2773. Nipple.


Fig. 2776. Coupling.


Fig. 2777. Reducing Coupling.

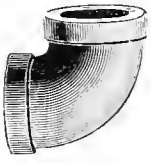


Fig. 2778. Elbow.

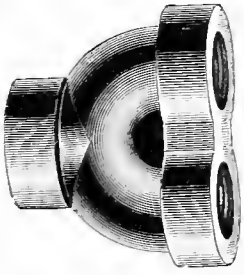


Fig. 2772. Three-Way Return Bend.


Fig. 2774. Open Return Bend.


Fig. 2779. Open Return. Bend.


Fig. 2780. Closed Return Bend.


Fig. 2781. Tee.

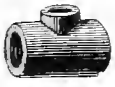


Fig. 2782. Tee.

General Fittings and Special Parts for Baker's Heating Apparatus.

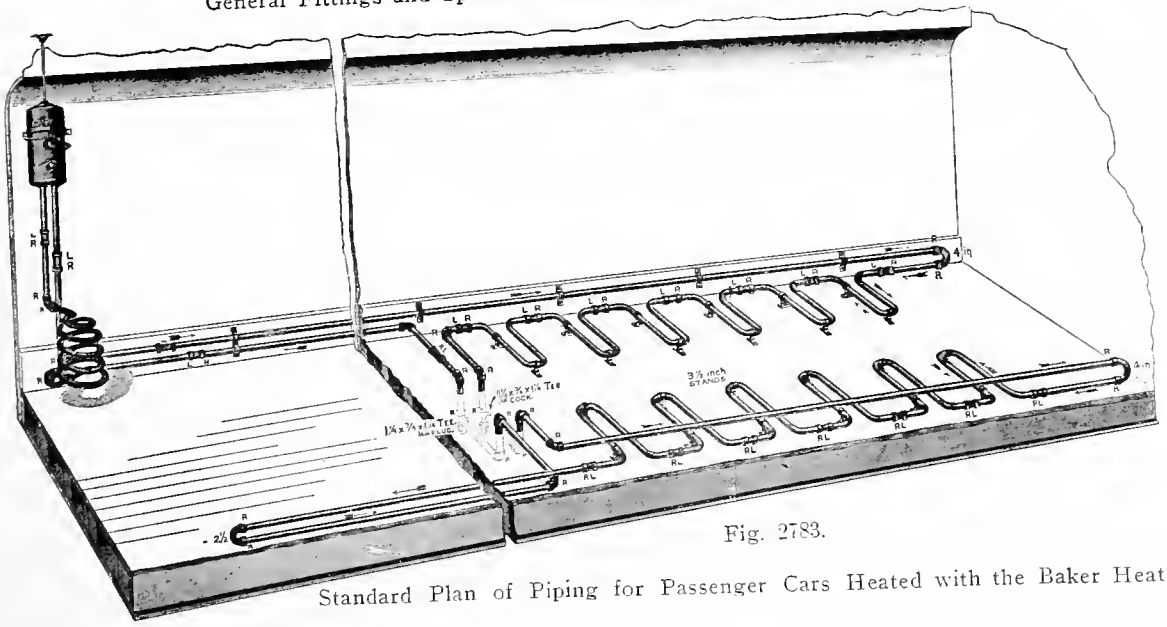


Fig. 2783.

Standard Plan of Piping for Passenger Cars Heated with the Baker Heater.

Numbers Refer to List of Names of Parts on Next Page.

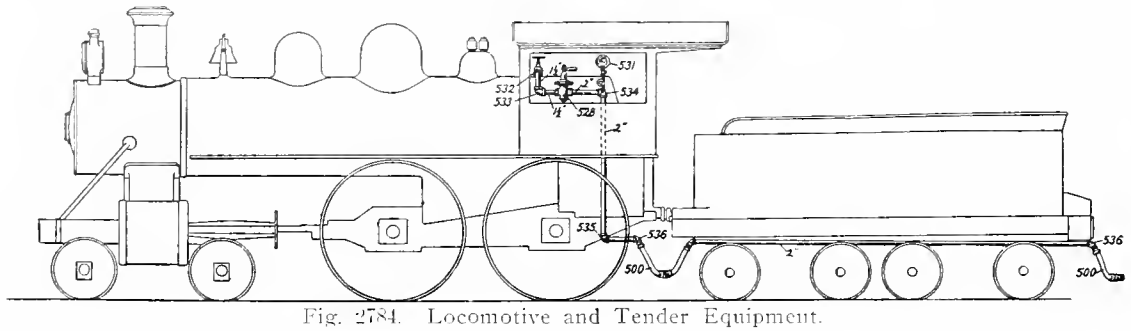


Fig. 2784. Locomotive and Tender Equipment.

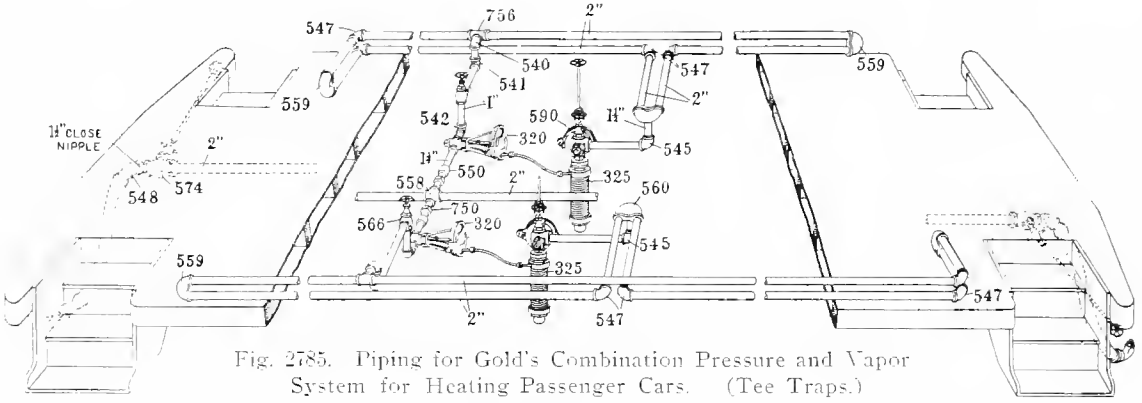


Fig. 2785. Piping for Gold's Combination Pressure and Vapor System for Heating Passenger Cars. (Tee Traps.)

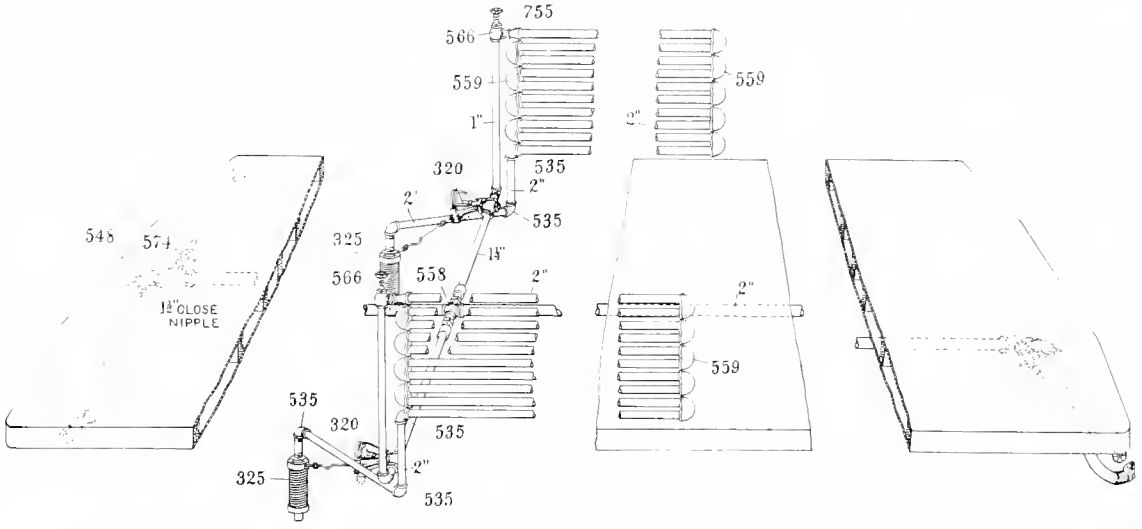


Fig. 2786. Piping for Gold's Improved Vapor System for Heating Baggage Cars.

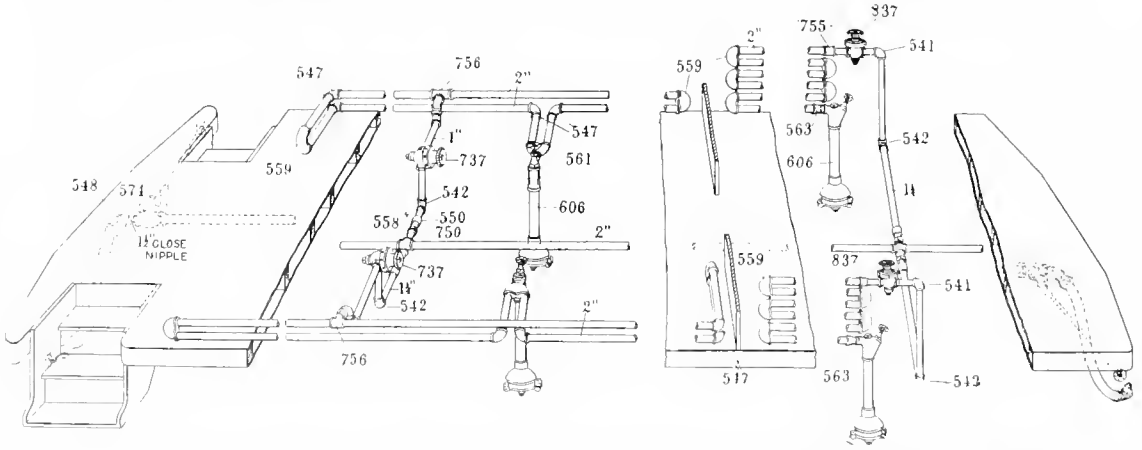


Fig. 2787. Piping for Gold's Improved Direct Steam System for Heating Combination Passenger and Baggage Cars Fitted with Gold's New Stop Valve Regulators.

Numbers Refer to List of Names of Parts Below.

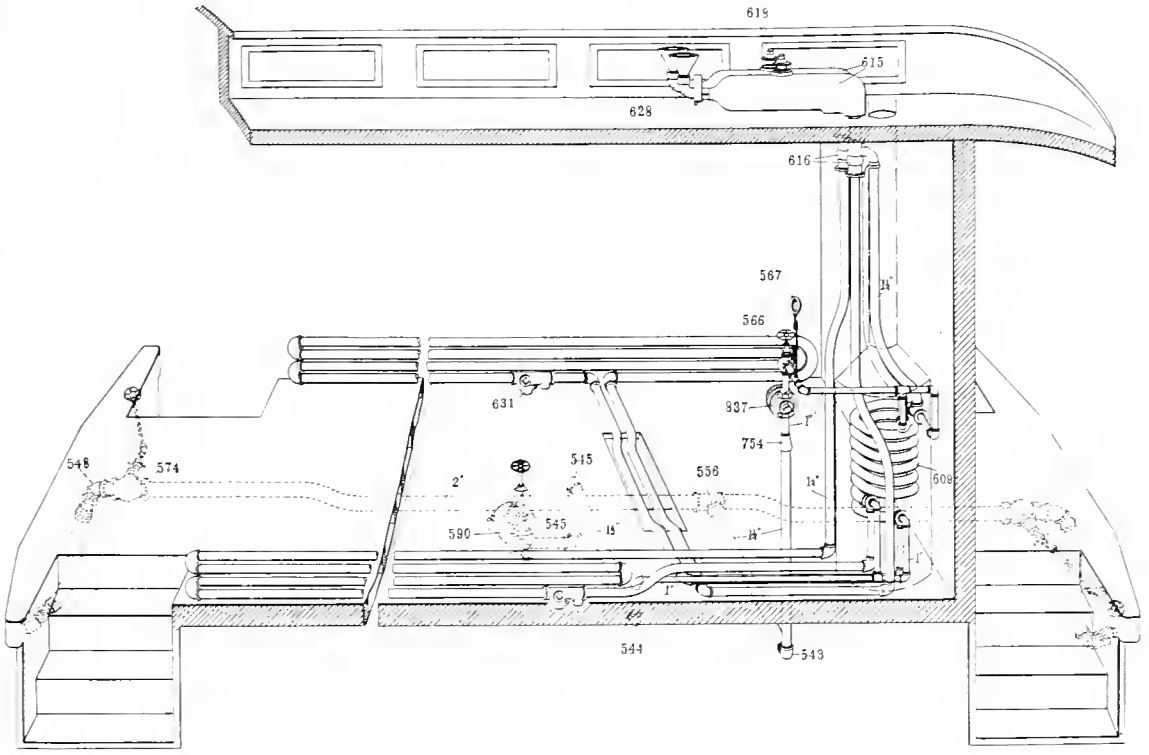


Fig. 2788. Piping for Gold's Improved System of Hot Water Circulation.

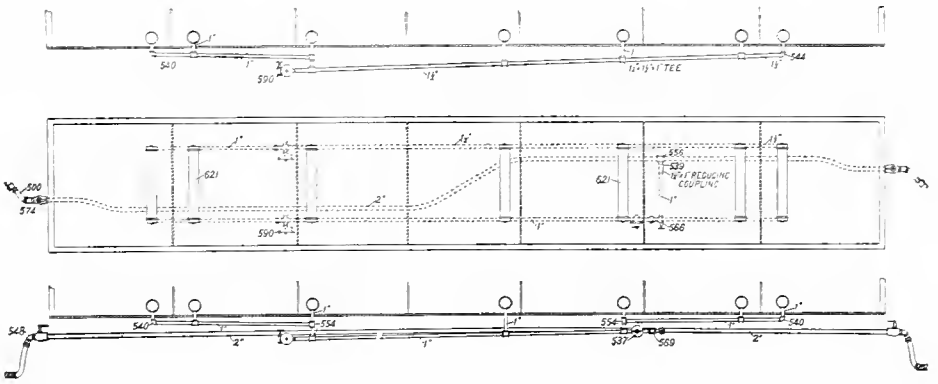
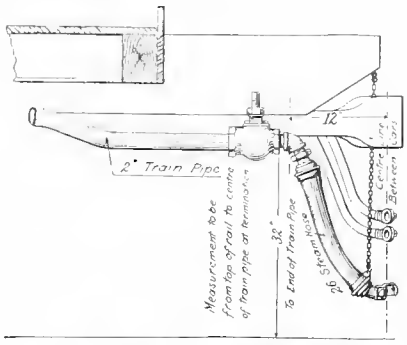
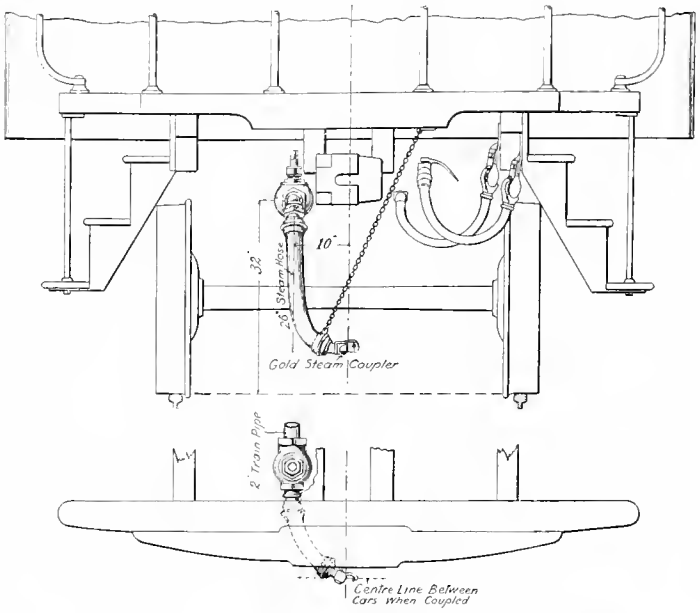


Fig. 2789. Piping for Gold's Improved Storage System for Heating Compartment Cars.

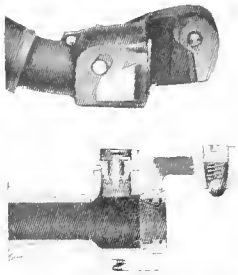
Names of Parts, Figs. 2784-2789.

320 *Gold Automatic Vapor Regulating Valve, Complete*
325 *Vapor Reservoir, Complete*
528 *Gold Improved Pressure Regulator*
531 *Locomotive Steam Gage*
532 *Locomotive Starting Valve*
533 *1½-in. Ell*
534 *2-in. x ¼-in. x 2-in. Tee*
535 *2-in. Ell*
536 *2-in. x 1½-in., 65-deg. Ell*
540 *1-in. Ell*
541 *1-in. R. & L. Ell*
542 *1¼-in. x 1-in. Ell*
543 *1¼-in. R. & L. Ell*
544 *1½-in. x 1-in. Ell*
545 *1½-in. Ell*
547 *2-in. R. & L. Ell*
548 *1½-in., 65-deg. Ell*
550 *1¼-in. R. & L. Coupling*
556 *2-in. x 2-in. x 1¼-in. Tee*
558 *2-in. x 2-in. x 1¼-in. x 1¼-in. Cross*
559 *2-in. R. & L. Return Bend*
560 *2-in. Return Bend, 1½-in. Side Outlet*
561 *2-in. Return Bend, 1½-in. Back Outlet*
563 *2-in. x 1½-in. Eccentric Reducers*
564 *2-in. Hook Plate*
565 *Pipe Shield*
566 *1-in. Supply Valve*
567 *Car Gage*
574 *Gold End Train Pipe Valve*
590 *Gold Improved Tee Trap*
606 *Gold Improved Vertical Trap*
609 *High Duplex Coil*
616 *Sealed Jet Accelerator*
618 *Ideal Safety Valve*
621 *Gold Storage Heater*
623 *Storage Heater Stand, High*
624 *Storage Heater Stand, Low*
737 *Gold New Stop Valve Temperature Regulator, Angle Type*
750 *Train Pipe Strainer Nipple*
754 *1¼-in. x 1-in. Reducer*
755 *2-in. x 1-in. Reducer*
756 *2-in. x 2-in. x 1-in. Tee*
837 *Gold New Stop Valve Temperature Regulator, Straightway Type*





Figs. 2793-2794.
Proper Location of Gold's Universal Straight Port Steam Coupler.



Figs. 2790-2792. Gold's Universal Straight Port Steam Coupler, No. 701.

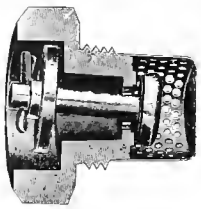


Fig. 2795. Automatic Gravity Relief Trap, No. 502.

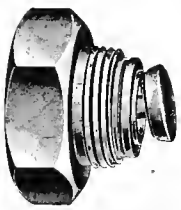


Fig. 2796. Gravity Relief Trap, Less Strainer, No. 503.

Fig. 2797. Relief Trap Body, No. 504.

Fig. 2798. Gold's Universal Straight Port Steam Coupler, No. 800. Two-Piece.

Fig. 2799. Relief Trap Spindle, No. 505.

Fig. 2800. Relief Trap Cotter, No. 506.

Fig. 2801. Baffle Plate, No. 507.

Fig. 2802. Composition Seat, No. 508.

Fig. 2803. Strainer, No. 509.

No. 14.
For 1¼-in. I. D. Hose.

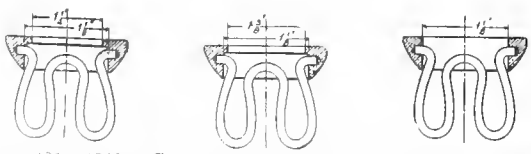
No. 801.
For 1⅜-in. I. D. Hose

No. 526.
For 1½-in. I. D. Hose.

Figs. 2804-2807. Interchange Nipples for No. 800 Coupler.

Fig. 2809. Hose Band, Complete, No. 523.

Fig. 2808. Coupler Latch, No. 519.



Figs. 2810-2812. Coupler Gaskets for Nos. 800 and 400 Couplers.

Fig. 2813. Coupler Gasket for Nos. 701 and 901 Couplers.

Fig. 2814. Hose Chain and Eye Plate, No. 527.

Gold's Universal Straight Port Coupler, Hose Fittings and Parts.

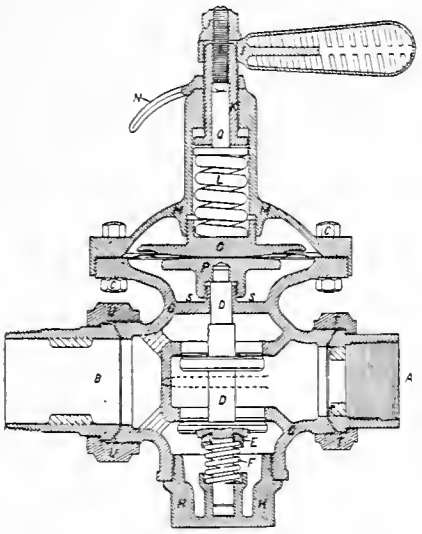


Fig. 2815. Improved Balance Valve Pressure Regulator, No. 529.

Names of Parts. Fig. 2815.

A 1½-in. Inlet Union Nipple
B 2-in. Outlet Union Nipple
C Bolts and Nuts for Dome and Body
D Balance Spindle with Hard Seats
E Oscillating Washer
F Bottom Spring
G Body of Regulator
H Bottom Plug
I Handle
J Top Nut
K Hollow Screw
L Top Spring
M Dome of Regulator
N Lock Nut
O Top Flange
P Bottom Flange
Q Top Spindle
R Set Screw
T 1½-in. Inlet Union Nut
U 2-in. Outlet Union Nut

Fig. 2816. Car Gage, No. 567.

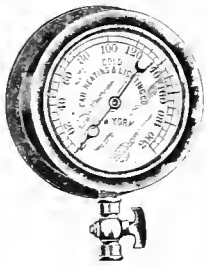


Fig. 2817. Locomotive Steam Gage, No. 531.

Fig. 2818. Stop Valve Temperature Regulator, No. 737.

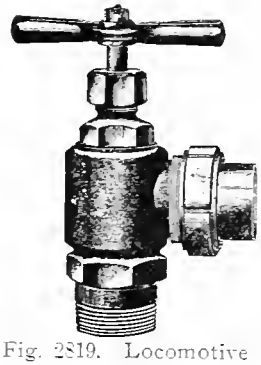


Fig. 2819. Locomotive Starting Valve, No. 532.

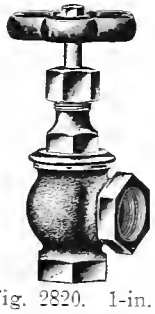


Fig. 2820. 1-in. Supply Valve, No. 566.

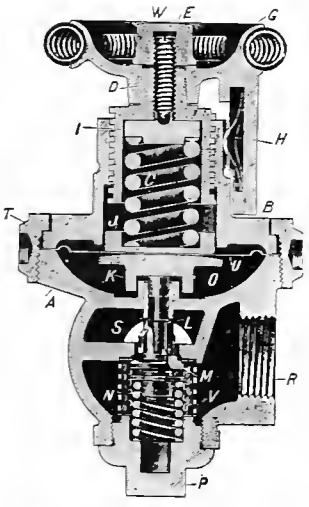


Fig. 2821. Section of Stop Valve Temperature Regulator, No. 737.

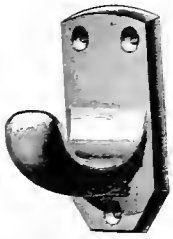


Fig. 2822. 2-in. Hook Plate, No. 564.

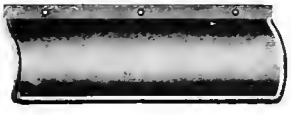


Fig. 2823. Pipe Shield, No. 565.

Fig. 2824. Strainer Nipple, No. 750.

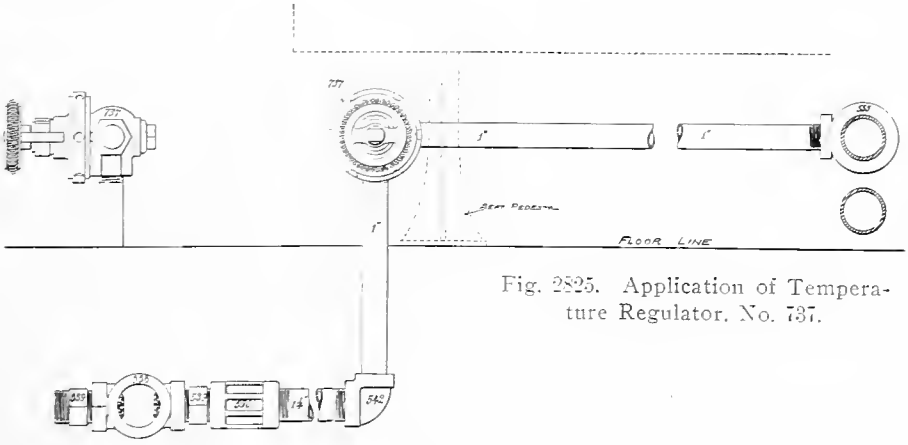


Fig. 2825. Application of Temperature Regulator, No. 737.

Names of Parts. Fig. 2821

A Body of Regulator
B Dome of Regulator
C Top Spring
D Regulating Screw
E Set Screw
G Wheel
H Indicator Spring
I Washer
J Top Flange
K Bottom Flange
L Auxiliary Valve Spindle
M Main Valve Spindle
N Bottom Spring
P Bottom Plug
R 1-in. Inlet
S 1-in. Outlet
T Spanner Nut
U Diaphragm
V Strainer
W Lock Nut

Fig. 2826. Improved End Train Pipe Valve, No. 574.

Fig. 2828. Valve Piston, No. 577.

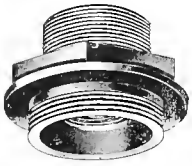
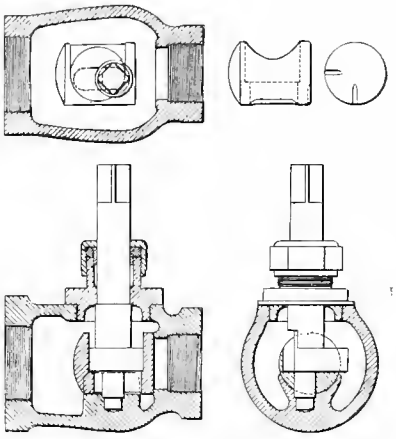


Fig. 2829. Valve Bonnet, No. 580.

Fig. 2831. Valve Spindle, No. 576.



Figs. 2832-2836. Sections of Gold's Improved End Train Pipe Valve.

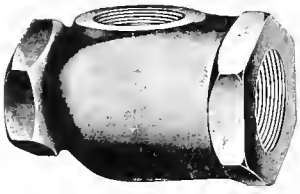


Fig. 2827. Valve Body, No. 575.

Fig. 2830. Valve Handle, No. 589.

Figs. 2837-2838. Universal Joint Set Screw and Wrench, Nos. 582 and 583.

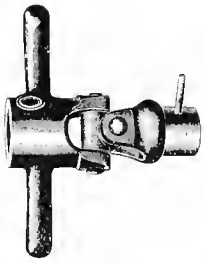


Fig. 2839. Universal Joint, No. 581.

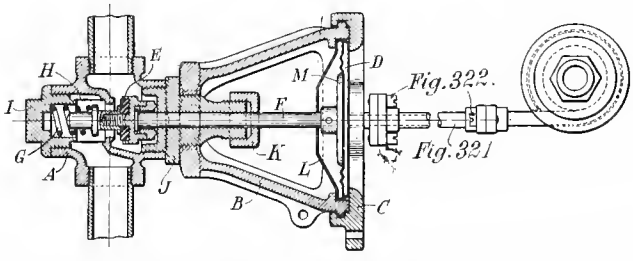
Fig. 2840. Valve Packing Nut, No. 578.

Fig. 2841. Gland, No. 579.

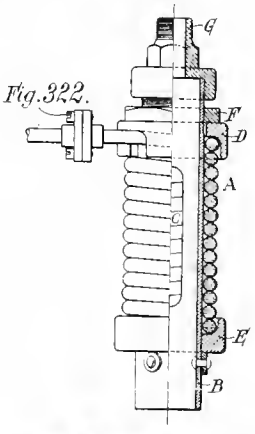
Fig. 2842. Valve Handle Wheel, No. 584.

Fig. 2843. Indicator, No. 587.

Gold's Improved End Train Pipe Valve and Parts.



Figs. 2844-2845. Automatic Vapor Regulating Valve, Complete.



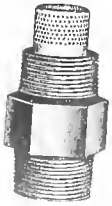


Fig. 2846. Nipple, No. 758, for 1¼-in. Train Line.

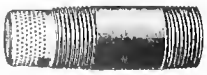


Fig. 2847. Nipple, No. 326, for 1-in. Train Line.

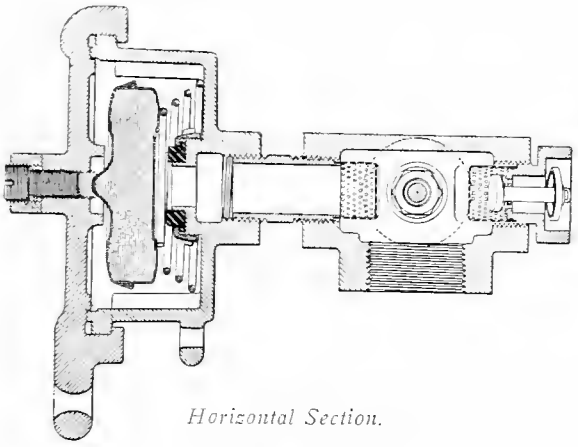
Fig. 2848. Valve Indicator Plate, No. 586.

Parts of Gold's Combination Pressure and Vapor Car Heating System.

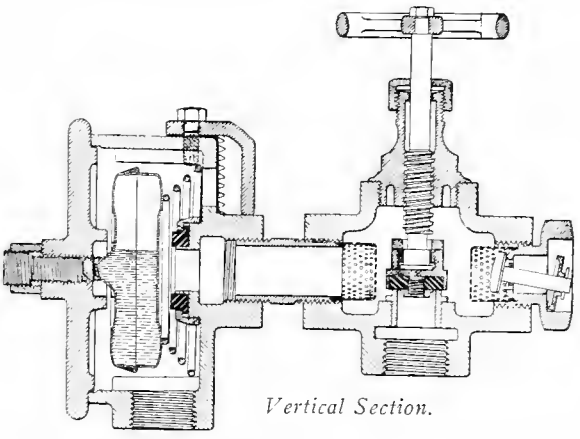
Names of Parts, Figs. 2844-2845.

A *Body*
B *Diaphragm Case*
C *Diaphragm Case Cover*
D *Diaphragm*
E *Valve*
F *Valve Stem*
G *Spring*
H *Strainer*
I *Bottom Plug*
J *Bonnet*
K *Packing Nut*
L *Diaphragm Shield*

M *Diaphragm Plate*
¼-in. Copper Pipe with Flanges
Steel Flange Screws
Vapor Reservoir, Complete
A *Copper Coil*
B *Slotted Pipe*
D *Top Cap*
E *Bottom Cap*
F *Lock Nut*
G *2-in. x 1-in. Brass Connector (to be used only when connecting to horizontal trap)*



Horizontal Section.



Vertical Section.

Figs. 2849-2850. Gold's Improved Automatic Tee Trap. No. 590.

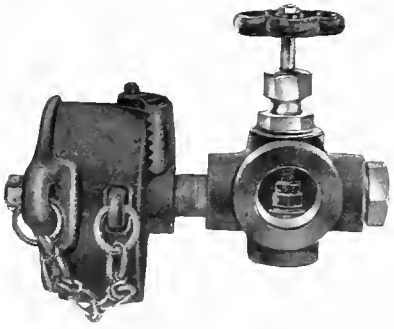


Fig. 2851. Automatic Tee Trap, No. 590.

Fig. 2852. Trap Body, No. 591.

Fig. 2853. Trap Cover, No. 595.

Fig. 2854. Set Screw, No. 596.

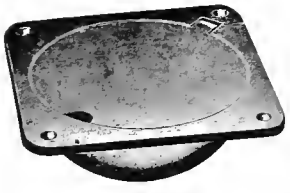


Fig. 2855. Floor Plate, No. 603.

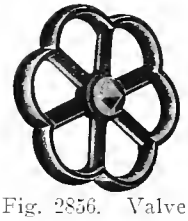


Fig. 2856. Valve Handle Wheel, No. 602.

Figs. 2857-2859. Diaphragm, Seat and Collar, Nos. 592-593 and 594.

Fig. 2860. Trap.

Fig. 2861. Strainer Nipple, No. 597.

Fig. 2862. Trap Ventilator, No. 599.

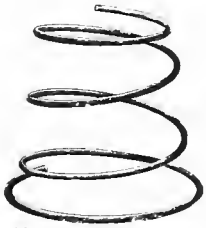


Fig. 2863. No. 600 Plate, No. 604.

Fig. 2864. Trap Rod, No. 605.

Parts of Gold's Improved Automatic Tee Trap.

Names of Parts. Fig. 2865.

A *Automatic Valve*
A_1 *Disc for Automatic Valve*
B *Blow-off Valve*
B_1 *Disc for Blow-off Valve*
C *Cast Iron Trap Head*
D *Strainer for Valve A*
E *Valve Stem*
F *Expansive Diaphragm*
G *Set Screw for Adjusting Trap*
H *Outlet Ports of Trap, Four*
I *Cam Lock for Cover M*
J *Diaphragm Casing Ventilating Holes*
K *Blow-off Discharge Shield*
L *Cast Iron Casing*
M *Hinged Cover for Trap Casing*
N *Hooks to Prevent Diaphragm Shifting*
O *Bottom Plate*
O_1 *Top Plate*
P *Outside Tube*
Q *Inside Tube*
R *Blow-off Discharge Passage*
S *Automatic Valve Discharge Passage*
T *Automatic Valve Guides*
U *Automatic Valve Stem Guides*
V *Spring Catch*
W *Brass Valve Seats*
X *Lock Nut*
Y *Slot for Spring Catch*
Z *Bonnet of Blow-off Valve*

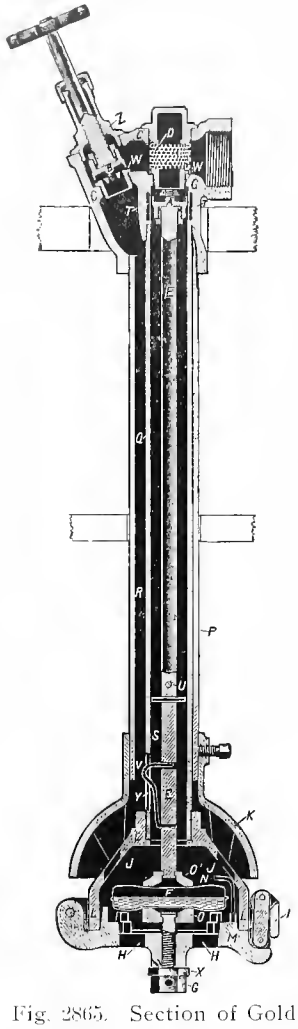


Fig. 2865. Section of Gold's Improved Vertical Trap, No. 607.

Fig. 2866. Improved Vertical Trap, No. 607.

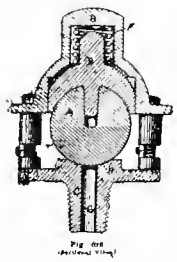


Fig. 2867. Section Through Gold's Ideal Safety Valve, No. 618.

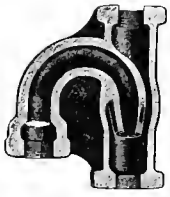


Fig. 2868. Sealed Jet, No. 616.

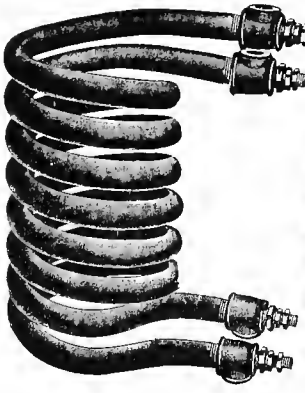


Fig. 2869. Large Heating Coil, No. 609.

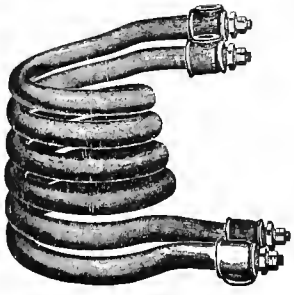
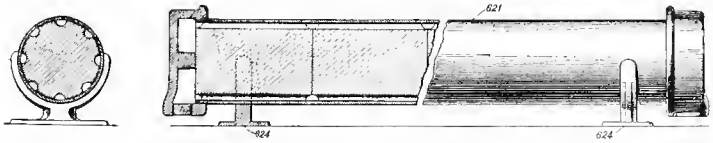


Fig. 2870. Small Heating Coil, No. 608.



Figs. 2871-2872. Storage Heater, No. 621.

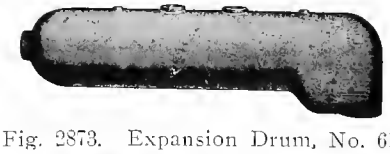


Fig. 2873. Expansion Drum, No. 615.

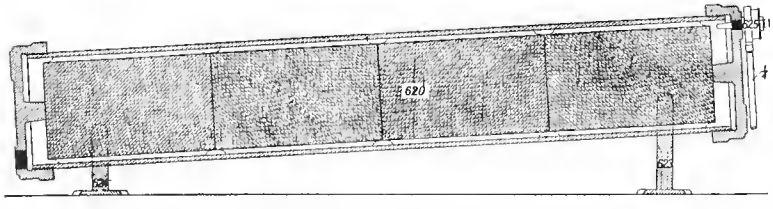


Fig. 2874. Longitudinal Section Through Storage Heater for Refrigerator Cars, No. 620.

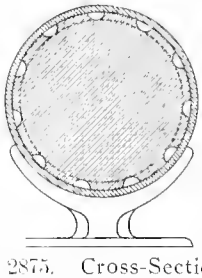


Fig. 2875. Cross-Section Through Heater, No. 620.

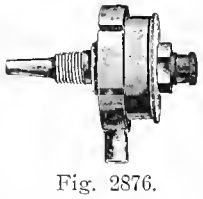


Fig. 2876. Air Valve, No. 625.

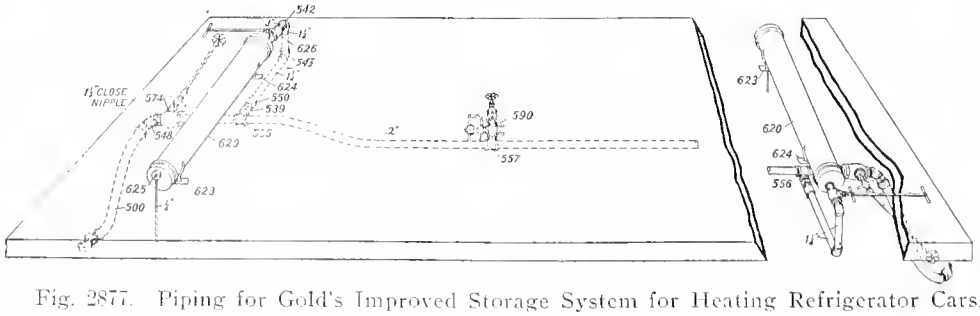
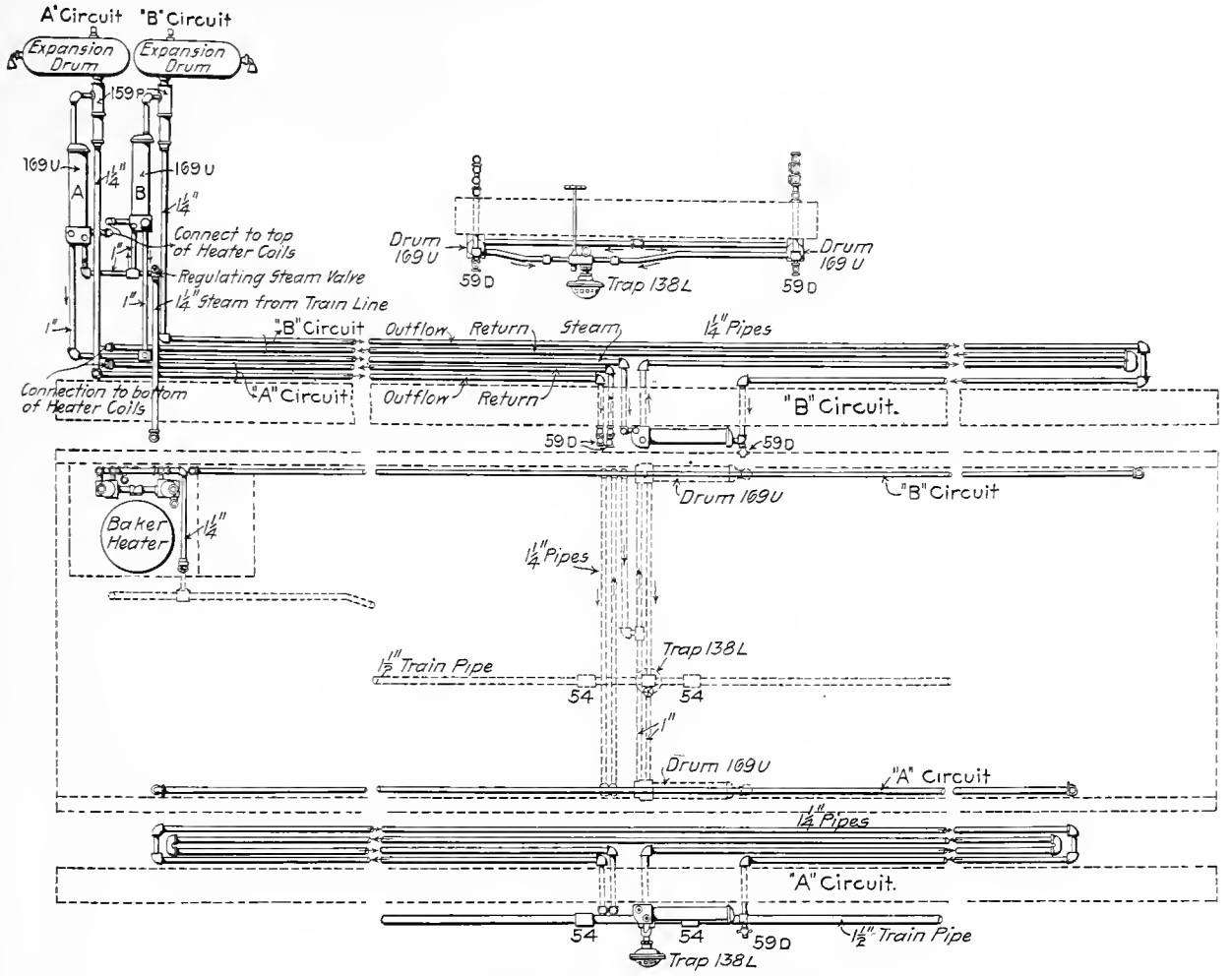


Fig. 2877. Piping for Gold's Improved Storage System for Heating Refrigerator Cars.



Figs. 2878-2880. Plan and Elevation of Piping Showing Application of Consolidated Steam Drum No. 169U to Double Circuit.

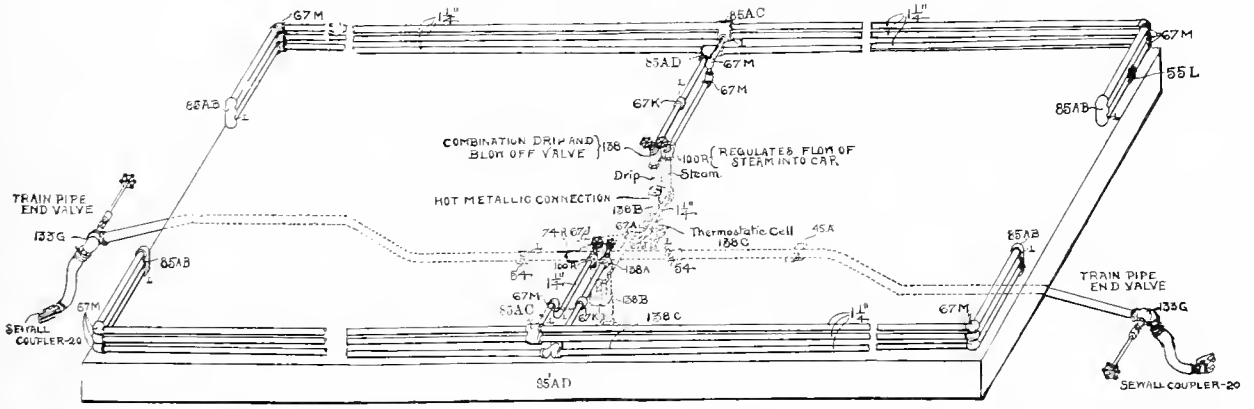


Fig. 2881. Plan of Piping, Direct Steam System C, Showing 3-Pipe System with Two Traps, No. 138 L.

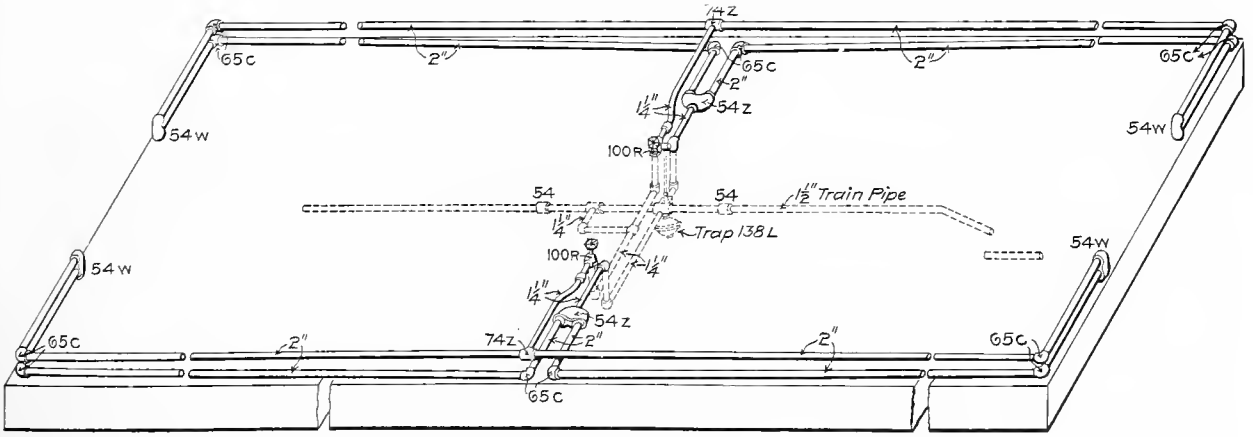


Fig. 2882. Plan of Piping, Direct Steam System B, with 1 Thermostatic Trap, No. 138 L.

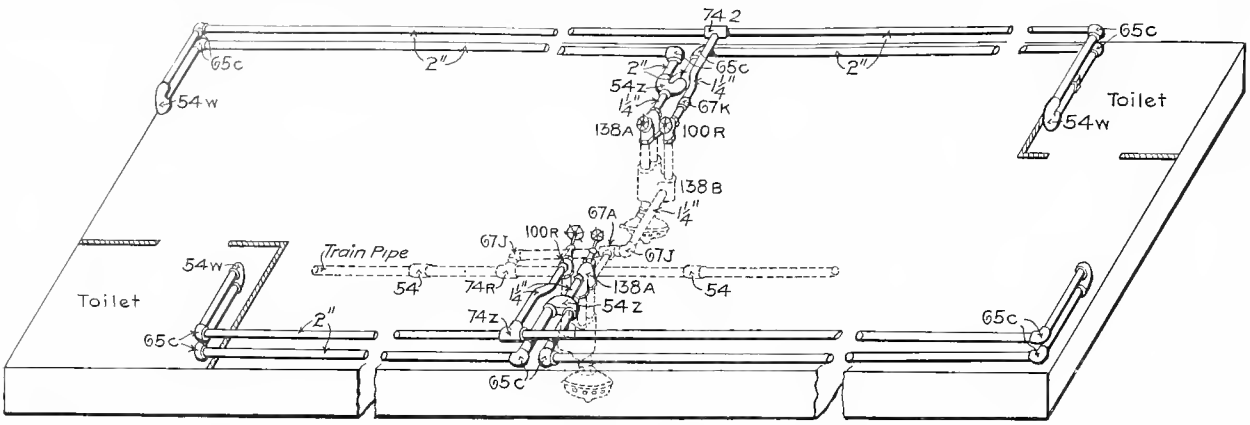


Fig. 2883. Plan of Piping. Standard Direct Steam System with 2 Traps, No. 138.

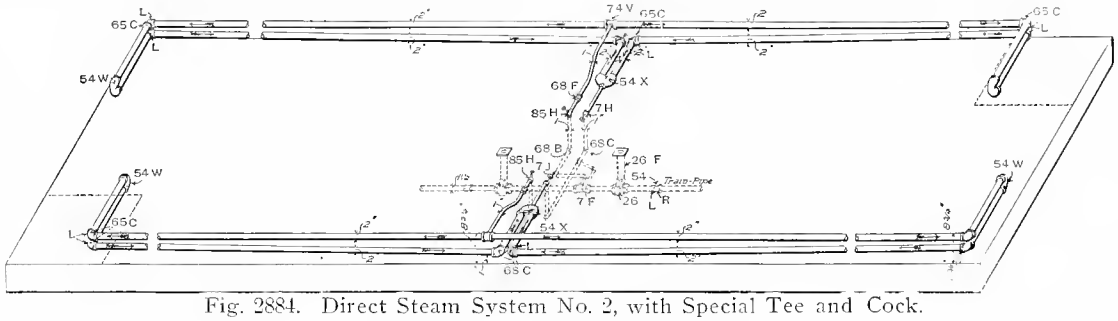


Fig. 2884. Direct Steam System No. 2, with Special Tee and Cock.

Names of Parts, Figs. 2878-2884.

7F *Tee with Drip Connection*
7H *Angle Trap Valve*
7J *Eccentric Tee*
20 *Sewall Coupler*
26 *Asbestos Packed Cock*
26F *Round Spindle*
26G *Floor Plate for* **26F**
45A *1½-in. Pipe Clamp*
54 *Coupling, R. & L.*
54W *Return Bend*
54X *Return Bend*
54Z *Return Bend with Eccentric Outlet*
55L *Expansion Bracket*
65C *R. & L. Ell*
67A *Tee*
67J *R. & L. Ell*
67K *R. & L. Couplings*
67M *Ell*
68B *Ell*
68C *R. & L. Ell*
68F *R. & L. Coupling*
74R *Tee*
74V *Tee*
74Z *Tee*
85AB *Three-Pipe Manifold*
85AC *Center Tee*
85AD *Return Tee*
85H *Graduating Steam Angle Valve*
100R *Graduating Steam Valve*
133G *End Train Pipe Valve*
138 *Steam Trap*
138A *Steam Trap*
138B *Steam Trap*
138C *Steam Trap*
138L *Steam Trap*

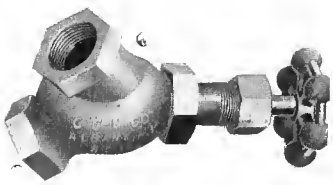


Fig. 2885. Graduating Steam Valve. No. 85H.

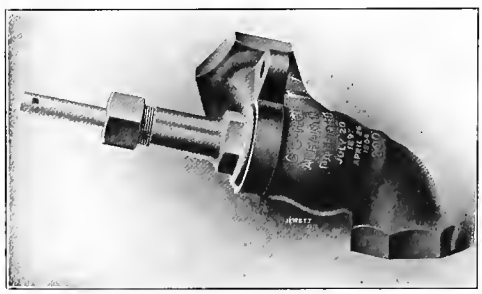


Fig. 2886. End Train Pipe Valve, No. 200.

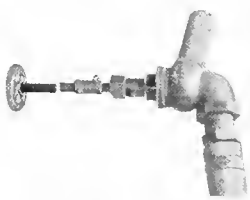


Fig. 2887. End Train Pipe Valve, No. 133G.

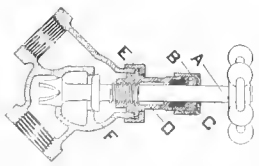


Fig. 2888. Section of Graduating Steam Valve, No. 85H.

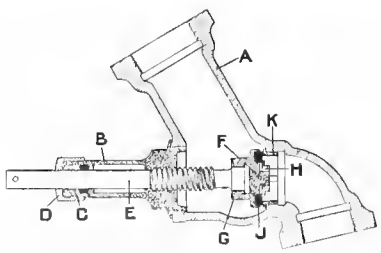


Fig. 2889. Section of End Train Pipe Valve, No. 200.

Names of Parts of Fig. 2889.

A *Body Casting* *200A*
B *Bonnet* *195B*
C *Gland* *133GC*
D *Gland Nut* *133GD*
E *Stem* *133GE*
F *Swivel Head* *133GG*
G *Swivel Head Nut* *133GH*
H *Gasket Nut* *133GJ*
J *Gasket* *133GK*
K *Brass Seat* *195D*

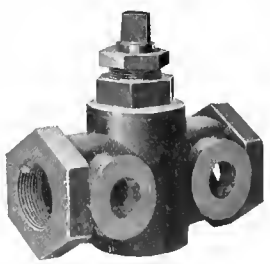
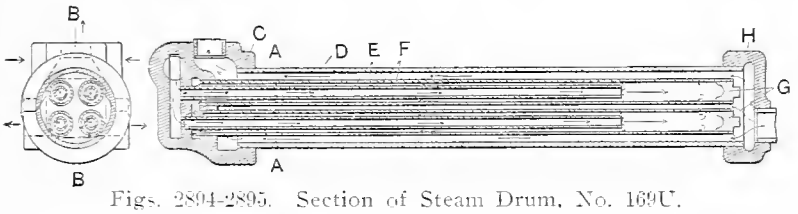


Fig. 2890. Filler Cock, No. 121.

Fig. 2893. Current Director, No. 59R.

Fig. 2892. Safety Valve, No. 59C.



Figs. 2894-2895. Section of Steam Drum, No. 169U.

Fig. 2896. Steam Drum, No. 169U.

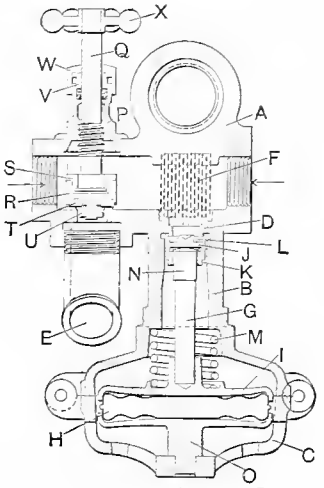


Fig. 2897. Section of Steam Trap, No. 138R.

Names of Parts. Figs. 2894-2895.

C	*Head Casting* *169V*	F	*1-in. Brass Pipe* *169P*
D	*3½-in. Iron Pipe* *169N*	G	*Plug for F* *169L*
E	*1½-in. Brass Pipe* *169R*	H	*Cap Casting* *169K*

Fig. 2898. Steam Trap, No. 138L.

Names of Parts. Fig. 2897.

A	*Body Casting* *138RA*	L	*Swivel Head Gasket* *138CL*
B	*Upper Basket Casting* *138RB*	M	*Spring* *138CM*
C	*Lower Basket Casting* *138CU*	N	*Cap for Valve Stem* *138CR*
D	*Brass Seat for Thermostatic Valve* *138RC*	O	*Lower Spider Plate* *138CW*
		P	*Bonnet* *100B*
E	*Curved Nipple for Blow-off* *138RD*	Q	*Valve Stem* *100C*
		R	*Swivel Head* *100D*
F	*Strainer* *138LC*	S	*Swivel Head Nut* *100E*
G	*Stem or Rod* *138LD*	T	*Gasket* *100G*
H	*Diaphragm* *138CA*	U	*Nut for T* *100H*
I	*Upper Spider Plate* *138CE*	V	*Gland* *100J*
J	*Swivel Head* *138CJ*	W	*Gland Nut* *100K*
K	*Swivel Head Nut* *138CK*	X	*Hand Wheel* *7R*

Fig. 2899. Steam Inlet Valve, No. 100L.

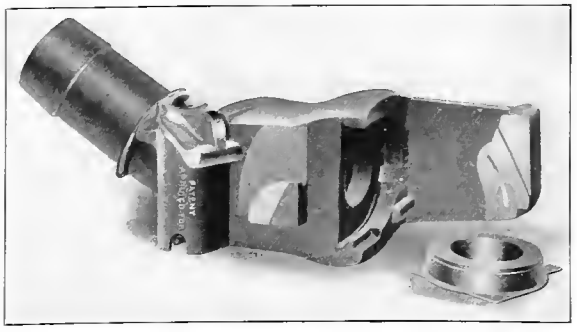


Fig. 2900. Consolidated Steam Coupler, No. 33.

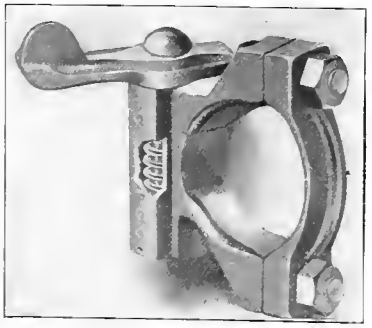


Fig. 2901. Clamp Lock for Steam Couplers, No. 9S.

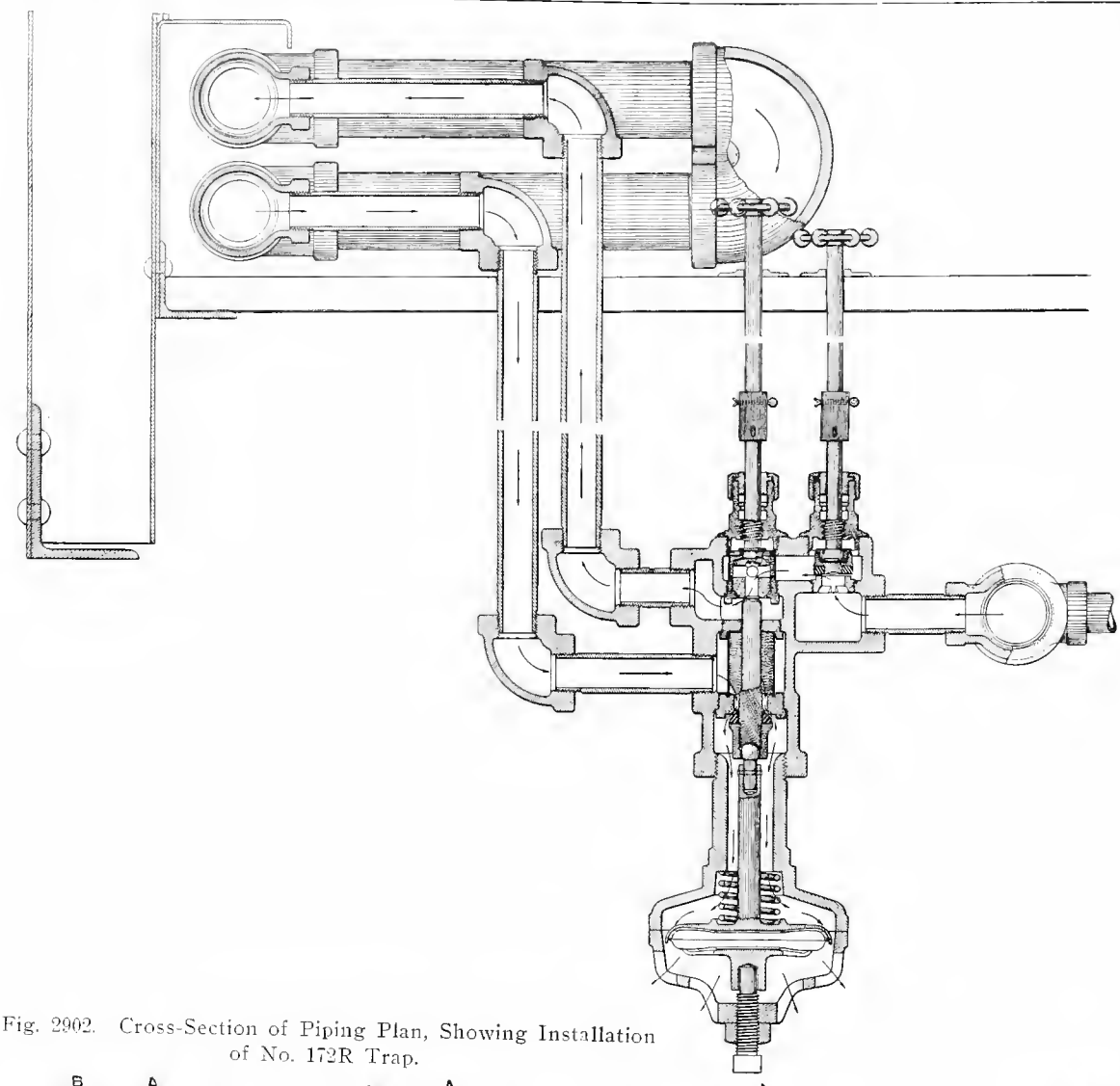


Fig. 2902. Cross-Section of Piping Plan, Showing Installation of No. 172R Trap.

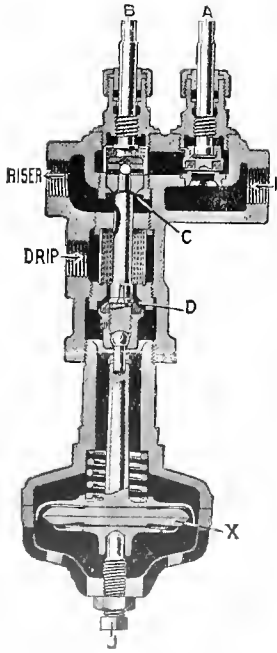


Fig. 2903. Combination Vapor-Pressure Trap, No. 172R, Operating as Vapor.

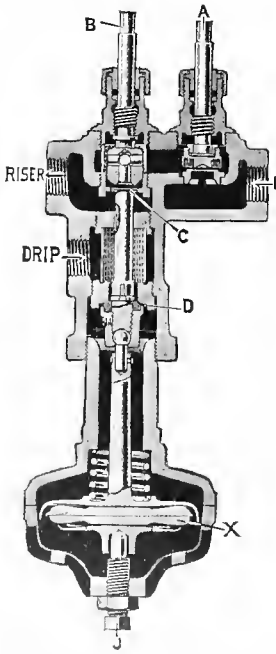


Fig. 2904. Combination Vapor-Pressure Trap, No. 172R, Operating as Pressure.

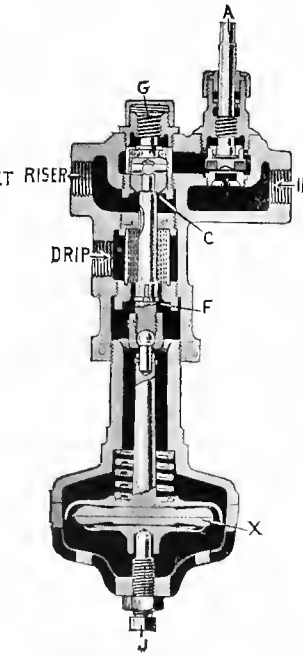


Fig. 2905. Straight Vapor Trap, No. 172V.

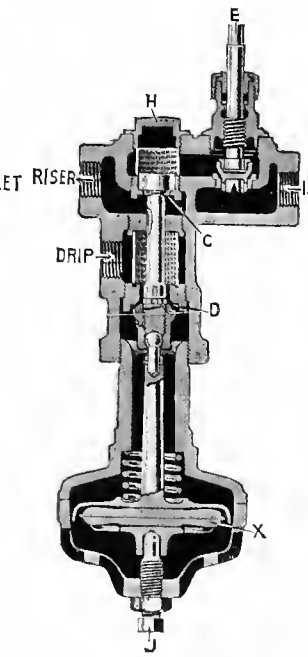


Fig. 2906. Straight Pressure Trap, No. 172SP.

Fig. 2907. Pair of Consolidated Steam Couplers, No. 9C (Locked).

Fig. 2908. Pair of Sewall Steam Couplers, No. 20AF (Locked).

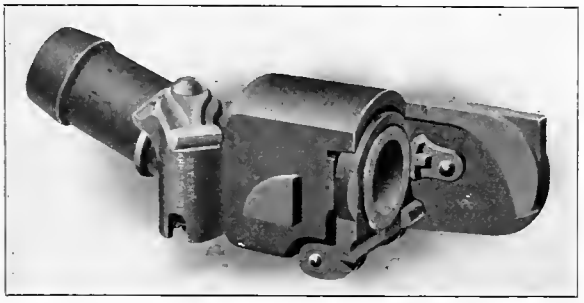


Fig. 2909. Consolidated Steam Coupler, No. 9C.

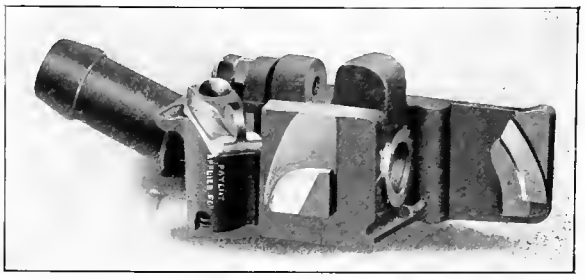
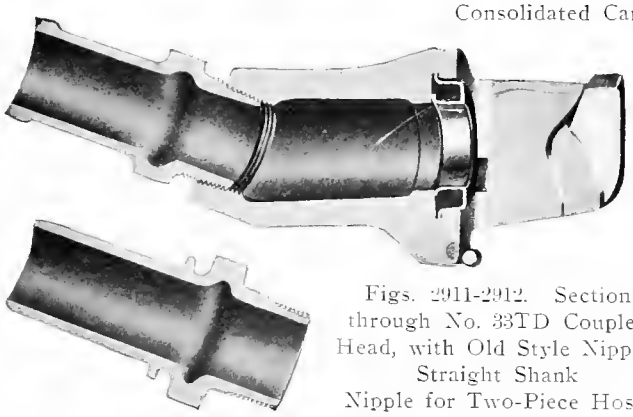


Fig. 2910. Sewall Steam Coupler, No. 20AF.

Consolidated Car Heating Co.



Figs. 2911-2912. Section through No. 33TD Coupler Head, with Old Style Nipple. Straight Shank Nipple for Two-Piece Hose Clamp Below.

Consolidated Car Heating Co.

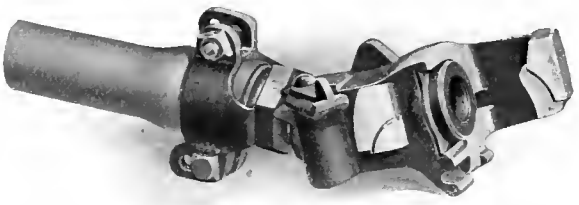
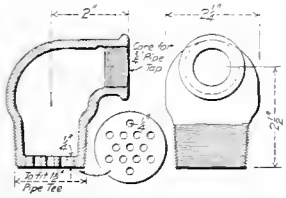
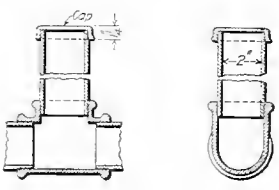


Fig. 2913. No. 33TD. Steam Coupler, with Two-Piece Hose Clamp.
Consolidated Car Heating Co.



Figs. 2914-2918. Inlet Elbow with Strainer.



Figs. 2919-2920. Seat Tees.

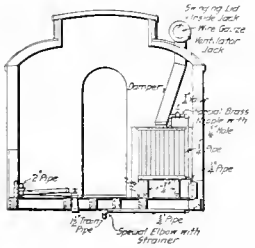
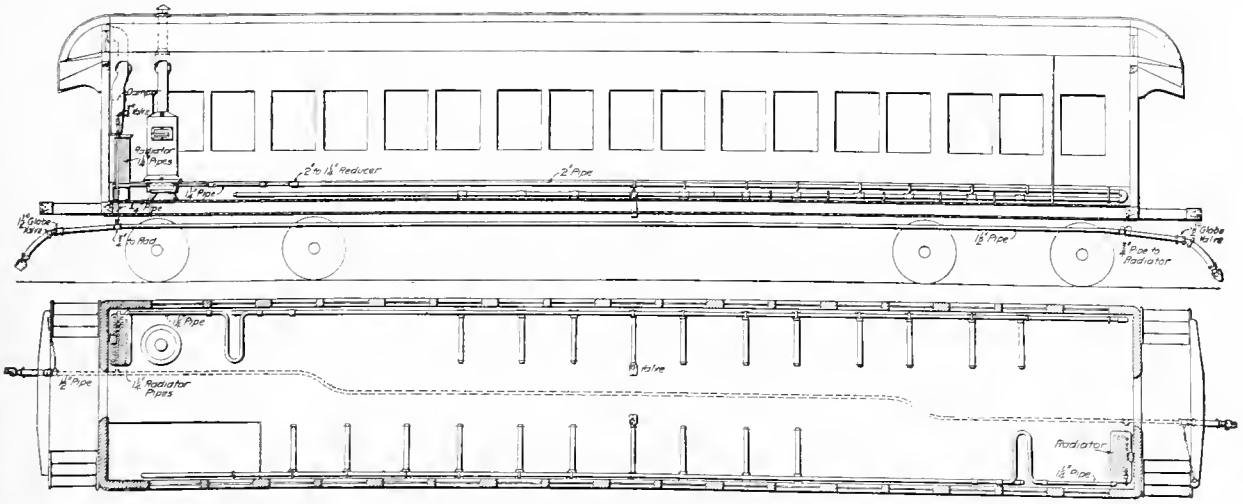
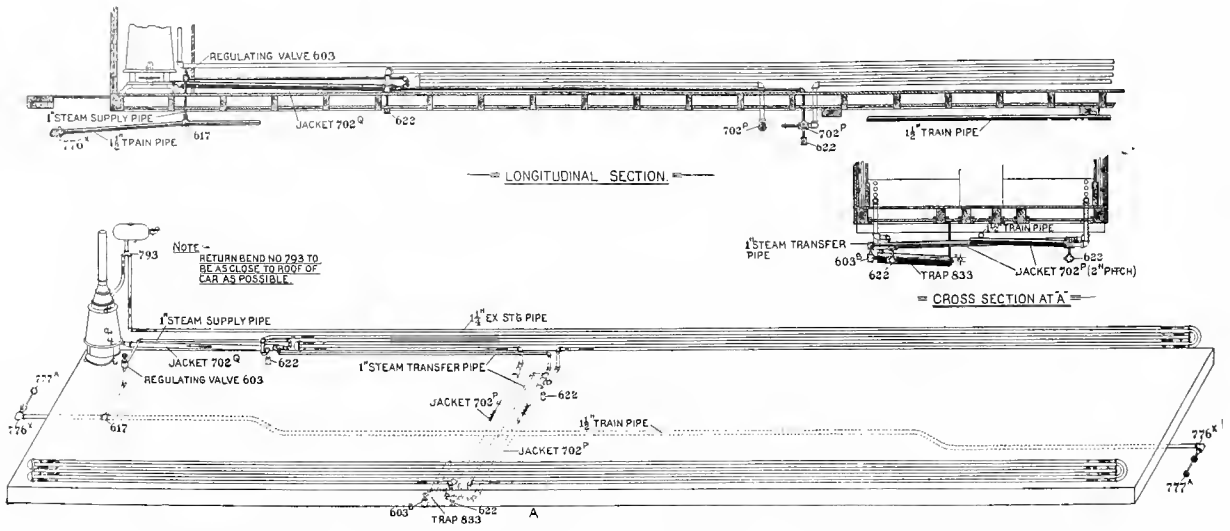


Fig. 2921. Cross-Section of Car.

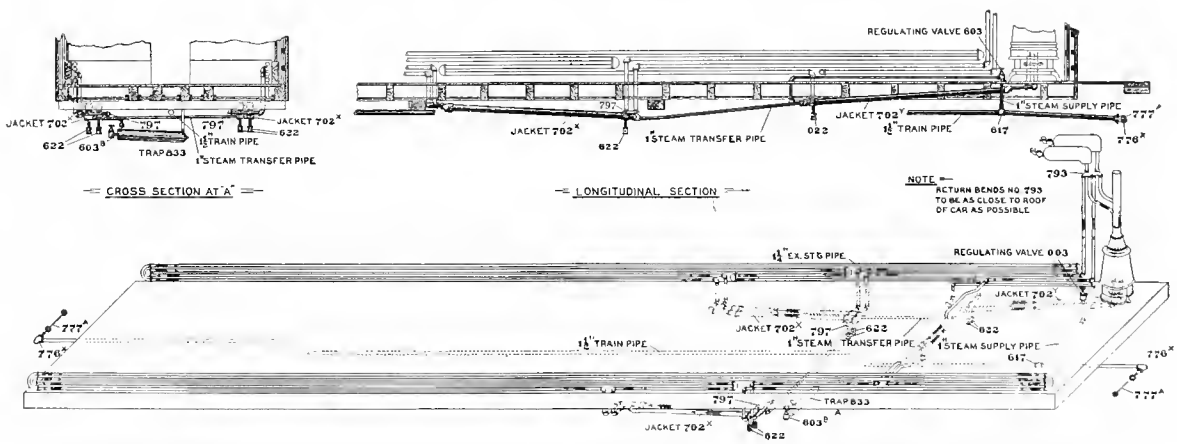


Figs. 2922-2923. Diagram of Piping for Steam Heating and Ventilating System Used on the Chicago & North Western.

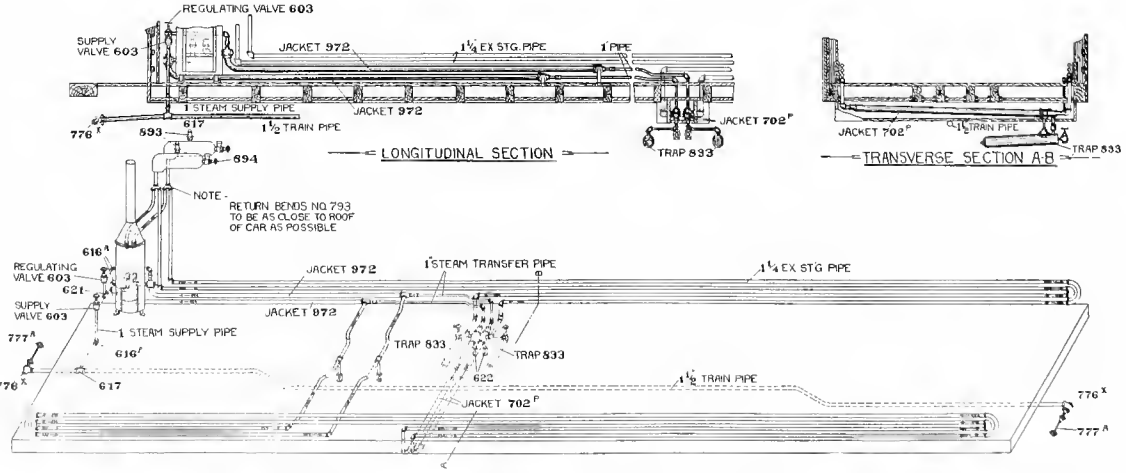
Numbers Refer to List of Names of Parts on Page 350.



Figs. 2924-2926. General View of Heater and Connections. Standard System of Steam Heating by Single Water Circulation (L-850). Water is Heated at 3 Points by Jackets (Nos. 702p and 702q), Shown in Figs. 2958-2960.



Figs. 2927-2929. General View of Heater and Connections. Standard System of Steam Heating by Double Water Circulation (L-845a). Water is Heated at 6 Points by Jackets (Nos. 702x and 702y), Shown in Figs. 2951-2954.



Figs. 2930-2932. General View of Heater and Connections. Standard System of Steam by Double Water Circulation. (L-1476) Water is Heated at 4 Points by Jackets. (Nos. 702p and 972), Shown in Figs. 2955-2960.

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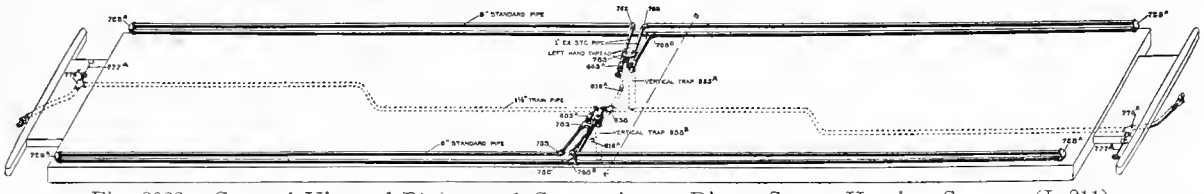
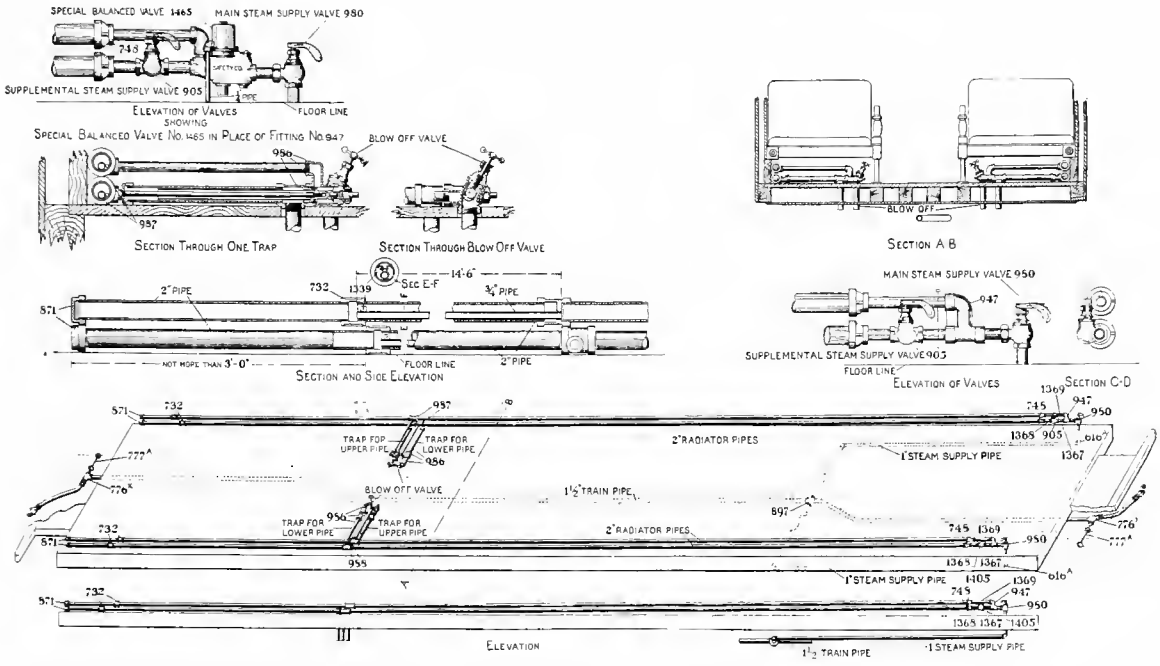
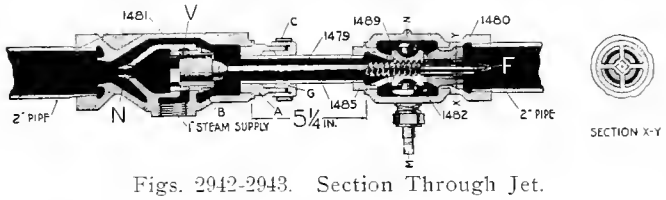


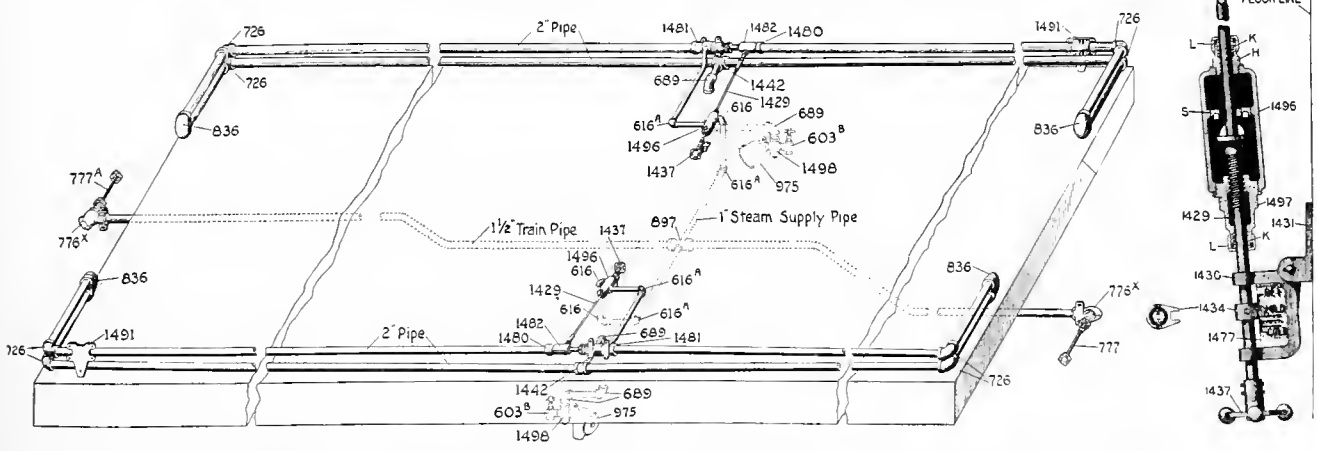
Fig. 2933. General View of Piping and Connections. Direct Steam Heating System (L-811). Adapted to All Classes of Cars with Slight Modifications.
Diagrams of Heating Systems.



Figs. 2934-2941. General View of Piping and Connections. Regulating Direct Steam Heating System (L-1410). Specially Adapted for Passenger Cars.



Figs. 2942-2943. Section Through Jet.



Figs. 2944-2945. General View of Piping and Connections. Thermo Jet System (L-1634). Specially Adapted for Passenger Cars.
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Names of Parts for Standard Heating Systems (L-850, L-845a and L-1476). Figs. 2924-2932.

Cat. No.	Specials.
603	*1-in. Angle Valve*
603b	*1-in. Drain Valve*
611	*1¼-in. Extra Heavy Car Ell*
611a	*1¼-in. Extra Heavy Car Ell, R. & L.*
612a	*1¼-in. x ¾-in. Extra Heavy Tee*
622	*¾-in. Extra Heavy Cock*
629	*¾-in. Extra Heavy Nipple*
639	*Directions for Management (Framed)*
642	*1-in. Plug*
680	*Covering for 1-in. Pipe*
681	*Covering for 1-in. Ell*
682	*Covering for 1-in. Tee*
690	*1¼-in. Plug*
702p	*Single Jacket*
702q	*Single Jacket*
702x	*Double Jacket*

Cat. No.	Specials.
702y	*Double Jacket*
756	*Covering for 1¼-in. Ell*
793	*1¼-in. Extra Heavy Return Bend, with 1¼-in. Back Outlet*
797	*1¼-in. Extra Heavy Return Bend*
802p	*Covering for Jacket, No. 702p*
802x	*Covering for Jacket, No. 702x*
802y	*Covering for Jacket, No. 702y*
833	*Automatic Trap Complete*
960	*Directions for Management, L-1476 System (Framed)*
972	*Bent Jackets*
	Train Pipe Specials.
617	*1½-in. x 1-in. Tee*
677	*Covering for 1½-in. Pipe*
679	*Covering for 1½-in. Tee*
776x	*Train Pipe Valve*
777a	*Extension Handle*

Cat. No.	Pipe and Fittings.
	(train pipe)
618	*1½-in. R. & L. Coupling*
628	*1½-in. Standard Pipe*
	(other than train pipe)
616	*1-in. Ell*
616a	*1-in. Ell, R. & L.*
621	*1-in. Tee*
625	*1-in. Standard Pipe*
626	*1¼-in. Extra Strong Pipe*
631	*1-in. R. & L. Coupling*
699	*1-in. Street Ell*

Names of Parts for Direct Steam Heating Systems (L-811, L-811a, L-811b, L-811c, L-811d and L-811e). Fig. 2933.

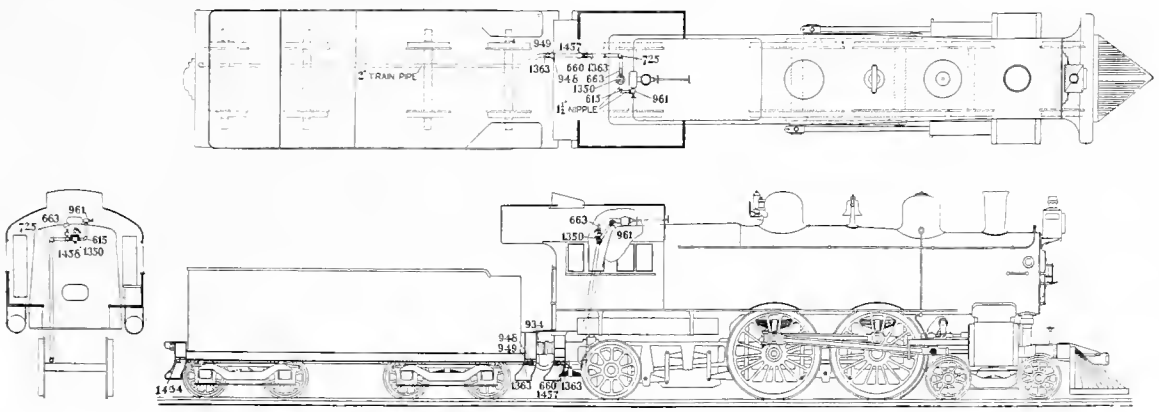
Cat. No	Specials.
179	*2-in. x ⅜-in. Lag Screw*
603a	*1-in. Angle Valve*
603c	*1-in. Cross Valve*
617	*1½-in. x 1-in. Tee*
638	*1½-in. x 1-in Cross*
680	*Covering for 1-in. Pipe*
681	*Covering for 1-in. Ell*
686	*2-in. Cross-over*
687	*2-in. x 1-in. Eccentric Reducer*
708b	*2-in. Tee*
723a	*2-in. Return Bend*
723b	*2-in., R. & L. Return Bend*
726	*2-in., R. & L. Ell*
741a	*Directions for Management (Framed)*

Cat. No.	Specials.
743	*2-in. x 1-in. Ell*
748	*2-in. x 1-in. Reducer*
749	*Pipe Strap*
752	*2-in. x 1-in. Ell (Eccentric Left)*
753	*2-in. x 1-in. Ell (Eccentric Right)*
783	*1-in. Open Return Bend with 1-in. Back Outlet*
836	*2-in. Special Return Bend*
933x	*Automatic Trap*
	Train Pipe Specials.
677	*Covering for 1½-in. Pipe*
679	*Covering for 1½-in. Tee*
683	*Covering for 1½-in. Cross*

Cat. No.	Train Pipe Specials.
776x	*Train Pipe Valve*
777a	*Extension Handle*
	Pipes and Fittings. (train pipe)
618	*1½-in., R. & L. Coupling*
628	*1½-in. Standard Pipe*
	(other than train pipe)
616	*1-in. Ell*
616a	*1-in., R. & L. Ell*
625	*1-in. Standard Pipe*
631	*1-in. R. & L. Coupling*
183	*1-in. Extra Strong Pipe*
685	*2-in. Standard Pipe*
732	*2-in., R. & L. Coupling*

Names of Parts for Direct Steam Heating Systems (L-1410 and L-1634). Figs. 2934-2945.

	Specials.
74	*¾-in. Pipe*
177	*2½-in. x ½-in. Lag Screws*
185	*Wood Screws, 1½ in. Long*
628	*1½-in. Standard Pipe*
680	*Covering for 1-in. Pipe*
681	*Covering for 1-in. Ells*
726	*2-in. Ells, Right and Left*
748	*2-in. x 1-in. Reducers*
836	*2-in. Close Return Bends*
871	*2-in. Pipe Caps*
897	*1½-in. x 1-in. Strainer Crosses*
905	*1-in. Globe Valve*
947	*1-in. Close Return Bends, with 1-in. Back Outlet*
975	*Trap, with Blow-off Valve No. 603b and Strainer No. 1498*
980	*1-in. Angle Valve*
986	*Blow-off Valves and Traps, Complete, with 2 Tees No. 987*
986	*Blow-off Valves and Traps, Complete, with 2 Tees No. 988*
1315	*Directions for Management (Framed), System L-1410*
1339	*Clamps for ¾-in. Pipe*
1367	*1-in. Extra Heavy Pipe Nipples, 4 in. Long, R. & L.*
1368	*1-in. Extra Heavy Pipe Nipples, 4 in. Long*
1369	*1-in. Extra Heavy Pipe Nipples, 10½ in. Long, R. & L.*
	Specials.
1405	*1-in. Globe Valve*
1423	*2-in. Pipe Hangers*
1429	*Extension Rod and Valve Stem*
1430	*Indicator Casting (with Pins and Cotters)*
1431	*Indicator Floor Plates*
1434	*Indicator*
1437	*Handles, with 2 Cotters Each*
1442	*Eccentric Tees*
1451	*Wood Screws, No. 14, F. H., 2 in. Long*
1476	*Universal Joints*
1477	*Indicator Plates*
1479	*Valve Stems*
1480	*Guide for Valve Stem*
1481	*Injector, Complete*
1482	*Worm Gear Case, Complete*
1485	*Expansion Guide*
1489	*Worm Gear*
1490	*Worm*
1491	*Special 2-in. Pipe Clamps*
1496	*Shut-off Valve*
1497	*Bonnet*
1499	*Directions, System L-1634*
	Train Pipe Specials.
677	*Covering for 1½-in. Pipe*
683	*Covering for 1½-in. x 1-in. Cross*
776X	*Train Pipe Valve*
777A	*Extension Handles*
800	*Covering for 2-in. Cross*
	Pipe and Fittings. (other than train pipe)
616	*1-in. Ells*
616A	*1-in. Ells, Right and Left*
625	*1-in. Standard Pipe*
627	*1¼-in. Standard Pipe*
631	*1-in. Couplings, Right and Left*
685	*2-in. Standard Pipe*
689	*1¼-in. Ells*
732	*2-in. Couplings, Right and Left*
	Pipe and Fittings. (train pipe)
618	*1½-in. Coupling, Right and Left*
628	*1½-in. Standard Pipe*



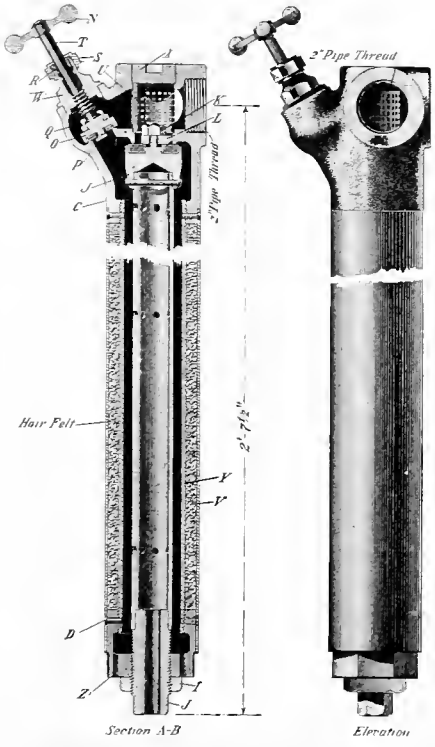
Figs. 2946-2948. Locomotive Equipment (L-1608).

Names of Parts for Locomotive Equipment (L-8a). Figs. 2946-2948.

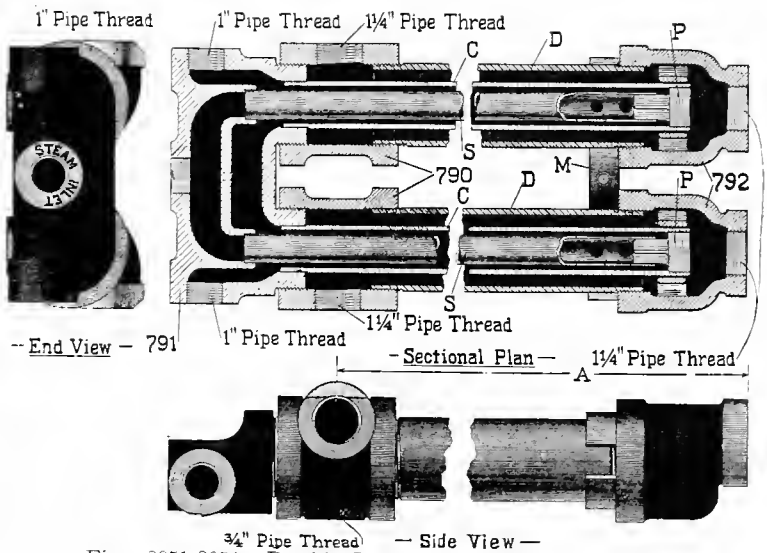
Cat. No.	Specials.
660	*1½-in. Ground Joint Union*
663	*Steam Gage*
757	*Covering for 2-in. Pipe*
934	*1⅝-in. Steam Hose, 24 in. Long*
948	*Half Clamps*
949	*Nipples, 1⅝-in. Hose, 1½-in. Pipe Thread*
953	*½ x 2¼-in. Bolts (square head, hexagon nut)*

Cat. No.	Specials.
961	*1½-in. Extra Heavy Angle Valve*
1350	*1½ x 2-in. Reducing Valve*
1363	*2 x 1½-in. Reducers*
1384	*Covering for 2-in. Ell*
1454	*2-in. 45° Ell*
1457	*1½-in. Extra Heavy Nipples, 3 in. Long*
1458	*2 x 2 x ¼-in. Tee*

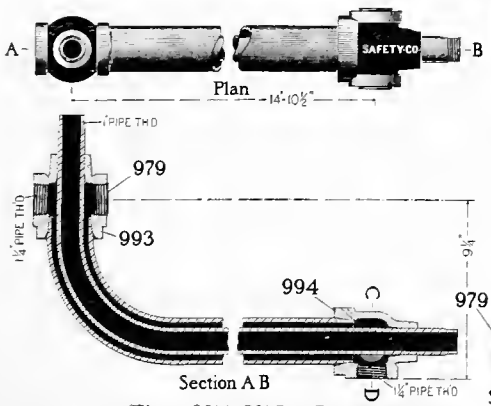
Cat. No.	Pipe and Fittings.
615	*1½-in. Ell*
628A	*1½-in. Extra Heavy Pipe*
685	*2-in. Standard Pipe*
725	*2-in. Ells*
732	*2-in. Couplings, R. & L.*



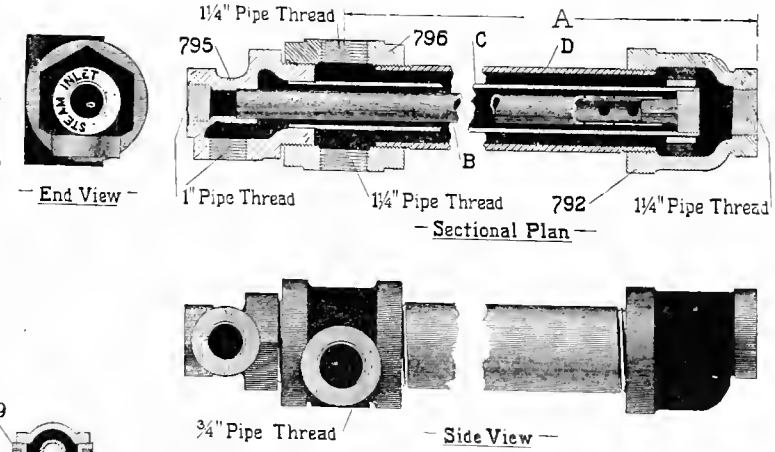
Figs. 2949-2950. Vertical Steam Trap, No. 933.



Figs. 2951-2954. Double Jackets, Nos. 702x and 702y
No. 702x-a, 7 ft. 6 in.
No. 702y-a, 8 ft. 6 in.



Figs. 2955-2957. Jacket No. 972.



Figs. 2958-2960. Single Jackets, Nos. 702p and 702q.
No. 702p-a, 7 ft. 6 in.
No. 702q-a, 8 ft. 6 in.

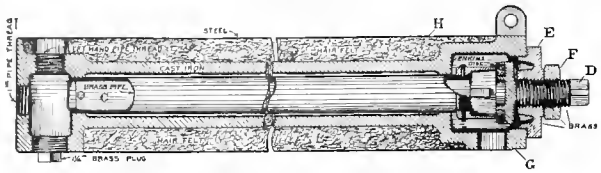


Fig. 2961. Steam Trap, No. 833.

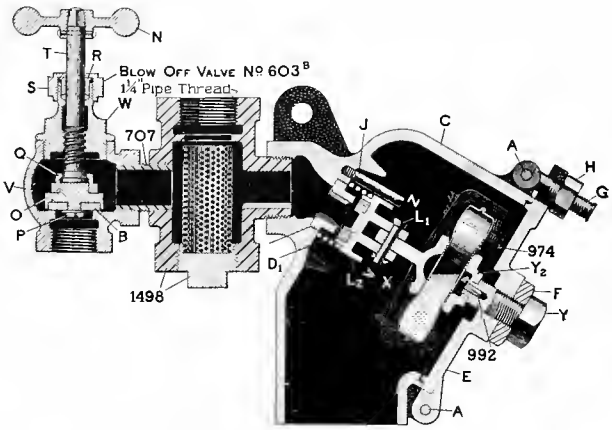
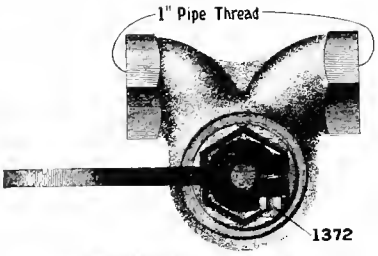
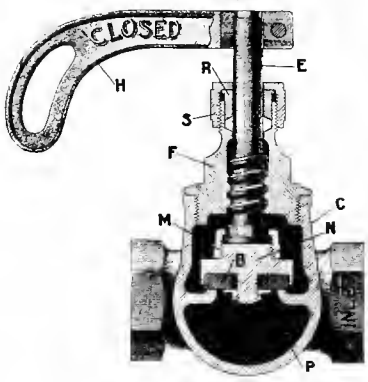


Fig. 2962. Steam Trap, No. 975.





Figs. 2963-2964. 1-in. Globe Valve, No. 905, (Body Has Inlet on Right). 1-in. Globe Valve, No. 1405, (Body Has Inlet on Left).

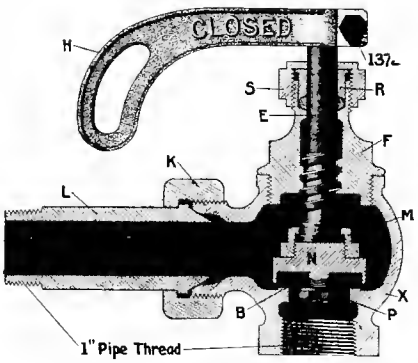
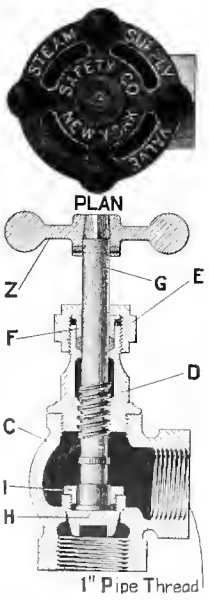
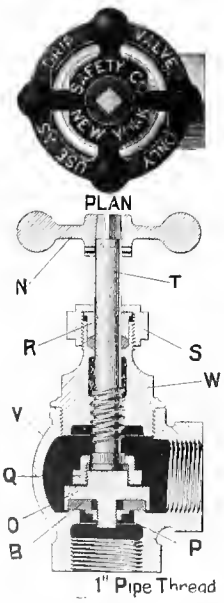


Fig. 2965. 1-in. Angle Valve, No. 980.



Figs. 2966-2967. 1-in. Inlet Valve, No. 603.



Figs. 2968-2969. 1-in. Drain Valve, No. 603b.

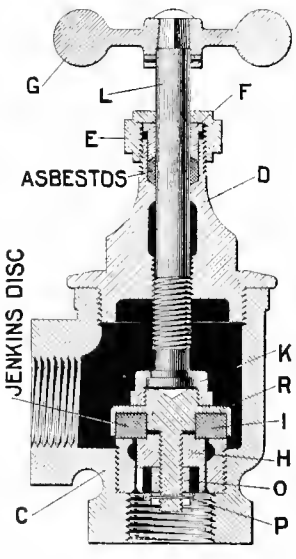


Fig. 2970. 1-in. Graduating Valve, No. 603a.

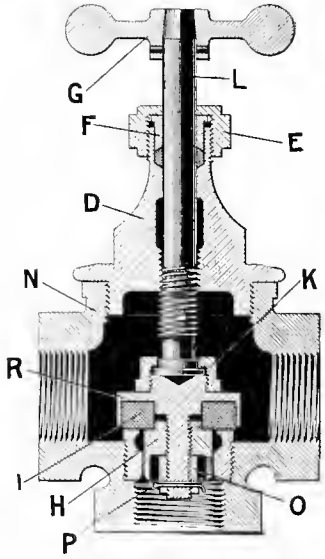


Fig. 2971. 1-in. Cross Graduating Valve, No. 603c.

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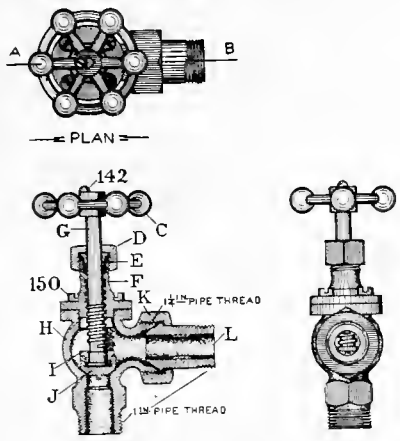
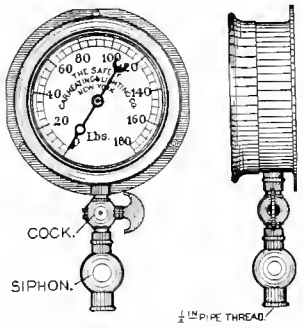
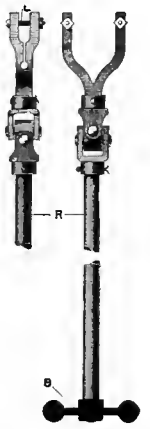


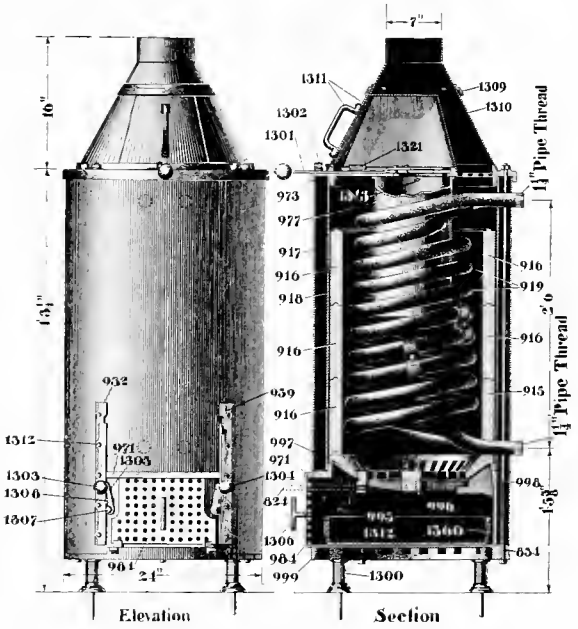
Figs. 2972-2974. 1-in. Extra Heavy Locomotive Valve, No. 661.



Figs. 2975-2976. Locomotive Steam Gage, No. 663.



Figs. 2977-2978. Drain Valve Extension Handle, No. 619.



Figs. 2979-2980. Car Heater, No. 1325.

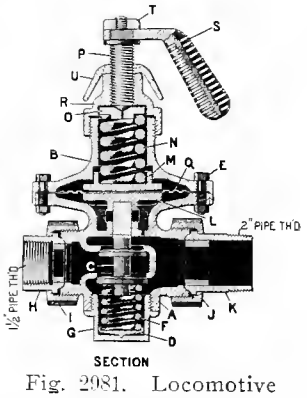
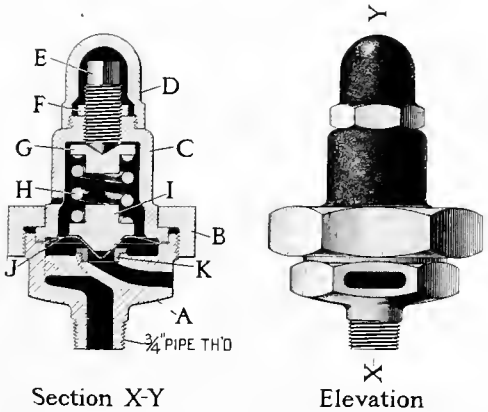
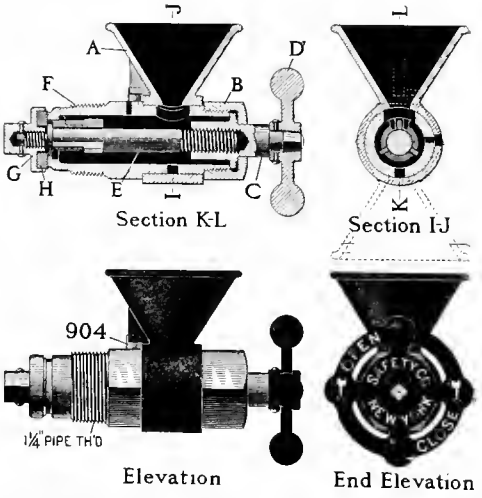


Fig. 2981. Locomotive Reducing Valve, No. 1350.

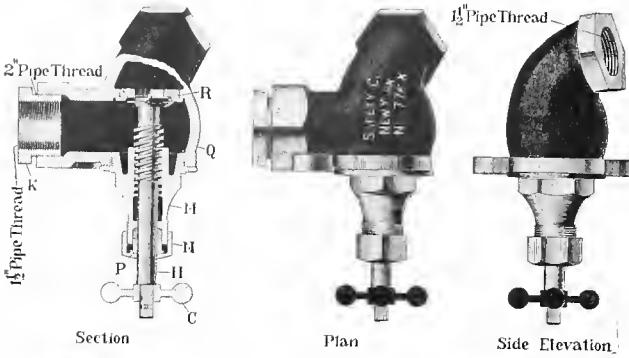


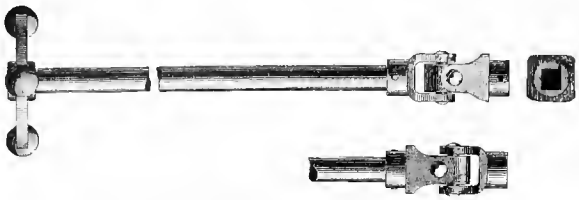
Figs. 2982-2983. Safety Valve, No. 893.



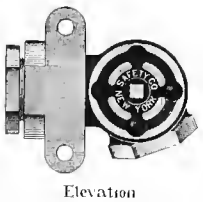
Figs. 2984-2987. Combination Valve, No. 894.

The Safety Car Heating & Lighting Co.

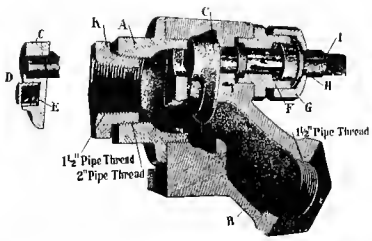




Figs. 2992-2994. Extension Handle for End Train Pipe Valve, No. 777a.



Figs. 2988-2991. 1½-in. End Train Pipe Valve, No. 776x.



Figs. 2995-2997. Train Pipe Valve, No. 1376.

Fig. 2998. S-5 Coupler, No. 720-B.

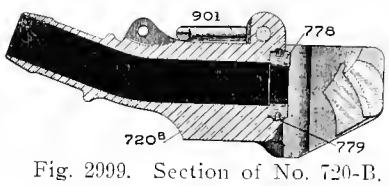


Fig. 2999. Section of No. 720-B.

Fig. 3000. S-4 Coupler, No. 920-B.

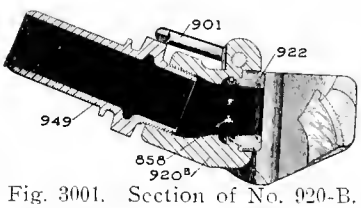


Fig. 3001. Section of No. 920-B.

Figs. 3003-3004. Gasket and Retaining Ring for Couplers.

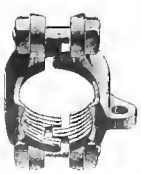
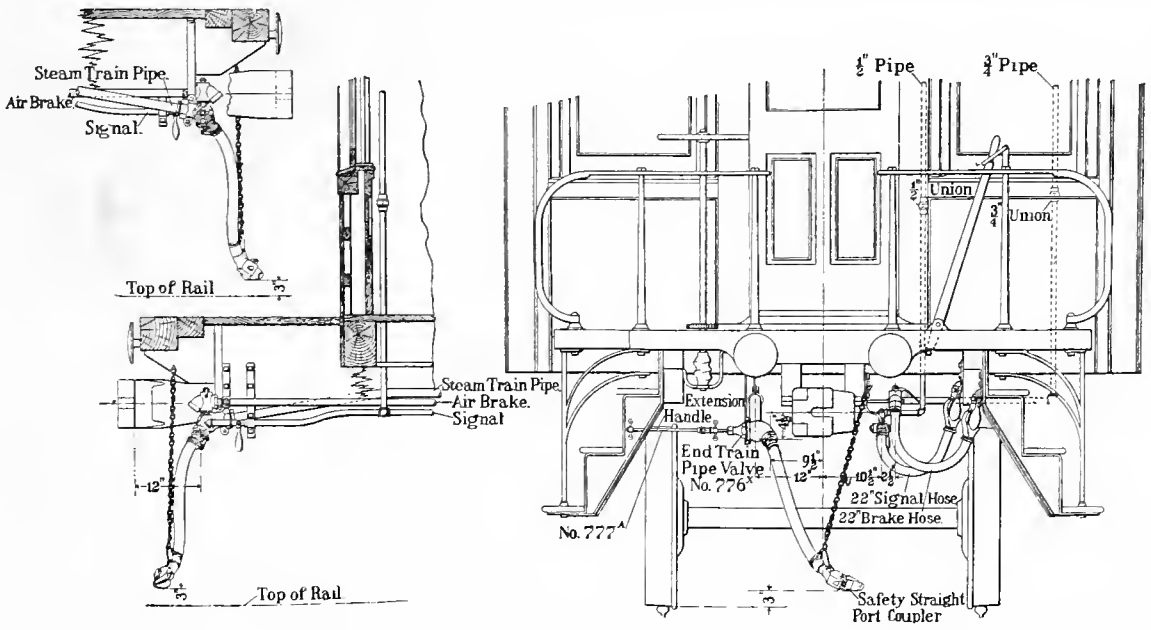


Fig. 3002. Clamp for S-4 Coupler.
Nos. 982-982a for 1¼-in. hose.
Nos. 948-948a for 1⅝-in. hose.

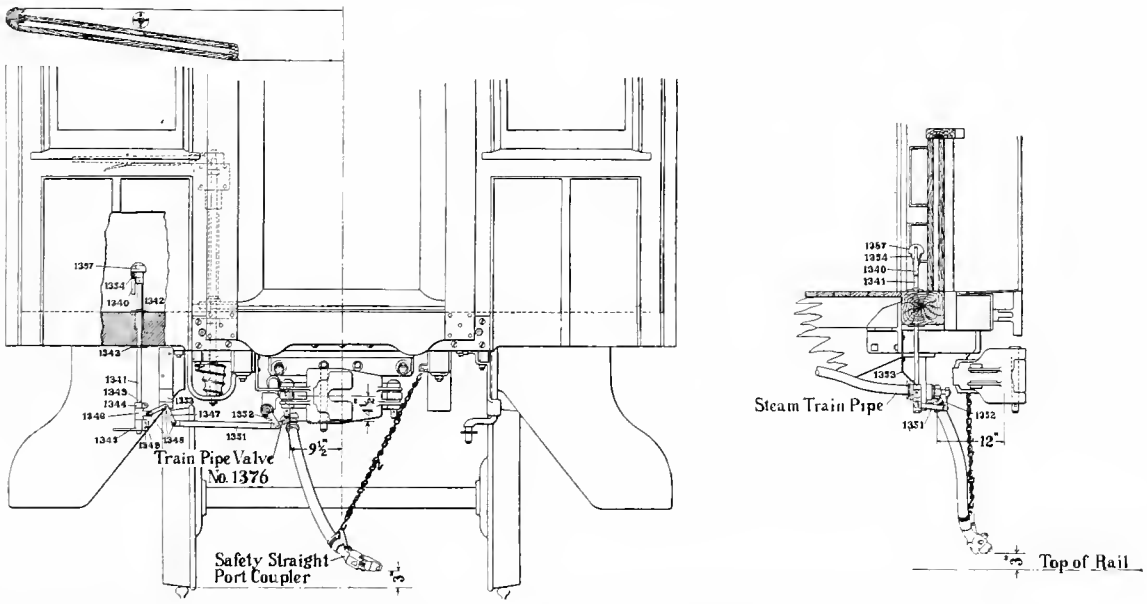
Gasket No. 922 has 1⅜-in. port and is Standard for Nos. 920a and 920b Couplers.
" " 931 " 1¼-in. port and is Standard for Nos. 920a and 920b Couplers with 1¼-in. Hose

Figs. 3005-3006. Gasket No. 778 and Retaining Ring No. 779.

The Safety Car Heating & Lighting Co.



Figs. 3007-3009. Standard Position for Train Pipe Valve, No. 776x, with Extension Handle, No. 777a.



Figs. 3010-3011. Standard Position for Train Pipe Valve, No. 1376, with Illustration of Platform Operating Mechanism, No. 1377.

Platform Operating Mechanism No. 1377 Complete, Includes

Cat. No.	
1340	*1 Platform Handle*
1341	*1 Vertical Rod*
1342	*1 Floor Plate*
1343	*1 Bottom Plate*
1344	*1 Set Collar*
1345	*1 Bottom Handle*
1346	*1 Collar Link*
1347	*1 Bell Crank*

Cat. No.	
1348	*2 Pins with Washers and Cotters for Bell Crank*
1349	*3 ⅜ x 1¼-in. Bolts*
1351	*1 Connecting Rod*
1352	*1 Valve Stem Lever*
1353	*1 Bracket for Bell Crank*
1354	*1 ⅜ x 1⅞-in. Bolt with Cotter Pin*
1387	*1 Top Casting for Platform Handle*

The Safety Car Heating & Lighting Co.

Numbers Refer to List of Names of Parts Below.

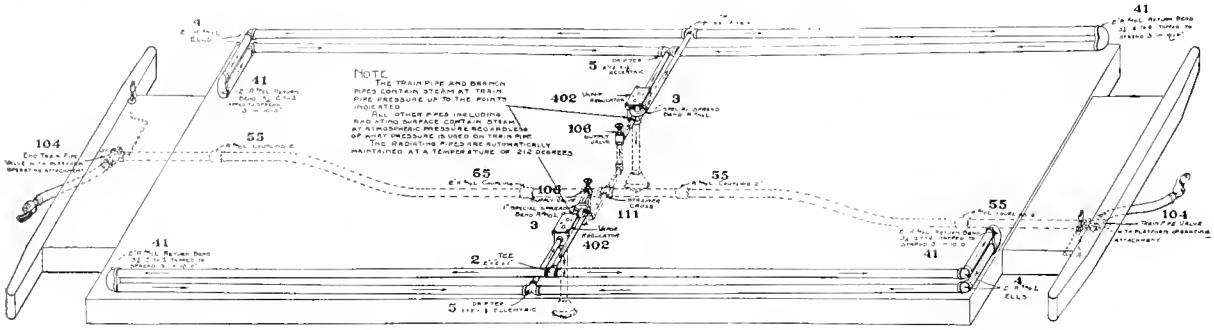


Fig. 3012. Diagram of Piping for Vapor System of Car Heating. Chicago Car Heating Co.

Names of Parts of Fig. 3012.

2 *2-in. x 2-in. x 1-in. Tee*
3 *1-in. Special Spread Bend, R. & L.*
4 *2-in. R. & L. Elbow*
5 *2-in. x 2-in. x 1½-in. Eccentric Drip Tee*
41 *2-in. Return Bend*
55 *2-in. R. & L. Coupling*
104 *End Train Pipe Valve*
106 *Throttle Supply Valve*
111 *2-in. x 1-in. Strainer Cross*
300 *Steam Hose Coupler*
402 *Vapor Regulator*

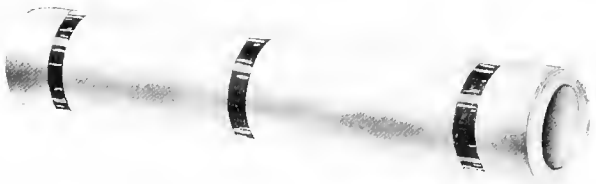
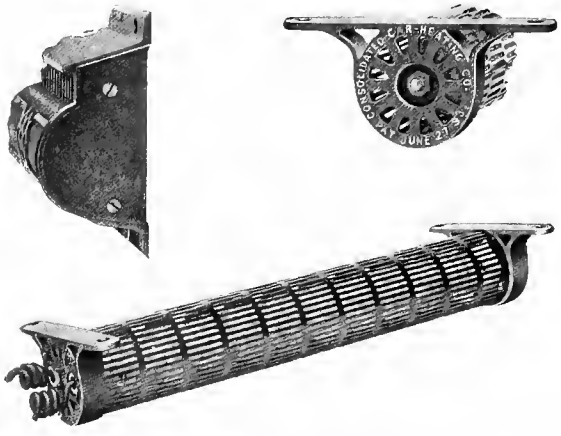


Fig. 3013. Asbestos Pipe Covering. Franklin Mfg. Co.



Figs. 3014-3015. Single Coil Electric Heater for Cross Seats, Drop Pattern, No. 192.

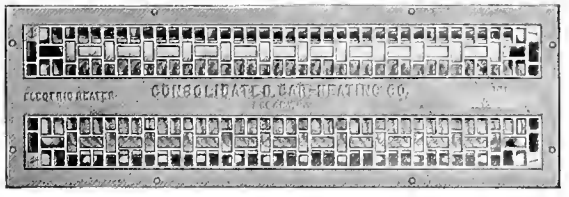


Fig. 3016. Electric Car Heater, Flush Panel Type, Double Coil, No. 143 LL.

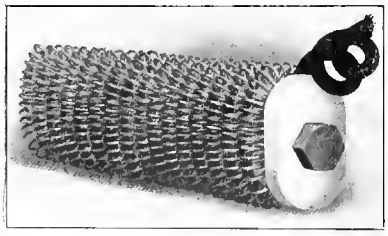


Fig. 3017. Resistance Coil for Electric Heater.

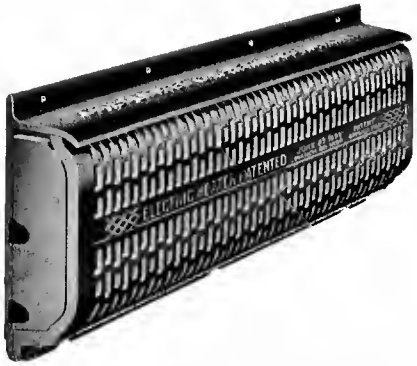


Fig. 3018. Double Coil, Panel Type, Electric Car Heater, No. 203 M.

Consolidated Car Heating Co.

Fig. 3019. Double Coil Electric Heater, Drop Pattern, No. 192 H.

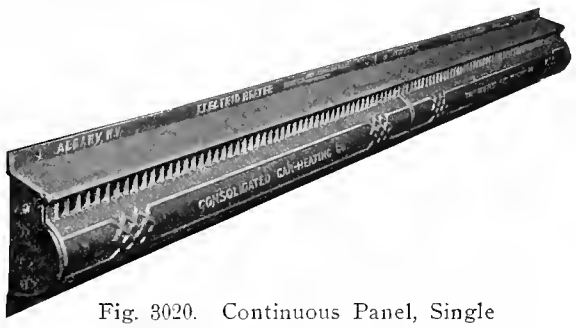


Fig. 3020. Continuous Panel, Single Coil, Electric Heater, No. 93 T.

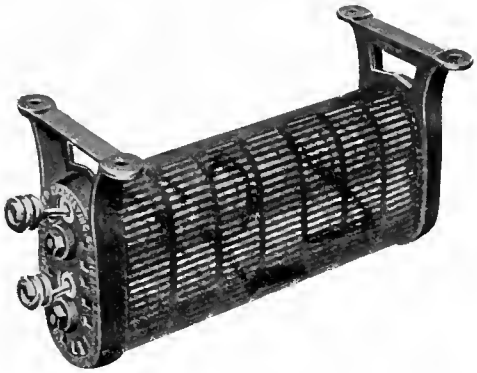


Fig. 3021. Double Coil Electric Heater, Drop Pattern, No. 192 H.

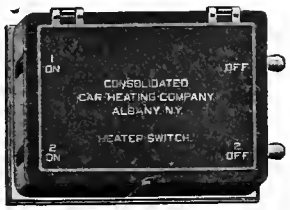


Fig. 3022. Heater Switch, Closed, No. 204.

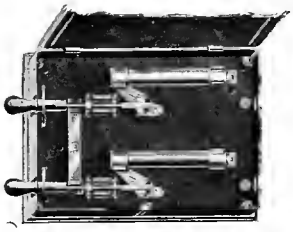


Fig. 3023. Heater Switch, Open, No. 204.

Electric Car Heaters. Consolidated Car Heating Co.

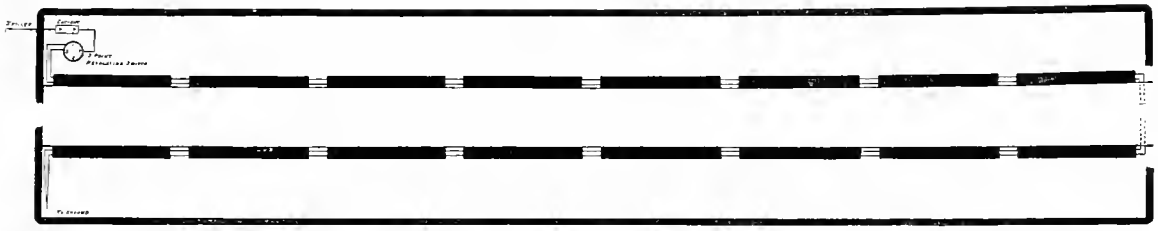


Fig. 3024. Wiring Diagram for Gold Electric Car Heating System Using Sixteen Panel Type Heaters—Three Degrees.

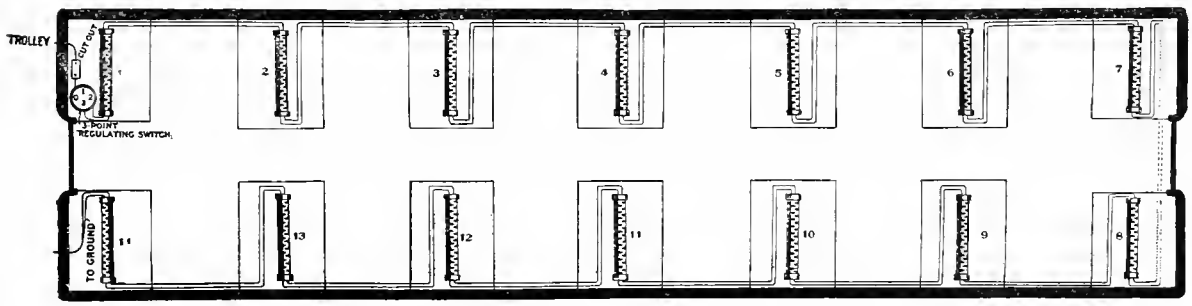


Fig. 3025. Wiring Diagram for Gold's Improved Electric Heater Equipment for Cross Seat Cars Using Fourteen Standard Heaters.

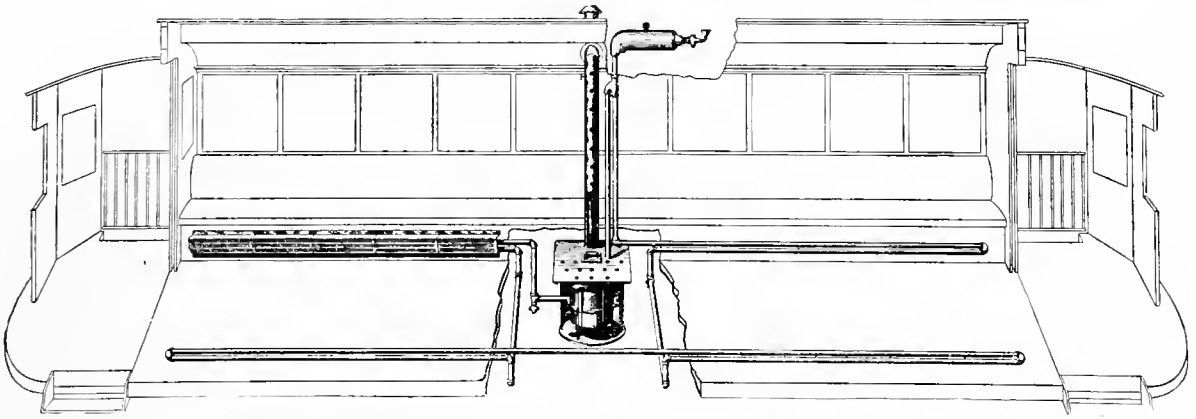
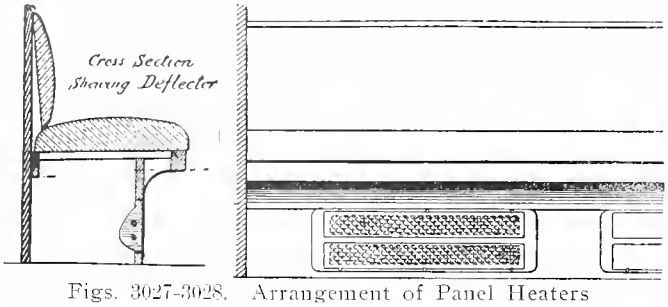


Fig. 3026. Diagram of Piping for Gold's Improved Sealed Jet Accelerator System of Hot Water Circulation in Connection with Electric Heaters for Interurban Electric Cars.



Figs. 3027-3028. Arrangement of Panel Heaters and Deflectors.

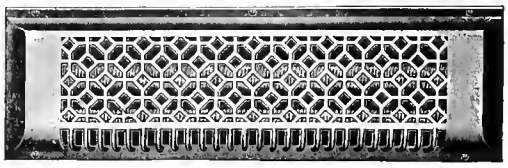


Fig. 3029. Gold's Improved Electric Heater.

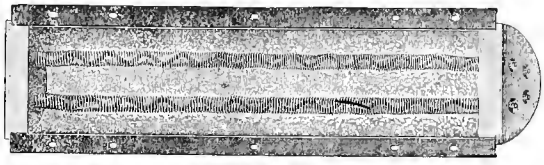


Fig. 3030. Interior View.

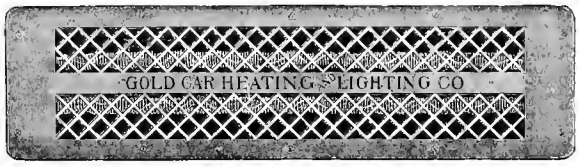


Fig. 3031. Front View.

Gold's Improved Electric Heater, Panel Type, Three Degrees.

Fig. 3032. Resistant Coil and Support Used in Gold's Improved Electric Heaters.

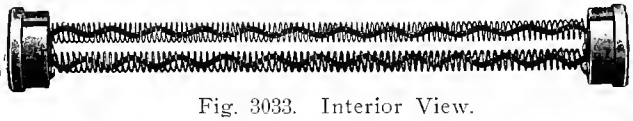


Fig. 3033. Interior View.

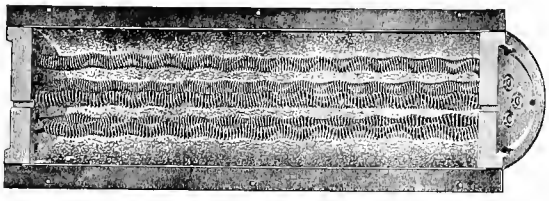


Fig. 3034. Interior View.

Fig. 3035. Front View.
Gold's Improved Standard Electric Heater, Three Degrees.

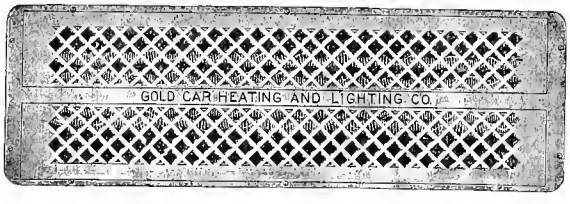


Fig. 3036. Front View.
Gold's Improved Electric Heater, Panel Type, Three Degrees.

Fig. 3037. Interior View.

Fig. 3038. Front View.
Gold's Improved Standard Electric Heater, One Degree.

Fig. 3039. Electric Heater Knife Switch.

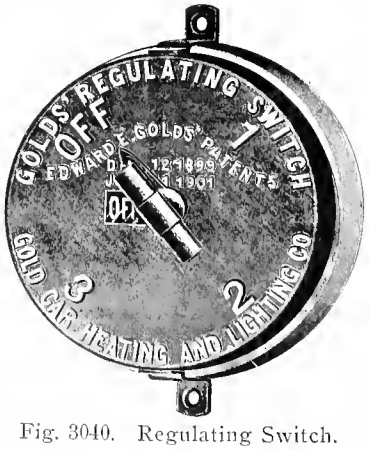


Fig. 3040. Regulating Switch.

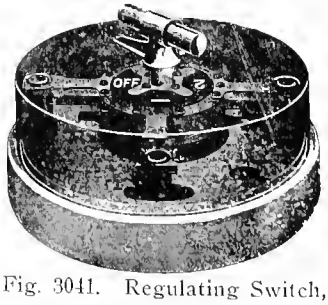


Fig. 3041. Regulating Switch, Interior View.

Gold Car Heating & Lighting Co.

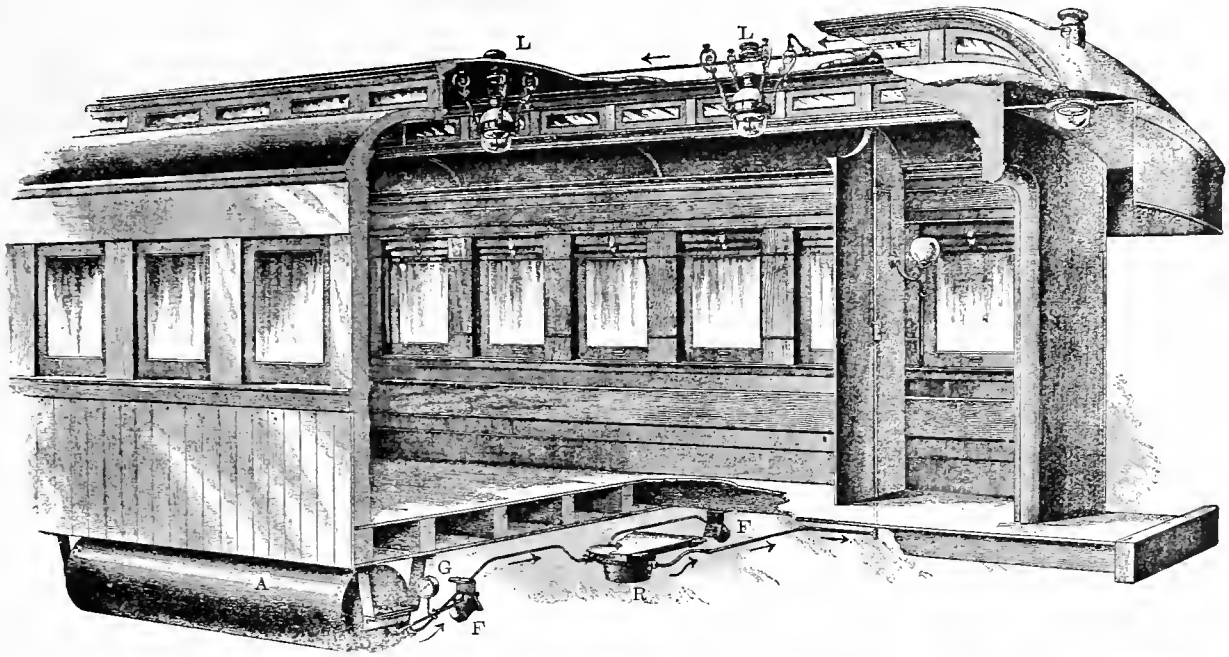


Fig. 3042. Sectional View. General Method of Application of Pintsch System of Gas Lighting to Passenger Cars.

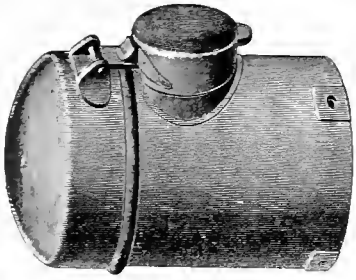


Fig. 3043.
No. 89. Filling Valve Cover (F).

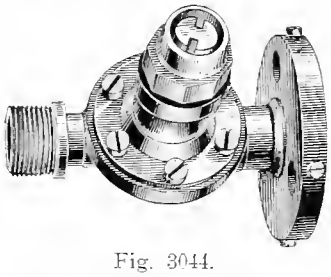


Fig. 3044.
No. 65. Filling Valve for Cars.
(See Section, Fig. 3108.)

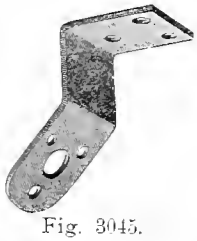


Fig. 3045.
No. 118a. Bracket for Filling Valve.

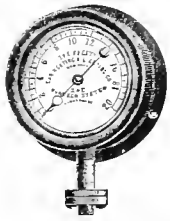


Fig. 3046.
No. 214. Gage for Car (G).

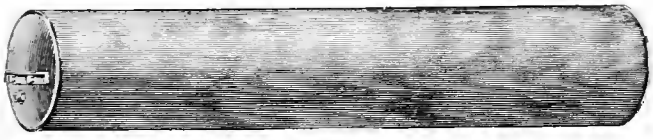


Fig. 3047.
Nos. 245-252. Holders (A).

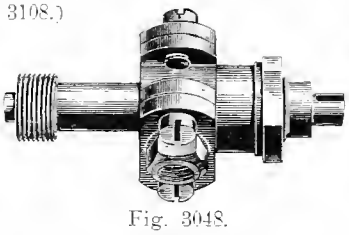


Fig. 3048.
No. 53b. Holder Valve. Side Outlets ¼ in.
(See Section, Fig. 3100.)

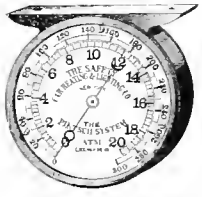


Fig. 3049.
No. 214a. Gage for Car. (lbs. and atm.)

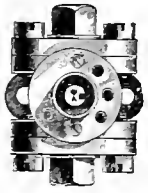


Fig. 3050.
Nos. 25, 25b, 25c. Main Cock.
¼, ⅜ and ½ in.

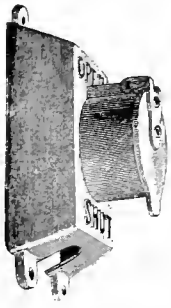


Fig. 3051.
Nos. 135, 135c. Cover for Main Cocks.

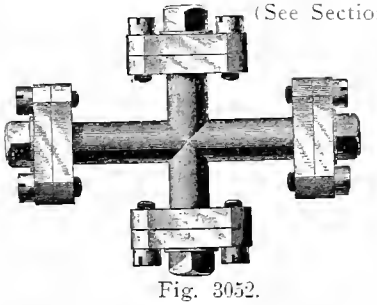


Fig. 3052.
No. 55a. Flanged Cross, ¼ in.

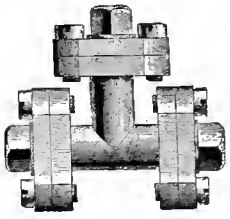


Fig. 3053.
Nos. 54-55. Flanged Tees, ¼ in.
Side Outlets, ⅛ in. and ¼ in.

Fig. 3054.
No. 9. Connection Piece, ¼ in.

Fig. 3055.
Regulator (R).
No. 244. 2-in. Water Pressure.
" 254. 2-lb. Pressure.
" 1844. 6-in. Water Pressure.
" 1954. 1-lb. Pressure.

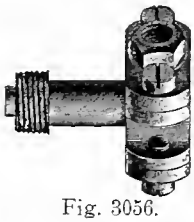


Fig. 3056.
No. 49. Flange Tee for Regulator, ¼ in.

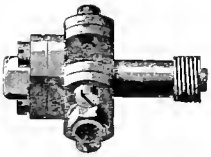


Fig. 3057.
Fig. 53a. Flange Cross, ⅛ in. Side Outlet, ¼ in.

Fig. 3058. Nos. 12-13. Tee Flange Unions; ¼ x ⅛ in. ¼ x ¼ in.

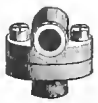


Fig. 3059. No. 17a. Angle Flange; ⅛ in.

Fig. 3060. Nos. 16a, b and c. Tee Flanges; ¼ x ⅛ in. ⅜ x ⅛ in. ½ x ⅛ in.

Fig. 3061. Nos. 3 and 3a. Flange for Nos. 49, 53b, 53a and 120.

Fig. 3062. Nos. 27-56. Lock Nuts; ⅜ in.; ½ in.

Fig. 3063. No. 167. Bracket Back; ⅛ in.

Fig. 3064. Nos. 28-28a-28b. Reducing Elbows; ⅜ in. x ⅛ in. ½ in. x ⅛ in. ¼ in. x ⅛ in.

Fig. 3065. Nos. 29-57. Cap; ⅜ in.; ½ in.

Fig. 3066. No. 171. Bolt for Filling Valve; 1¾ in. x ½ in.

Fig. 3067. No. 170. Bolt for Tank Strap; 2½ in. x ⅝ in.

Fig. 3068. Nos. 130-134. Couplings.

Fig. 3069. Nos. 32-32a. Elbow; ⅛ in.; ½ in.

Fig. 3070. Nos. 4-5. Connection; ⅛ in.; ¼ in.

Fig. 3071. No. 26. Nipple to Support Lamp; ⅜ in. (Give Thickness of Roof.)

Fig. 3072. No. 31a. Plug; ½-in.

Fig. 3073. No. 243. Regulator Strap.

Fig. 3074. Nos. 161-164. Pipe Strap.

Fig. 3075. Nos. 140-159.

140 *Screws for Gland of Nos. 21, 25, 25b, 25c, etc. (brass)*
146 *Screws for Regulator Inlet No. 1b*
146a *Screw for Top Gland of No. 66 (brass)*
148 *Screws for Valve Covers Nos. 89 and 90 (brass)*
149 *Screws for Gland of No. 65*
150 *Screws for Flange Fittings, Nos. 10, 12, 13, 25c, 49, 53b, etc.*
150a *Screws for Large Valves, etc., same as No. 150 (brass)*
152 *Screws for Bonnet of No. 65*
153 *Screws for Valve Carrier of No. 65, Retaining Screw (brass)*
159 *Screws for Flange Fittings, Nos. 8a, 16c, 17a, etc.*

Fig. 3076. Nos. 142-157.

142 *Check Screws for Clusters*
144 *Screw for Bracket Lamp*
151 *Screws for Hinge Cover and Spring Catch (brass)*
154 *Screws for Vestibule Lamp Diaphragm*
156 *Screws for Hinge Cover, Spring Catch and Crown (brass)*
156a *Screws for Cluster Stem (brass)*
157 *Screws for Reflectors, Bezel Ring, etc.*

161 *Straps for ⅜-in. Pipe*
162 *Straps for ¼-in. Pipe*
163 *Straps for ⅛-in. Pipe*
164 *Straps for ½-in. Pipe*

Fig. 3077. Nos. 175-180.

175 *Lags for Hanging Holders, 7-in. x ⅝-in.*
176 *Lags for Hanging Holders, 5-in. x ⅝-in.*
177 *Lags for Filling Valve Brackets, 2½-in. x ½-in.*
179 *Lags for Hanging Regulator, 2-in. x ⅜-in.*
180 *Lags for Hanging Regulator, 3½-in. x ⅜-in.*

Fig. 3078. Nos. 188-189.

188 *1¼-in. Wood Screws, No. 14, r. h. nickel, for Vestibule Lamps*
189 *⅜-in. Wood Screws, No. 10, r. h. brass, for Main Cocks and Covers*

Fig. 3079. Nos. 185-187.

185 *1½-in. Wood Screws, No. 14 f. h. bright, for Regulators*
186 *1-in. Wood Screws, No. 8 f. h. bright, for Pipe Straps*
187 *¾-in. Wood Screws, No. 8 f. h. bright, for Pipe Straps*

Fig. 3080. Nos. 155-158.

155 *Screws for Hinge and Spider*
155a *Screws for Bracket*
158 *Screws for Inner Ring of Crown*

Fig. 3081. No. 6. Brass Ring for Nos. 4 and 5.

No. 58. For Large Valves.

No. 60. For Flanges of ⅜-in. x ¼-in. Pipe.

No. 62. For Flanges of ⅛-in. Pipe.

Figs. 3082-3084. Lead Washers.

Fig. 3085. No. 14a. Flanges for Gages.

Fig. 3086. No. 14.

Fig. 3087. No. 23. Iron Washer.

Fig. 3088. No. 24. Rubber for Iron Washer.

Fig. 3089. No. 231. Mill Base Check.

Fig. 3090. No. 34. Tee.

Fig. 3091. No. 230. Pillar for Bracket Lamp.

Fig. 3092. No. 222a. Burner.

Fig. 3093. No. 45. Keys for Lamps and Valves.

Fig. 3094. No. 46.

Fig. 3095. No. 21a. Burner Cock for Lamp. No. 205a.

Fig. 3096. No. 235. Burner for Argand Lamp. No. 86a.

Fig. 3097. No. 1112. Burner for Argand Lamp. No. 87a.

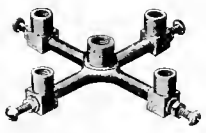


Fig. 3098. Nos. 227 and 575. Four-Flame Cluster.

Fig. 3099. No. 226a. Cluster for Vestibule Lamp.

Fig. 3100. Nos. 226 and 575a. Two-Flame Cluster.

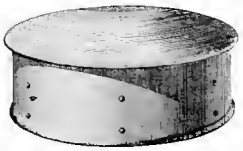


Fig. 3101. Ventilator. No. 348, 6½-in.; No. 1689, 4⅝-in.

Fig. 3102. Nos. 203-204. Globe Ventilator. 6½ in. and 4⅝ in.

Fig. 3103. No. 300. Torch and Key.

Fig. 3104. No. 22. Main Cock for Postal Cars.

Fig. 3105. No. 135b. Cover for Main Cocks. Nos. 25, 25b and 25c.

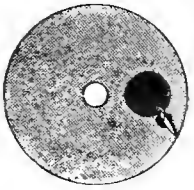


Fig. 3106. No. 200. Wind Guard.

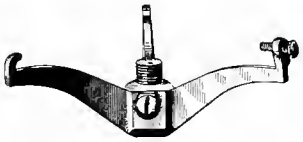


Fig. 3106a. No. 80b. Shade Holder for No. 102.

Fig. 3107. No. 80c. Shade Holder for No. 236.

Fig. 3110. Mica Chimney. No. 109.

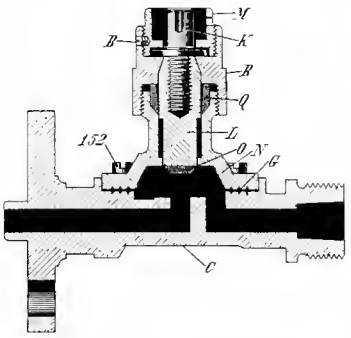


Fig. 3108. Section of Filling Valve. No. 65.

Names of Parts of Fig. 3108.

- **B** *Set Screw*
- **C** *Valve Body*
- **G** *Gasket for Bonnet*
- **K** *Valve Stem*
- **L** *Valve Carrier*
- **M** *Valve Stem Nut*
- **N** *Bonnet*
- **O** *Disc*
- **Q** *Packing*
- **R** *Packing Nut*
- **152** *Screw for Bonnet*

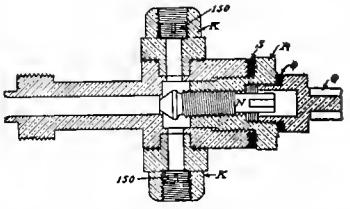


Fig. 3109. Section of Holder Valve, No. 53b.

Names of Parts of Fig. 3109.

- **K** *Flanges*
- **N** *Valve*
- **O** *Gasket for Cap*
- **Q** *Cap*
- **R** *Gland*
- **S** *Gasket for Gland*
- **150** *Flange Screws*

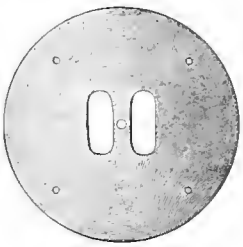


Fig. 3111.
No. 113 and No. 513.
Two-flame Reflectors.

Fig. 3112.
No. 110. Ring Reflector.

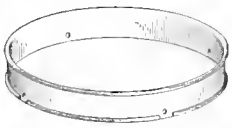


Fig. 3113.
No. 1625. Ring Reflector.

Fig. 3114.
No. 114. Reflector
for Wall Lamp.

Fig. 3115.
No. 285. Enameled
Chimney.

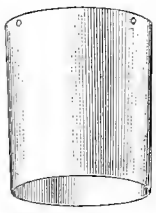


Fig. 3116.
No. 577. Reflector.

Fig. 3117.
No. 410. Reflector.

Fig. 3118.
No. 107 and No. 3313.
Reflectors.

Fig. 3119.
No. 111a. Cup Reflector.

Fig. 3120.
No. 537a. Cup Reflector.
(Porcelain.)

Fig. 3122.
No. 492. 10-in. Opal Dome.
No. 1646. 6-in. Opal Dome.

Fig. 3121.
No. 99. 8½-in. Clear Glass Bowl.
No. 100. 9-in. Clear Glass Bowl.
No. 106. 10-in. Clear Glass Bowl.
No. 106a. 10-in. Etched Glass Bowl.
No. 1084. 6-in. Clear Glass Bowl.
No. 1084a. 6-in. Etched Glass Bowl.
No. 1804. 5-in. Clear Glass Bowl.
No. 2193. 10-in. Opal Bowl.

Fig. 3123.
No. 102. 4-in.
Opal Globe.
No. 1912. 3-in.
Opal Globe.

Fig. 3124.
No. 104. 10-in. Opal Dome.
No. 1668. 9-in. Opal Dome.

Fig. 3125.
No. 103a. Glass
for Lamp No. 205a.

Fig. 3126.
No. 1826. 6½-in. Opal Bowl.
No. 1826a. 6½-in. Clear Glass Bowl.

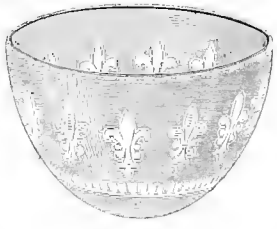


Fig. 3127.
No. 493. 10-in. Etched Bowl.
No. 493a. 10-in. Clear Glass Bowl.
No. 2206. 10-in. Clear Glass Bowl,
Etched Figure.

Fig. 3128.
No. 596. 9-in. Clear Glass Bowl.
No. 596a. 9-in. Clear Glass Bowl.
Etched Figure.
No. 597. 9-in. Etched Bowl.

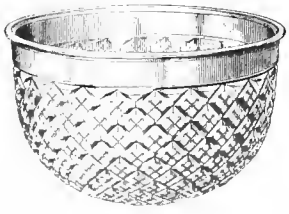


Fig. 3129.
No. 100a. 9-in. Pressed
Glass Bowl.

Fig. 3130.
No. 1647. 6-in. Etched
Bowl.

Fig. 3131.
No. 423. 11-in. Etched
Glass Bowl.

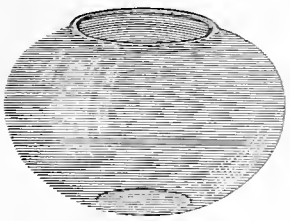


Fig. 3132.
No. 3181. 8¾-in. Opal Bowl.

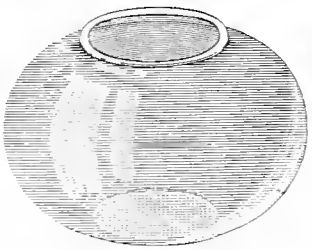


Fig. 3133.
No. 2996. 7½-in. Opal Bowl.
" 3055. 8½-in. Frosted "
" 3116. 9½-in. Opal "
" 3261. 9½-in. Frosted "
" 3264. 8½-in. Opal "

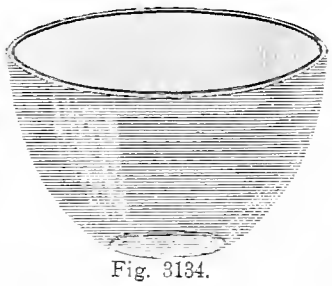


Fig. 3134.
No. 3245. 6-in. Opal Bowl.
" 3312. 10-in. " "
" 3318. 10-in. Frosted "

Fig. 3135.
No. 3069. 9-in. Frosted Bowl.
" 3107. 9-in. Opal "
" 3199. 6-in. " "
" 3320. 9-in. Frosted "

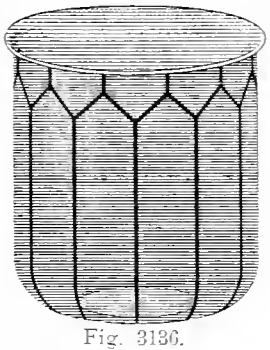


Fig. 3136.
No. 3227. 8¼-in.
Straw Opal Bowl.

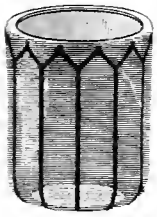


Fig. 3137.
No. 3230. 4⅝-in.
Straw Opal Bowl.
No. 3333. 4⅝-in.
Opal Bowl.

Fig. 3138.
No. 3047. 9-in.
Frosted Bowl.
No. 3302. 9-in.
Electro Etched Bowl.
No. 3308. 9-in.
Opal Bowl.

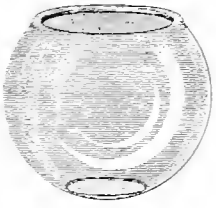


Fig. 3139.
No. 3138. 6-in.
Opal Bowl.
No. 3326.
6-in. Frosted Bowl.

Bowls for Mantle Lamps.

Fig. 3140.
No. 1620. 3¼-in.
Etched Globe.
No. 475. 3¼-in.
Opal Globe.

Fig. 3141.
No. 236. Shade for
Argand Reading Lamp.

Fig. 3142.
No. 295. 7-in. Ribbed
Dome.

Fig. 3143.
No. 374. 4-in. Etched
Globe.

Shades for Bracket Gas Lamps.

Fig. 3144.
No. 2864. 3½-in.
Opal Shade.

Fig. 3145.
No. 2689. 4-in. Electro-
Etched Shade.

Fig. 3146.
No. 1769. 2¼-in.
Etched Shade.

Fig. 3147.
No. 1768. 2¼-in.
Etched Shade.

Fig. 3148.
No. 1817. 3½-in.
Etched Shade.

Fig. 3149.
No. 1741. 2¼-in.
Opal Shade.
No. 1741a. 2¼-in.
Etched Shade.

Fig. 3150.
No. 1771. 2¼-in.
Pressed Shade.

Fig. 3151.
No. 1770. 2¼-in.
Etched Shade.

Fig. 3152.
No. 1752. 3-in.
Etched Shade.

No. 1753. 3-in.
Fig. 3153.
Etched Shade.

The Safety Car Heating & Lighting Co.


No. 237.


No. 237a.


No. 234.


No. 1090.

Fig. 3154. Chimneys.


No. 202. 2-in.

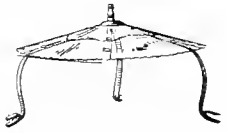

No. 201. 4-in.

Fig. 3159. Mica Canopies.

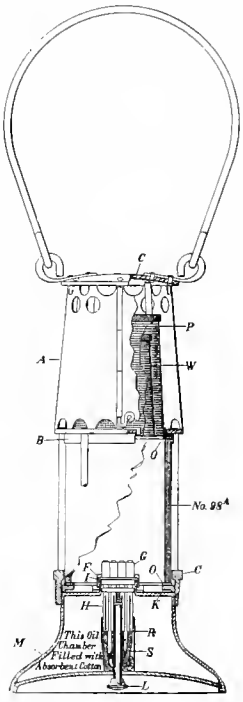


Fig. 3160. Car Filler's Lantern, No. 209.


Fig. 3161.
Mantle, No. 3044.
Protector, No. 3077.


Fig. 3162.
Mantle, No. 2640.
Protector, No. 3078.


Fig. 3163.
No. 2712. 3-in.
Clear Glass Bowl.


Fig. 3164.
No. 2603a. 4⅜-in.
Opal Bowl.
No. 3345. 4⅜-in.
Clear Glass Bowl.

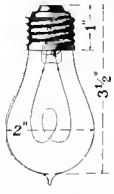


Fig. 3165.
No. 4025. Electric Bulb.

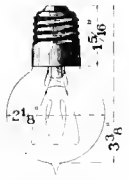


Fig. 3166.
No. 4026. Electric Bulb.

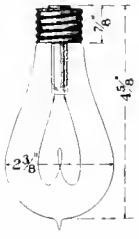


Fig. 3167.
No. 4028. Electric Bulb.

Fig. 3168.
No. 4029. Electric Bulb.

Fig. 3169.
No. 4031. Electric Bulb.

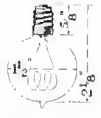


Fig. 3170.
No. 4032. Electric Bulb.

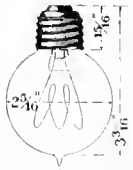


Fig. 3171.
No. 4033. Electric Bulb.

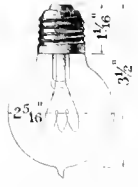


Fig. 3172.
No. 4034. Electric Bulb.

The Safety Car Heating & Lighting Co.

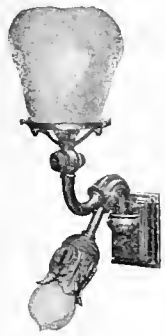


Fig. 3173.
No. 373a. Combination Bracket Lamp.

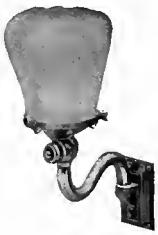


Fig. 3174.
No. 373. Bracket Lamp.

Fig. 3175.
No. 377. Drop Bracket Lamp.

Fig. 3176.
No. 86. Drop Bracket (Key Cock).
No. 86a. Drop Bracket (Thumb Cock).
See Section, Fig. 3213.

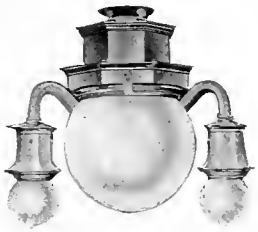


Fig. 3177.
No. 1825a. Combination Bracket Lamp.

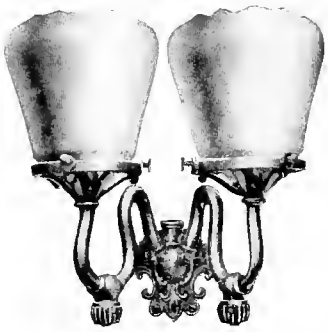


Fig. 3178.
No. 1876. Bracket.

Fig. 3179.
No. 1925. Bracket Lamp.

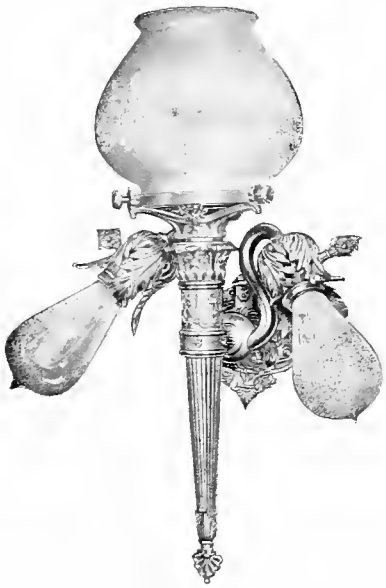


Fig. 3180.
No. 375. Combination Bracket Lamp.

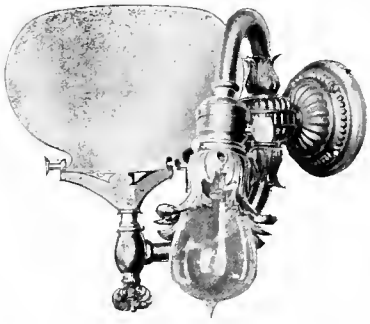
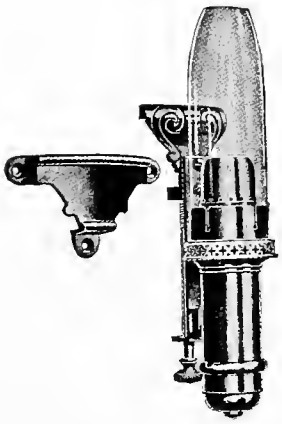
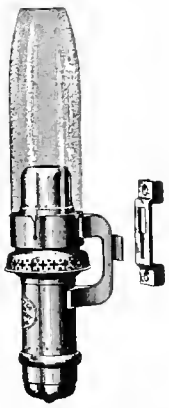


Fig. 3181.
No. 84. Combination Bracket Lamp.

Fig. 3182.
No. 87a. Argand Bracket Lamp.



Figs. 3183-3184.
No. 232. Candle Bracket Lamp.



Figs. 3185-3186.
No. 282. Removable Candle Bracket.

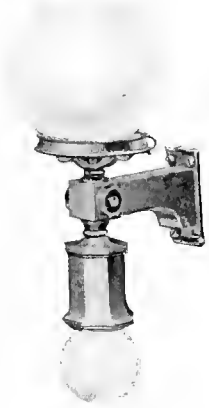


Fig. 3187.
No. 1910a. Combination Bracket.

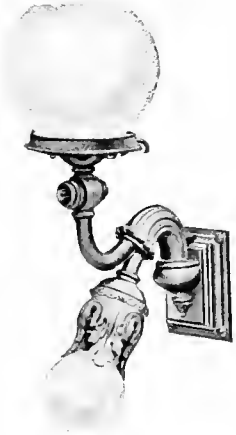


Fig. 3188.
No. 1920a. Combination Bracket.

Fig. 3189.
No. 218. Deck Lamp.

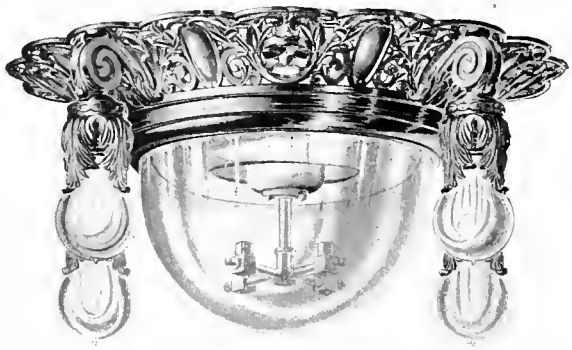


Fig. 3190.
No. 431. Combination Deck Lamp.
See Section, Fig. 3212.

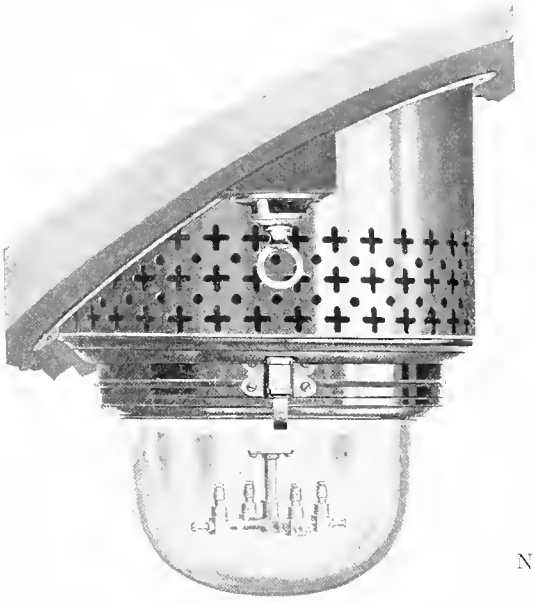


Fig. 3191.
No. 256. Deck Lamp.
See Section, Figs. 3221-3222.

Fig. 3192.
No. 440a. Combination Deck Lamp with 4 Electrics.
No. 440b. Combination Deck Lamp with 2 Electrics.
See Section, Figs. 3217-3218.

Fig. 3193.
No. 440. Deck Lamp.
See Section, Figs. 3217-3218.

Fig. 3194.
No. 442. Deck Lamp.
See Section, Figs. 3223-3224

Fig. 3195.
No. 441. Deck Lamp.

Fig. 3196.
No. 1841. Deck Lamp.

Fig. 3197.
No. 1680a. Combination Deck Lamp with 4 Electrics.
No. 1680b. Combination Deck Lamp with 2 Electrics.
See Section, Fig. 3219.

Fig. 3198.
No. 1905b. Combination Deck Lamp with 2 Electrics.
No. 1905. Deck Lamp.

Fig. 3199.
Wall Lamp, No. 205a.

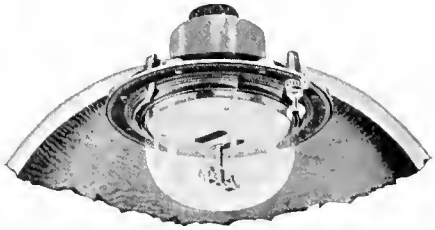


Fig. 3200.
No. 194. Two-flame Vestibule Lamp.
No. 195. Four-flame Vestibule Lamp.
See Section, Fig. 3214.

Fig. 3201.
No. 427. Lamp.
See Section, Figs. 3215-3216.

Fig. 3202.
No. 438a. Combination Lamp.

Fig. 3203.
No. 438. Lamp.
See Section, Fig. 3220.

Fig. 3204.
No. 191. Lamp.

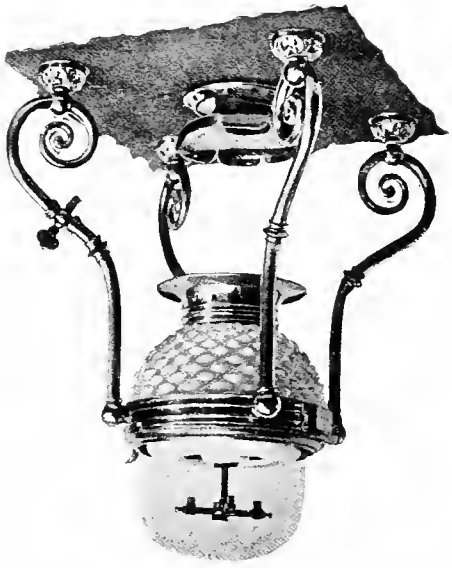


Fig. 3205.
No. 196. Lamp.

Fig. 3206.
No. 434. Combination Lamp.

Fig. 3207.
No. 208. Lamp.

Numbers Refer to List of Names of Parts with Figs. 3208-3224.

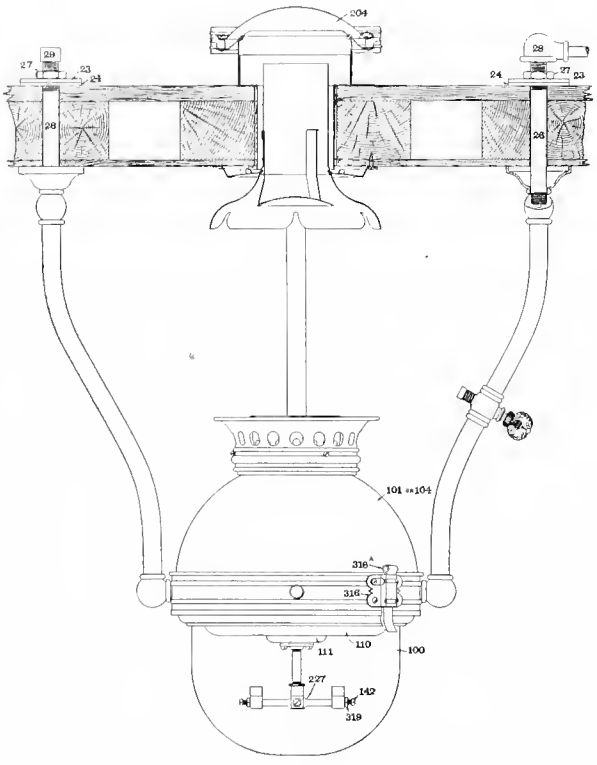
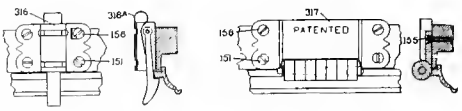
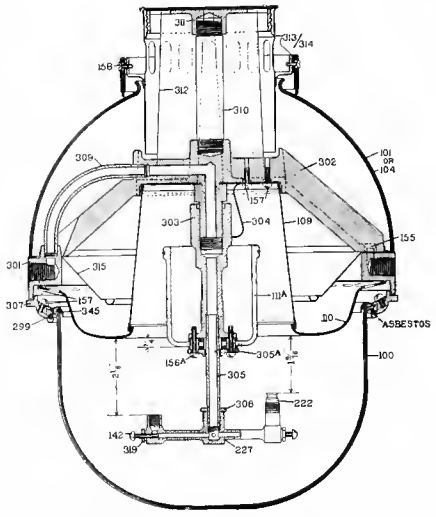


Fig. 3208. Method of Hanging Four-arm Lamp.





Figs. 3209-3211. Section of Standard Lamp Body.

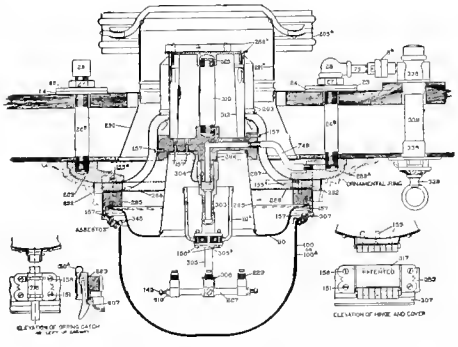


Fig. 3212. Section of Combination Deck Lamp, No. 431 and No. 218.

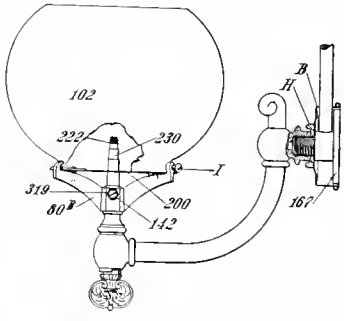


Fig. 3213. Section of Bracket Lamp, No. 86a.

List of Names of Parts of Lamp Sections. Figs. 3208-3224.

Cat. No.	Description.
8a	⅛-in. *Flange Union*
17a	⅛-in. *Angle Flange*
23	*Iron Washer for ⅜-in. Pipe*
24	*Rubber Washer for ⅜-in. Pipe*
26	⅜-in. *Nipple, 6 in. Long*
26b	⅜-in. *Nipple, 5 in. Long*
26c	⅜-in. *Nipple, 3½ in. Long*
27	⅜-in. *Locknut*
28	⅜-in. x ⅛-in. *Ell*
29	⅜-in. *Cap*
79	⅛-in. *Extra Strong Pipe*
100	*Glass Bowl*
100a	*9-in. Pressed Glass Bowl*
101	*Opalescent Dome*
102	*4-in. Opal Globe*
104	*Opal Dome*
107	*Ring Reflector*
109	*Mica Chimney*
110	*Ring Reflector*
111a	*Cup Reflector (Porcelain)*
113	*Reflector*
142	*Check Screws for Cluster*
142a	*Screw for Bracket*
151	*Screw for Hinge Cover and Spring Catch*
154	*Screw for Center Casting*
155	*Screw for Hinge and Spider*

Numbers Refer to List of Names of Parts with Figs. 3208-3224.

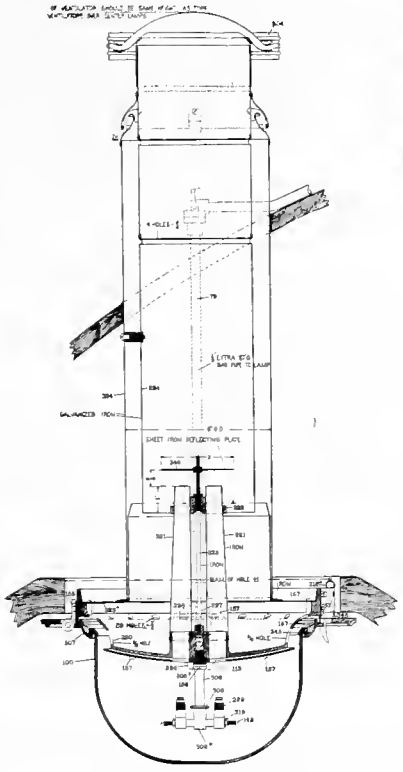
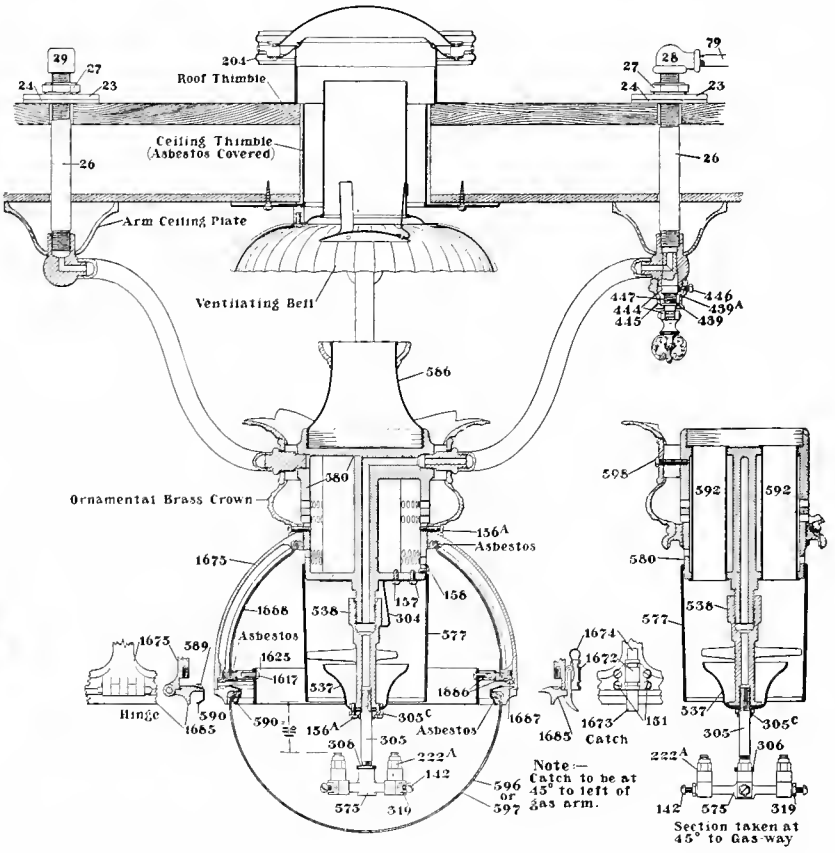
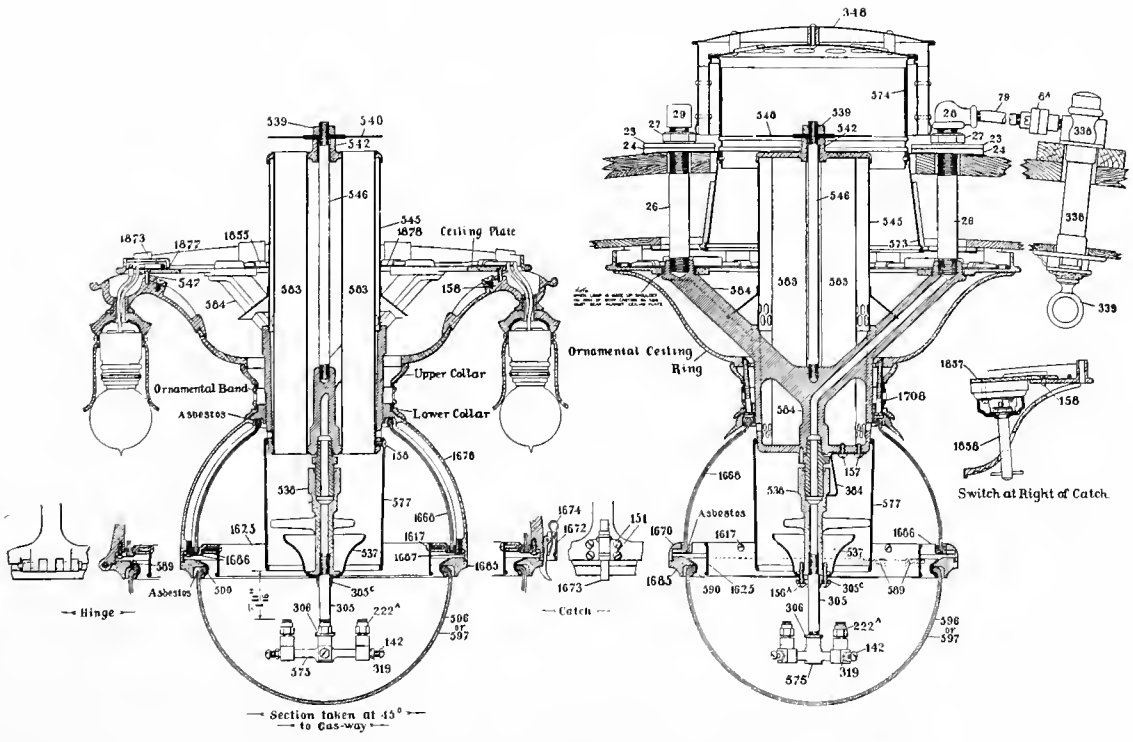


Fig. 3214. Section of Vestibule Lamp, No. 194.



Figs. 3215-3216. Section of Lamp, No. 427.



Figs. 3217-3218. Section of Combination Deck Lamp, No. 440a.

Numbers Refer to List of Names of Parts with Figs. 3208-3224.

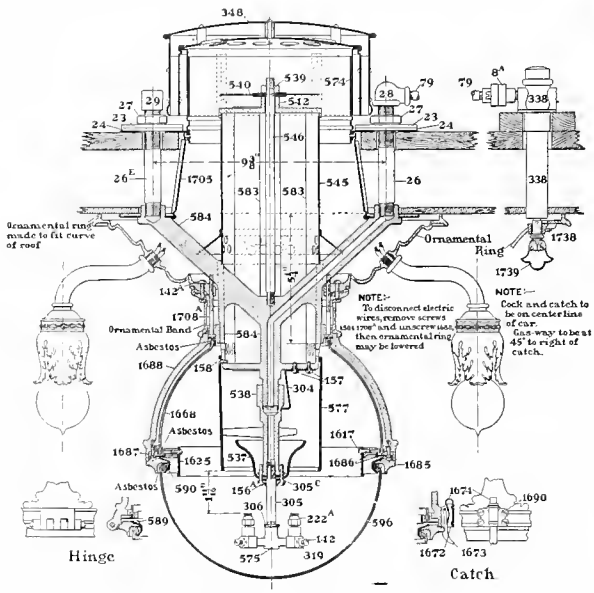


Fig. 3219. Section of Combination Deck Lamp, No. 1680a.

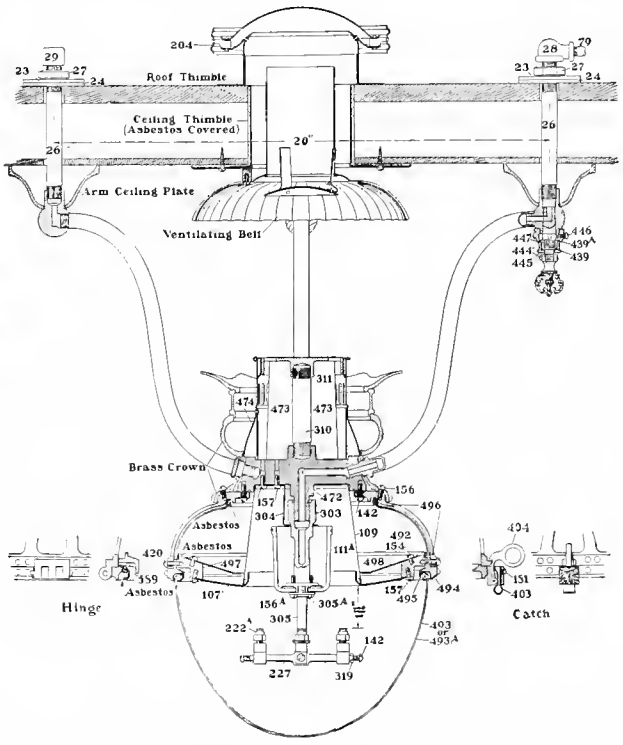
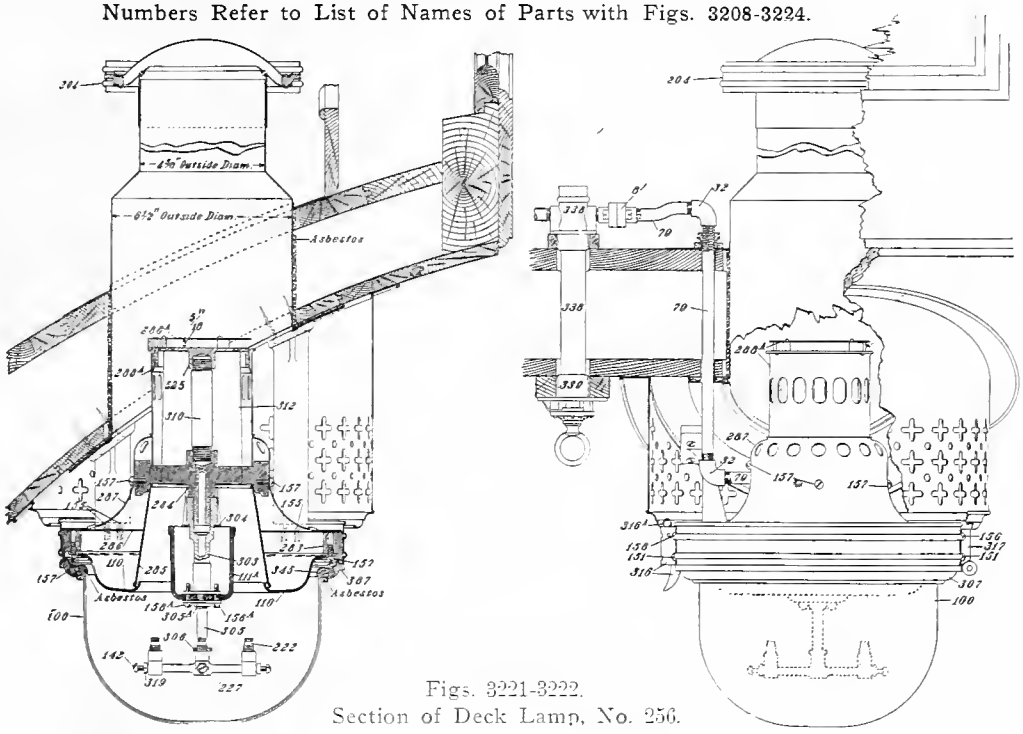


Fig. 3220. Section of Lamp, No. 438.

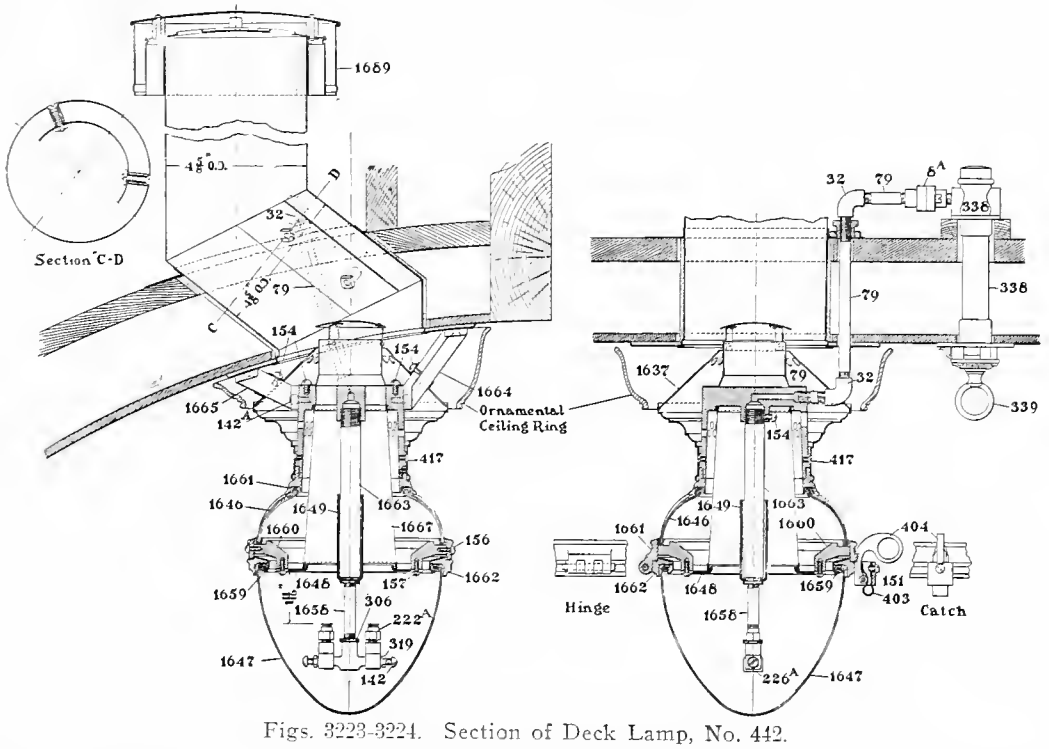
List of Names of Parts of Lamp Sections. Figs. 3208-3224 (Continued).

Cat. No.	Description.
155a	*Screw for Spacing Block and Bracket*
156	*Screw for Hinge Cover and Spring Catch*
156a	*Screw for Cluster Stem*
157	*Screw for Reflector*
158	*Screw for Inner Ring or Crown*
167	*Bracket Back*
189	*Screw for Thumb-piece*
200	*4-in. Wind Guard*
203a	*Ventilator*
203b	*Ventilator*
204	*4⅝-in. Ventilator*
204a	*Ventilator*
222a	*Burner Tips, Hexagon Base*
226	*Two-flame Cluster*
226a	*Two-flame Cluster*
227	*Four-flame Cluster*
230	*Pintsch Pillar*
283	*Cast Iron Body Ring*
284	*Cast Iron Spider*
285	*Enameled Chimney*
286	*Lower Diaphragm*
287	*Upper Diaphragm*
288a	*Deflecting Plate and Chimney*
289	*Bracket*
289a	*Bracket for Gas-way Connection*
290	*Lower Thimble*
290a	*Lower Thimble*
291	*Roof Thimble*
291a	*Roof Thimble*
292	*Spacing Block*
293	*Shield*
299	*Asbestos Wick*
301	*Cast Iron Ring*
302	*Spider*
303	*Extension Pillar*
304	*Lock*
305	*Cluster Stem*
305a	*Cluster Stem Flange*
305b	*Cluster Stem Flange*
305c	*Cluster Stem Flange*
306	*Locknut for Cluster Stem*
307	*Bezel or Ring for Bowl*
309	*Gas-way Tube*
310	*Post*
311	*Top Piece for Flues*
312	*Flues*
313	*Chimney*
314	*Ring for Fastening Crown*
315	*Diaphragm*
316	*Spring Catch, Complete*
316a	*Spring for Spring Catch*
317	*Hinge Cover*
319	*Locknuts for Check Screws*
320	*Body Casting*
321	*Flues*
322	*Top Piece for Flues*
323a	*Diaphragm*
324	*Ventilating Chimney*
325	*Center Post for Flues*
326	*Cock, Complete*
327	*Gas-way*
338	*Cock and Sleeve*
339	*Thumb-piece and Socket for Cock*
345	*Spun Globe Holder Ring*
346	*Deflecting Plate*
348	*6½-in. Ventilator*
349	*Gas-way Tube*
403	*Spring for Catch*
404	*Catch*
417	*Screw*
420	*Screw for Fuse Block Bracket*
439	*Washer for Cock*
439a	*Washer for Cock*
444	*Plug and Pin for Cock*
445	*Cap for Cock*
446	*Set Screw for Cap*
447	*Spring for Cock*
472	*Body Casting*
473	*Flues*
474	*Chimney*
492	*10-in. Opal Dome*
493	*10-in. Etched Bowl*
493a	*10-in. Clear Glass Bowl*
494	*Bezel*
495	*Spun Globe Holder*
496	*Frame for Dome*
497	*Ring Casting*
498	*Diaphragm*
525	*Top Ring for Flues*
537a	*Cup Reflector*
538	*Extension Pillar*
539	*Locknut for Deflecting Plate*
540	*Deflecting Plate*
542	*Top Piece for Flues*
545	*Cover for Flues*
546	*Flue Post*
547	*Screw for Ceiling Plate*
573	*Lower Thimble*
574	*Roof Thimble*
575	*Four-flame Cluster*
575a	*Two-flame Cluster*
577	*Cylindrical Reflector*
580	*Body Casting*
583	*Flues*
584	*Body Casting*
586	*Extension Chimney*
589	*Screw for Spun Globe Holder Ring*
590	*Spun Globe Holder Ring*
592	*Flues*
596	*9-in. Clear Glass Bowl*
596a	*9-in. Clear Glass Bowl, Etched Figure*
597	*9-in. Etched Bowl*
598	*Screw for Globe Holder*
1617	*Screws for Ring Reflector*

Numbers Refer to List of Names of Parts with Figs. 3208-3224.



Figs. 3221-3222.
Section of Deck Lamp, No. 256.



Figs. 3223-3224. Section of Deck Lamp, No. 442.

List of Names of Parts of Lamp Sections, Figs. 3208-3224 (Continued).

Cat. No.	Description.
1625	*Ring Reflector*
1637	*Conical Shield*
1646	*6-in. Opal Dome*
1647	*6-in. Etched Bowl*
1648	*Ring Reflectar*
1649	*Cup Reflector*
1658	*Cluster Stem*
1659	*Spun Globe Holder Ring*
1660	*Body Casting*
1661	*Frame for Dome*
1662	*Bezel or Globe Ring*
1663	*Extension Pillar*
1664	*Long Bracket*
1665	*Short Bracket*
1667	*Mica Chimney*

Cat. No.	Description.
1668	*Opal Dome*
1670	*Frame for Dome*
1672	*Cover for Catch*
1673	*Catch*
1674	*Spring for Catch*
1675	*Frame for Dome*
1685	*Bezel*
1686	*Dome Ring Holder*
1687	*Screw for Dome Ring Holder*
1688	*Frame for Dome*
1689	*Ventilator*
1690	*Screw for Catch*
1705	*Lower Thimble*
1708	*Screw for Ornamental Parts*
1708a	*Screw for Ornamental Body*

Cat. No.	Description.
1738	*Screw far Thumb-piece*
1739	*Thumb-piece and Socket for Cock*
1757	*Wood Screw for Ornamental Ring*
1851	*Waod Screw for Ornamental Ring*
1853	*Key for Switch*
1854	*Bracket for Wires*
1855	*Clamp for Wires*
1857	*Bracket for Switch*
1858	*Key for Switch*
1862	*Wood Screws for Ceiling Ring*
1873	*Porcelain Insulator Clamp*
1877	*Washer for No. 1873*
1878	*Washer for No. 1855*

Fig. 3225.
No. 2515. Bracket Mantle Lamp. See Section, Figs. 3242-3243.

Fig. 3226.
No. 2511a. Combination Deck Mantle Lamp.
See Section, Figs. 3245-3246.

Fig. 3227.
No. 2511. Deck Mantle Lamp.

Fig. 3228.
No. 2503. Deck Mantle Lamp.
See Section, Figs. 3252-3253.

Fig. 3229.
No. 2501. Four-light Mantle Lamp Chandelier.
See Section, Fig. 3244.

Fig. 3230.
No. 2505. Four-light Mantle Lamp Chandelier.
See Section, Fig. 3241.

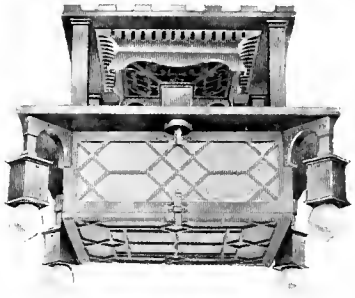


Fig. 3231.
No. 2523a. Combination Lamp.
See Section, Figs. 3247-3248.

Fig. 3232.
No. 2532 Deck Lamp.

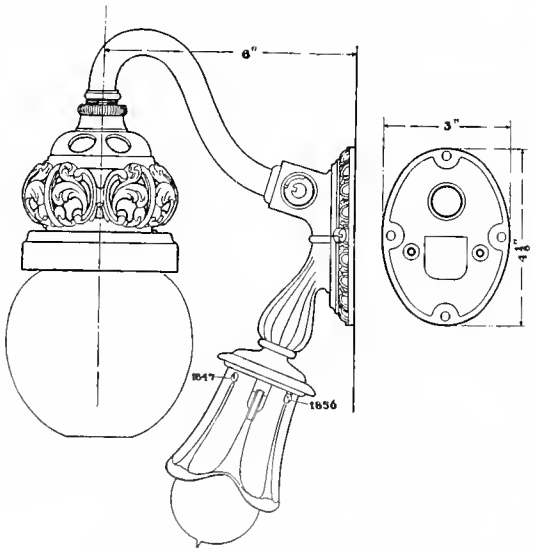


Fig. 3236.
No. 2550a. Combination Bracket Lamp.

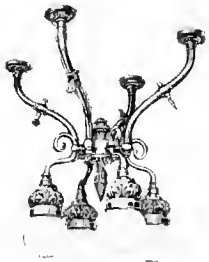


Fig. 3233.
No. 2524. Lamp.
See Section, Fig. 3251.

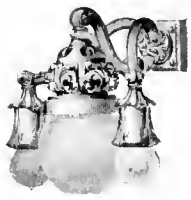


Fig. 3234.
No. 2556a. Combination Bracket Lamp.

Fig. 3235.
No. 2556. Bracket Lamp.

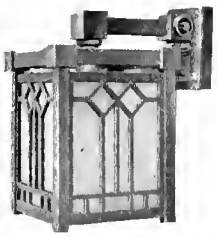
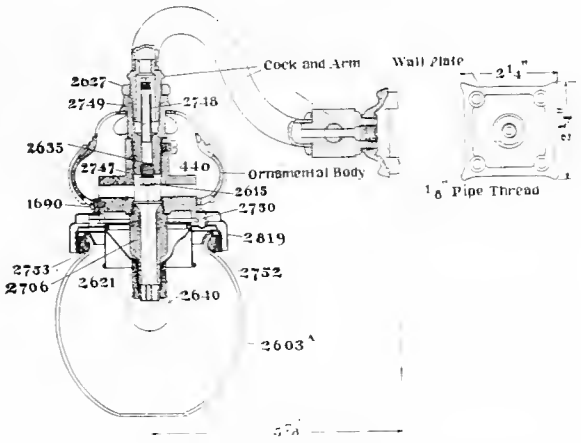


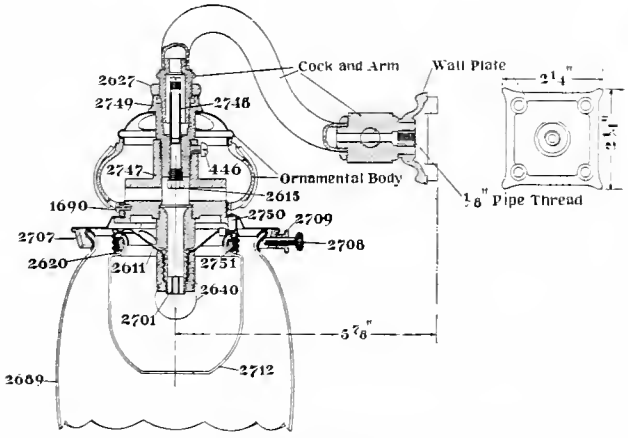
Fig. 3237.
No. 2534. Bracket Lamp.

Fig. 3238.
No. 2513. Wall Mantle Lamp.

Numbers Refer to List of Names of Parts, with Figs. 3239-3254.



Figs. 3239-3240.
Section of Bracket Mantle Lamp, No. 2536.



Figs. 3242-3243.
Section of Bracket Mantle Lamp, No. 2515.

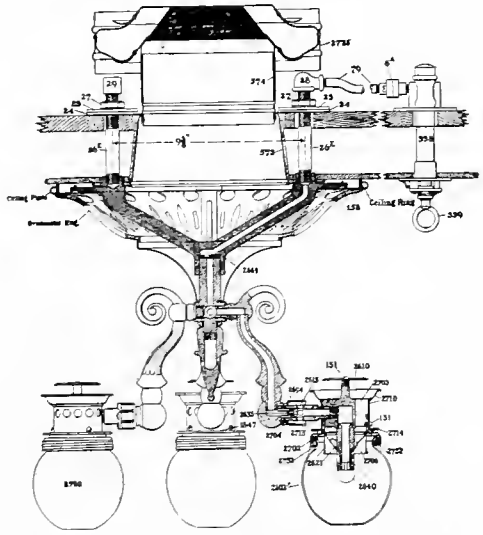


Fig. 3244. Section of Mantle Lamp, No. 2501.

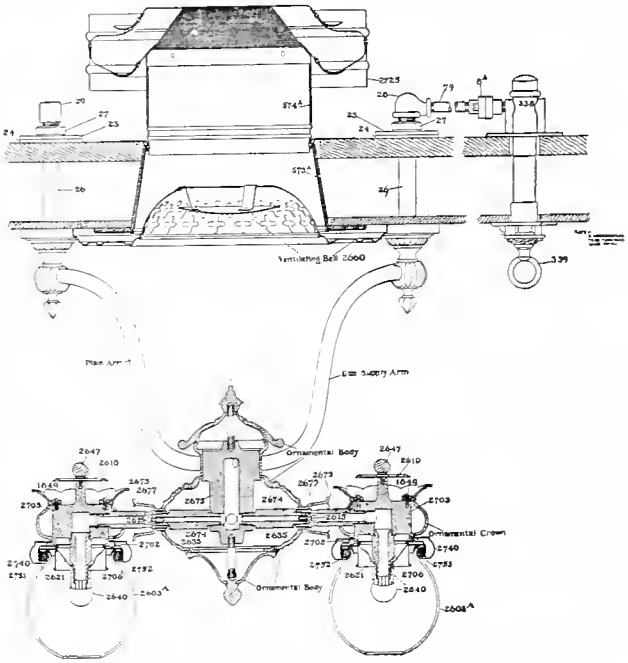


Fig. 3241. Section of Mantle Lamp, No. 2505.

Names of Parts of Mantle Lamp Sections. Figs. 3239-3254.

Cat. No.	Description.
8a	1/8-in. *Flange Union*
23	*Iron Washer*
24	*Rubber Washer*
26	3/8-in. *Nipple, 6 in. Long*
26d	3/8-in. *Nipple, 4 in. Long*
26c	3/8-in. *Nipple, 3 1/2 in. Long*
26f	3/8-in. *Nipple, 6 1/2 in. Long*
27	3/8-in. *Locknut*
28	3/8-in. x 1/8-in. *Ell*
29	3/8-in. *Cap*
30	3/8-in. *Tee*
31	3/8-in. *Plug*
79	1/8-in. *Extra Strong Pipe*
100	*Glass Bowl*
142a	*Screw for Ornamental Ring*
151	*Screw for Deflecting Plate*
154	*Screw for Deflecting Plate*
155	*Screw for Hinge*
155a	*Screw for Body Casting*
156	*Screw for Catch Cover*
157	*Screws for Reflector, Catch, etc.*
157a	*Screw for Porcelain Clamp*
158	*Screw for Ceiling Plate*
204a	*Ventilator*
307	*Bezel*
316a	*Spring for Catch*
326	*Cock, Complete*
338	*Cock and Sleeve*
339	*Thumb-piece for Cock*
345	*Spun Globe Holder Ring*
413	*Screw for Husk*
417	*Screw for Bezel*

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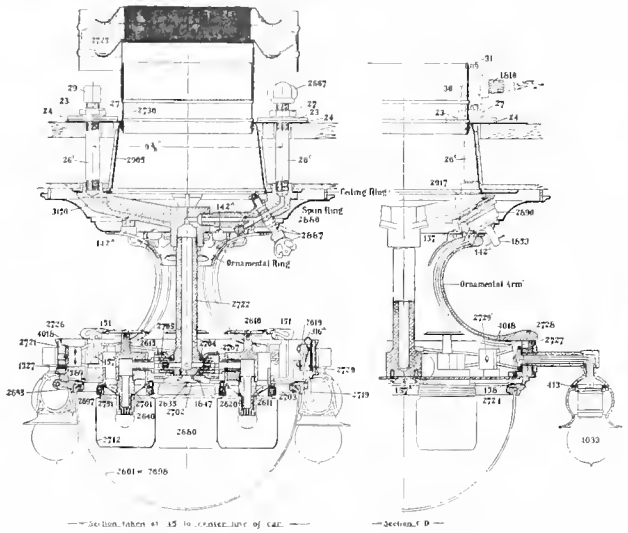
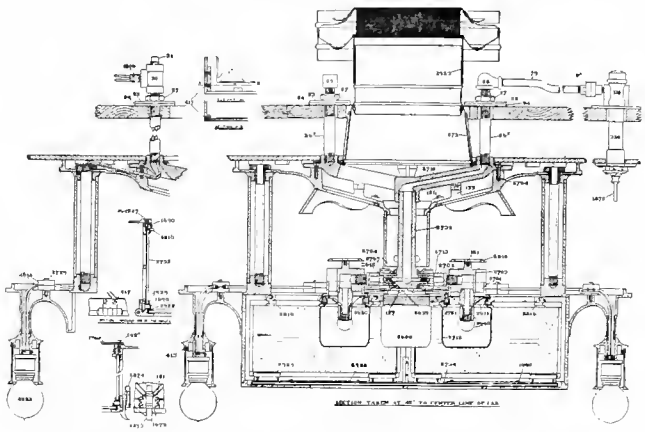
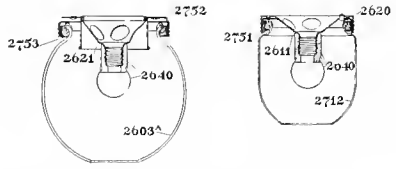
Numbers Refer to List of Names of Parts with Figs. 3239-3254.



Figs. 3245-3246. Section of Mantle Lamp, No. 2511a.



Figs. 3247-3248. Section of Mantle Lamp, No. 2523a.



No. 2700. No. 2680.

Figs. 3249-3250. Sections of Mantle Lamp Bulbs.

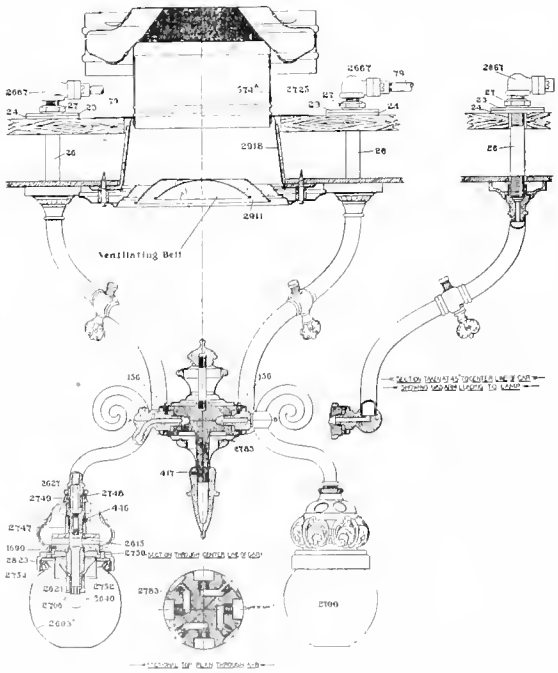
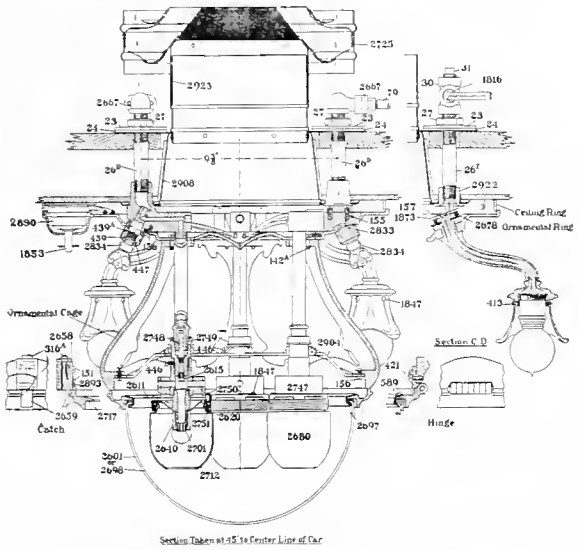


Fig. 3251. Section of Mantle Lamp, No. 2524.

Names of Parts of Mantle Lamp Sections. Figs. 3239-3254. (Continued).

Cat. No.	Description.
421	*Screw for Ornamental Cage*
439	*Washer for Lamp Cock (Thick)*
439A	*Washer for Lamp Cock (Thin)*
446	*Set Screw for Extension Pillar*
447	*Spring for Lamp*
573	*Lower Thimble*
574	*Roof Thimble*
574A	*Roof Thimble*
589	*Screw for Spun Globe Holder*
1527	*Screw for Top and Side Pieces of Bezel*
1672	*Cover for Catch*
1690	*Screw for Ornamental Body*
1816	*⅜-in. Close Nipple*
1847	*Screw for Spring Lock*
1849	*Screw for Ornamental Ring*
1853	*Key for Switch*
1862	*Wood Screw for Ornamental Ring*
1870	*Thumb-piece for Cock*
1873	*Porcelain Insulator Clamp*
2601	*11-in. Spherical Bowl, Clear Glass*
2603A	*Opal Bowl*
2605	*Body Ring*
2606	*Ceiling Ring*
2608	*Reflector*
2610	*Deflecting Plate*
2611	*Mantle and Globe Holder*
2615	*Gas Tip*
2619	*Cover for Catch*
2620	*Globe Ring*
2621	*Mantle and Globe Holder*
2627	*Locknut*
2634	*Ventilating Chimney*
2635	*Screen for Gas Tip*
2640	*Mantle*
2647	*Pinnacle for Deflector*
2658	*Catch Cover*
2659	*Catch*
2667	*⅜-in. x ⅛-in. Angle Flange*
2669	*Spider Casting*
2673	*Air Mixer*
2674	*Gas Tube*
2675	*Center Casting*
2677	*Air Shield*
2678	*Vulcabeston Washer*
2679	*Extension Piece*
2680	*Incandescent Gas Bulb, Complete*
2694	*Air Shield*
2695	*Bezel*
2697	*Spun Globe Holder*
2698	*11-in. Etched Glass Bowl*

Numbers Refer to List of Names of Parts Below.



Figs. 3252-3253. Section of Mantle Lamp, No. 2503a.

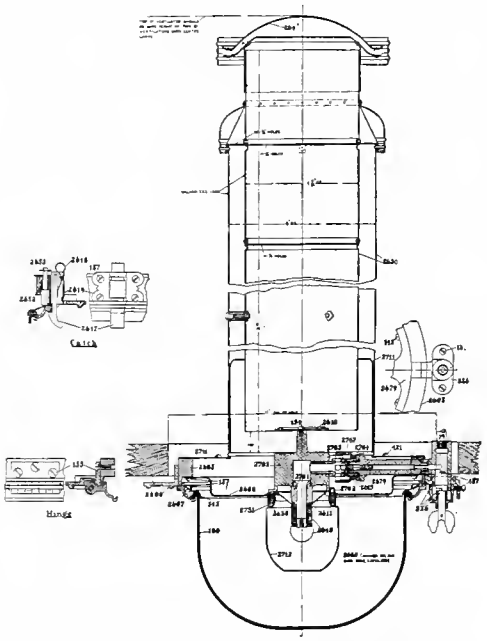


Fig. 3254. Section of Vestibule Mantle Lamp, No. 2594.

Names of Parts of Mantle Lamp Sections, Figs. 3239-3251, 3252, 3254. (Continued.)

Cat. No.	Description.
2700	*Incandescent Bulb and Globe, Complete*
2701	*Burner Nozzle*
2702	*Spring Lock*
2703	*Lamp Body*
2704	*Washer*
2705	*Air Mixer*
2706	*Burner Nozzle*
2707	*Shade Holder*
2708	*Thumb Screw*
2709	*Thumb Screw Locknut*
2710	*Spun Crown*
2711	*Thimble and Flange*
2712	*Clear Glass Bowl*
2713	*Air Mixer*
2714	*Shield*
2717	*Bezel*
2718	*Body Casting*
2719	*Catch*
2720	*Brace for Catch*
2721	*Body Ring*
2722	*Cluster Stem*
2724	*Cluster Stem Strap*
2725	*Ventilator*
2726	*Porcelain Clamp*
2727	*Vulcabeston Washer*
2728	*Screw for Ornamental Arm*
2729	*Screw for Porcelain Clamp*
2730	*Roof Thimble*
2732	*Cluster Stem*
2734	*Bottom Glass*
2735	*Side Glass*
2737	*Catch*
2738	*Spring for Catch*
2740	*Spun Ring*
2742	*Clamps for Bottom and Side Glass*
2743	*Clamps for Side Glass*
2747	*Lamp Body*
2748	*Gas Strainer*
2749	*Extension Pillar*
2749A	*Extension Pillar*
2750	*Spring Lock*
2751	*Inner Globe Ring*
2752	*Outer Globe Ring*
2753	*Inner Globe Ring*
2754	*Spring Pin*
2764	*Screw for Ornamental Ring*
2767	*Air Shield*
2782	*Body Ring*
2783	*Center Casting*
2816	*Clamp for Glass*
2823	*Shield*
2873	*Catch*
2883	*Cluster Stem*
2886	*Gas-way Bracket*
2887	*Thumb-piece and Plug for Cock*
2890	*Electric Switch*
2893	*Bracket for Catch*
2904	*Brace for Lamp Bodies*
2905	*Ceiling Thimble*
2908	*Ceiling Thimble*
2911	*Ventilating Bell*
2917	*Bracket for Switch*
2918	*Ceiling Thimble*
2922	*Collar for Electric Nipple*
2923	*Roof Thimble*
2928	*Bezel Clamp for Glass*
2929	*Side Clamp for Glass*
2953	*Bonnet for Cock*
2954	*Thumb-piece and Plug for Cock*
3162	*Wood Screw*
3170	*Body Casting*
4018	*Wire Cleat*
4033	*Electric Bulb*

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Names of Parts of Mantle Lamp Sections, Figs. 3255-3275.

Cat. No.	Description.
8A	⅛-in. Flange Union
23	Iron Washer
24	Rubber Washer
26	⅜-in. Nipple, 6 in. Long
26B	⅜-in. Nipple, 5 in. Long
26E	⅜-in. Nipple, 4¾-in. Long
26F	⅜-in. Nipple, 6½ in. Long
26I	⅜-in. Nipple, 6¼-in. Long
27	⅜-in. Locknut
28	⅜-in. x ⅛-in. Ell
29	⅜-in. Cap
30	⅜-in. Tee
31	⅜-in. Plug
79	⅛-in. Extra Strong Pipe
102	4-in. Opal Bowl
142A	Screw for Gas Cock Body
151	Screw for Catch, etc.
156	Screw for Bracket
157	Screw for Body Casting
157A	Screw for Ceiling Ring
158	Screw for Switch Bracket
167	Wall Plate
200	Wind Guard
204	4⅝-in. Ventilator
222A	Burner Tip
230	Pintsch Pillar
307	Bezel
316A	Spring for Catch
319	Locknut
324	Ventilating Chimney
326	Cock, Complete
338	Cock and Sleeve
339	Thumb-piece and Socket for Cock
345	Spun Globe Holder
413	Screw for Husk
420	Screw for Crown
421	Screw for Thimble
439	Thick Washer for Cock
439A	Thin Washer for Cock
444	Thumb-piece and Plug for Cock
445	Bonnet for Cock
446	Set Screw for Bonnet
447	Spring for Cock
518	Screw for Spider Casting
547	Screw for Hinge
589	Screw for Globe Holder
598	Screw for Lock
1527	Screw for Gas Cock Body
1672	Cover for Catch
1673	Catch
1674	Spring for Catch
1683	Gas Cock Body
1684	Thumb-piece and Plug for Cock
1733	Spun Globe Holder
1741	2¼-in. Opal Shade
1782	Screw for Shade Holder
1783	Locknut for No. 1782
1816	⅜-in. Close Nipple
1847	Screw for Husk
1853	Key for Switch
1855	Clamp for Wires
1856	Screw for Electric Socket
1857	Bracket for Switch
1858	Key for Switch
1865	Set Screw
1873	Porcelain Insulator
1877	Vulcabeston Washer
1878	Vulcabeston Washer
1949	Ceiling Thimble
1950	Roof Thimble
2175	High Pressure Base Check
2213	Check Screw
2214	Screw for Orifice
2601	11-in. Clear Glass Bowl
2606	Ceiling Ring
2615	Gas Tip
2619	Cover for Catch
2640	Small Mantle
2656	Screw for Bracket
2667	⅜-in. x ⅛-in. Angle Flange
2695	Bezel
2697	Spun Globe Holder
2698	11-in. Electro Etched Bowl
2711	Thimble and Flange
2719	Catch
2720	Brace for Catch
2721	Body Ring with Electrics
2726	Porcelain Clamp
2727	Vulcabeston Washer
2728	Screw for Ornamental Arm
2729	Screw for Insulator
2748	Gas Strainer
2763	Screw for Shade Holder Ring
2854	Ceiling Thimble
2855	Roof Thimble
2886	Gas-way Bracket
2887	Thumb-piece and Plug for Cock
2890	Electric Switch
2917	Bracket for Switch
2922	Collar for Electric Nipple
2936	Globe Holder
3044	Large Mantle
3046	Gas Tip
3049	Burner Nozzle
3050	Bezel
3051	Spider Casting
3052	Body Casting
3053	Top Flue
3054	Bottom Flue
3055	8½-in. Frosted Bowl
3057	Crown
3063	Ventilating Bell
3070	Ventilating Bell
3081	Ornamental Crown and Apron
3084	Bracket
3085	Center Casting
3087	Bottom Flue
3091	Top Flue
3106	Gas Strainer
3107	9-in. Clear Glass Bowl
3116	9½-in. Opal Bowl
3125	Ornamental Crown and Apron
3126	Brackets
3128	Bushing
3129	Crown
3130	Flue
3131	Ornamental Collar
3132	Ornamental Apron
3134	Bracket
3135	Spider Casting
3136	Gas-way
3137	Extension Pillar
3139	Spacing Piece
3140	Center Casting
3143	Screw for Gas-way
3147	Burner Nozzle
3148	Ventilating Bell
3149	Short Arms
3163	Short Arm
3165	Spider Casting
3168	Extension Pillar
3170	Spider Casting
3174	Center Casting
3218	Ornamental Crown and Apron
3219	Bracket
3220	Flue
3237	Body Casting
3241	Ornamental Collar
3243	Ceiling Thimble
3261	9½-in. Frosted Bowl
3264	8½-in. Opal Bowl
3266	Body Ring
3267	Extension Piece
3268	Flue
3270	Extension Pillar
3271	Flue
3272	Lock
3273	Ornamental Crown and Apron
3274	Roof Thimble
3303	Gas Strainer
3313	Reflector
3319	Ceiling Thimble
3321	Bracket for Reflector
3373	Apron
3375	Body Casting
3406	Extension Flue
3411	Air Tube
3412	Ring Reflector
4018	Porcelain Wire Cleat
4033	Electric Bulb
4144	Screw for Ornamental Ceiling Ring

Numbers Refer to List of Names of Parts on Page 376.

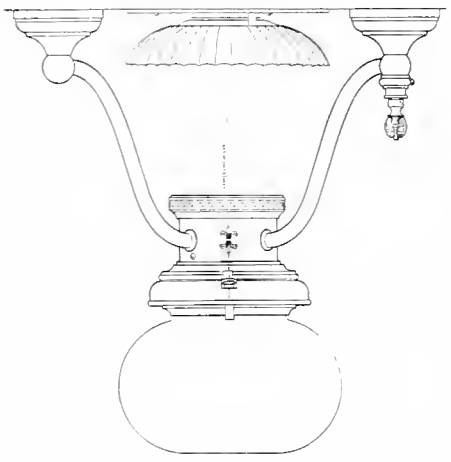


Fig. 3255.
No. 3500. Lamp.

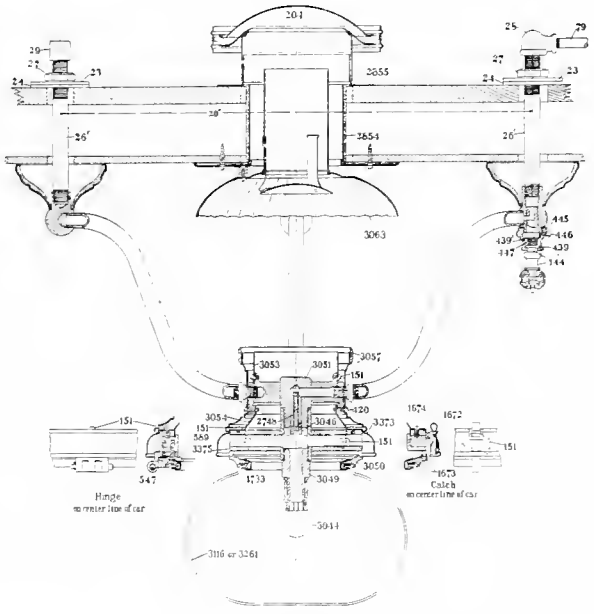


Fig. 3256.
Section of No. 3500. Lamp.

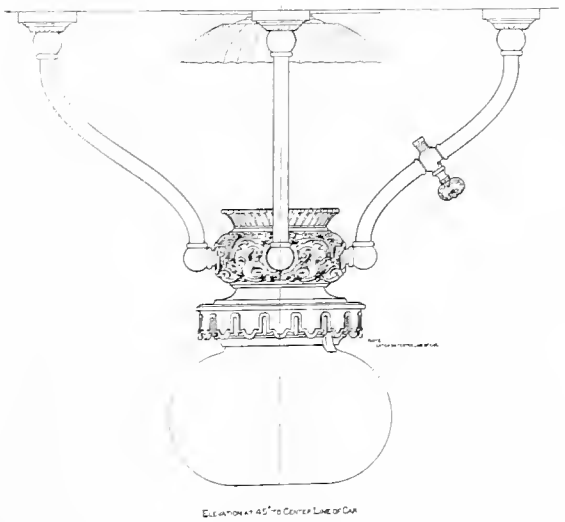


Fig. 3257.
No. 3508. Lamp.

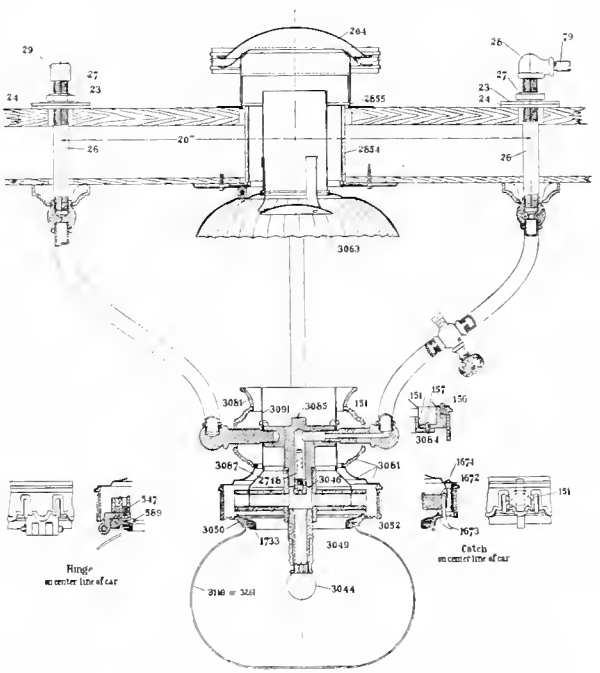


Fig. 3258.
Section of No. 3508. Lamp.

Numbers Refer to List of Names of Parts on Page 376.

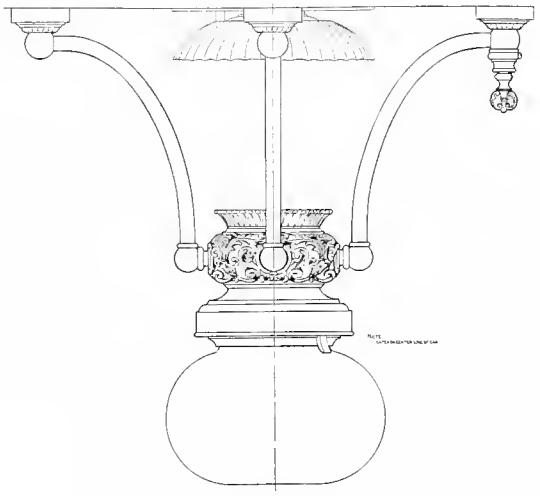


Fig. 3259.
No. 3509. Lamp.

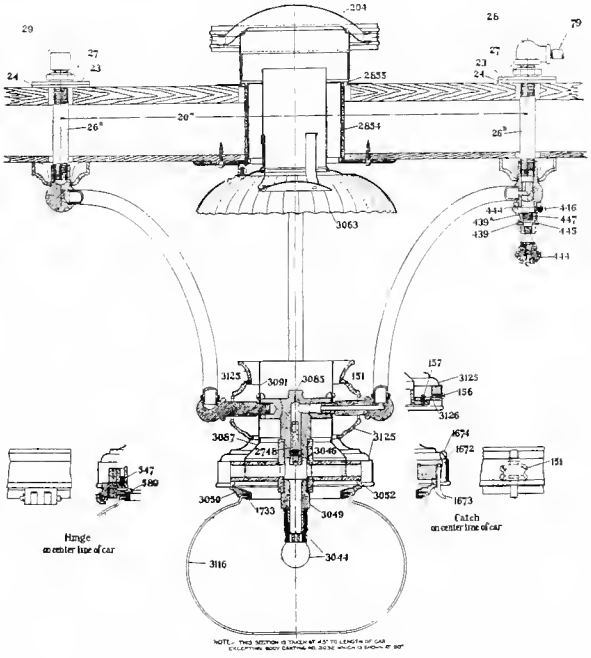


Fig. 3260.
Section of No. 3509. Lamp.

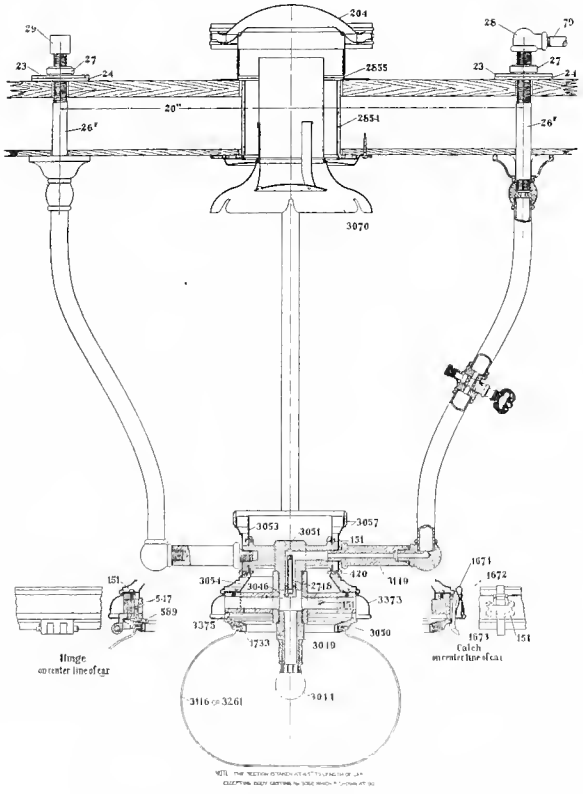


Fig. 3261.
Section of No. 3511. Lamp.

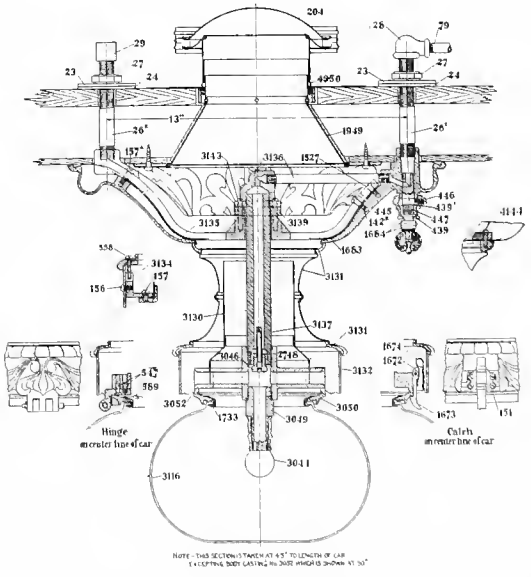


Fig. 3262.
Section of No. 3512. Lamp.

Numbers Refer to List of Names of Parts on Page 376.

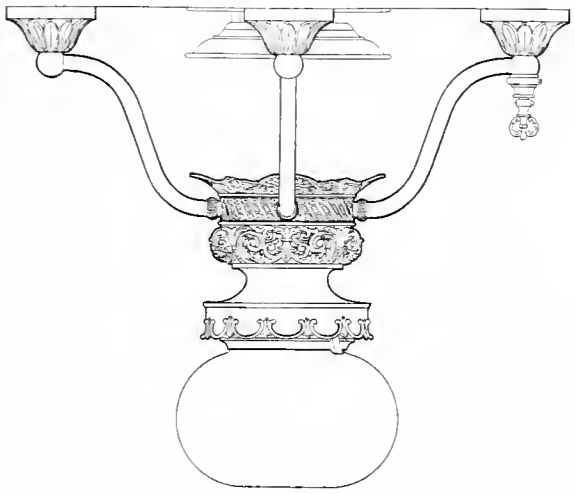


Fig. 3263.
No. 3514. Lamp.

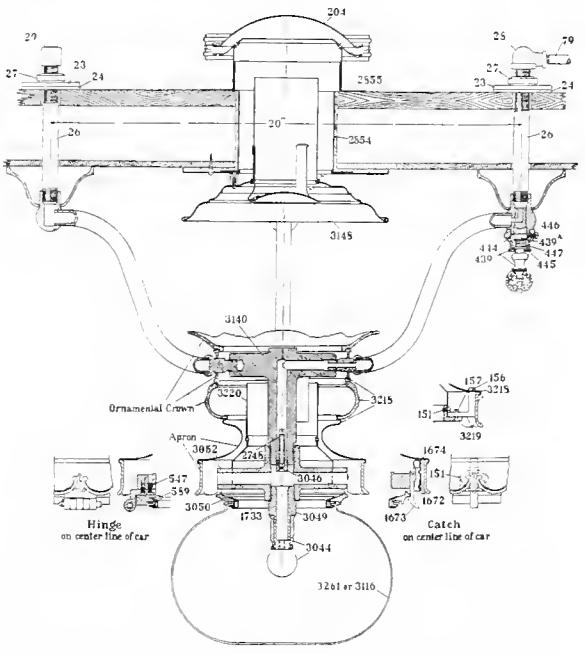


Fig. 3264.
Section of No. 3514. Lamp.

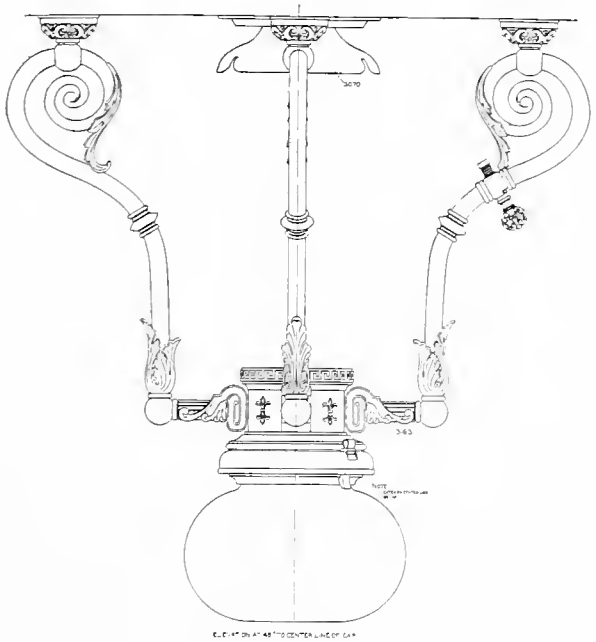


Fig. 3265.
No. 3518. Lamp.

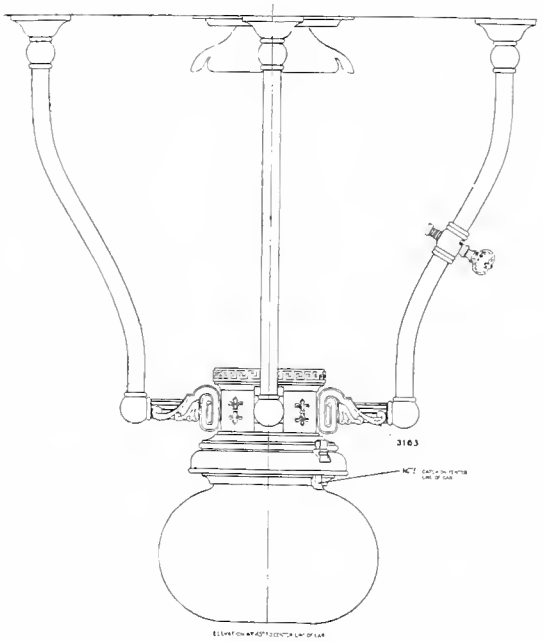


Fig. 3266.
No. 3519. Lamp.

Numbers Refer to List of Names of Parts on Page 376.

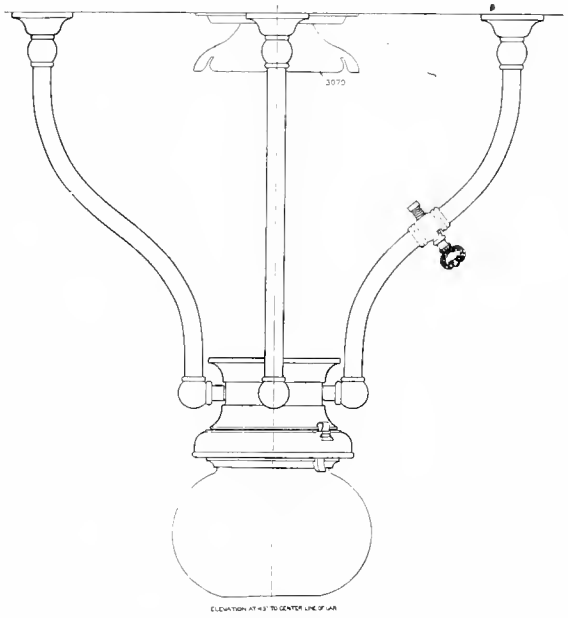


Fig. 3267.
No. 3520. Lamp.

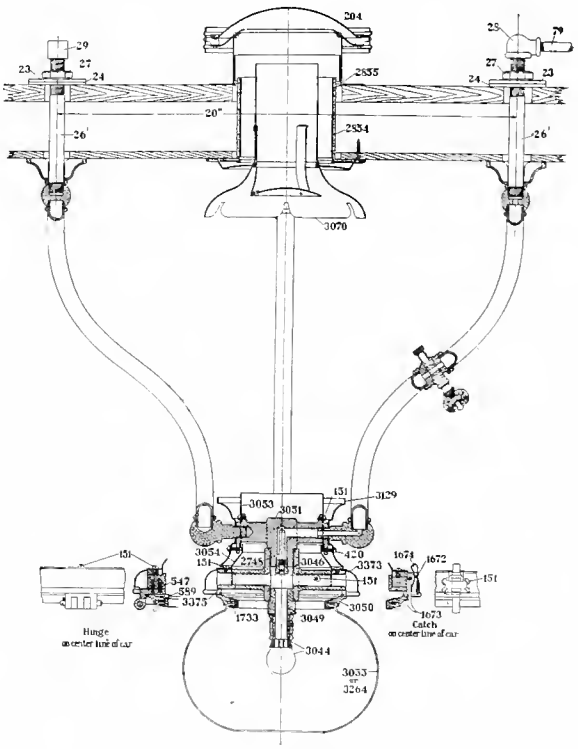


Fig. 3268.
Section of No. 3520. Lamp.

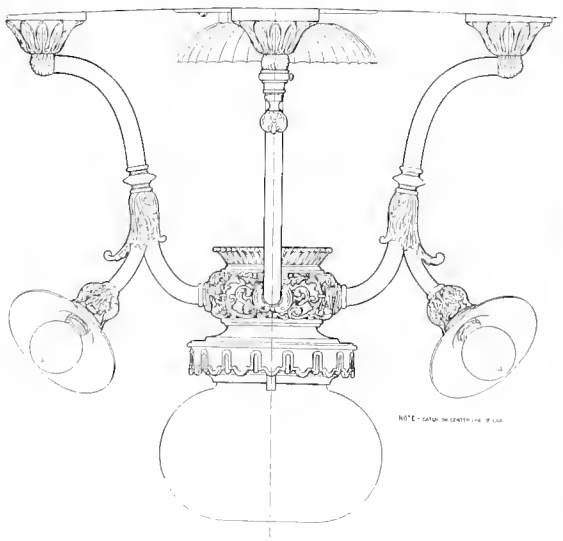


Fig. 3269.
No. 3538a. Combination
Lamp.

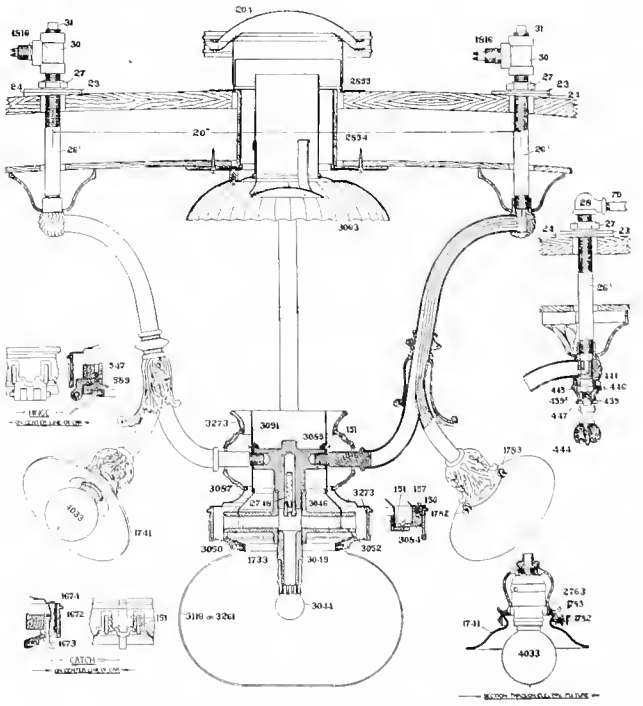


Fig. 3270.
Section of No. 3538a.
Combination Lamp.

Numbers Refer to List of Names of Parts on Page 376.

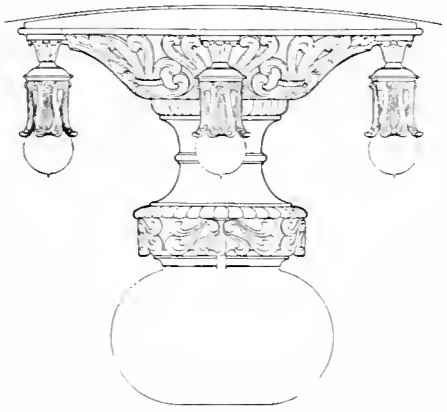


Fig. 3271.
No. 3532a. Combination Lamp.

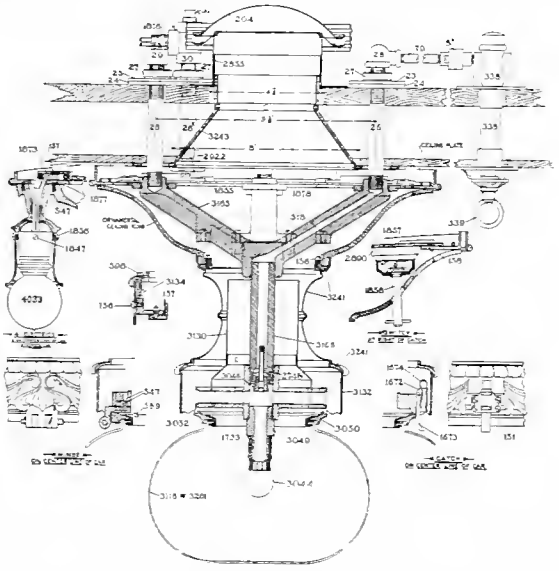


Fig. 3272.
Section of No. 3532a. Combination Lamp.

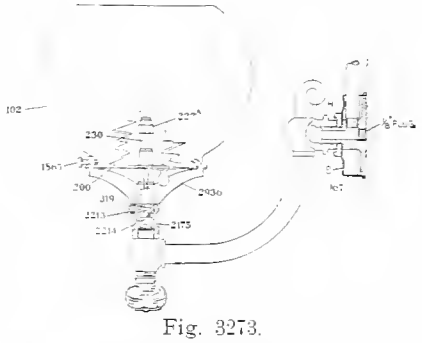
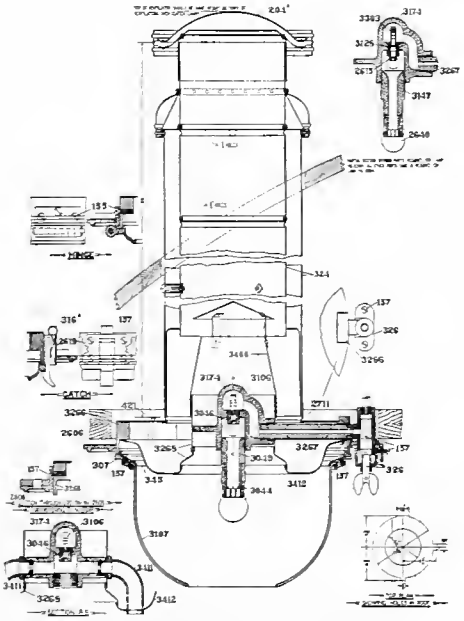


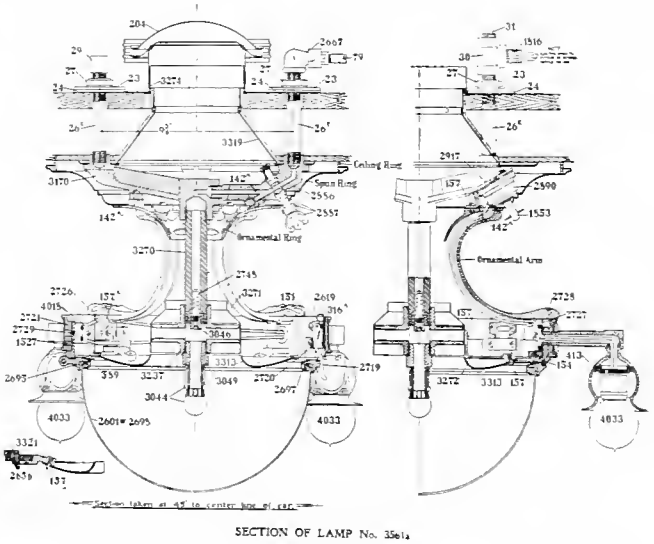
Fig. 3273.
No. 2286a. Bracket Lamp.



SECTION OF VESTIBULE LAMPS Nos. 2594 and 3594

NOTE.—Lamp No. 2594 has a small mantle, as shown in small section in upper right hand corner, and when used with Regulator No. 254, Gas Strainer No. 3303 is required, as shown, and with Regulator No. 1954, Gas Strainer No. 3106 is required. For old style vestibule lamp No. 2694, see sectional cut on page 1[illegible]

Fig. 3274.
Section of Nos. 2594 and 3594.
Vestibule Lamps.



SECTION OF LAMP No. 3561a

Fig. 3275.
Section of No. 3561a. Lamp.

Names of Parts of Acetylene Lamp Sections, Figs. 3276-3285.

Cat. No.	Description
17a	*Angle Flange*
23	*Iron Washer*
24	*Rubber Washer*
26	*⅜-in. Nipple, 6 in. Long*
26b	*⅜-in. Nipple, 5 in. Long*
26f	*⅜-in. Nipple, 6½ in. Long*
27	*⅜-in. Locknut*
28	*⅜-in. x ⅛-in. Ell*
29	*⅜-in. Cap*
32	*⅛-in. Ell*
79	*⅛-in. Extra Strong Pipe*
100	*Glass Bowl*
140	*Screw for Bezel*
142a	*Screw for Gas Cock Body*
144	*Screw for Spring Lock*
151	*Screw for Catch and Reflector*
154	*Screw for Flue*
155	*Screw for Hinge*
156	*Screw for Ceiling Ring*
156a	*Screw for Flange*
157	*Screw for Reflector*
157a	*Screw for Ceiling Ring*
204	*4⅝-in. Ventilator*
204a	*Ventilator*
307	*Bezel for Bowl, with Hinge*
316	*Spring Catch, Complete*
316a	*Spring for Catch*
323a	*Diaphragm*
324	*Ventilating Chimney*

Fig. 3276.
No. 1641. Acetylene Wall Lamp.
See Section, Figs. 3282-3283.

Fig. 3277.
No. 1681. Acetylene Deck Lamp.
See Section, Fig. 3284.

Fig. 3278.
No. 1627. Acetylene Lamp.
See Section, Fig. 3279.

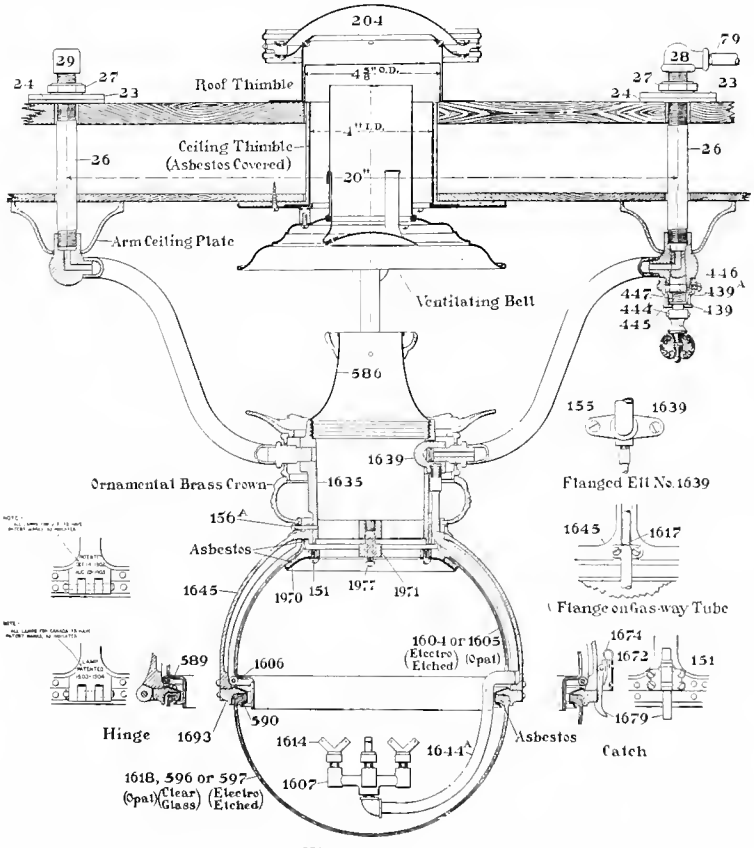
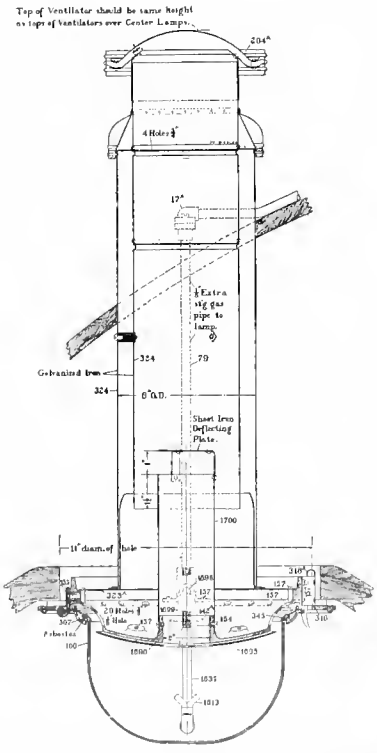
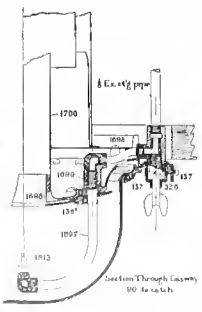
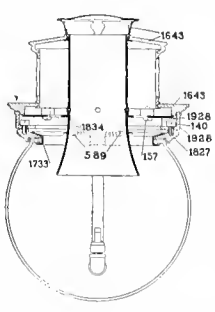


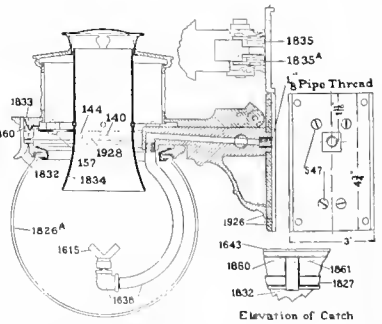
Fig. 3279.
Section of Acetylene Lamp, No. 1627.





Figs. 3280-3281.
Section of Acetylene Vestibule Lamp, No. 1694.





Figs. 3282-3283.
Section of Acetylene Wall Lamp, No. 1641.

Numbers Refer to List of Names of Parts Above and on Page 383.

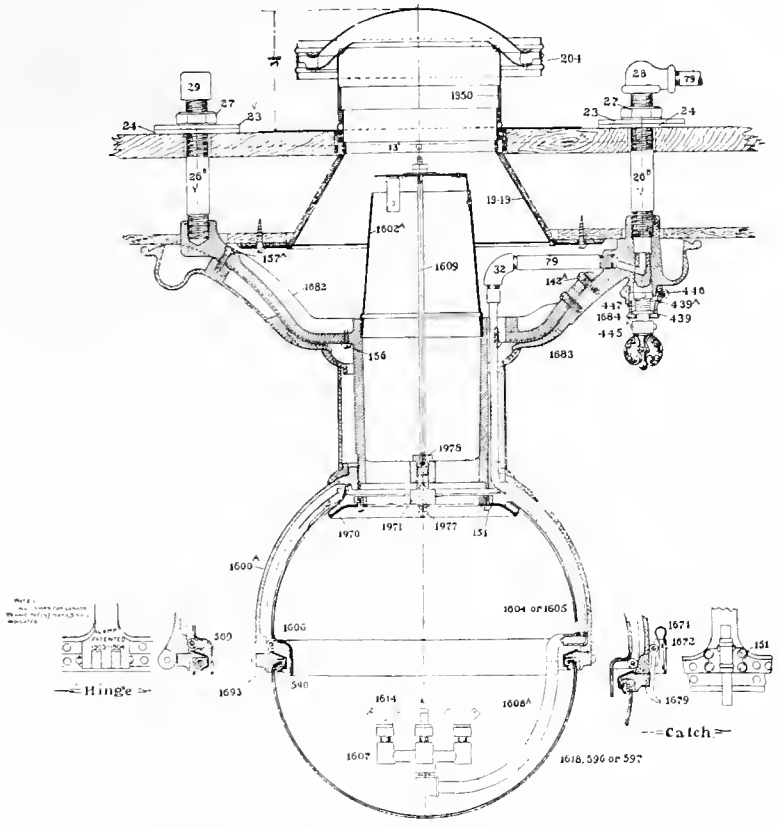


Fig. 3284. Section of Acetylene Lamp, No. 1681.

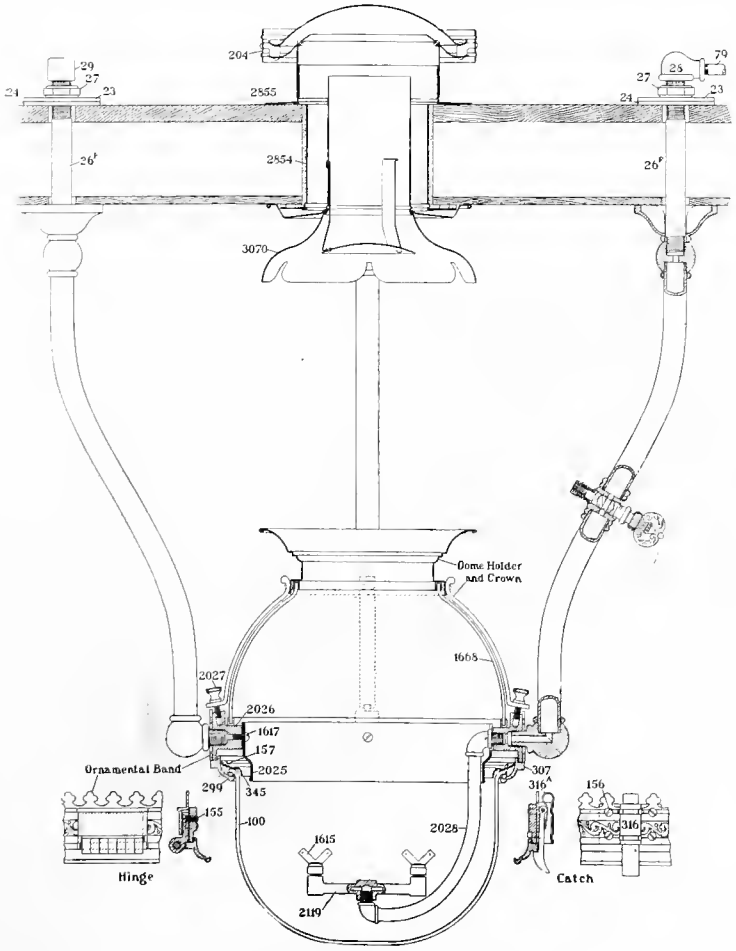


Fig. 3285.
Section of Acetylene Lamp, No. 2012.
The Safety Car Heating & Lighting Co.

Names of Parts of Acetylene Lamp Sections, Figs. 3276-3285. (Continued.)

Cat. No.	Description.
326	*Cock, Complete*
345	*Spun Globe Holder Ring*
439	*Thick Washer for Cock*
439a	*Thin Washer for Cock*
444	*Plug and Thumb-piece for Cock*
445	*Bonnet for Cock*
446	*Screw for Cock*
447	*Spring for Cock*
547	*Screw for Wall Plate*
586	*Extension Chimney*
589	*Screw for Spun Globe Holder*
590	*Spun Globe Holder*
596	*9-in. Clear Glass Bowl*
597	*9-in. Etched Glass Bowl*
1600a	*Frame for Dome*
1602a	*Flue*
1604	*9-in. Etched Dome*
1605	*9-in. Opal Dome*
1606	*Dome Ring*
1607	*Four-flame Cluster*
1608a	*Gas-way Tube*
1609	*Post for Flues*
1613	*⅜-ft. Von Schwartz Burner*
1614	*½-ft. Von Schwartz Burner*
1615	*¾-ft. Von Schwartz Burner*
1617	*Screw for Gas-way Tube Flange*
1618	*9-in. Opal Bowl*
1635	*Body Casting*
1638	*Gas-way Tube*
1639	*Flanged Ell*
1643	*Crown*
1644a	*Gas-way Tube*
1645	*Frame for Dome*
1668	*Opal Dome*
1672	*Cover for Catch*
1674	*Spring for Catch*
1679	*Catch*
1682	*Body Casting*
1683	*Gas Cock Body*
1684	*Thumb-piece and Plug for Cock*
1693	*Bezel*
1695	*Reflector*
1696	*Body Casting*
1697	*Gas-way Tube*
1697a	*Two-flame Cluster*
1698	*Brass Nipple*
1699	*Flanged Ell*
1700	*Flue*
1733	*Spun Globe Holder*
1826	*6½-in Opal Bowl*
1826a	*6½-in. Clear Glass Bowl*
1827	*Bezel*
1832	*Catch*
1833	*Spring for Catch*
1834	*Reflector*
1835	*Spring for Hinge, Left*
1835a	*Spring for Hinge, Right*
1860	*Flange for Catch*
1861	*Screw for Flange*
1926	*Body with Gas Cock*
1928	*Spring Lock for Bezel*
1949	*Lower Thimble*
1950	*Roof Thimble*
1970	*Reflector*
1971	*Casting for Reflector*
1977	*Set Screw*
1978	*Bushing for Flue Post*
2025	*Reflector*
2026	*Body Ring*
2027	*Thumb-screw*
2028	*Gas-way Tube*
2119	*Two-flame Cluster*
2854	*Ceiling Thimble*
2855	*Roof Thimble*
3070	*Ventilating Bell*

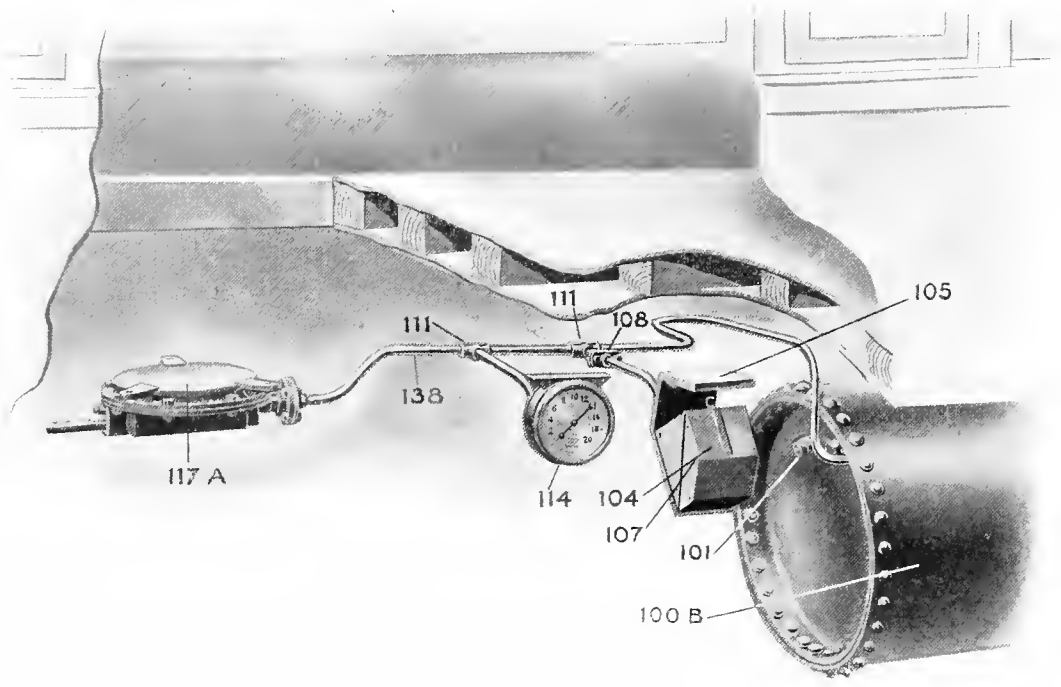


Fig. 3286. Application of Tank, Piping, Etc., for Safety Storage System of Acetylene Car Lighting.

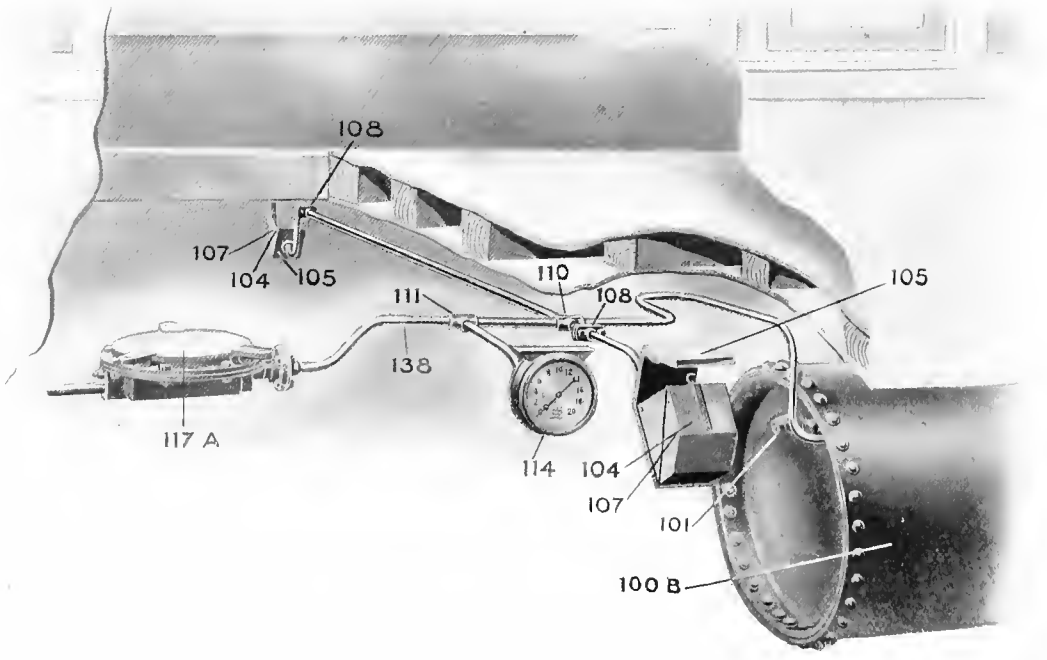


Fig. 3287. Application of Tank, Piping, Etc., for Safety Storage System of Acetylene Car Lighting with Filling Valves on Each Side of Car.
The Commercial Acetylene Co.

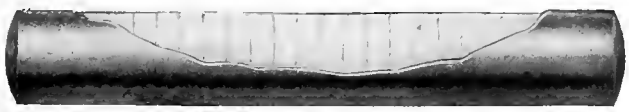


Fig. 3288. Brazed Cylinder.
Cut Open to Show Packing.

Fig. 3292. No. 242.
¾ ft. V. S. Burner
Male Thread.

Fig. 3293. No. 49.
Burner Pillar.

Fig. 3289. No. 121.
Main Cock.

Fig. 3290. No. 122.
Main Cock Key.

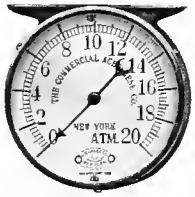


Fig. 3291. No. 114.
Gage for Car.

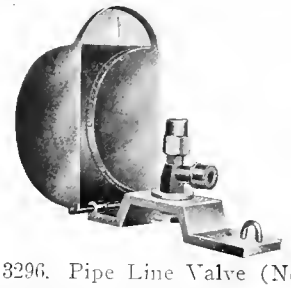


Fig. 3296. Pipe Line Valve (No. 149) with Cover (No. 151) and Bracket (No. 150) Complete.

Fig. 3294. No. 123.
Blow Off for Safety Device.

Fig. 3295. No. 106.
Key for Nos. 101, 104, 149.

Fig. 3297. No. 108.
¼-in. Flange
Union H. P.

Fig. 3298. No. 117A.
Regulating Valve.

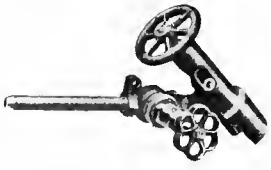


Fig. 3299. No. 144.
Charging Hose
Connection.

Fig. 3300. Filling Valve (No. 104) with Bracket (No. 105) and Cover (No. 107) Complete.

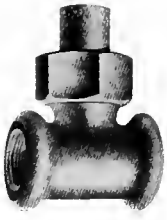


Fig. 3301. No. 125.
⅜-in. x ⅛-in. Brass
Union Tee.

Fig. 3302. No. 101.
Stud Valve.

Fig. 3303.
No. 109. Lead
Gasket for No. 108.

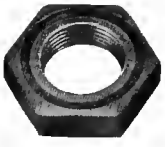


Fig. 3304.
No. 128. Lock
Nut for No. 127.

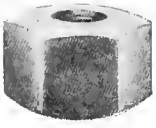


Fig. 3305. No. 102.
Nut for Stud
Valve Connection.

Fig. 3306. No. 159.
⅜-in. x ⅛-in. Drop
Ell (Plain).

Fig. 3307. No. 19.
¾-in. Hose Band.

Fig. 3308. No. 216.
⅜-in. Rubber Washer.

Fig. 3309. No. 217.
⅜-in. Iron Washer.

Fig. 3310. No. 56.
Burner Cleaner.

Fig. 3311. No. 145.
7/16-in. Wire Wound
Gas Hose.

Fig. 3312. No. 103.
Nipple for No. 101.

Fig. 3313. Fig. 127.
Special ⅜-in.
Pipe Nipple.

Fig. 3314. No. 79.
Hose Coupler.

Fig. 3315.
No. 112. ¼-in.
Steel Ell.

Fig. 3316.
No. 113.
¼-in. Steel Coupling.

Fig. 3317.
No. 111.
Steel Tee.

Fig. 3318.
No. 110.
Steel Cross.

Fig. 3319.
Center Lamp No. 350.
(Section Cut, Fig. 3329.)

Fig. 3320.
Vestibule Lamp
No. 375.
(Section Cut, Fig. 3327.)

Fig. 3321. No. 39.
Globe Holder for
Nos. 12 and 13.

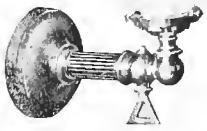


Fig. 3322. No. 5.
Side Bracket.

Fig. 3323. No. 46.
Bracket.
Globe No. 47.

Fig. 3324. No. 2.
Car Bracket.

Fig. 3326. No. 43.
4⅞-in. Globe Ventilator.

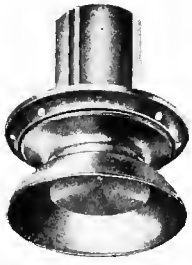


Fig. 3325. No. 40.
Standard Ventilating Bell.

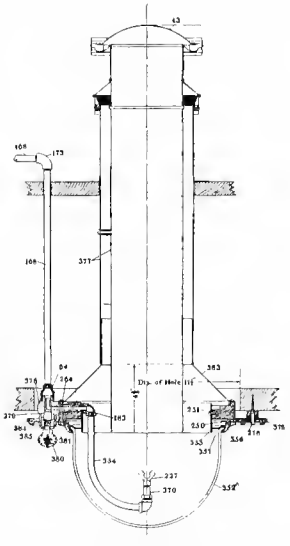


Fig. 3327.
Vestibule Fixture No. 375.

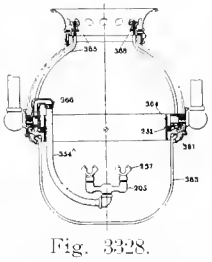


Fig. 3328.
Pintsch Lamp Converted.

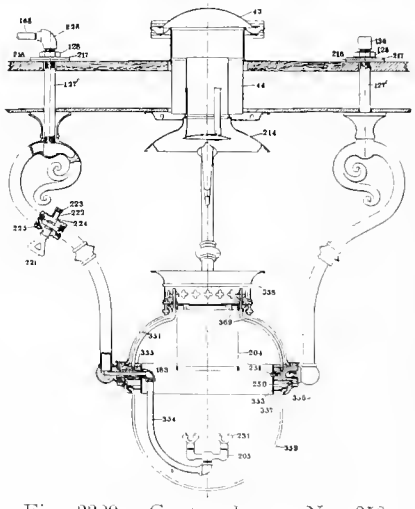


Fig. 3329. Center Lamp No. 350.

Names of Parts of Acetylene Lamp Sections. Figs. 3327-3329.

43 *4⅞-in. Globe Ventilator*
44 *Roof Thimble*
64 *⅜-in. x ⅛-in. Reducer*
127F *⅜-in. Pipe Nipple*
128 *⅜-in. Lock Nut*
136 *⅜-in. Cap*
168 *⅛-in. Pipe*
173 *⅛-in. Ell, Iron*
183 *⅛-in. Ell, Brass*
204 *Mica Chimney*
205 *2-Flame Cluster*
214 *Ventilating Bell*
216 *Rubber Washer*
217 *Iron Washer*
221 *Plug and Thumb Piece for Cock*
222 *Spring for Cock*
223 *Nut for Spring*
224 *Washer for Cock*
225 *Body for Cock*
226 *Cock Complete*
228 *⅛-in. x ⅜-in. Ell*
237 *¾-ft. Burner*
250 *Screw for No.* **357**
251 *Screw for Nos.* **353** *and* **364**
262 *Screw for Hinge*
263 *Screw for Catch*
264 *Screw for Thimble No.* **383**
265 *Screw for No.* **360**
276 *Wood Screw for Ventilating Bell No.* **214**
278 *Wood Screw for Body Ring*
351 *10-in. Opal Dome*
352 *10-in. Clear Glass Bowl*
352A *10-in. Opal Bowl*
353 *Reflector*
354 *Gas Way*
354A *Gas Way Tube*
355 *Body Casting*
356 *Bezel*
357 *Spun Globe Holder*
358 *Crown*
359 *Catch*
360 *Spring for Catch*
361 *Support for Catch*
362 *Hinge*
Hinge Pin
Brass Band for Body No. **355**
Pin and Clip for Catch No. **359**
363 *9-in. Clear Glass Bowl*
364 *Reflector*
365 *Wire Support and Nut*
366 *Gas Way Connection*
367 *Support for No.* **364**
368 *Lug for No.* **365**
369 *Wire Support and Nut*
370 *Burner Pillar*
376 *Body Ring*
377 *Ventilating Flue*
378 *Body for Cock*
379 *Plug for Cock*
380 *Thumb Piece for Plug*
381 *Cap for Cock*
382 *Cock Complete*
383 *Thimble*
384 *Washer for Cock*
385 *Spring for Cock*

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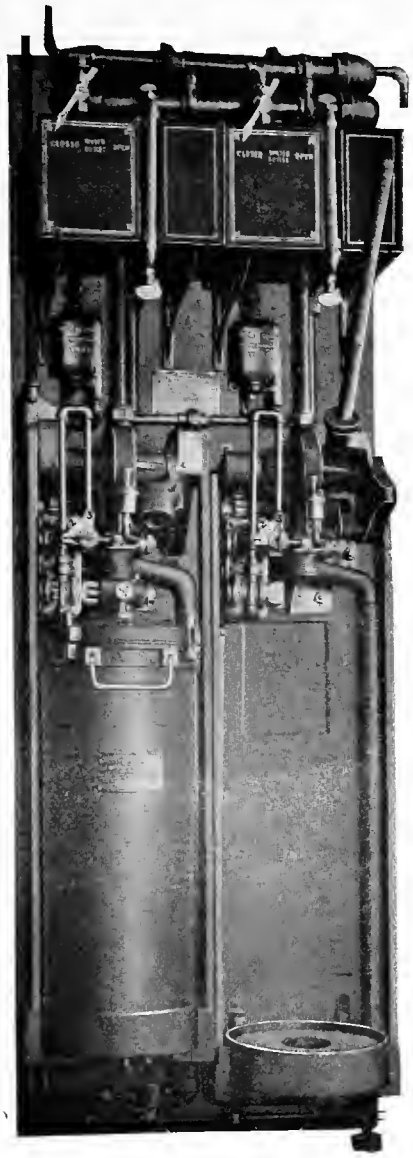


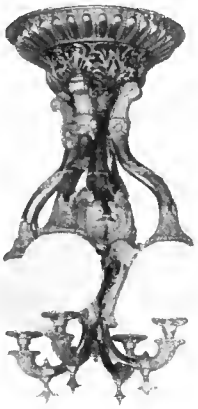


Fig. 3330.
Four-light Chandelier,
No. 754.

Figs. 3331-3332. Generating Apparatus and Removable Cartridge.

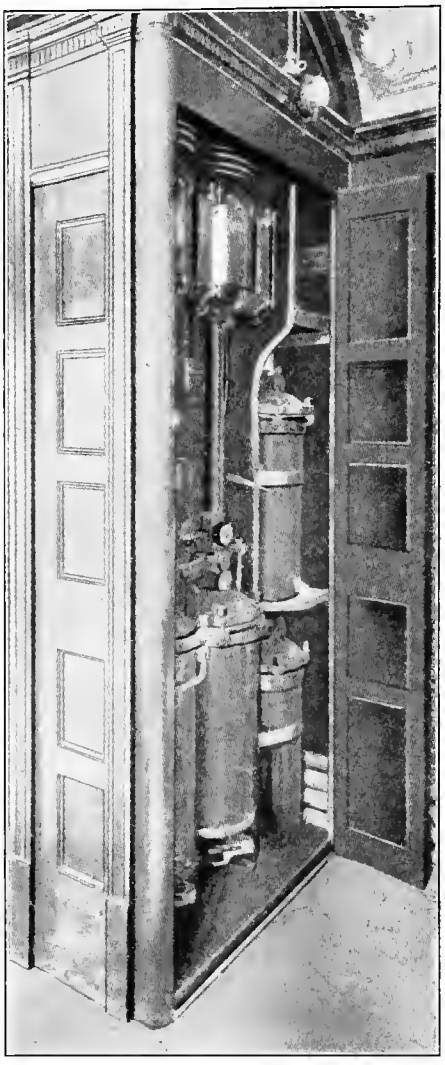


Fig. 3333. View Showing Location of Generator in Closet at End of Car.

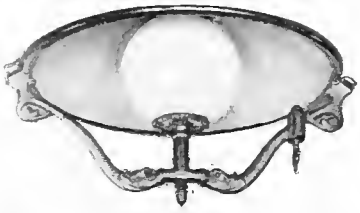


Fig. 3334. Vestibule Lamp, No. 709.

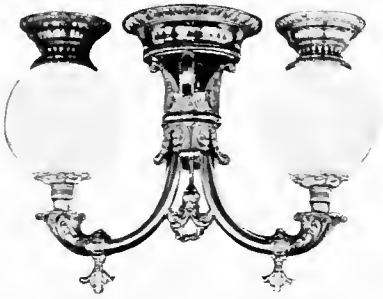


Fig. 3337. Two-light Chandelier,
No. 720.

Fig. 3338. One-light Oval
Corridor Lamp.
Adams & Westlake Co.

Fig. 3339.
Four-light Combination Gas and Electric Chandelier, No. 747.

Fig. 3340.
Combination Gas and Electric Side Bracket Lamp, No. 723.

Fig. 3341.
Oval Panel Lamp, No. 732.

Fig. 3342.
Panel Lamp for Passage Way, No. 766.

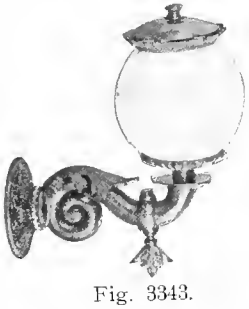


Fig. 3343.
Side Bracket Lamp, No. 738.

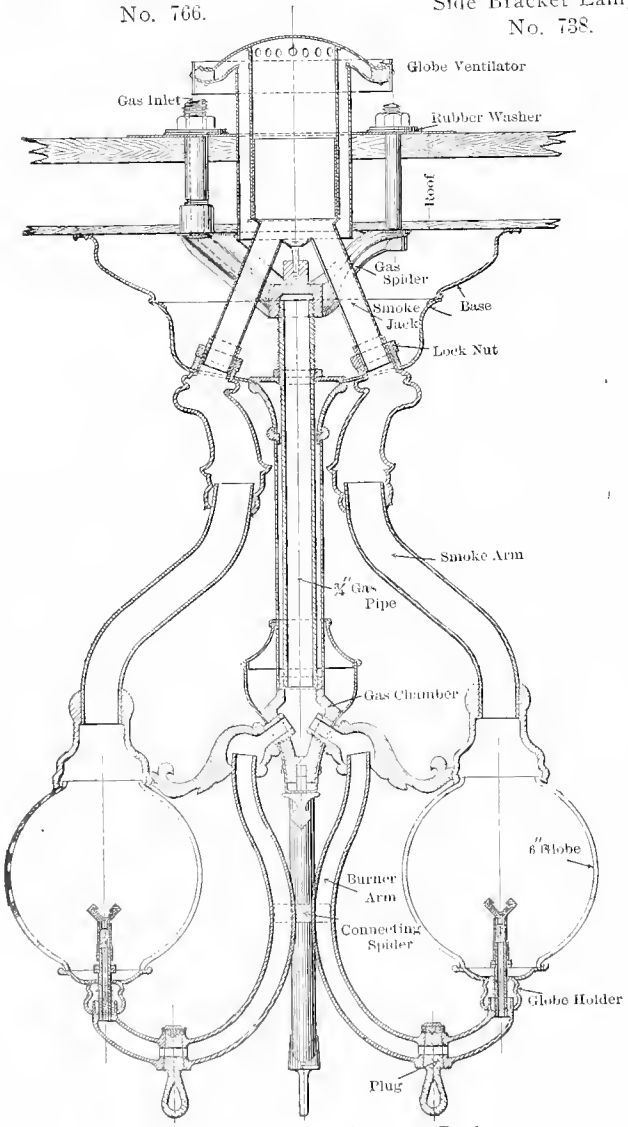


Fig. 3344. Section of Lamp Body.

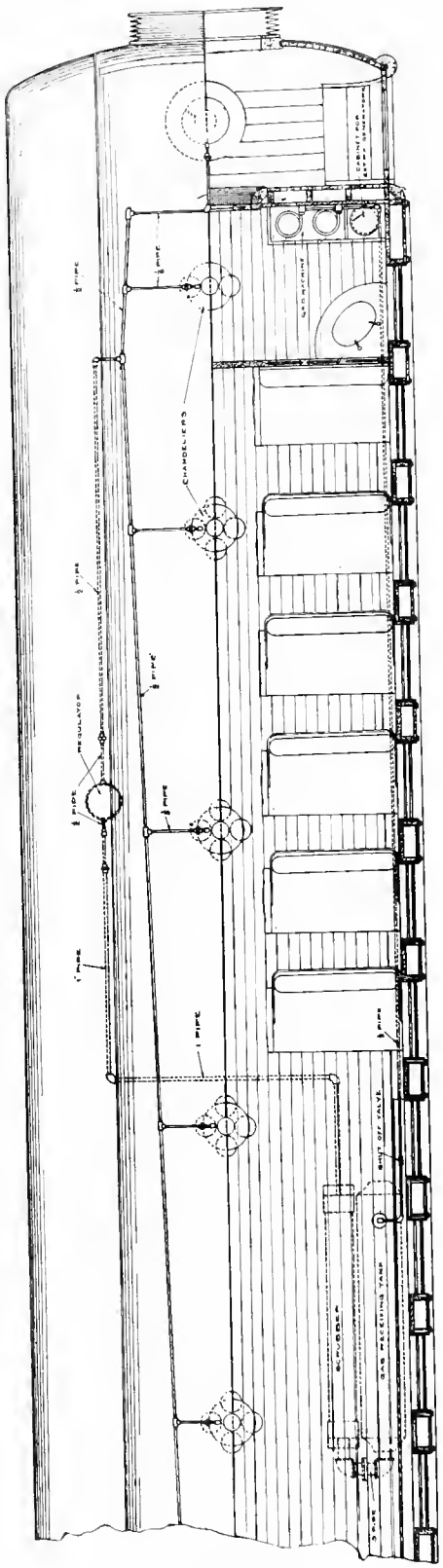


Fig. 3345.
Plan of Piping of Car.

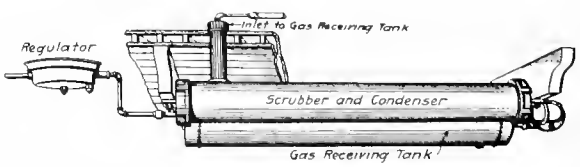


Fig. 3346.
Arrangement of Fixtures Under Car.

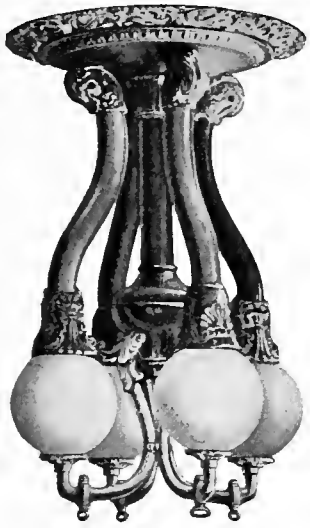


Fig. 3347. Four-light Chandelier, No. 772.

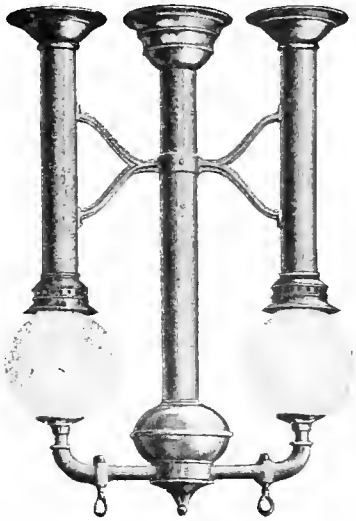


Fig. 3348. Two-light Chandelier, No. 764.

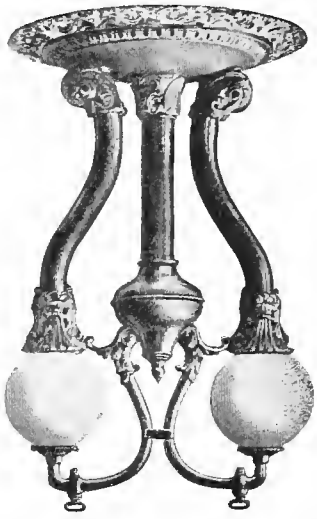


Fig. 3349. Two-light Chandelier, No. 770.

Fig. 3350. One-light Vestibule Chandelier, No. 798, for Flat Deck.

Fig. 3351. One-light Chandelier, No. 784.

Fig. 3352. Two-light Electric Bracket, No. 7290.

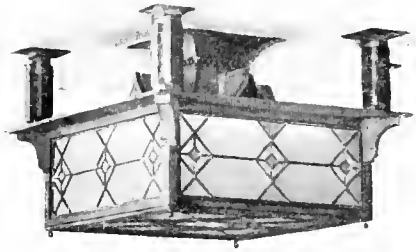


Fig. 3354. Four-light Chandelier, No. 792.

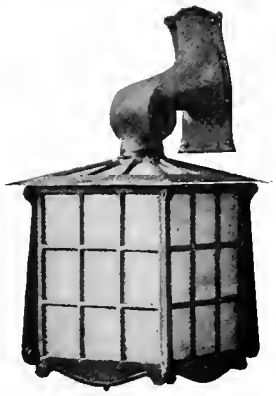


Fig. 3353. One-light Side Deck Lamp, Curved Foot for Empire Deck.

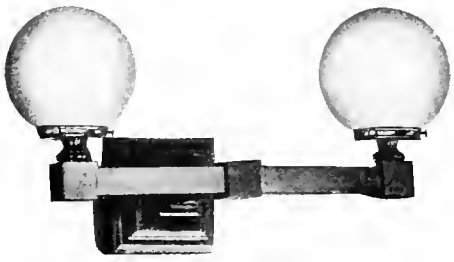


Fig. 3355. Two-light Electric Bracket, No. 7190a.

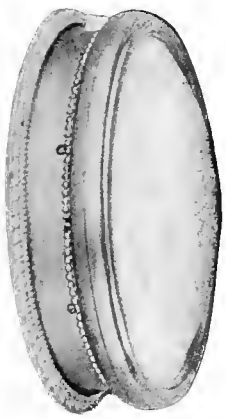


Fig. 3356. One-light Oval Panel Lamp.

Adams & Westlake Co.

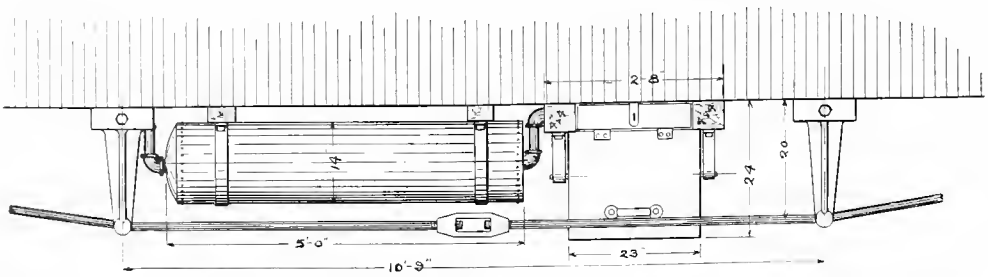


Fig. 3357. Application of Generator and Gas Tank Under Car.
Avery System of Acetylene Gas Lighting.

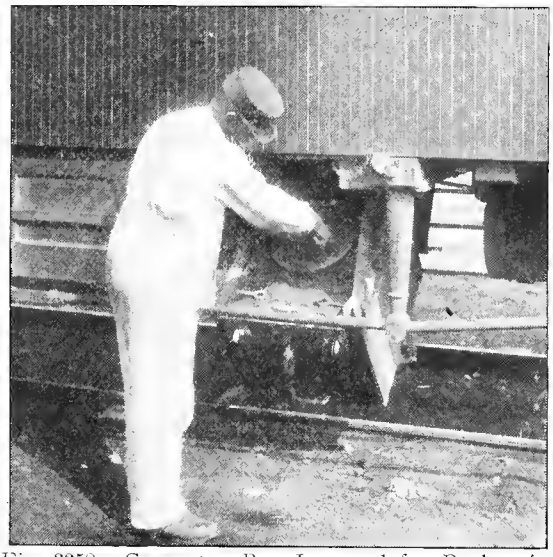


Fig. 3358. Generator Box Lowered for Recharging.

Fig. 3359. Generator Box Closed in Running Position.

Fig. 3360. Two-light Chandelier, No. 202.

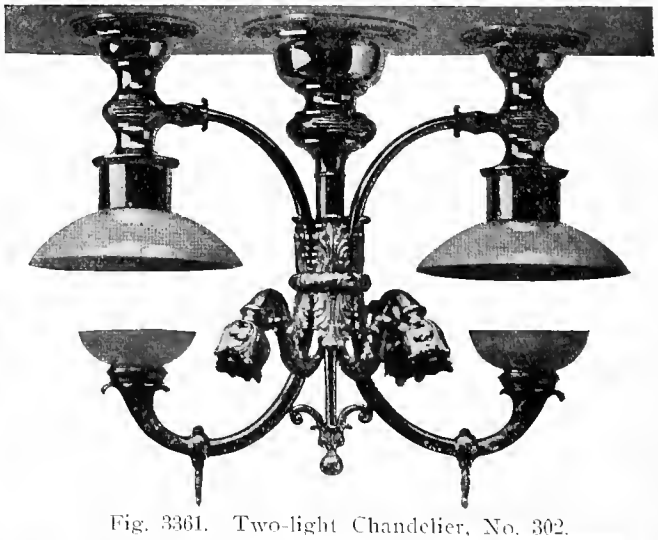


Fig. 3361. Two-light Chandelier, No. 302.

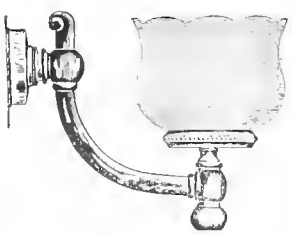


Fig. 3362.

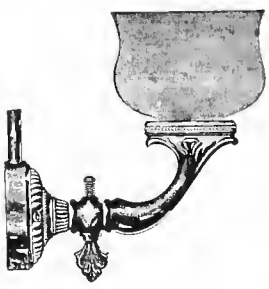
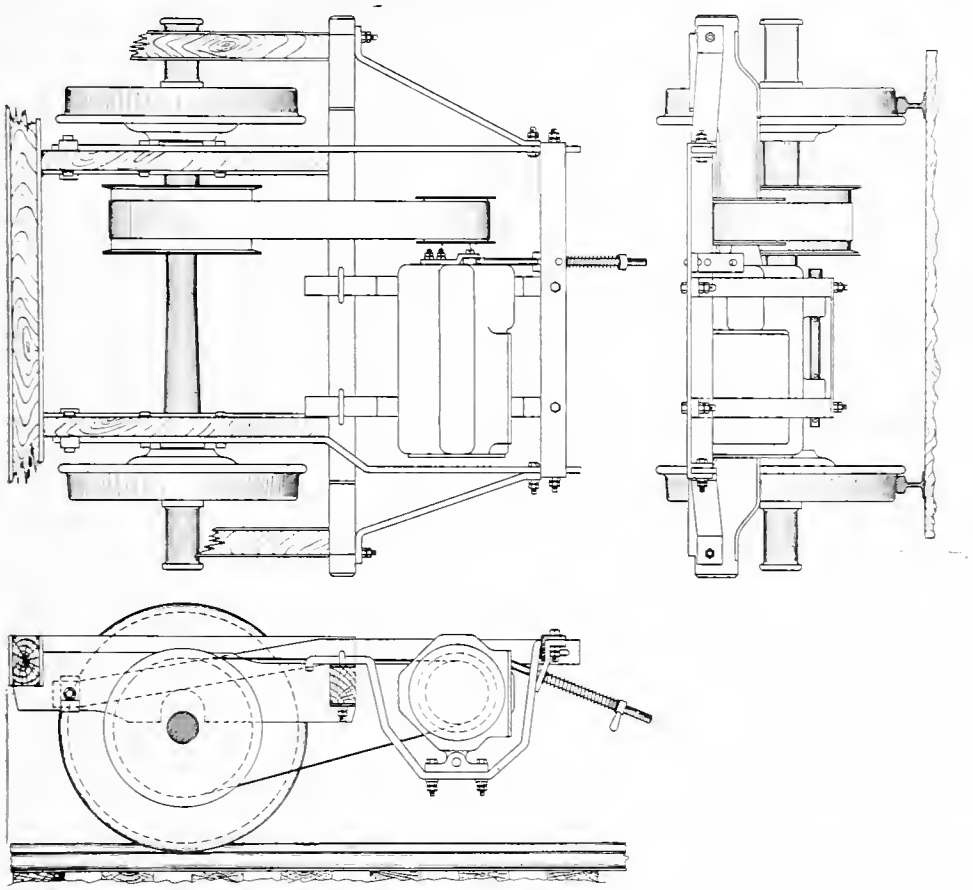


Fig. 3363.
Bracket Gas Lamps.
Dayton Manufacturing Co.

Fig. 3364.



Figs. 3365-3367. Application of Generator to Truck. Newbold System of Electric Car Lighting.

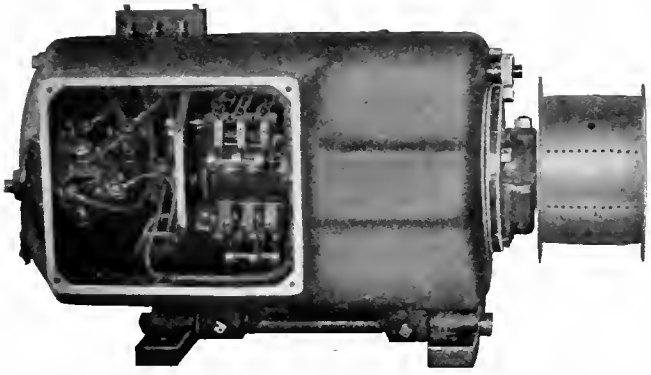


Fig. 3368. Generator with Casing Removed Showing Brushes.

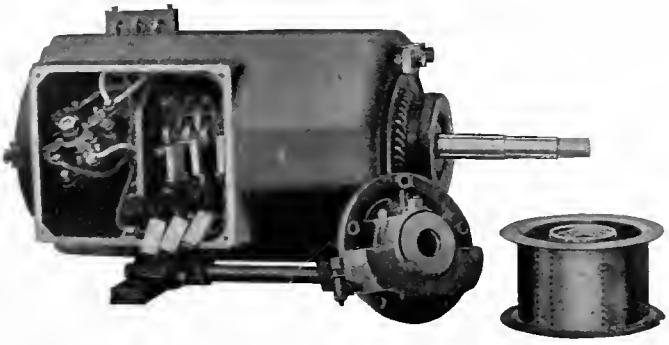


Fig. 3369. Generator with Casing and Pulley Removed and Brushes Taken Down.

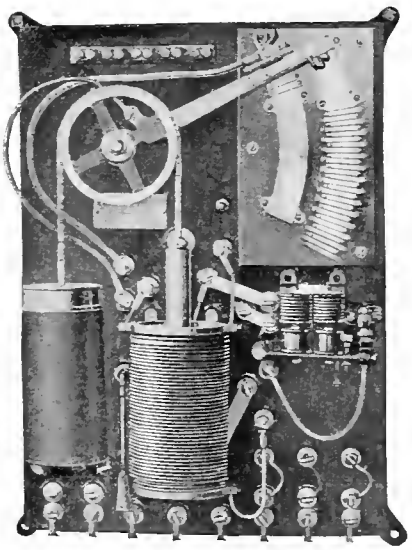
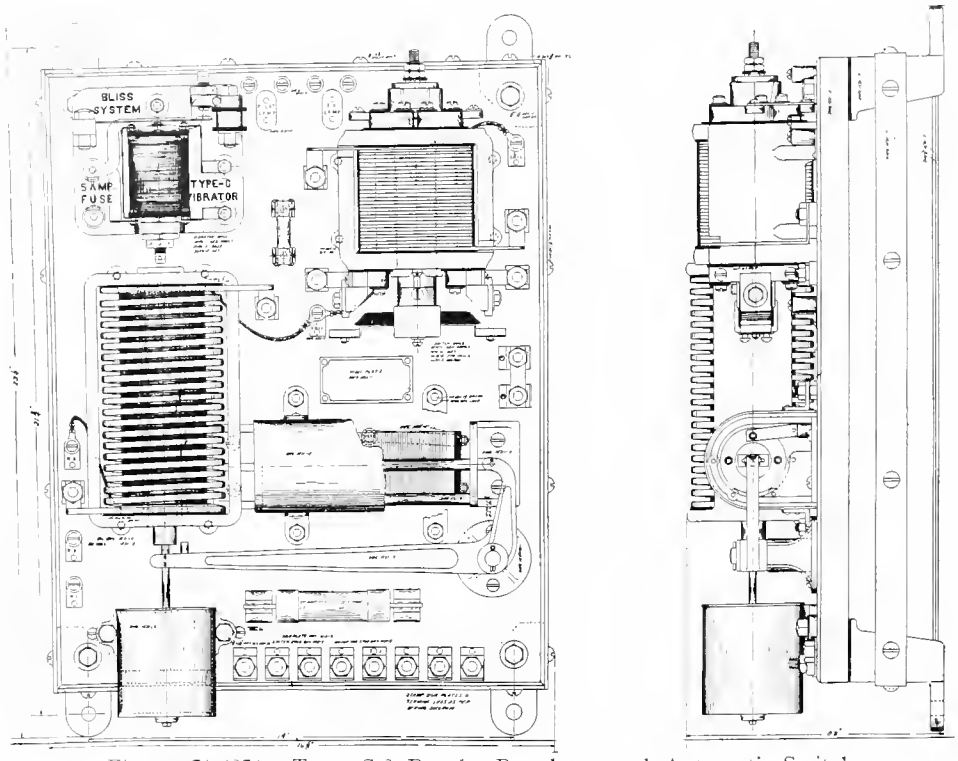
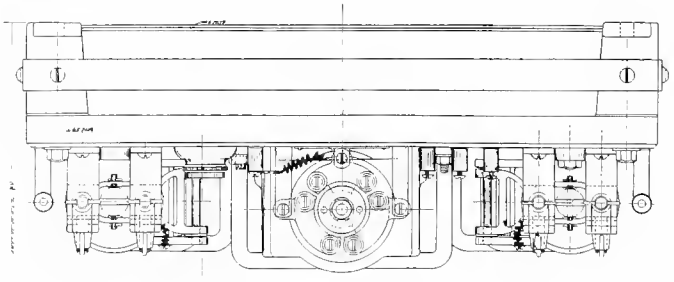


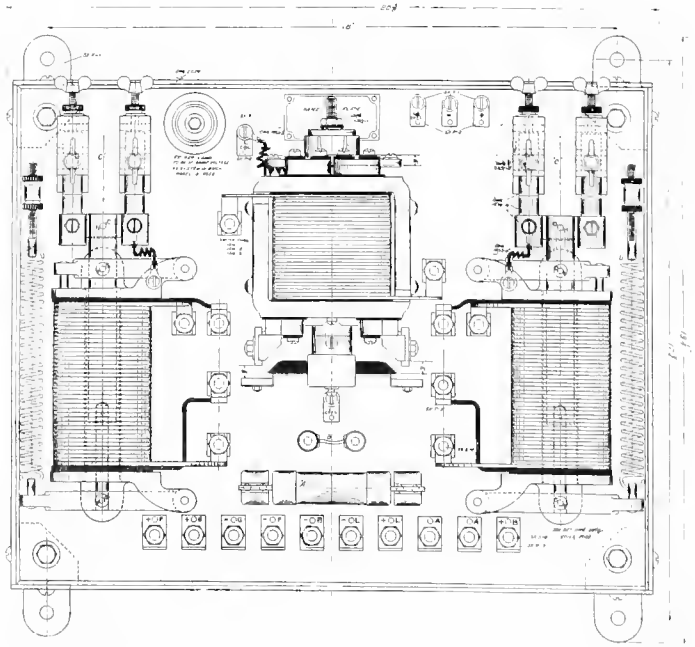
Fig. 3370. Automatic Regulator.

Adams & Westlake Co.



Figs. 3371-3372. Type C-2 Panel. Regulator and Automatic Switch.





Figs. 3373-3374. Type F Panel. Regulator and Automatic Switch.
The United States Light & Heating Co.

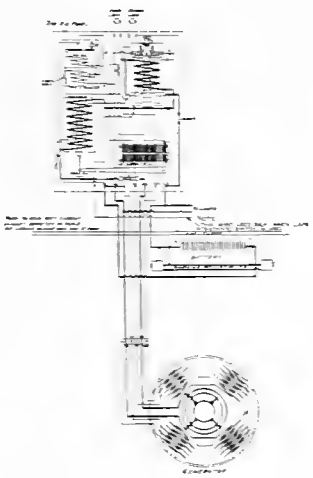


Fig. 3375. Wiring Diagram, Type C-2 Panel.

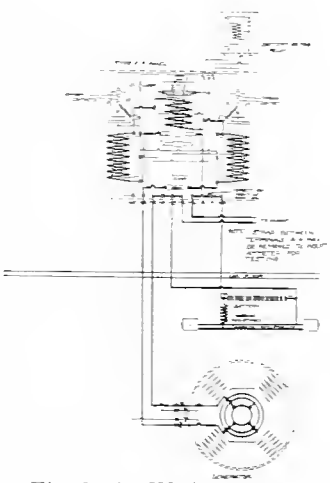


Fig. 3376. Wiring Diagram, Type F-7 Panel.

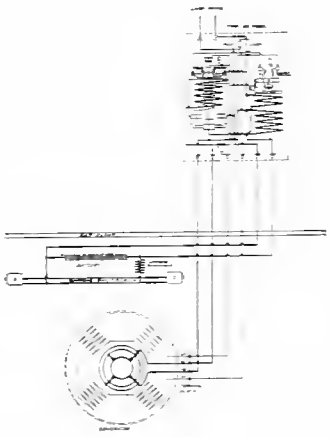


Fig. 3377. Wiring Diagram, Type E-2 Panel.

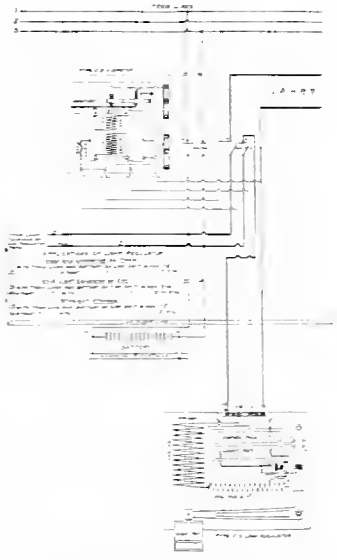


Fig. 3378. Wiring Diagram, Type C-3 Lamp Regulator.

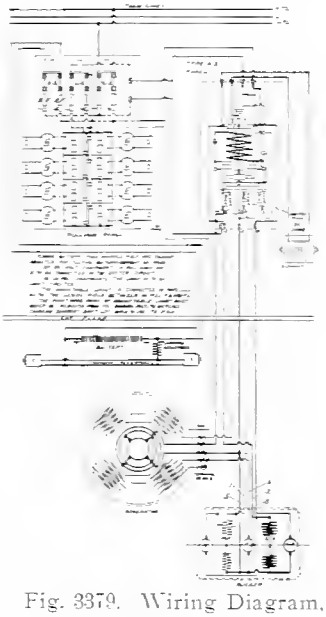
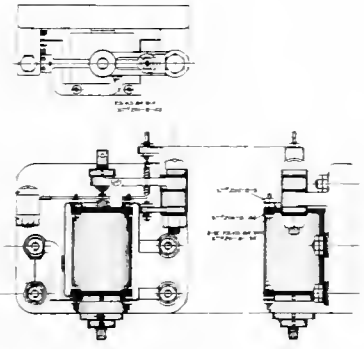
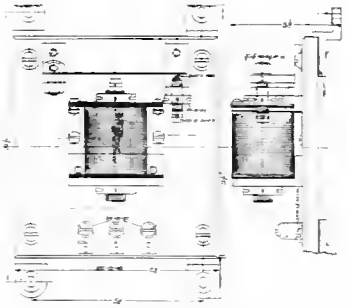


Fig. 3379. Wiring Diagram, Bucker System as Applied to Pullman Private Cars.



Figs. 3380-3382. Type C Lamp Regulator Vibrator or Relay.



Figs. 3383-3384. Battery Voltage Relay.

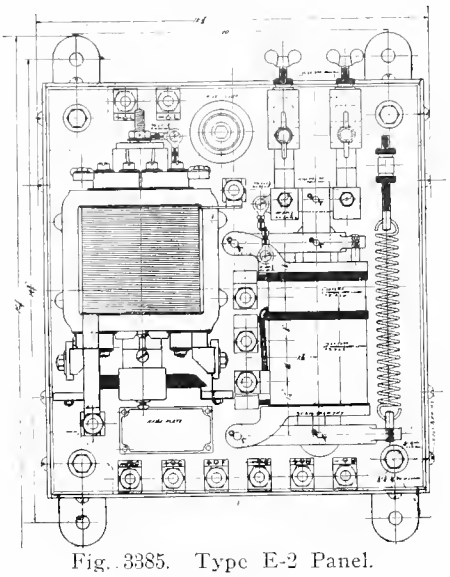
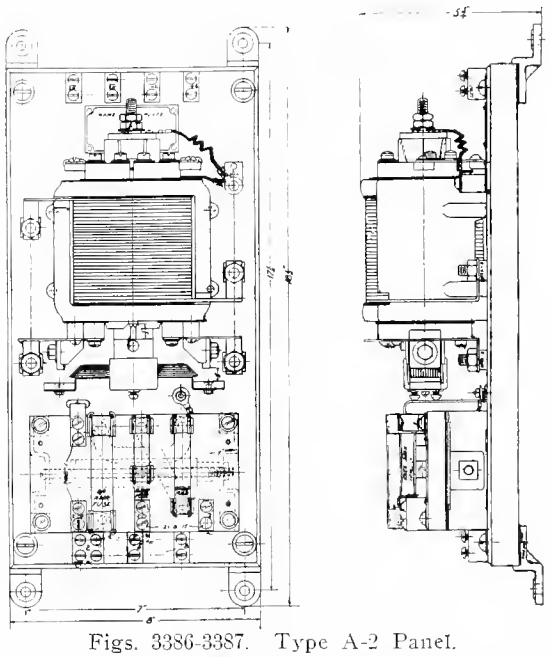
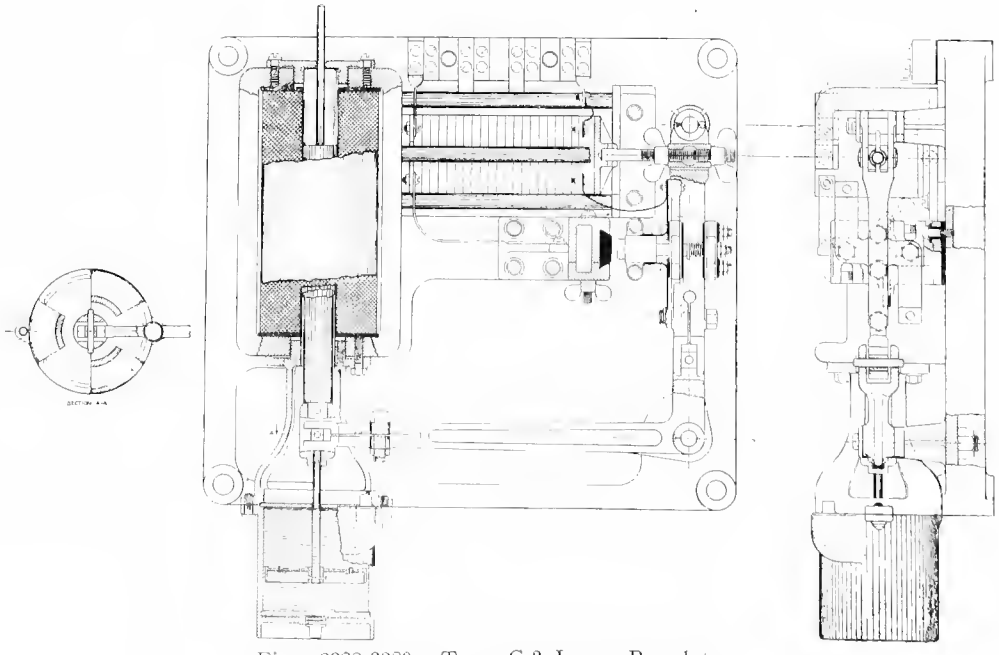


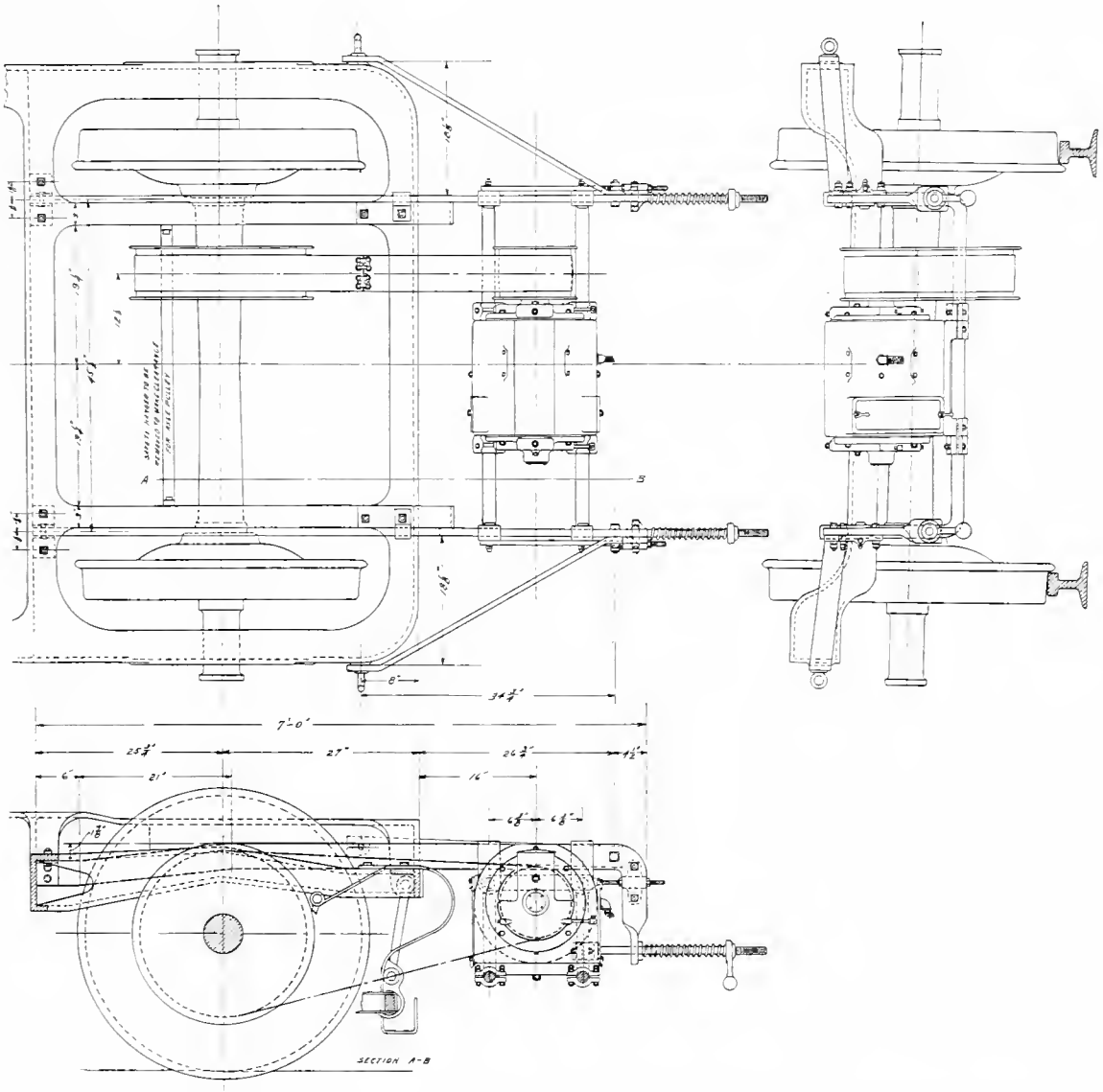
Fig. 3385. Type E-2 Panel.
Regulator and Automatic Switch.
"Export" Type.



Figs. 3386-3387. Type A-2 Panel.
Automatic Switch. Bucker System.



Figs. 3388-3389. Type C-3 Lamp Regulator.
The United States Light & Heating Co.



Figs. 3390-3392. Application of Type E Generator to Pullman Standard 106-S Steel Truck.

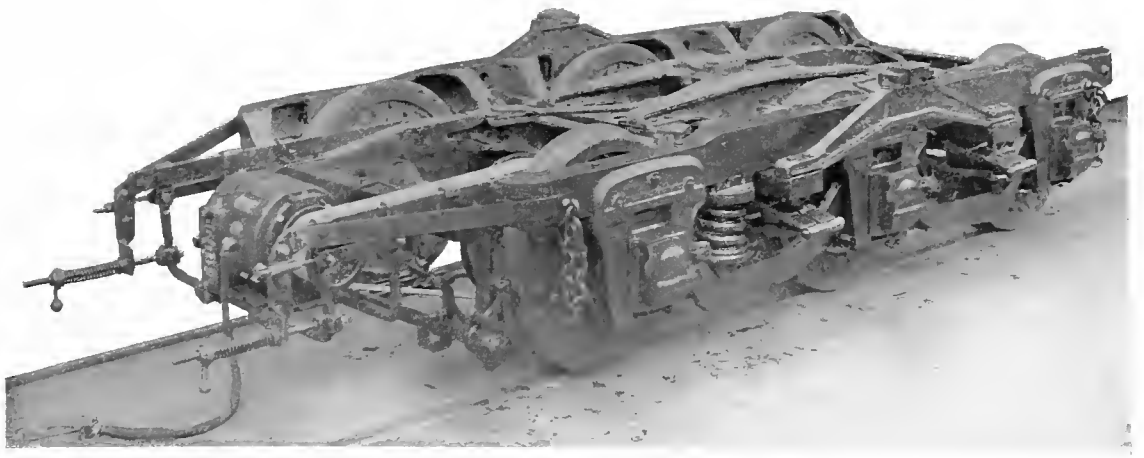
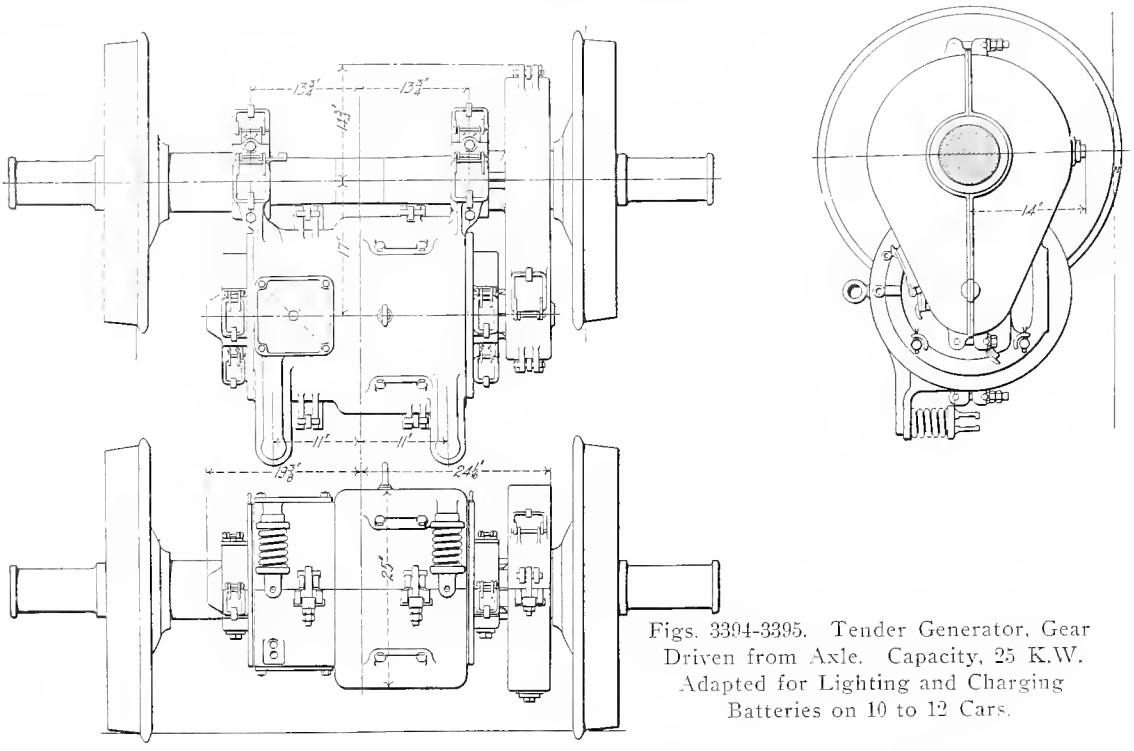
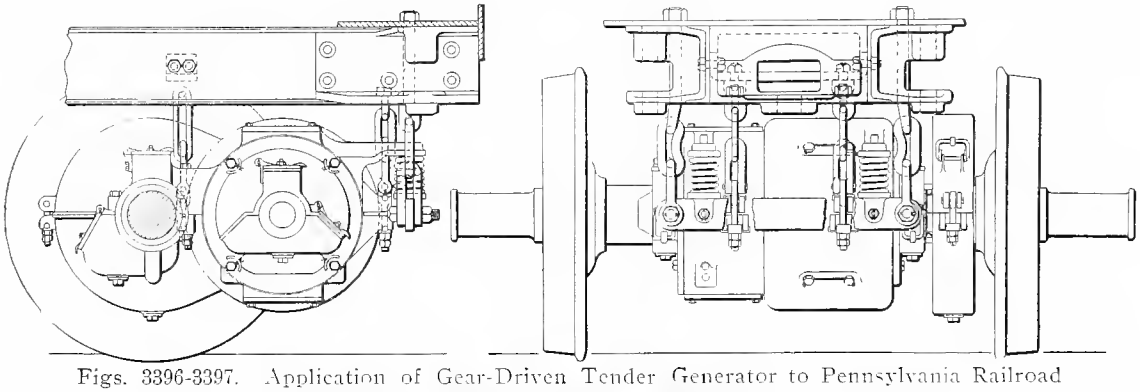


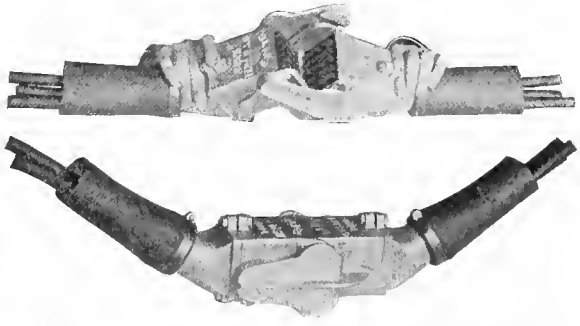
Fig. 3393. Pullman Standard 106 Truck with Type E Generator.
The United States Light & Heating Co.



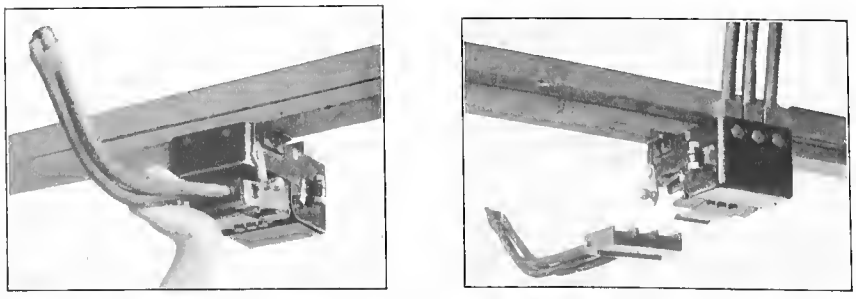
Figs. 3394-3395. Tender Generator, Gear Driven from Axle. Capacity, 25 K.W. Adapted for Lighting and Charging Batteries on 10 to 12 Cars.



Figs. 3396-3397. Application of Gear-Driven Tender Generator to Pennsylvania Railroad Tender, Showing Method of Suspension.



Figs. 3398-3399. Train Line Coupler, Steam Type, Adapted for Use Below Car Floor. Couples by Hand and Automatically Uncouples. Capacity, 300 Amperes.



Figs. 3400-3401. Train Line Coupler, Vestibule Type. Adapted for Overhead Use. Couples by Hand, Uncouples Automatically. The United States Light & Heating Co.

COMPLETE EQUIPMENT IS COMPOSED OF THE FOLLOWING:

1 Standard Generator
1 Polarity Changer
1 Dynamo Pulley
1 Standard Suspension
1 Axle Pulley, Belt, Plates and Rivets
1 Standard Regulator
1 or more Resistance Unit
1 Lamp Rheostat
1 Exciting Coil
1 Complete Coupling Block

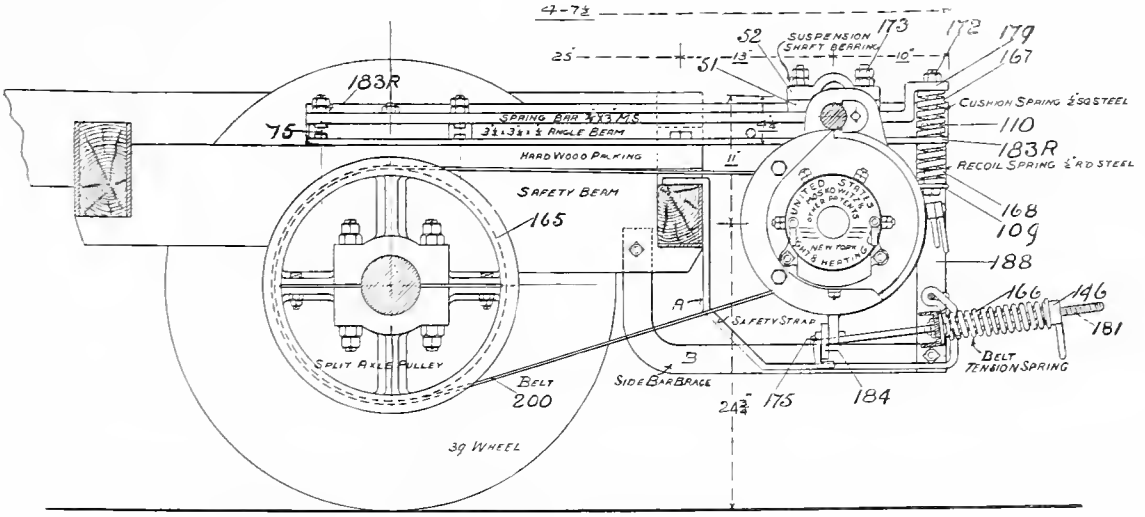


Fig. 3402. Application of Moskowitz Car Generator to Truck.

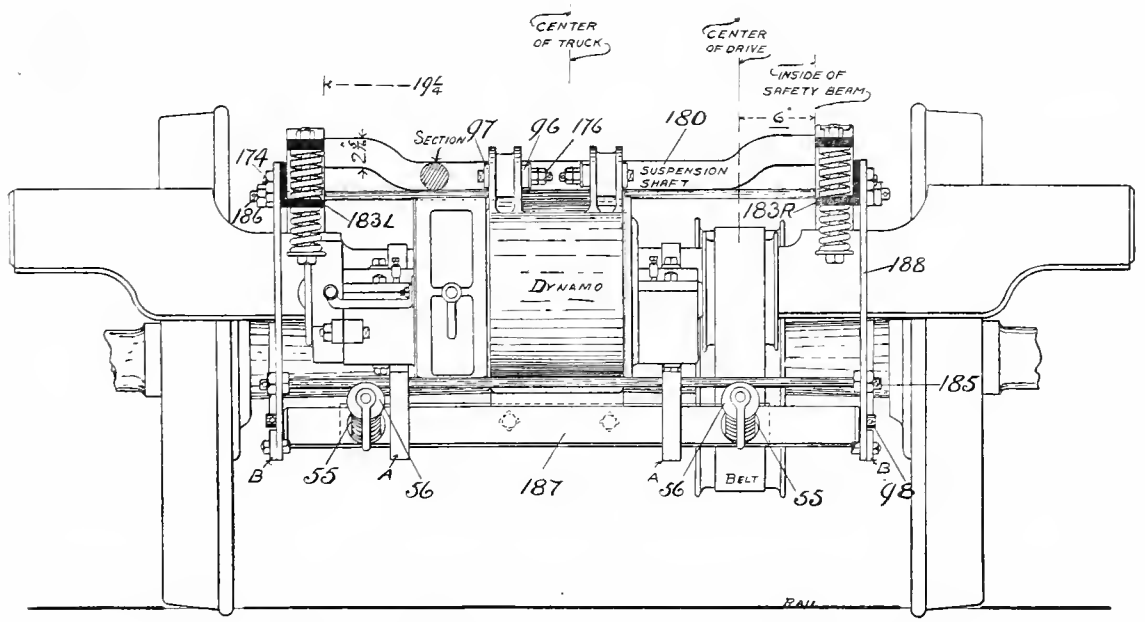
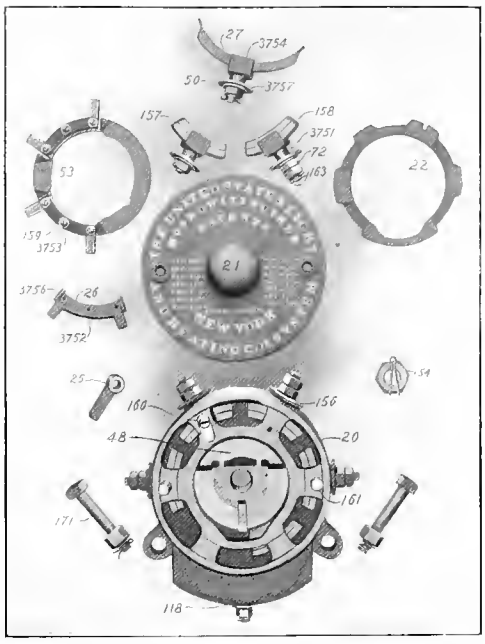


Fig. 3403. Application of Moskowitz Car Generator to Truck, Using Belt Drive.

Names of Parts of Moskowitz Generator Application. Figs. 3402-3403.

Cat. No.	Description.
51	*Suspension Shaft Boxes*
52	*Suspension Shaft Boxes Caps*
55	*Spring Washers (Double Guide)*
56	*Spring Fallowers (Single Guide)*
75	*Distance Block*
96	*Shaft Wedges*
97	*Shaft Shoes*
98	*Trunnion Ends and Pins*
109	*Recoil Spring Washers*
110	*Belt Guides*
146	*Gravity Nuts (for belt tension springs)*
165	*Axle Pulley*
166	*Belt Tension Spring*
167	*Springs, Cushion, Square Section*
168	*Springs, Recoil, Round Section*
172	*Bolts for Recoil Spring Nuts and Pins*
173	*Bolts, Hex. Nuts and Cotter Pins for Boxes*
174	*Bolts for Side Bar (Special)*
175	*Bolts for Tension Bar*
176	*Wedge Bolts with Hex. Nuts and Cotters*
179	*Spring Bars*
180	*Suspension Shaft*
181	*Hook Tension Bolts*
183R	*Angle Bar (Pulley Side)*
183L	*Angle Bar (Commutator Side)*
185	*Distance Rod*
186	*Distance Rod*
187	*Swivel Bar*
200	*Belt*

Numbers Refer to Lists of Names of Parts Below and with Figs. 3424-3425.



Figs. 3404-3412. Automatic Polarity Changer and Parts.

Names of Parts of Polarity Changer. Figs. 3404-3412.

Cat. No.	Description.
20	*Polarity Changer Case*
21	*Polarity Changer Door*
22	*Guide Ring*
25	*Polarity Changer Door Gravity Nuts*
26	*Switch Tongues (Bronze)*
27	*Short Circuit Contact Bar*
48	*Polarity Changer Latch*
50	*Brass Washers*
53	*Switch Ring*
72	*Nuts, Brass*
118	*Terminal Cover and Bolt*

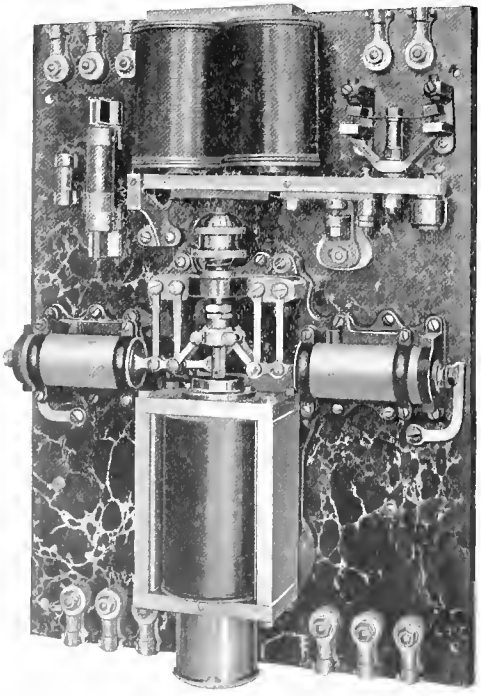


Fig. 3419. Automatic Regulator and Switch.

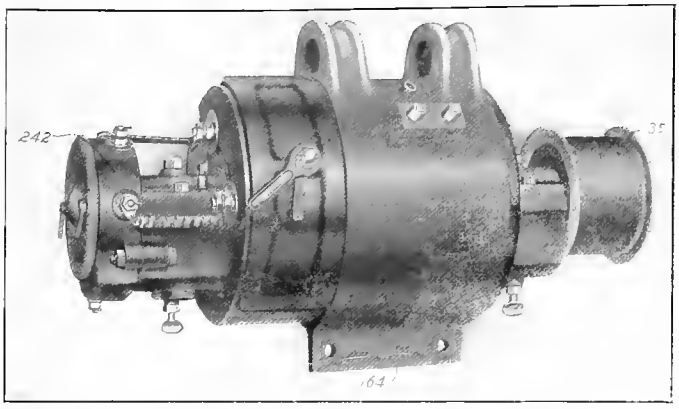
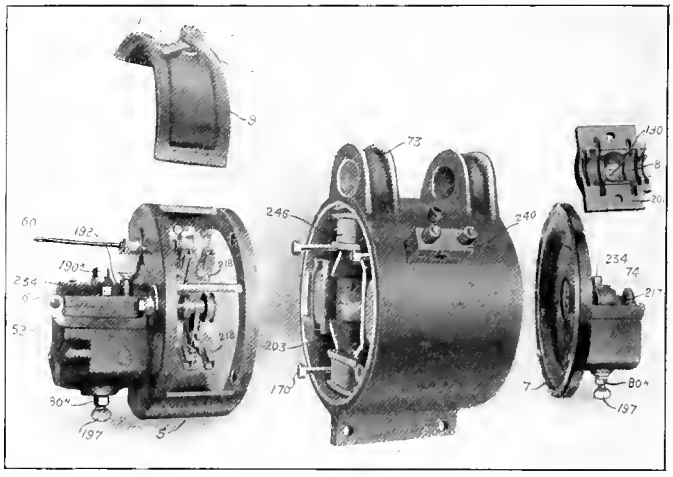


Fig. 3413. Car Lighting Generator, 30 or 60 Volts.



Figs. 3414-3418. Head, Field and Parts of Car Lighting Generator.

Cat. No.	Description.
154	*Nut (hex.) and Cotter for Polarity Changer Latch*
156	*Stop Screw for Guide Ring*
157	*P. C. Contact Post, Short*
158	*P. C. Contact Post, Long*
159	*Machine Screws and Washers*
161	*Polarity Changer Door Studs*
163	*Cotter Pins*

Cat. No.	Description.
171	*Bolts, Machine*
3751	*Insulating Bushings*
3752	*Insulating Bushings*
3753	*Insulating Washers*
3754	*Insulator Shoes*
3756	*Insulating Segments*
3757	*Insulating Washers*

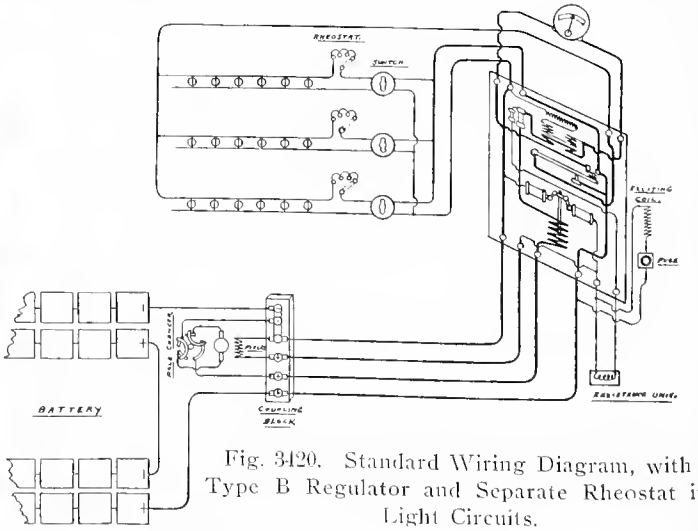


Fig. 3420. Standard Wiring Diagram, with Type B Regulator and Separate Rheostat in Light Circuits.

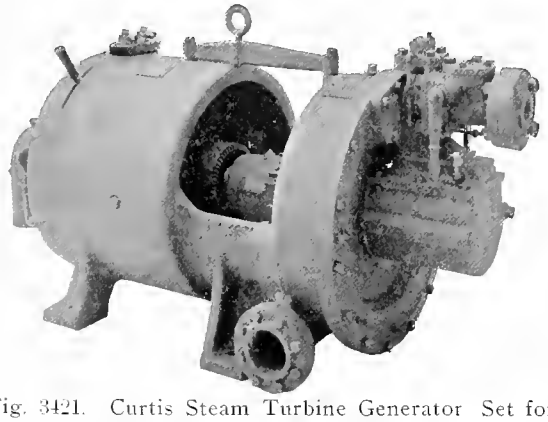


Fig. 3421. Curtis Steam Turbine Generator Set for Train Lighting, Baggage Car Type. General Electric Co.

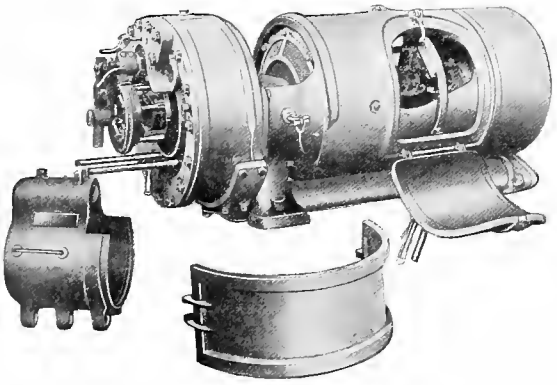


Fig. 3422. Curtis Steam Turbine Generator Set for Train Lighting, Locomotive Type. Open. General Electric Co.

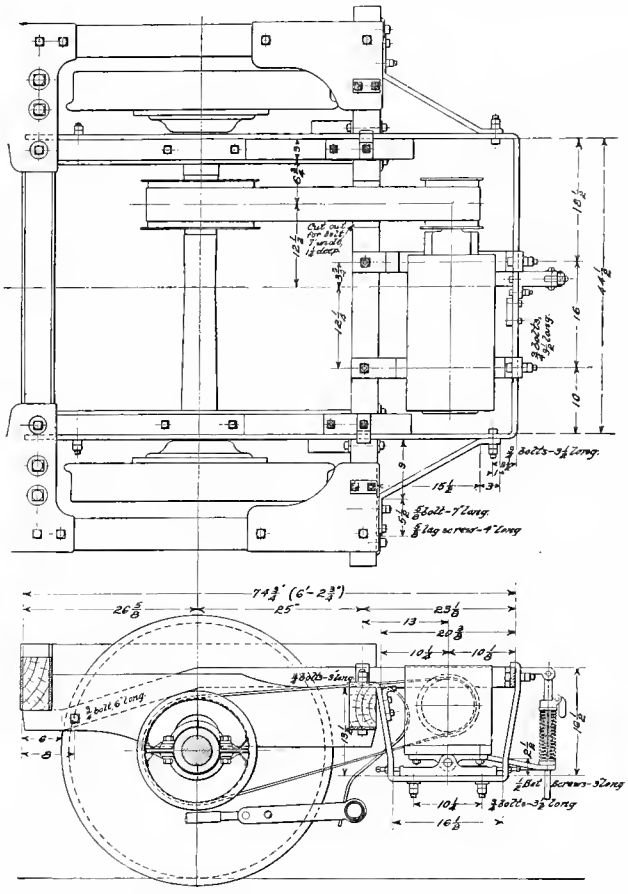


Fig. 3423. Application of Generator, Type A, to Four-Wheel Truck. Consolidated Railway Electric Lighting & Equipment Co.

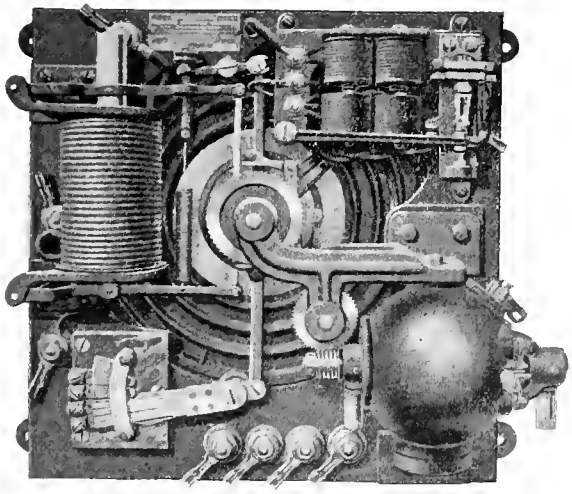


Fig. 3424. Regulator for Type A Equipment.

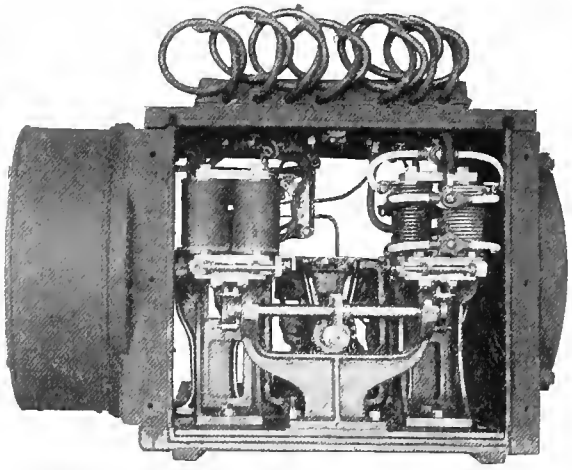


Fig. 3426. Regulator, Type D, with Cover Removed. Consolidated Railway Electric Lighting & Equipment Co.

Names of Parts. Figs. 3414-3418.

Cat. No.	Description.
5	*Dynamo Head, Commutator End*
6	*Bearing Cap*
7	*Dynamo Head, Pulley End*
8	*Bearing Cap*
9	*Commutator Door*
19	*Commutator Door Latch*
19A	*Commutator Door Hook*
35	*Dynamo Pulley, 8 in.*
	Dynamo Pulley, 9 in.
	Dynamo Pulley, 10 in.
59	*Brush Connector, Bottom*
60	*Brush Connector, Top*
73	*Steel Dynamo Field*
74	*Bearing*
80N	*Overflow Pipe*
146	*Gravity Nuts for above*
164	*Complete Generator*
170	*Bolts, with Nuts, Washers and Cotters*
190	*Bearing Stop*
190A	*Bearing Stop, Screw and Nut*
192	*Oil Pipes, Complete*
197	*Thumb-screw*
203	*Field Wedges, Fiber*
207	*Leather Gasket for Bearing Cap*
217	*Oil Rings*
218	*Brush Holders*
234	*Cap Screws*
240	*Clamping Block*
242	*Polarity Changer, Complete*
246	*Field Coils*

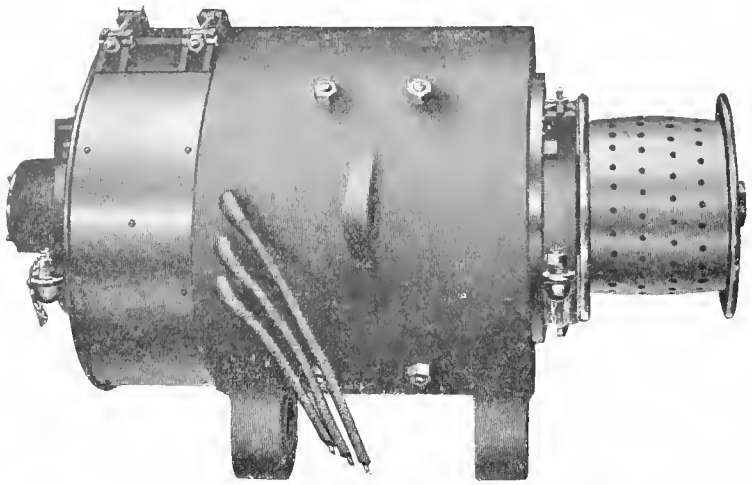


Fig. 3427. Axle Lighting Generator Complete.

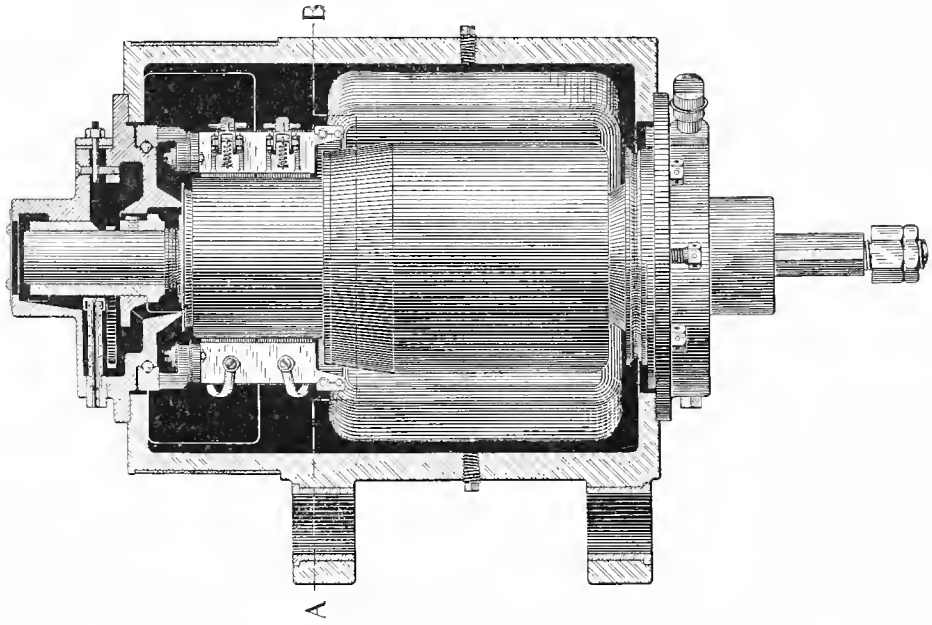


Fig. 3428. Section Through Axle Lighting Generator.

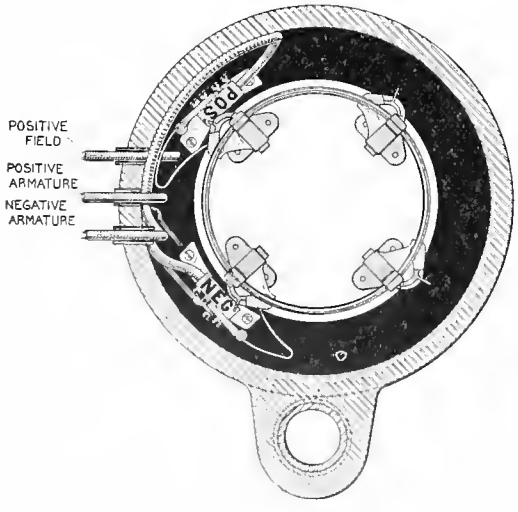


Fig. 3429. Section A-B Through Generator.

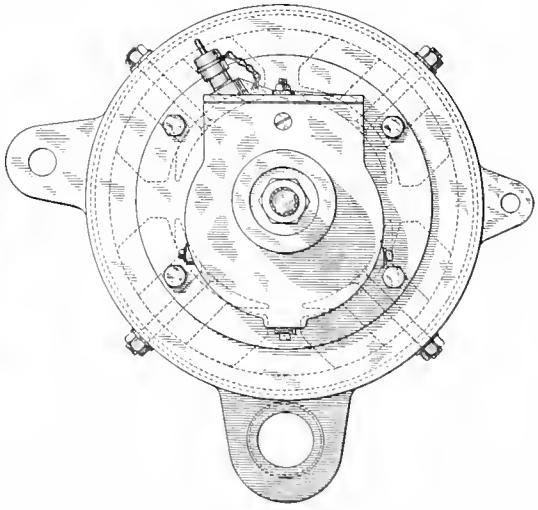
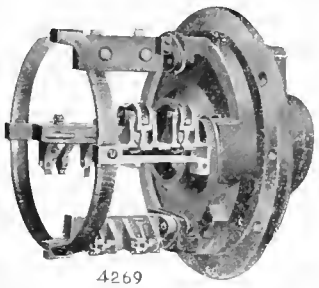


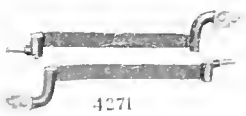
Fig. 3430. End Elevation of Generator.

The Safety Car Heating & Lighting Co.



4269

Fig. 3431. Front Head for Generator, with Brush Rocker.



4271

Figs. 3431-3432. Flexible Leads.

4268

Fig. 3433. Back Head for Generator.

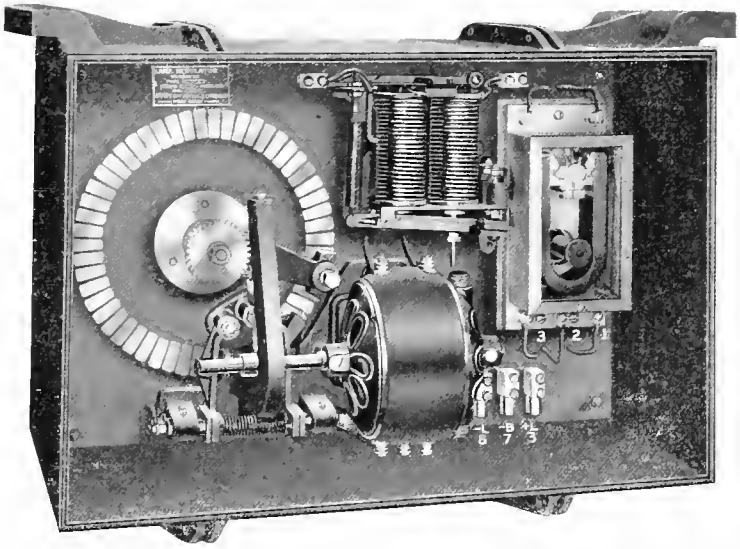


Fig. 3434. Lamp Regulator. Type "A" Equipment.
(Applied Under Car.)

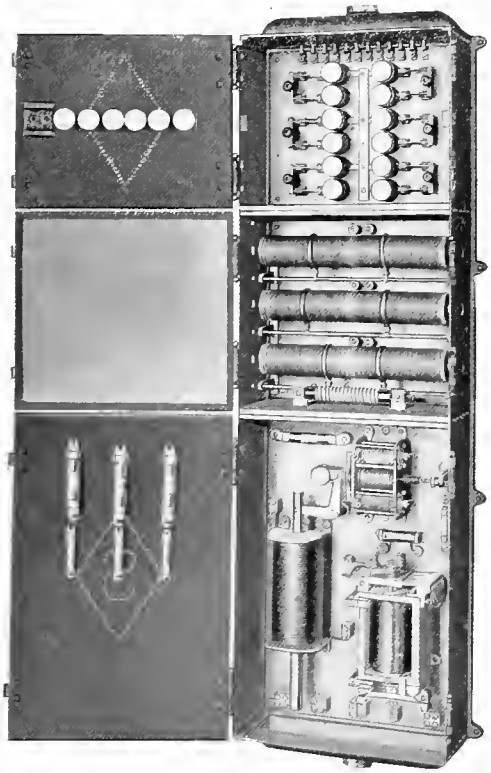


Fig. 3435. Arrangement of Type "B" Generator and Lamp Regulator.
(Applied In Car.)

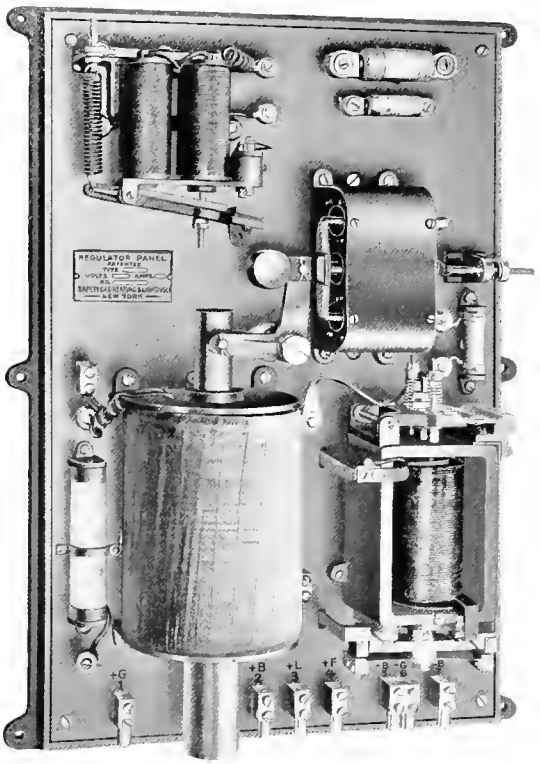


Fig. 3436. Lamp Regulator, Type "A" Equipment.
(Applied In Car.)

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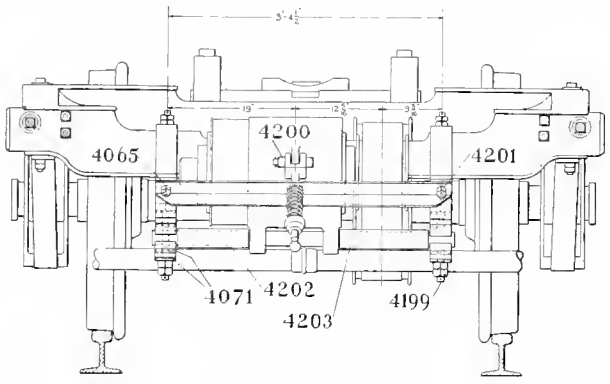
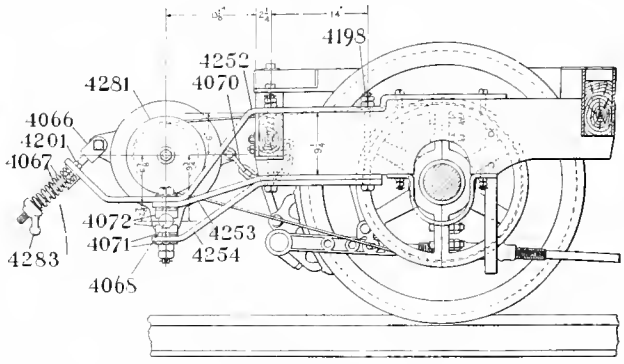


END ELEVATION



SIDE ELEVATION
(WHEEL REMOVED)

Figs. 3437-3438. General Method of Supporting Dynamo on Six-Wheel Truck.

Names of Parts of Figs. 3437-3438.

Cat. No.	Description.
4060	*Strap for Belt Shield*
4065	*Angle Iron*
4066	*1-in. Eye Bolt*
4067	*Spring*
4068	*2 3-16-in. Steel Shafting, 3 ft. 9½ in. Long*
4070	*Safety Chain*
4071	*Washer*
4072	*Saddle*
4198	*¾-in. Bolt*
4199	*1-in. Bolt, 9¼ in. Long*
4200	*1-in. Bolt, 4 in. Long*
4201	*¾-in. Bolt, 3 in. Long*
4202	*Pipe Filler for Shaft, Short*
4203	*Pipe Filler for Shaft, Long*
4249	*Strap for Belt Shield*
4250	*Belt Shield*
4252	*Upper Supporting Iron*
4253	*Middle Supporting Iron*
4254	*Lower Supporting Iron*
4255	*Shield for Dynamo Pulley*
4281	*Dynamo Pulley, 9-in. Diameter, 6-in. Face*

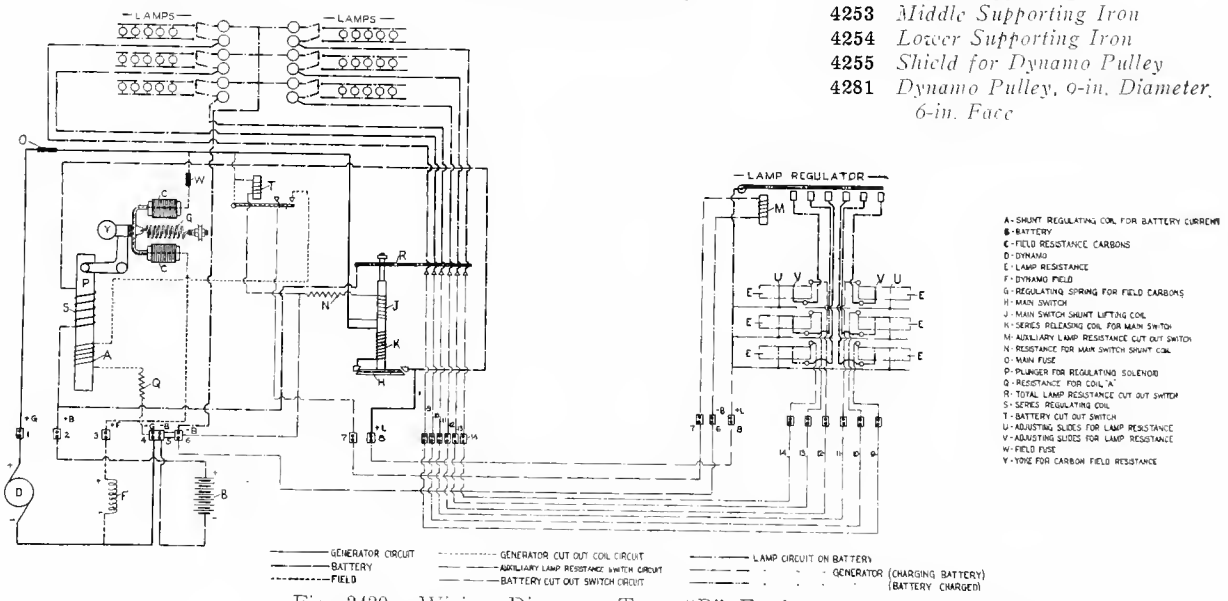


Fig. 3439. Wiring Diagram, Type "B" Equipment.

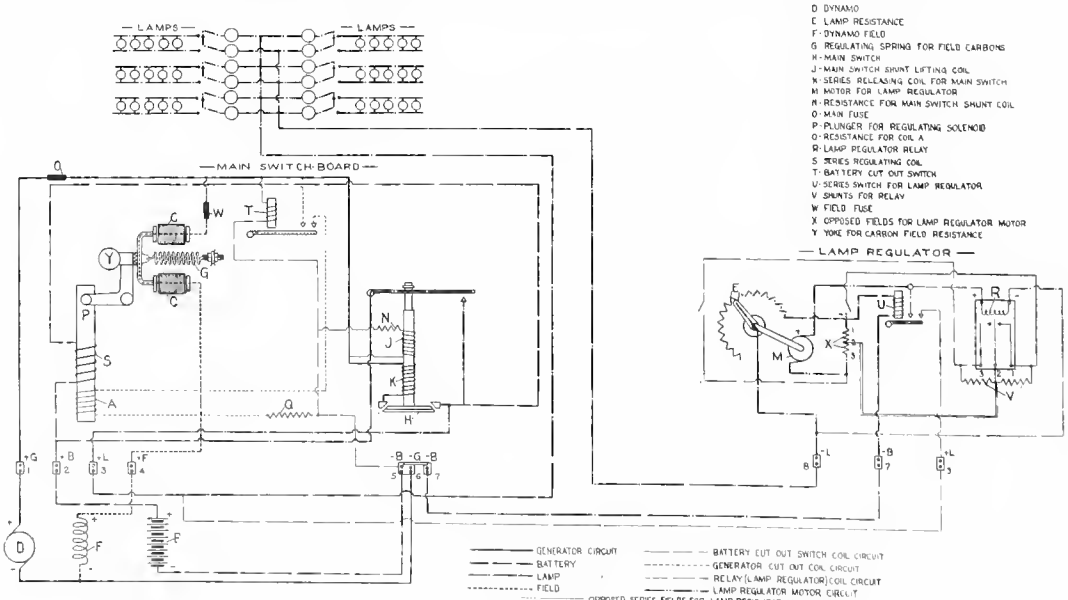


Fig. 3440. Wiring Diagram, Type "A" Equipment.

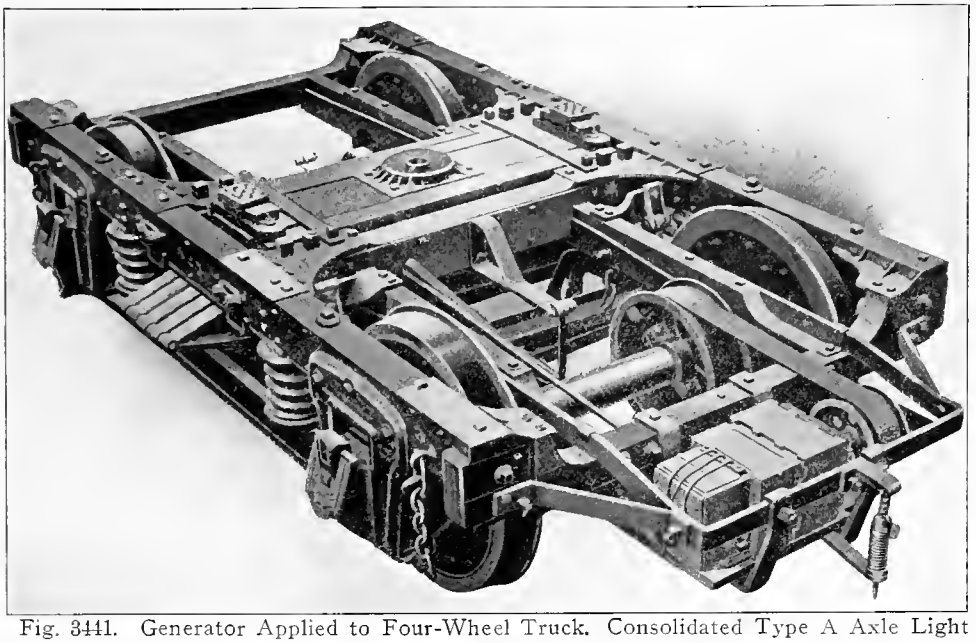


Fig. 3441. Generator Applied to Four-Wheel Truck. Consolidated Type A Axle Light System for Day Coaches and Chair Cars. Consolidated Railway Electric Lighting & Equipment Co.

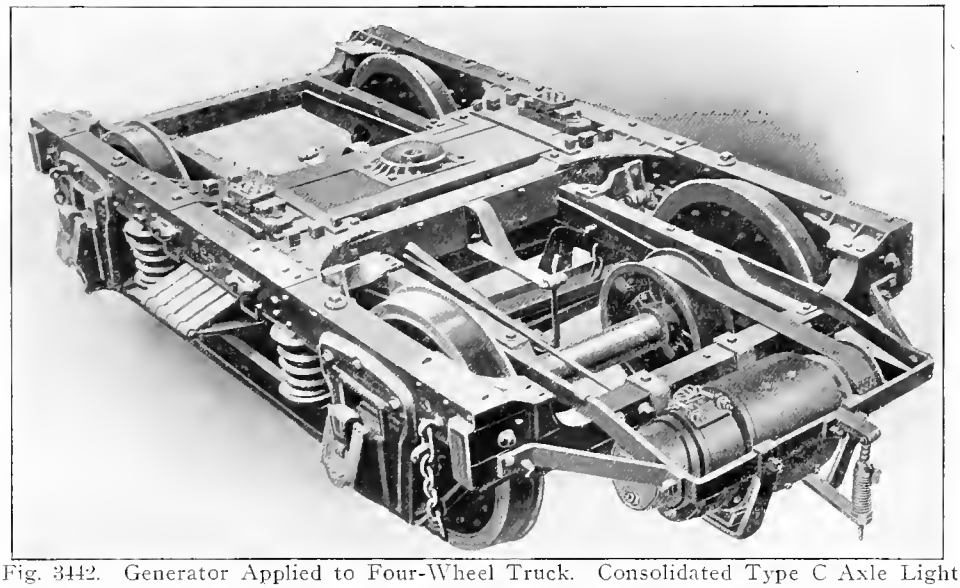


Fig. 3442. Generator Applied to Four-Wheel Truck. Consolidated Type C Axle Light System for Dining, Sleeping and Private Cars. Consolidated Railway Electric Lighting & Equipment Co.

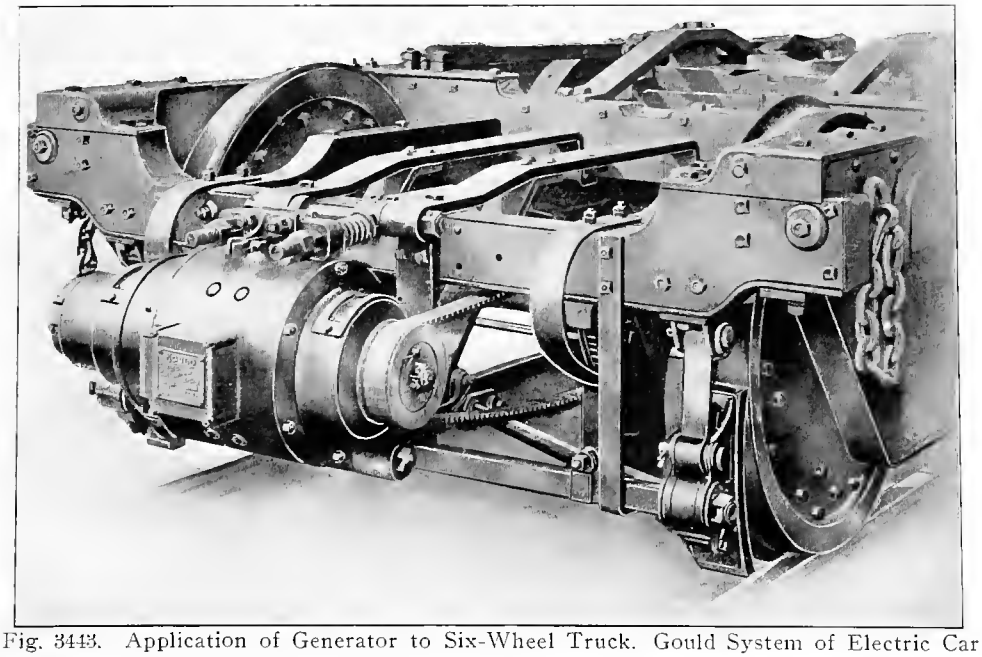


Fig. 3443. Application of Generator to Six-Wheel Truck. Gould System of Electric Car Lighting. Gould Coupler Co.

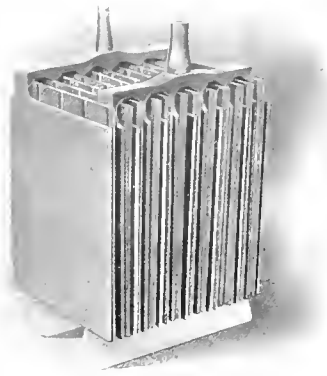


Fig. 3444. Element on Bottom Rests.

Fig. 3445. Cable Connector, Style A.

Fig. 3446. Cable Connector, Style B.

Figs. 3447-3449. Negative and Positive Terminal Bushings and Hard-Rubber Vent.

Fig. 3450. Perforated Hard-Rubber Separator.

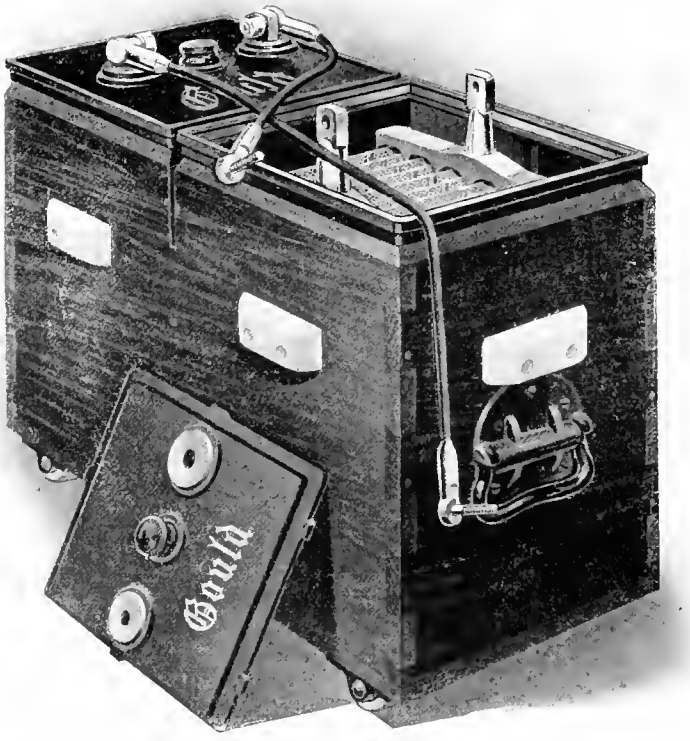


Fig. 3451. Two-Cell Unit Complete in Lead Lined Tank.

Fig. 3452. Hard-Rubber Insulating Sheet.

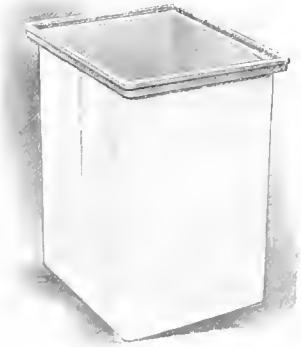


Fig. 3453. Crowned Lead Lining.

Fig. 3454. Hard Rubber Cover, Sealed Type.

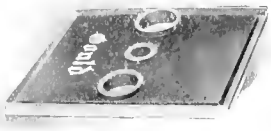


Fig. 3455. Hard Rubber Cover, Soft Edge Type. Gould Storage Battery Co.

Fig. 3456. Hard Rubber Jar.

Fig. 3457. Lead Lining for Type EP-13 Storage Battery.

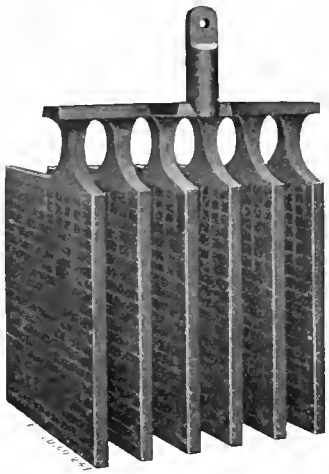


Fig. 3458. Tudor Positive Group for Type EC-13 Storage Battery.

Fig. 3459. Rubber Jar for Type EP-13 Storage Battery.

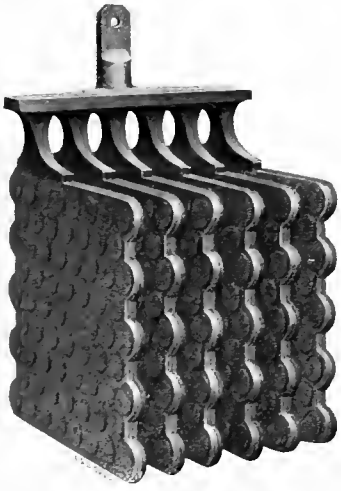


Fig. 3460. Manchester Positive Group for Type ECS-13 Storage Battery.

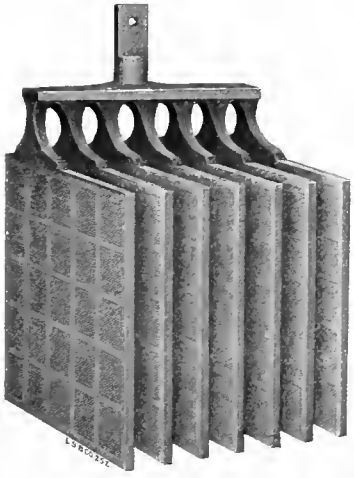


Fig. 3461. Box Negative Group for Type ECS-13 Storage Battery.

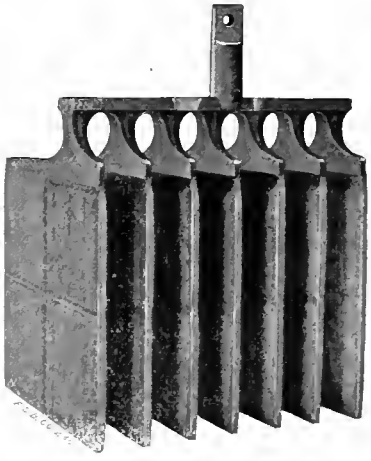


Fig. 3462. Rolled Negative Group for Type ECS-13 Storage Battery.

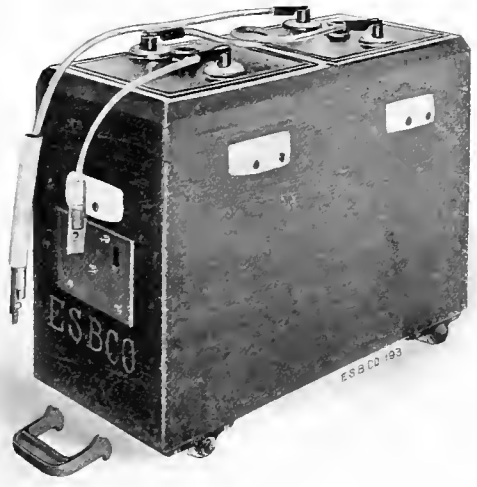
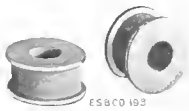


Fig. 3463. Two-Cell Unit of Type EP-13 Storage Battery in Lead Lined Tank with Special Connectors.

Fig. 3464. Two-Cell Unit of Type EP-11 Storage Battery in Rubber Jars, Wood Crate.

The Electric Storage Battery Co.



Figs. 3465-3466. Sponge Rubber Terminal Bushings for Type E P Storage Battery Cover, Positive and Negative.

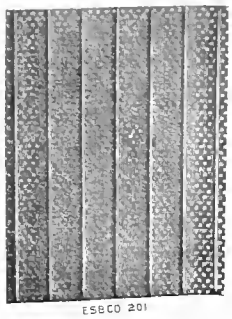


Fig. 3467. Ribbed and Perforated Rubber Separator for Type EP Storage Battery. (Ribbed on Both Sides.)

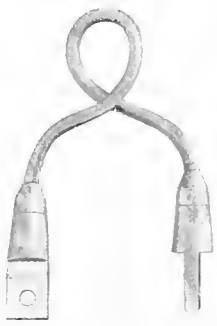


Fig. 3468. Cable Connector, No. 7290.

Fig. 3469. Cable Connector, No. 7292.

Fig. 3470. Bolt Connector, No. 7080.

Fig. 3471. Lead Protector Cap, No. 7090.

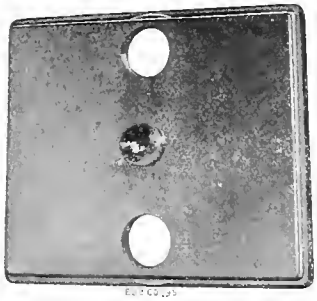


Fig. 3472. Hard Rubber Cover for Type EP Storage Battery Cell, Showing Hard Rubber Vent Plug.

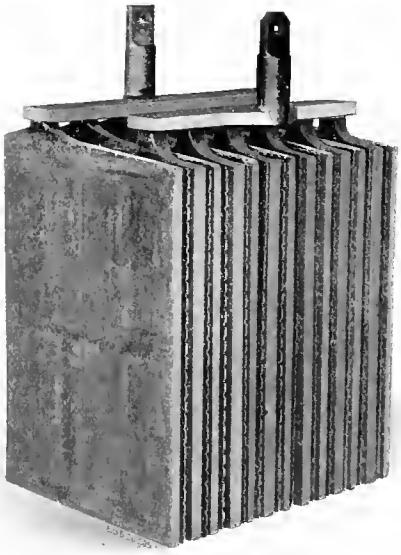


Fig. 3473. Tudor Accumulator Element for Type EP-13 Storage Battery.

Fig. 3474. Soft Lip Rubber Cover for Storage Battery Cell, Showing Knob and Soft Rubber Vent Plug.

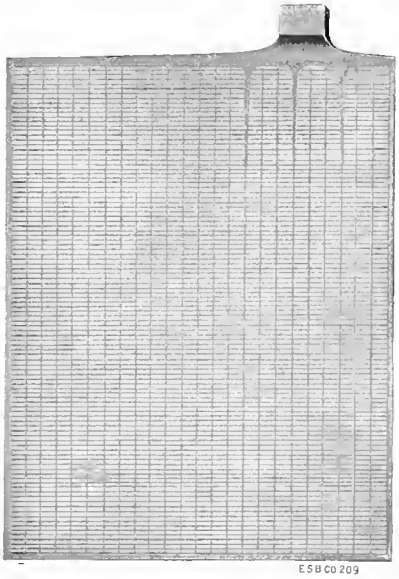


Fig. 3475. Shelf Negative Plate for Type EP Storage Battery.

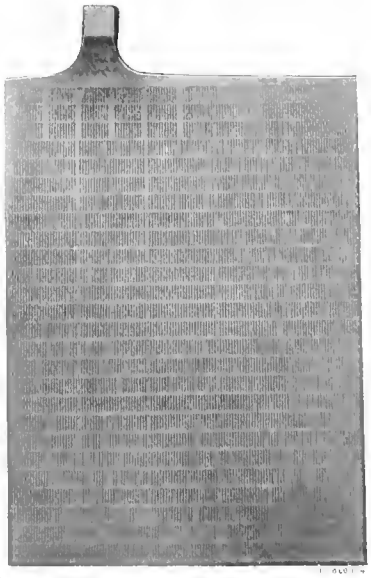


Fig. 3476. Tudor Positive Plate for Type EP Storage Battery. The Electric Storage Battery Co.

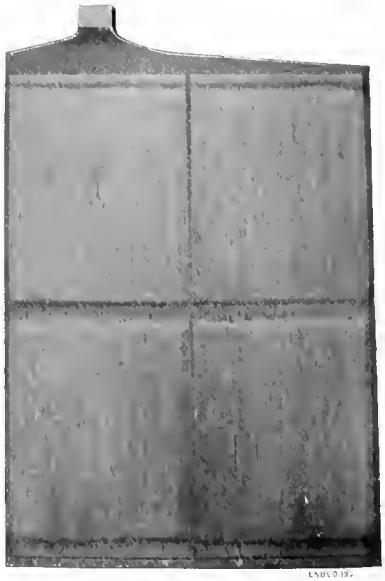


Fig. 3477. Rolled Negative Plate for Type EP Storage Battery.

Fig. 3478. Rubber Jars Assembled in Two-Compartment Lined Tanks.

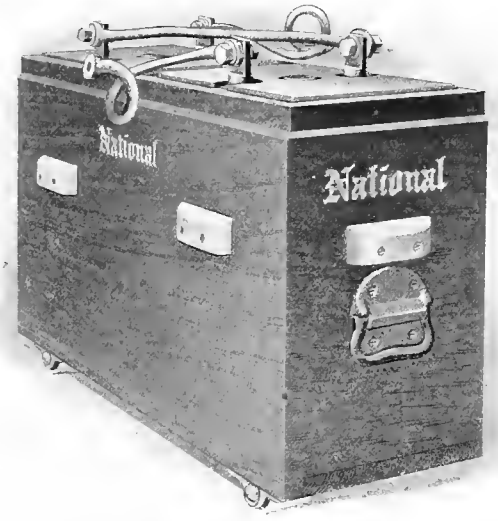


Fig. 3480. Two-Compartment Unit Complete in Lead Lined Tank.

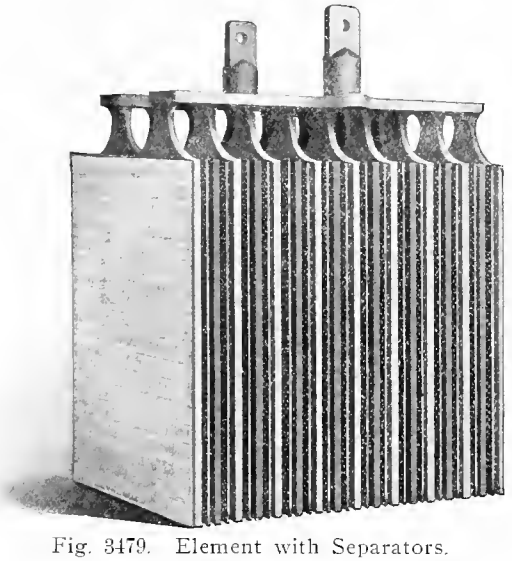
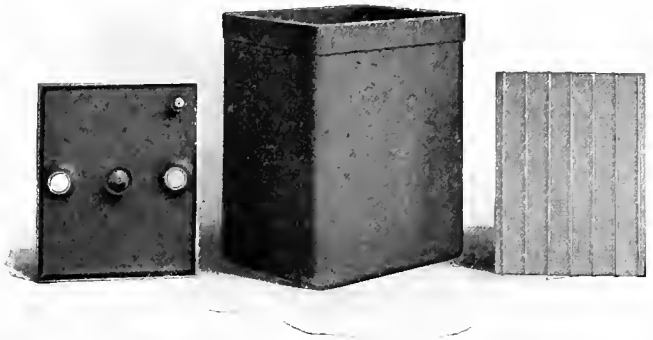


Fig. 3479. Element with Separators.



Figs. 3481-3483. Reinforced Rubber Jar with Soft Rubber-Lipped Cover and Double-Ribbed Separator.

Fig. 3484. Lead Lining with Porcelain Rests.

United States Light & Heating Co.

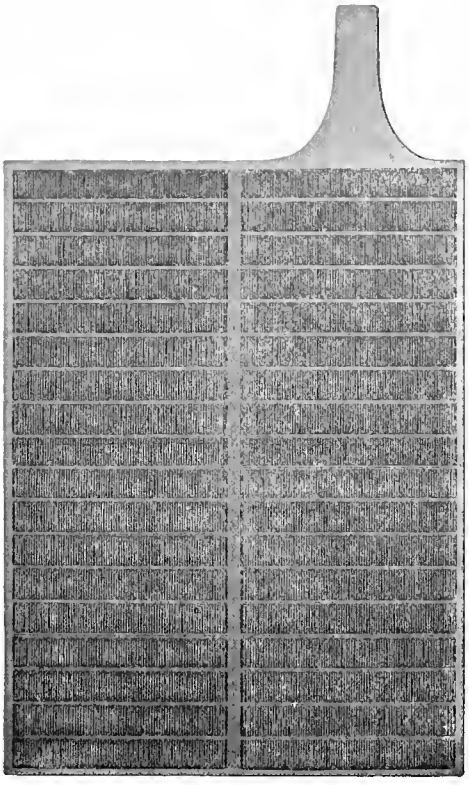


Fig. 3485. Positive Formed Plate.

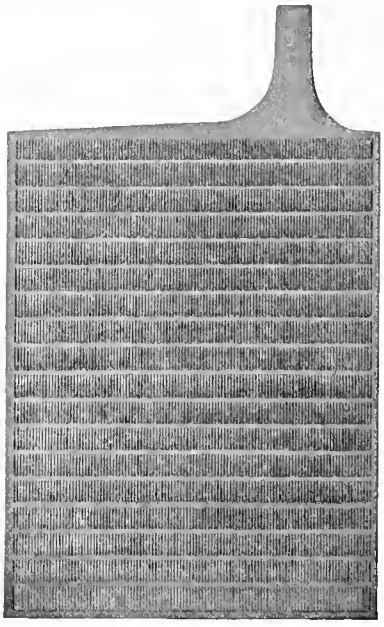
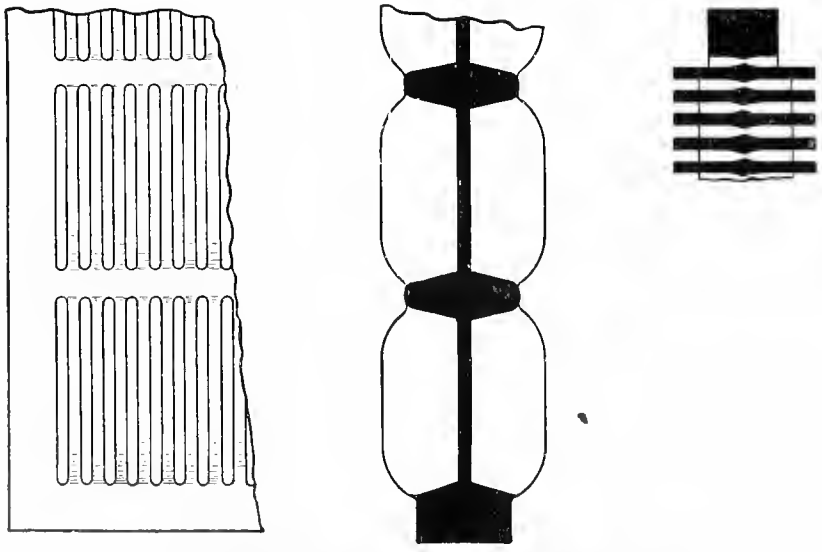


Fig. 3486. Negative Unformed Plate.



Figs. 3487-3489. Enlarged Details of Positive Plate.
United States Light & Heating Co.

Fig. 3490.
Electric Chandelier, No. 1763.

Fig. 3491.
Electric Chandelier, No. 1777.

Fig. 3492.
Electric Chandelier, No. 1746.

Fig. 3493.
Electric Pendant,
No. 1781.

Fig. 3494.
Electric Pendant,
No. 1775.

Fig. 3495.
Electric Bracket,
No. 1843.

Fig. 3496.
Electric Bracket,
No. 1786.

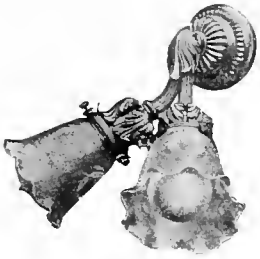


Fig. 3497.
Electric Bracket,
No. 371a.

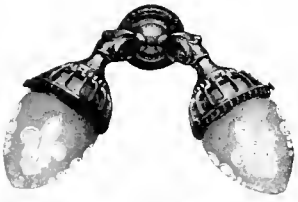


Fig. 3498.
Electric Bracket,
No. 1747.

Fig. 3499.
Electric Bracket,
No. 1776.

Fig. 3500.
Electric Bracket,
No. 370a.

Fig. 3501.
Electric Bracket,
No. 1748.

Fig. 3502.
Electric Bracket,
No. 1923.

Fig. 3503.
Electric Bracket,
No. 1762.

Fig. 3504.
Electric Bracket,
No. 372a.

Fig. 3505.
Electric Bracket,
No. 1743.

Fig. 3506.
Electric Bracket,
No. 1765.

Fig. 3507.
Electric Bracket,
No. 1742.

Fig. 3508.
Electric Bracket,
No. 1785.

Fig. 3509.
Electric Pendant,
No. 1780.

Fig. 3510.
Electric Pendant,
No. 1740.

Fig. 3511.
4 Light Deck Lamp,
No. 2247.

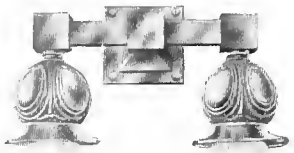


Fig. 3512.
2 Light Bracket,
No. 2117.

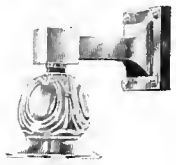


Fig. 3513.
1 Light Bracket,
No. 2116.

Fig. 3514.
Pendant,
No. 2115.

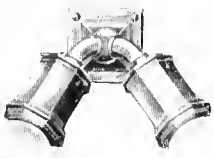


Fig. 3515.
2 Light Bracket,
No. 2148.

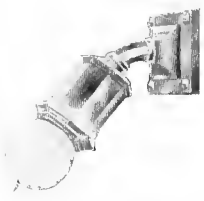


Fig. 3516.
1 Light Bracket,
No. 2147.

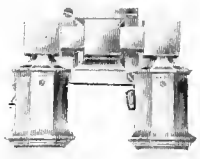


Fig. 3517.
2 Light Bracket,
No. 2176.

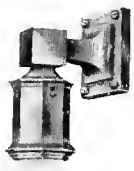


Fig. 3518.
1 Light Bracket,
No. 2177.

Fig. 3519.
Pendant,
No. 2178.

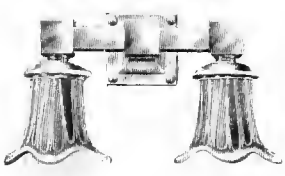


Fig. 3520.
2 Light Bracket,
No. 1933.

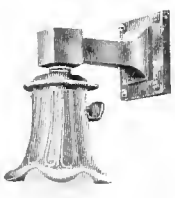


Fig. 3521.
1 Light Bracket,
No. 1930.

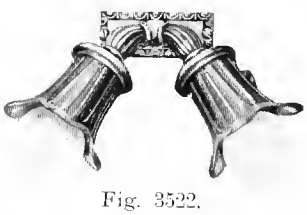


Fig. 3522.
2 Light Bracket,
No. 1973.

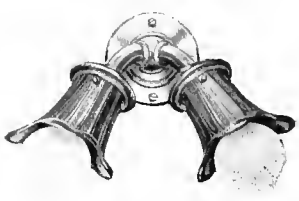


Fig. 3523.
2 Light Bracket,
No. 1924.

Fig. 3524.
1 Light Bracket,
No. 1923.

Fig. 3525.
Pendant,
No. 1929.

Fig. 3526.
Pendant,
No. 1922.

Fig. 3527.
Pendant,
No. 1936.

Fig. 3528.
Pendant,
No. 1931.

Fig. 3529.
Pendant,
No. 1774.

Fig. 3530.
Pendant,
No. 369a.

Fig. 3531.
Pendant,
No. 1740.

Fig. 3532.
Pendant,
No. 1764.

Fig. 3533.
Pendant,
No. 1955.

Fig. 3534.
Pendant,
No. 2151.

Fig. 3535.
Pendant,
No. 1773.

Fig. 3536.
Pendant,
No. 1744.

Fig. 3537.
Pendant,
No. 1766.

Fig. 3538.
Pendant,
No. 1749.

Fig. 3539.
Pendant,
No. 1921.

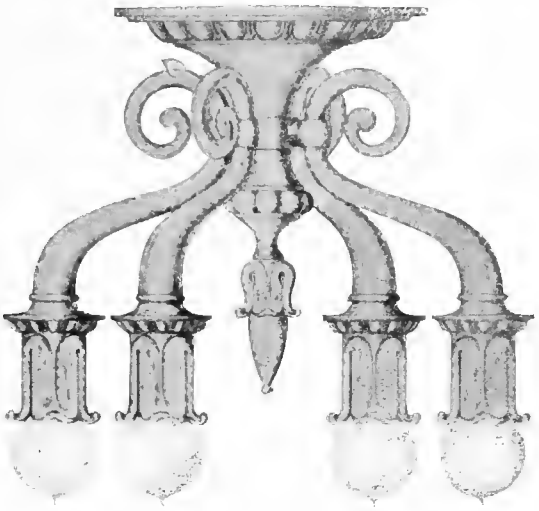


Fig. 3540. Electric Chandelier, No. 7580.

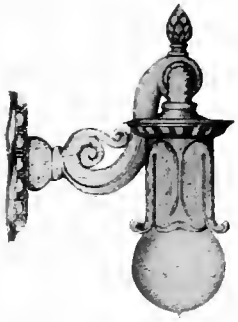


Fig. 3541.
Side View.

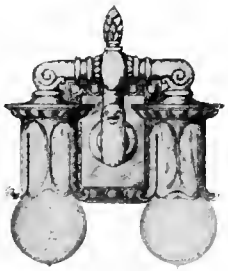


Fig. 3542.
Front View.

Electric Bracket, No. 9000.

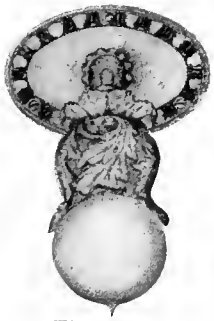


Fig. 3545.
Front View.

Fig. 3546.
Side View.

Electric Bracket, No. 9230.

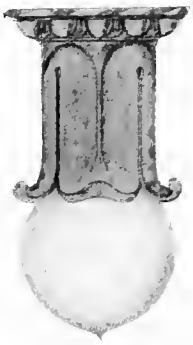


Fig. 3543.
Electric Pendant,
No. 7620.

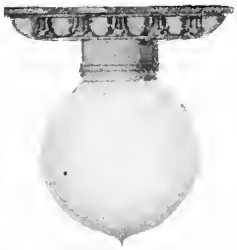


Fig. 3544.
Electric Pendant,
No. 7760.

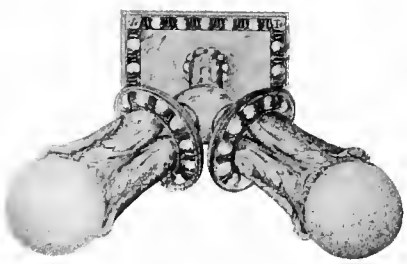


Fig. 3547.
Front View

Fig. 3548.
Side View.

Electric Bracket, No. 7260.

Adams & Westlake Co.

Fig. 3549. Acme Burner Chandelier, No. 192.

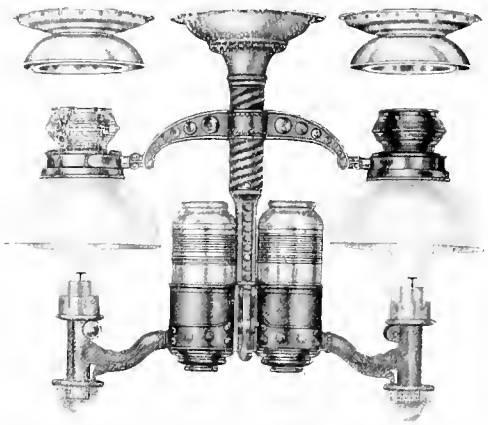


Fig. 3550. Acme Burner Chandelier, No. 191.

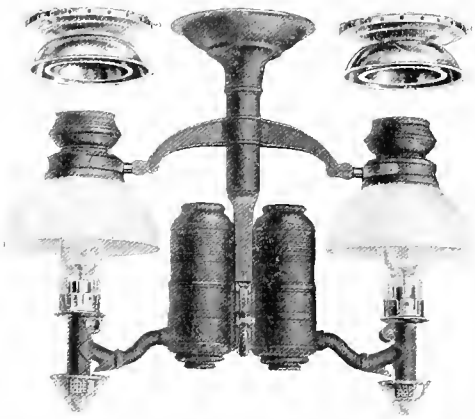


Fig. 3551. Acme Burner Chandelier, No. 190.

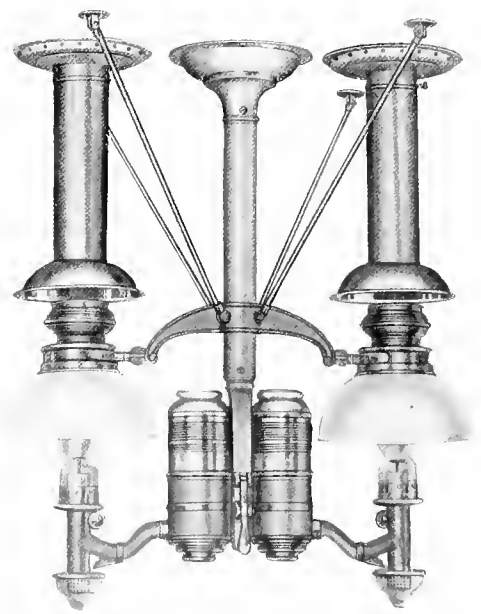


Fig. 3552. Acme Burner Chandelier, No. 190-A.

Fig. 3553. Acme Burner Chandelier, with Oil Fount Detached.

Adams & Westlake Co.

Fig. 3554.
Diam. 6⅞ ins.

Fig. 3555.
Diam. 6 ins.

Fig. 3556.
Diam. 7 ins.

Fig. 3557.
Diam. 4½ ins.
Adjustable.

Fig. 3558.
Diam. 7¾ ins.

Fig. 3559.
Diam. 9 ins.
Kirby's Adjustable.

Fig. 3560.
Diam. 7¼ ins.

Fig. 3561.
Bracket Canopy.

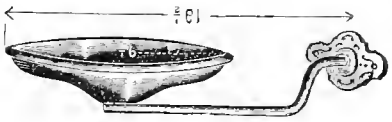


Fig. 3562.
Sectional View.

Fig. 3563.
Diam. 5¾ ins.

Figs. 3554-3563. Lamp Canopies or Smoke Bells. Dayton Manufacturing Co.

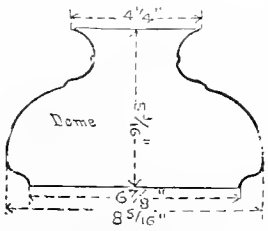


Fig. 3564.
"Dome" Lamp Shade.

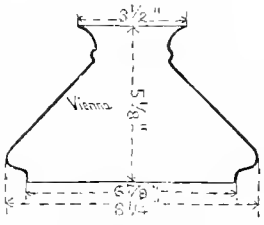


Fig. 3565.
"Vienna" Lamp Shade.

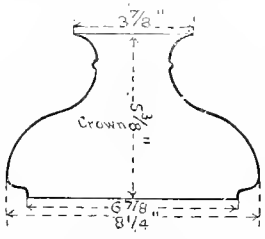


Fig. 3566.
"Crown" Lamp Shade.

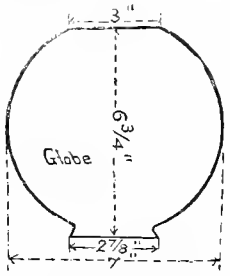


Fig. 3567.
"Globe" Lamp Shade
or Lamp Globe.

Figs. 3564-3567. Standard Styles of Lamp Shades: Special Forms for Student and Other Lamps.
(The use of these Standards in the trade is general, but not universal.)

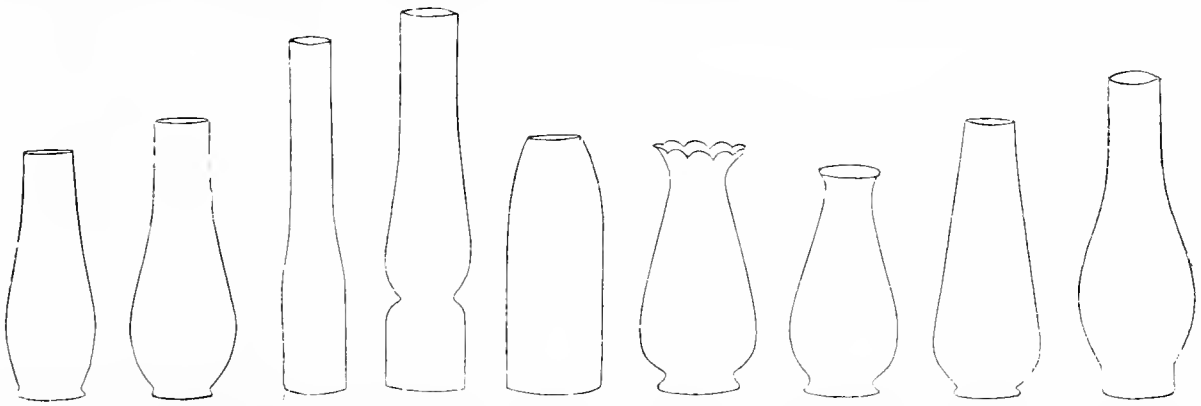


Fig. 3568.
Lip Sm. Bulb
(Dual).

Fig. 3569.
Lip Bulb
(Dual).

Fig. 3570.
Moehring.
Argand.

Fig. 3571.
Mammoth.

Fig. 3572.
Sun.

Fig. 3573.
Hinge
(Crimp Top).

Fig. 3574.
Hinge
(Bell Top).

Fig. 3575.
Lip
(Gun Shape).

Fig. 3576.
Slip
(Dual)

Standard Styles of Lamp Chimneys.
(The use of these Standards in the trade is general, but not universal).

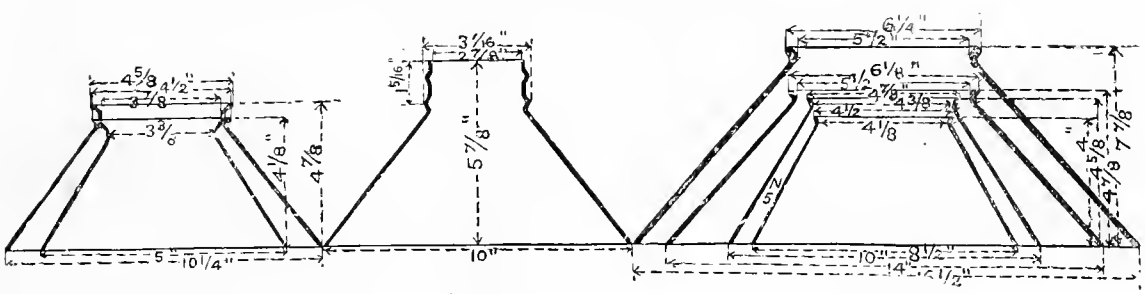


Fig. 3577.

Fig. 3578.

Fig. 3579.

Standard Styles of Cone Lamp Shades.
(The use of these Standards in the trade is general, but not universal).

Fig. 3580.
Side Candle Lamp.

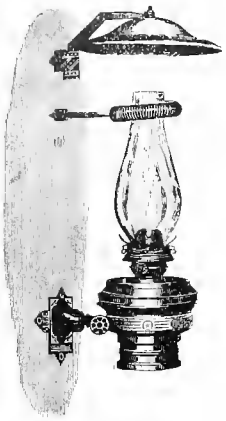


Fig. 3581.
No. 3.

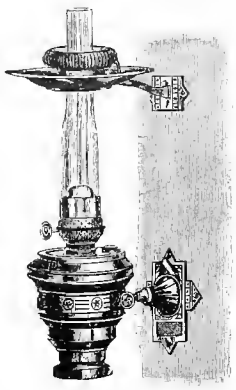


Fig. 3582.
No. 11½.

Fig. 3583.
No. 306.

Side Lamps. Adams & Westlake Co.

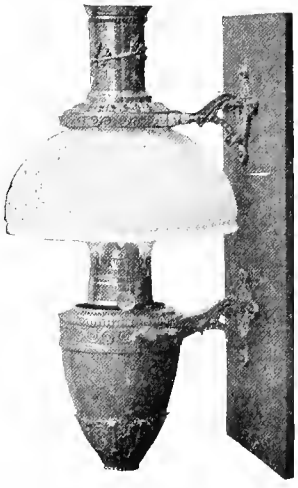


Fig. 3584.
Side Lamp.

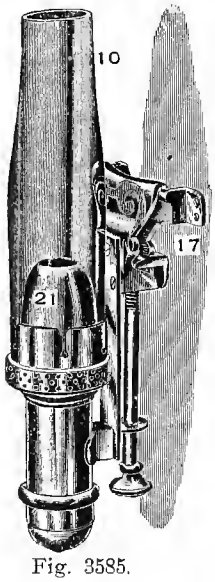


Fig. 3585.
Emergency Side Candle Lamp. A. & W.

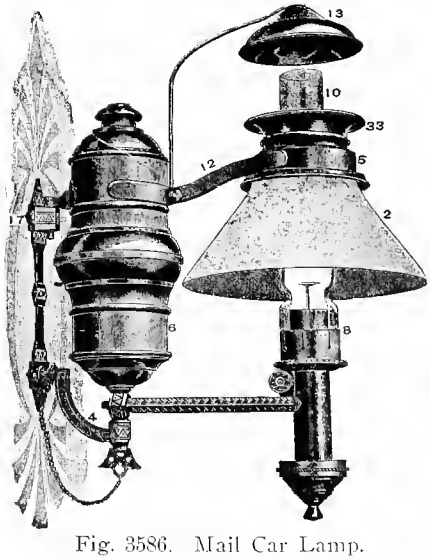


Fig. 3586. Mail Car Lamp.
With Shade and Acme Burner.
Adams & Westlake Co.

Fig. 3587.
Side Lamp and Electrolier.

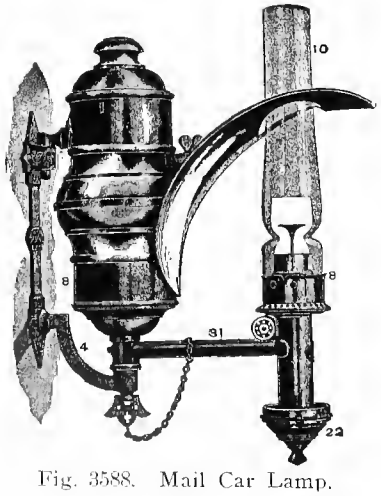


Fig. 3588. Mail Car Lamp.
With Reflector and Acme Burner.
A. & W.

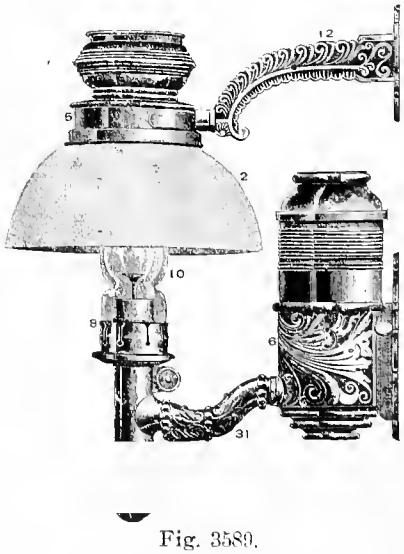


Fig. 3589.
Side Lamp.
With Acme Burner.

Fig. 3590. Two-light Chandelier.
J. L. Howard & Co.

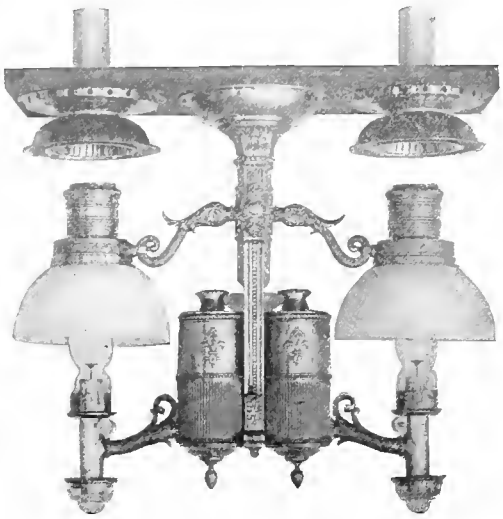


Fig. 3591. Two-light Chandelier with Acme Burners. A. & W.

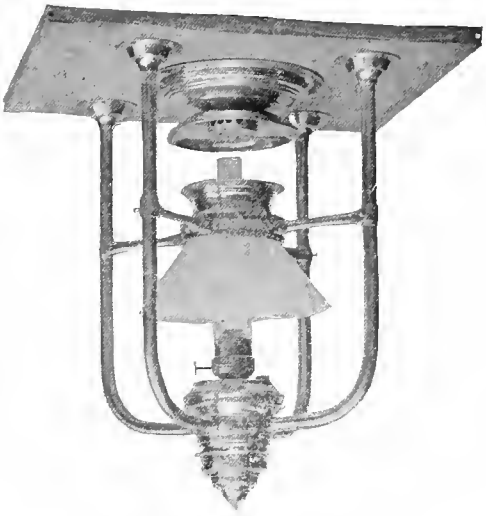


Fig. 3593. Center Lamp.
Drop, 22 in. Moehring Center Draft Burner.

Fig. 3592.
Center Lamp and Electrolier Combined.

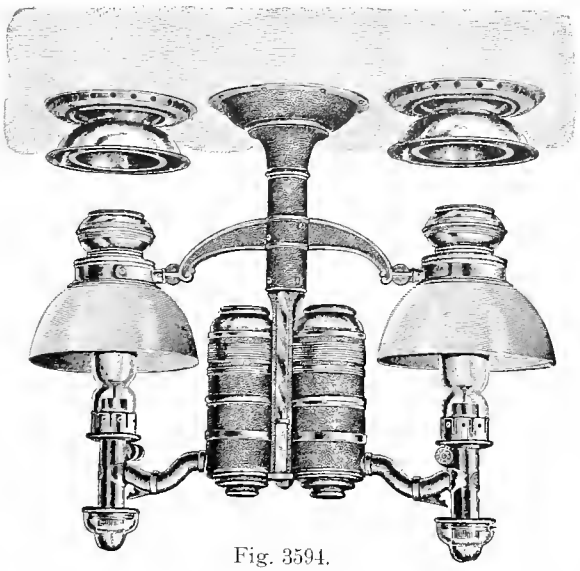


Fig. 3594.
Plain Lamp for Postal, Baggage and Suburban Cars. A. & W.

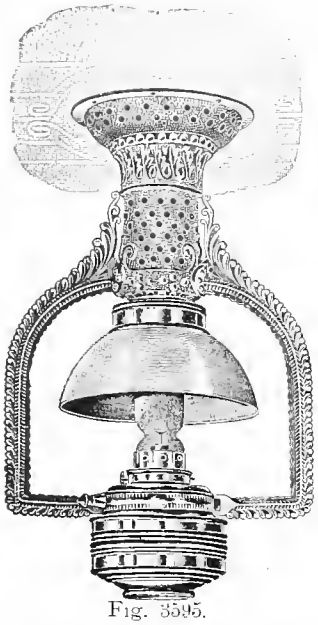


Fig. 3595.
Drop Over-all, 26 ins.
Acme Burner.

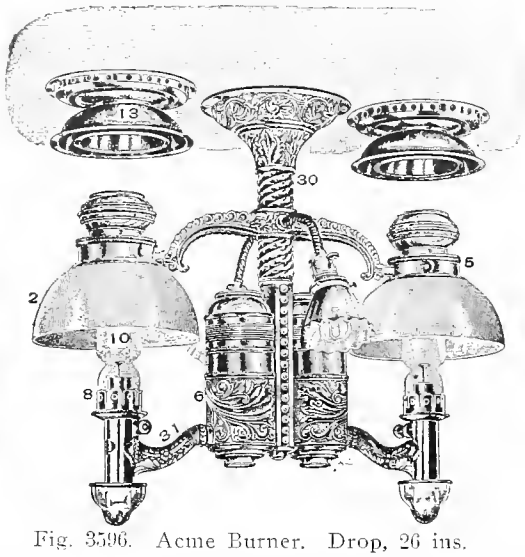


Fig. 3596. Acme Burner. Drop, 26 ins.

Fig. 3597.
Drop Over-all, 23 ins.
Acme Burner.

Center Lamps. Adams & Westlake Co.

Fig. 3598.
A Decorated Lamp for Dining, Parlor, Sleeping and First-Class Coaches.

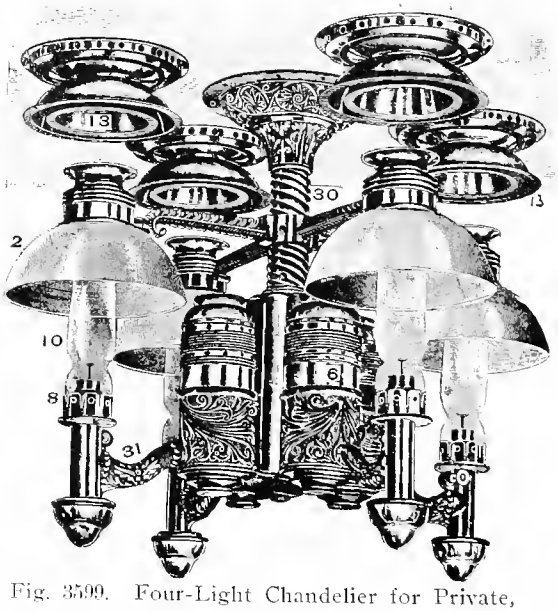


Fig. 3599. Four-Light Chandelier for Private, Dining and Parlor Cars.
Drop, 26 ins. With Acme Burner, Glass Drip Cups, and Patent Combination Smoke Bell and Ventilator.

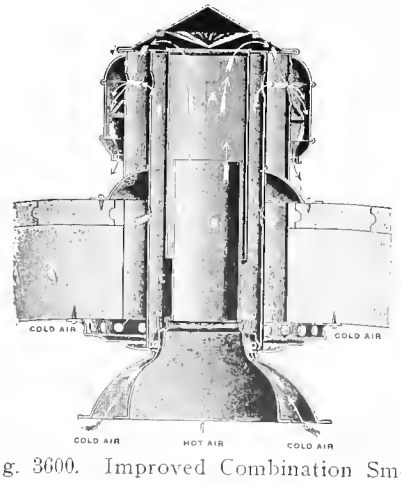


Fig. 3600. Improved Combination Smoke Bell and Ventilator.

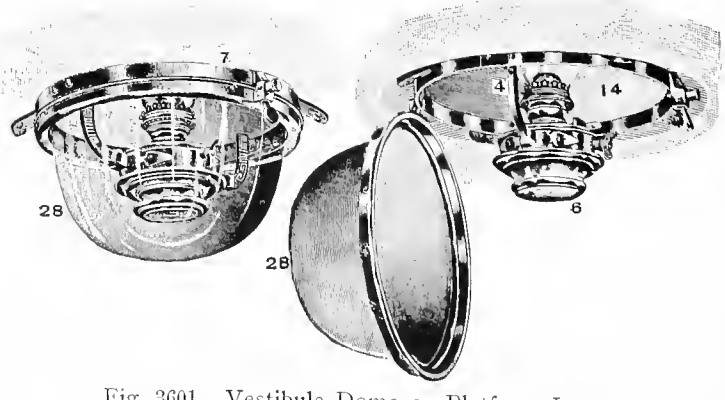


Fig. 3601. Vestibule Dome or Platform Lamp.
Diameter of Ring, 13 ins. Drop of Bowl, 7½ ins.
Adams & Westlake Co.

Names of Parts of Lamps. Figs. 3585-3601.

1	*Lamp Stay*	7	*Globe Holder*	14	*Lamp Reflector*	21	*Candle Holder Cap*
2	*Lamp Shade*	8	*Lamp Burner*	15	*Lamp Chimney Reflector*	22	*Candle Holder Cup*
3	*Lamp Globe Chimney*	10	*Lamp Chimney*	16	*Side Lamp Holder*	28	*Lamp Globe*
4	*Lamp Arms*	11	*Lamp Chimney Holder*	17	*Side Lamp Bracket*	30	*Center Stay*
5	*Lamp Ring*	12	*Lamp Chimney Bracket*	18	*Side Lamp Braces*	31	*Feed Tube*
6	*Lamp Reservoir*	13	*Smoke Bell*	20	*Lamp Bottom*	33	*Shade Cap*

Fig. 3602. Hinged Bracket.

Fig. 3603. Hinged Bracket.

Fig. 3604. Lamp Socket.

Fig. 3605. Parted Bracket.

Fig. 3606. Flag Socket. A. & W.

Fig. 3607. Lamp and Flag Holder. A. & W.

Fig. 3608. Corner Lamp and Flag Holder.

Fig. 3609. Projecting Socket Holder.

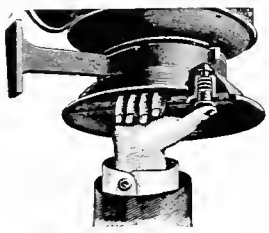


Fig. 3610. Lamp Bracket, Adjustable. A. & W.

Fig. 3611. Parted Lamp Bracket. A. & W.

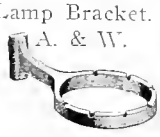


Fig. 3612. Solid Lamp Bracket. A. & W.

Fig. 3613. Top Support Bracket. A. & W.

Fig. 3614. Set Screw Bracket. A. & W.

Fig. 3615. Corner Socket. A. & W.

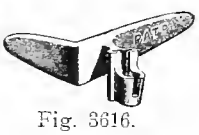


Fig. 3616. Corner Socket.

Lamp and Flag Holders, Brackets and Sockets.

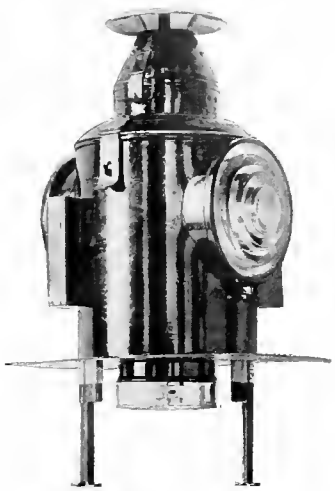


Fig. 3617. Caboose Cupola Lamp. A. & W.

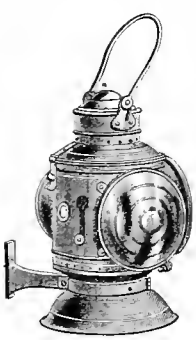


Fig. 3618. Caboose Tail Lamp.

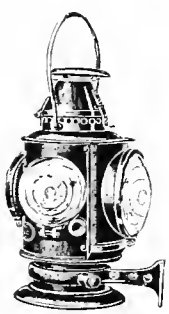


Fig. 3619. "Tornado" Coach Tail Lamp, No. 83. A. & W.

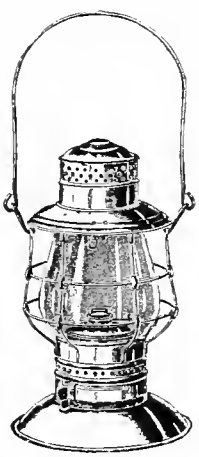


Fig. 3620. Double Wire Guard Lantern, No. 39.

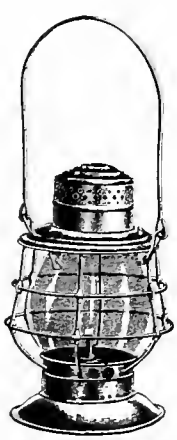


Fig. 3621. Double Wire Guard Lantern, No. 39, with Outside Wick Raiser.

Fig. 3622. Double Wire Guard Lantern, No. 39.

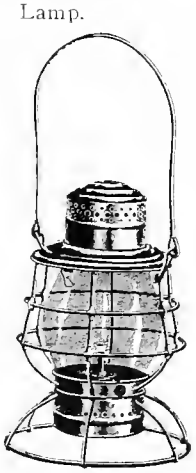


Fig. 3623. Double Wire Guard Lantern, No. 39, with Outside Wick Raiser.

Fig. 3624. Adams Steel Guard Lantern, No. 11, with Outside Wick Raiser.

Fig. 3625.

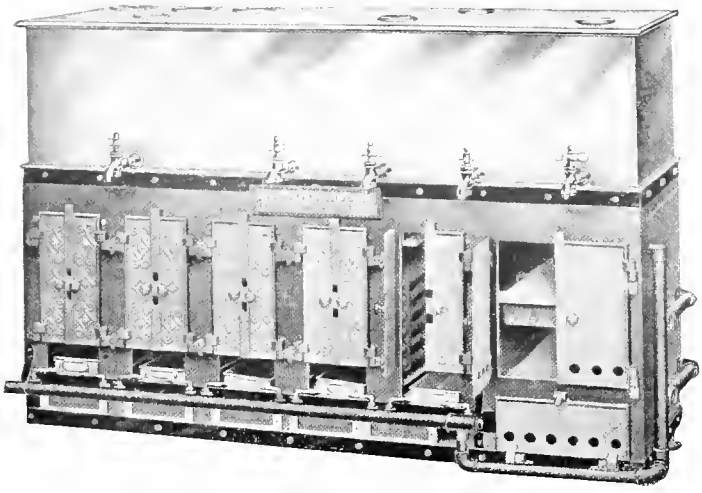


Fig. 3626. Gas Broiler and Oven. No. 1507.

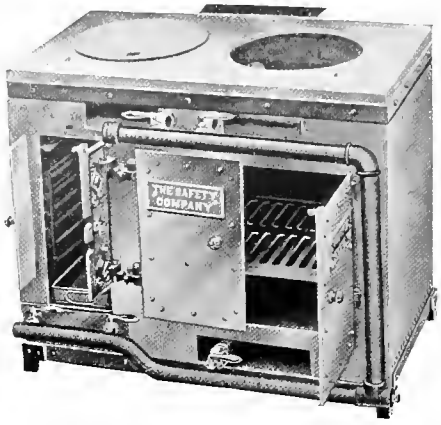


Fig. 3627. Gas Broiler and Oven. No. 1501a.

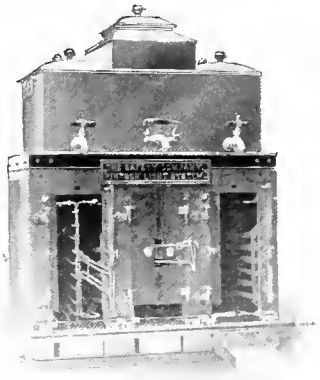


Fig. 3628. Gas Broiler. No. 1509.

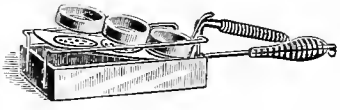


Fig. 3629. Egg Poacher. No. 1504.

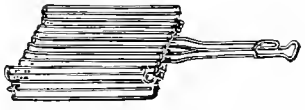


Fig. 3631. Broiling Iron. No. 1502.

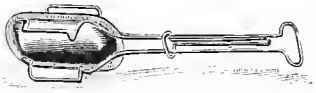
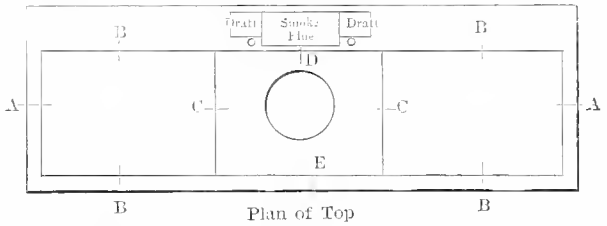


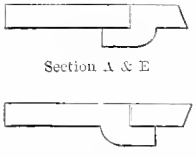
Fig. 3630. Hash Browner. No. 1504.

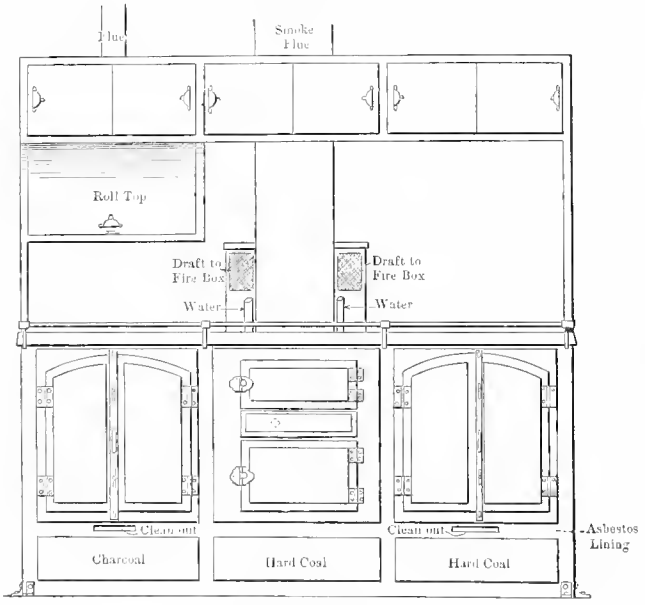
Fig. 3632. Frying Pan. No. 1503.

Pintsch Gas Broilers and Utensils. Safety Car Heating & Lighting Co.



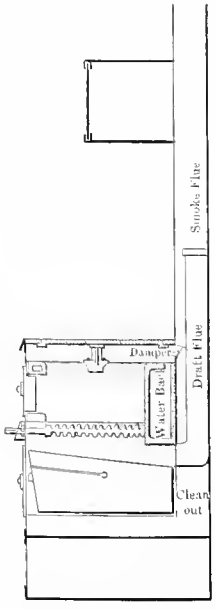
Plan of Top





Front View

Section through Oven



Section through Fire-Box

Figs. 3633-3638. Stearns Safety Car Range for Dining Cars. Stearns Steel Range Co.

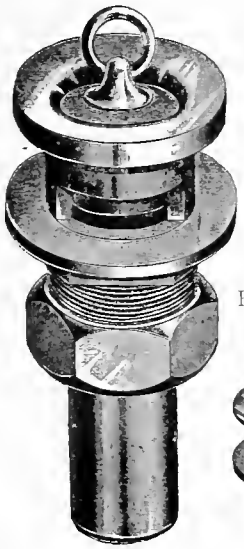


Fig. 3639. Basin Bushing and Plug for Overflow Bowl. A. & W.

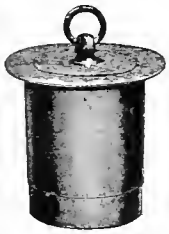


Fig. 3640. Sink Bushing and Plug. A. & W.

Fig. 3641. Basin Bushing and Plug. A. & W.

Fig. 3642. Tail Coupling for Alcove Faucet. A. & W.

Fig. 3643. Tumbler Holder and Drip. A. & W.

Fig. 3644. Drip Couplings. A. & W.

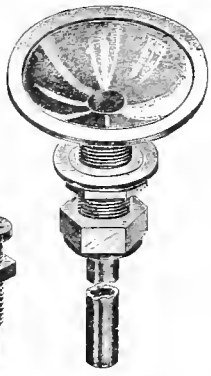


Fig. 3645. Water Cooler Drip and Connections. A. & W.

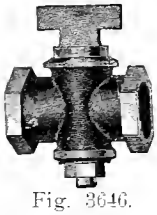


Fig. 3646. D. M. Co. Stop Cocks.

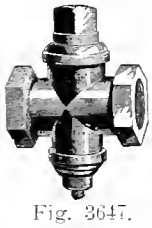


Fig. 3647. D. M. Co.

Fig. 3648. Spud. D. M. Co.

Fig. 3649. Spud and Coupling. D. M. Co.

Fig. 3650. Tank Waste Cock. A. & W.

Fig. 3651. Spider. D. M. Co.

Fig. 3652. Wrench. A. & W.

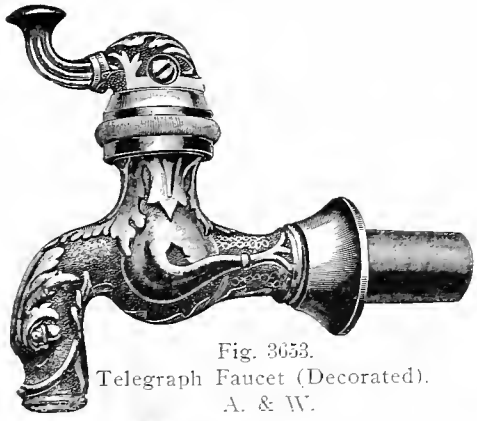


Fig. 3653. Telegraph Faucet (Decorated). A. & W.

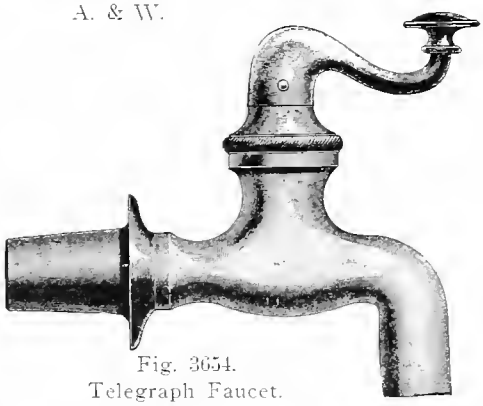


Fig. 3654. Telegraph Faucet. D. M. Co.

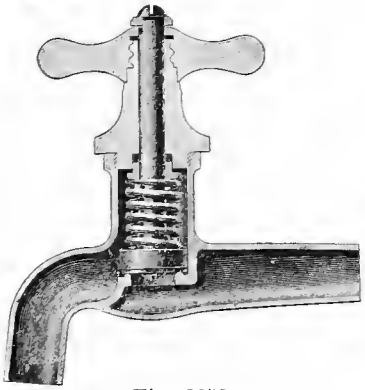


Fig. 3656. Zane's Self-Closing Bibb Cock. D. M. Co.

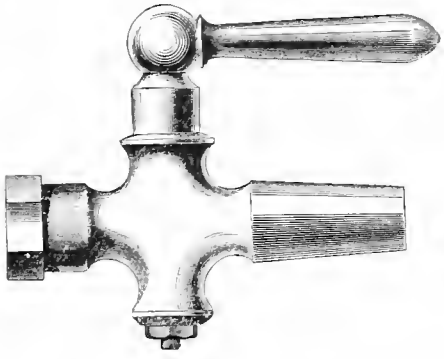


Fig. 3657. Stop Cock. D. M. Co.

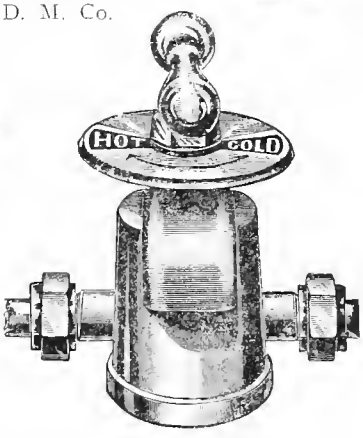


Fig. 3658. Hitchcock's Combination Hot and Cold Water Faucets. A. & W.

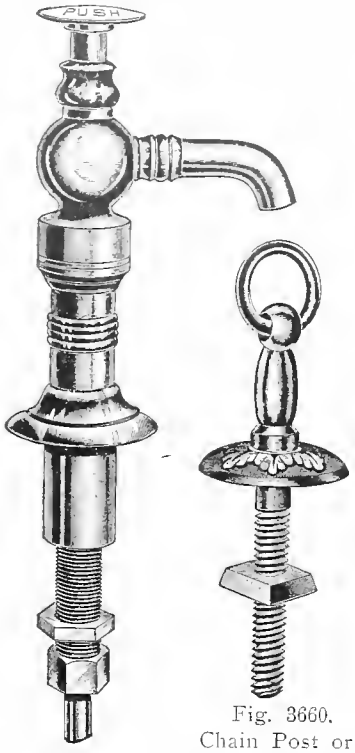


Fig. 3659. Compression Faucet. A. & W.

Fig. 3660. Chain Post or Stay. A. & W.

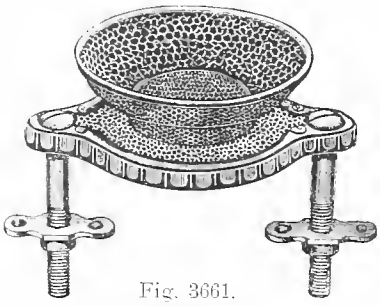


Fig. 3661. Soap Dish. Center to Center of Bolts, 5 ins. A. & W.

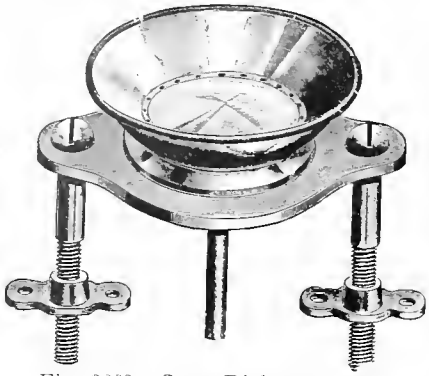


Fig. 3663. Soap Dish. A. & W.

Fig. 3662. Soap Dish. 4½ ins. in Diameter. A. & W.

Fig. 3664. Soap Dish. Size, 3⅝ x 4⅝ ins. A. & W.

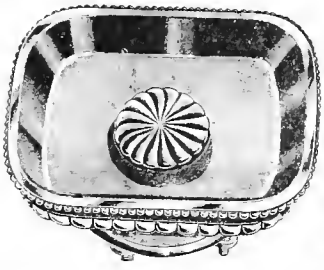


Fig. 3665. Soap Dish. Size, 3⅝ x 4⅝ ins. A. & W.

Fig. 3666. Soap Dish.

Fig. 3667. Tumbler Holder. A. & W.

Fig. 3668. Tumbler Holder. A. & W.

Fig. 3669.

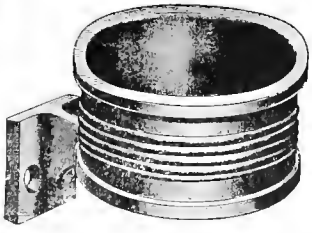


Fig. 3670. Tumbler Holders. A. & W.

Fig. 3671.

Fig. 3672.

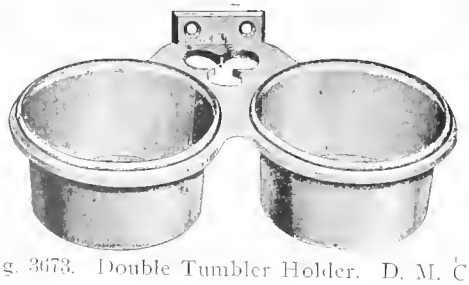


Fig. 3673. Double Tumbler Holder. D. M. Co.

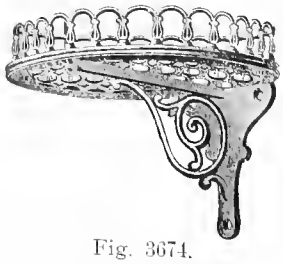


Fig. 3674. Bottle Bracket. D. M. Co.

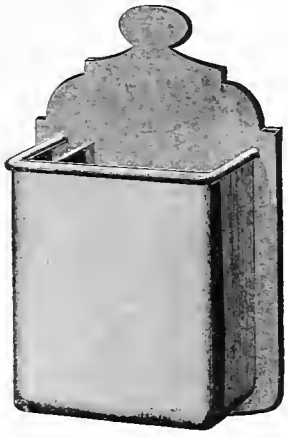


Fig. 3675. Comb and Brush Case. A. & W.

Fig. 3676. Cuff Rack. A. & W.

Fig. 3677. Comb and Brush Case. A. & W.

Fig. 3678. Comb and Brush Rack. A. & W.

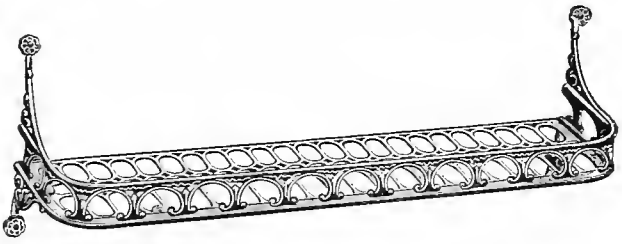


Fig. 3679. Towel Rack. A. & W.

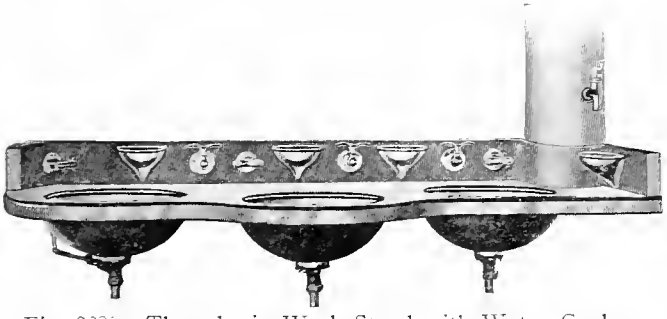


Fig. 3680. Three-basin Wash Stand with Water Cooler. White Metal with Fittings Arranged on Splasher Rail. A. & W.

Fig. 3681. Fern or Flower Rack.

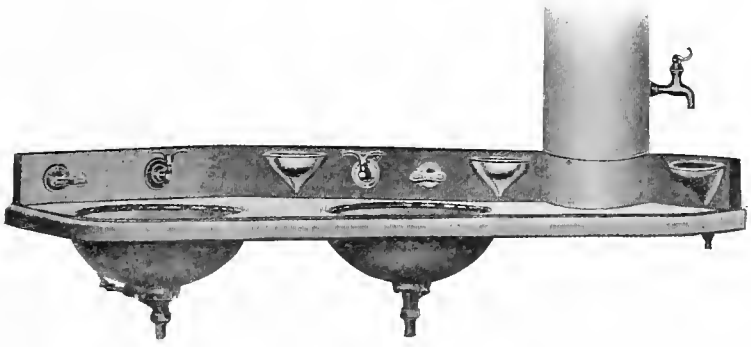


Fig. 3682. Two-basin Wash Stand with Water Cooler. White Metal with Fittings Arranged on Splasher Rail. A. & W.

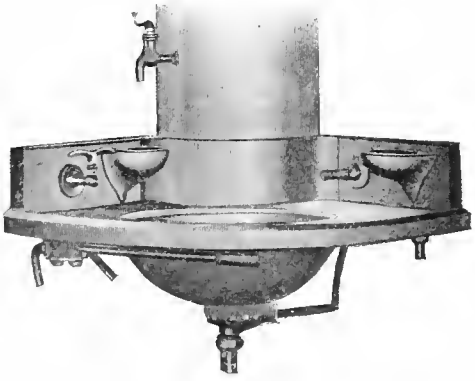


Fig. 3683. Single-basin Corner Wash Stand. White Metal with Fittings Arranged on Splasher Rail. A. & W.

Names of Parts. Figs. 3684-3686.

1 *Bowl or Basin*
2 *Slab*
3 *Riser*
4 *Compression Faucet*
5 *Basin Valve*
6 *Combination Hot and Cold Water Faucets (A. & W.)*
7 *Soap Dish*
9 *Supply Pipe to Compression Faucet*
10 *Wash Basin Drain*
11 *Supply Pipe, Hot Water*
12 *Supply Pipe, Cold Water*
13 *Tumbler Holder Drain*
14 *Water Cooler*
15 *Water Cooler Faucet*

Fig. 3684.
Wash Bowl, Fittings and Water Cooler.

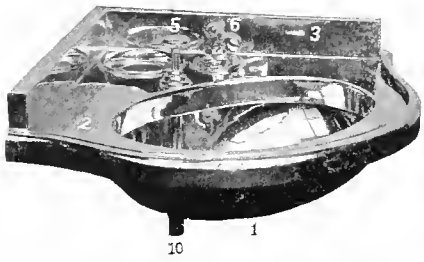


Fig. 3685. Wash Bowl and Fittings.

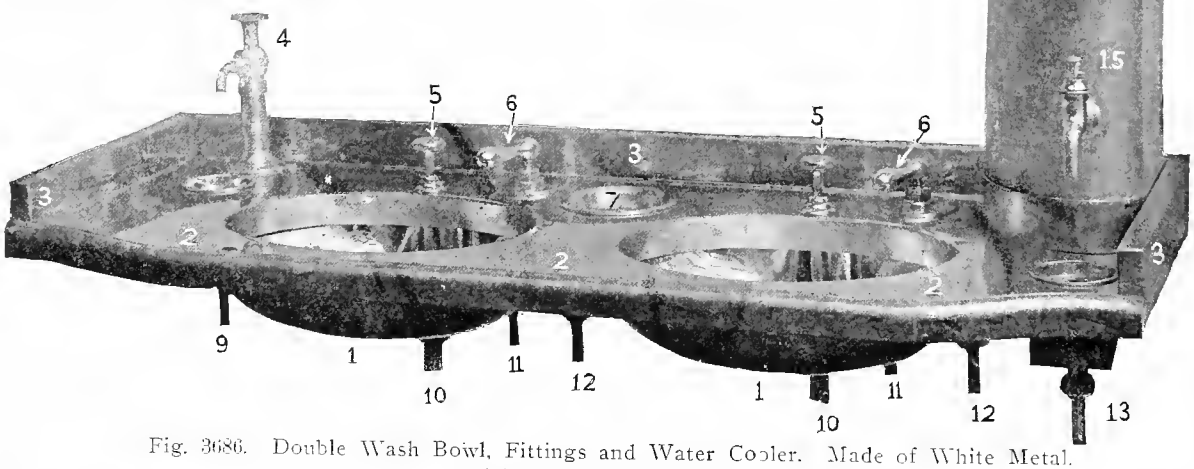


Fig. 3686. Double Wash Bowl, Fittings and Water Cooler. Made of White Metal.
Adams & Westlake Co.

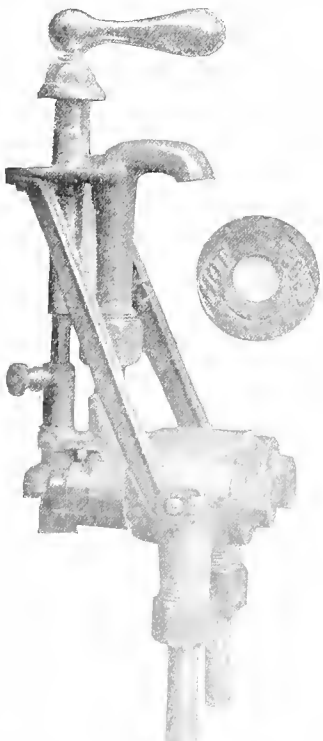


Fig. 3687.
Combination Hot and Cold Water Faucet. A. & W.

Fig. 3688.
General View of Folding Wash Stand.

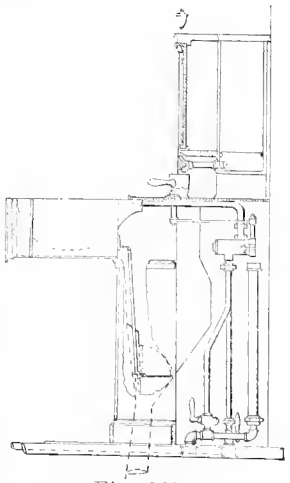


Fig. 3689.
Sectional Side Elevation.

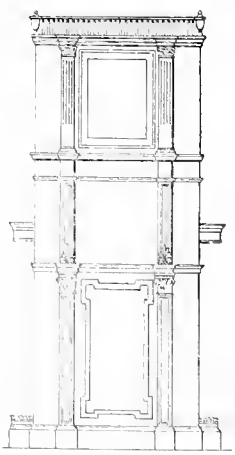


Fig. 3690.
Front Elevation.

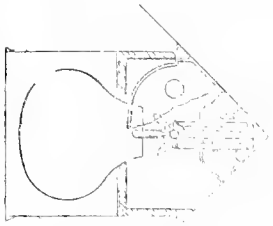


Fig. 3691. Sectional Plan.

Folding Wash Stand for Staterooms. A. & W.

Fig. 3692. White Metal Corner Lavatory.

Fig. 3693. Vitreous Ware Corner Lavatory.

Fig. 3694. Vitreous Ware Lavatory.

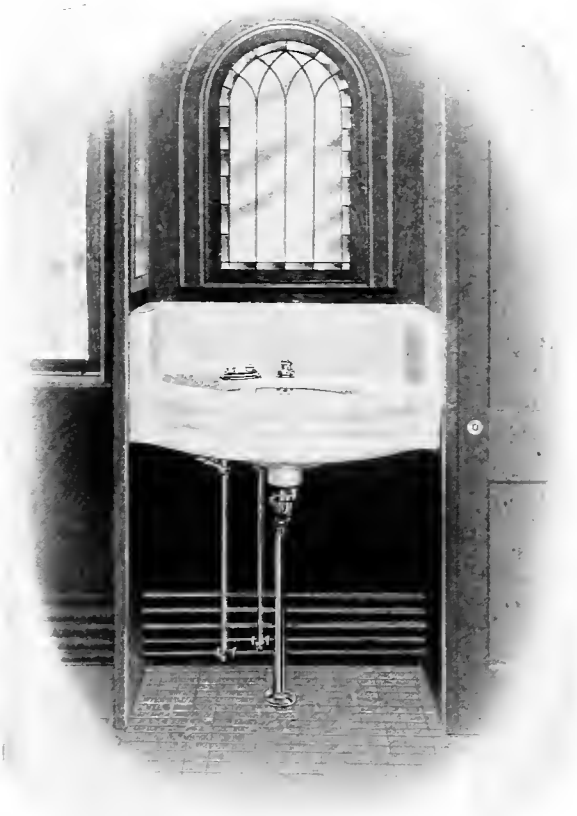
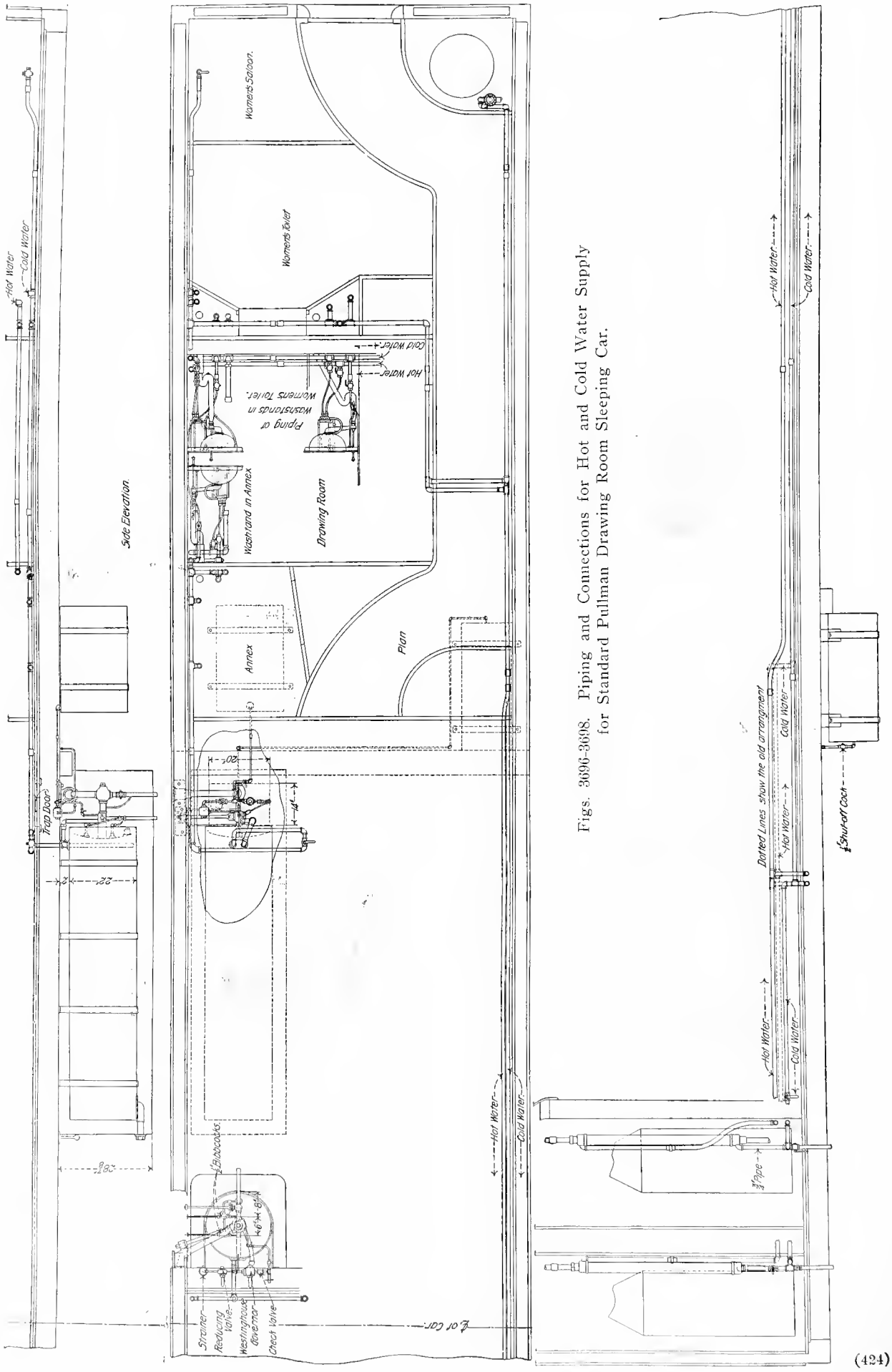
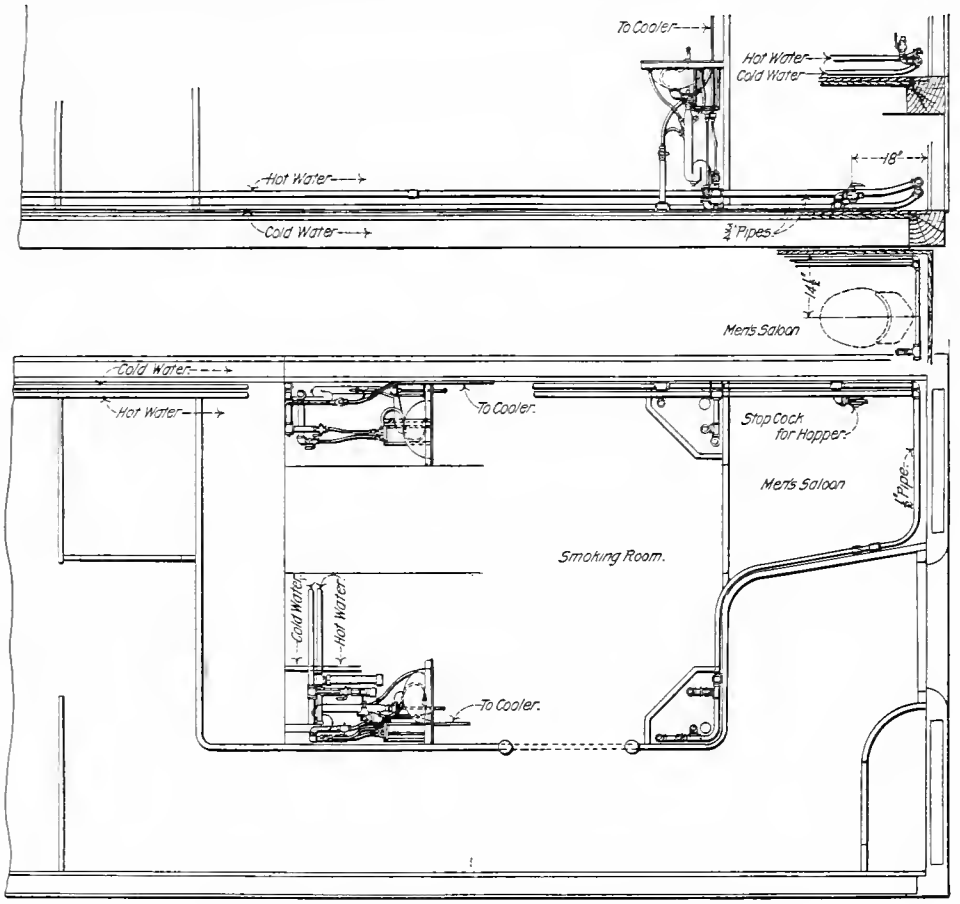


Fig. 3695. Vitreous Ware Recess Lavatory.

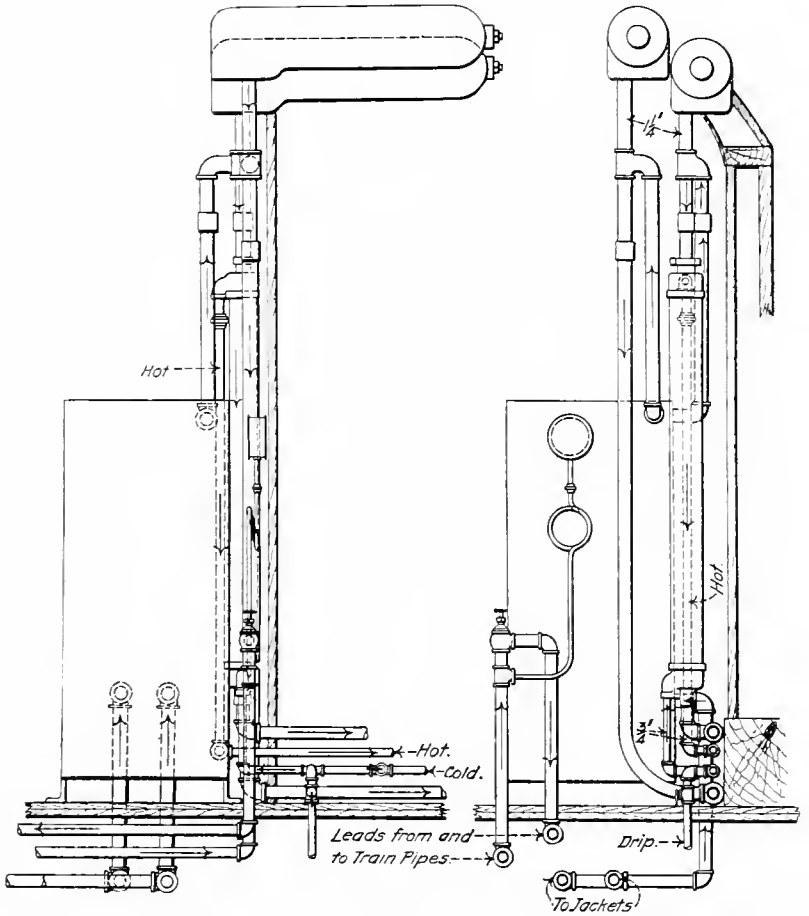
Watrous Co.



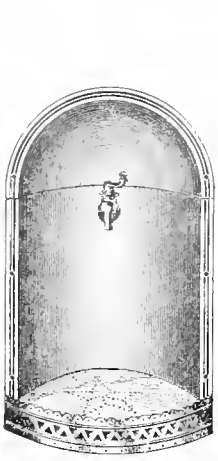
Figs. 3696-3698. Piping and Connections for Hot and Cold Water Supply for Standard Pullman Drawing Room Sleeping Car.



Figs. 3699-3700. Plan of Piping for Men's Wash Room, Pullman Standard Drawing-Room Sleeping Car.



Figs. 3701-3702. Hot and Cold Water Connections to Baker Heater, Pullman Standard Drawing-Room Sleeping Car.



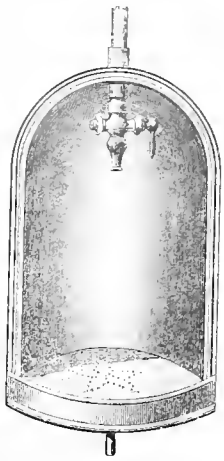
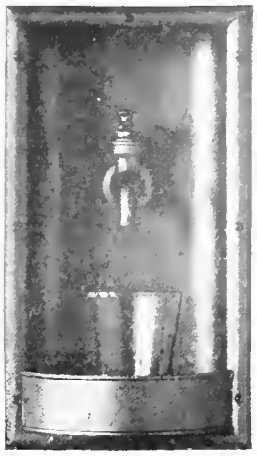


Fig. 3703. Water Alcoves. Fig. 3704.



Figs. 3705-3706. Water Alcoves. J. L. Howard & Co.

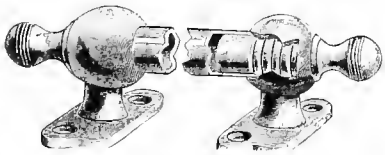


Fig. 3707. Towel Rod and Bracket. D. M. Co.

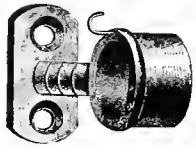


Fig. 3708. Curtain Rod Bracket. D. M. Co.

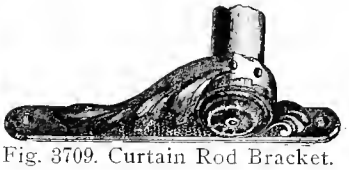
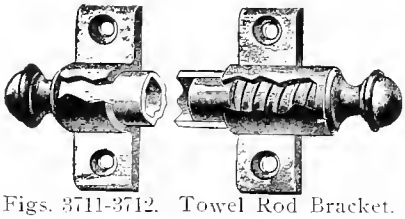


Fig. 3709. Curtain Rod Bracket. A. & W.

Fig. 3710. Window Rod Bracket. A. & W.



Figs. 3711-3712. Towel Rod Bracket. D. M. Co.

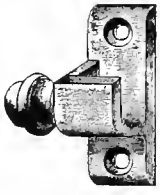


Fig. 3713. Towel Rod Bracket. D. M. Co.

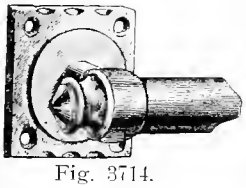


Fig. 3714.

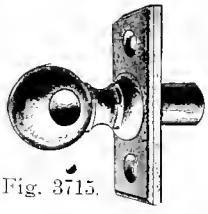


Fig. 3715.

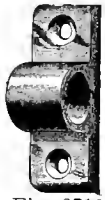


Fig. 3716.

Curtain Rod Brackets. D. M. Co.

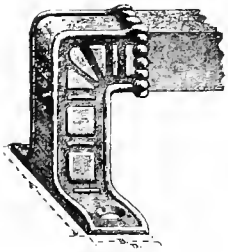


Fig. 3717. A. & W.

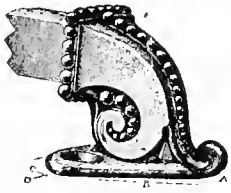


Fig. 3718. A. & W.

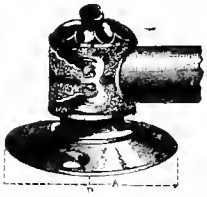


Fig. 3719. D. M. Co.

Fig. 3720. A. & W.

Fig. 3721. A. & W.

Window Rod Brackets.

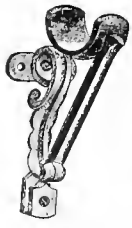


Fig. 3722.

Fig. 3723.

Fig. 3724.

Fig. 3725.

Towel Roller Brackets. A. & W.

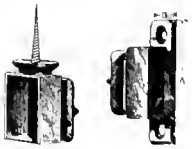
Fig. 3726.

Fig. 3727.

Window Rod Brackets. A. & W.

Figs. 3728-3731. Curtain Rings. D. M. Co.

Figs. 3732-3733. Curtain Rod Bushings. D. M. Co.



Figs. 3734-3735. Curtain Rod Brackets. D. M. Co.

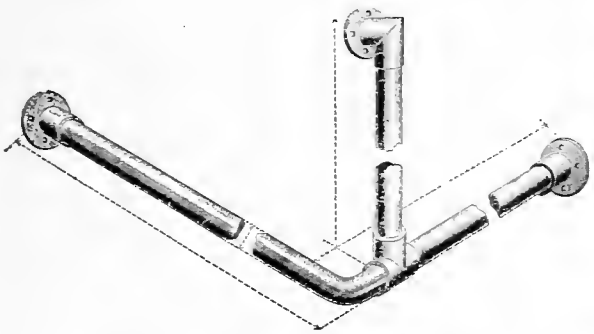
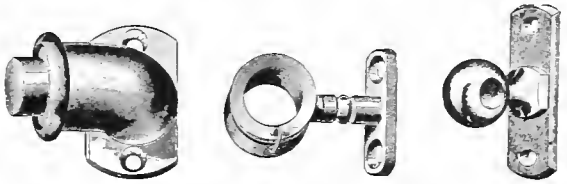


Fig. 3736. Section Curtain Rod. A. & W.



Figs. 3737-3739. Window Rod Brackets. A. & W.

Figs. 3740-3741. Towel Rods. A. & W.

Fig. 3742. Window Guard Rod Bracket. A. & W.

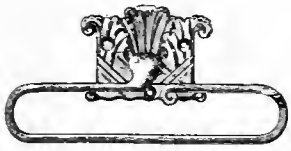


Fig. 3743.

Fig. 3744. Towel Racks and Rods. D. M. Co.

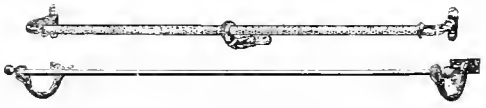
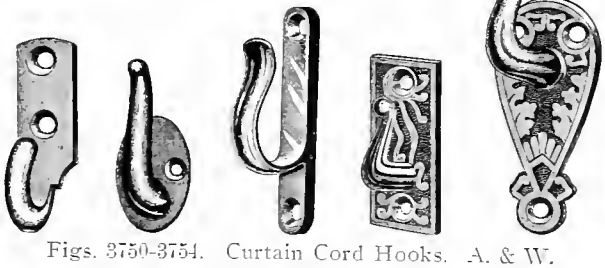


Fig. 3745.

Fig. 3746. A. & W. Railings for Toilet Racks.

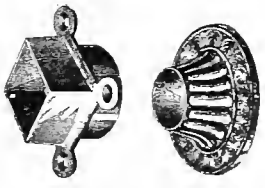
Fig. 3747. D. M. Co.

Figs. 3748-3749. Towel Rods. A. & W.

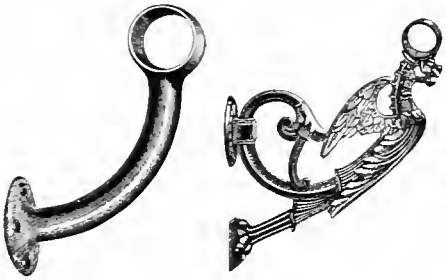


Figs. 3750-3754. Curtain Cord Hooks. A. & W.

Fig. 3755. Cup Hook.



Figs. 3756-3757. Curtain Rod Bushings. D. M. Co.



Figs. 3758-3759. Foot Rest Rod Brackets. A. & W.

Fig. 3760. Curtain Rod Bracket. A. & W.

Fig. 3761. Window Rod Bracket.

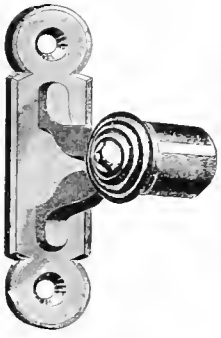
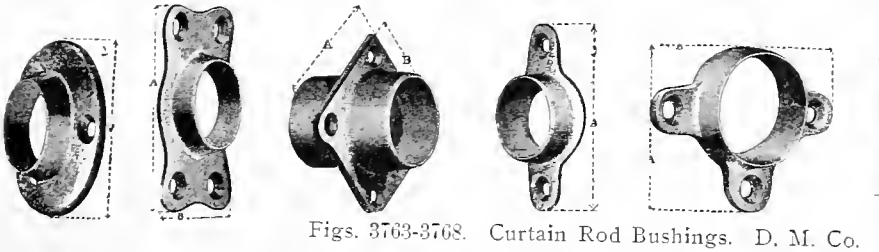
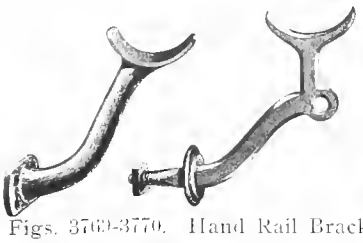


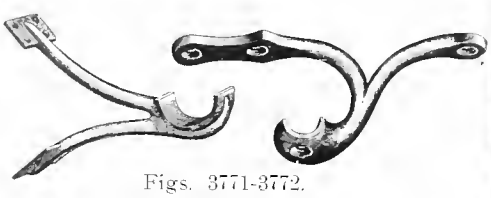
Fig. 3762. Window Rod Bracket. A. & W.



Figs. 3763-3768. Curtain Rod Bushings. D. M. Co.

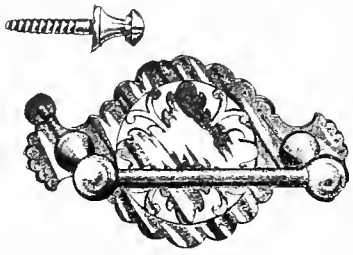


Figs. 3769-3770. Hand Rail Brackets.



Figs. 3771-3772. Pole Brackets for Street Cars.

Figs. 3777-3780. Pole or Hand Straps.



Figs. 3775-3776. Drawer Pull. D. M. Co.

Fig. 3790. Hand Rod Bracket.

Figs. 3781-3789. Upholsterers' Nails and Buttons.

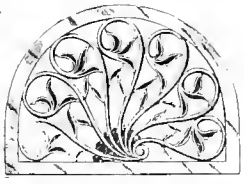


Fig. 3791. Grille for Vestibule Door.

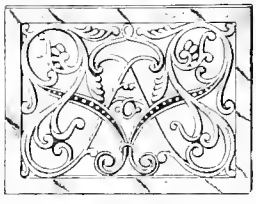


Fig. 3792. Grille for Vestibule Door.

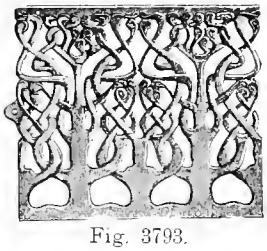


Fig. 3793. To Cover Heater Pipes.

Fig. 3794. For Vestibule and King Pin Plate.

Fig. 3795. For Door.

Ornamental Cast Work, Grilles, Etc. D. M. Co.

Fig. 3796. Mirror Frame.

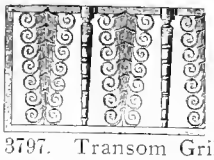


Fig. 3797. Transom Grille.

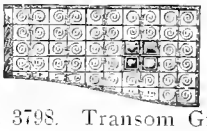


Fig. 3798. Transom Grille. One-Half.

Fig. 3799. Mirror Frame.

Fig. 3800. Mirror Frame.

Ornamental Cast Work. D. M. Co.

Fig 3801. Asbestos Protected Metal Interior Finish. Asbestos Protected Metal Co.

Figs. 3803-3804. Partition or Window Panels. Panel Decorations in Relief. They Are Veneered with Natural Wood.

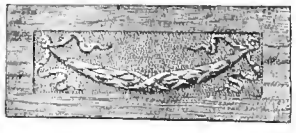


Fig. 3802. Deck Window Panel.

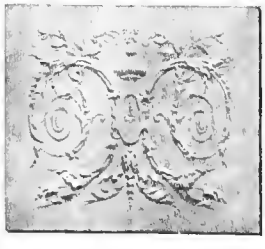
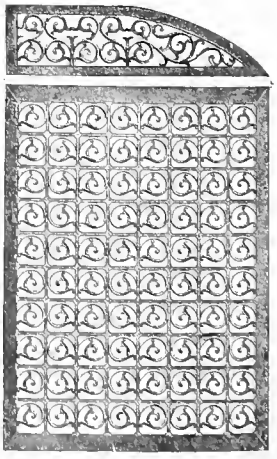
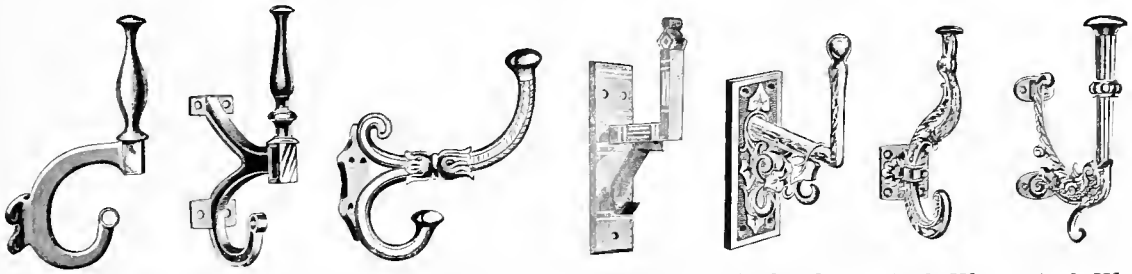


Fig. 3805. For Bulkheads.

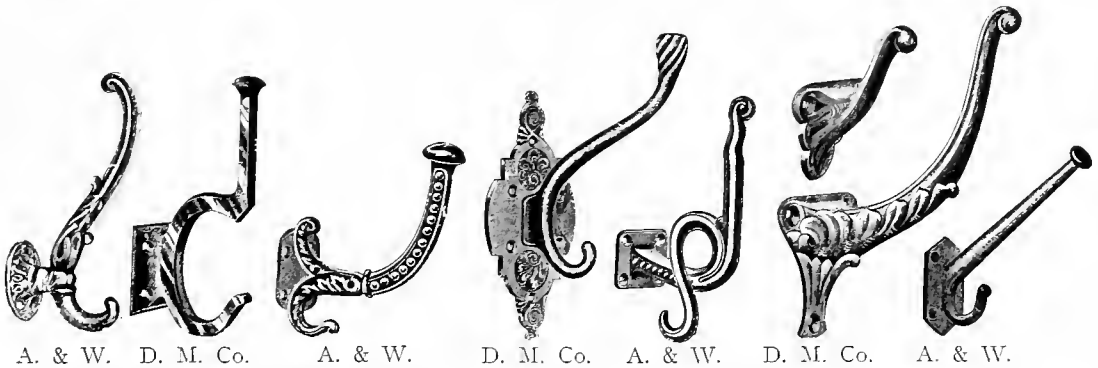


Figs. 3806-3807. Cast Grilles.



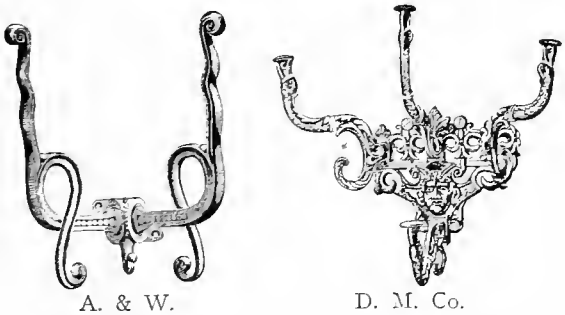
D. M. Co. A. & W. A. & W. A. & W. A. & W. A. & W. A. & W.

Figs. 3808-3814. Coat and Hat Hooks.



A. & W. D. M. Co. A. & W. D. M. Co. A. & W. D. M. Co. A. & W.

Figs. 3815-3823. Coat and Hat Hooks.



A. & W. D. M. Co.

Figs. 3824-3825. Coat and Hat Hook Clusters.

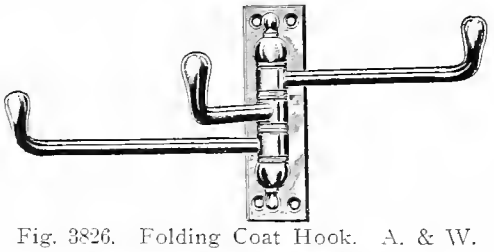
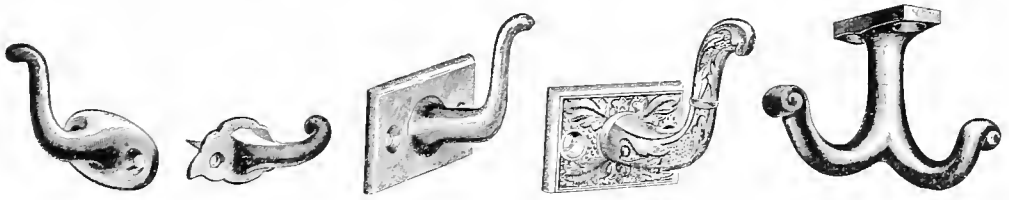
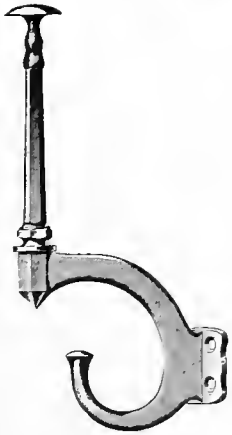


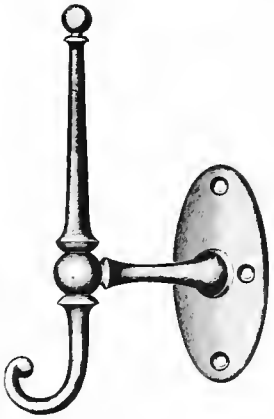
Fig. 3826. Folding Coat Hook. A. & W.



Figs. 3827-3830. Coat Hooks. D. M. Co.



No. 0170.



No. 0171.

Figs. 3831-3833. Coat and Hat Hooks.
Russell & Erwin Mfg. Co.

No. 0172.

Fig. 3834.
Ceiling Hook,
No. 0256.
R. & E. Mfg. Co.

Fig. 3835.
Wardrobe Hook, No. 129.
R. & E. Mfg. Co.

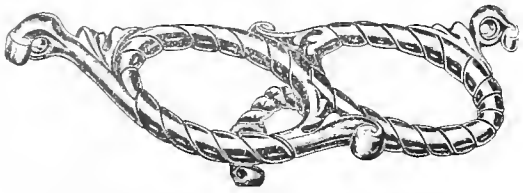


Fig. 3836. Umbrella Holder. A. & W.

Fig. 3837. Umbrella Holder Pocket. A. & W.

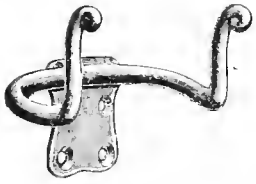


Fig. 3838. Broom Holder or Hook D. M. Co.

Fig. 3839. Whisk Broom Holder. D. M. Co.

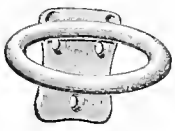


Fig. 3840. Broom Holder. D. M. Co.

Fig. 3841. Car Washer.

Fig. 3842. Broom in Holder. D. M. Co.

Fig. 3843. Whisk Broom and Holder D. M. Co.

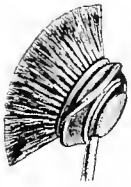


Fig. 3844. Car Washer.

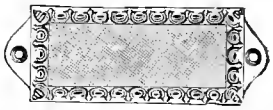


Fig. 3845. Match Striker.

Fig. 3846. Window Cleaner. D. W. Bosley Co.

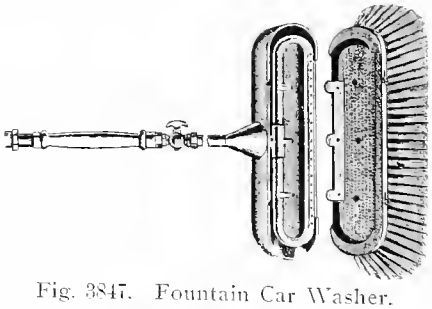


Fig. 3847. Fountain Car Washer.

Fig. 3848. Axe Pocket and Holder.

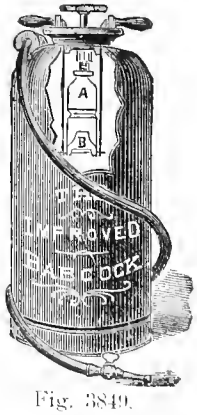


Fig. 3849. Babcock Fire Extinguisher. A. Acid Bottle. B. Acid Bottle Carrier.

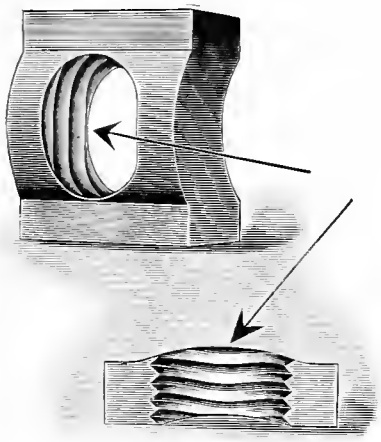
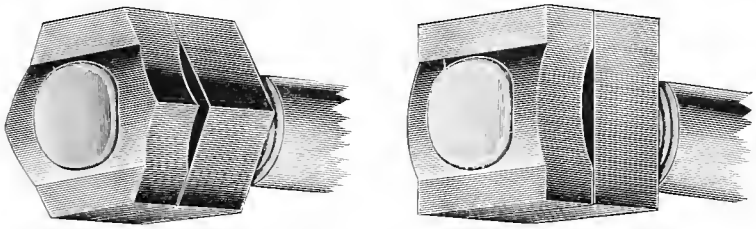


Fig. 3850. Grip Nut with Exaggerated Curve in Thread Pitch.
Grip Nut Co.



Figs. 3851-3852. Hexagon and Square Grip Nuts.
Grip Nut Co.

Fig. 3853. Lock Washer.
National Lock Washer Co.

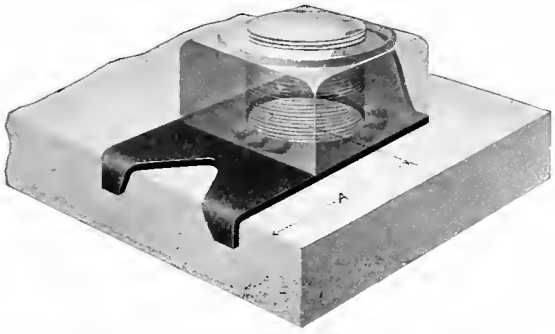
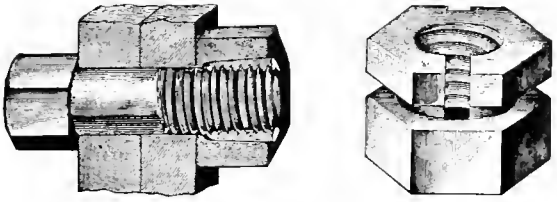


Fig. 3854. "F. B. C." Arch Bar Nut and Lock.
Keystone Nut Lock Mfg. Co.



Figs. 3855-3856. Columbia Lock Nut.
U. S. Metal & Mfg. Co.

Fig. 3857. Cleveland Turnbuckle, R. and L.
Cleveland City Forge & Iron Co.

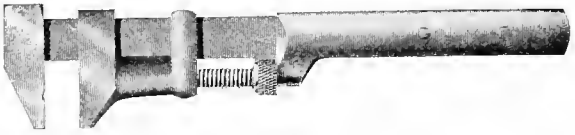


Fig. 3858. Coes' Steel Handle Railroad Monkey Wrench. Coes Wrench Co.

Fig. 3859. Hillman Lock Turnbuckle.
U. S. Metal & Mfg. Co.

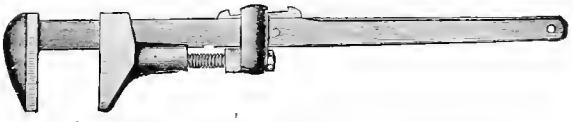


Fig. 3860. Railroad Wrench, Key Model.
Coes Wrench Co.

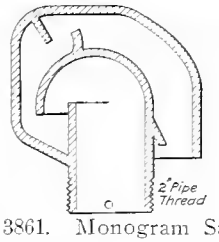


Fig. 3861. Monogram Safety Vent Valve for Tank Cars.
Payne-Jennings Co.

Fig. 3862. Bartley Flange Nut Fastener.

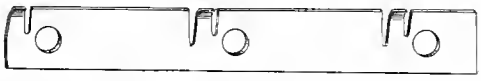
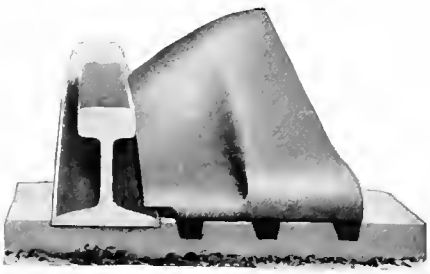
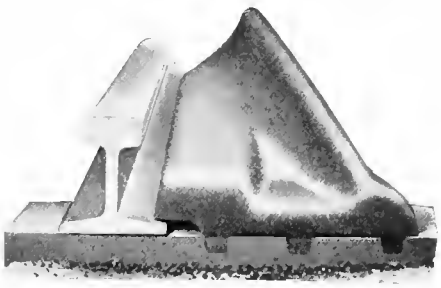


Fig. 3863. Multiple Nut Fastener.

American Nut and Bolt Fastener Co.





Figs. 3864-3865. Inside and Outside Car Replacers.
Buda Foundry & Mfg. Co.

Fig. 3866.
Broad Base
Jack.

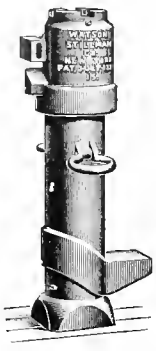


Fig. 3867.
Claw Type
Jack.
Watson-Stillman Co.

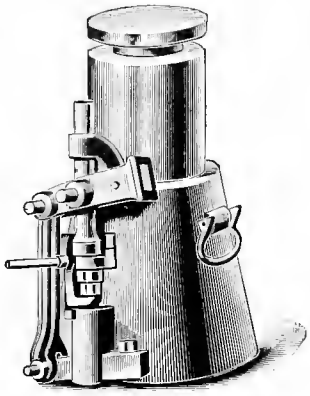
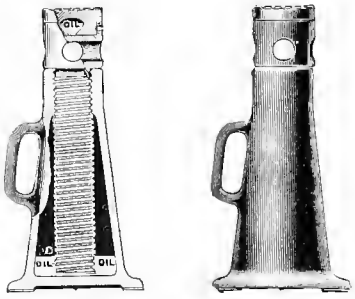


Fig. 3868.
Double Piston Outside
Pump Jack.

Fig. 3869. Low Type Journal
Box Jack.
Watson-Stillman Co.



Figs. 3870-3871. Chapman Jack.
Chapman Jack Co.

Fig. 3872. Barrett
Automatic Lowering Car Jack.
Capacity, 15 Tons.
Duff Mfg. Co.

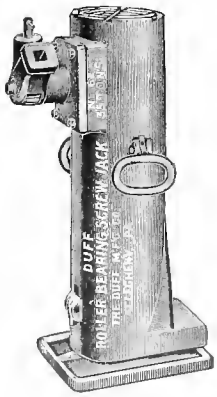


Fig. 3873. Roller Bearing
Ratchet Screw Jack, No. 62.
Capacity, 35 Tons.

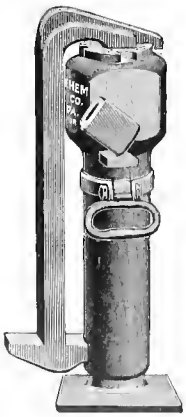


Fig. 3874.
Wrecking Jack.

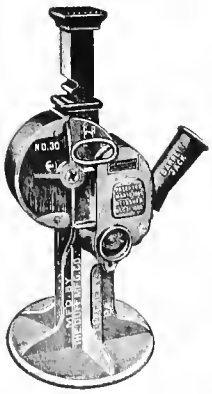


Fig. 3875.
Barrett Geared
Ratchet Lever Car
Jack, No. 30.
Capacity, 35 Tons.
Duff Mfg. Co.

Fig. 3876.
Roller Bearing
Ratchet Screw
Jack, No. 63.
Capacity, 25 Tons.

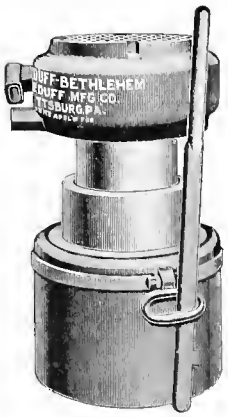


Fig. 3877.
Low or
Telescope Jack

Fig. 3878. Small Base Jack.

Fig. 3879. Broad Light Base Jack.

Fig. 3880. Broad Heavy Base Jack.

Fig. 3881. Independent Claw Jack.

Fig. 3882. Car Inspectors' Double Pump Jack.

Fig. 3883. Elliptical Base Jack.

Fig. 3884. Claw Jack

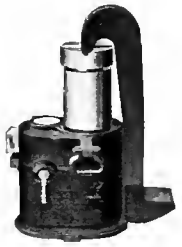


Fig. 3885. Horizontal Claw Jack.

Richard Dudgeon.

Fig. 3886. Car Replacing Jack.

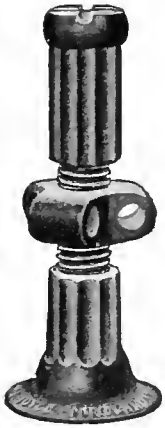


Fig. 3887. Double Movement Jack.

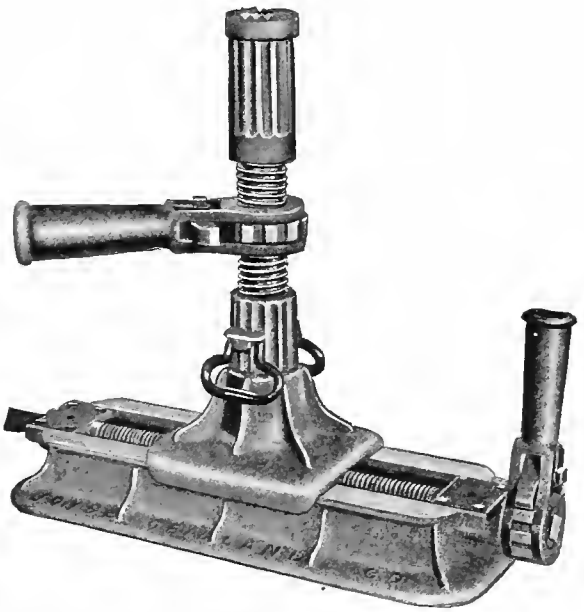


Fig. 3888. Traversing Jack.

Joyce-Cridland Co.

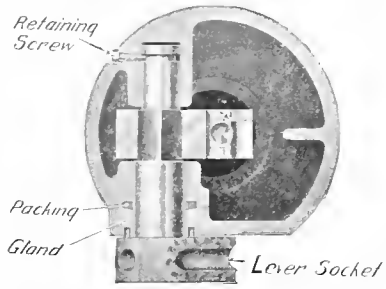


Fig. 3889. Sectional View Through Head.

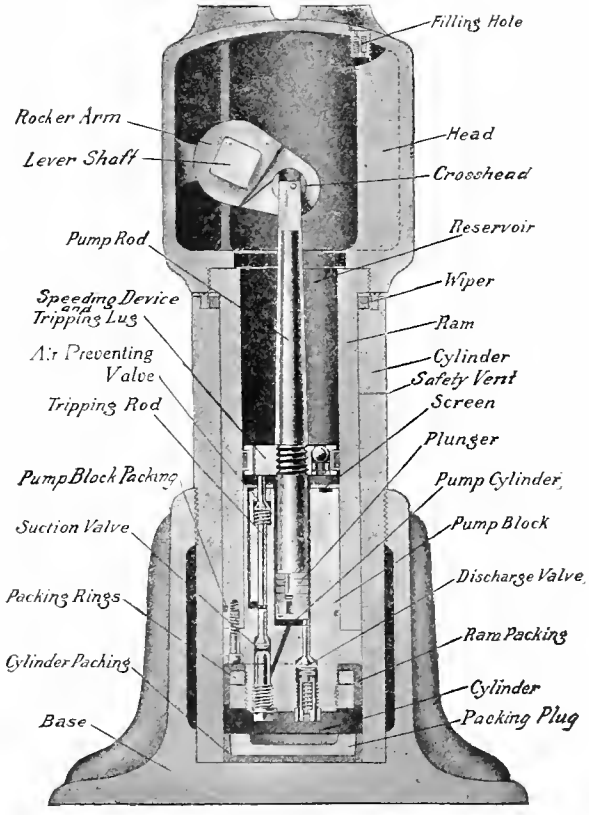


Fig. 3890. Inside Type Hydraulic Jack.
Joyce-Cridland Co.

Numbers Refer to List of Names of Parts Below.

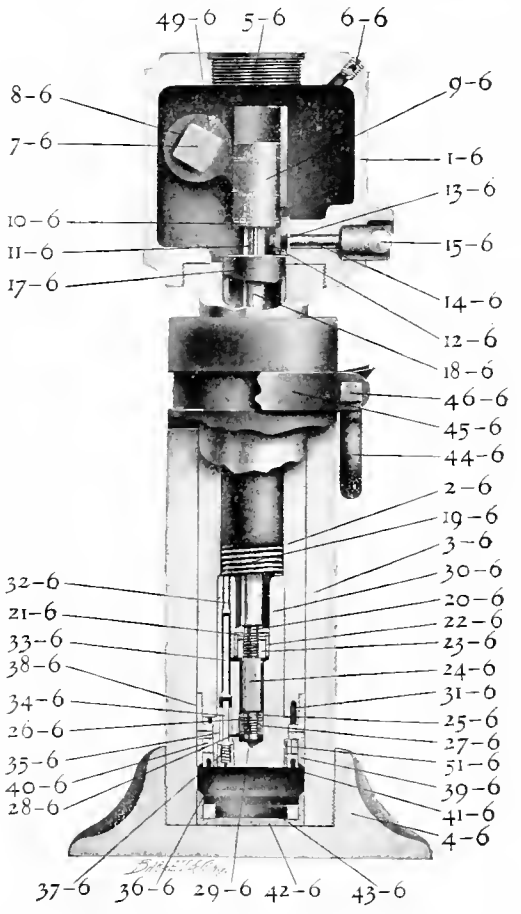


Fig. 3891. Universal Hydraulic Jack.
Richard Dudgeon.

Names of Parts of Universal Jack. Fig. 3891.

1-6 *Head*
2-6 *Ram*
3-6 *Cylinder*
4-6 *Low Base*
5-6 *Head Plate*
6-6 *Air Valve*
7-6 *Socket*
8-6 *Arm*
9-6 *Piston Head*
10-6 *Piston Retaining Pin*
11-6 *Lowering Pin*
12-6 *Cam Shaft Nut*
13-6 *Cam*
14-6 *Cam Shaft*
15-6 *Valve Handle*
16-6 *Valve Handle Pin*
17-6 *Push Tube*
18-6 *Piston*
19-6 *Push Tube Spring*
20-6 *Large Piston Collar*
21-6 *Large Hard Packing*
22-6 *Large Cup Packing*
23-6 *Large Piston Packing Ring*
24-6 *Piston Extension*
25-6 *Small Piston Collar*
26-6 *Small Hard Packing*
27-6 *Small Cup Packing*
28-6 *Small Piston Packing Ring*
29-6 *Jam Screw*
30-6 *Pump*
31-6 *Pump Pin*
32-6 *Upper Valve*
33-6 *Middle Valve*
34-6 *Lower Valve*
35-6 *Valve Case*
36-6 *Valve Bonnet*
37-6 *Valve Spring*
38-6 *Pump Retaining Ring*
39-6 *Ram Packing*
40-6 *Ram Packing Ring, Upper*
41-6 *Ram Packing Ring, Lower*
42-6 *Bottom Packing*
43-6 *Bottom Packing Ring*
44-6 *Handles*
45-6 *Straps*
46-6 *Handle Bolts*
47-6 *Lever*
48-6 *Base Screw*
49-6 *Arm Screw*
50-6 *Socket Packing*
51-6 *Packing Ring Pin*
52-6 *Cam Pin*

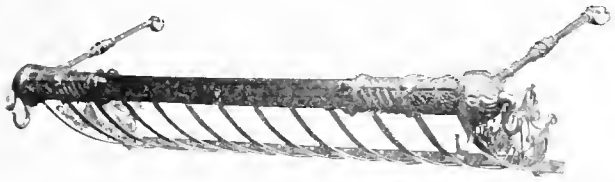


Fig. 3892. Cast Basket Racks.

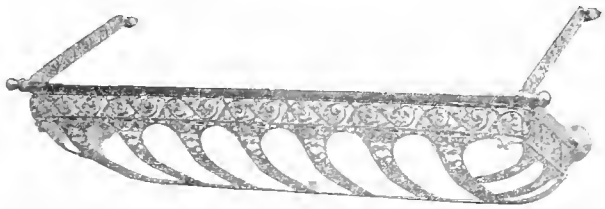


Fig. 3893.

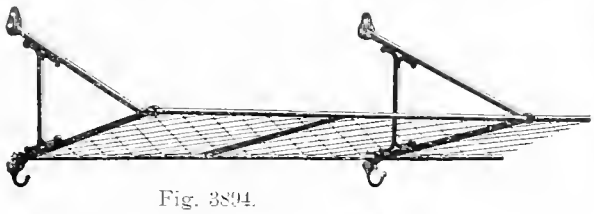


Fig. 3894.
Continuous Basket Rack.
D. M. Co.

Fig. 3895.
Wire Basket Rack, with
Cast Ends. A. & W.

Fig. 3896.
Continuous Basket Rack.
D. M. Co.

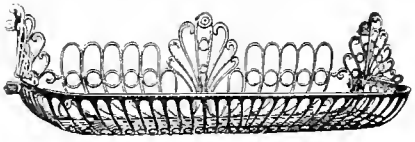


Fig. 3897.
Cast Basket Rack.
A. & W.

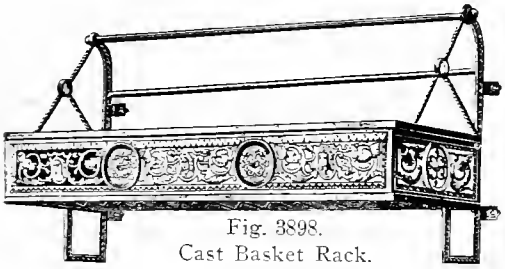


Fig. 3898.
Cast Basket Rack.
A. & W.

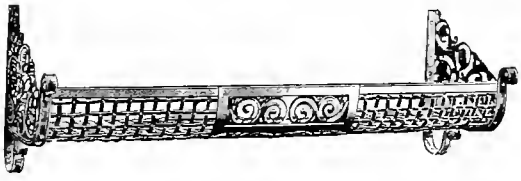


Fig. 3899.
Cast Basket Rack.
A. & W.

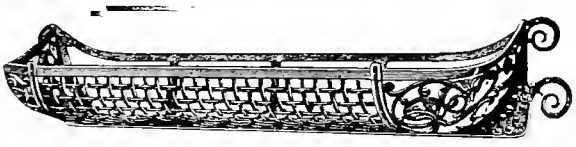


Fig. 3900.
Cast Basket Rack.
D. M. Co.

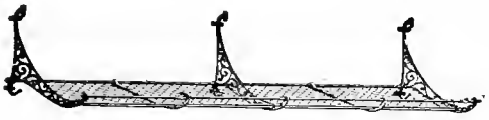


Fig. 3901.
Wire Basket Rack with Cast Bracket.
D. M. Co.

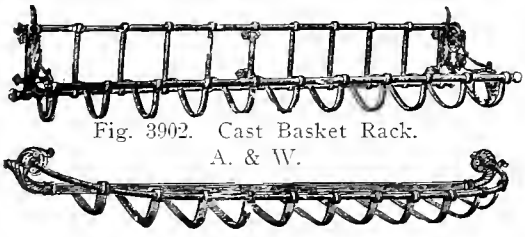
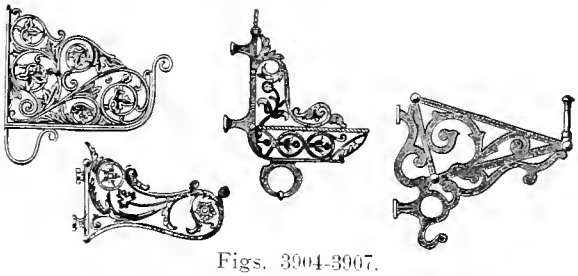


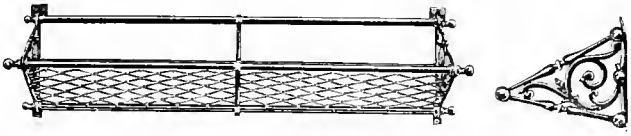
Fig. 3902. Cast Basket Rack.
A. & W.

Fig. 3903.
Cast Basket Rack.
A. & W.



Figs. 3904-3907.
Cast Bracket Ends for Basket Racks.
A. & W.

Fig. 3908.
Cast Basket Rack.
A. & W.



Figs. 3909-3910.
Wire Bottom Basket Rack.
A. & W.

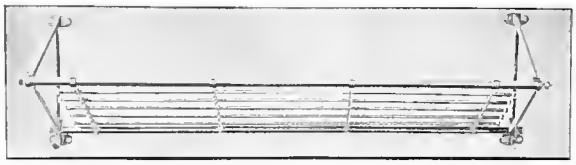


Fig. 3911.

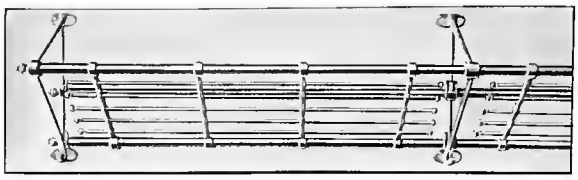


Fig. 3912.

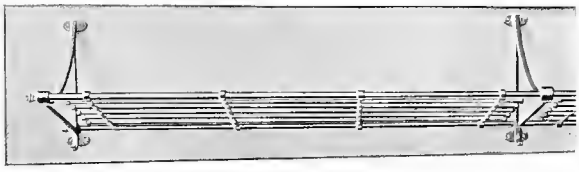


Fig. 3913.

Fig. 3914.

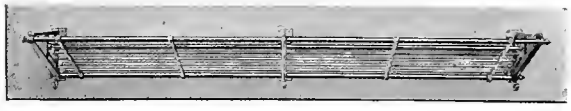


Fig. 3915.

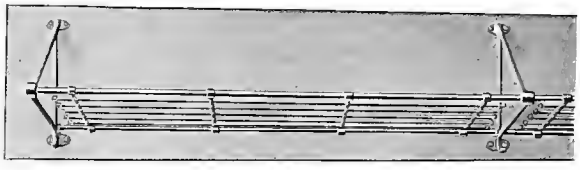


Fig. 3916.

Removable Bottom Basket Racks. Adams & Westlake.

Fig. 3917. Removable Bottom Basket Rack. A. & W.

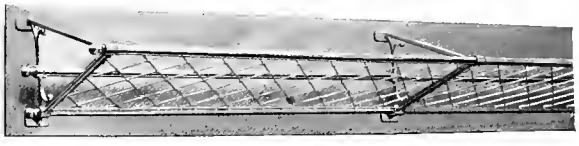
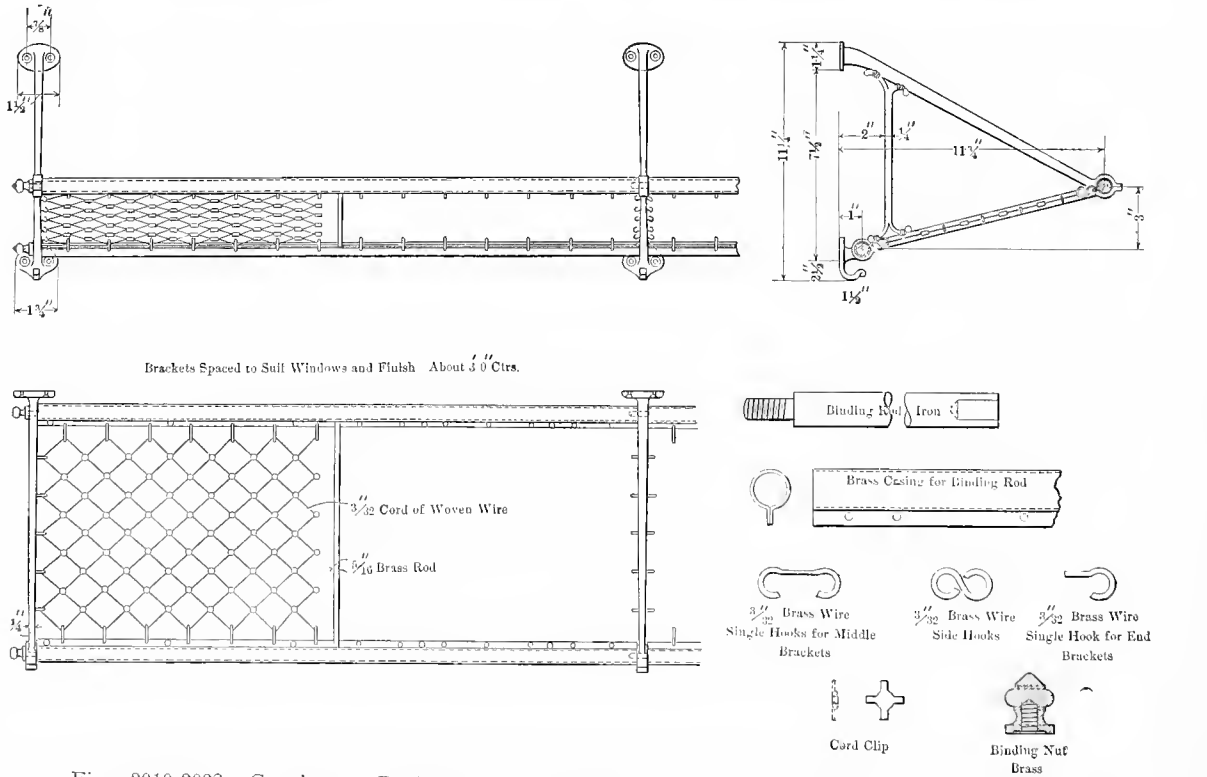
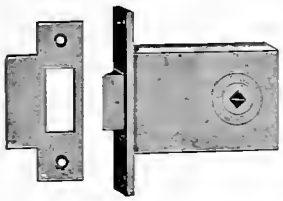


Fig. 3918. Continuous Removable Bottom Baggage Rack, No. 55. J. L. Howard & Co.

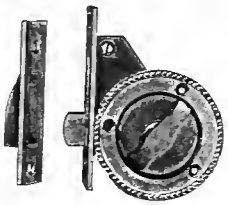


Figs. 3919-3932. Continuous Basket Rack and Details. First-Class Coach. N. Y., N. H. & H.



Figs. 3933-3934.
Door Latch.

Fig. 3935.
Door Latch Handle.



Figs. 3936-3937.
Door Bolt and Keeper.

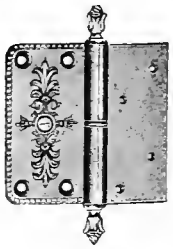


Fig. 3938.
Door Hinge.

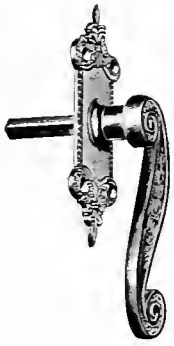


Fig. 3939.
Door Latch Handle.

Fig. 3940.
Brakeman's
Grab Handle.

Fig. 3941.
Trap Door Holder.

Fig. 3942.
Trap Door Holder.

Fig. 3945.
Brakeman's
Step.

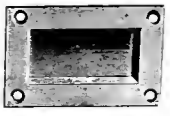


Fig. 3943.
Flush End
Sash Lift.

Fig. 3944.
End Upper
Sash Lift.

Fig. 3946. Step Tread Nosing.
Wide Vestibule Fittings, Pullman Type. Adams & Westlake Co.

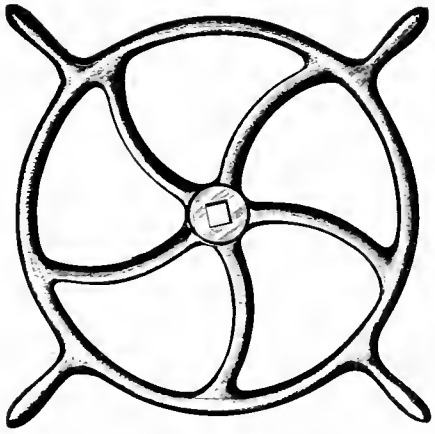
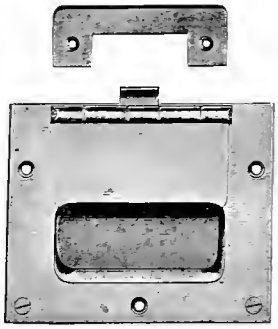


Fig. 3947. Brake Wheel.



Figs. 3948-3949.
Trap Door Latch and Keeper.
Wide Vestibule Fittings, Pullman Type.
Adams & Westlake Co.

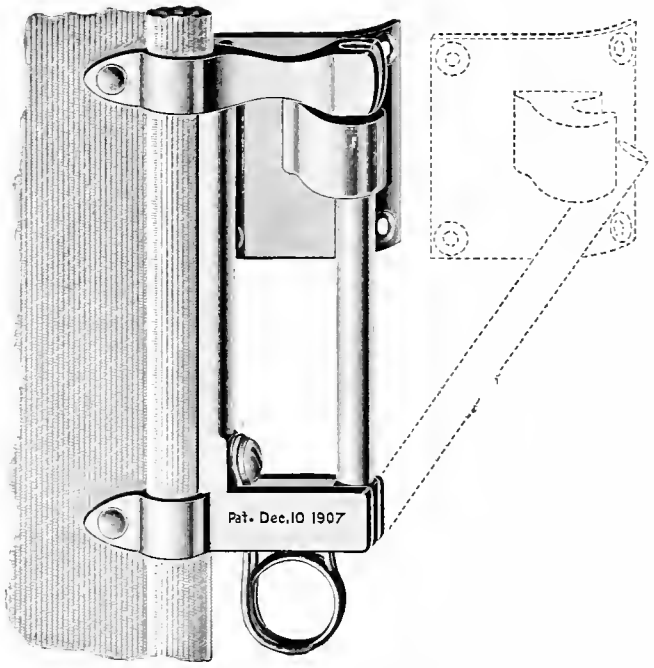


Fig. 3950. Automatic Releasable Vestibule Curtain Handle.
The Curtain Supply Co.

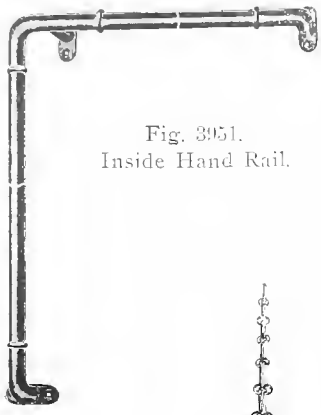


Fig. 3951.
Inside Hand Rail.

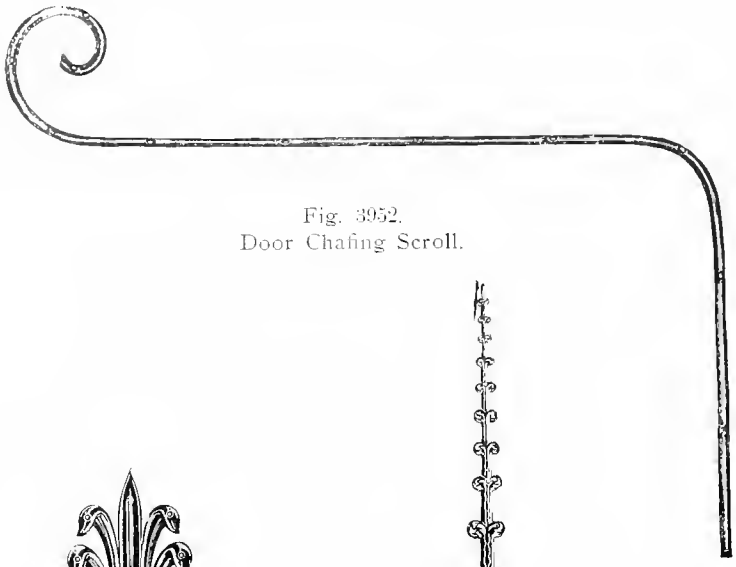


Fig. 3952.
Door Chafing Scroll.

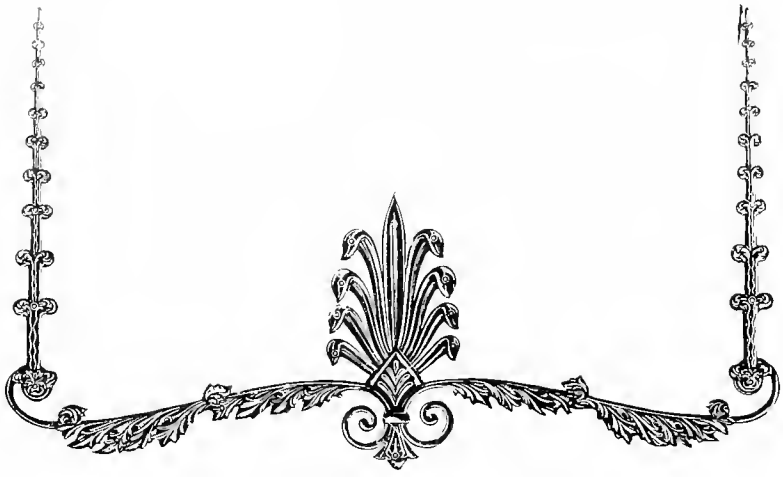


Fig. 3953. Door Ornament.

Fig. 3954.
Corner Post Grab
Handle.

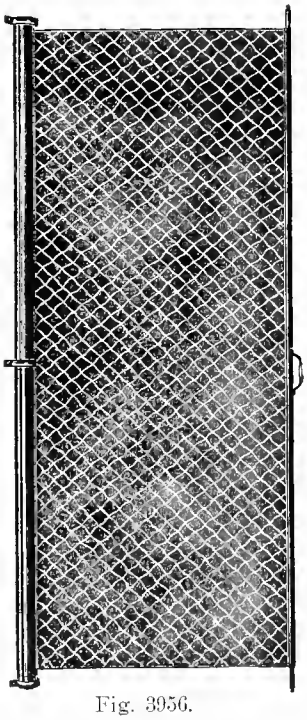
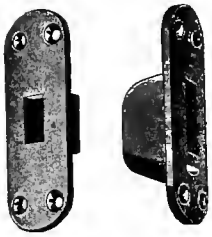


Fig. 3956.
Passageway Curtain and Shield.



Figs. 3957-3958.
Tail Gate Sockets.

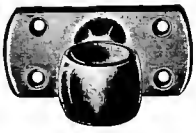


Fig. 3959.
Uncoupling Rod Guide.

Fig. 3960.
Brake Handle.
Bumper.

Fig. 3961.
Bell Cord Guide.

Fig. 3955.
Uncoupling Rod
Floor Plate.

Fig. 3962.
Diaphragm
Molding
Joint Cover.

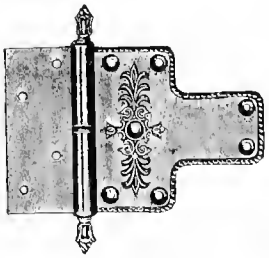
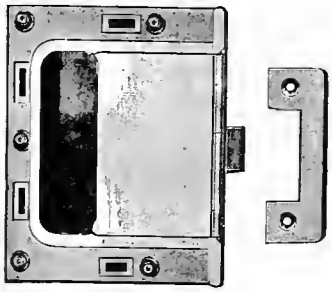


Fig. 3964.
Door Hinge.

Fig. 3965.
Door Chafing Plate.

Fig. 3963. Uncoupling Rod
Handle and Socket.

Wide Vestibule Fittings, Pullman Type. Adams & Westlake Co.



Figs. 3966-3967.
Trap Door Latch and Keeper.

Fig. 3968.
Brake Rod Floor Plate.

Fig. 3969.
Uncoupling Rod Guide.

Fig. 3970.
Uncoupling Rod Foot.

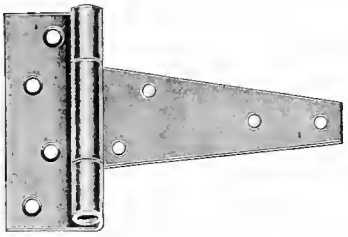


Fig. 3971.
Trap Door Hinge.

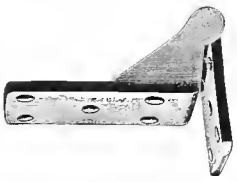
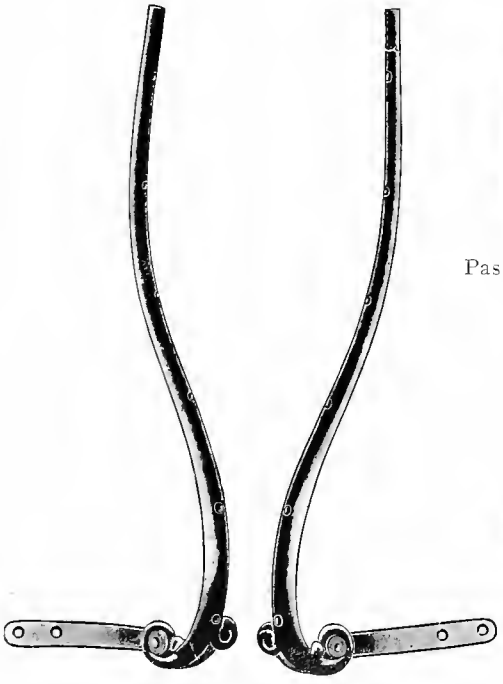


Fig. 3972.
Trap Door Hinge.

Fig. 3973. Step Tread Nosing.

Figs. 3977-3978.
Drop Hand Rail.



Figs. 3979-3980.
Step Stringer Nosings. R. & L.

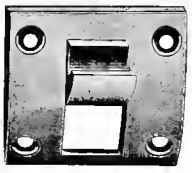
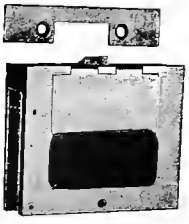


Fig. 3974.
Passageway Curtain Catch.



Figs. 3975-3976.
Trap Door Latch and Keeper.

Fig. 3981.
Bell Cord Guide.

Fig. 3986.
Corner Post Grab Handle.

Fig. 3987.
Corner Post Grab Handle.

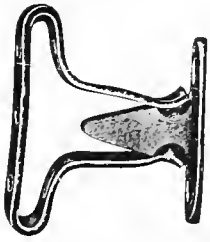


Fig. 3982.
Door Holder.

Fig. 3983. Alcove Molding.

Fig. 3984.
Mat Hook.

Fig. 3985. Door Ornament.

Wide Vestibule Fittings, Pullman Type. Adams & Westlake Co.

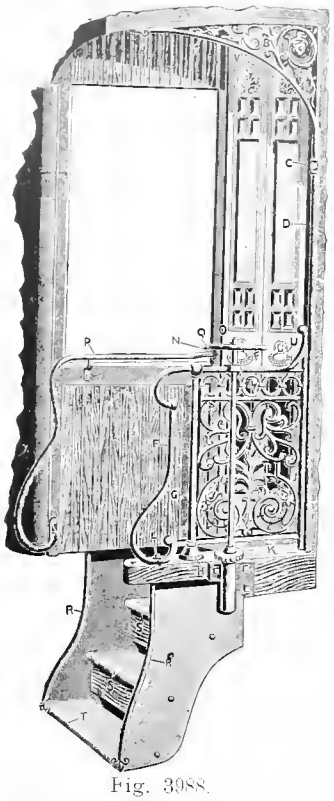


Fig. 3988.
Narrow Vestibuled Platform and Trimmings. D. M. Co.

Names of Parts. Fig. 3988.

A	*Connecting Strip End*	L	*Rail Bolt*
B	*Ornamental Casting*	M	*Brake Staff Holder*
C	*Post Rail Ornament*	N	*Brake Wheel*
D	*Connecting Strip*	O	*Hand Rail Nut*
E	*Connecting Strip*	P	*Body Grab Rail*
F	*Grab Rail*	Q	*Grab Rail Bushing*
G	*Post*	R	*Step Fender*
H	*Rail Base*	S	*Step Molding*
I	*Rail Panel*	T	*Step Molding*
J	*Rail Post Strip*	U	*Door Drop Handle*
K	*Bottom Rail*	V	*Ornamental Casting*

Names of Parts. Fig. 3989.

A	*Ornamental Casting*	H	*Body Grab Rail*
B	*Ornamental Casting*	I	*Brake Wheel*
C	*Hand Rail Nut*	J	*Connecting Strip*
D	*Flush Handle*	K	*Door Frame*
E	*Brake Staff Holder*	L	*Ornamental Casting*
F	*Step Fender*	M	*Door Frame*
G	*Platform End Rail*		

Figs. 3990-3991.
Window Guard Rods.

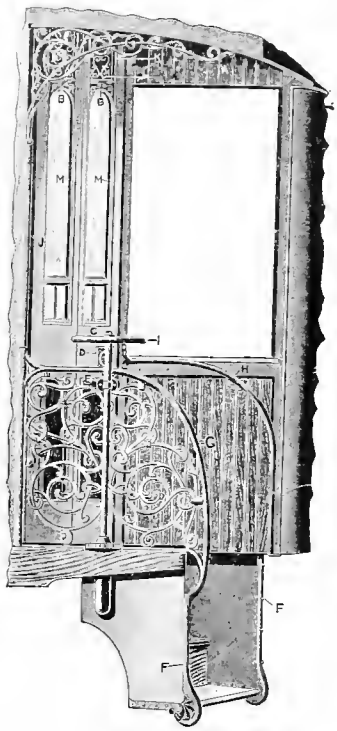
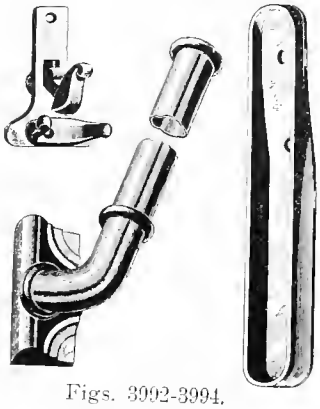


Fig. 3989.
Narrow Vestibuled Platform and Trimmings. D. M. Co.



Figs. 3992-3994.
Door Guard Drop Rod Catch and Pocket. D. M. Co.

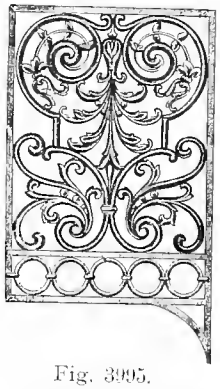
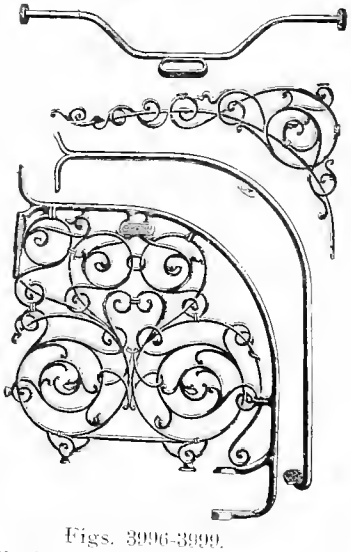


Fig. 3995.
Platform Gate Panel. A. & W.



Figs. 3996-3999.
Platform End Hand Rails, Panel, and Bracket. A. & W.

Fig. 4000. Observation Platform Railing. A. & W.

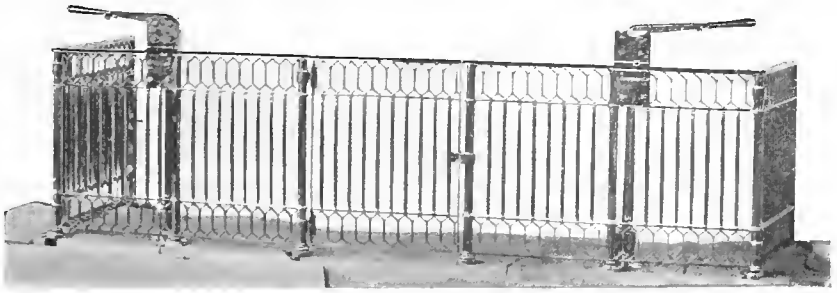
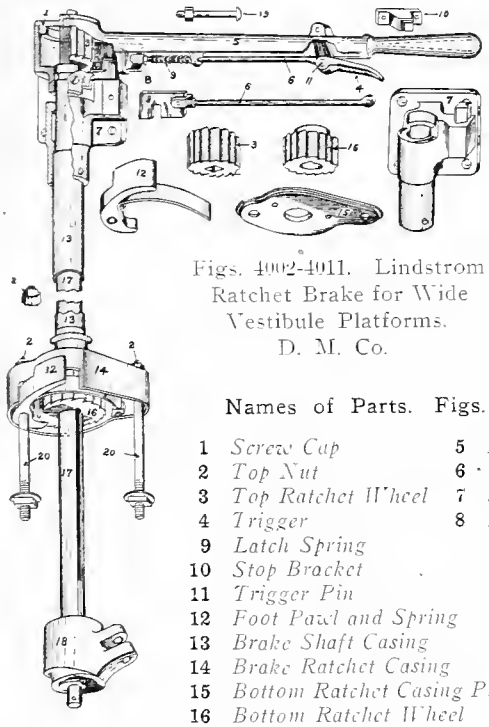


Fig. 4001. Observation Platform Railing. A. & W.



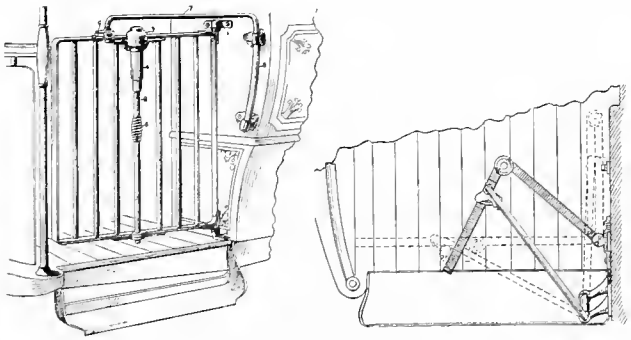
Figs. 4002-4011. Lindstrom Ratchet Brake for Wide Vestibule Platforms. D. M. Co.

Names of Parts. Figs. 4002-4011.

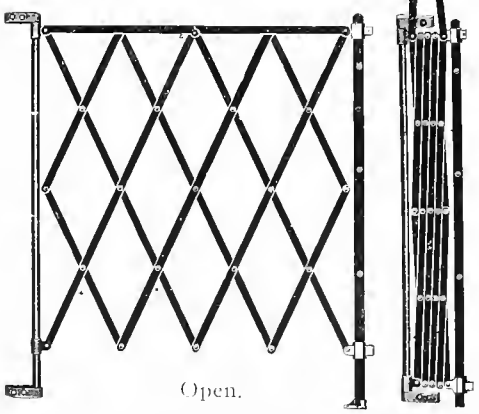
1 *Screw Cap*
2 *Top Nut*
3 *Top Ratchet Wheel*
4 *Trigger*
5 *Brake Handle*
6 *Trigger Rod*
7 *Shaft Bracket*
8 *Latch*
9 *Latch Spring*
10 *Stop Bracket*
11 *Trigger Pin*
12 *Foot Pawl and Spring*
13 *Brake Shaft Casing*
14 *Brake Ratchet Casing*
15 *Bottom Ratchet Casing Plate*
16 *Bottom Ratchet Wheel*
17 *Brake Shaft*
18 *Chain Connector*
19 *Shaft Bracket Bolts and Nuts*
20 *Bottom Ratchet Casing Bolts and Bottom Nuts*

Fig. 4012.
Wood's Platform Gate, Decorated. A. & W.

Fig. 4015. Platform Chain.

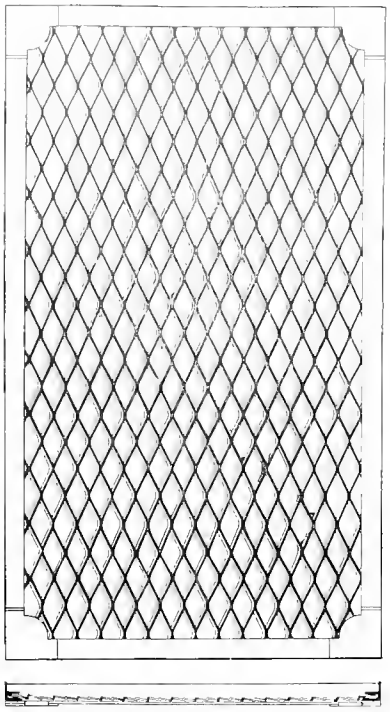


Figs. 4013-4014. Bliss Folding Platform Gate.
R. Bliss Mfg. Co.



Open. Closed.

Figs. 4016-4017.
Folding Platform Tail Gate.



Figs. 4018-4019.
Expanded Metal Window Guard, for Postal Cars. Merritt & Co.

Fig. 4020. Letter Box Lid.
D. M. Co.

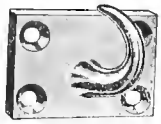


Fig. 4021.
Mail Bag Hook.
A. & W.

Fig. 4022.
Letter Case Label Holder.
D. M. Co.

Fig. 4023. Letter Box Lid.
A. & W.

Fig. 4024. Label Holder.

Fig. 4025.

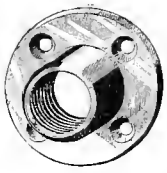


Fig. 4026.

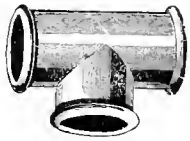


Fig. 4027.
Safety Rod Bracket, Bushing and T Joint.
D. M. Co.

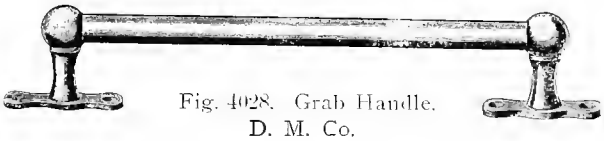


Fig. 4028. Grab Handle.
D. M. Co.

Figs. 4029-4031.
Door Handles.
D. M. Co.

Fig. 4032.
Letter Case Label Holder.
D. M. Co.

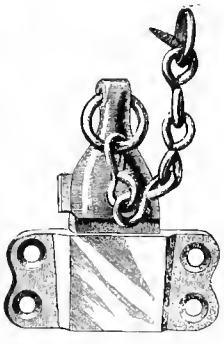


Fig. 4033.
Door Wedge and Clasp.
D. M. Co.

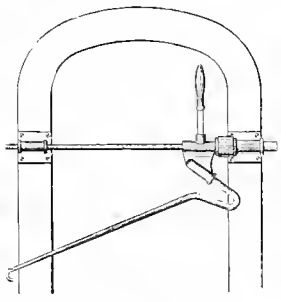


Fig. 4034.
Mail Bag Catcher.

Fig. 4035.

Fig. 4035a.
Pouch Hooks.
D. M. Co.

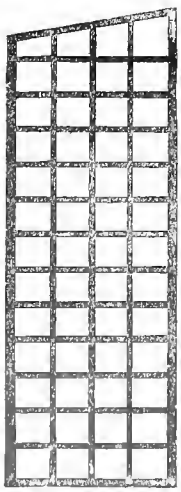


Fig. 4037.
Paper Case Casting.
D. M. Co.

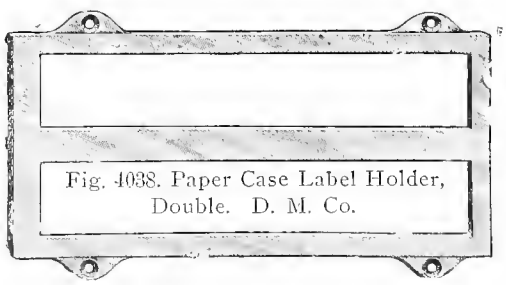


Fig. 4038. Paper Case Label Holder, Double. D. M. Co.

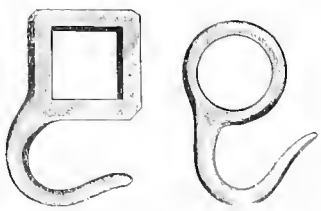
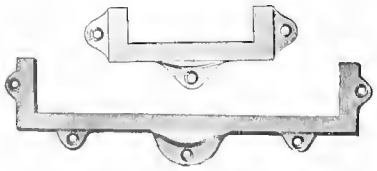


Fig. 4036. Fig. 4036a.
Pouch Hooks.
A. & W.



Figs. 4039-4040.
Paper Case Label Holders.
A. & W.

Fig. 4041.
Paper Case Label Holder.
A. & W.

Fig. 4042.

Fig. 4043.

Howard's Patent Railway Water Closets. Jas. L. Howard & Co.

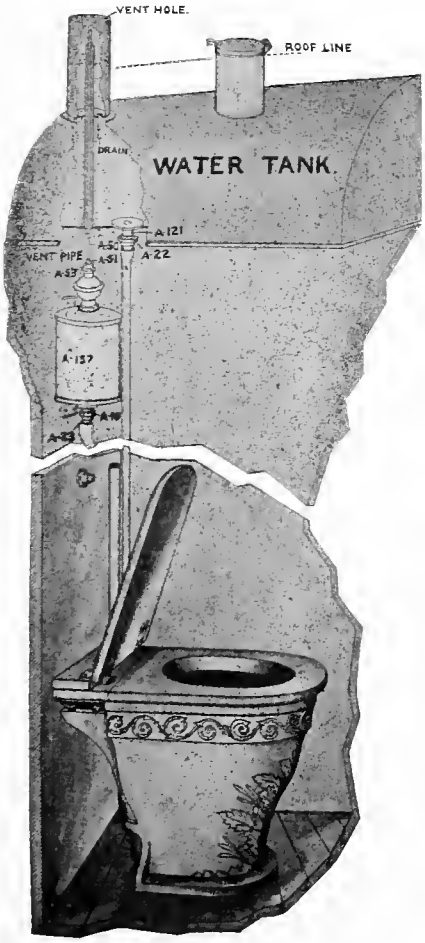


Fig. 4044.
Rex Sanitary Water Closet.
D. M. Co.

Fig. 4045.
Apron and Lid Partly Raised.

Fig. 4046.
Apron and Lid Raised.

Protection Dry Closet. A. & W.

Fig. 4047.
Seat and Lid Raised.

Fig. 4048.
Lid Raised.

Acme Dry Closet. A. & W.

Fig. 4049. "Eckert," No. 8, Enameled Iron Water Closet. D. M. Co.

Fig. 4050. Duner Combined Flush or Dry Closet with Side Handle. Duner Co.

Fig. 4053. Duner Enameled Iron Corner Closet, No. 3. Tray to be Inclosed. Duner Co.

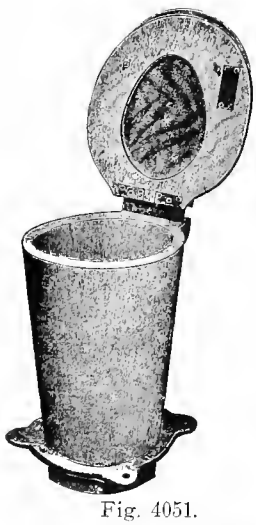


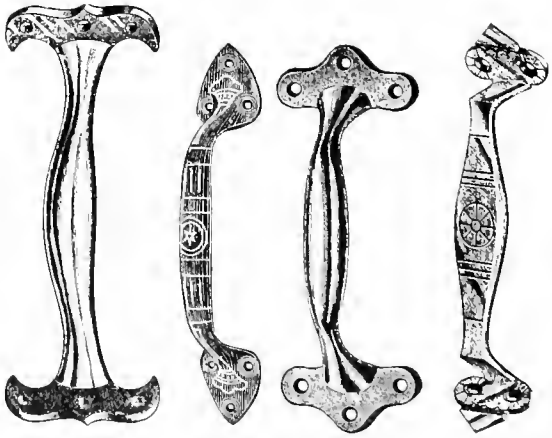
Fig. 4051. Seat and Lid Raised. Samson Dry Closet.

Fig. 4052. Lid Raised. A. & W.

Fig. 4054. Sloping Cone Shaped Closet Hopper. D. M. Co.

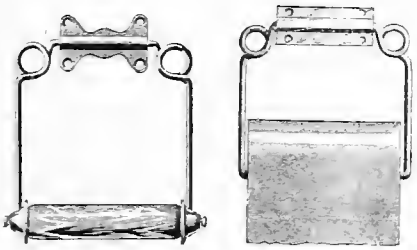
Fig. 4055. Straight Earthen Closet Hopper. A. & W.

Fig. 4056. Straight Cone Shaped Earthen Hopper. A. & W.

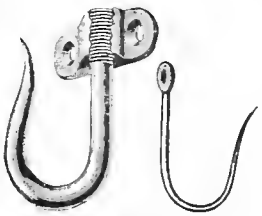


A. & W. A. & W. A. & W. D. M. Co.

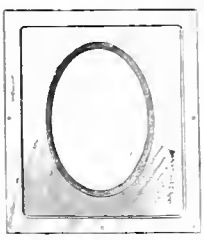
Figs. 4057-4060. Saloon Handles.



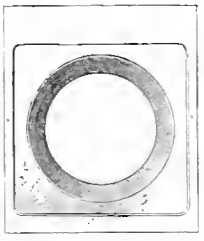
Figs. 4061-4062.
Paper Holders and Roll.
D. M. Co.



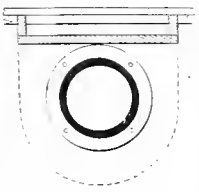
Figs. 4063-4064.
Paper Hooks.
D. M. Co.

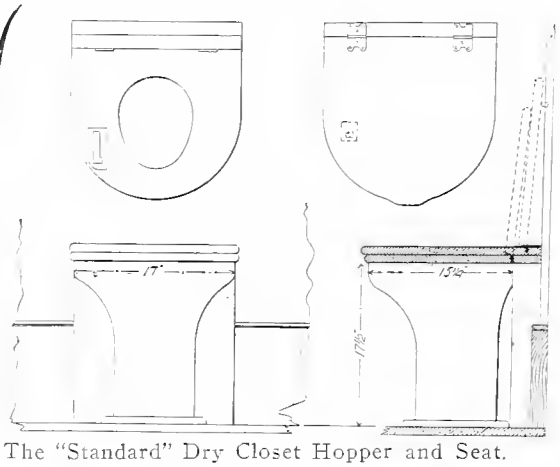


Figs. 4065-4066.
Enameled Drip Tray for Oval Seat.
D. M. Co.



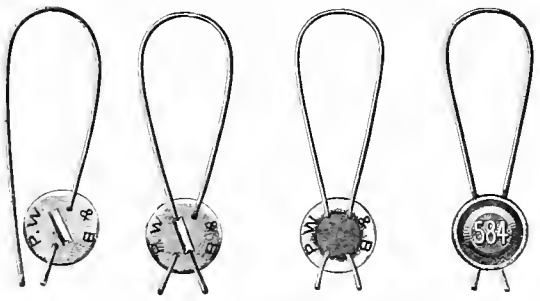
Enameled Drip Tray for Round Seat.
D. M. Co.





Figs. 4067-4071. The "Standard" Dry Closet Hopper and Seat.
D. M. Co.

Figs. 4072-4073. Tin Cup Shackle Car Seal.
E. J. Brooks & Co.



Figs. 4074-4077. Safety Cross Wire Tin and Lead Seals.
E. J. Brooks & Co.

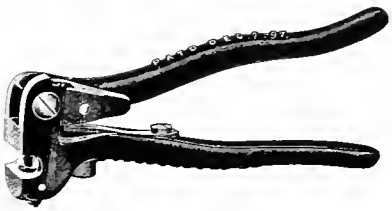


Fig. 4078. Ratchet Seal Press.

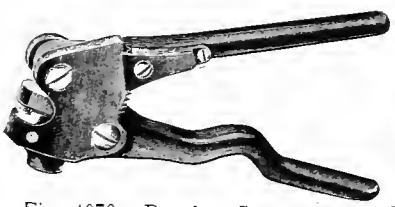
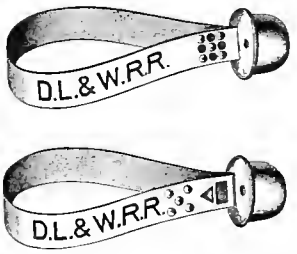
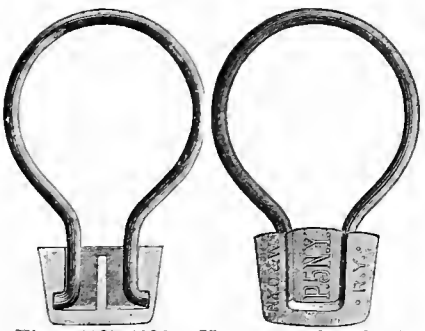


Fig. 4079. Ratchet Seal Press.
E. J. Brooks & Co.

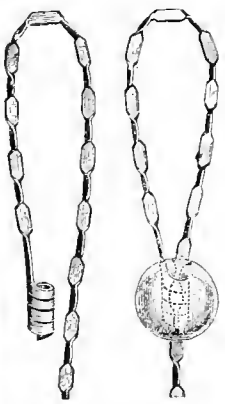


Figs. 4080-4081. Self-Locking Seal.
E. J. Brooks & Co.

Figs. 4082-4084. Horse Shoe Car Seal.
E. J. Brooks & Co.



Figs. 4085-4086. Keystone Car Seal.



Figs. 4087-4088.
Safety Cast in Coil Wire Pebbled Lead Seal with Indented B Wire.

Fig. 4089.
Six-Ply Wire Shackle and Lead Car Seal.

Figs. 4090-4091.
The Perfection Stamped Encased Eyelet Rivet Shackle.

Fig. 4092.
Central Cast in Crosswise Lead Seal with Detective Wire.

Car Seals. E. J. Brooks & Co.

Fig. 4093. Revolving Parlor Car Chair, No. 32.

Figs. 4094-4096. Detachable Cushion and Back of Parlor Car Chair, No. 32.

Fig. 4097. Parlor Car Chair, No. 38.

Fig. 4098. Parlor Car Chair, No. 34.

Fig. 4099. Reclining Parlor Car Chair, No. 41.

Fig. 4100. Parlor Car Chair, No. 30.

Hale & Kilburn Mfg. Co.

Fig. 4101. Steel Walkover Seat, No. 194.
Frieze Plush Upholstery.
P. R. R. Standard for Steel Coaches.

Fig. 4102. Steel Walkover Seat, No. 197.
Plush Upholstery.
Harriman Lines Type for Steel Coaches.

Fig. 4103. Walkover Seat, No. 197.
Frieze Plush Upholstery.
For Vestibuled Coaches.

Fig. 4104. Walkover Seat, No. 96.
Frieze Plush Upholstery.
For Vestibuled Coaches.

Fig. 4105. Reversible Seat, No. 73.
Plush Upholstery.
For Day Coaches.

Fig. 4106. Walkover Seat, No. 90.
Frieze Plush Upholstery.
P. R. R. Standard for Wood Coaches.

Hale & Kilburn Mfg. Co.

Fig. 4107. Reversible Seat, No. 179.
Plush Upholstery.
N. Y., N. H. & H. Type for Vestibuled Coaches.

Fig. 4108. Walkover Seat, No. 93.
Rattan Upholstery.
For Smoking Cars.

Fig. 4109. Walkover Seat, No. 97.
Frieze Plush Upholstery.
For Vestibuled Coaches.

Fig. 4110. Reversible Seat, No. 71.
Rattan Upholstery.
For Narrow Gage Cars.

Fig. 4111. Double Reclining Chair, No. 65.
Plush Upholstery.

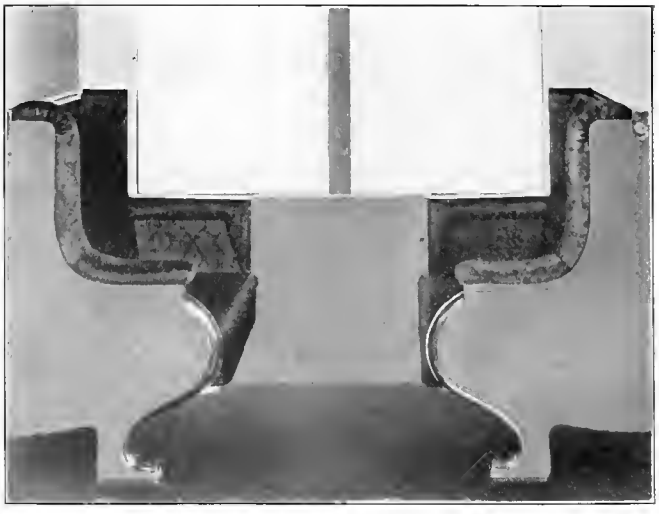


Fig. 4112. Steel Sleeping Car Berth Seats.
Plush Upholstery.

Fig. 4113. Wheeler Slideover Seat without Ends for Electric Service.

Fig. 4114. No. 38W. Wheeler Slideover Seat with High Back and Pedestal Base.

Fig. 4115. No. 55AGF. Wheeler Slideover Seat for Interurban or Narrow Gage Cars. Extra High Back.

Fig. 4116. No. 104 P. & S. High Turnover Back with Adjustable Foot Rest.

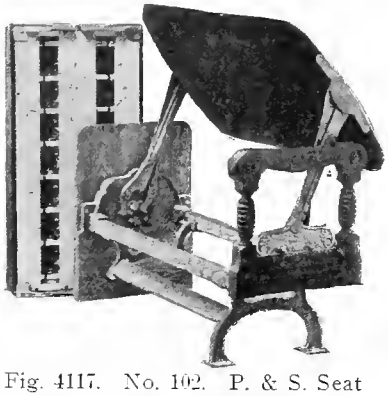


Fig. 4117. No. 102. P. & S. Seat in Plush for Steam Road Service.

Fig. 4118. No. 97B. Wakefield Double Revolving Individual Car Seats.

Fig. 4119. No. 99. P. & S. Seat for Electric Service.

Fig. 4120. No. 42C. Wheeler Slideover Seat, Rattan, for Electric Cars.

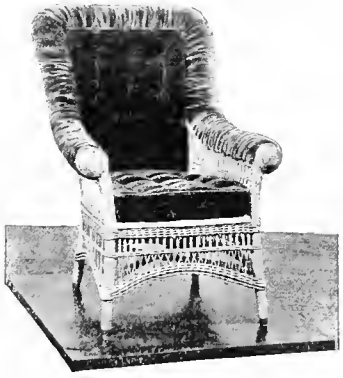


Fig. 4121. Upholstered Rattan Chair for Parlor Cars.

Heywood Brothers & Wakefield Co.

Fig. 4122. No. 34. High Back Coach Seat, Pedestal End.

Fig. 4123. No. 32X. High Back Coach Seat, Showing Construction of Frames.

Fig. 4124. No. 66X. High Back Coach Seat. Flyover Type.

Fig. 4125. No. 33. Medium Back Coach Seat.

Fig. 4126. No. 59. Scarritt Double Reclining Chair.

Fig. 4127. No. 17. Medium Back Coach Seat.

Fig. 4128. Reversible Seat for Electric Cars. Rattan Upholstery.

Fig. 4129. Standard High Back Coach Seat. Frieze Plush Upholstery.

St. Louis Car Co.

Fig. 4130. No. 114. Parlor Car Chair.

Fig. 4131. No. 1091. Parlor Car Chair.

Fig. 4132. No. 113. Parlor Car Chair.

Fig. 4133. No. 115. Parlor Car Chair.

Scarritt-Comstock Furniture Co.

Fig. 4134. Standard Coach Seat. Plush Upholstery.

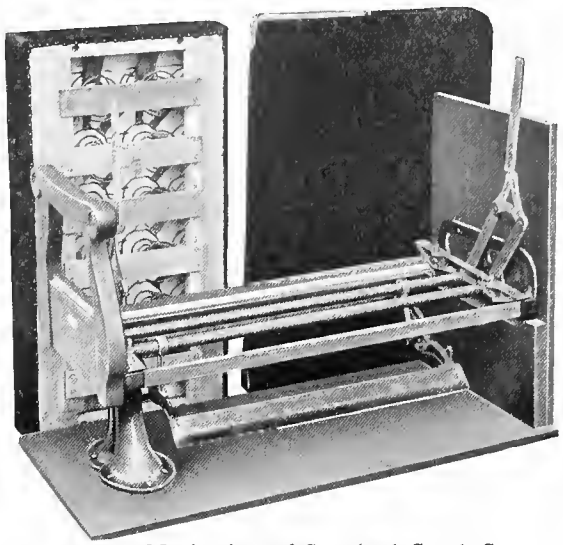


Fig. 4135. Mechanism of Standard Coach Seat.

Fig. 4136. Double Reclining Chair Seat.

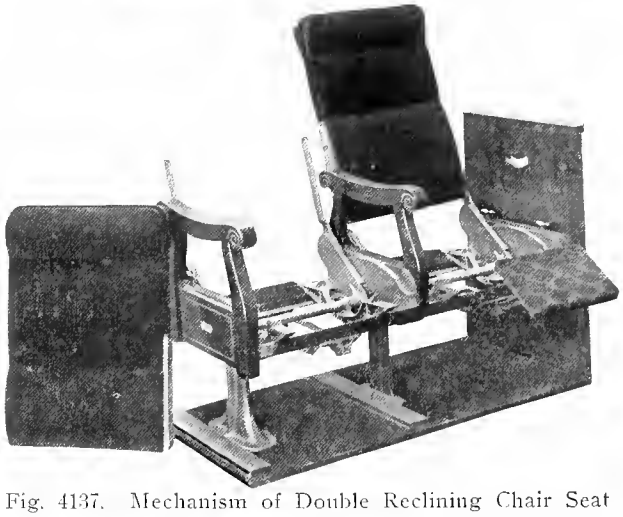
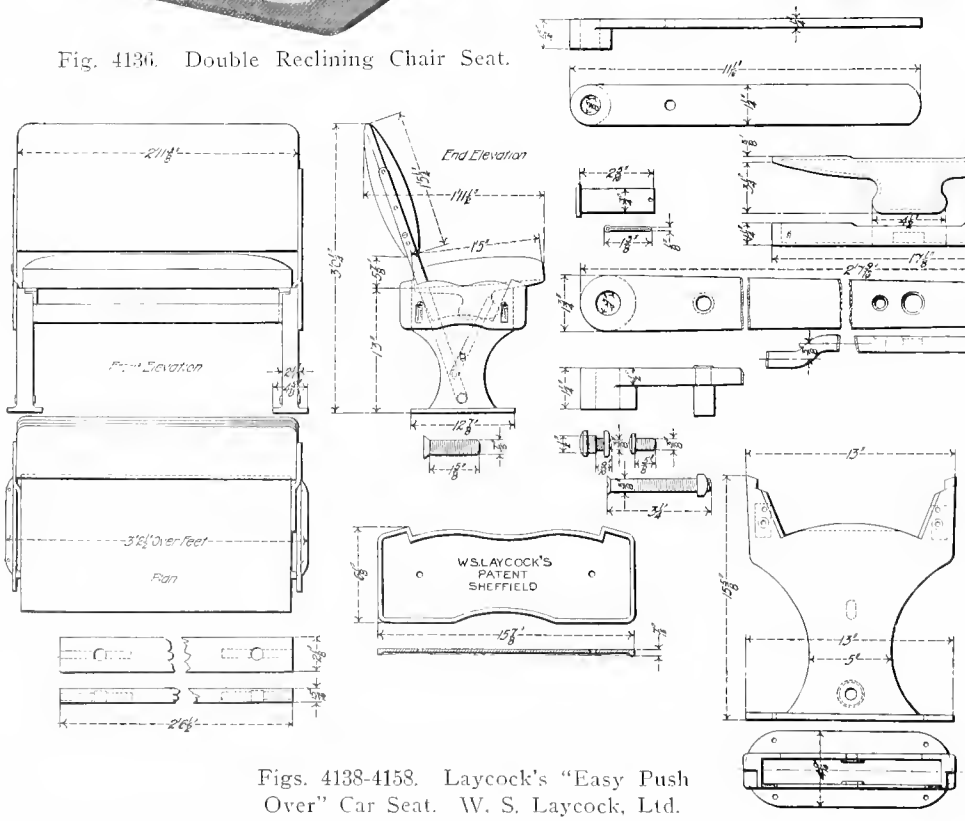


Fig. 4137. Mechanism of Double Reclining Chair Seat Barney & Smith Car Co.



Figs. 4138-4158. Laycock's "Easy Push Over" Car Seat. W. S. Laycock, Ltd.

Fig. 4159. Richards
Panel Back Dining Car Chair, without Arms.

Fig. 4160. Richards
Panel Back Double Seat.

Fig. 4161. Richards
Panel Back Dining Car Chair, with Arms.

Fig. 4162. Richards
Panel Back Fiber-Rush Chair.

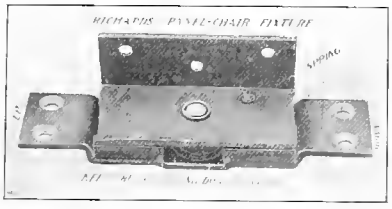
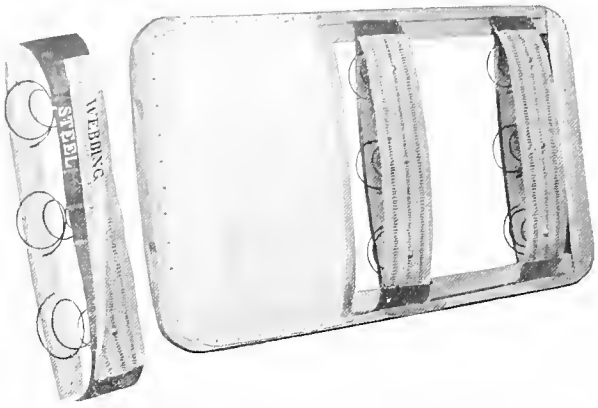


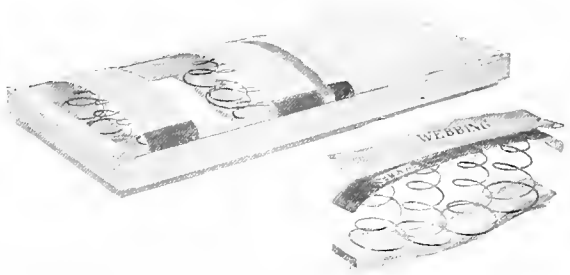
Fig. 4163. Richards
Panel Chair Steel Pivot Fixture.

Fig. 4164. Richards
Standard Pullman Panel Back Parlor Car Chair.

Fig. 4165. Richards Panel Back Revolving Chair Seat, with or without Reclining Back.



Figs. 4166-4167. Improved Combination Spring Back. One Section is Detached.



Figs. 4168-4169. Improved Combination Spring Cushion, with One Section Detached.

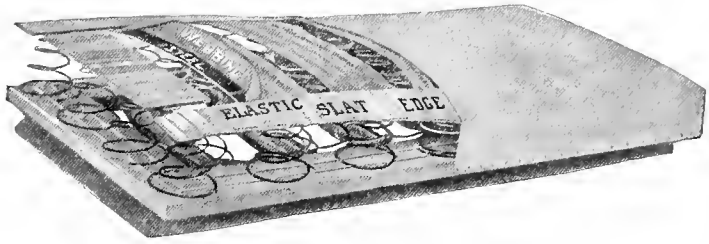
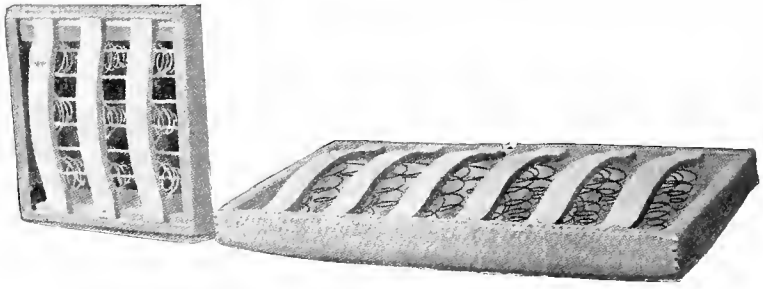


Fig. 4170. Sectional View, Showing the Use of Slat and Webbing and the Elastic Slat Edge.



Figs. 4171-4172. Reverse Side of Single and Double Rattan Spring Seats. Showing Construction.

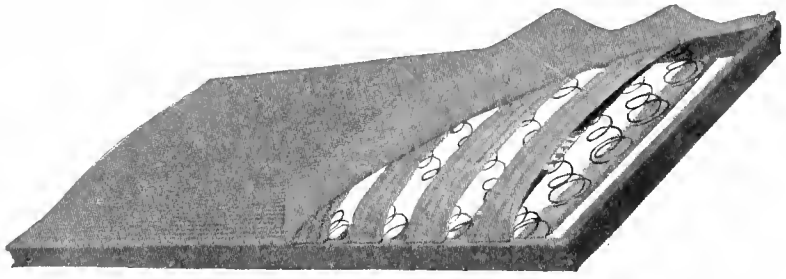
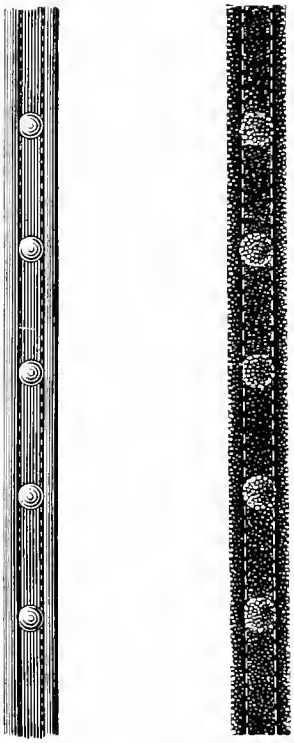


Fig. 4173. Sleeping Car Berth Spring for Upper Berth.



Figs. 4174-4175.
Leather Band and Nails. Plush Band and Nails.

Fig. 4176. Double Rattan Spring Cross Seat.

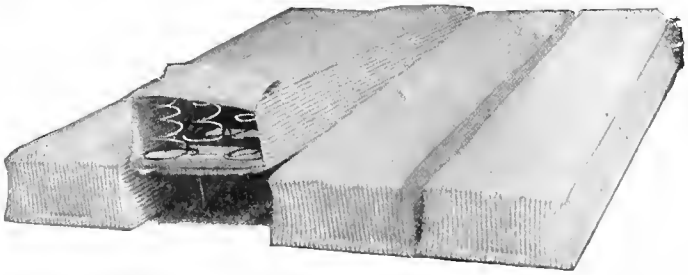


Fig. 4177. Spring Bed Sections for Private and Sleeping Cars. Hale & Kilburn Mfg. Co.

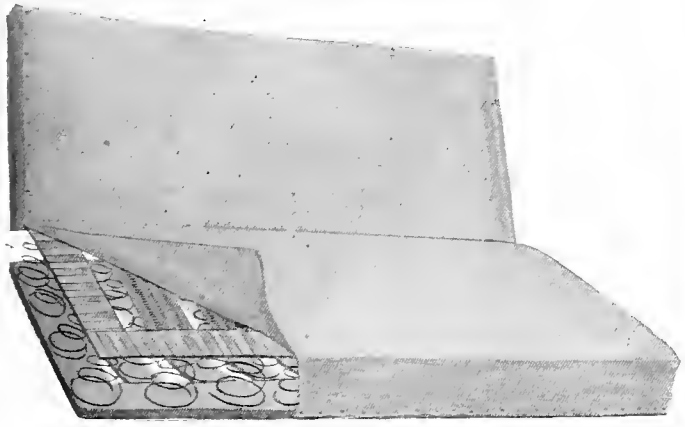


Fig. 4178.
Patent Spring Edge Sleeping Car Cushion and Back.
Hale & Kilburn Mfg. Co.

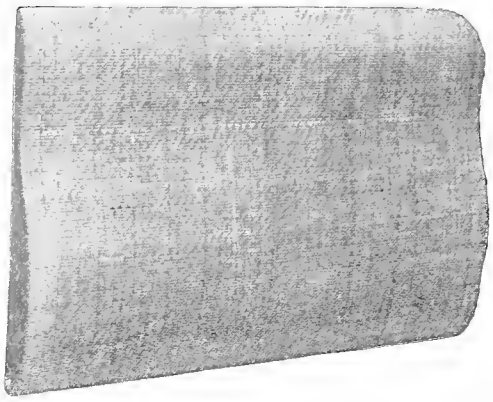


Fig. 4179. Rattan Cross Seat Spring Back with Head Rest.

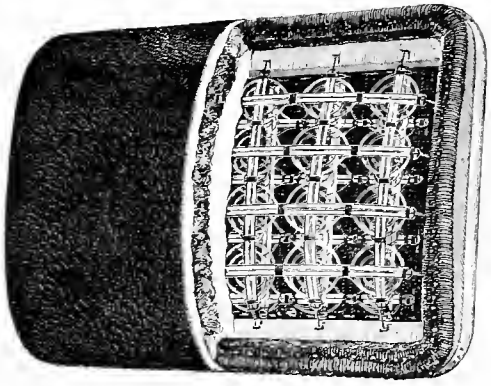


Fig. 4180. Sectional View.
Upholstered Back Springs.

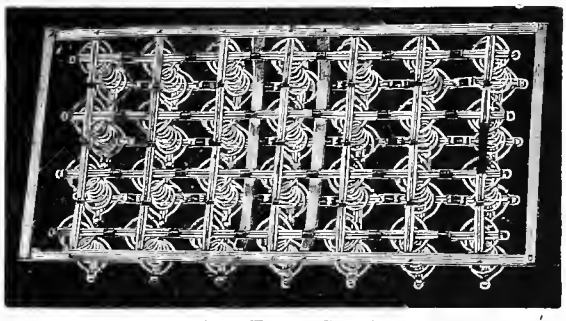


Fig. 4181. Spring Edge Cushion Springs.

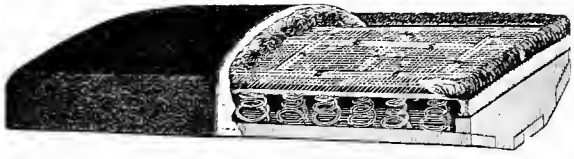


Fig. 4182. Sectional View.
Upholstered Cushion Springs.

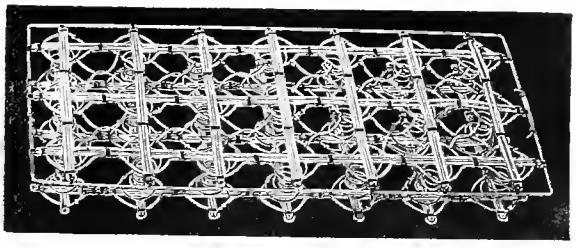


Fig. 4183.
Plain Springs for Cushions.

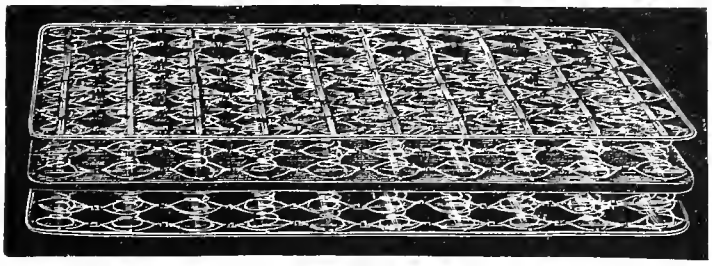
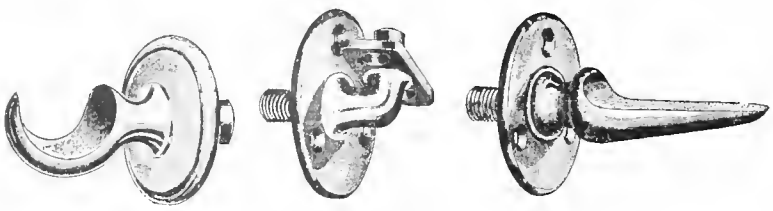


Fig. 4184. Reversible Double Border Spring for Beds.
Heywood Brothers & Wakefield Co.



A. & W. A. & W. D. M. Co.
Figs. 4185-4187. Seat Arm Rest Brackets.

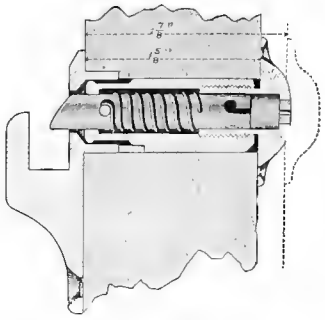


Fig. 4188.
Kirby's Seat Lock for Wood Seat Ends. D. M. Co.

Figs. 4194-4195.
Seat Arm Thimbles.
A. & W.

Figs. 4189-4193.
Seat Arm Caps.
A. & W.

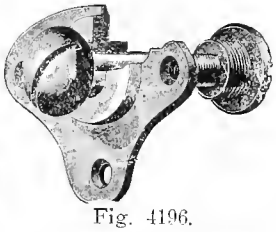
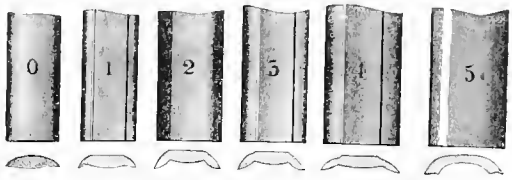


Fig. 4196.
Seat Arm Pivot Bolt.
D. M. Co.



Figs. 4197-4208. Seat Back Mouldings.
D. M. Co.
White Metal from ½ in. Flat to ¾ in. Half-Round.

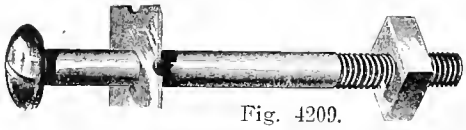
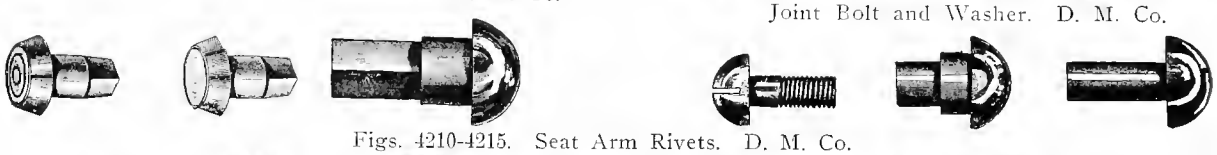
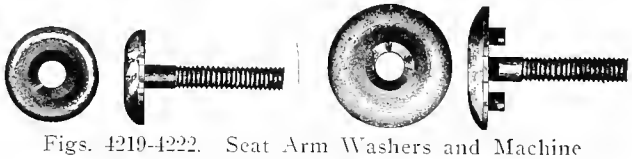


Fig. 4209.
Joint Bolt and Washer. D. M. Co.

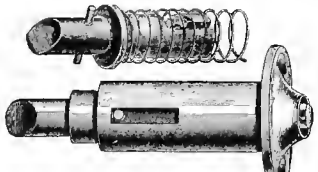


Figs. 4210-4215. Seat Arm Rivets. D. M. Co.

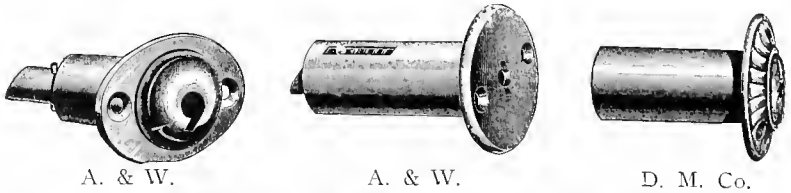
D. M. Co. A. & W. A. & W.
Figs. 4216-4218. Seat Arm Washers.



Figs. 4219-4222. Seat Arm Washers and Machine Bolts. D. M. Co.



Figs. 4223-4224. Seat Back Arm Lock, Bolt and Spring. A. & W.



A. & W. A. & W. D. M. Co.
Figs. 4225-4227. Seat Back Arm Locks with Escutcheons.

Figs. 4228-4229.
Straight Seat Arm Stops.
A. & W.

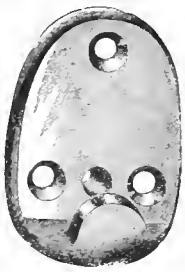
A. & W. D. M. Co.
Figs. 4230-4234. Curved Seat Arm Stops.

A. & W. A. & W.
Made Right and Left Handles.


D. M. Co.

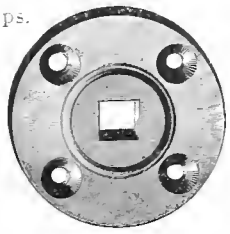

D. M. Co.

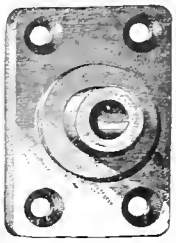

A. & W.


A. & W.


A. & W.

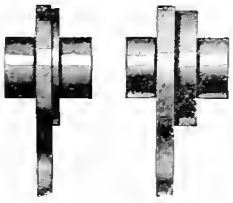
Figs. 4235-4240.
Shield and Oval Shaped Seat Arm Stops.





Figs. 4241-4244.
Round Seat Arm Stops. With or Without Locks.
A. & W.

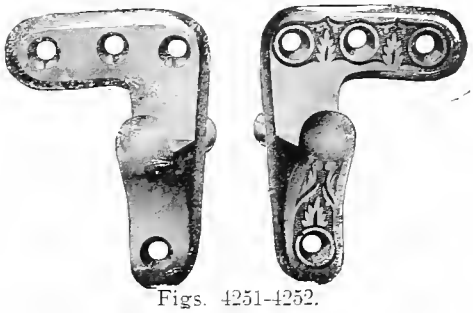
Figs. 4245-4246.
Seat Arm Pivots. D. M. Co.



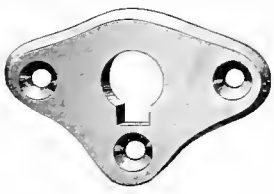
Figs. 4247-4248.
Seat Arm Pivot Plates.

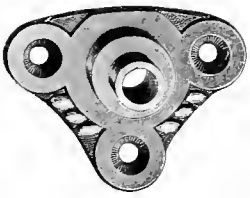
Figs. 4249-4250.
Seat Arm Stops.

The thicker ones are for the side of car to prevent the arm from striking the woodwork when the back is being turned.
D. M. Co.

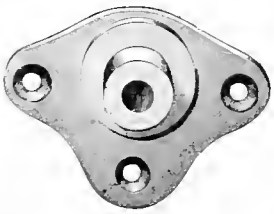


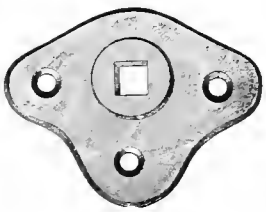
Figs. 4251-4252.
Seat Arm Stops.
A. & W.


A. & W.

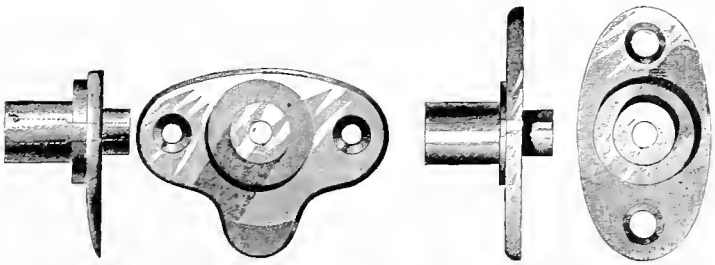

A. & W.

Figs. 4253-4256.


A. & W.


D. M. Co.

Seat Arm Pivot Plates.
The thicker ones are for the end of seat next to side of car and prevent the arm from striking the woodwork when the back is being turned.


Figs. 4257-4260. Seat Arm Pivot Plates. D. M. Co.

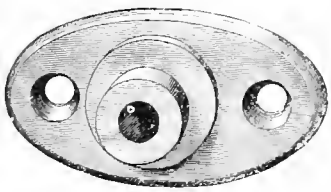
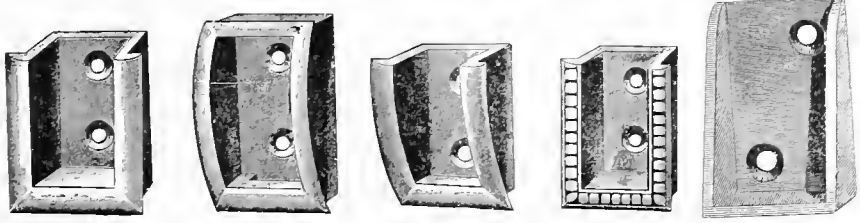


Fig. 4261. Seat Arm Pivot Plate, With Solid Nipple. D. M. Co.


Figs. 4262-4266. Seat Rail Brackets or Sockets.
A. & W.

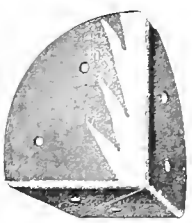
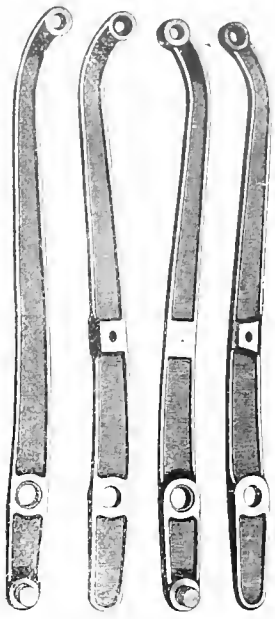


Fig. 4267. Seat Corner, Sheet Brass.
D. M. Co.



Figs. 4268-4271.
Seat Back Arms for
Forney Seats.

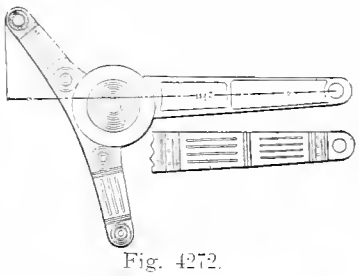


Fig. 4272.
Pivoted Seat Back Arm.
D. M. Co.

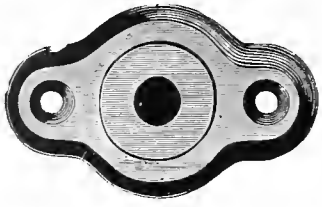


Fig. 4273.
Seat Arm Pivot Plate.
A. & W.

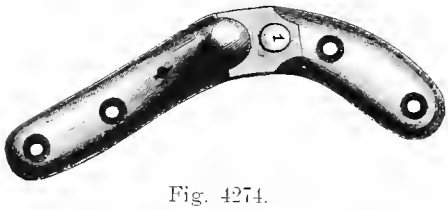
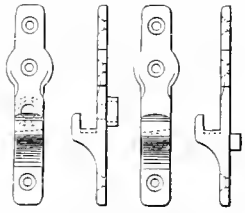


Fig. 4274.
Curved Seat Arm Stop with Lock.



Figs. 4275-4278.
With Lock. Without Lock.
Seat Arm Stops.

Figs. 4279-4282. Chair and Sofa Casters.
A. & W.

Fig. 4283. Seat Pull.
A. & W.

Fig. 4284. Seat Pull.
A. & W.

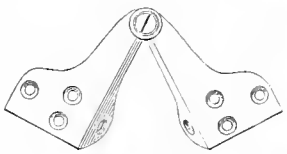
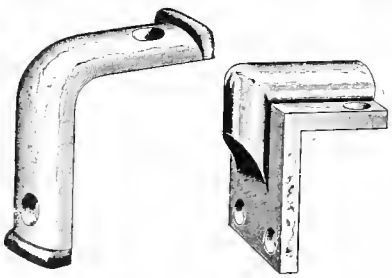
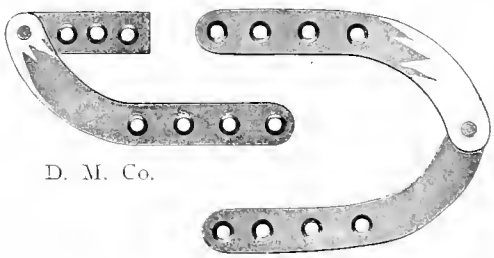


Fig. 4285.
Seat Hinge.
D. M. Co.



Figs. 4286-4287.
Seat Back Corners.
A. & W.



D. M. Co.

Figs. 4288-4289.
Sofa Hinges.
A. & W.

Fig. 4290. Sofa
Arm Rest Fixture.
D. M. Co.

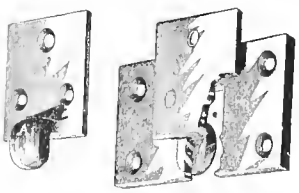
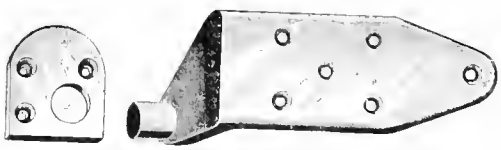


Fig. 4291. Fig. 4292.
Soft Arm Rest Fixtures.
D. M. Co.

Fig. 4293.
Spring Catch.



Figs. 4294-4295. Sofa Back Pivot,
Hinge and Bushing.
D. M. Co.

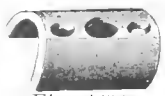


Fig. 4296.
Pin Bushing.

Fig. 4297.
Pin Plate.

Fig. 4298.
Catch Plate.

Fig. 4299.
Pin.

Sofa Arm Rest Fixtures.
D. M. Co.

Figs. 4300-4301.
Sofa Back Leg Socket
and Pocket.
D. M. Co.

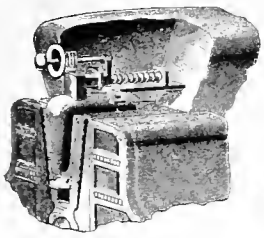


Fig. 4302.
Sofa Arm Rest Bolt in Position. D. M. Co.

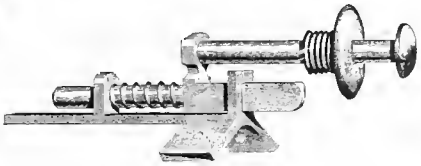


Fig. 4303. Sofa Arm Rest Bolt.
D. M. Co.

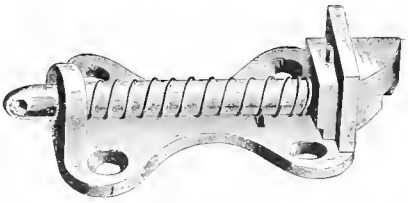
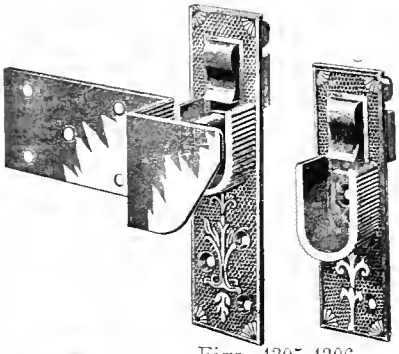


Fig. 4304. Sofa Bolt.
A. & W.



Figs. 4305-4306.
Berth Pivot Sockets.
A. & W.

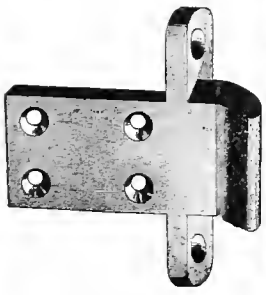
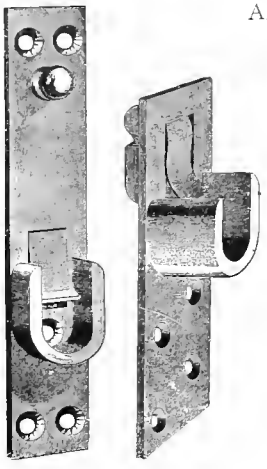


Fig. 4307.
Sofa Leg Hook.



Figs. 4308-4309.
Upper Berth Pivot Sockets.
A. & W.

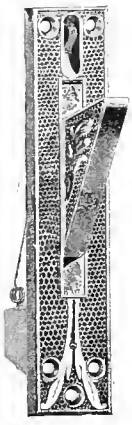


Fig. 4310.
Upper Berth Catch.
A. & W.

Fig. 4311.
Strike Plate.
A. & W.

Figs. 4314-4315.
Sofa Rail End and Socket. A. & W.

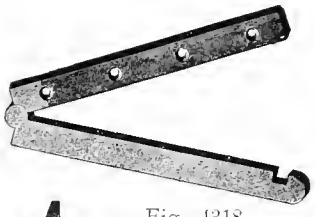
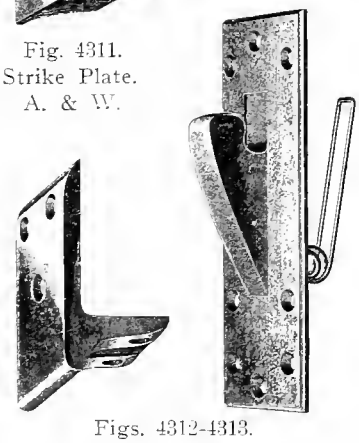
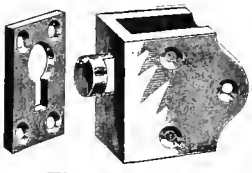


Fig. 4318.
Berth Extension Arms. A. & W.



Figs. 4312-4313.
Upper Berth Catch and Plate.
A. & W.



Figs. 4316-4317.
Head Rest Pivot and Plate. A. & W.

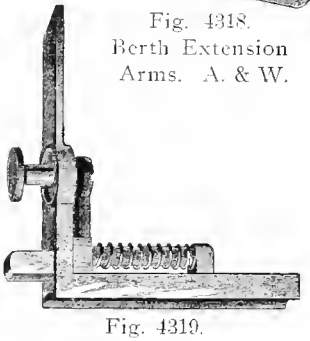
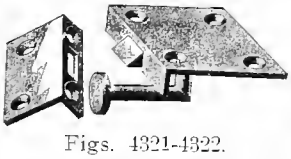
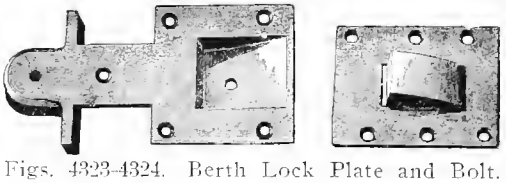


Fig. 4319.
Head Board Bolt,
A. & W.

Fig. 4320.
Head Board Fastener.
A. & W.



Figs. 4321-4322.
Seat Back Pocket Catch.



Figs. 4323-4324. Berth Lock Plate and Bolt.
A. & W.

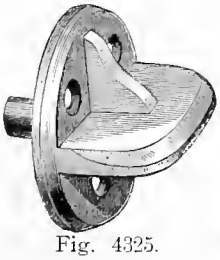


Fig. 4325.
Upper Berth Bracket.

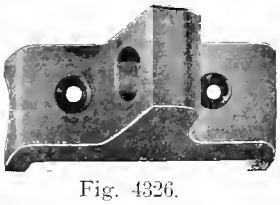
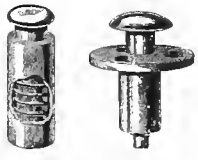


Fig. 4326.
Upper Berth Rest.
A. & W.

Fig. 4327.
Berth Pivot.
A. & W.

Figs. 4328-4329.
Berth Head Rest Pivot and Plate. A. & W.



Figs. 4330-4331.
Berth Rattle Stops.
A. & W.

Fig. 4332.
For Bevel Rail Head.
D. M. Co.

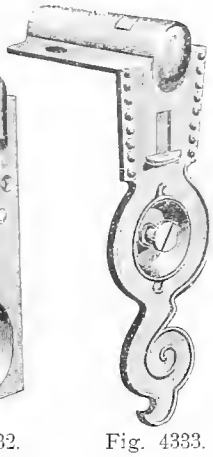


Fig. 4333.
For Flat Rail Board.
A. & W.

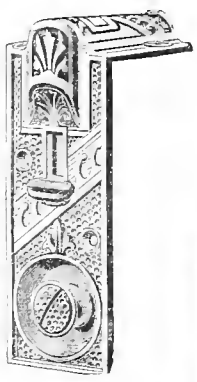


Fig. 4334.
For Flat Rail Bushings.
D. M. Co.

Head Board Bushings.

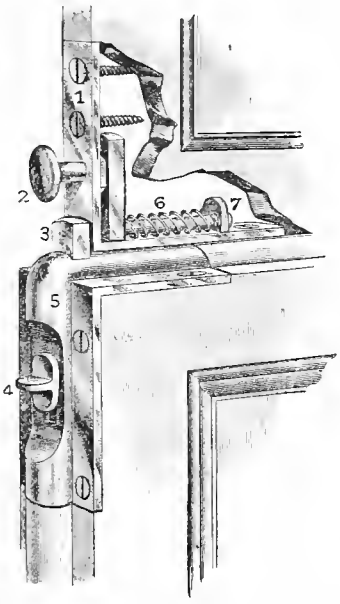


Fig. 4335.
Head Board Bolt and Bushing.
D. M. Co.

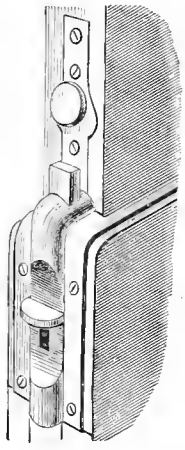
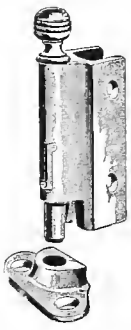


Fig. 4336.
Head Board Bolt.
Outside View.

1 *Upper Face Plate*
2 *Knob Latch*
3 *Lower or Fixed Bolt*
4 *Slide Latch*
5 *Lower Face Plate*
6 *Bolt Spring*
7 *Upper or Spring Bolt*

Fig. 4337.
Head Board Coupling Keeper.

Fig. 4338.
Head Board Coupling.



Figs. 4339-4340.
Head Board Fastener.
A. & W.

Figs. 4341-4342. Head Board Bolt and Bushing.
A. & W.

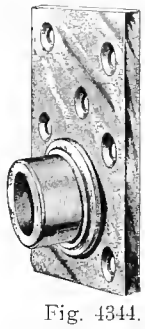
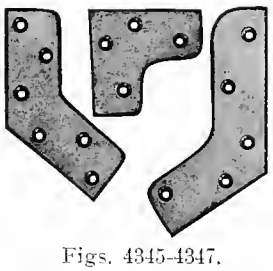


Fig. 4344.
Berth Hinge Pivot.
A. & W.



Figs. 4345-4347.
Head Board Plates.
A. & W.

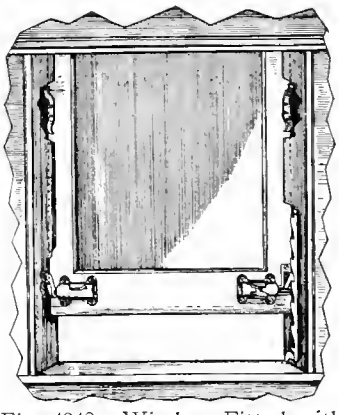
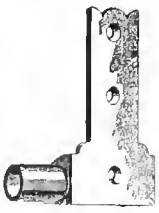


Fig. 4348. Window Fitted with "Rex" Sash Fastenings.
D. M. Co.

A. & W.



D. M. Co.

A. & W.

D. M. Co.

Figs. 4349-4352. Berth Hinges.

Fig. 4353.
Berth Hinge Plate.
A. & W.

Fig. 4354.
Berth Hinge Pivot.

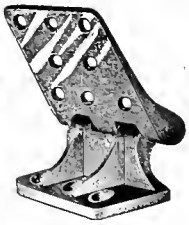
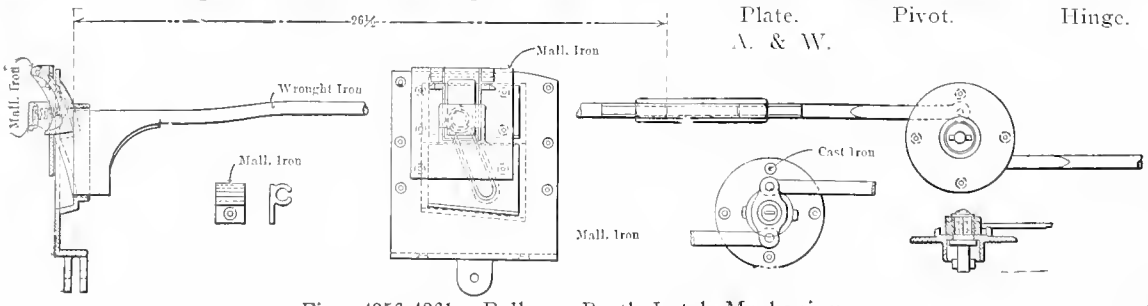


Fig. 4355.
Fast Berth Hinge.



Figs. 4356-4361. Pullman Berth Latch Mechanism.

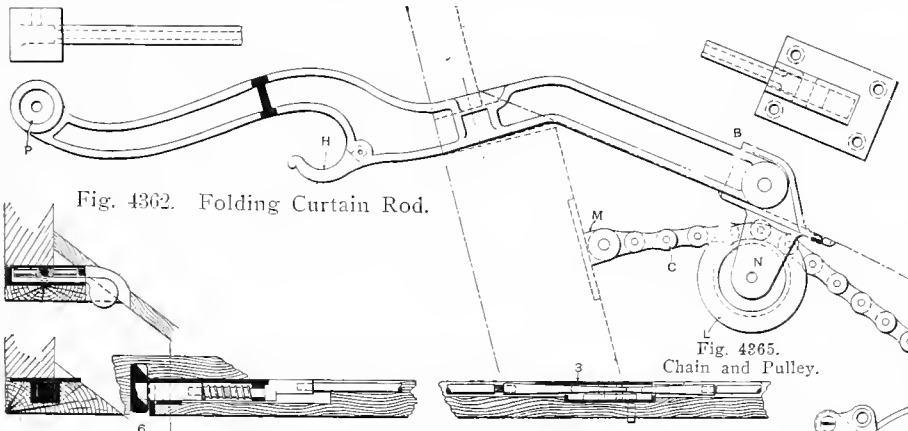


Fig. 4362. Folding Curtain Rod.

Fig. 4365. Chain and Pulley.

Figs. 4363-4364. Sections of Berth Latch.

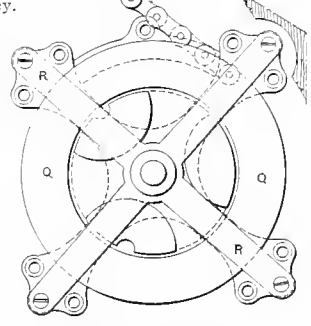


Fig. 4367. Berth Spring.

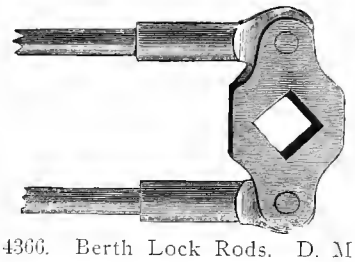
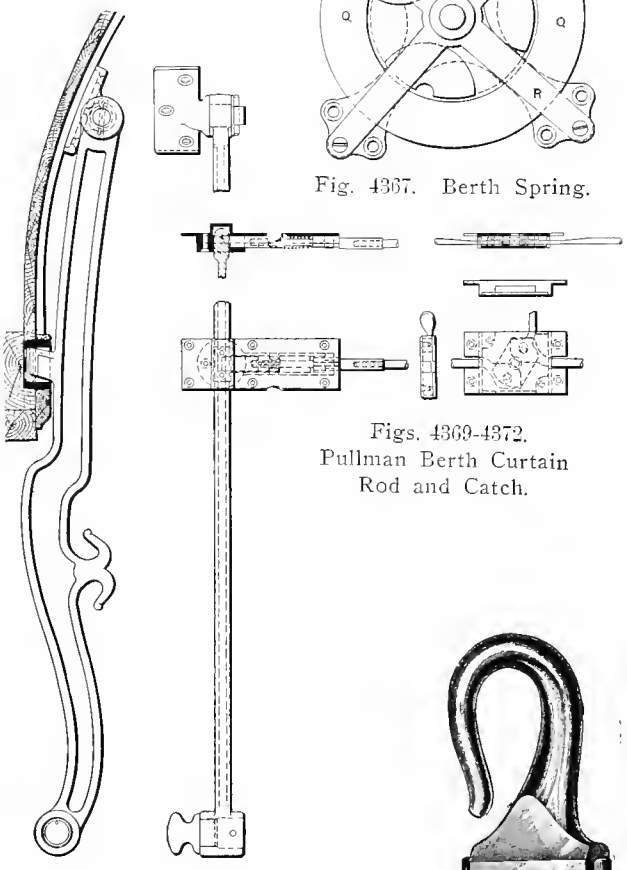


Fig. 4366. Berth Lock Rods. D. M. Co.



Figs. 4369-4372. Pullman Berth Curtain Rod and Catch.

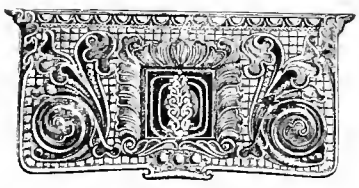


Fig. 4368. Berth Latch Handle. A. & W.

Figs. 4373-4374. Berth Latch Handles. A. & W.

Fig. 4375. Berth Latch Handle. A. & W.

Fig. 4376. Berth Curtain Hook.

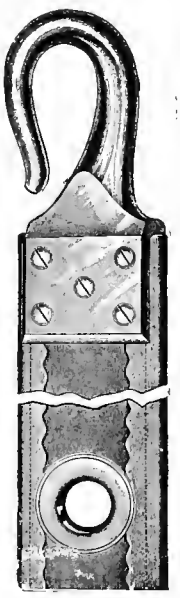


Fig. 4377. Upper Berth Safety Strap and Hook. J. L. Howard & Co.

Figs. 4378-4382. Berth Numbers. D. M. Co.

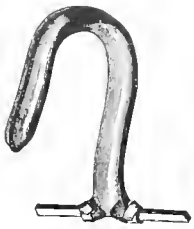
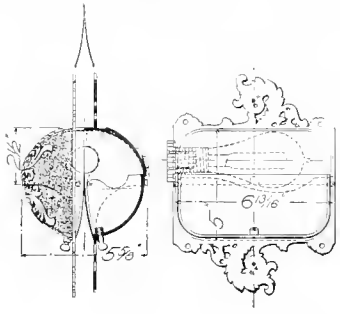


Fig. 4383.
Berth
Curtain Hook.
D. M. Co.

Fig. 4384.
Berth Safety.
Rope Hook.
A. & W.



Figs. 4385-4387. Elevations
Gibbs Berth Lamp.
D. M. Co.

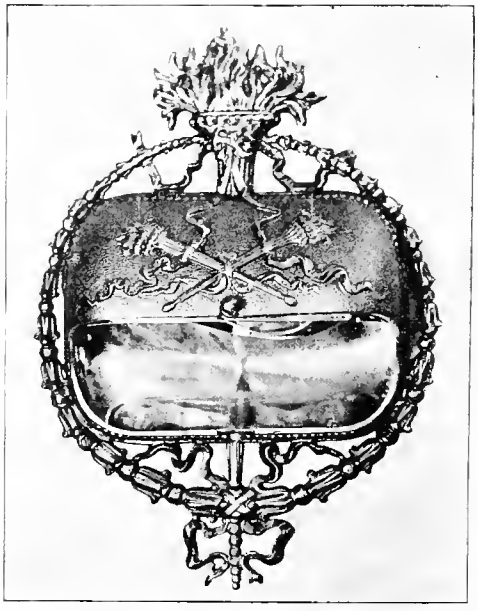


Fig. 4388. General View.
Gibbs Berth Lamp. D. M. Co.

Fig. 4389.
Pen Rack.
D. M. Co.

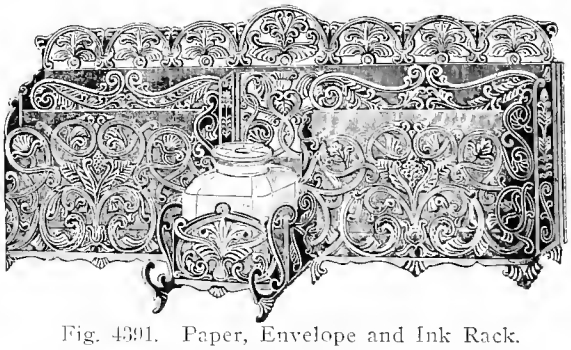


Fig. 4391. Paper, Envelope and Ink Rack.
D. M. Co.

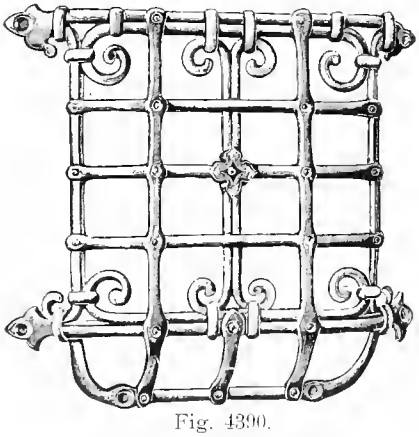


Fig. 4390.
Telegraph Blank Rack.
A. & W.

Fig. 4392.
Match Striker.
A. & W.

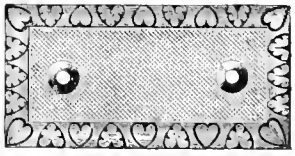
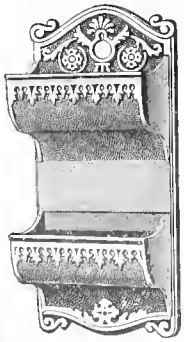


Fig. 4393.
Match Striker. A. & W.



Figs. 4394-4395.
Match Box Holder. Match Safe.
A. & W. A. & W.

Fig. 4396. Cigar and Ash Receiver.

Fig. 4397.
Ash Receiver.
A. & W.

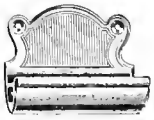


Fig. 4398.
Match Striker and
Cigar Holder.
A. & W.

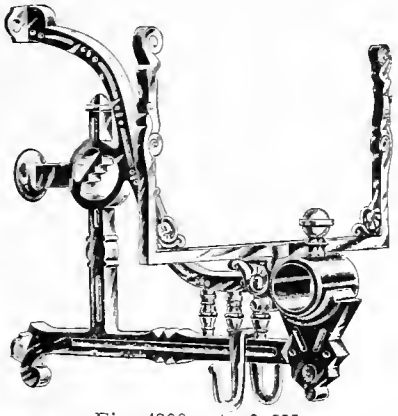


Fig. 4399. A. & W.

Fig. 4400. A. & W.

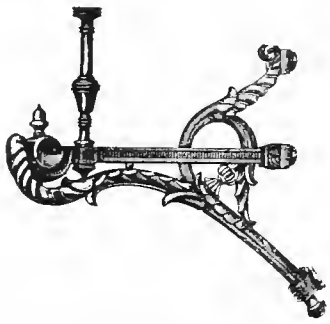


Fig. 4401. A. & W.

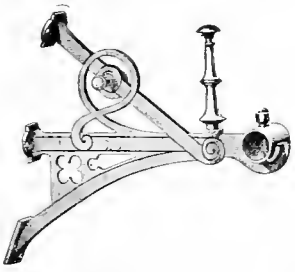


Fig. 4402.
J. L. Howard & Co.

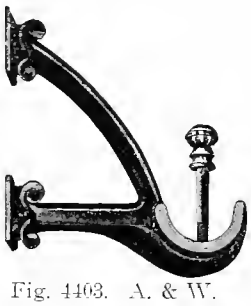


Fig. 4403. A. & W.

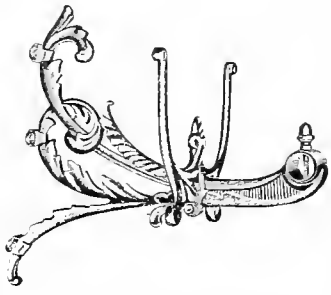


Fig. 4404. A. & W.

Fig. 4405.
A. & W.

Berth Curtain Rod Brackets.

Fig. 4406.
Berth Curtain Rod Bracket.
A. & W.

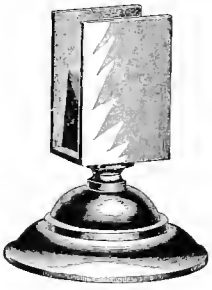
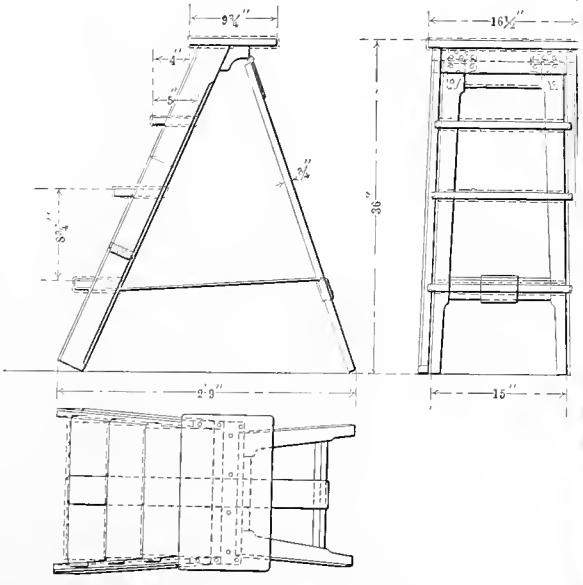


Fig. 4407.
Match Box Holder.
A. & W.

Fig. 4408.
Table Leg Hook.
A. & W.

Figs. 4409-4410.
Table Holder and Plate.
A. & W.



Figs. 4413-4415. Pullman Sleeping Car Step Ladder.

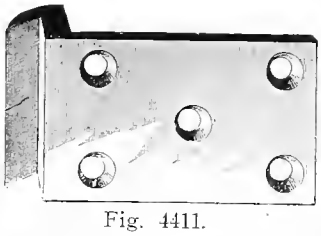


Fig. 4411.
Table Hook. D. M. Co.

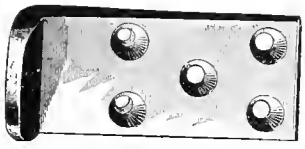


Fig. 4412.
Table Hook. D. M. Co.

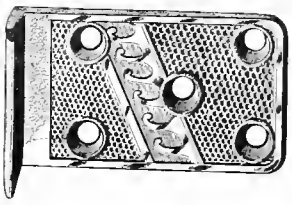


Fig. 4416.
Table Hook. D. M. Co.

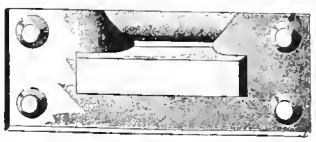


Fig. 4417.
Table Hook Plate. D. M. Co.

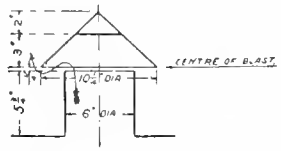


Fig. 4418. The Cone Cap.

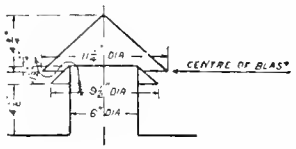


Fig. 4419. The Cone and Apron.

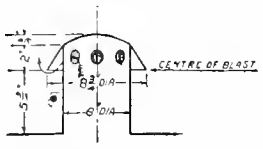


Fig. 4420. The Canopy.

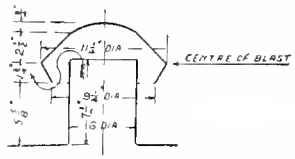


Fig. 4421. The Tornado Canopy.

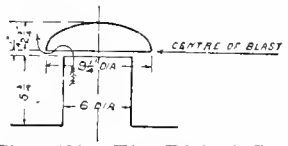


Fig. 4422. The Dished Cap.

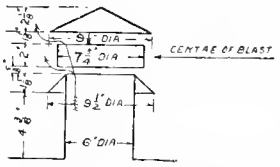


Fig. 4423. The Moore.

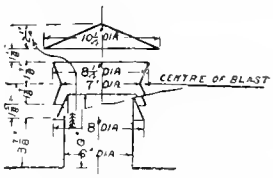


Fig. 4424. The Duplex.

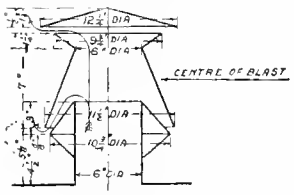


Fig. 4425. The Roe.

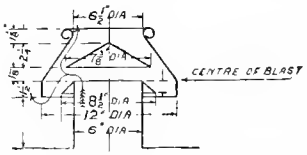


Fig. 4426. The Stasch.

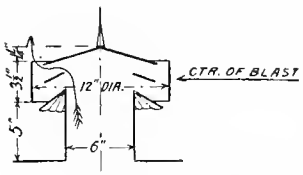


Fig. 4427. The Star.

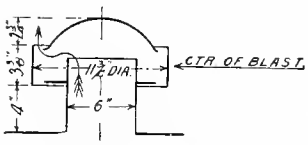


Fig. 4428. The World.

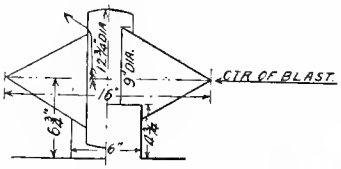


Fig. 4429. The Torpedo.

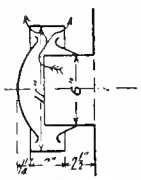


Fig. 4430.
The Globe Horizontal.

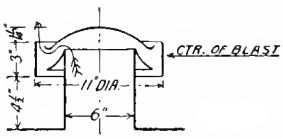


Fig. 4431.
The Globe Erect.

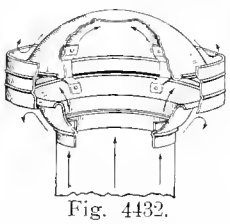


Fig. 4432.
The Globe.

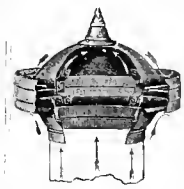
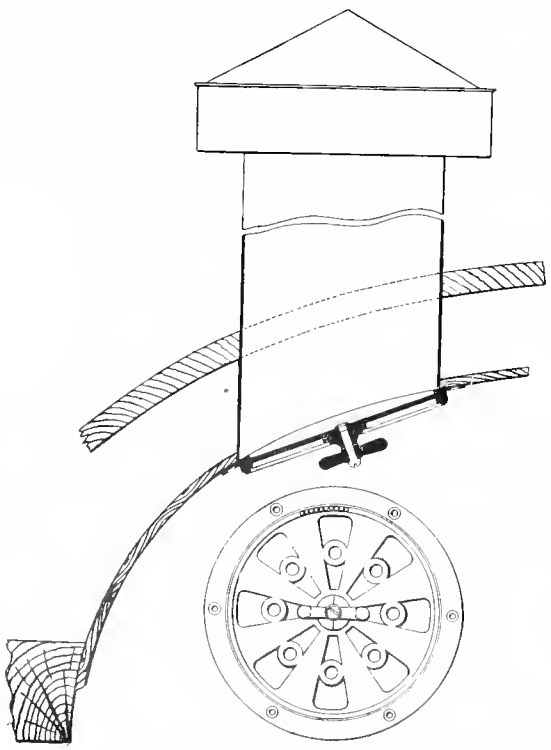
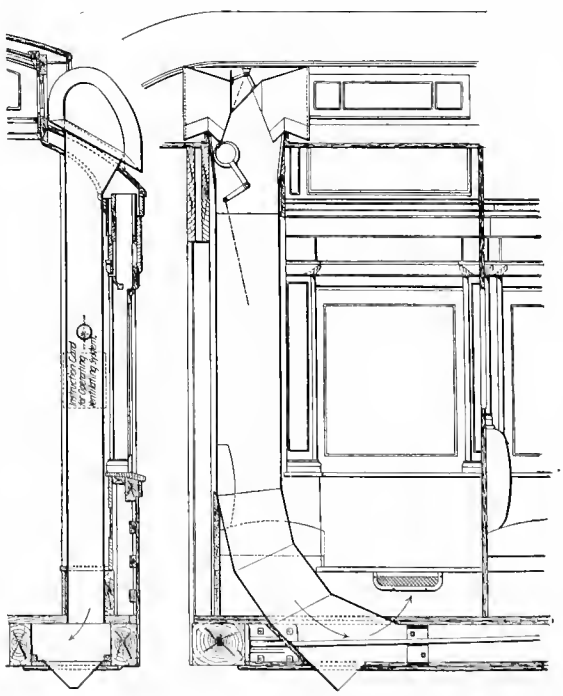


Fig. 4433.
The Globe.

Globe Ventilator Co.



Figs. 4434-4435. Ventilator for Saloons.



Figs. 4436-4437.
System of Ventilating Passenger Cars.
Pennsylvania Railroad.

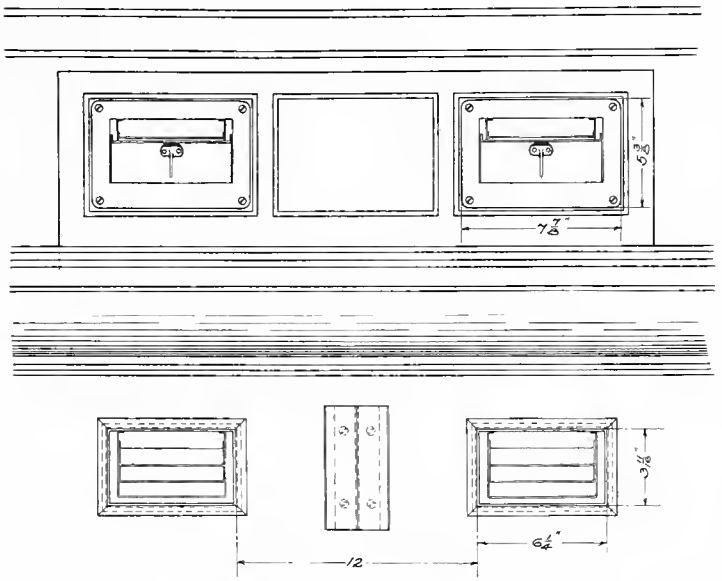


Fig. 4438. Automatic Ventilator.

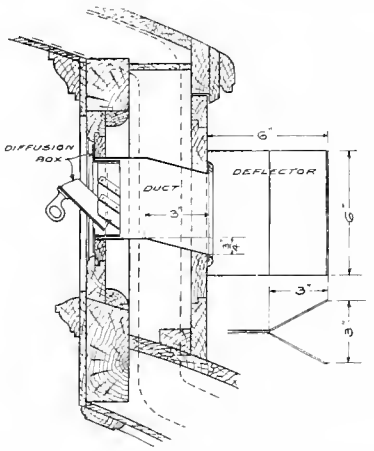


Fig. 4439. Section Through Automatic Ventilator.

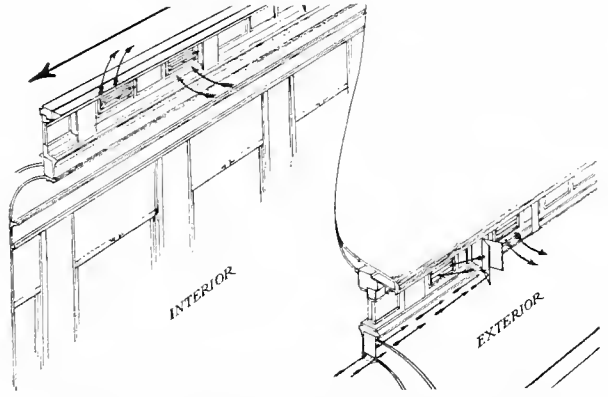


Fig. 4440. Application of Automatic Ventilator to Deck of Passenger Car.
Automatic Ventilator Co.

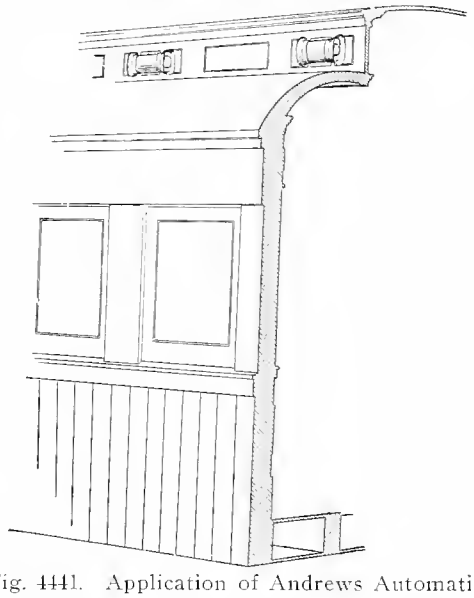
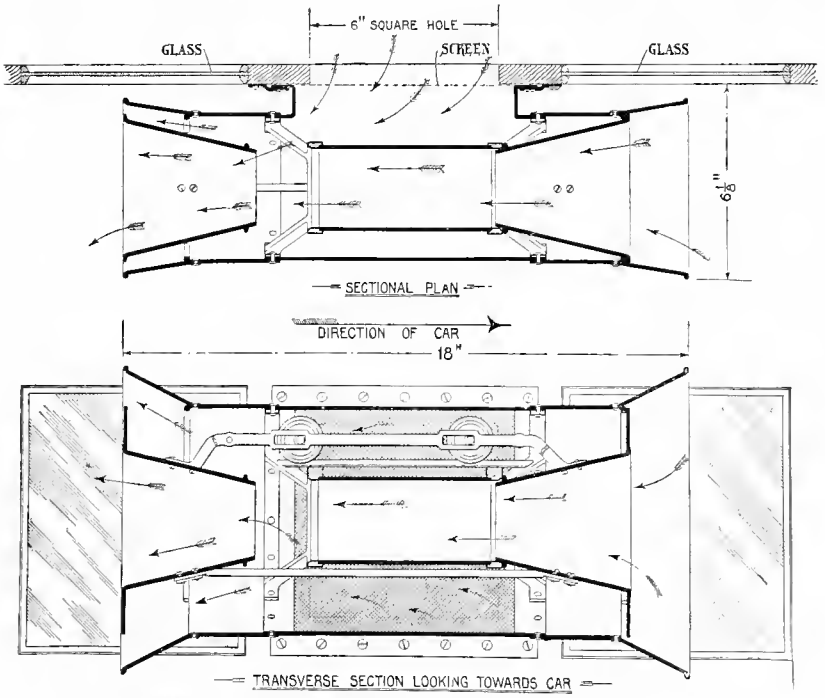


Fig. 4441. Application of Andrews Automatic Ventilator to Deck of Passenger Car.



Figs. 4442-4443. Sections Through Andrews Automatic Ventilator.
Safety Car Heating & Lighting Co.

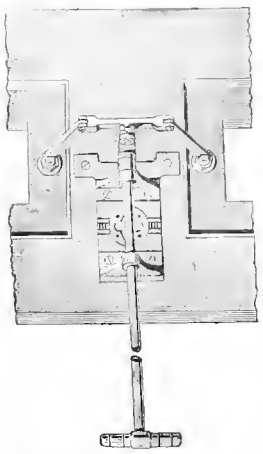


Fig. 4444. Windows Closed.

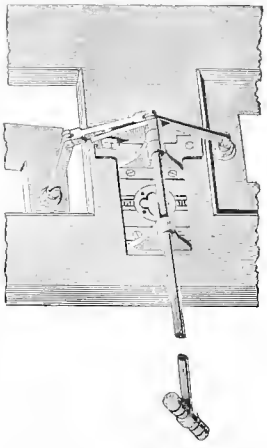


Fig. 4445. One Window Open. Mansfield Deck Sash Opener. A. & W.

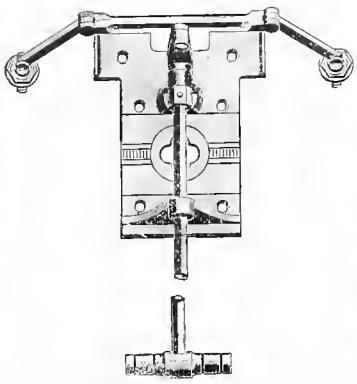
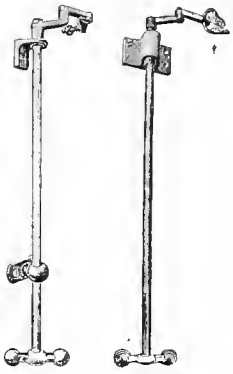


Fig. 4446. Opener Complete.



Figs. 4447-4448. Deck Sash Transom. Opener. D. M. Co. Opener. D. M. Co.

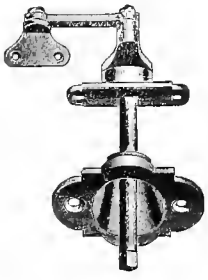


Fig. 4449. Lauder Monitor.

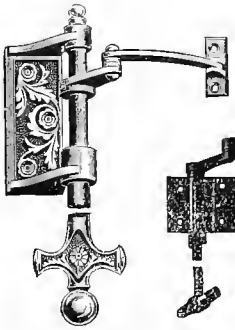


Fig. 4450. Single, Decorated.

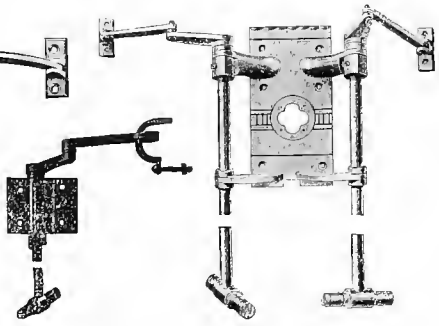


Fig. 4451. Single, Plain. Fig. 4452. Mansfield's Improved, Double. Deck Sash Openers. A. & W.

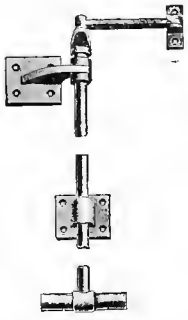
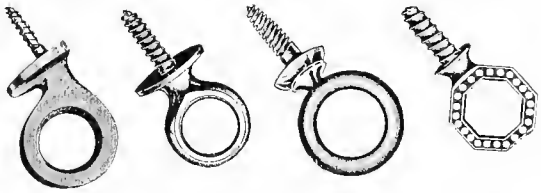


Fig. 4453. Single, Plain.

Figs. 4454-4455. Single Key.

Figs. 4456-4458. Deck Sash Pulls, With Flanges. A. & W.



Figs. 4459-4462. Deck Sash Pulls, With Screws. A. & W.

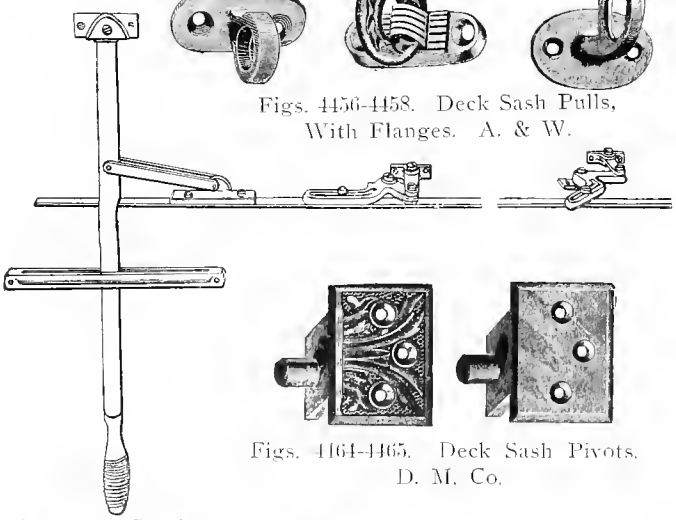
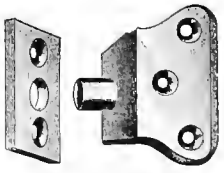


Fig. 4463. Continuous Deck Sash Opener.

Figs. 4464-4465. Deck Sash Pivots. D. M. Co.

Fig. 4466. Pull, With Screw. A. & W.



Figs. 4467-4468. Deck Sash Pivot and Plate. A. & W.

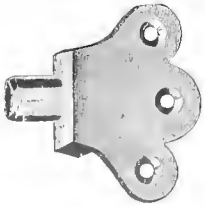


Fig. 4472. A. & W. Deck Sash Pivots and Plates.

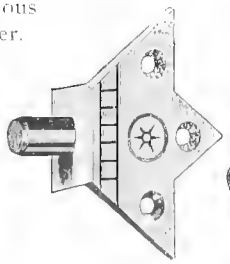


Fig. 4473. J. L. Howard & Co.

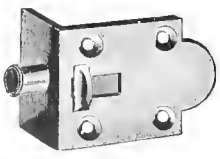


Fig. 4474.

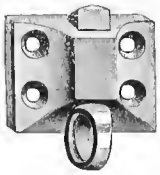


Fig. 4478.

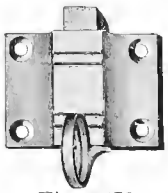


Fig. 4479.

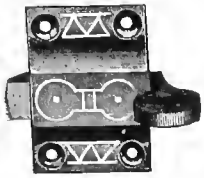
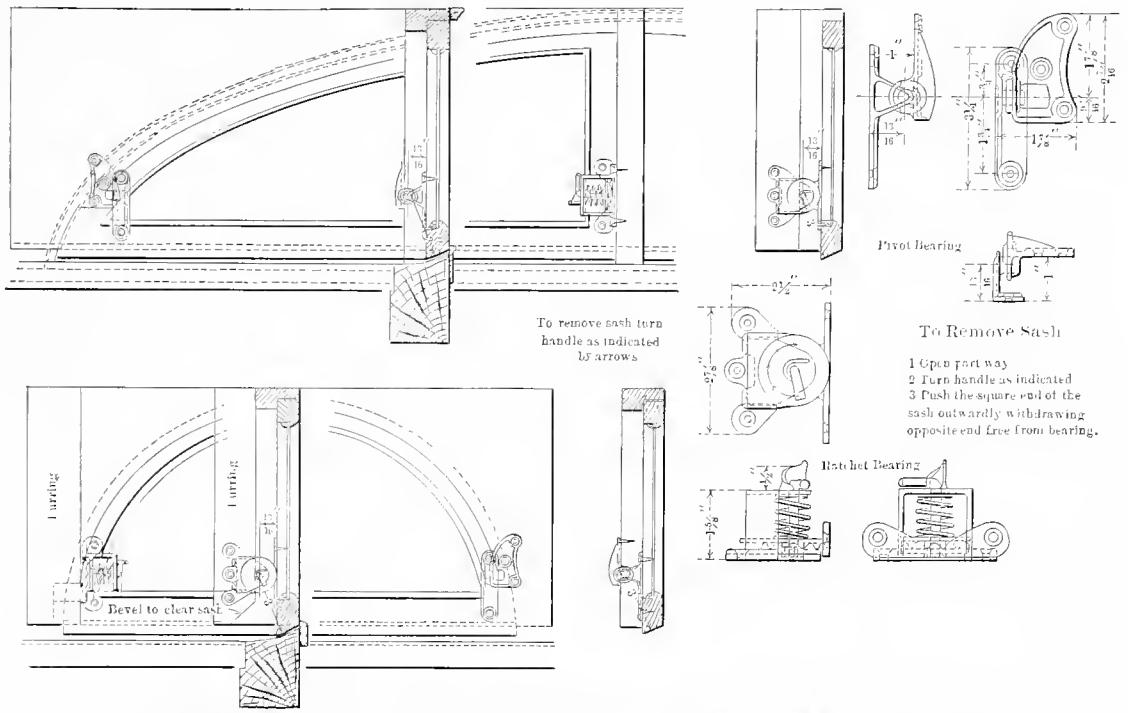


Fig. 4480.

Deck Sash and Transom Catches. A. & W.



Figs. 4481-4490. Application of Forsyth "Safety" Deck Sash Ratchet to Pullman Cars. Forsyth Brothers Co.

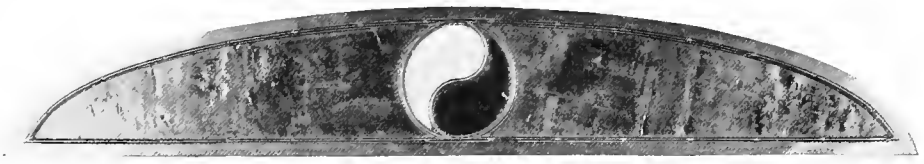


Fig. 4491. Art Glass Deck Light. A. & W.

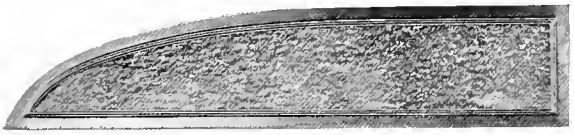


Fig. 4492. Art Glass Half Deck Light. A. & W.

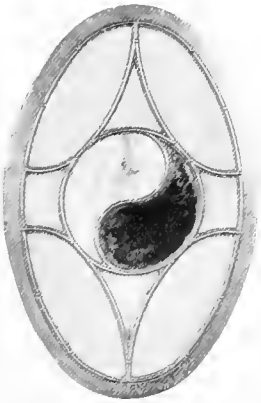
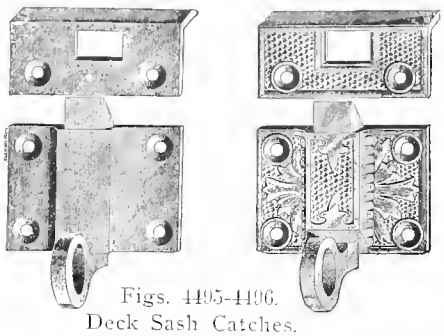
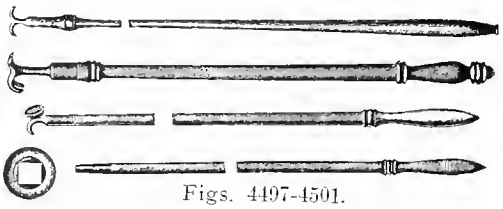


Fig. 4493. Art Glass Oval Sash. A. & W.

Fig. 4494. Art Glass Oval Sash with Ventilator for Saloons. A. & W.



Figs. 4495-4496.
Deck Sash Catches.
D. M. Co.



Figs. 4497-4501.
Pull Hooks or Deck Sash Openers.
A. & W.

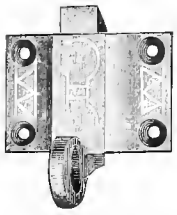


Fig. 4502.

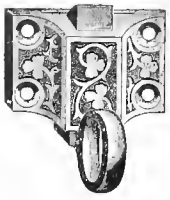


Fig. 4503.

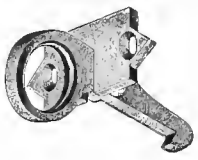
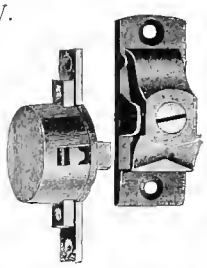


Fig. 4504.

Deck Sash Catches.
A. & W.

Figs. 4505-4506.
Lower Ratchet Plate and Ratchet Spring.
Upper Ratchet Plate.



Figs. 4507-4508.
Ratchet Clamp.
Pivot.

Morgan Automatic Deck Sash Pivot and Clamp.
A. & W.

Fig. 4509.

Fig. 4510.

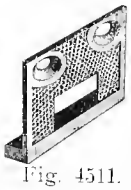


Fig. 4511.

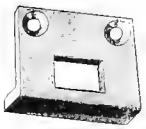


Fig. 4512.

Deck Sash Catch Plates or Strike Plates.
A. & W.

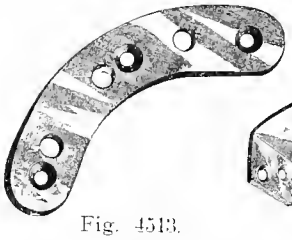


Fig. 4513.
Deck Sash Circle Plate.
D. M. Co.

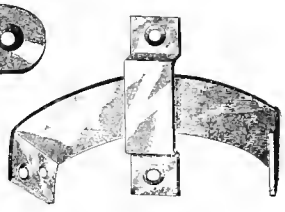
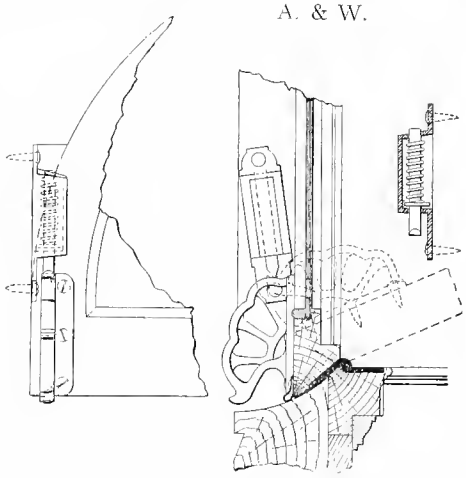


Fig. 4514.
Deck Sash Quadrant and Clip.
A. & W.



Figs. 4515-4517. Sectional Elevations.
Pullman Deck Sash Pivot and Ratchet Catch.

Fig. 4518.
Deck Sash Socket and Spring, and Ratchet Catch.

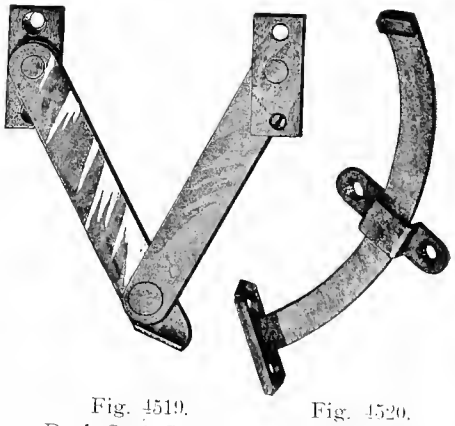


Fig. 4519.
Deck Sash Stop Hinge.
D. M. Co.

Fig. 4520.
Deck Sash Quadrant and Clip.
A. & W.

Fig. 4525.
Transom Sash Stop.
A. & W.

Fig. 4521.
Ratchet Plate.

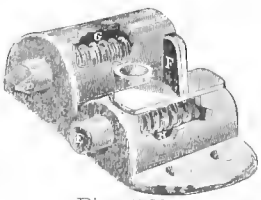


Fig. 4522.
Pivot and Ratchet Bolt.

"Monitor" Deck Sash Pivot and Ratchet Catch.
D. M. Co.

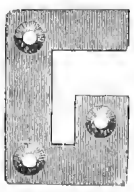


Fig. 4523.

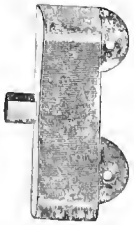


Fig. 4524.

Deck Sash Double Ratchet and Ratchet Plate (Left Hand).
A. & W.

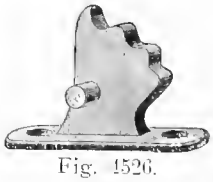
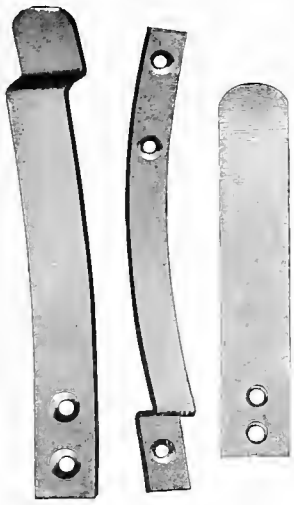


Fig. 4526.
Deck Sash Pivot and Ratchet.
A. & W.



Figs. 4527-4529.
Sash and Blind Springs.
A. & W.

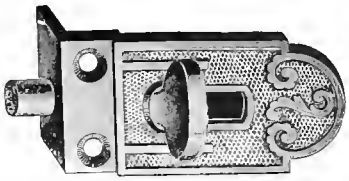


Fig. 4530. Blind Bolt.
A. & W.

Figs. 4531-4532.
Blind
Bolt Bushing.
A. & W.

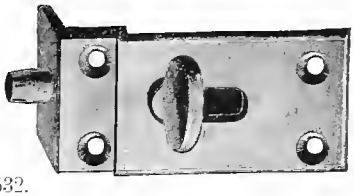


Fig. 4533.
Blind Bolt. A. & W.

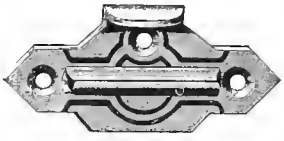


Fig. 4534.
Lower Window Blind Pull or Lift.
A. & W.

Fig. 4535.
Upper Window Blind Pull or Lift.
A. & W.

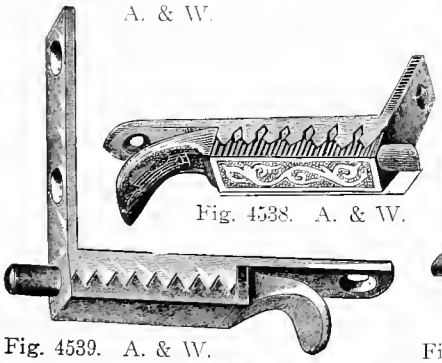


Fig. 4539. A. & W.

Fig. 4538. A. & W.

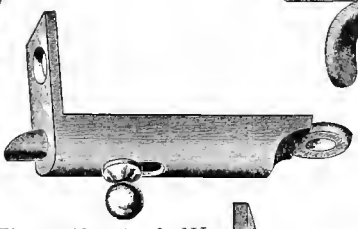


Fig. 4540. A. & W.

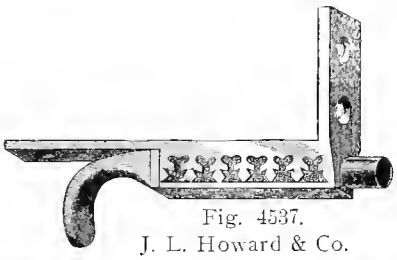


Fig. 4537.
J. L. Howard & Co.

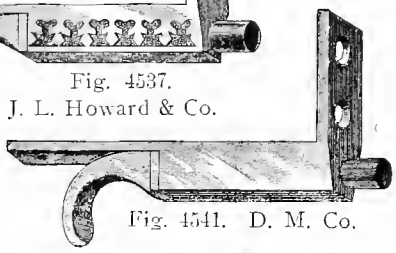


Fig. 4541. D. M. Co.

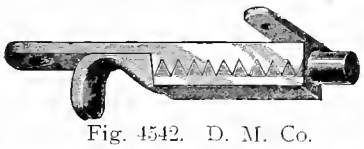
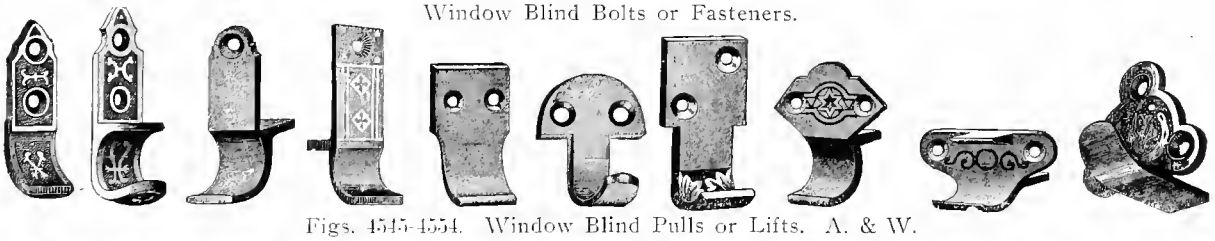


Fig. 4542. D. M. Co.

Fig. 4543. A. & W.

Fig. 4544. A. & W.

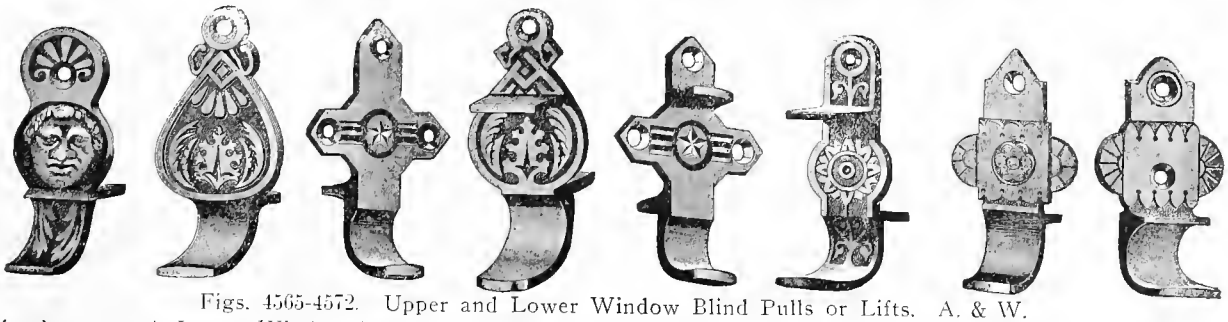
Window Blind Bolts or Fasteners.



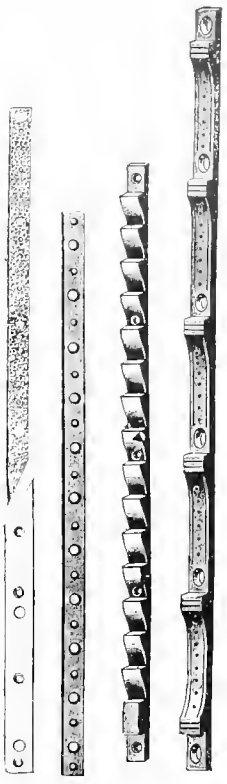
Figs. 4545-4554. Window Blind Pulls or Lifts. A. & W.

A. & W. A. & W. D. M. Co. A. & W. A. & W. J. L. Howard & Co. D. M. Co. D. M. Co. D. M. Co.

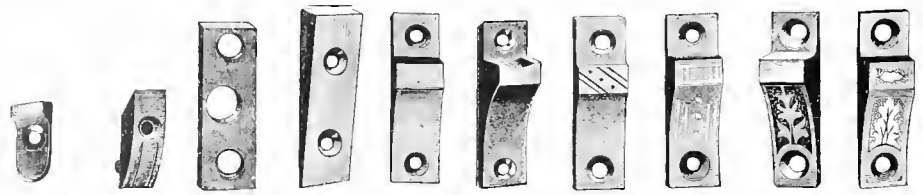
Figs. 4555-4564. Upper and Lower Window Blind Pulls or Lifts.



Figs. 4565-4572. Upper and Lower Window Blind Pulls or Lifts. A. & W.
A Lower Window Blind Pull Has a Projecting Flange to Support the Upper Blind.

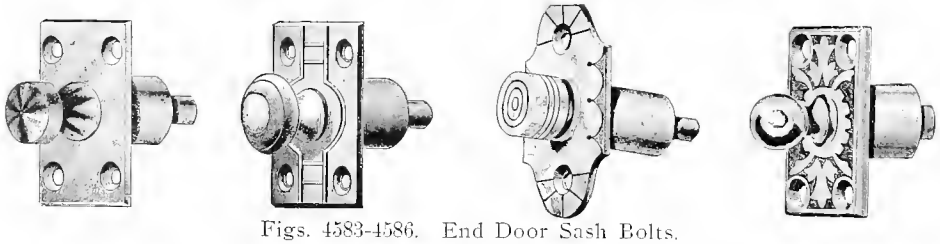


Figs. 4591-4594.
End Door Sash Bolt Plates. Ratchet Sash and Blind Lock Stops.
A. & W.



D.M.Co. D.M.Co. D.M.Co. D.M.Co. A.&W. A.&W. A.&W. A.&W. D.M.Co. A.&W.

Figs. 4573-4582. Sash and Blind Lock Stops.



Figs. 4583-4586. End Door Sash Bolts.

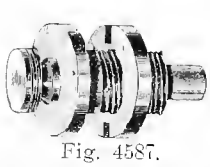
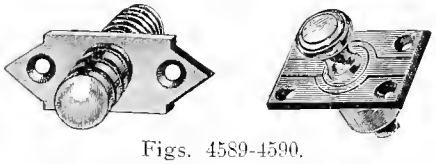


Fig. 4587.
End Door Sash Bolt.
A. & W.

Fig. 4588.
End Door Sash Lift.



Figs. 4589-4590.
End Door Sash Bolts.

Figs. 4595-4596. Sash Bars. D. M. Co.

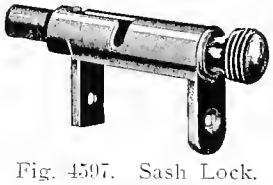


Fig. 4597. Sash Lock.

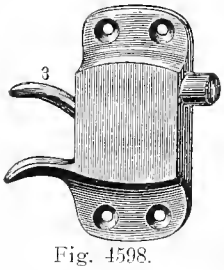


Fig. 4598.
Sash Lock.

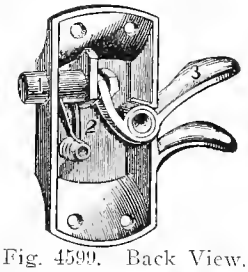
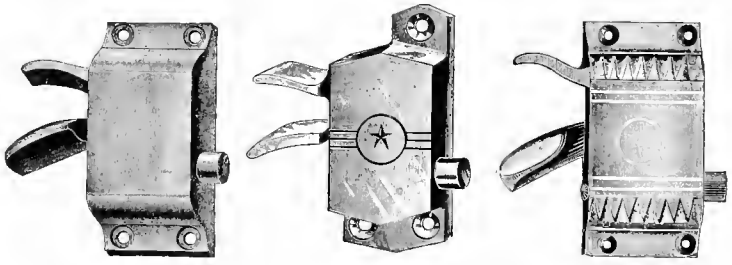
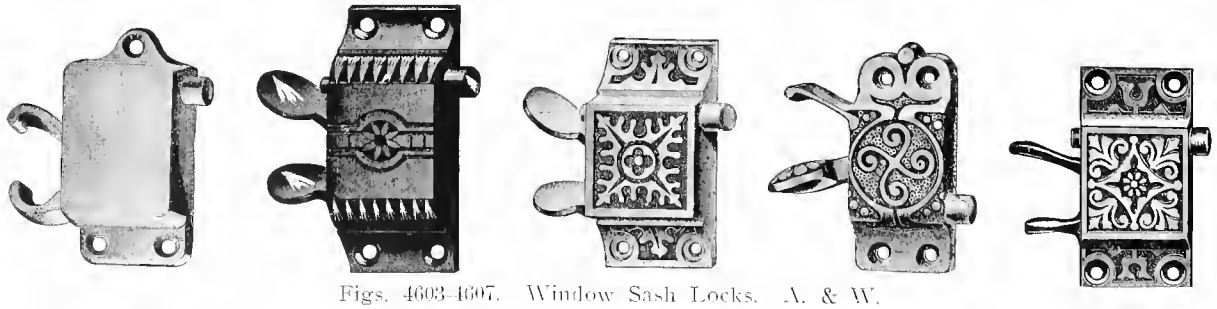


Fig. 4599. Back View.
Sash Lock.



Figs. 4600-4602. Window Sash Locks.
J. L. Howard & Co.



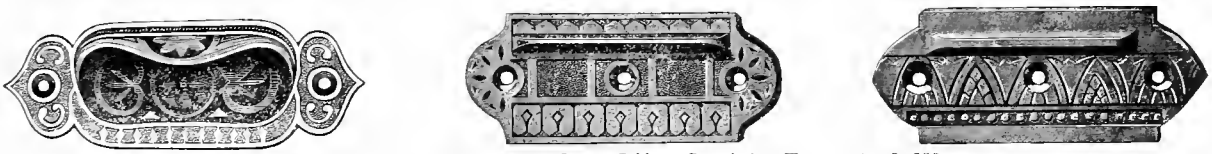
Figs. 4603-4607. Window Sash Locks. A. & W.

Figs. 4608-4612. Window Sash Locks. A. & W.

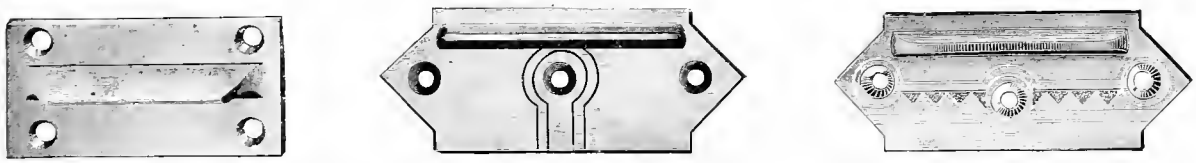
A. & W. D. M. Co. D. M. Co. A. & W. A. & W. A. & W.

Figs. 4613-4618. Window Sash Lifts, Cone Top.

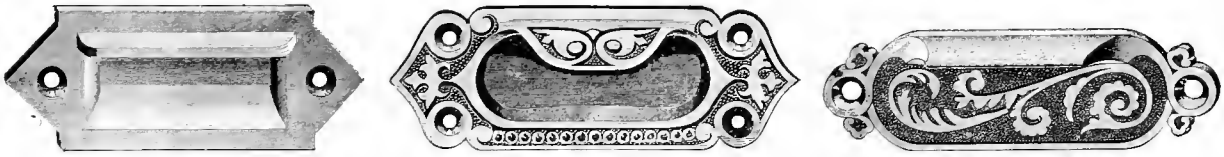
Figs. 4619-4624. Window Sash Lifts, Curved and Straight Top.



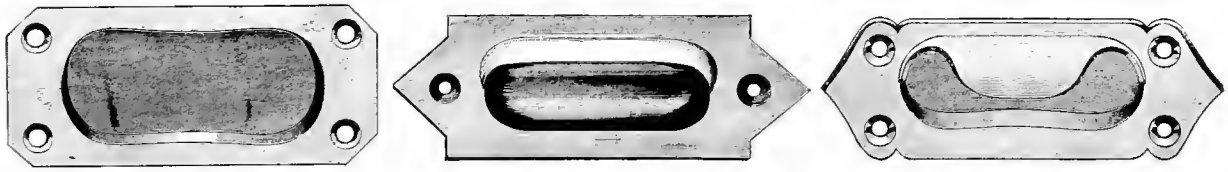
Figs. 4625-4627. Window Sash Lifts, Straight Top. A. & W.



Figs. 4628-4630. Window Sash Lifts, Straight Top. A. & W.

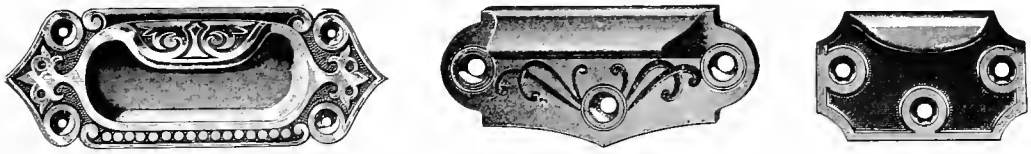


Figs. 4631-4632. Window Sash Lifts. A. & W.

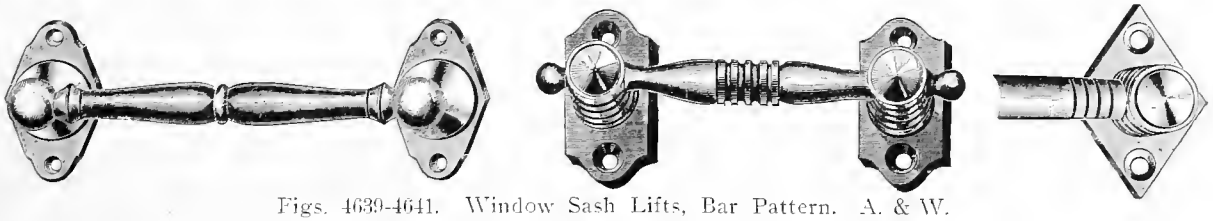


A. & W. J. L. Howard & Co. A. & W.

Figs. 4633-4635. Window Sash Lifts, Mortise.



Figs. 4636-4638. Window Sash Lifts. A. & W.



Figs. 4639-4641. Window Sash Lifts, Bar Pattern. A. & W.

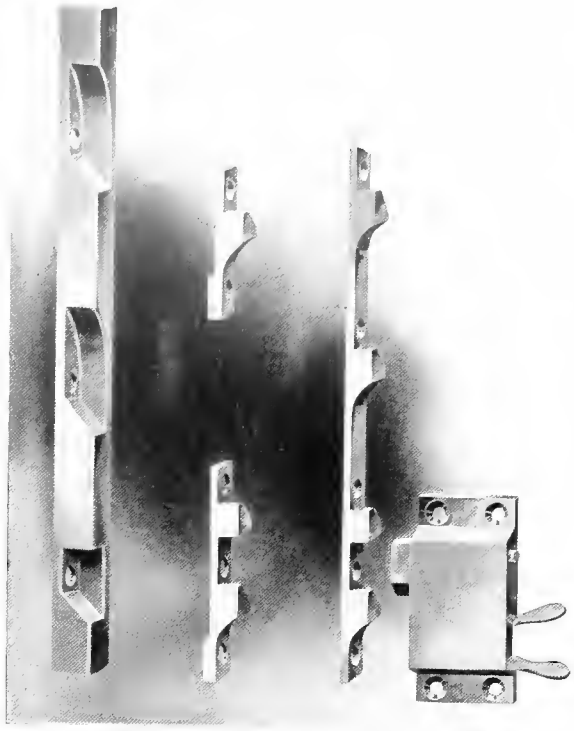


Fig. 4642. Stamped, Individual and Continuous Wedging Racks and Gravity Wedging Sash Lock.

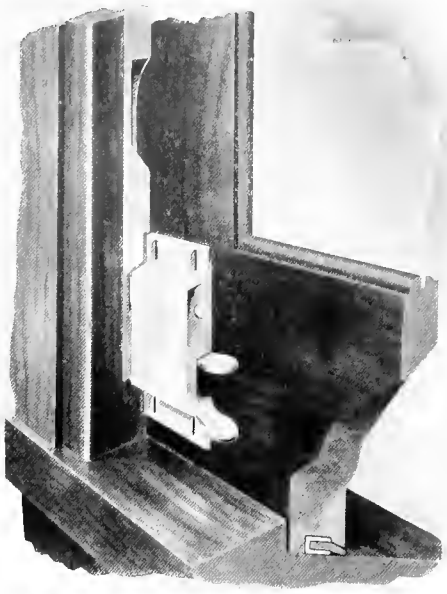


Fig. 4643. Stamped Bronze Continuous Flush Stop Rack, with Gravity Wedging Lock.

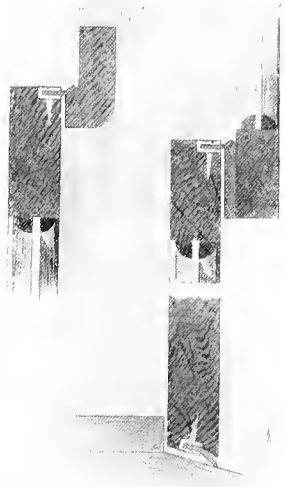


Fig. 4644. Top and Bottom Weather Stripping and Brass Holding Channels for Two-Part Sash.

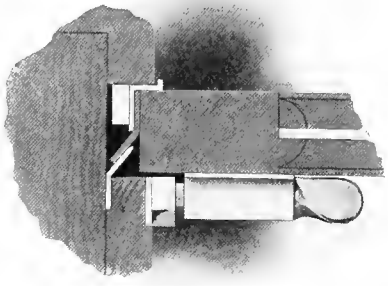
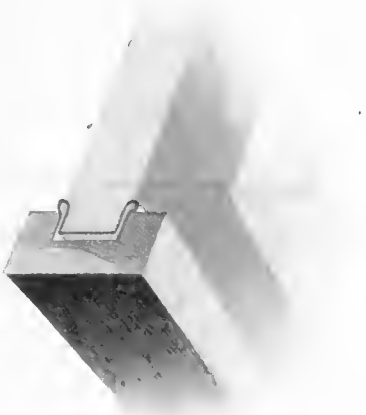
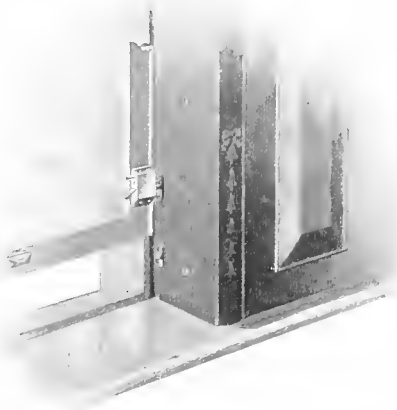


Fig. 4645. Top View of Side Compression Strip, Dust Deflector and Gravity Wedging Sash Lock.

Fig. 4646. Universal Roller Sash Balance and Chain Connections. Grip Nut Co.

Fig. 4647. Universal Window Fixtures.





Figs. 4648-4649. Brown Metallic Window Strip. Metal Plated Car & Lumber Co.

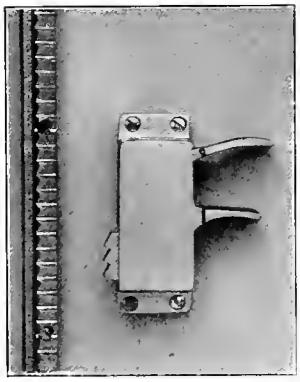


Fig. 4650. No. 83. Ratchet Sash Lock and Stop. J. L. Howard & Co.

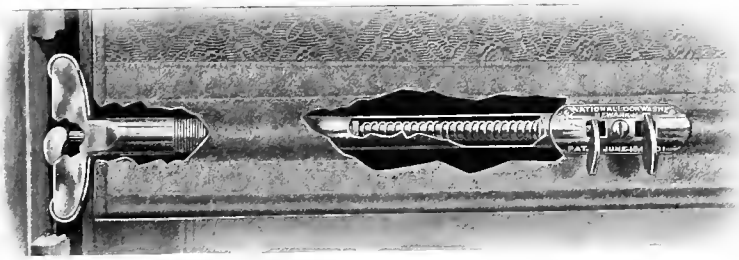


Fig. 4651. National Cam Curtain Fixture. National Lock Washer Co.

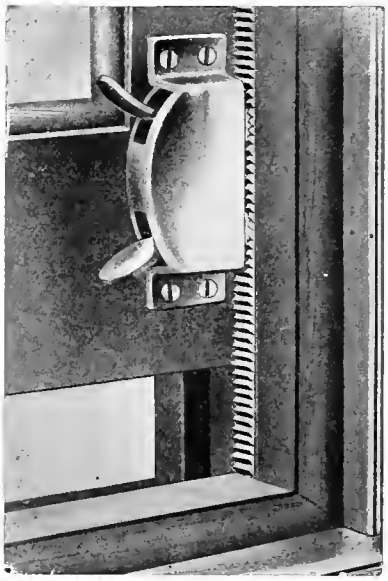


Fig. 4652. National Sash Lock. National Lock Washer Co.

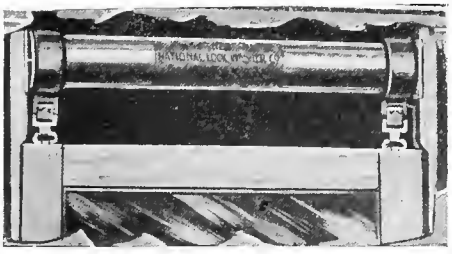
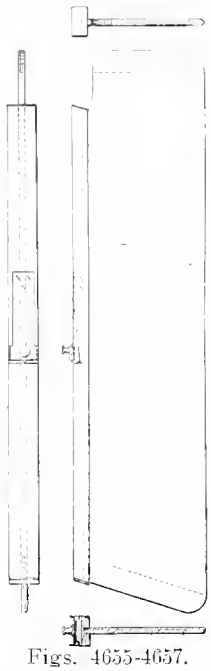


Fig. 4653. National Sash Balance. National Lock Washer Co.

Fig. 4654. National Balance Curtain Fixture with Protected Groove. National Lock Washer Co.



Figs. 4655-4657.
Window Dust Guard
or Deflector.

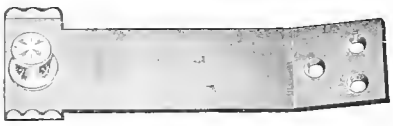


Fig. 4658.
Dust Guard Spring Holder.

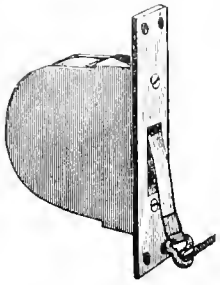


Fig. 4659.
Caldwell Window
Sash Balance.

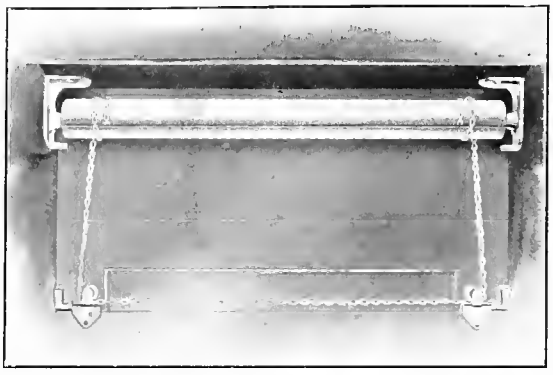


Fig. 4660. Edwards Roller Sash Balance with Rock Shaft Sash Tightening Devices.

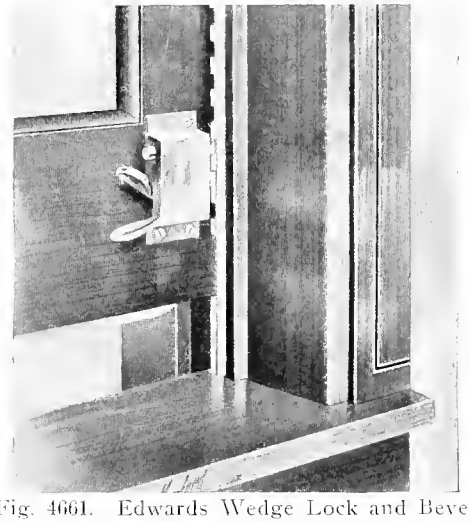


Fig. 4661. Edwards Wedge Lock and Bevel Stop Bar as Used Without Roller Sash Balance.

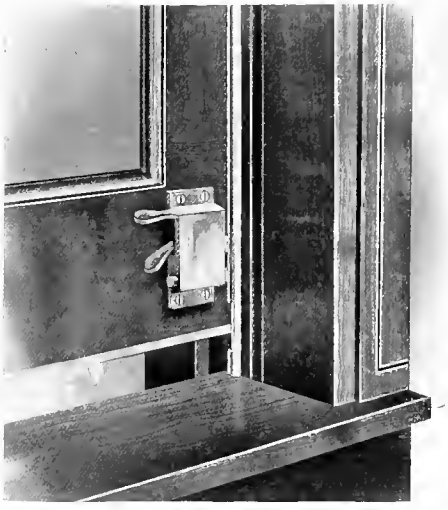


Fig. 4662. Edwards Wedge Lock and Bevel Stop Bar as Used with Spring Roller Sash Balance.

Fig. 4663. Edwards No. 13-O Lock as Used Without Roller Sash Balance.

Fig. 4664. Edwards Combined Rock Shaft Lock and Sash Tightening Device as Used With Spring Roller Sash Balance, Window Design No. 13-OBFI.

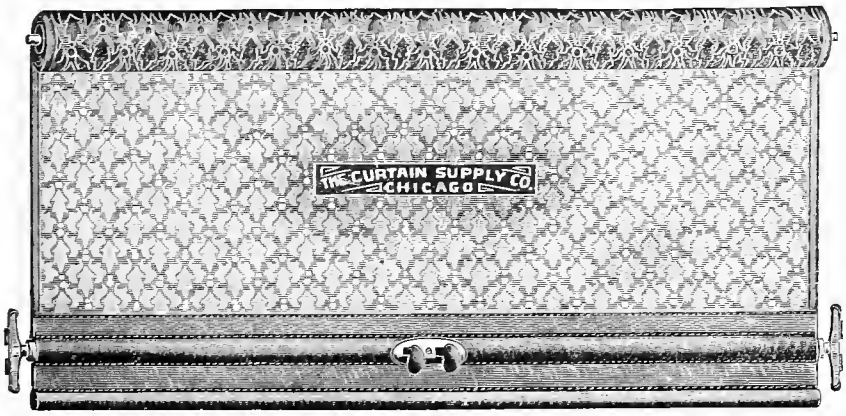


Fig. 4665. Closed Car Curtain with Forsyth No. 86 or "Ring" Fixtures.

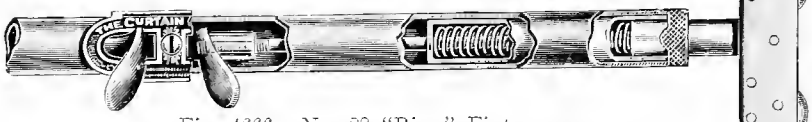


Fig. 4666. No. 88 "Ring" Fixture.

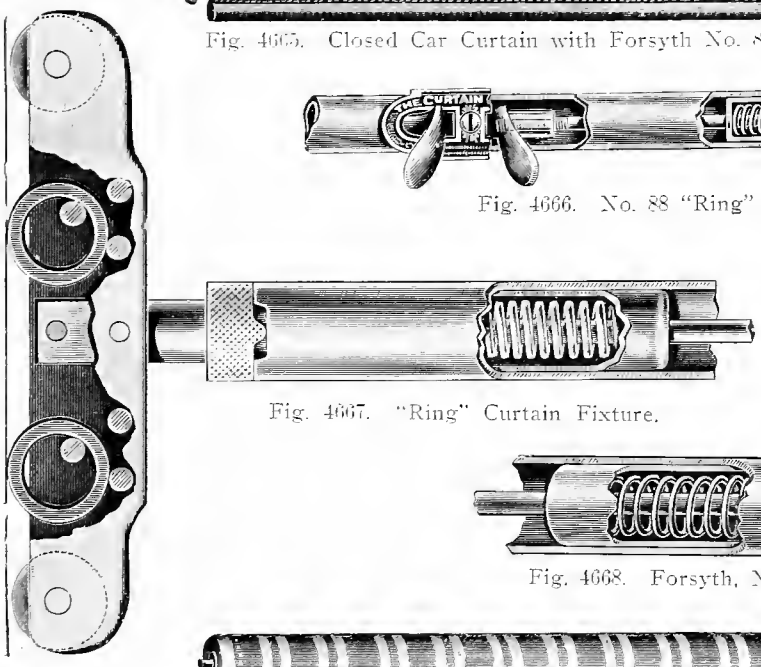


Fig. 4667. "Ring" Curtain Fixture.

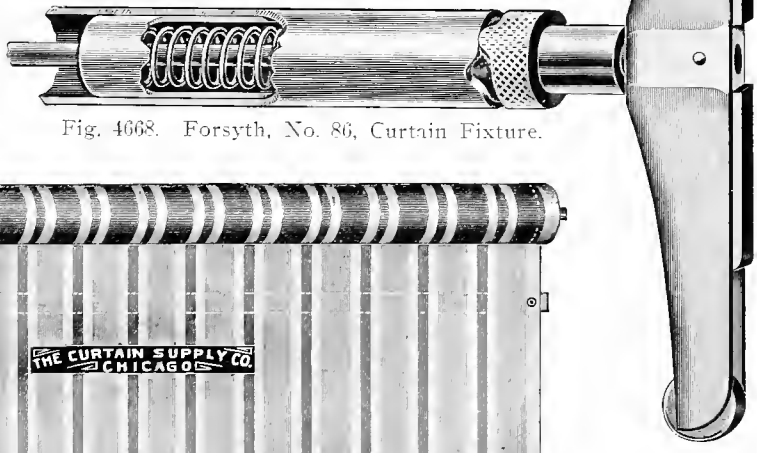


Fig. 4668. Forsyth, No. 86, Curtain Fixture.

Fig. 4669. Open Car Curtain with Acme or Climax Fixtures.

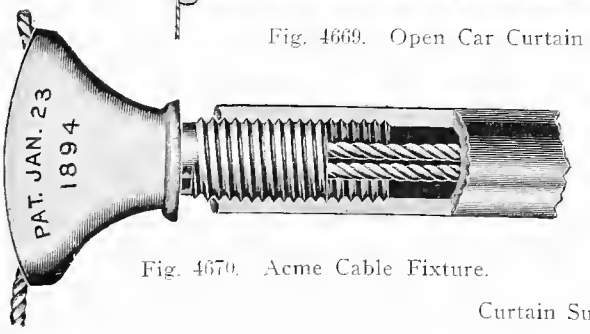


Fig. 4670. Acme Cable Fixture.

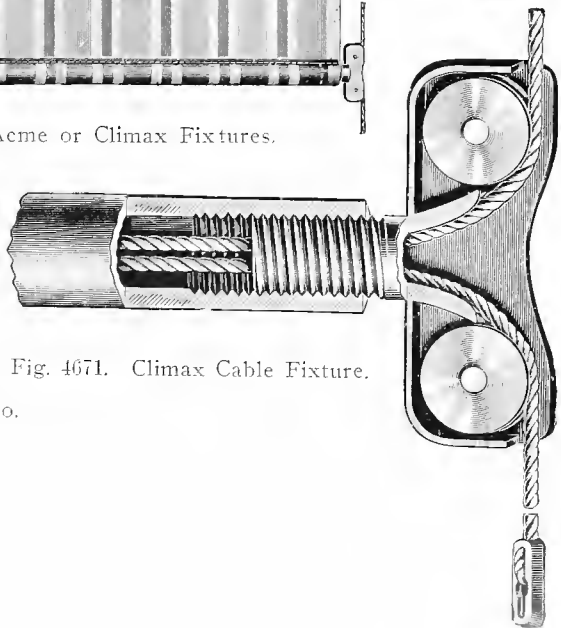
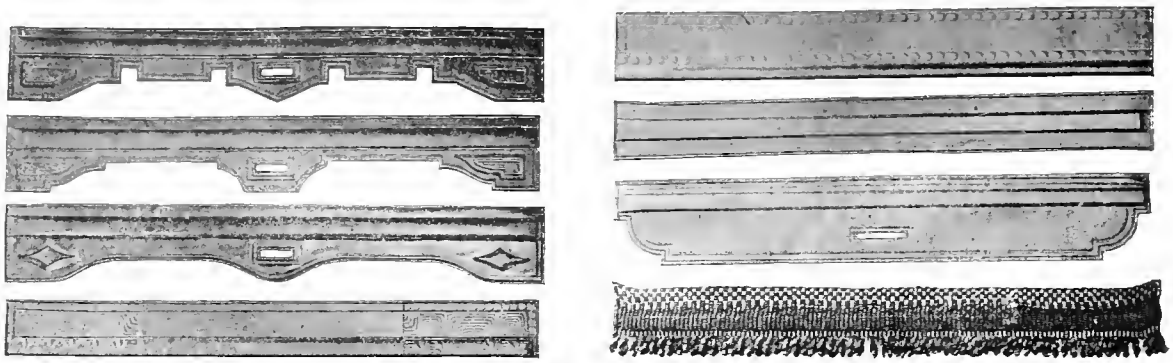


Fig. 4671. Climax Cable Fixture.

Curtain Supply Co.



Figs. 4672-4679. Leather and Fringe Shade Bottoms.
In all Colors and Designs to Match Tapestry.

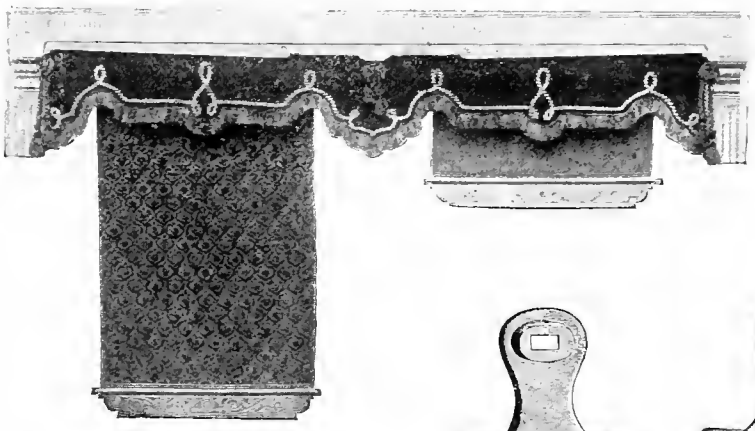
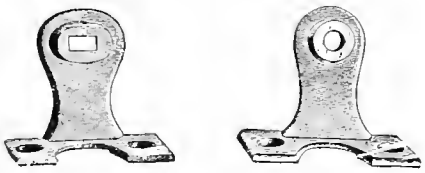
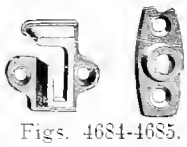


Fig. 4680.
Lambrequin and Shades for Parlor Car.
Hale & Kilburn Mfg. Co.

Fig. 4681.
Hartshorn Shade Roller and Brackets, Showing Centrifugal Pawls.
(The McKay shade roller is somewhat similar but uses a cam instead of a pawl.)



Figs. 4682-4683.
McKay's Curtain Brackets, No. 1.



Figs. 4684-4685.
McKay's Curtain Brackets, No. 2.

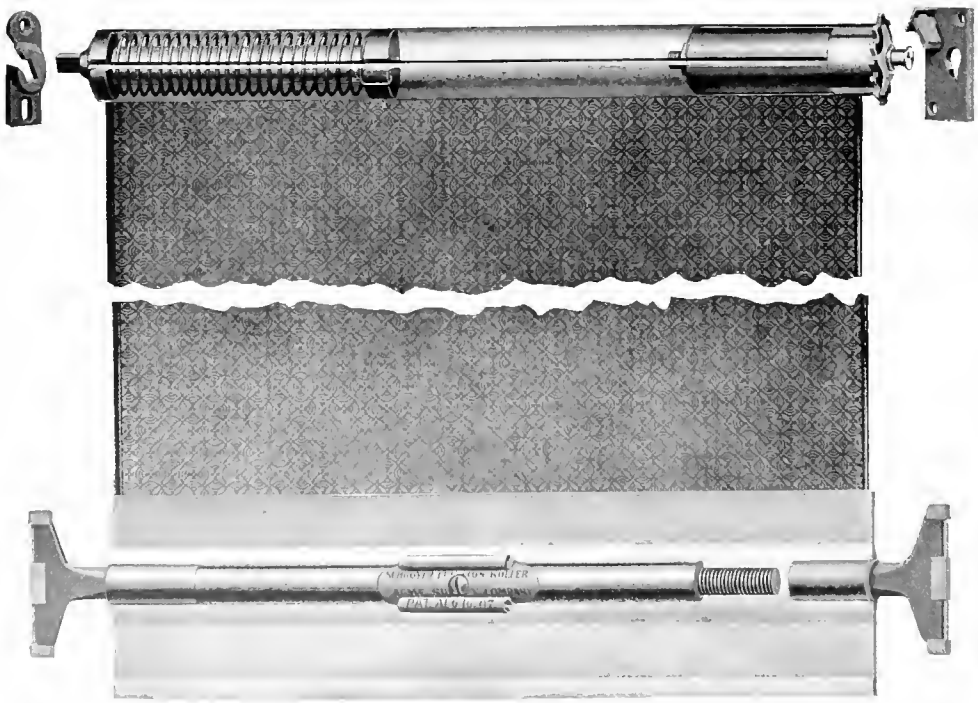


Fig. 4686. Car Curtain with Schroyer Friction Roller.
Acme Supply Co.

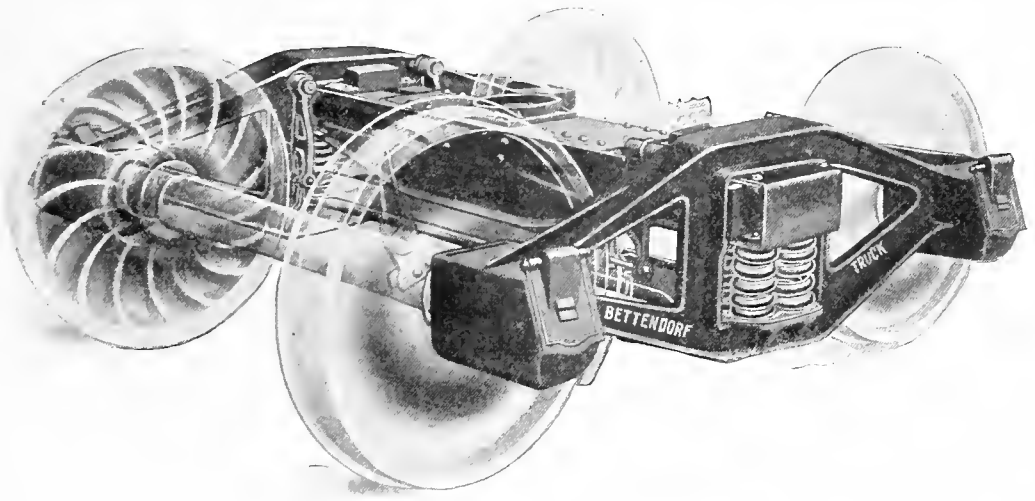


Fig. 4687. Swing Motion Truck. Bettendorf Axle Co.

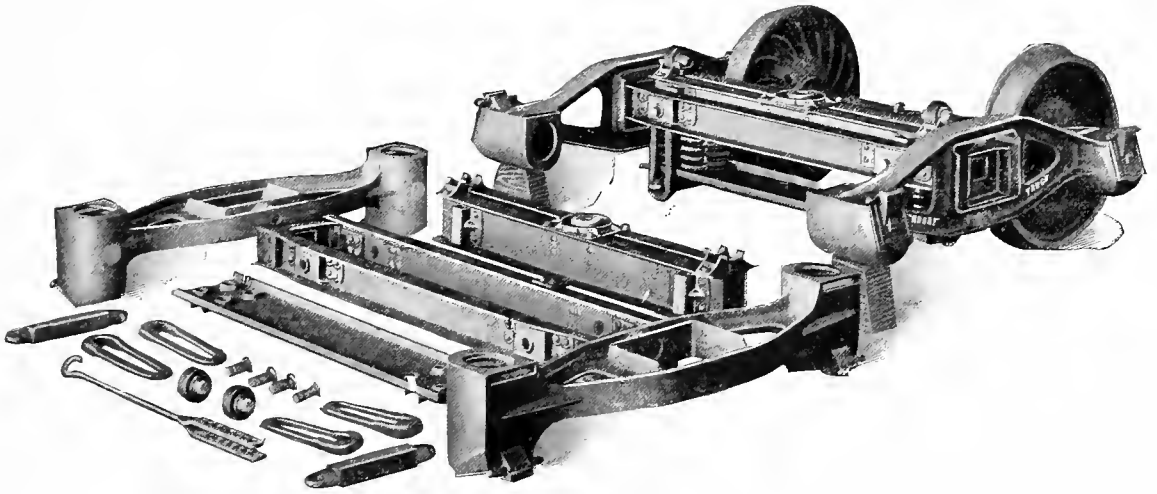
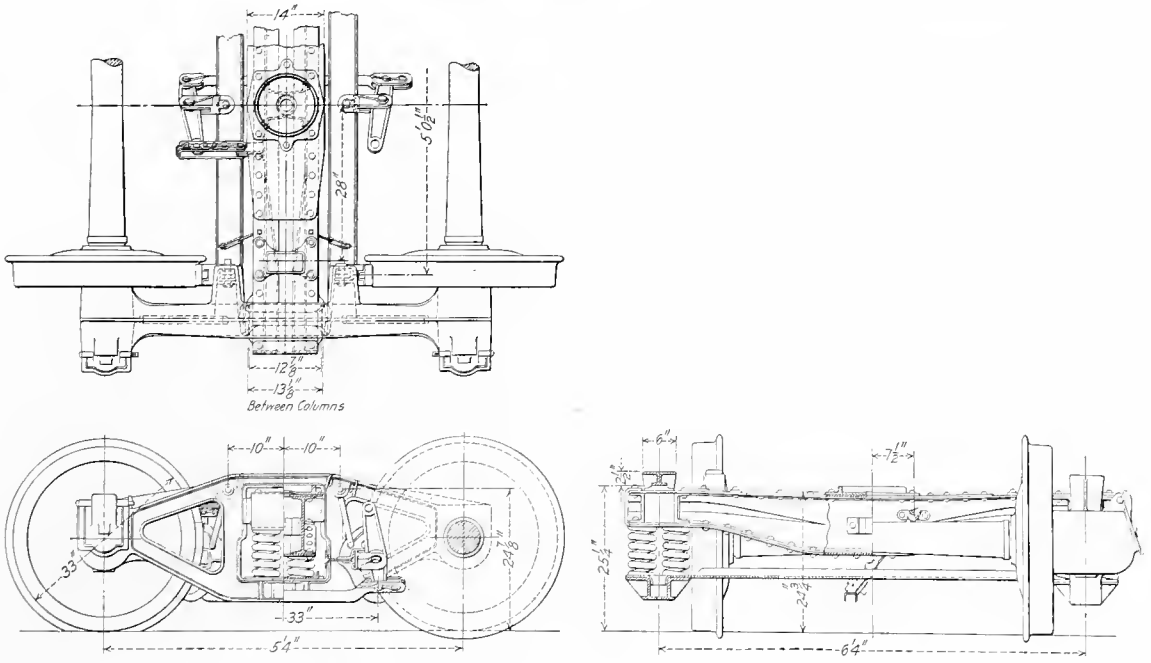


Fig. 4688. Detail Parts and Ensemble of Swing Motion Truck. Bettendorf Axle Co.



Figs. 4689-4691. 80,000 lbs. Capacity Truck. Bettendorf Axle Co.

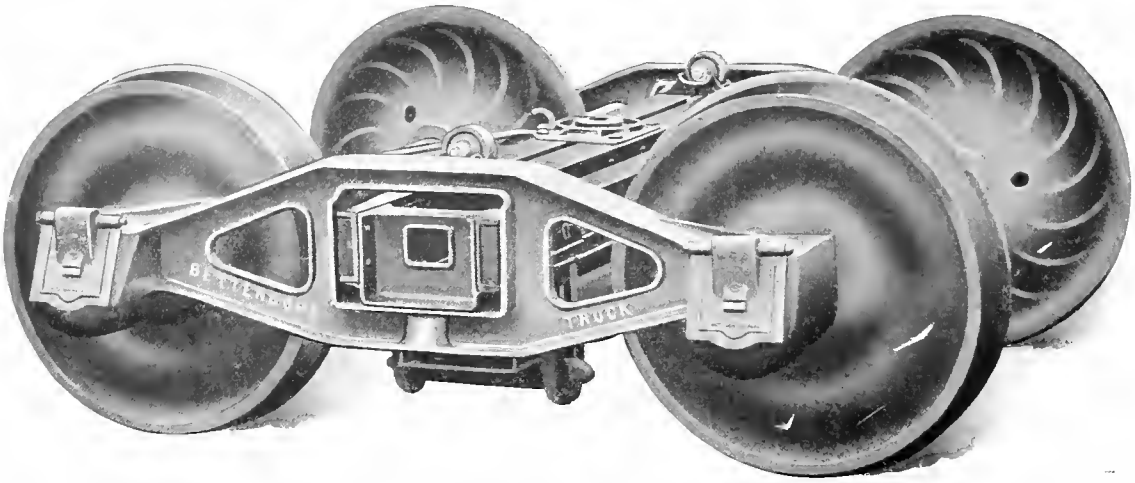


Fig. 4692. Swing Motion Truck. 30 Tons Capacity. Bettendorf Axle Co.

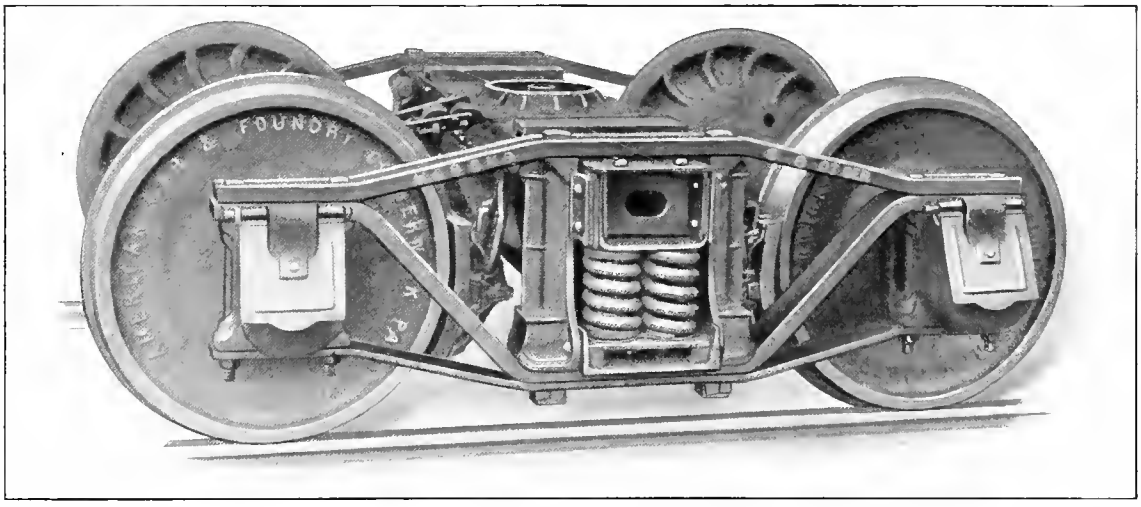


Fig. 4693. Diamond Arch Bar Truck. 30, 40 or 50 Tons Capacity.
American Car & Foundry Co.

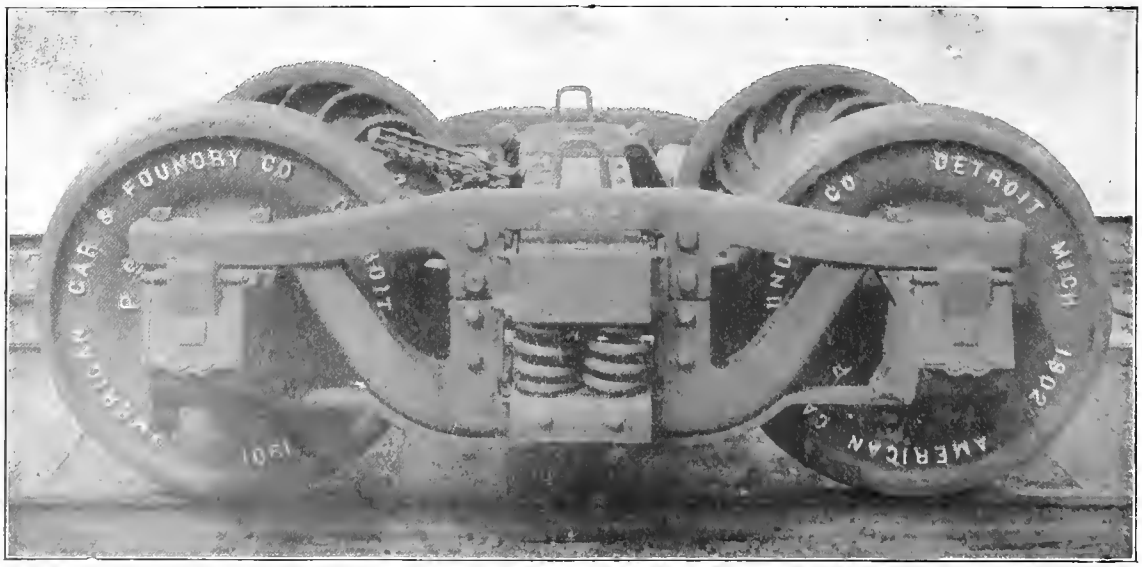


Fig. 4694. Pressed Steel Arch Bar Truck.
Cleveland Car Specialty Co.

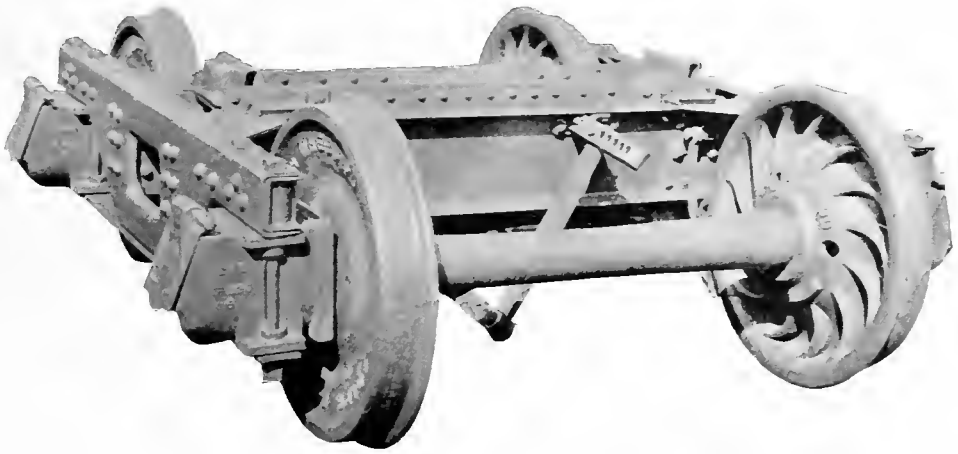


Fig. 4695. Buckeye Pressed Steel Truck. Pressed Steel Car Co.

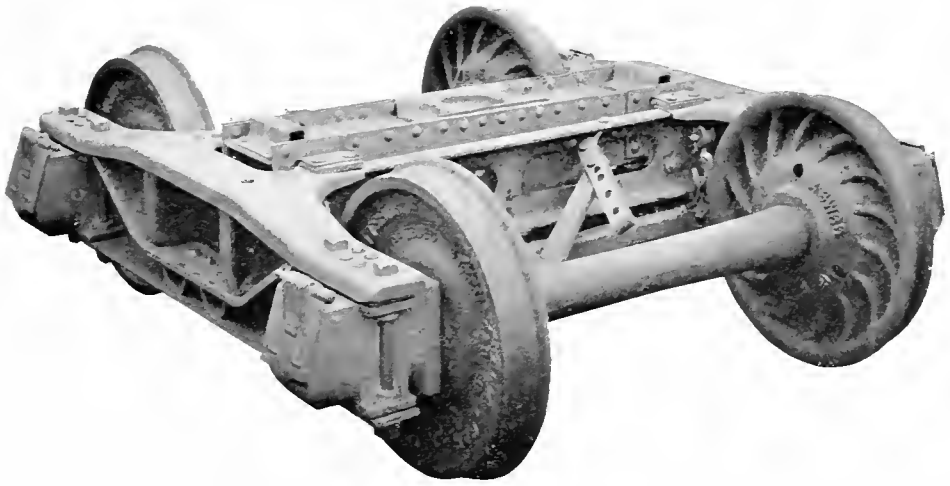


Fig. 4696. Pressed Steel Diamond Arch Bar Truck. Pressed Steel Car Co.

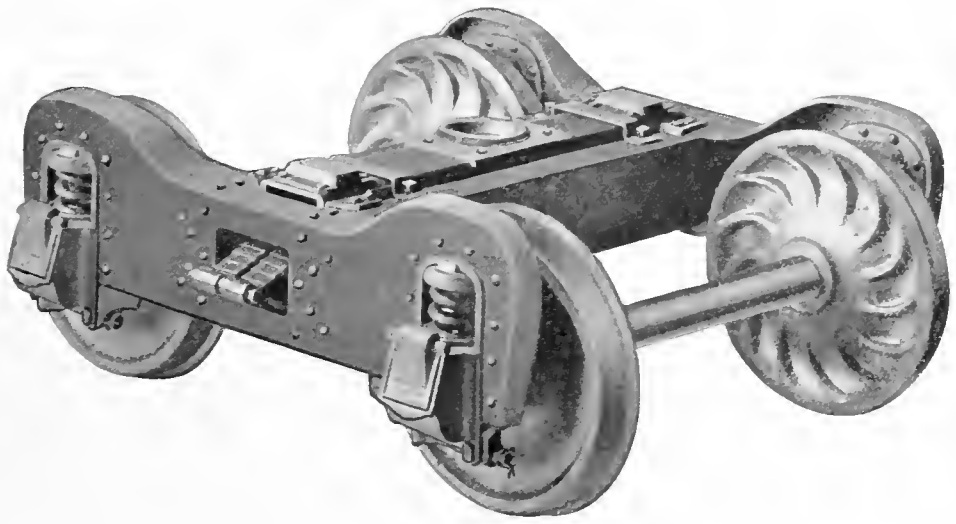
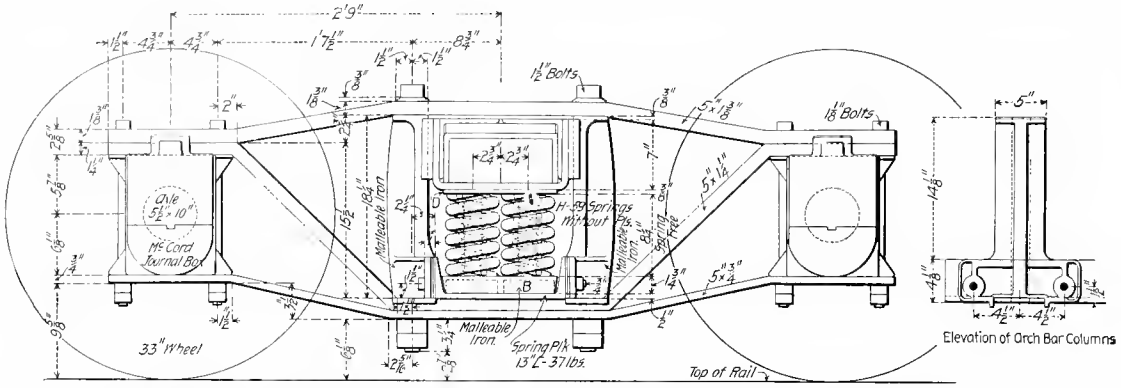
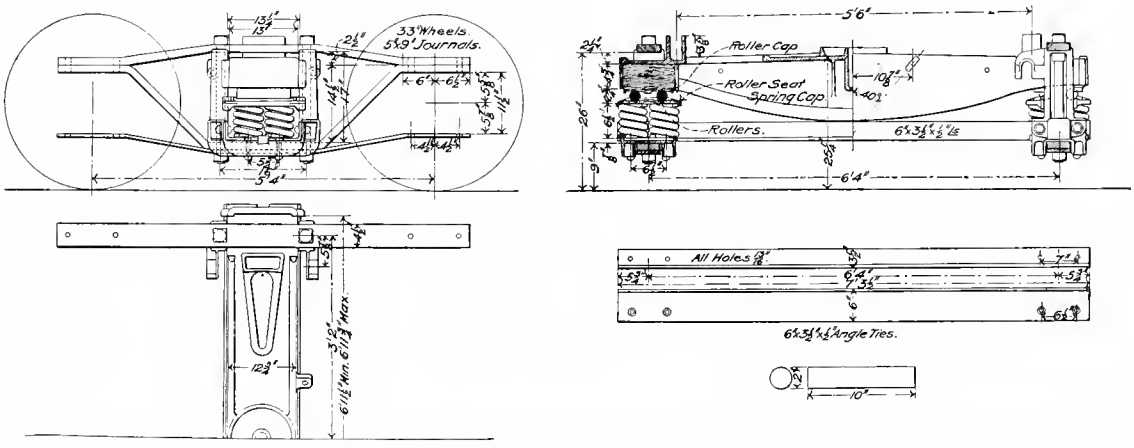


Fig. 4697. Fox Pressed Steel Truck. Pressed Steel Car Co.

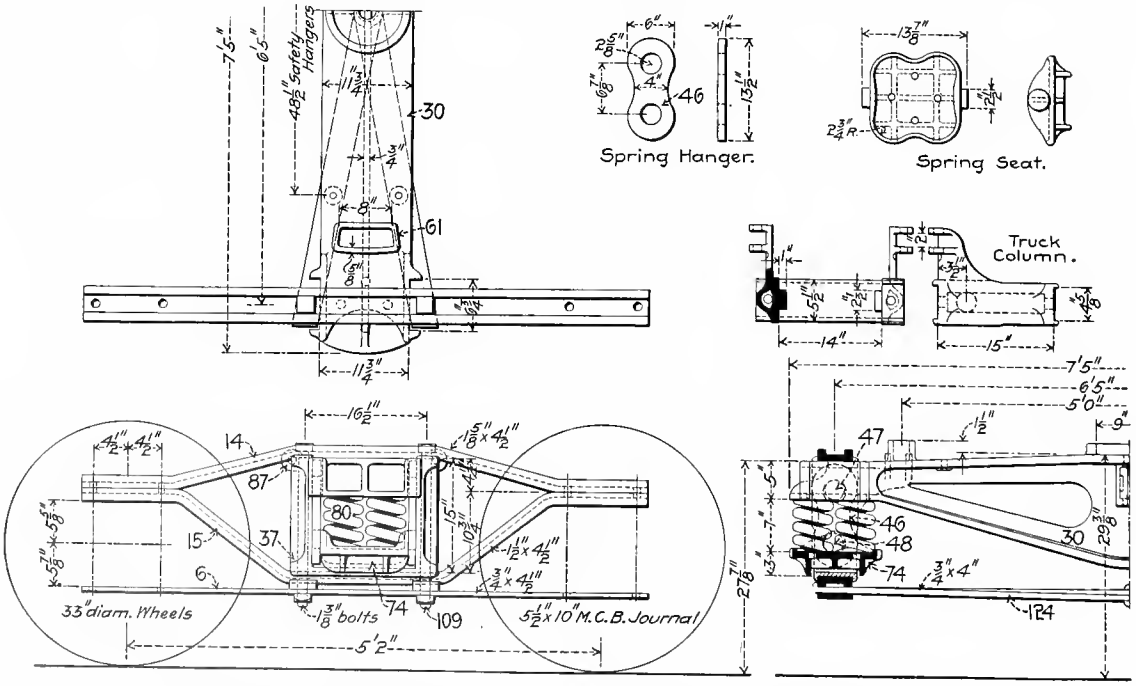


Figs. 4698-4699. 100,000 lbs. Capacity Diamond Arch Bar Truck. Cambria Steel Co.

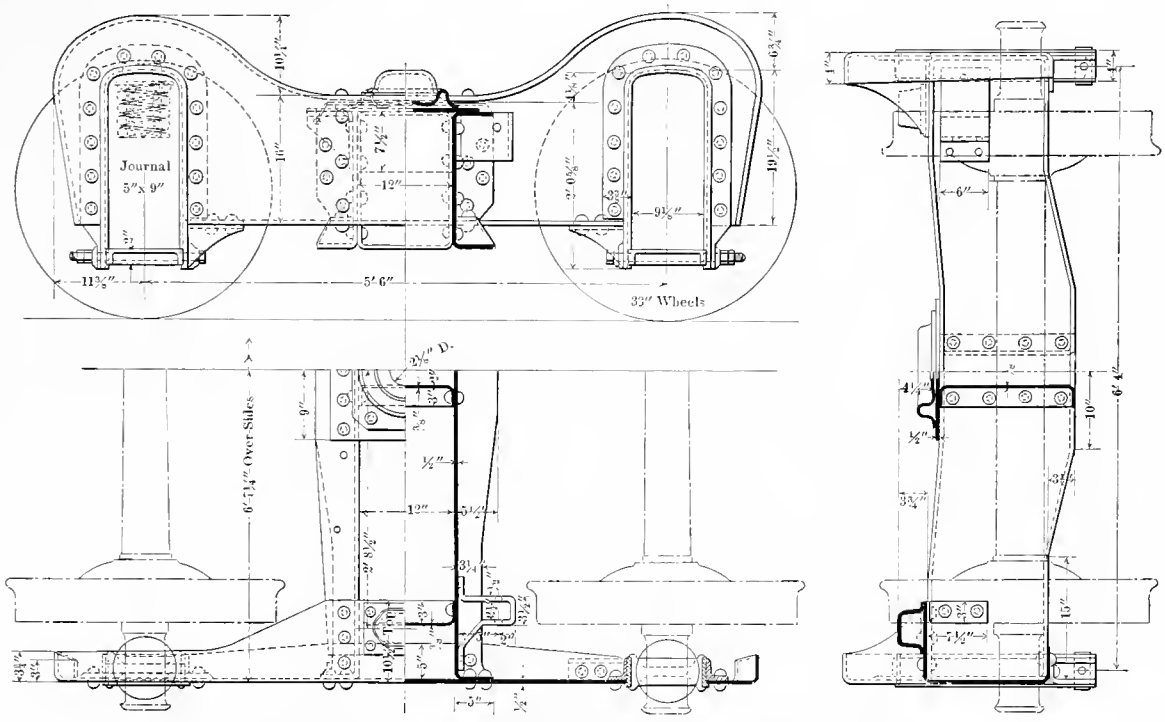


Figs. 4700-4704. Barber Type Diamond Arch Bar Truck with Top Rollers. Capacity, 80,000 lbs. Standard Car Truck Co.

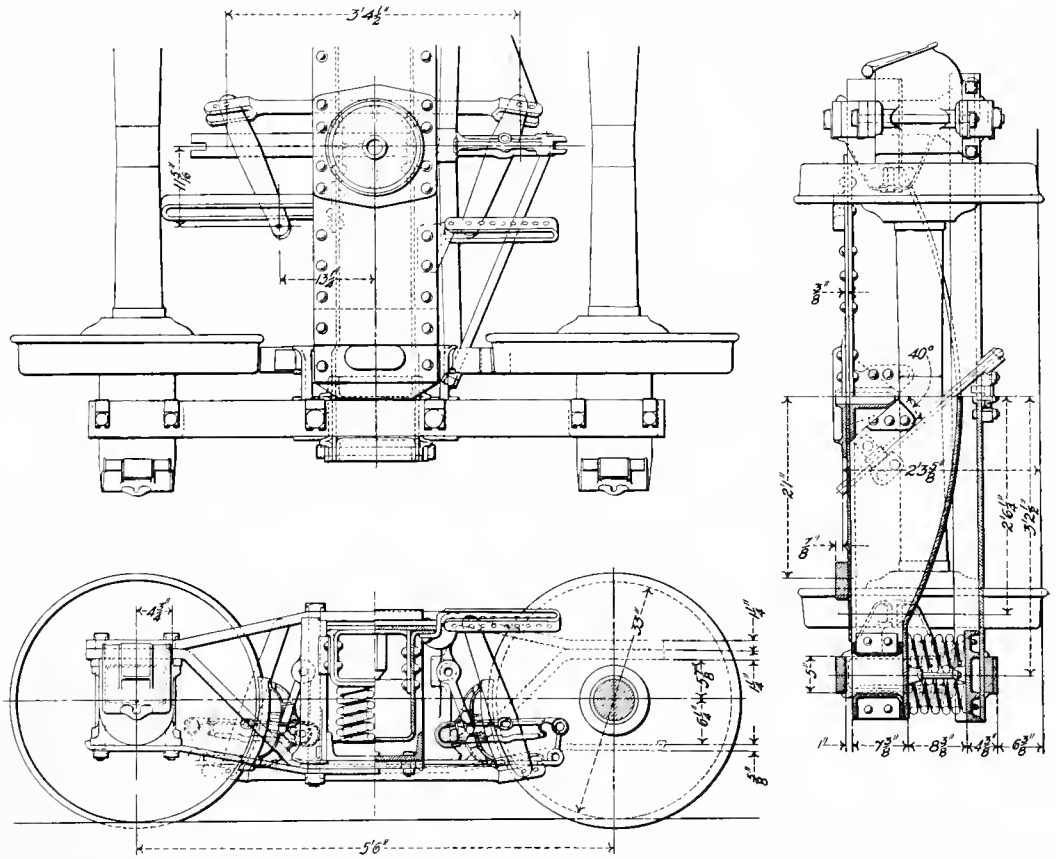
Numbers Refer to List of Names with Figs. 4724-4726.



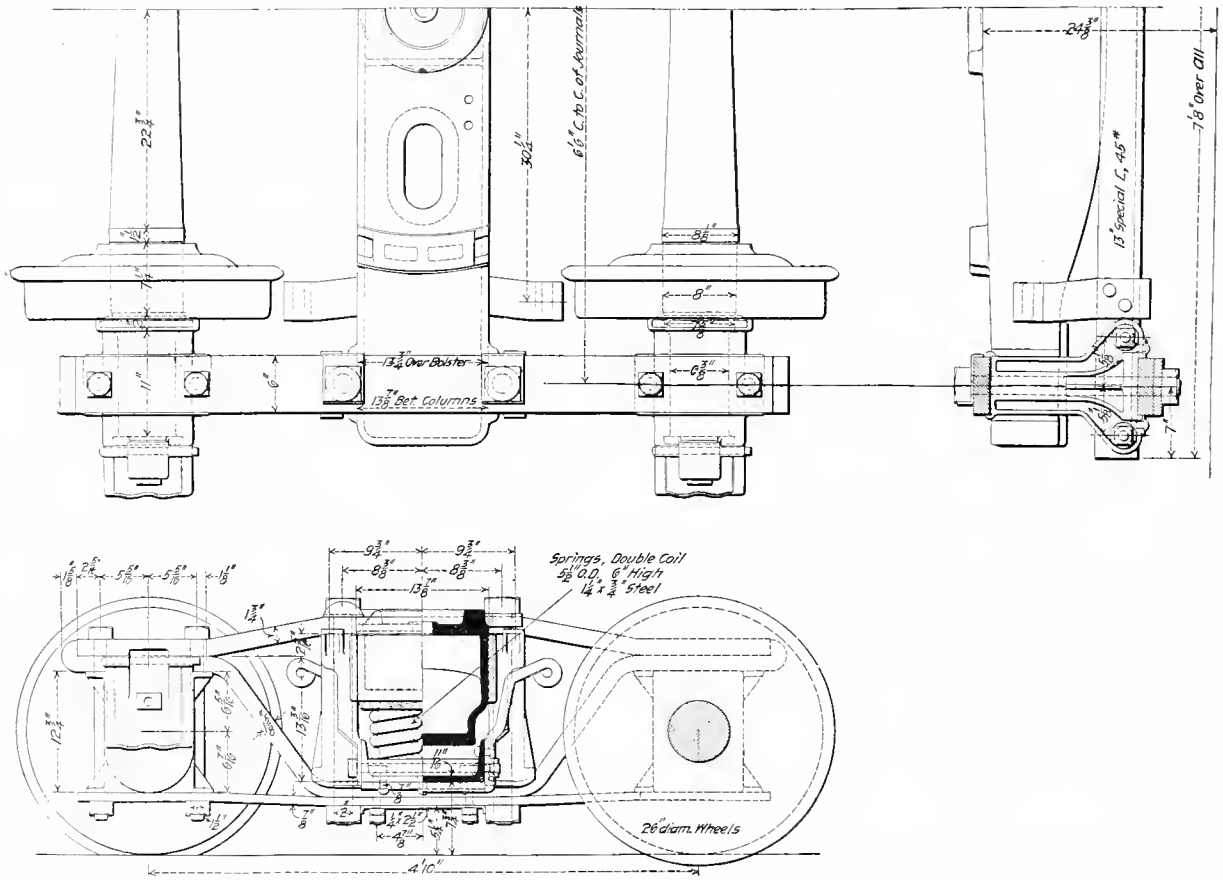
Figs. 4705-4713. Swing Motion Diamond Arch Bar Truck; 100,000 lbs. Capacity.



Figs. 4714-4716. Fox Pressed Steel Pedestal Truck; 80,000 lbs. Capacity.
Pressed Steel Car Co.

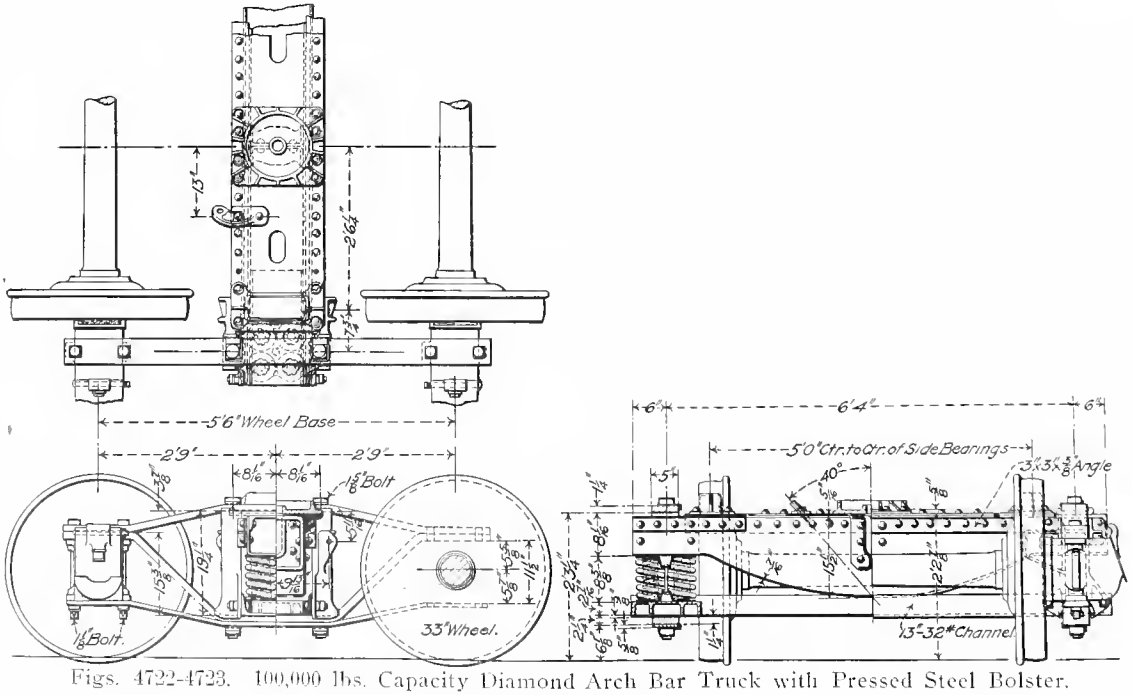


Figs. 4717-4719. 100,000 lbs. Capacity Diamond Arch Bar Truck with Pressed Steel Bolster.
Pressed Steel Car Co.



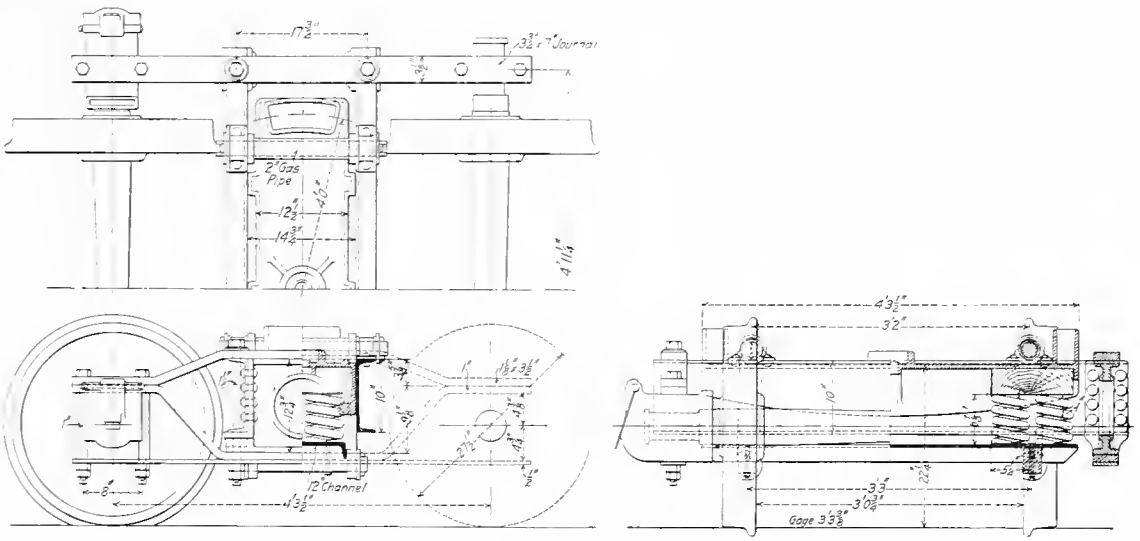
Figs. 4720-4721. Diamond Arch Bar Truck with Cast Steel Bolster for 150,000 lbs. Capacity Flat Car.

Pittsburgh & Lake Erie.



Figs. 4722-4723. 100,000 lbs. Capacity Diamond Arch Bar Truck with Pressed Steel Bolster.

Standard Steel Car Co.

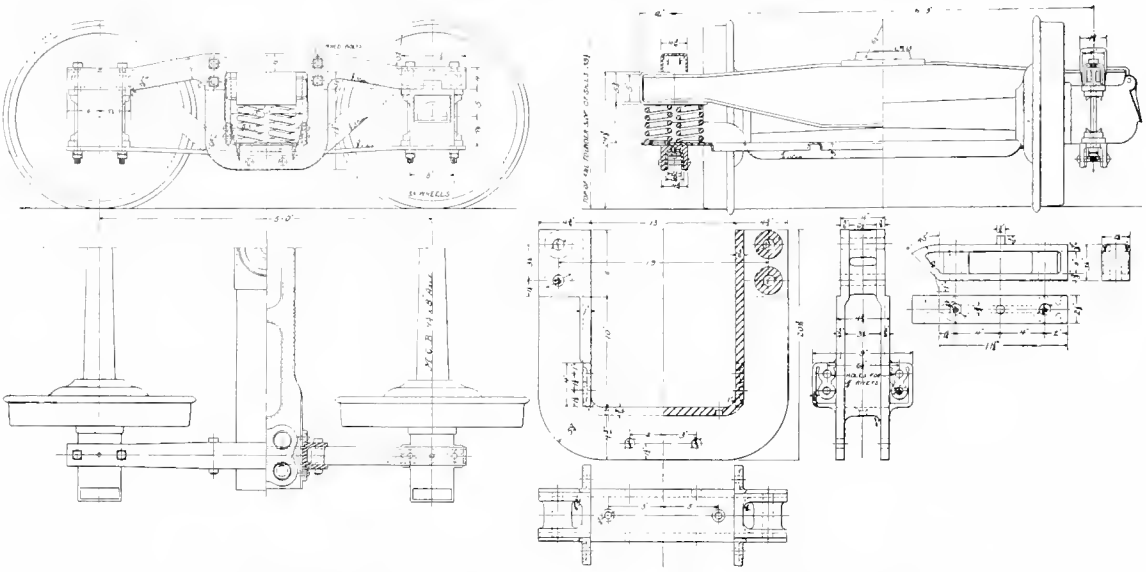


Figs. 4724-4726. 40,000 lbs. Capacity Swing Motion Truck. Santader a Bilboa.

American Car & Foundry Co.

Names of Parts of Car Trucks, Freight, Figs. 4705-4713, Passenger, Figs. 4771-4777, 4780-4783.

1 *Wheel*
2 *Axle*
3 *Journal Box*
4 *Journal Box Lid*
5 *Pedestal*
6 *Pedestal Tie Bar*
7 *Pedestal Stay Rod*
10 *Wheel Piece*
11 *Outside Wheel Piece Plate*
12 *Inside Wheel Piece Plate*
14 *Arch Bar*
15 *Inverted Arch Bar*
17 *End Piece of Truck Frame*
20 *Transom*
20a *Extra Transom*
21 *Middle Transom for Six-Wheel Truck*
22 *Outside Transom for Six-Wheel Truck*
23 *Transom Tie Bar*
23a *Extra Transom Tie Rod*
24 *Transom Truss Rod*
25 *Transom Truss Block*
26 *Transom Truss Rod Washer*
27 *Transom Chafing Plate*
30 *Truck Bolster*
37 *Bolster Guide Bars or Truck Columns*
43 *Spring Plank*
44 *Spring Plank Bearing*
45 *Spring Plank Safety Strap*
46 *Swing Hangers*
47 *Upper Swing Hanger Pivot*
48 *Lower Swing Hanger Pivot*
49 *Swing Hanger Pivot Bearing*
51 *Safety Beam*
55 *Axle Safety Strap*
59 *Safety Beam Tie Rod*
60 *Safety Beam Iron*
61 *Truck Side Bearing*
62 *Side Bearing Bridge*
63 *Truck Center Plate*
64 *Center Plate Block*
66 *Center Bearing Arch Bar*
67 *Center Bearing Inverted Arch Bar*
68 *Check Chain*
69 *Truck Check Chain Hook*
70 *Truck Check Chain Eye*
71 *Equalizing Bar*
72 *Equalizing Bor Spring Cap*
73 *Equalizing Bar Spring Seat*
74 *Bolster Spring Seat*
75 *Bolster Spring Cap*
76 *Spring Block*
79 *Equalizing Bar Spring*
80 *Bolster Spring*
83 *Brake Head*
84 *Brake Beam*
86 *Brake Hanger*
87 *Brake Hanger Carrier*
88 *Brake Beam Safety Chain*
89 *Brake Safety Chain Eye Bolt*
90 *Brake Safety Strap*
91 *Release Spring*
92 *Brake Lever*
93 *Brake Lever Fulcrum*
95 *Brake Lever Stop*
97 *Lower Brake Rod*
98 *Brake Shoe*
109 *Column Bolts*
124 *Brake Beam Adjusting Hanger Plate*
130 *End Piece Corner Plate*
131 *Transom Corner Plate*



Figs. 4727-4732. Pressed Steel Arch Bar Truck, 100,000 lbs. Capacity.
Cleveland Car Specialty Co.

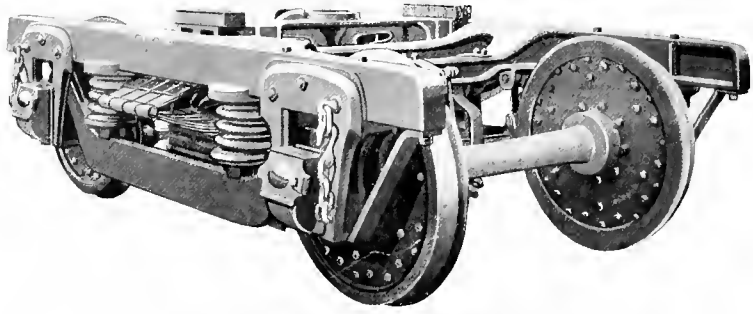


Fig. 4733. Cast Steel Four-Wheel Passenger Truck.
(Truck frame cast in one piece.)
Commonwealth Steel Co.

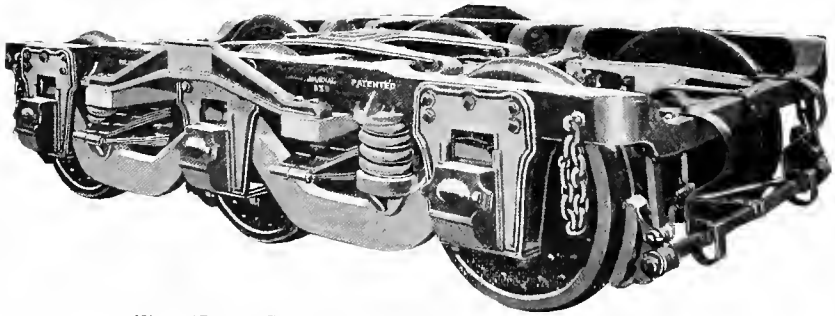


Fig. 4734. Cast-Steel Six-Wheel Passenger Truck.
(Truck frame cast in one piece.)
Commonwealth Steel Co.

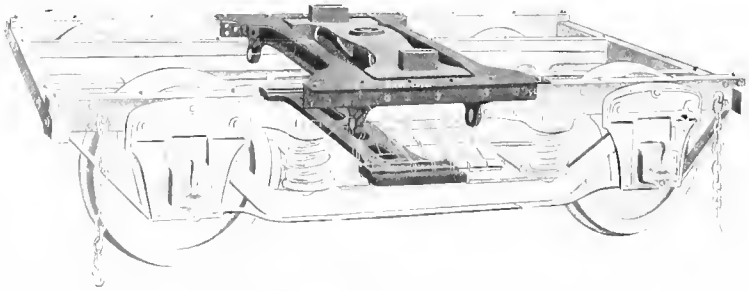
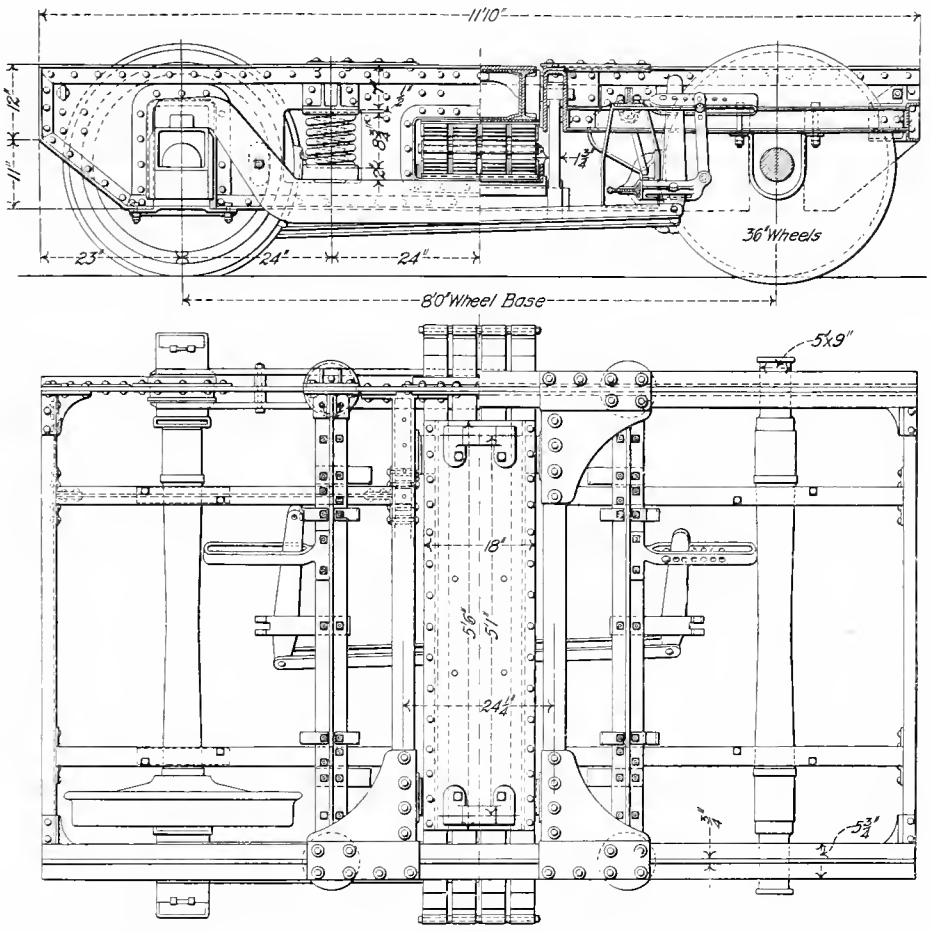
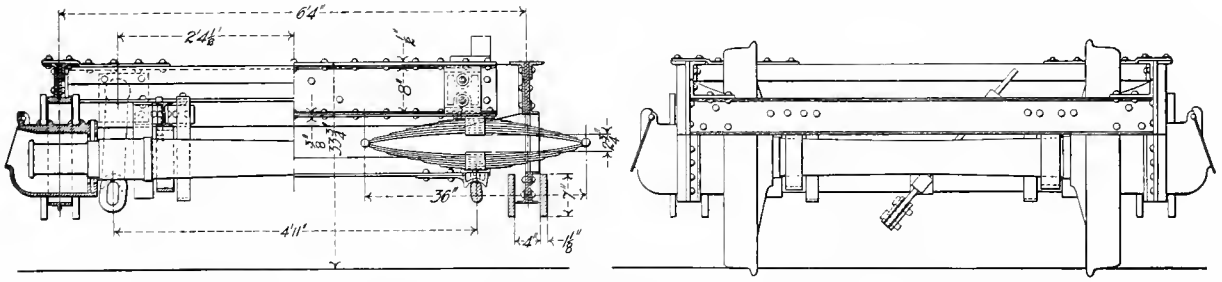


Fig. 4735. Four-Wheel Passenger Truck with Cast Steel Center Truck Frame. Commonwealth Steel Co.

(Details of center frame shown in Figs. 5061-5065.)



Figs. 4736-4737. Plan and Side Elevation of Four-Wheel Steel Passenger Truck.



Figs. 4738-4739. End Elevation and Cross-Section of Four-Wheel Steel Passenger Truck.

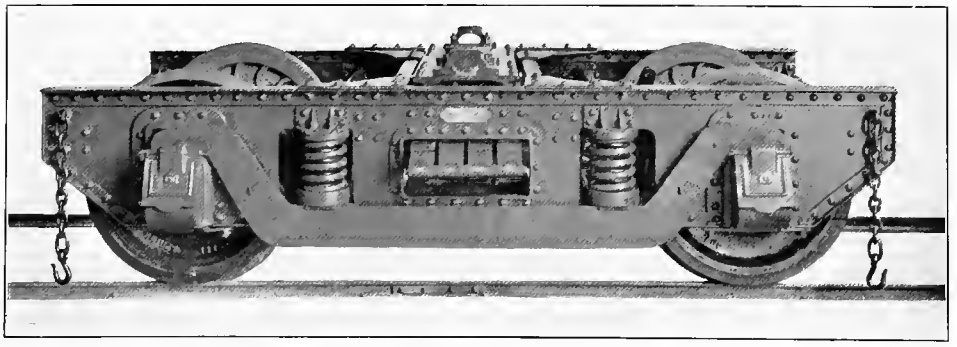
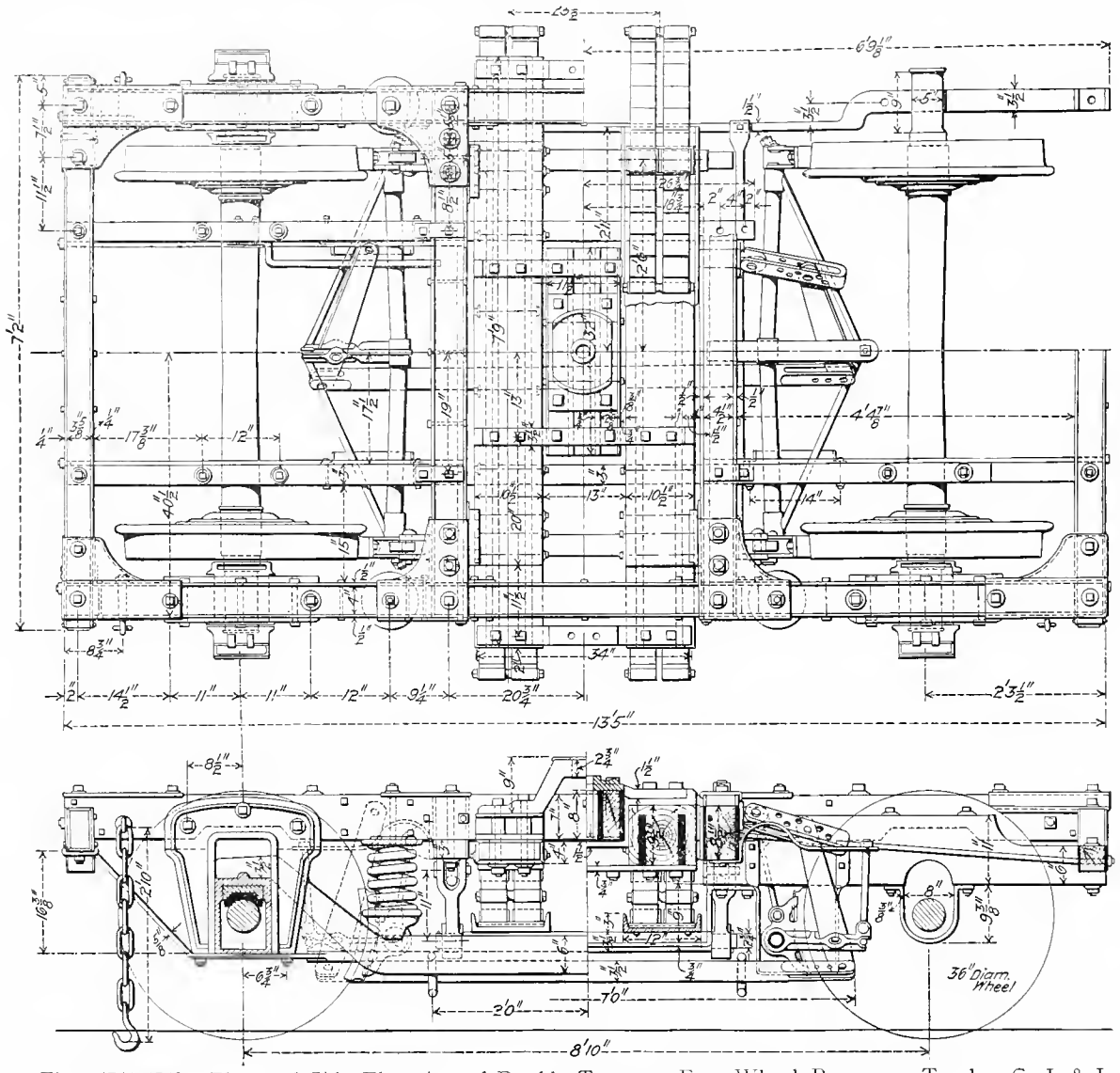


Fig. 4740. Four-Wheel Steel Passenger Truck.
Barney & Smith Car Co.



Figs. 4741-4742. Plan and Side Elevation of Double Transom Four-Wheel Passenger Truck. C., I. & L.

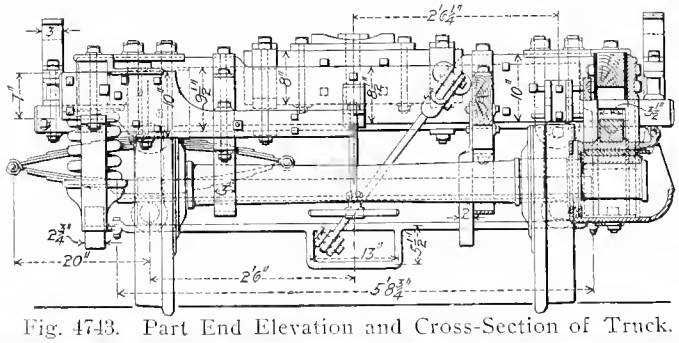


Fig. 4743. Part End Elevation and Cross-Section of Truck.

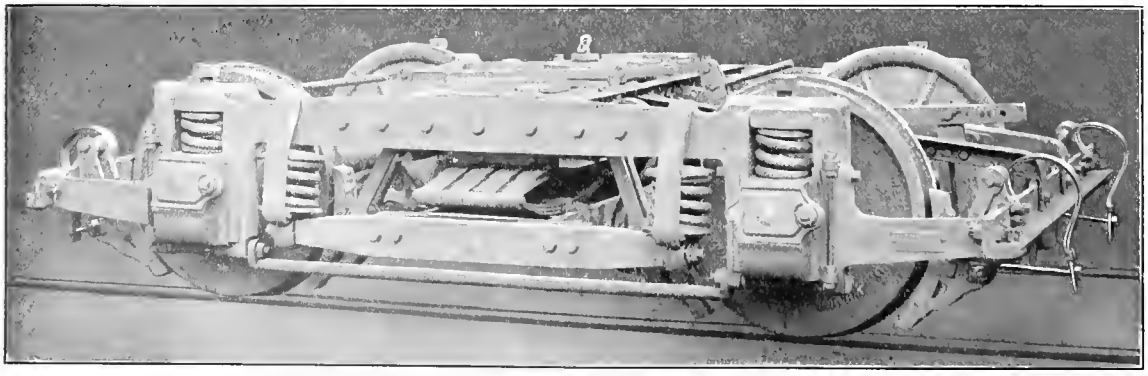


Fig. 4744. Four-Wheel Steel Passenger Truck, No. 27-E 3. J. G. Brill Co.

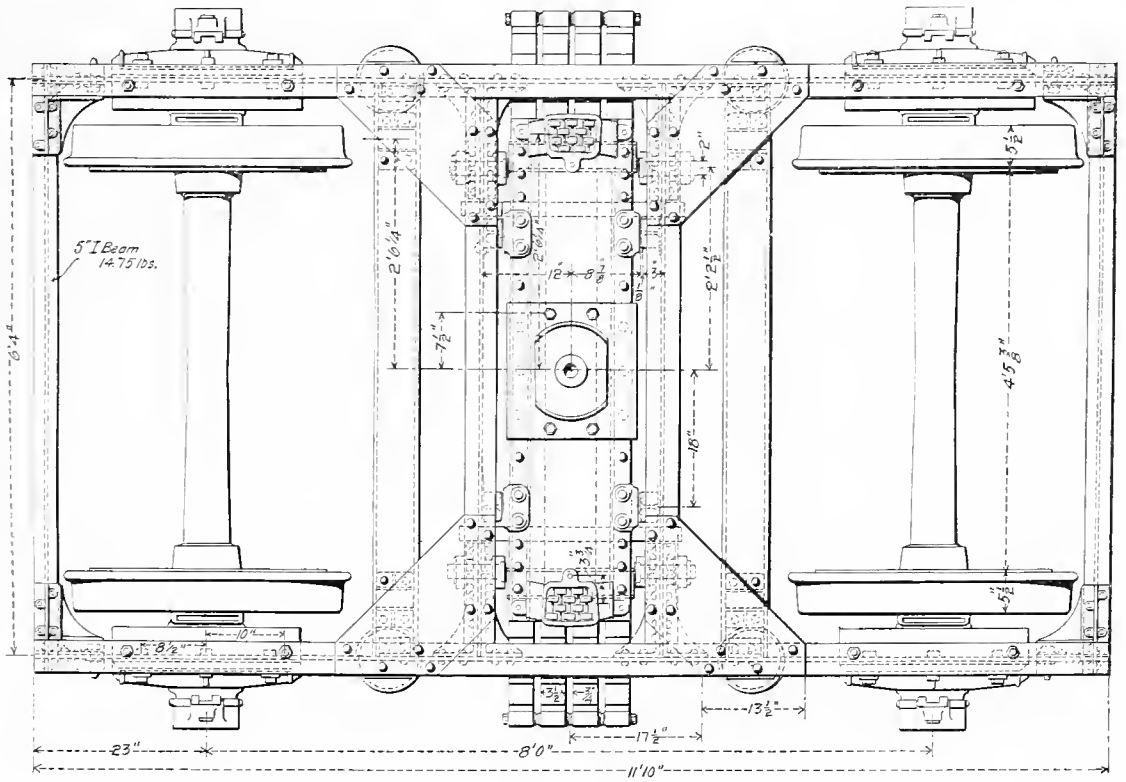


Fig. 4745. Plan.

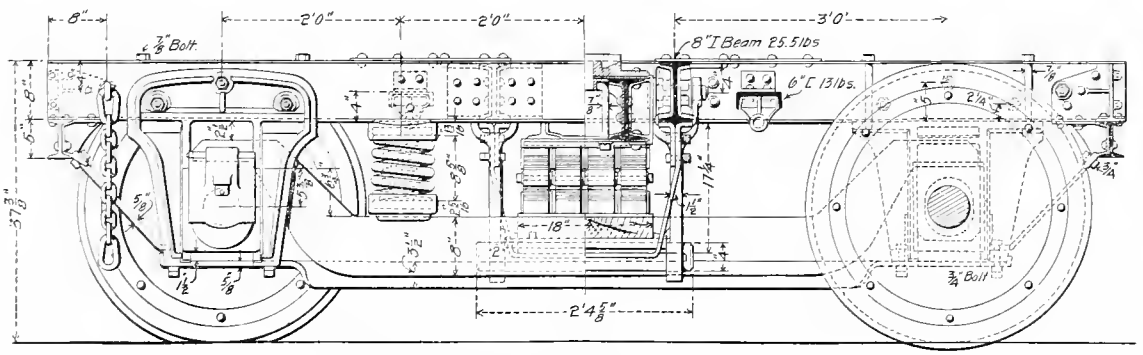


Fig. 4746. Part Side Elevation and Section.

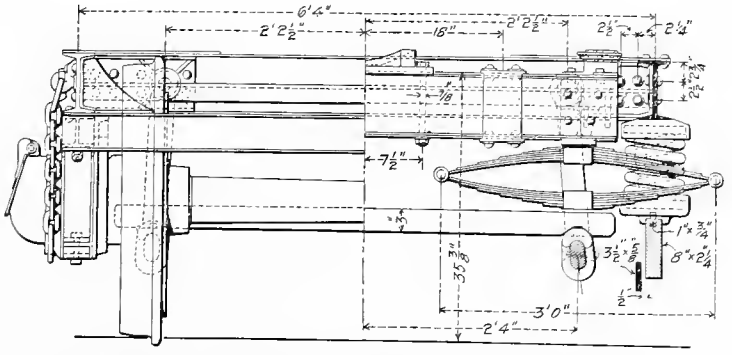


Fig. 4747. Part End Elevation and Cross-Section.
All-Metal Four-Wheel Passenger Truck. L. S. & M. S.

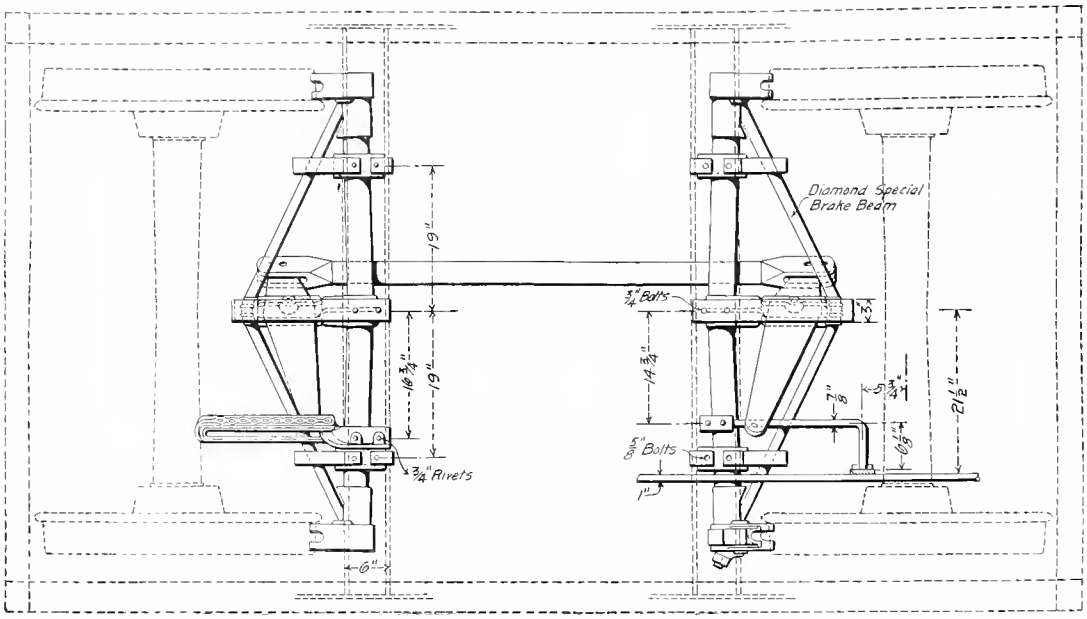


Fig. 4748. Plan.

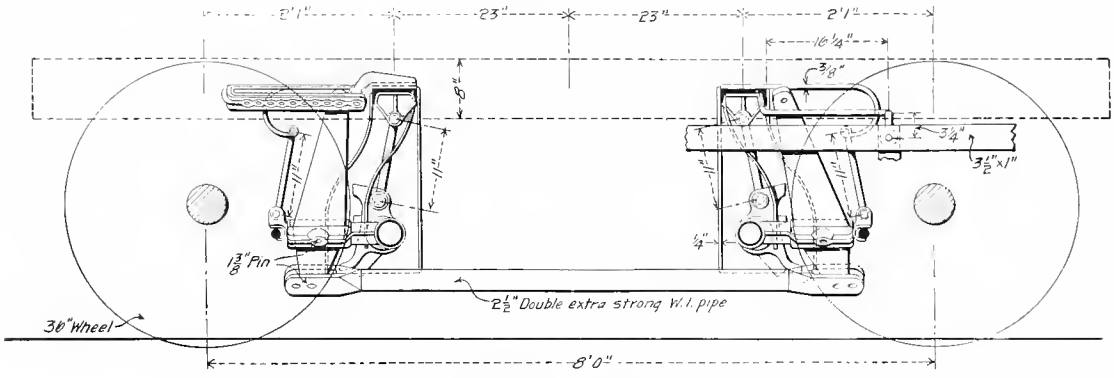


Fig. 4749. Side Elevation.

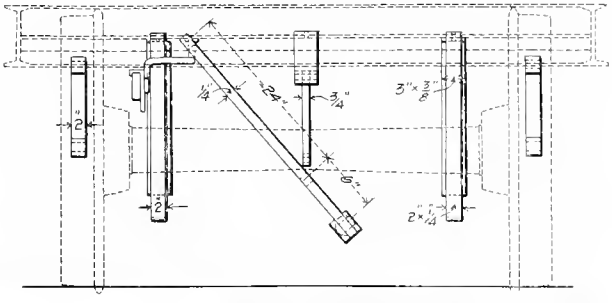


Fig. 4750. End Elevation.

Details of Brake Gear, Four-Wheel Passenger Truck. L. S. & M. S.

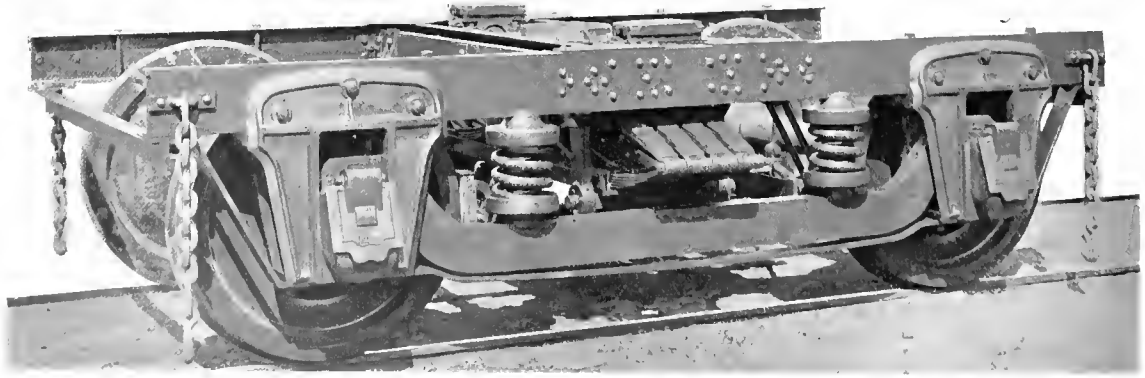


Fig. 4751. Four-Wheel Box Steel Passenger Truck.

Harlan & Hollingsworth.

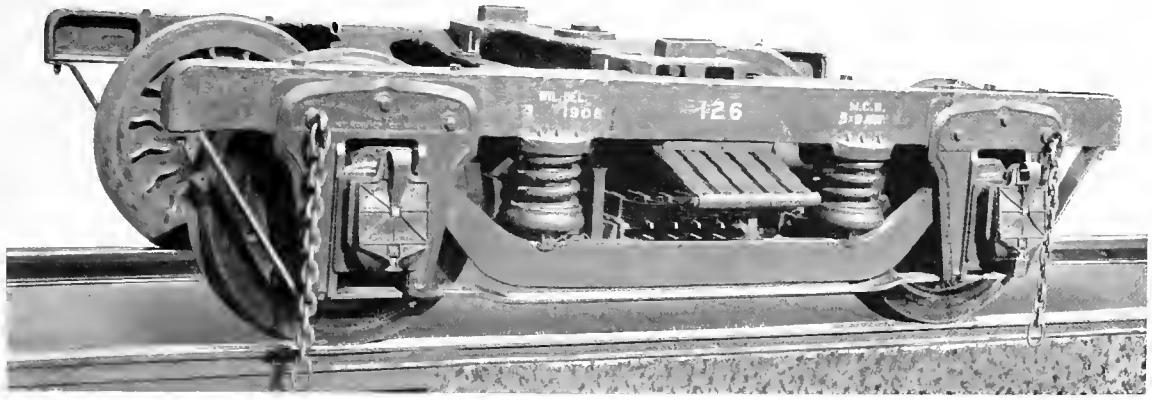


Fig. 4752. Four Wheel Steel Passenger Truck.
Harlan & Hollingsworth.

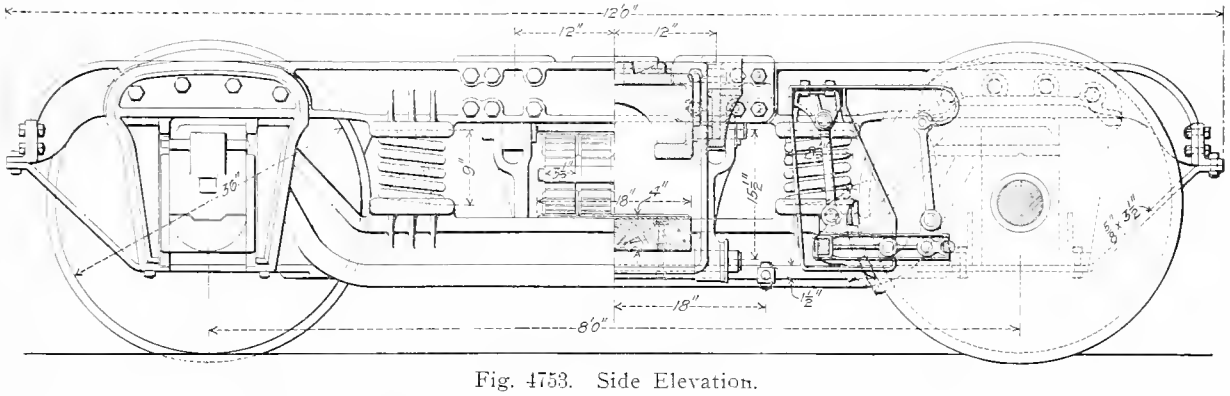


Fig. 4753. Side Elevation.

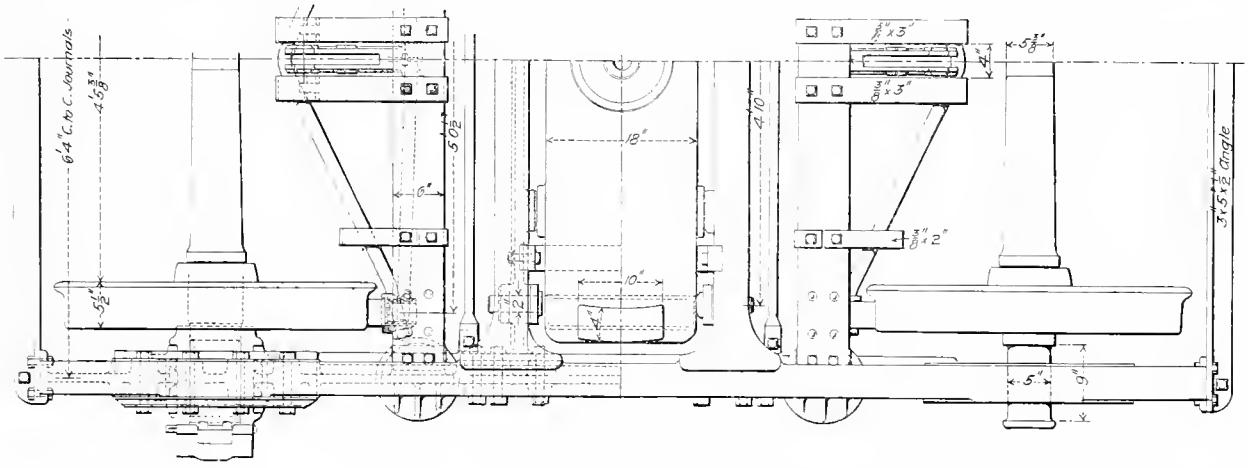


Fig. 4754. Half Plan.

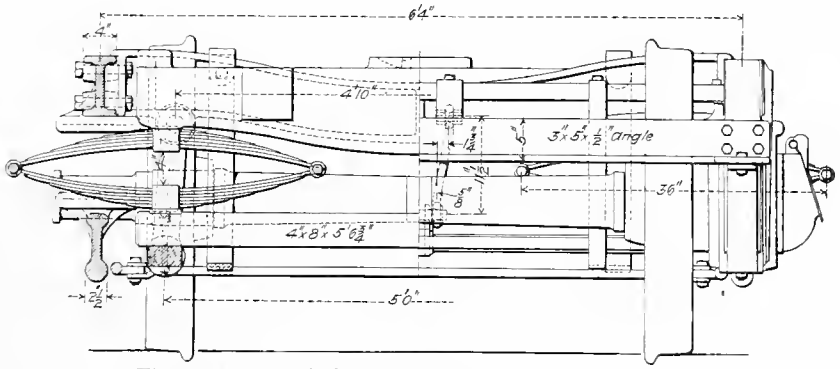
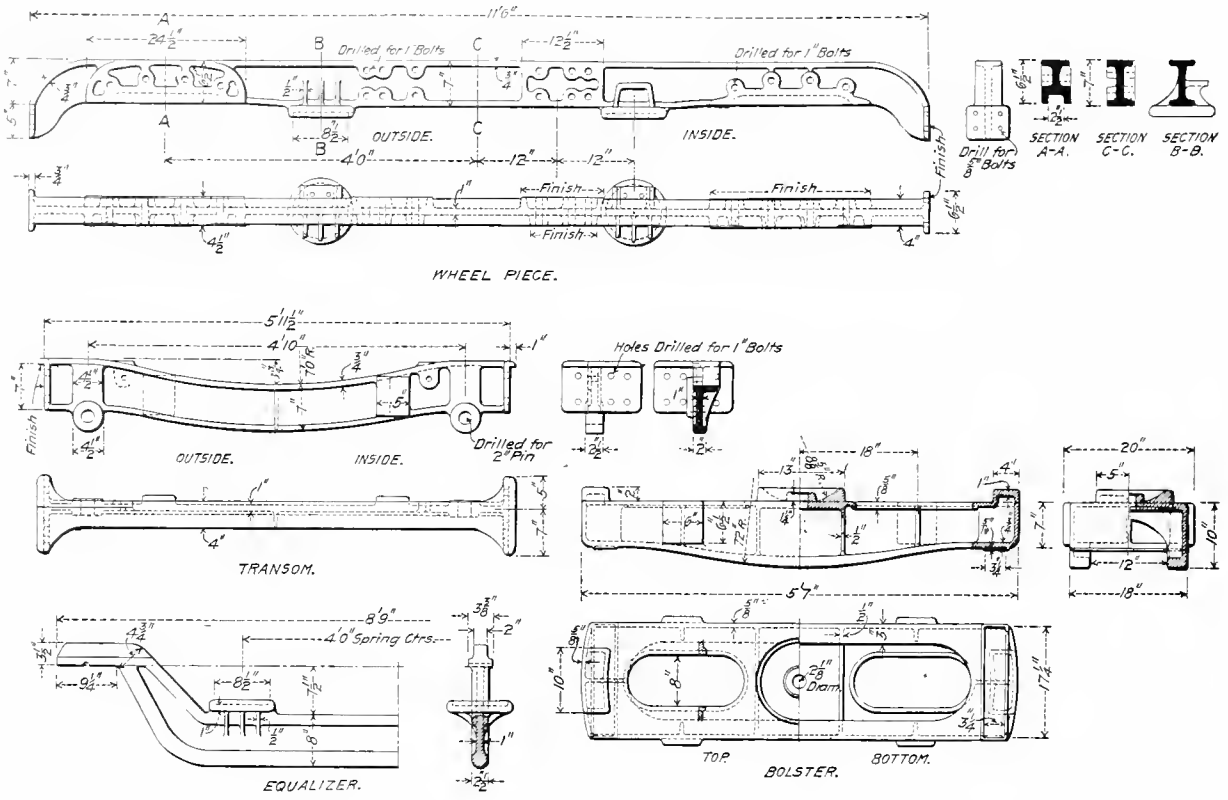
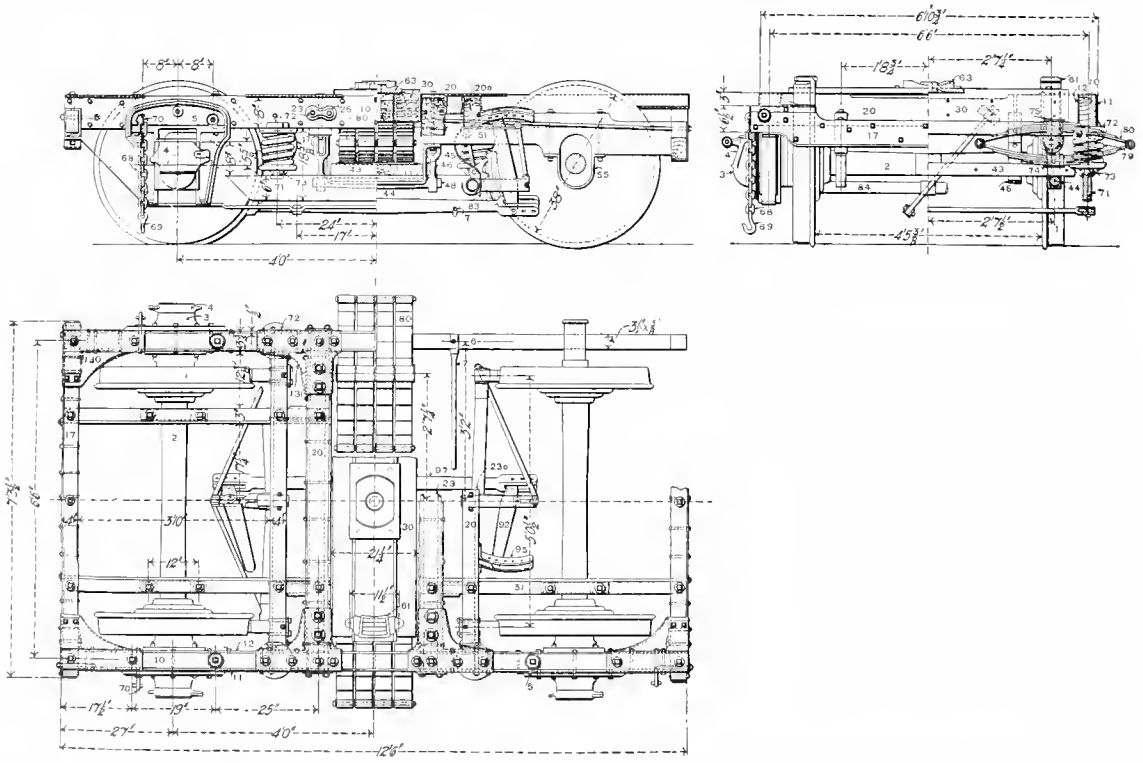


Fig. 4755. Half End Elevation and Cross-Section.
Cast Steel Four-Wheel Passenger Truck. C., C., C. & St. L.



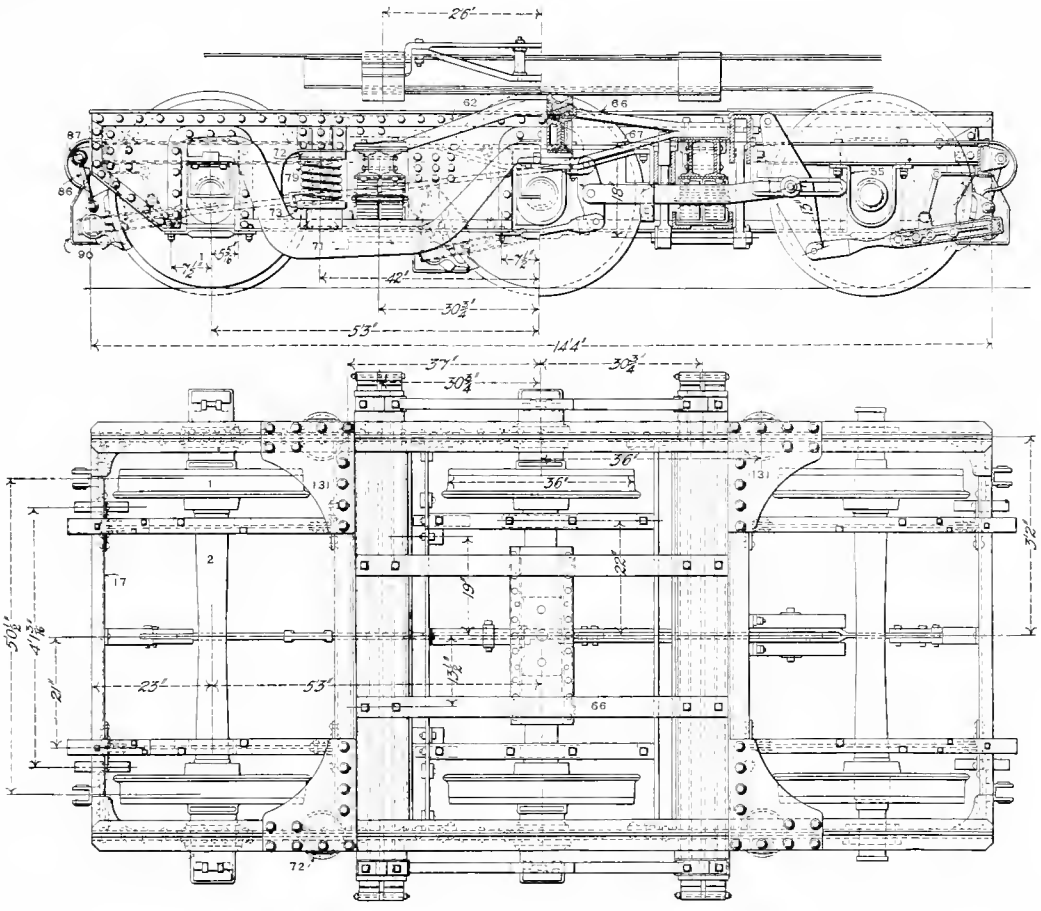
Figs. 4756-4770. Details of Cast Steel Four-Wheel Passenger Truck. C., C., C. & St. L.

Numbers Refer to List of Names of Parts with Figs. 4724-4726.

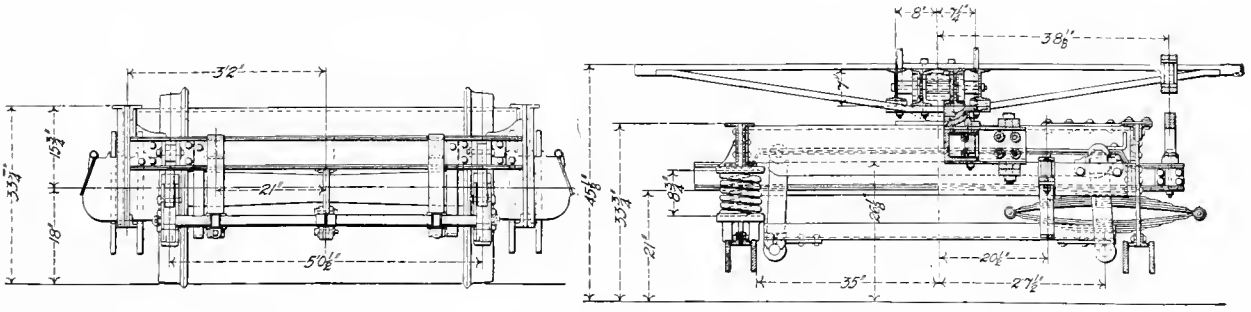


Figs. 4771-4773. Plan, Side and End Elevations of Pullman Standard Four-Wheel Passenger Truck, No. 104. Pullman Co.

Numbers Refer to List of Names of Parts with Figs. 4724-4726.



Figs. 4774-4775. Plan and Side Elevation of Six-Wheel Steel Passenger Truck.



Figs. 4776-4778. End Elevation and Cross-Section of Six-Wheel Steel Passenger Truck.
Barney & Smith Car Co.

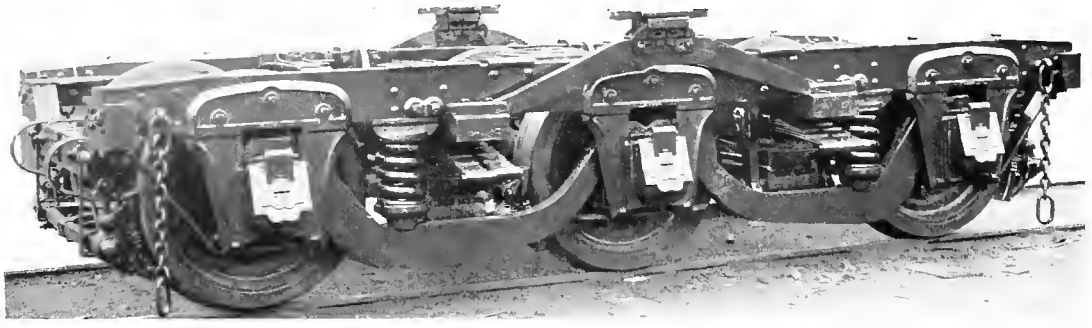
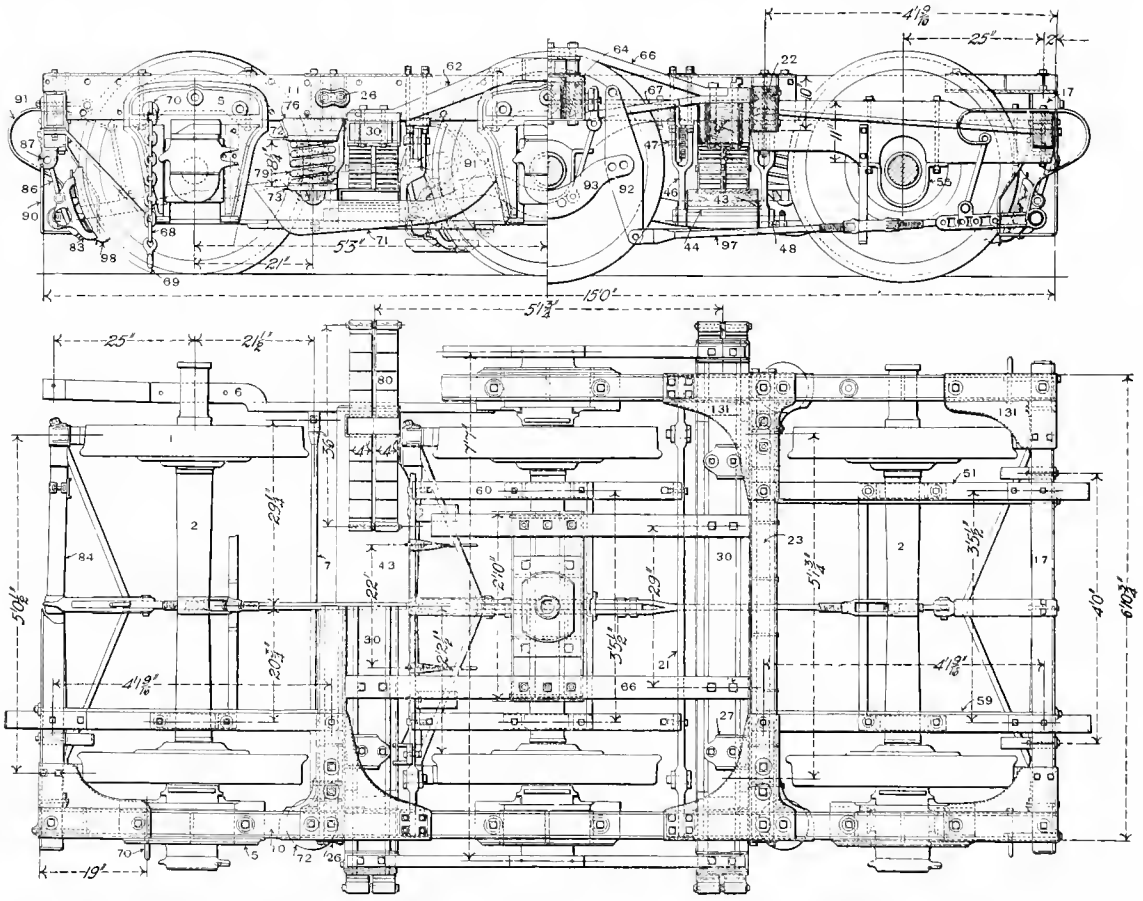
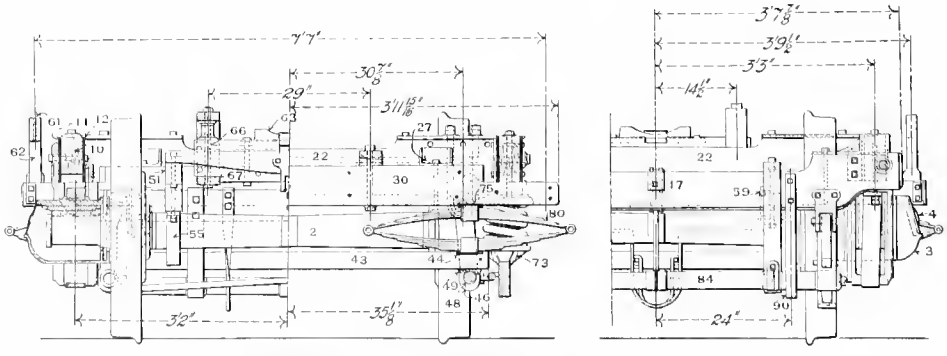


Fig. 4779. Six-Wheel Truck. Harlan & Hollingsworth

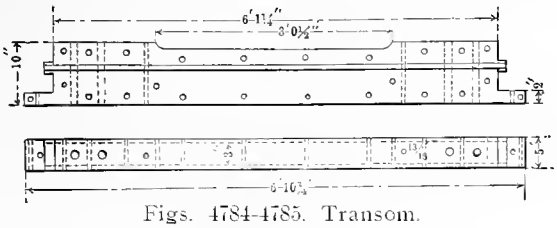
Numbers Refer to List of Names of Parts with Figs. 4724-4726.



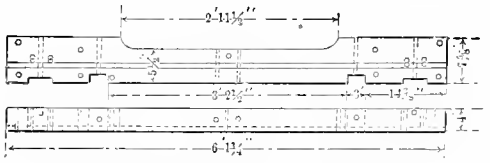
Figs. 4780-4781. Plan and Side Elevation of Pullman Standard Six-Wheel Passenger Truck, No. 106. Pullman Co.



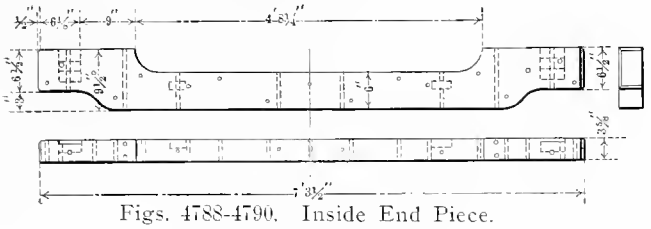
Figs. 1782-1783. Cross-Section and Half End Elevation.



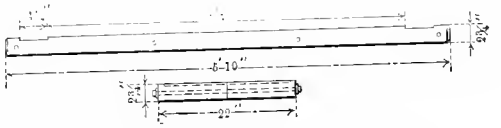
Figs. 4784-4785. Transom.



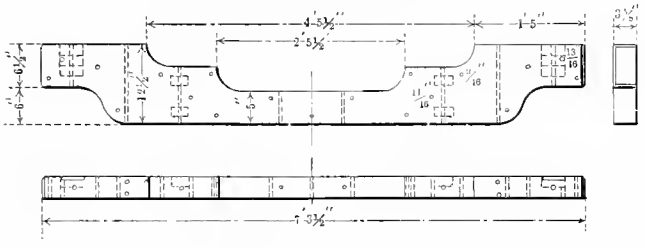
Figs. 4786-4787. Extra Transom.



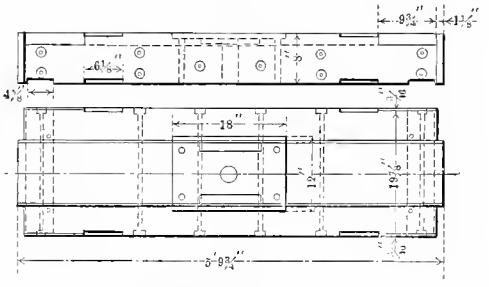
Figs. 4788-4790. Inside End Piece.



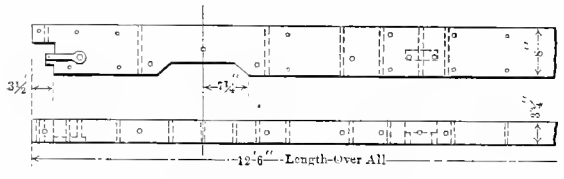
Figs. 4791-4792. Spring Plank.



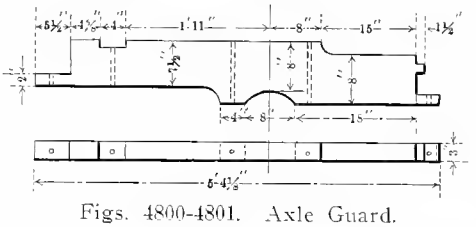
Figs. 4793-4795. Outside End Piece.



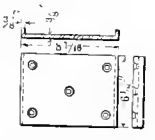
Figs. 4796-4797. Bolster.



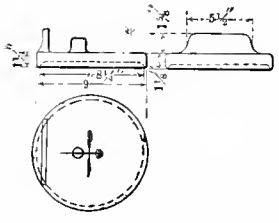
Figs. 4798-4799. Wheel Piece.



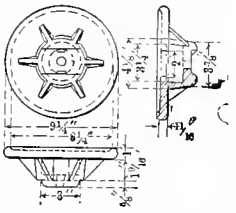
Figs. 4800-4801. Axle Guard.



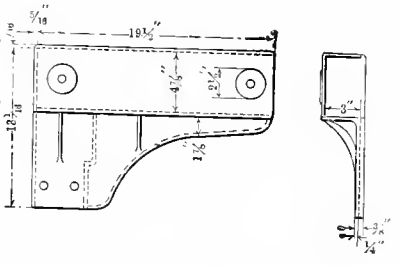
Figs. 4810-4812. Friction Plate.



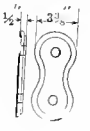
Figs. 4802-4804. Equalizer Spring Cap.



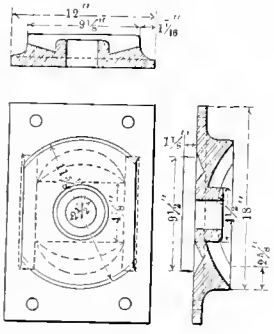
Figs. 4805-4807. Equalizer Spring Seat.



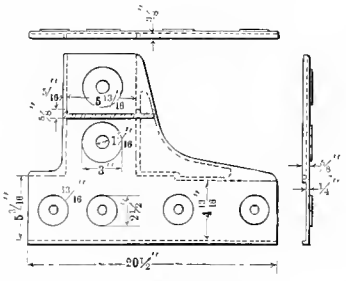
Figs. 4808-4809. End Sill Corner Plate.



Figs. 4813-4814. Transom Tie Rod Washer.



Figs. 4815-4816. Center Plate.



Figs. 4817-4819. Transom Corner Plate.

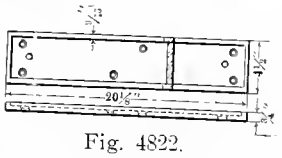
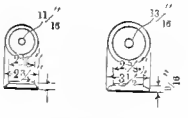
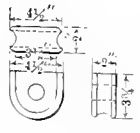


Fig. 4822. Elliptic Spring Cap and Seat.

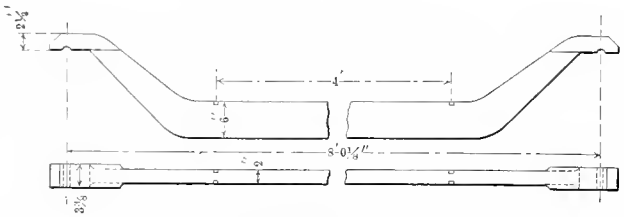


Figs. 4820-4821. Washers.

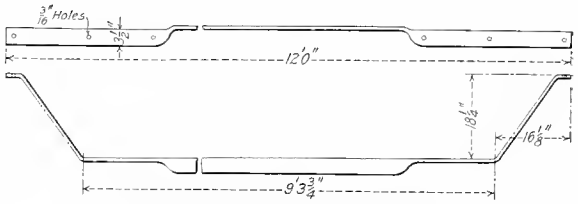


Figs. 4823-4824. U-Bolt Casting.

Cast Iron and Wooden Details of Pullman Standard Four-Wheel Passenger Truck, No. 104.



Figs. 4825-4826. Equalizer.



Figs. 4827-4828. Pedestal Strap.

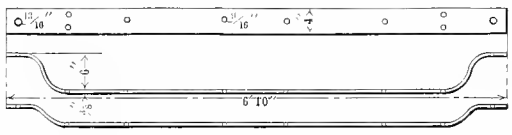
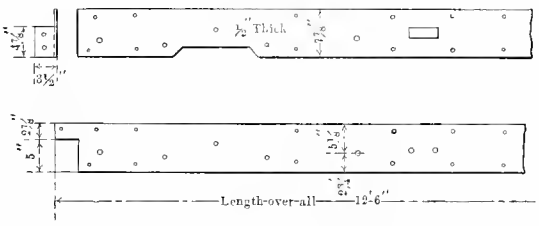
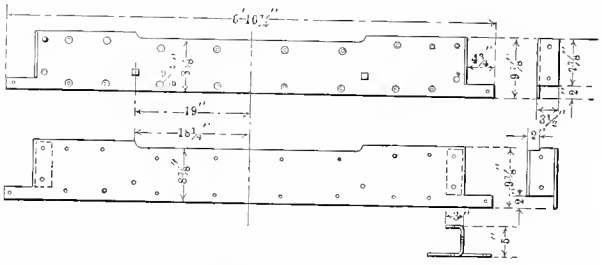


Fig. 4829. End Piece Bottom Plates.



Figs. 4830-4832. Inside and Outside Wheel Piece Plates.



Figs. 4833-4836. Transom Plates.

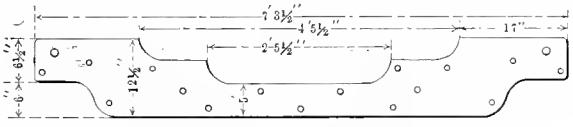


Fig. 4837. End Piece Plate.

Figs. 4838-4839. Transom Tie Rods.

Fig. 4840. Eye Bolt.

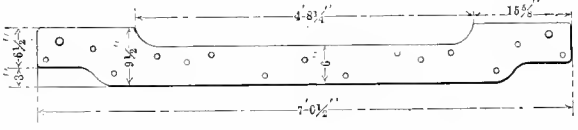
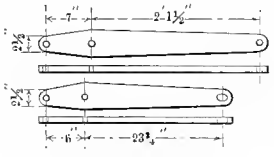


Fig. 4841. End Piece Plate.



Figs. 4842-4845. Brake Levers.

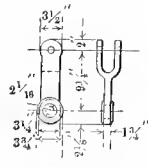
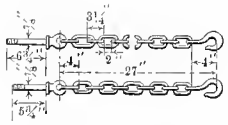
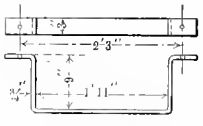


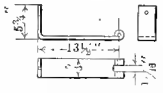
Fig. 4846. Bolster Hanger.



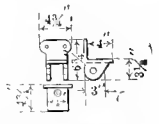
Figs. 4847-4848. Safety Chains.



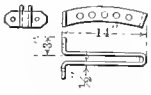
Figs. 4849-4850. Spring Plank Safety Hanger.



Figs. 4851-4853. Balance Spring.

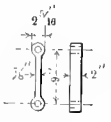


Figs. 4854-4855. Brake Hanger Carrier.



Figs. 4856-4858. Dead Lever Guide.

Fig. 4859. Balance Hanger.



Figs. 4860-4861. Brake Hanger.

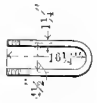


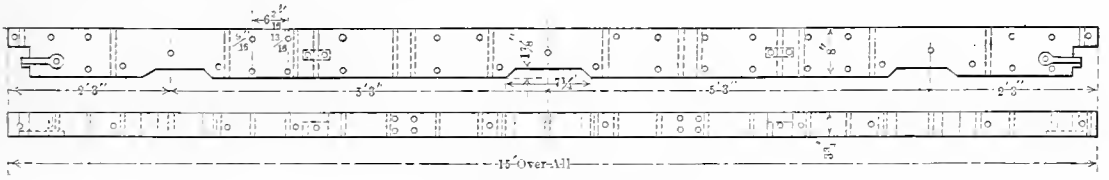
Fig. 4862. U-Bolt.

Fig. 4863. U-Bolt.

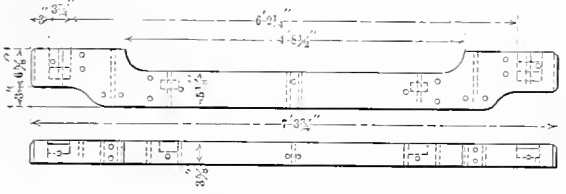
Fig. 4864. Brake Hanger Pin.

Fig. 4865. Bolster Hanger Pin.

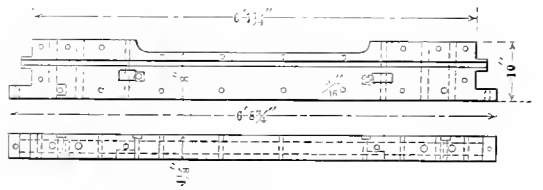
Wrought Iron Details of Pullman Standard Four-Wheel Passenger Truck, No. 104.



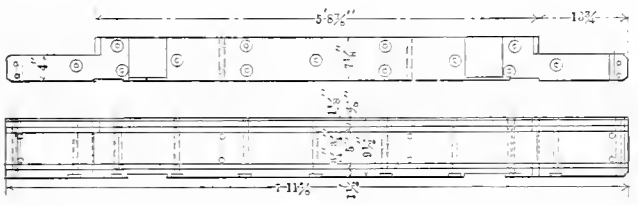
Figs. 4866-4867. Wheel Piece.



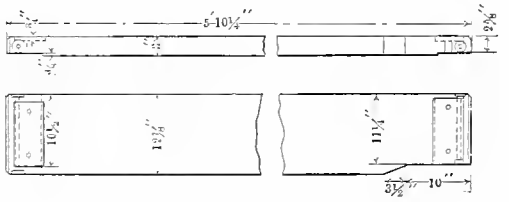
Figs. 4868-4869. End Piece.



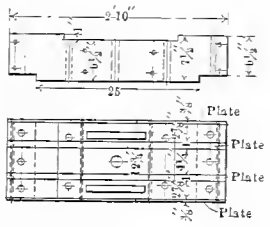
Figs. 4870-4871. Transom.



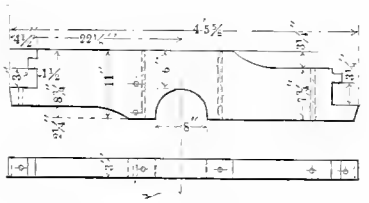
Figs. 4872-4873. Bolster.



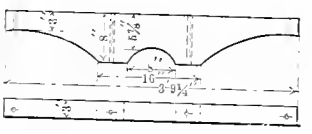
Figs. 4874-4875. Spring Plank.



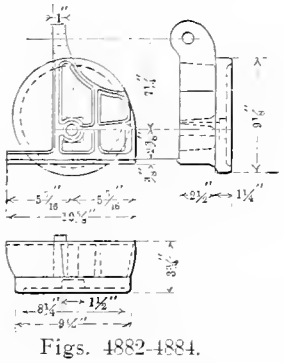
Figs. 4876-4877. Center Block.



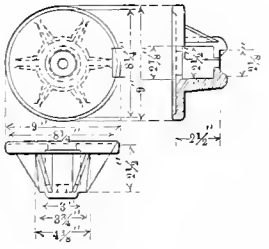
Figs. 4878-4879. End Axle Guard.



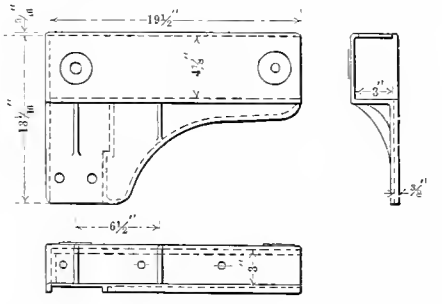
Figs. 4880-4881. Center Axle Guard.



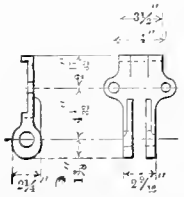
Figs. 4882-4884. Equalizer Spring Cap.



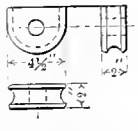
Figs. 4885-4887. Equalizer Spring Seat.



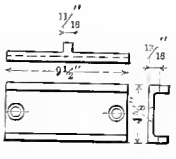
Figs. 4888-4890. End Piece Corner Plate.



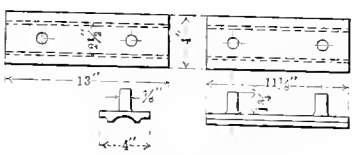
Figs. 4891-4892. Fulcrum Hanger Carrier.



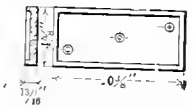
Figs. 4893-4895. Bolster Hanger Carrier.



Figs. 4896-4898. Elliptic Spring Cap.

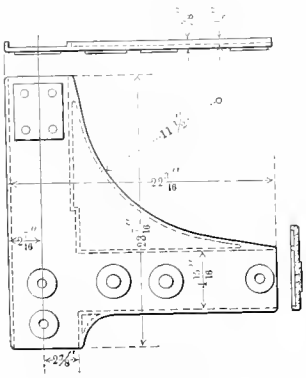


Figs. 4899-4902. Bolster Hanger Axle Plates.

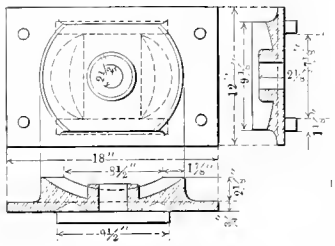


Figs. 4903-4904. Elliptic Spring Seat.

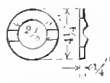
Wooden and Cast Iron Details of Pullman Standard Six-Wheel Passenger Truck, No. 106.



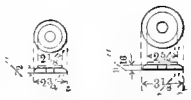
Figs. 4905-4907.
Transom Corner Plate.



Figs. 4908-4910.
Center Plate.



Figs. 4911-4912.
Bolster Hanger
Axle Washer.



Figs. 4913-4914.
Washers.

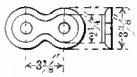
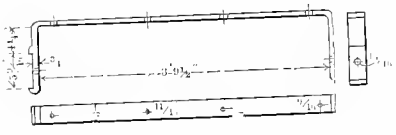
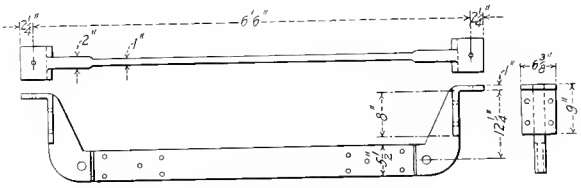


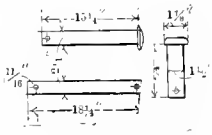
Fig. 4915.
Transom Truss
Washer.



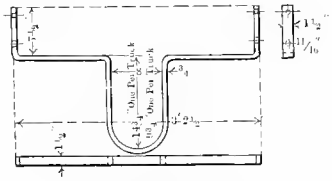
Figs. 4916-4918.
Axle Guard Truss.



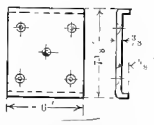
Figs. 4919-4921.
Middle Transom.



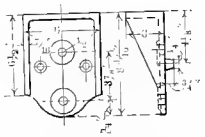
Figs. 4922-4924.
Bolster Hanger
Axles and Pin.



Figs. 4925-4927.
Safety Guards for
Brake Connection Rods.



Figs. 4928-4929.
Bolster Chafing
Plate.



Figs. 4930-4931.
Friction Block.

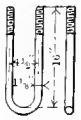


Fig. 4932.
U-Bolt.

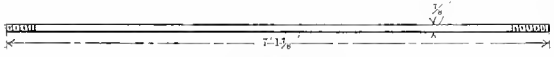


Fig. 4933.
Transom Tie Rod.

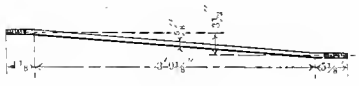


Fig. 4934.
Transom and End Piece
Tie Rod.

Figs.
4935-4936.
Eye Bolt.

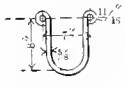
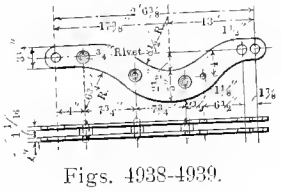
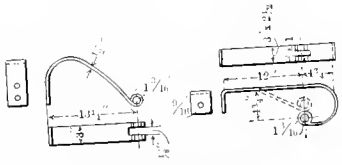


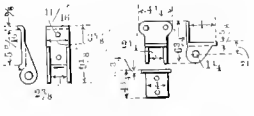
Fig. 4937.
Safety
Guard.



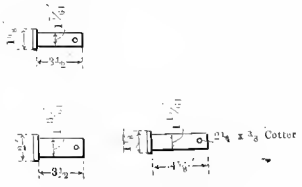
Figs. 4938-4939.
Lever Fulcrum.



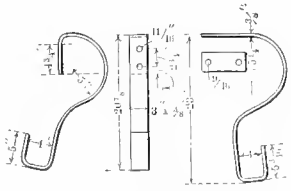
Figs. 4940-4945.
Balance Springs.



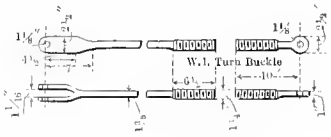
Figs. 4946-4950.
Brake Hanger
Carriers.



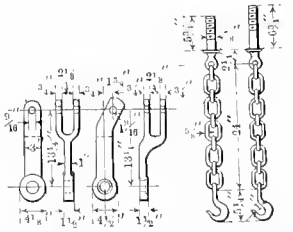
Figs. 4951-4953.
Brake Connection.
Pins.



Figs. 4954-4956.
Release Springs.

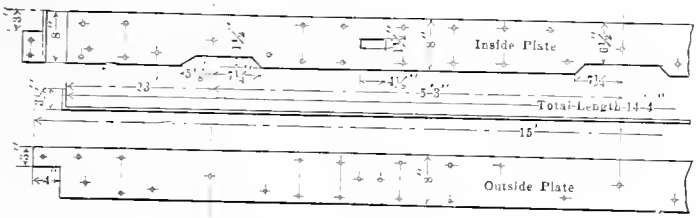


Figs. 4957-4958.
Brake Connection Rods.

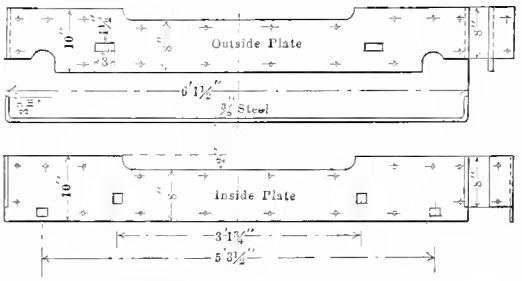


Figs. 4958-4961. Figs. 4962-4963.
Bolster Hangers. Safety Chains.

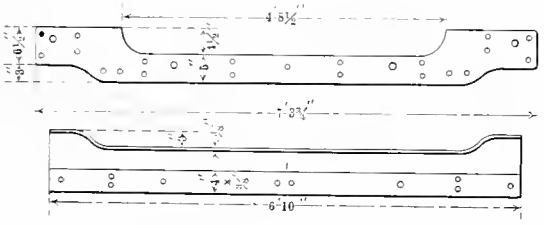
Cast and Wrought Iron Details of Pullman Standard Six-Wheel Passenger Truck, No. 106.



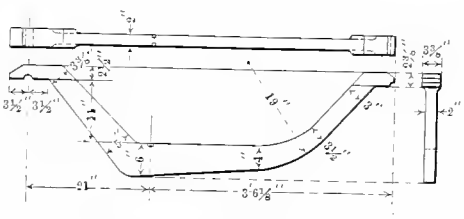
Figs. 4964-4966. Wheel Piece Plates.



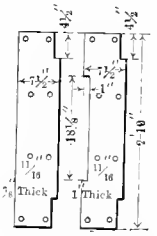
Figs. 4967-4969. Transom Plates.



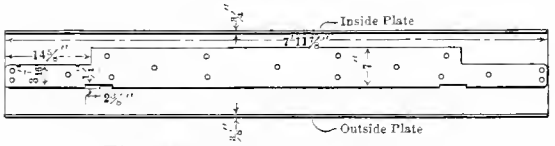
Figs. 4970-4971. End Piece Plates.



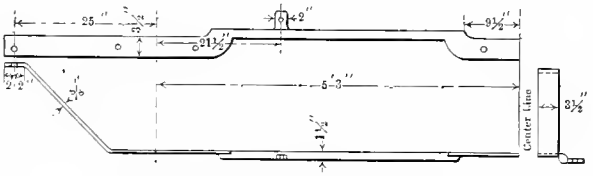
Figs. 4972-4974. Equalizer.



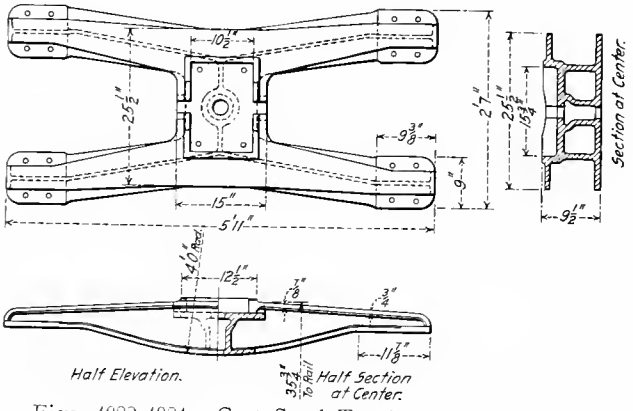
Figs. 4975-4976. Center Block Plates.



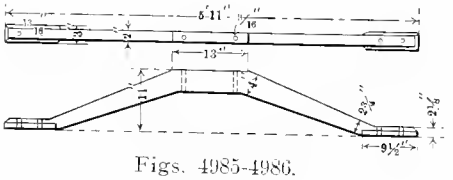
Figs. 4977-4978. Bolster Plates.



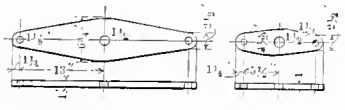
Figs. 4979-4981. Pedestal Strap.



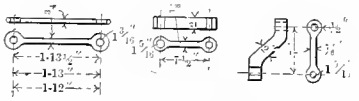
Figs. 4982-4984. Cast Steel Truck Center Bolster.



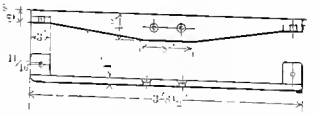
Figs. 4985-4986. Side Bearing Arch.



Figs. 4987-4989. Brake Levers.

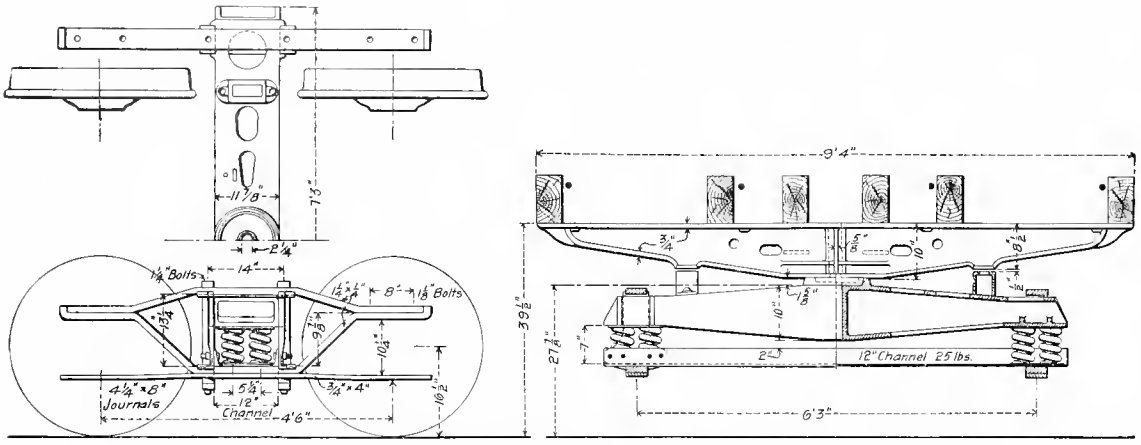


Figs. 4990-4992. Brake Beam Hangers.

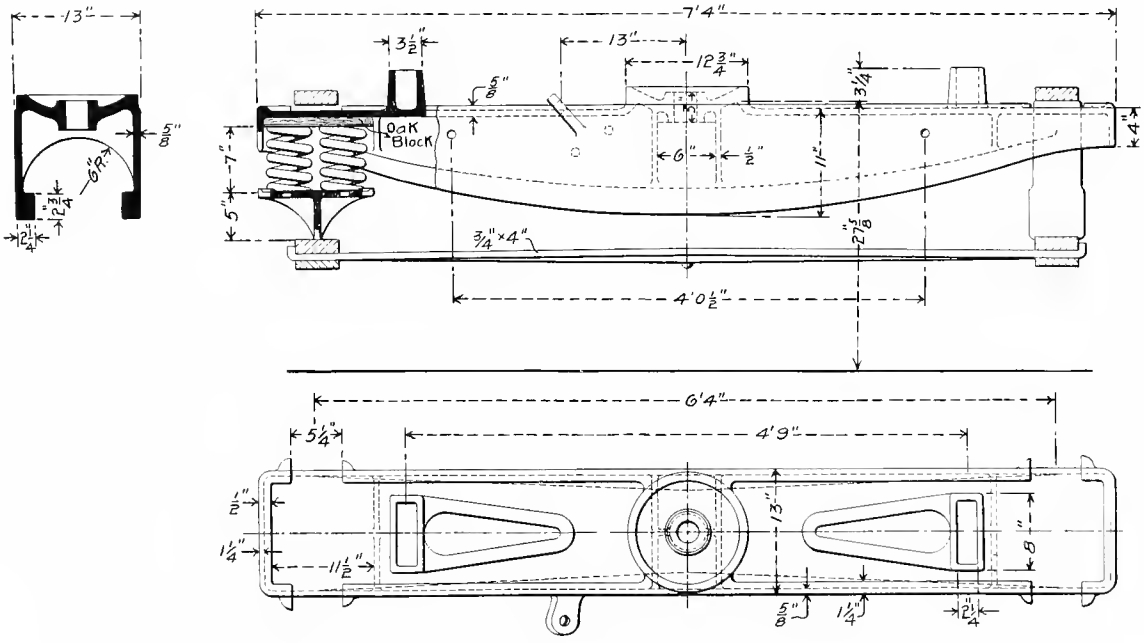


Figs. 4993-4994. Fulcrum Hanger Carrier Beam.

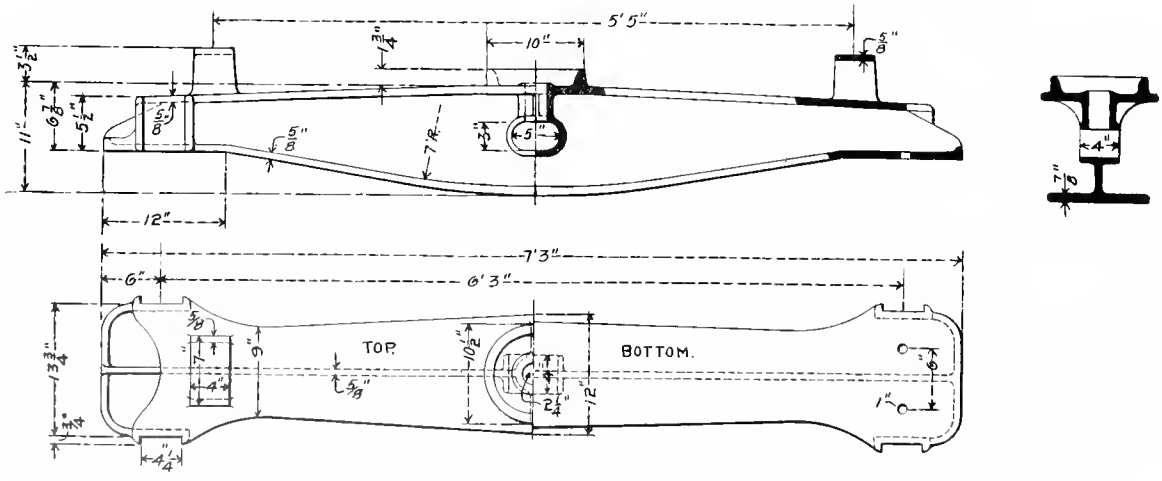
Wrought Iron Details of Pullman Standard Six-Wheel Passenger Truck, No. 106.



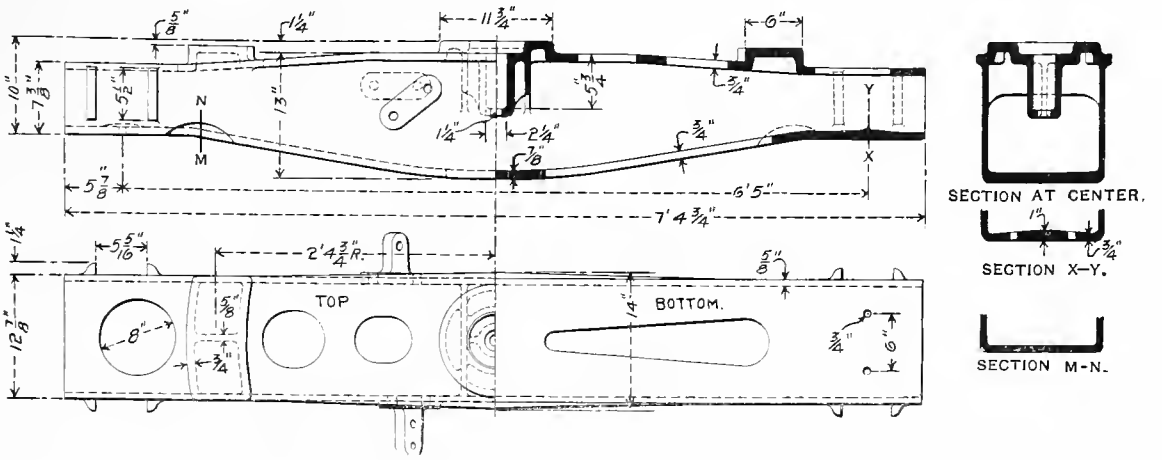
Figs. 4995-4997. Cast Steel Body and Truck Bolsters. American Steel Foundries.



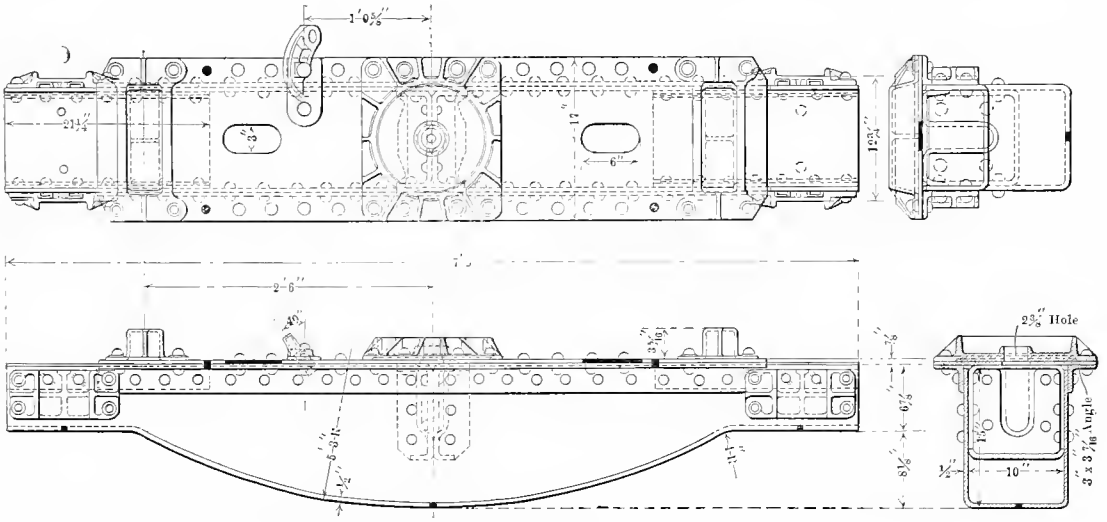
Figs. 4998-5000. Cast Steel Truck Bolster. American Steel Foundries.



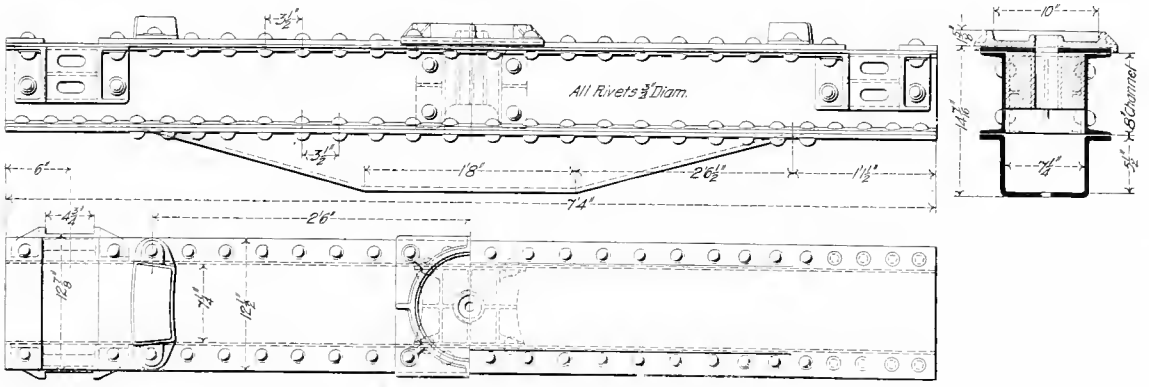
Figs. 5001-5003. Cast Steel Truck Bolster. American Steel Foundries.



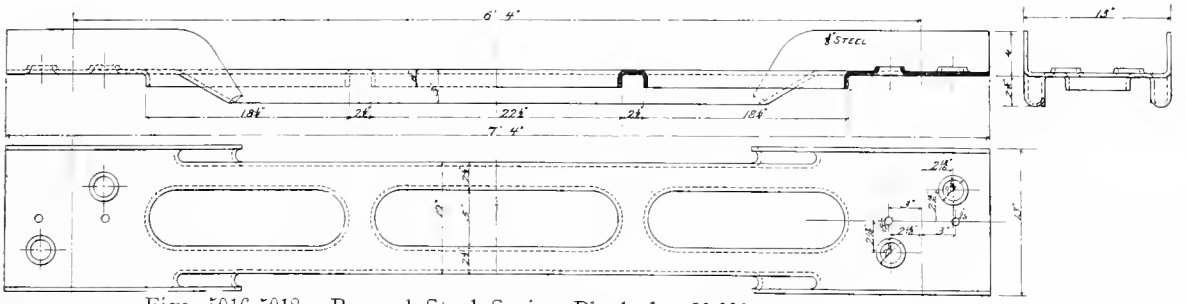
Figs. 5004-5008. Cast Steel Truck Bolster. American Steel Foundries.



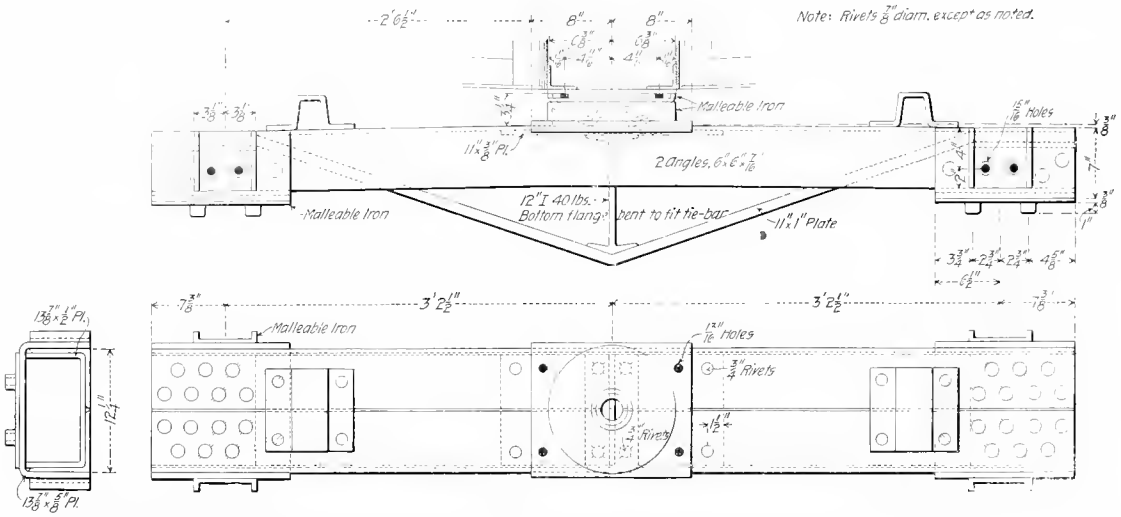
Figs. 5009-5012. Pressed Steel Truck Bolster for 100,000 lbs. Capacity Car.
Standard Steel Car Co.



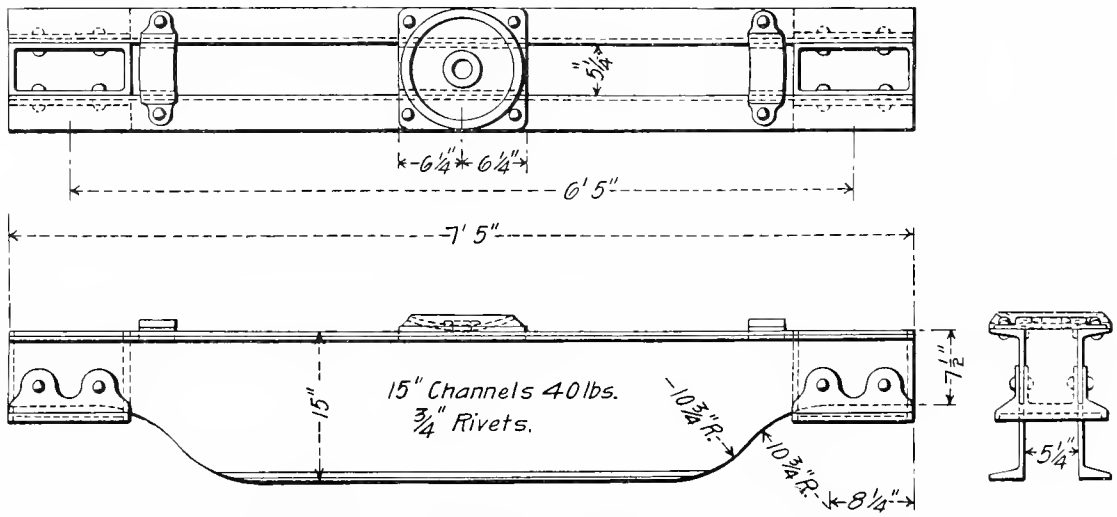
Figs. 5013-5015. Monitor Truck Bolster for 80,000 lbs. Capacity Car.
Chicago Railway Equipment Co.



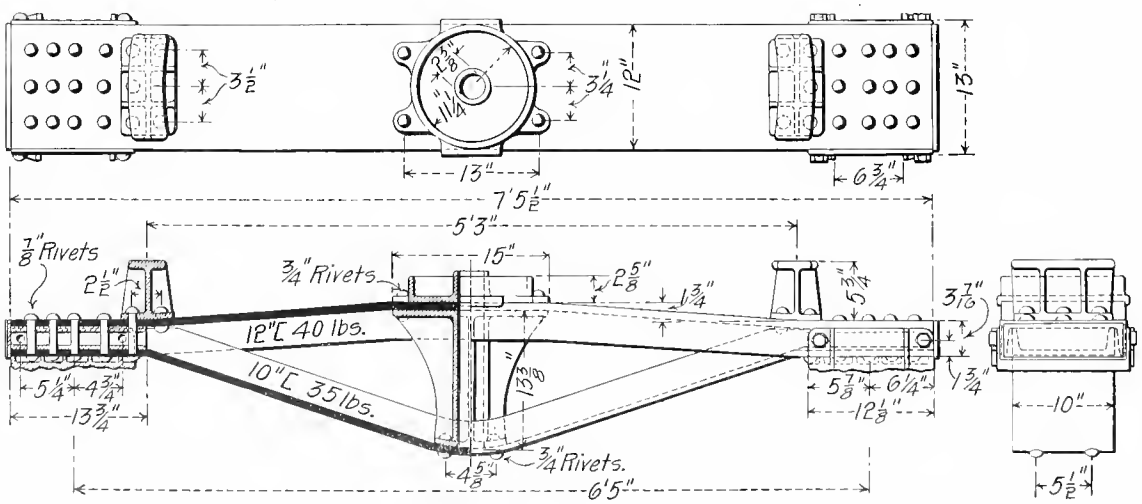
Figs. 5016-5018. Pressed Steel Spring Plank for 80,000 lbs. Capacity Car Truck.
Cleveland Car Specialty Co.



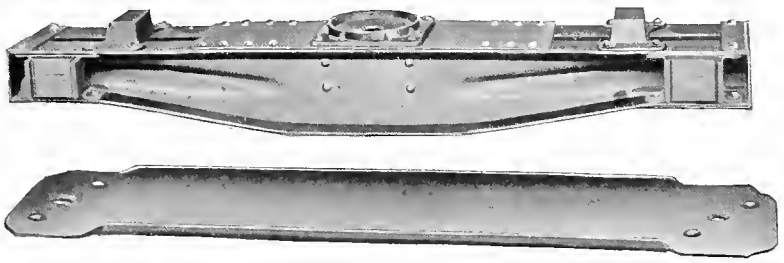
Figs. 5019-5022. 100,000 lbs. Capacity Diamond Arch Bar Truck Bolster. Cambria Steel Co.



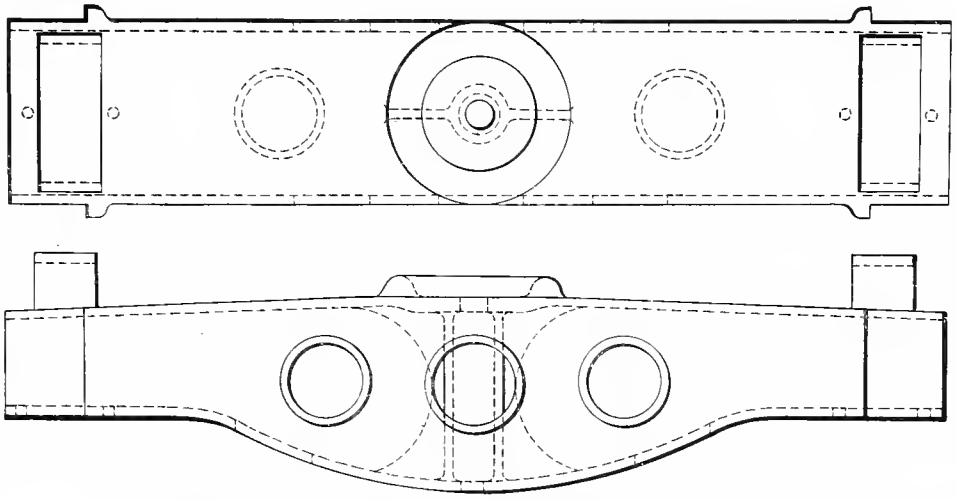
Figs. 5023-5025. Twin Channel Truck Bolster. Vanderbilt Patent.



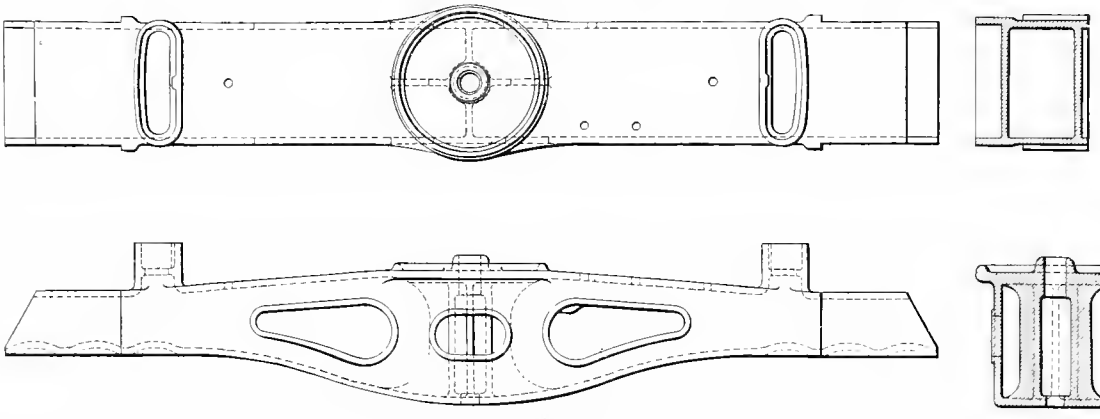
Figs. 5026-5029. Trussed Channel Truck Bolster. Vanderbilt Patent.



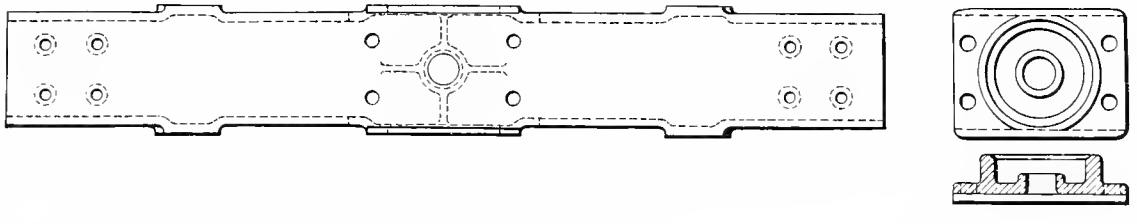
Figs. 5030-5031. Truck Bolster and Spring Plank.
Bettendorf Axle Co.

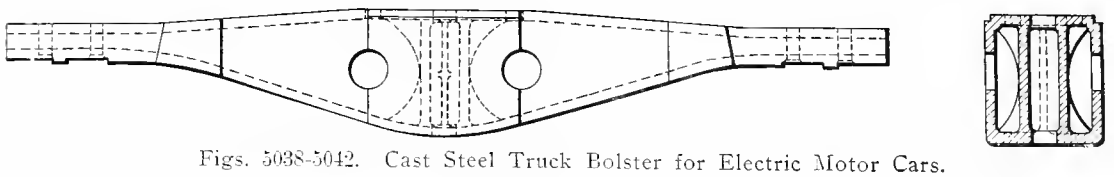


Figs. 5032-5033. Cast Steel Truck Bolster for 100,000 lbs. Capacity Cars.



Figs. 5034-5037. Cast Steel Truck Bolster for 100,000 lbs. Capacity Cars.





Figs. 5038-5042. Cast Steel Truck Bolster for Electric Motor Cars.
Benjamin Atha & Co.

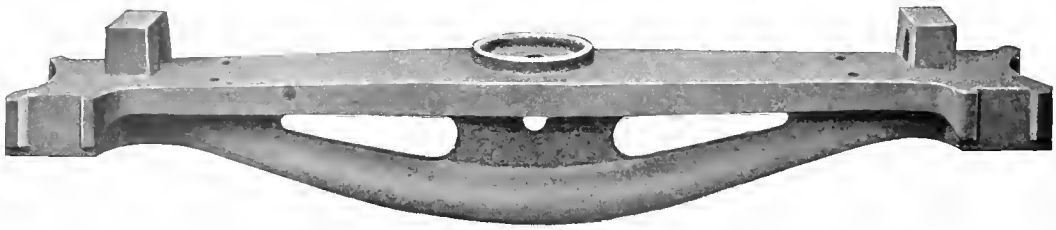


Fig. 5043. I-Shape Cast Steel Truck Bolster. American Steel Foundries.

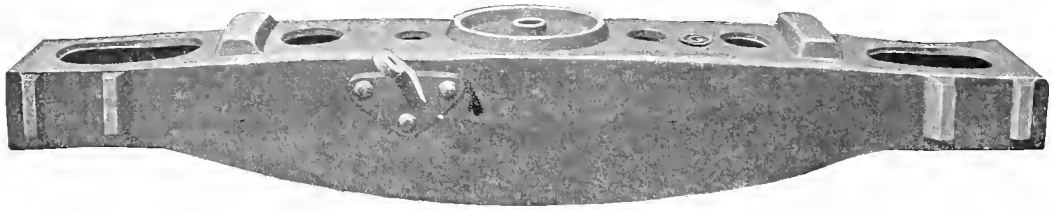


Fig. 5044. Box Shape Cast Steel Truck Bolster. American Steel Foundries.

Fig. 5045. I-Shape Cast Steel Truck Bolster. American Steel Foundries.

Fig. 5046. V-Shape Cast Steel Truck Bolster. American Steel Foundries.

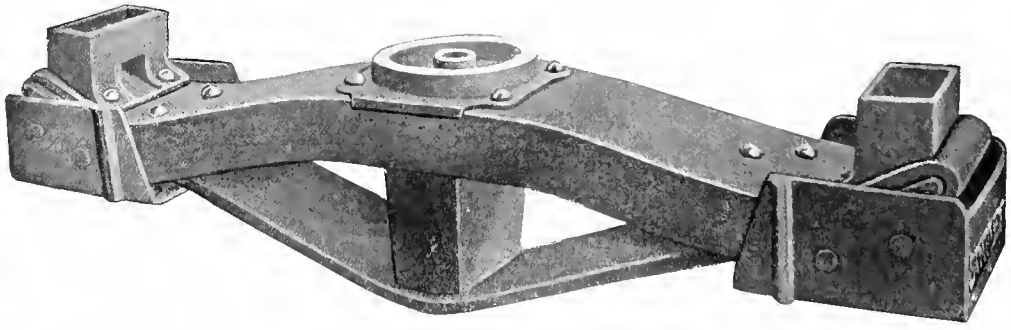


Fig. 5047. Simplex Truck Bolster for Theilson Truck. Simplex Railway Appliance Co.

Fig. 5048. Simplex Truck Bolster for 80,000 lbs. Capacity Car.
Simplex Railway Appliance Co.

Fig. 5049. Gould U-Type Truck Bolster. Gould Coupler Co.

Fig. 5051. Crown Truck Bolster. Gould Coupler Co.

Fig. 5052. Lind Truck Bolster. Pressed Steel Car Co

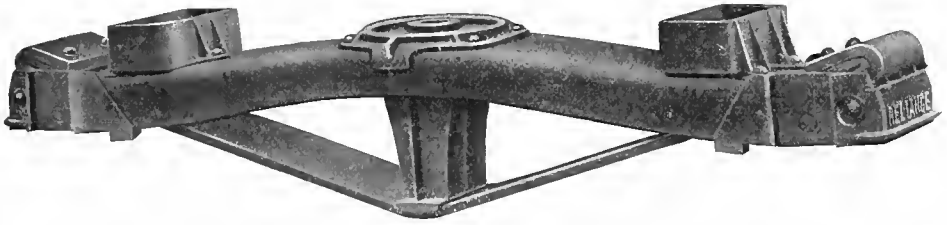


Fig. 5053. Reliance Truck Bolster. Pressed Steel Car Co.

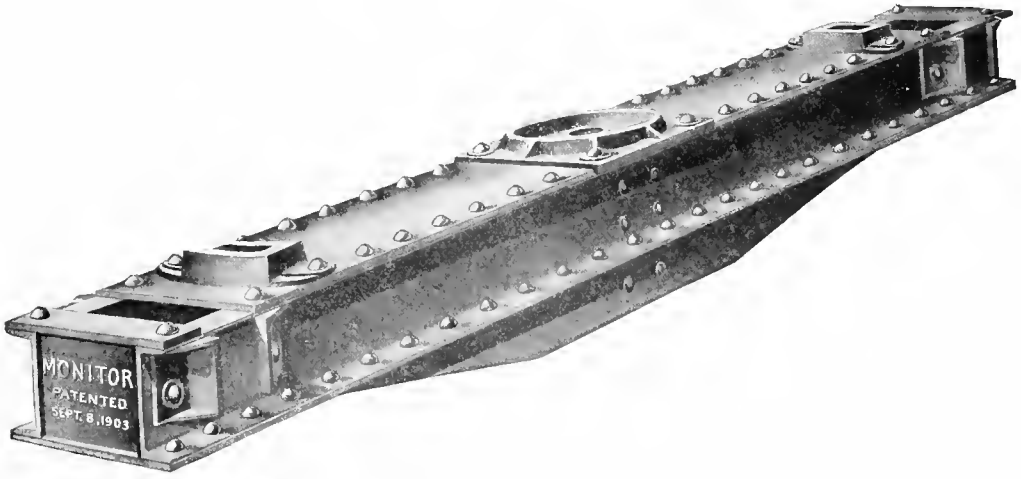
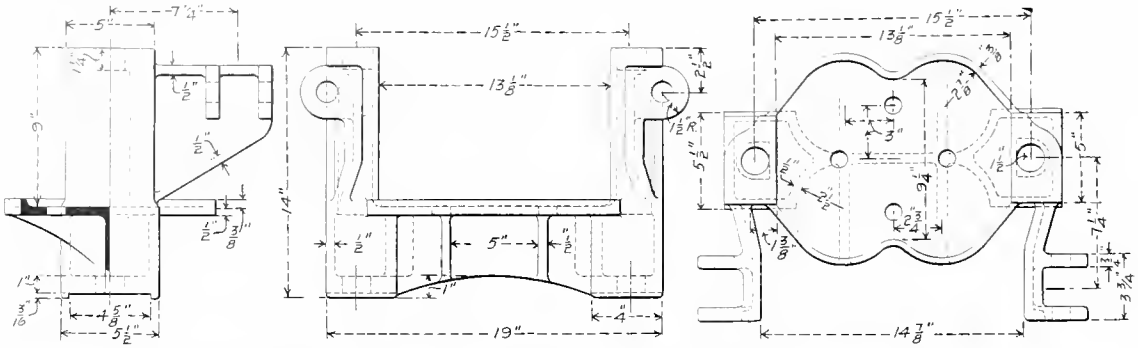
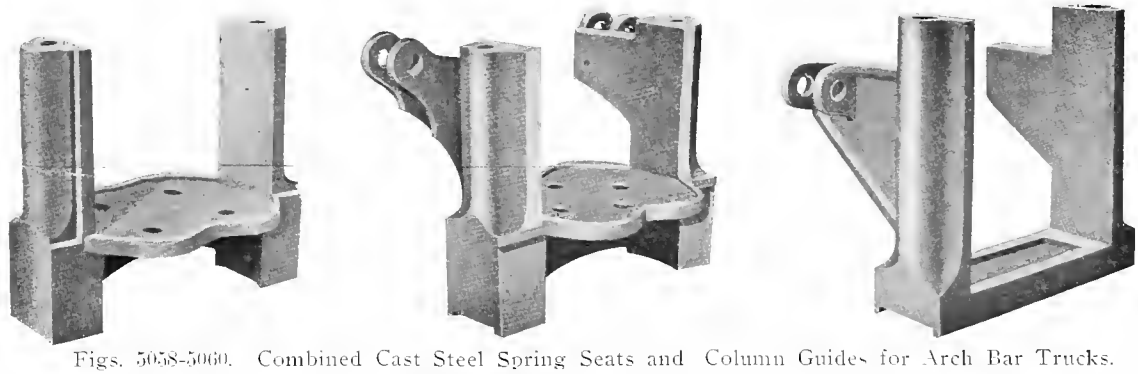


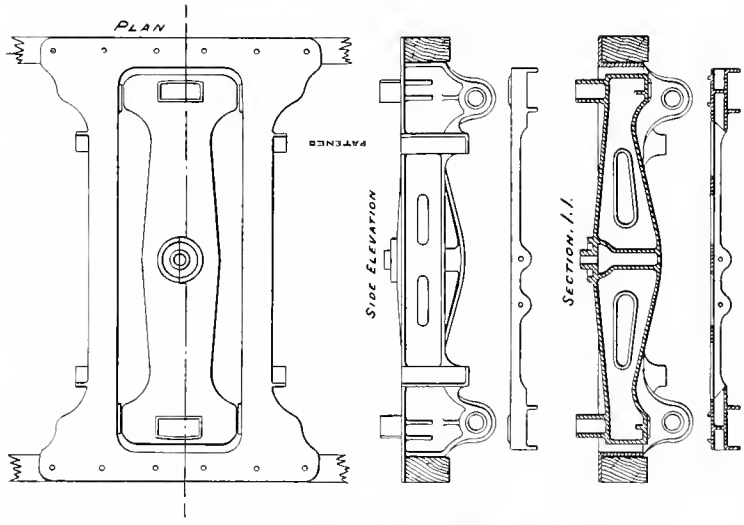
Fig. 5054. Monitor Truck Bolster. Chicago Railway Equipment Co.



Figs. 5055-5057. Standard Column, Brake Hanger and Spring Seat, Cast Steel.
American Steel Foundries.



Figs. 5058-5060. Combined Cast Steel Spring Seats and Column Guides for Arch Bar Trucks.
American Steel Foundries.



Figs. 5061-5065. Cast Steel Truck Center Frame.
Commonwealth Steel Co.

Fig. 5066. Cast Steel Double Truck Center Bolster for Six-Wheel Passenger Truck.
Commonwealth Steel Co.

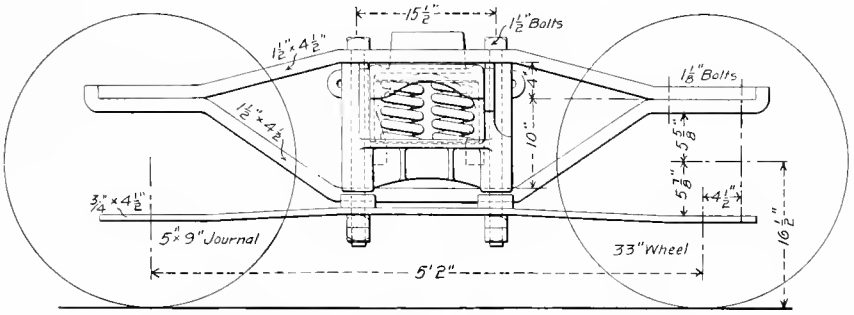


Fig. 5067. Standard Arch Bar Truck Side Frames.
American Steel Foundries.

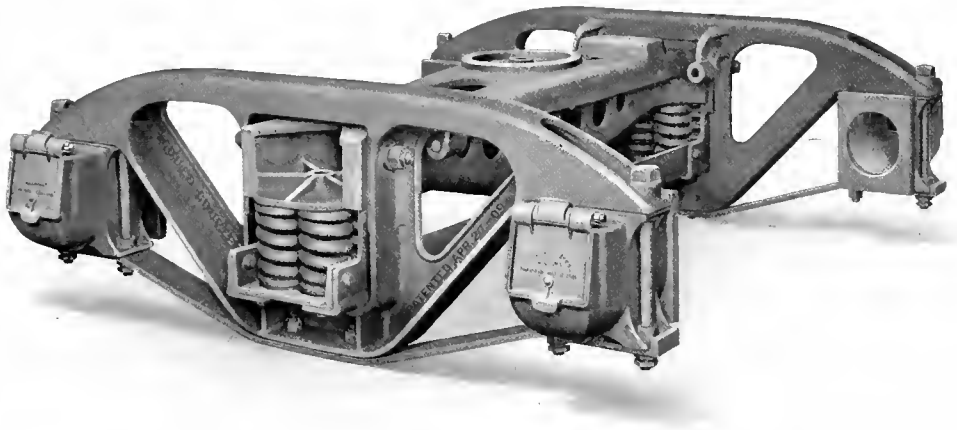
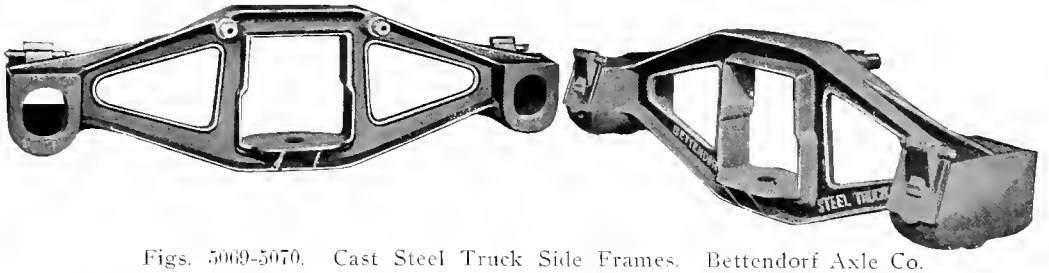
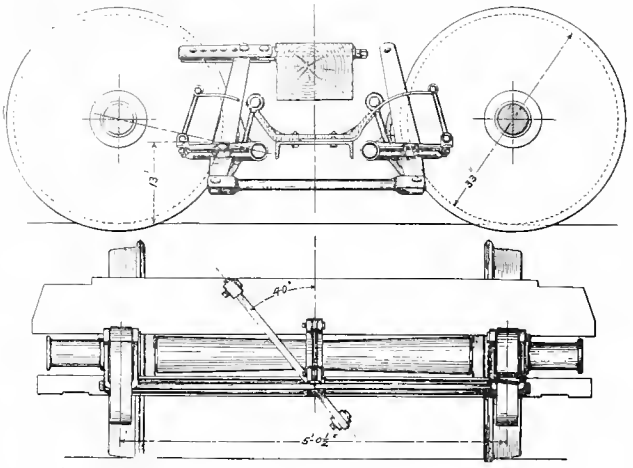


Fig. 5068. Cast Steel Truck Side Frames, Assembled. Gould Coupler Co.

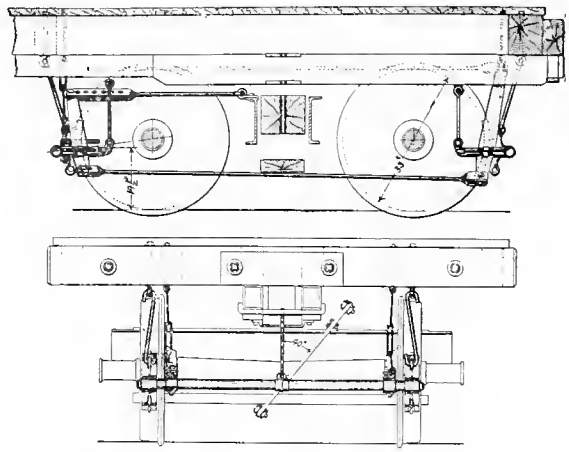


Figs. 5069-5070. Cast Steel Truck Side Frames. Bettendorf Axle Co.

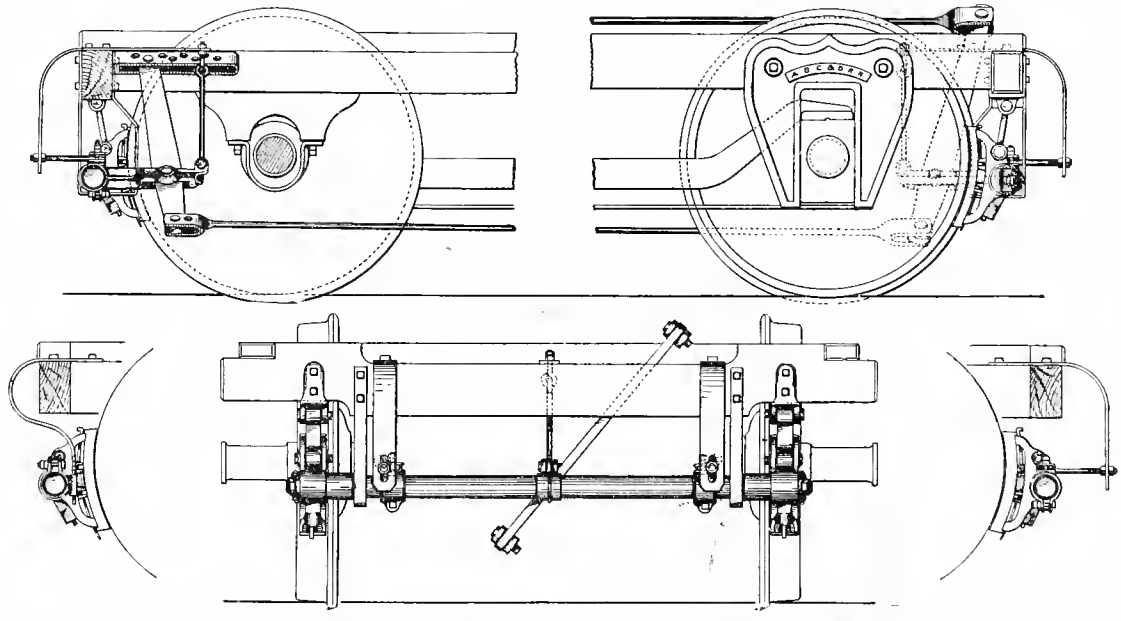
Fig. 5071. Open Hearth Cast Steel Truck Side Frame.
Scullin-Gallagher Iron & Steel Co.



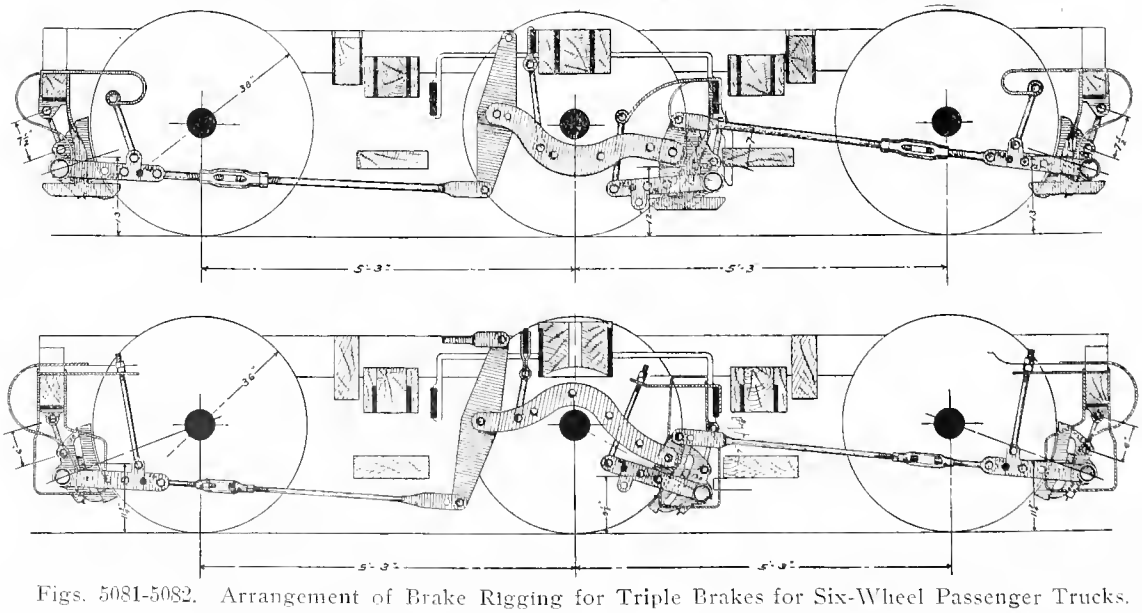
Figs. 5072-5073. Application of Inside Hung Brake Beam to Rigid Diamond Freight Truck.



Figs. 5074-5075. Application of Outside Hung Brake Beam. Beam Hung from Car Body with Pot Hook Hangers.



Figs. 5076-5080. Application of Adjustable Spring Head Beam to Four-Wheel Passenger Truck. A, shows Old Style Release Spring. B, shows Adjustable Release Spring.



Figs. 5081-5082. Arrangement of Brake Rigging for Triple Brakes for Six-Wheel Passenger Trucks. Above Hangings Recommended by the Chicago Railway Equipment Co.

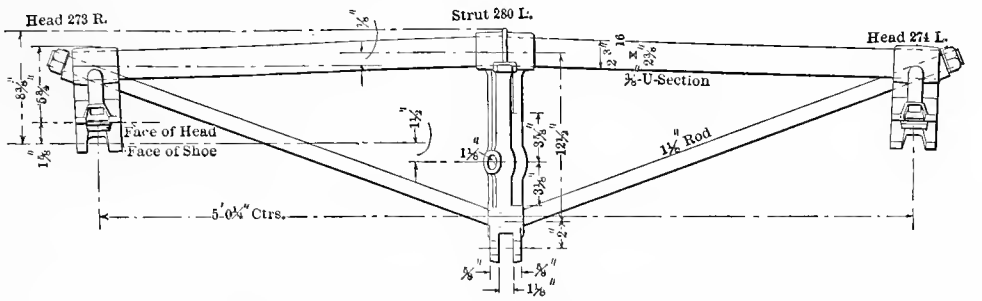


Fig. 5083. "Creco" Heavy Freight Brake Beam.

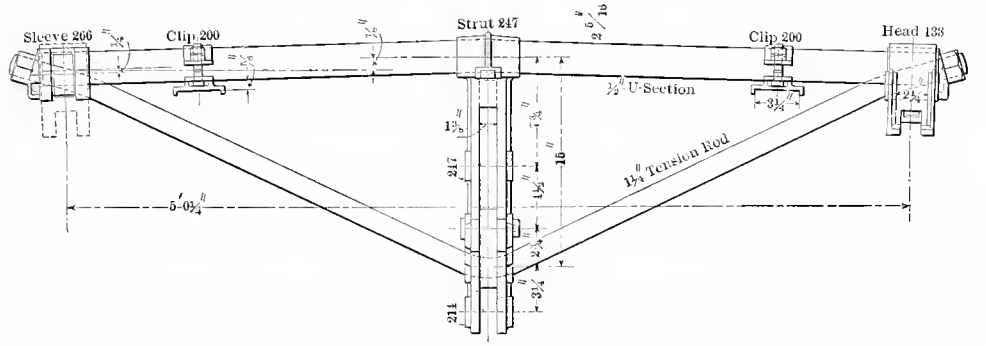


Fig. 5084. "Creco" Triple Brake Beam for High Speed Service, 6-Wheel Trucks.

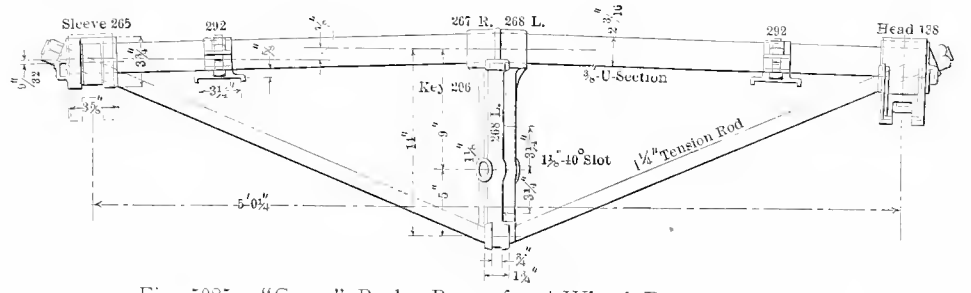


Fig. 5085. "Creco" Brake Beam for 4-Wheel Passenger Truck.

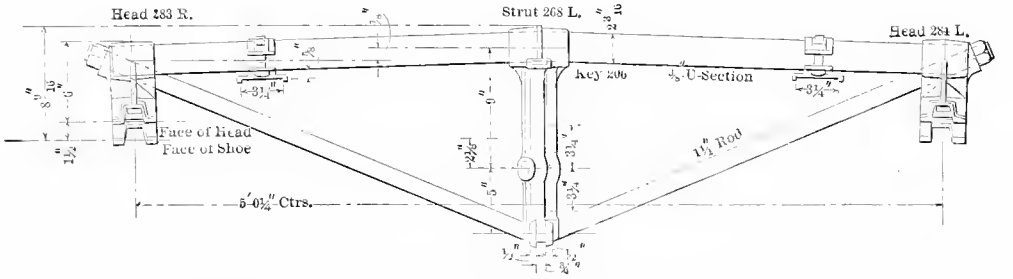


Fig. 5086. "Creco" Passenger Brake Beam with Rigid Heads.

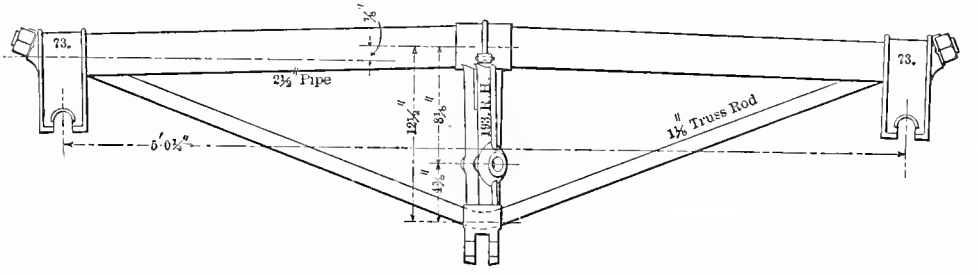


Fig. 5087. 2½-Inch National Hollow Brake Beam with Rigid Heads for Heavy Freight Service.

Chicago Railway Equipment Co.

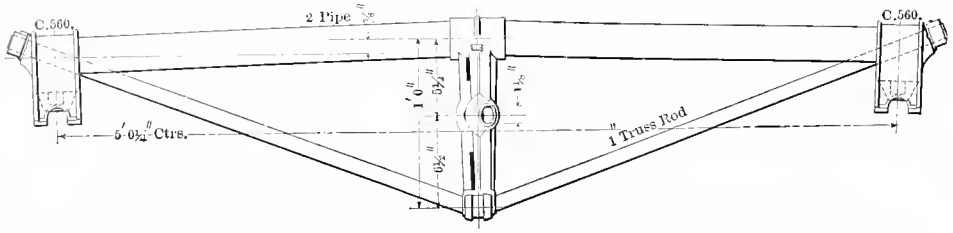


Fig. 5088. 2-Inch National Hollow Freight Brake Beam with Rigid Heads.

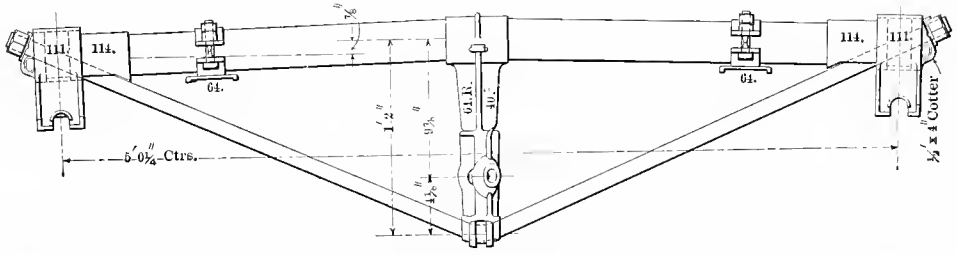


Fig. 5089. 2½-Inch National Hollow Double Brake Beam with Adjustable Heads for 4-Wheel Passenger Trucks.

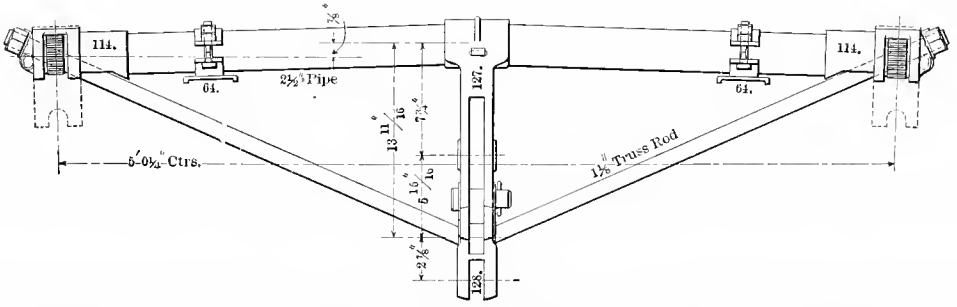


Fig. 5090. 2½-Inch National Hollow Triple Brake Beam with Adjustable Heads for 6-Wheel Passenger Trucks.

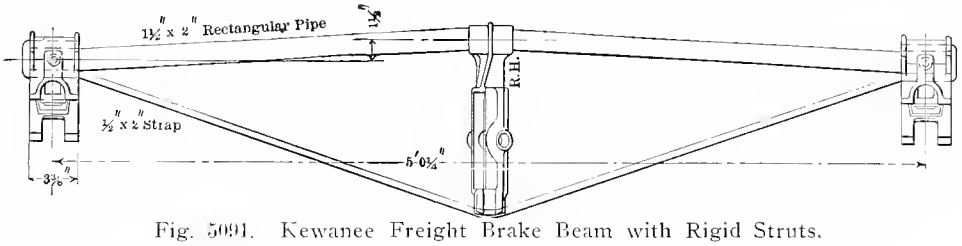


Fig. 5091. Kewanee Freight Brake Beam with Rigid Struts.

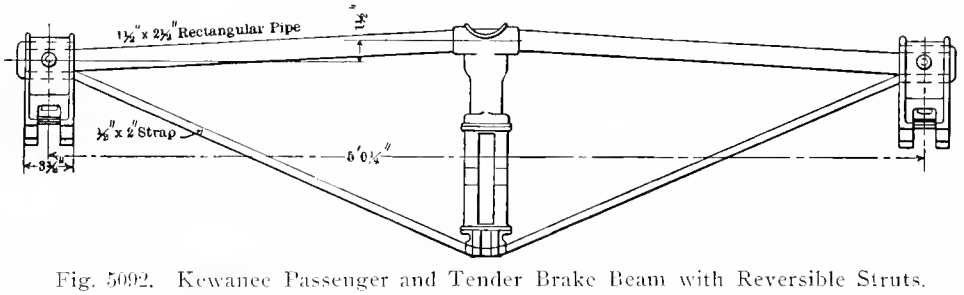


Fig. 5092. Kewanee Passenger and Tender Brake Beam with Reversible Struts.

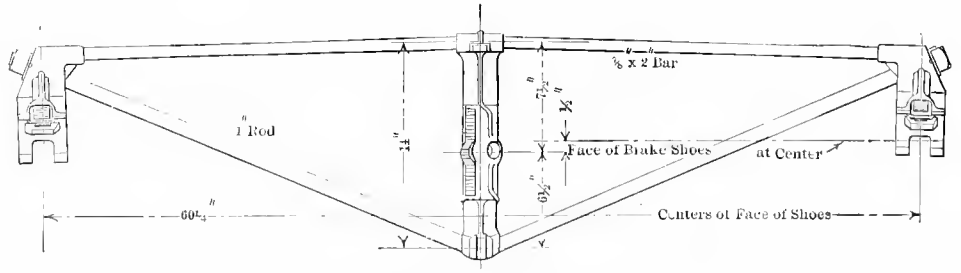


Fig. 5093. "Diamond" Extra Freight Brake Beam.

Chicago Railway Equipment Co.

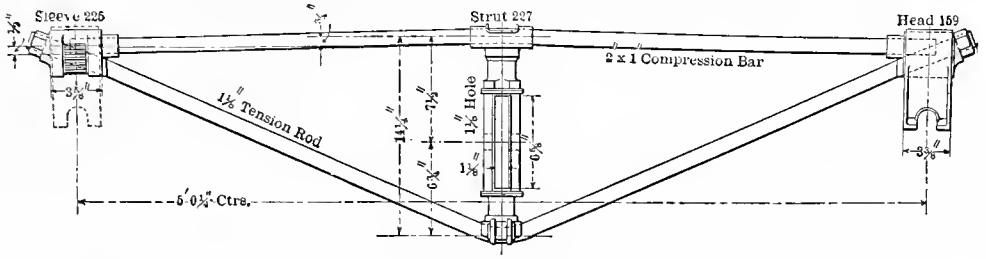


Fig. 5094. "Diamond Adjustable" Brake Beam for Heavy Freight Service.

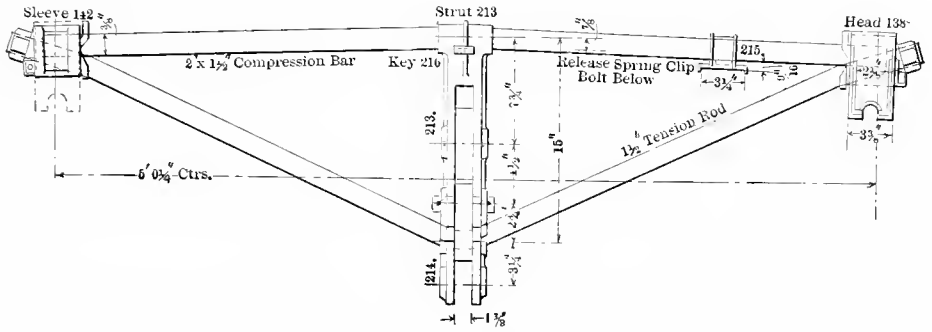
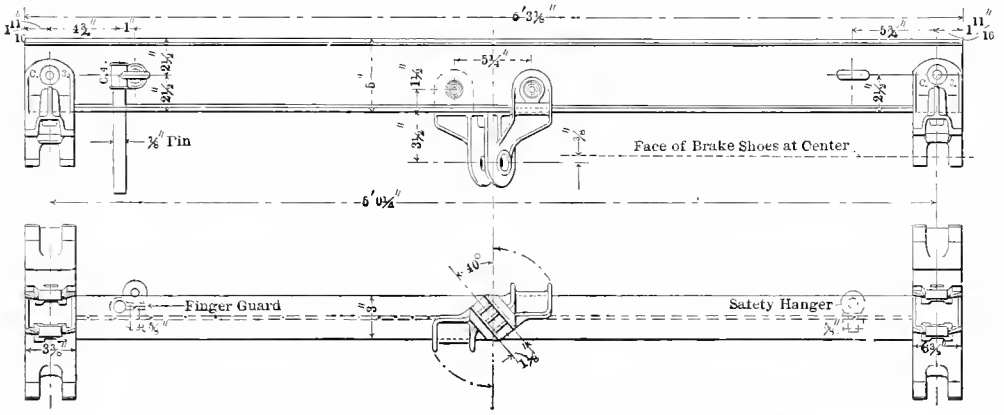
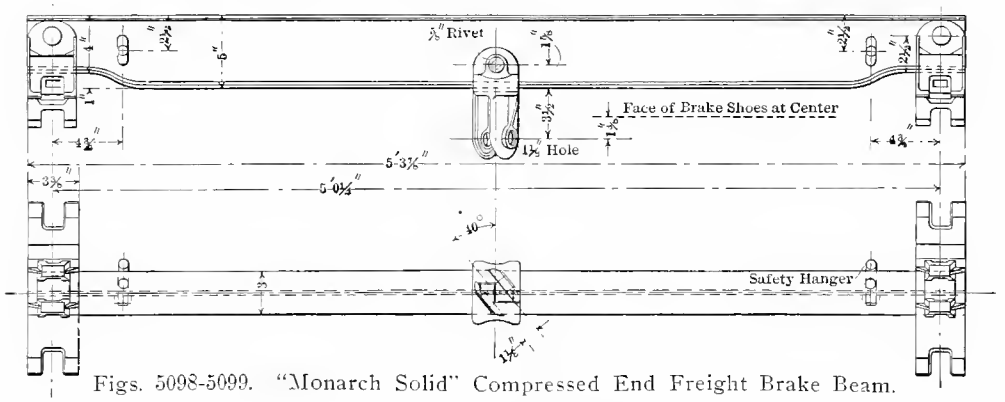


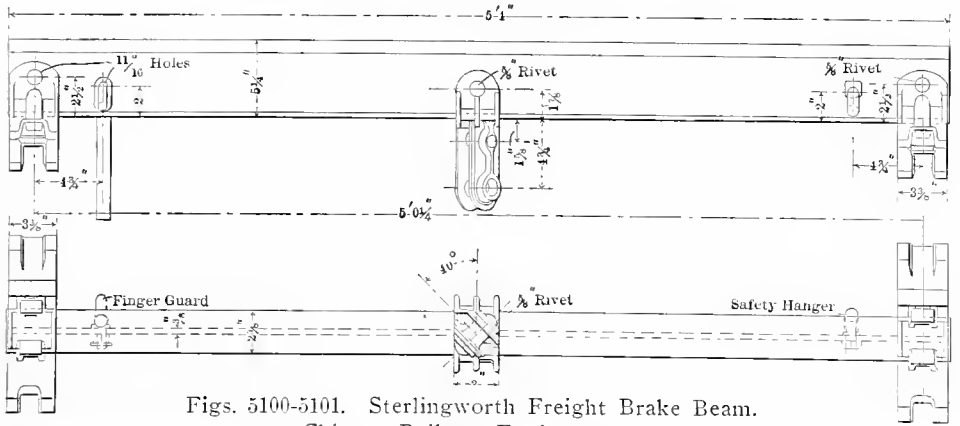
Fig. 5095. "Diamond Special" Triple Brake Beam for 6-Wheel Passenger Trucks and High Speed Service.



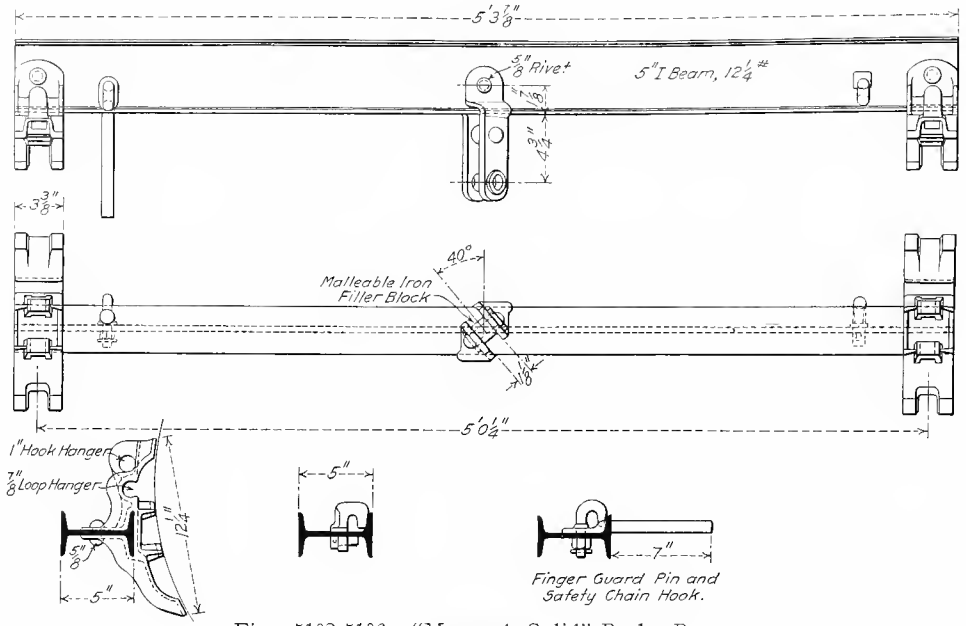
Figs. 5096-5097. "Ninety-Six" Brake Beam for Freight Cars.



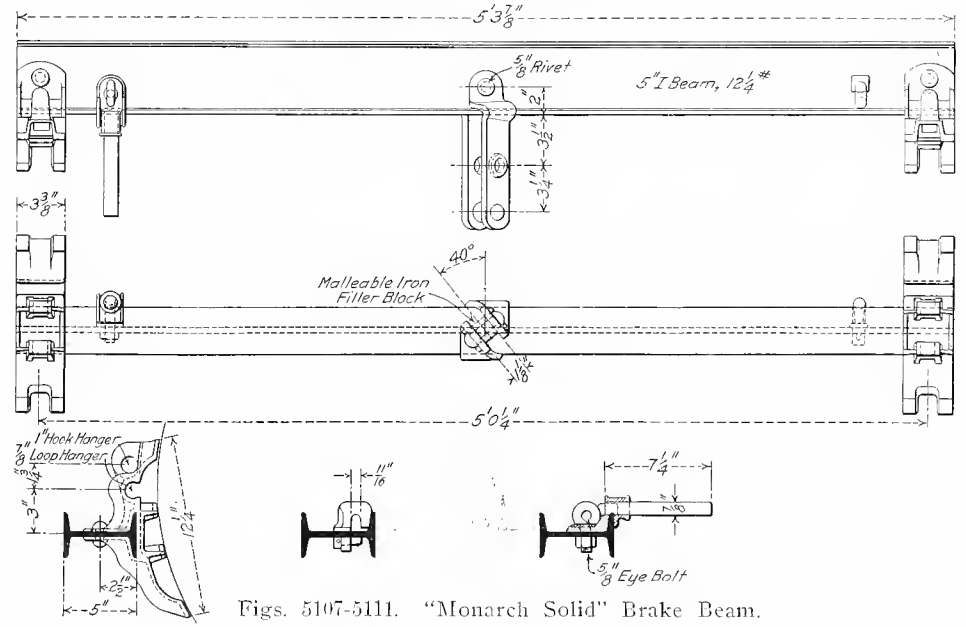
Figs. 5098-5099. "Monarch Solid" Compressed End Freight Brake Beam.



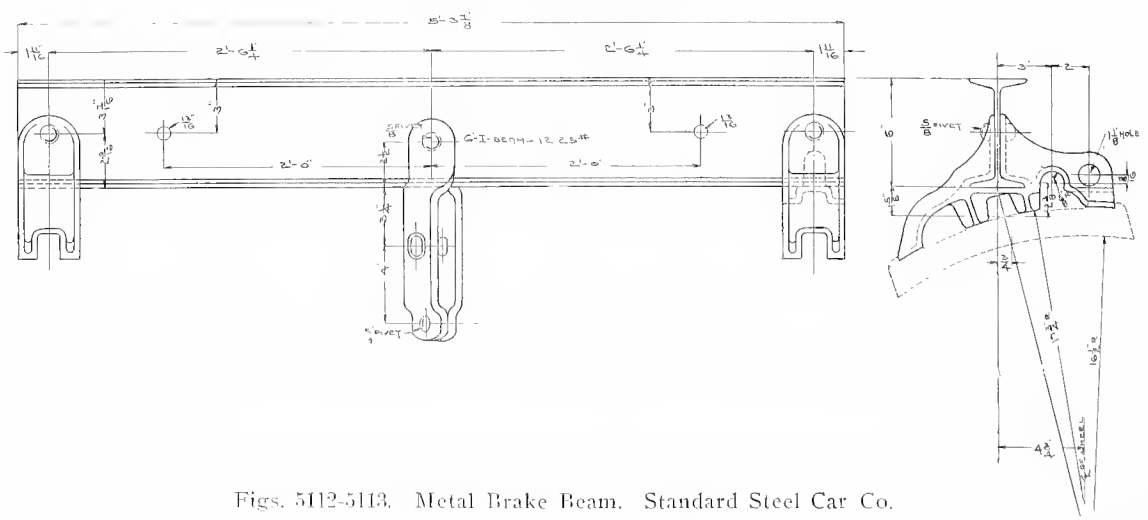
Figs. 5100-5101. Sterlingworth Freight Brake Beam.
Chicago Railway Equipment Co.



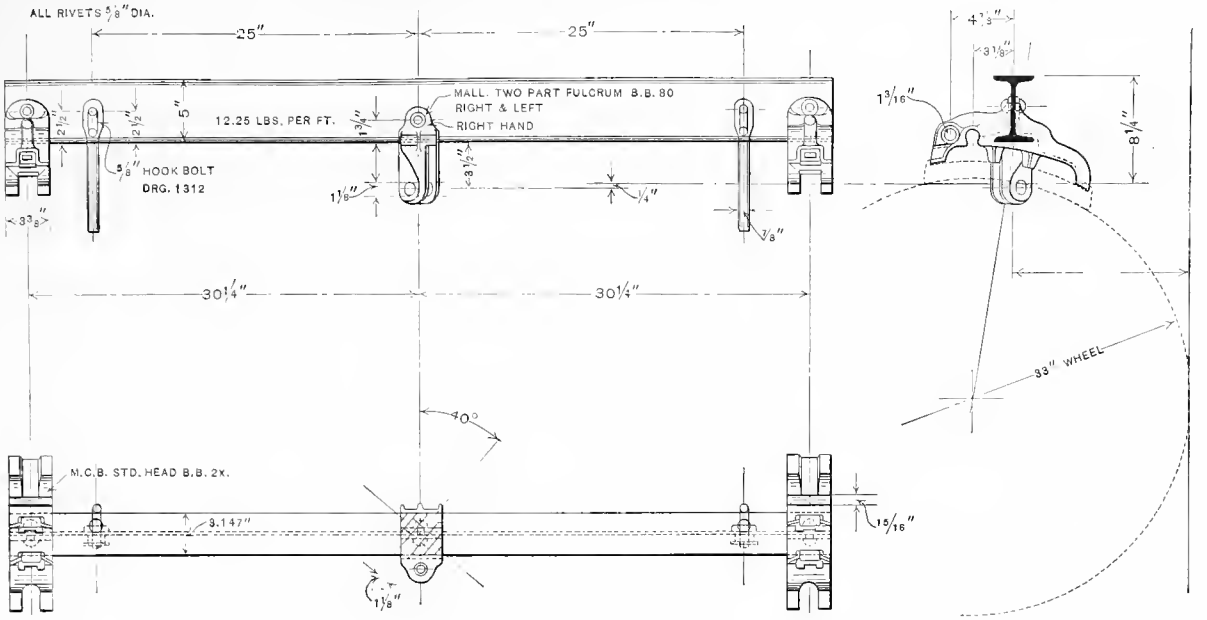
Figs. 5102-5106. "Monarch Solid" Brake Beam. Chicago Railway Equipment Co.



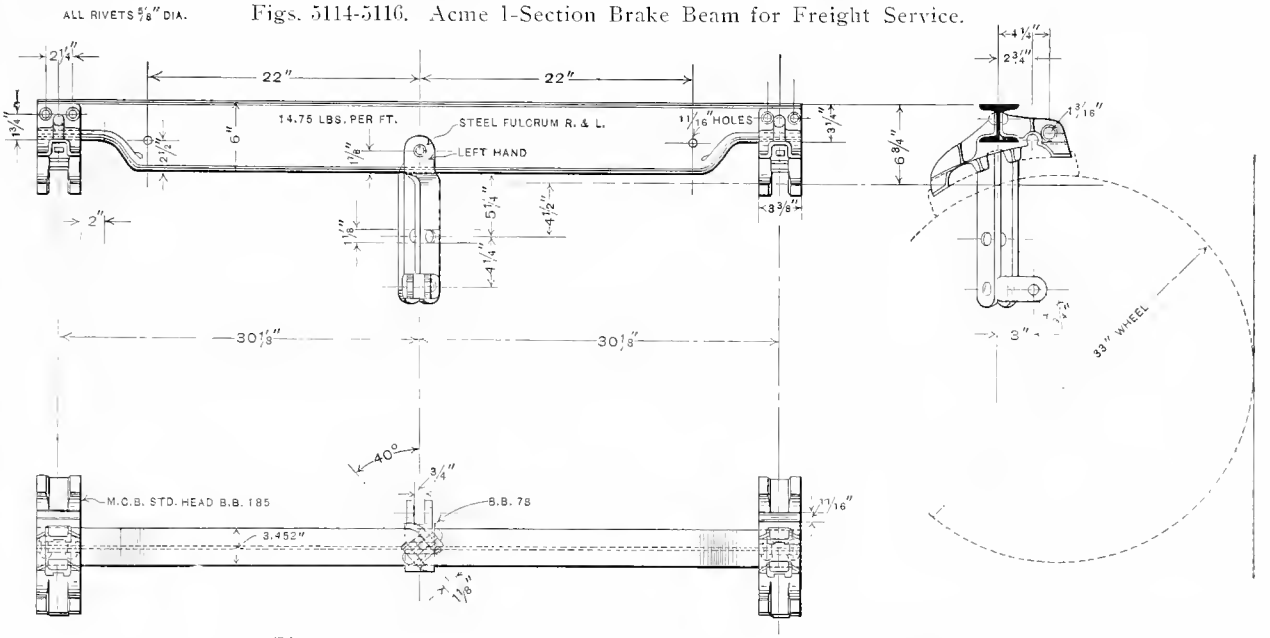
Figs. 5107-5111. "Monarch Solid" Brake Beam. Chicago Railway Equipment Co.



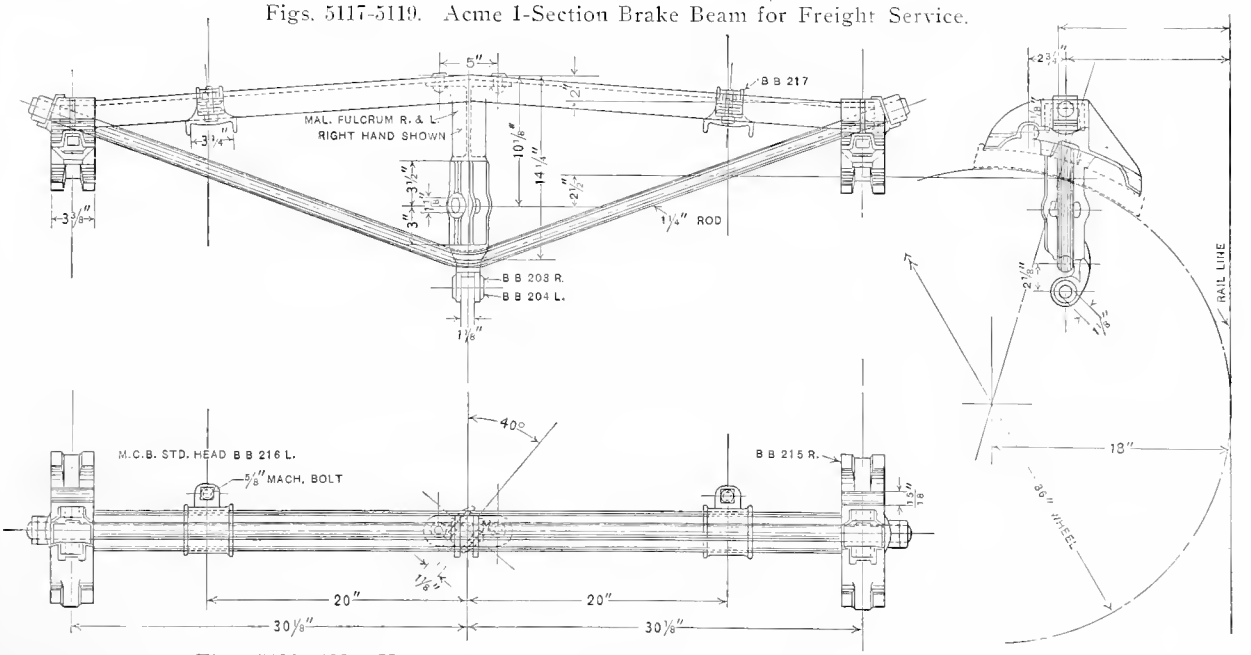
Figs. 5112-5113. Metal Brake Beam. Standard Steel Car Co.



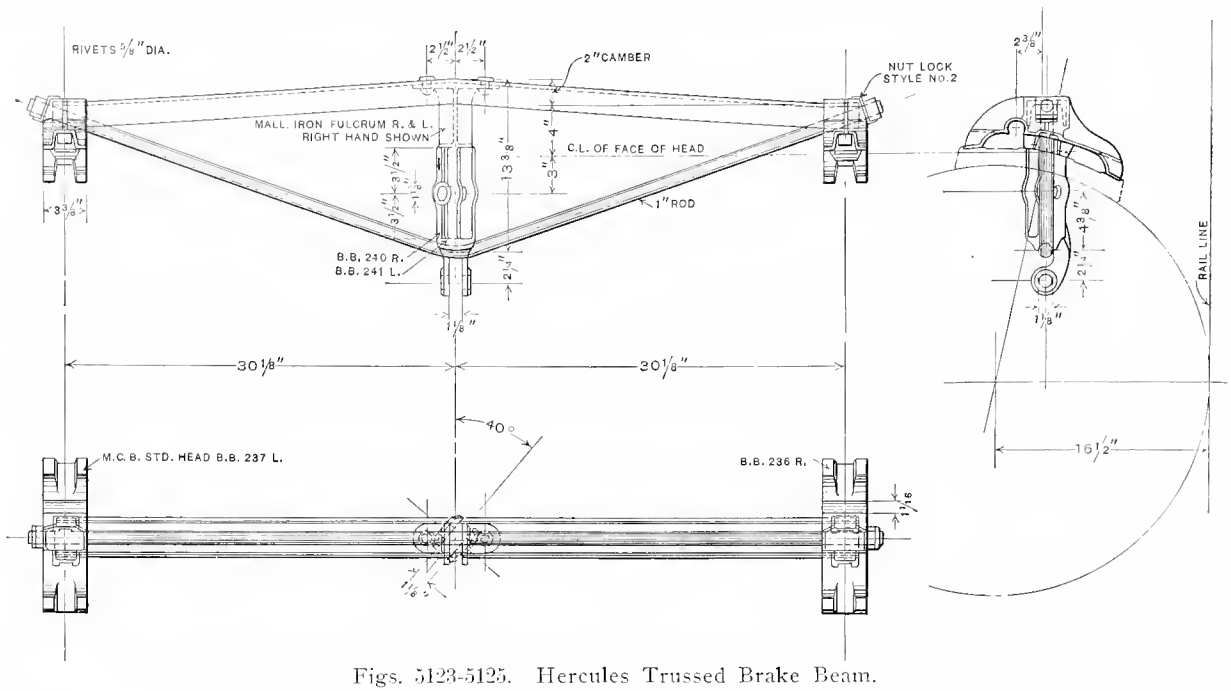
Figs. 5114-5116. Acme 1-Section Brake Beam for Freight Service.



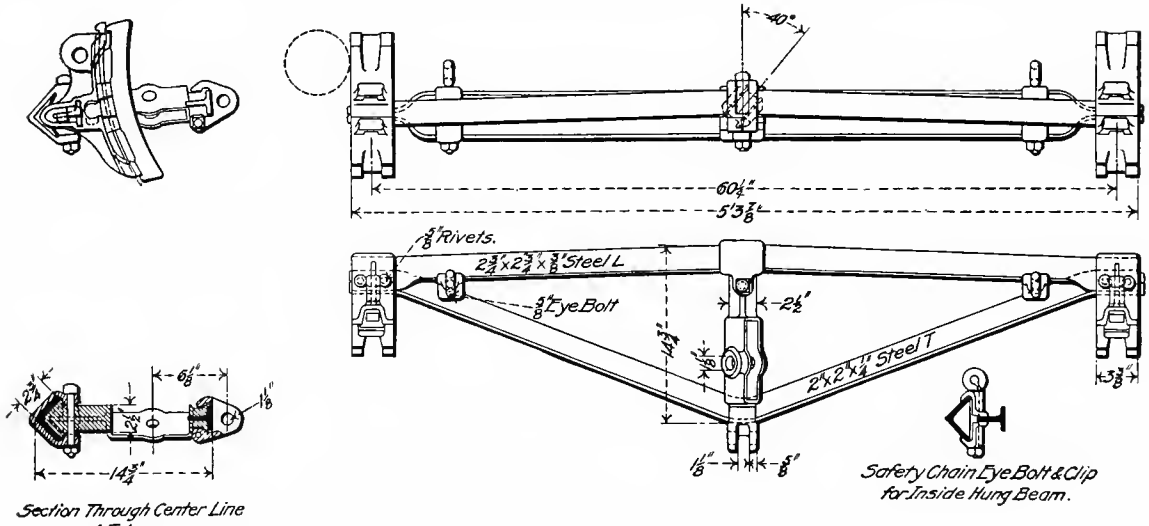
Figs. 5117-5119. Acme 1-Section Brake Beam for Freight Service.



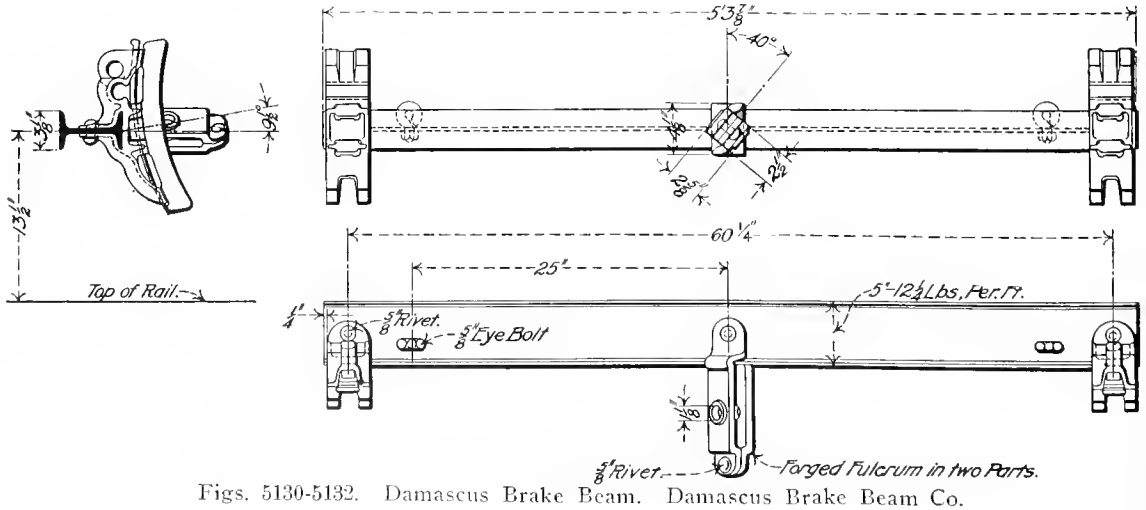
Figs. 5120-5122. Hercules Trussed Brake Beam for 4-Wheel Passenger Truck.
Simplex Railway Appliance Co.



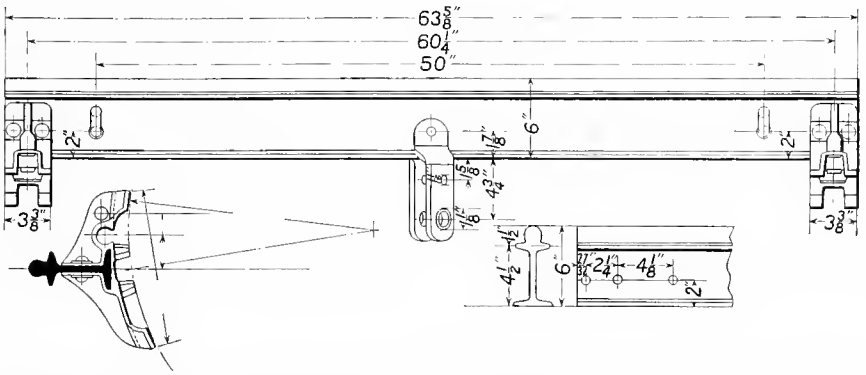
Figs. 5123-5125. Hercules Trussed Brake Beam.
Simplex Railway Appliance Co.



Figs. 5126-5129. Waycott Heavy Freight Brake Beam. Damascus Brake Beam Co.



Figs. 5130-5132. Damascus Brake Beam. Damascus Brake Beam Co.



Figs. 5133-5135. Special Combination Deck and I-Section Brake Beam, Recommended for Heavy Freight Service. Pennsylvania Brake Beam Co.

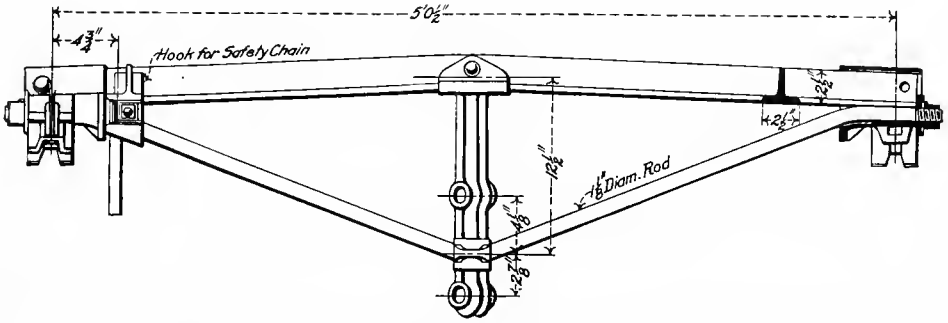
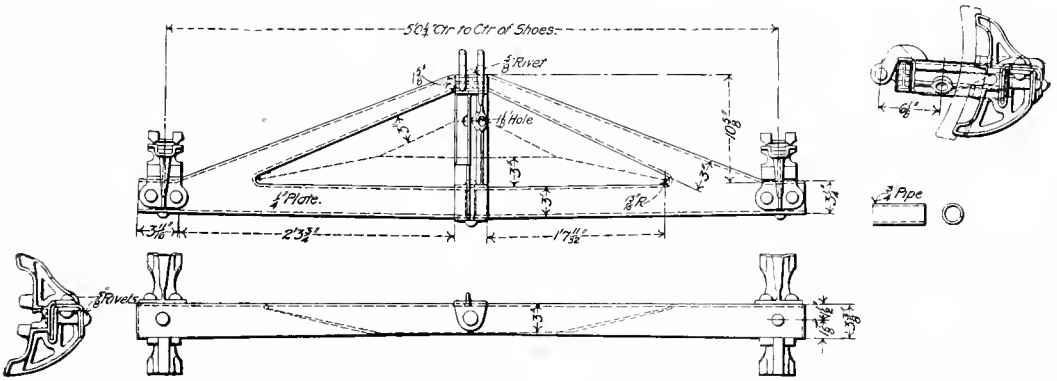
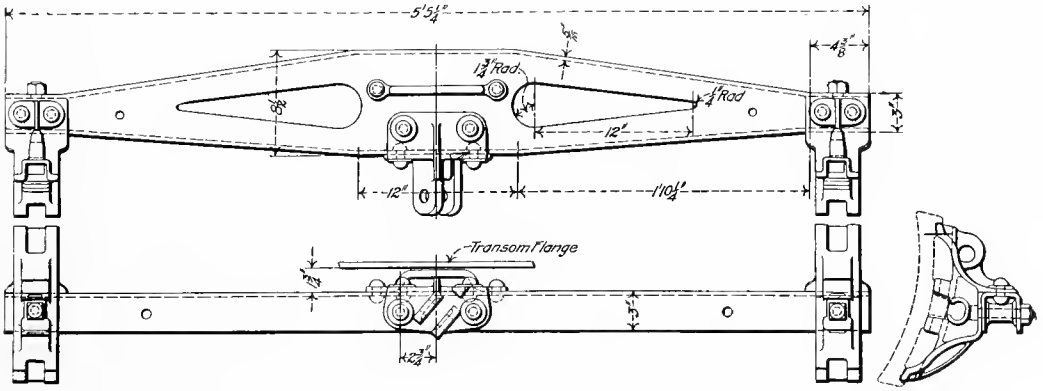


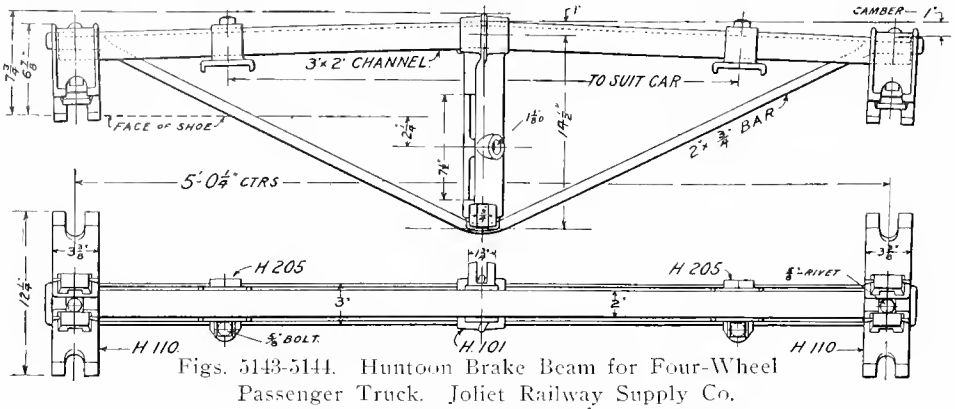
Fig. 5136. T-Iron Brake Beam. Standard Railway Equipment Co.



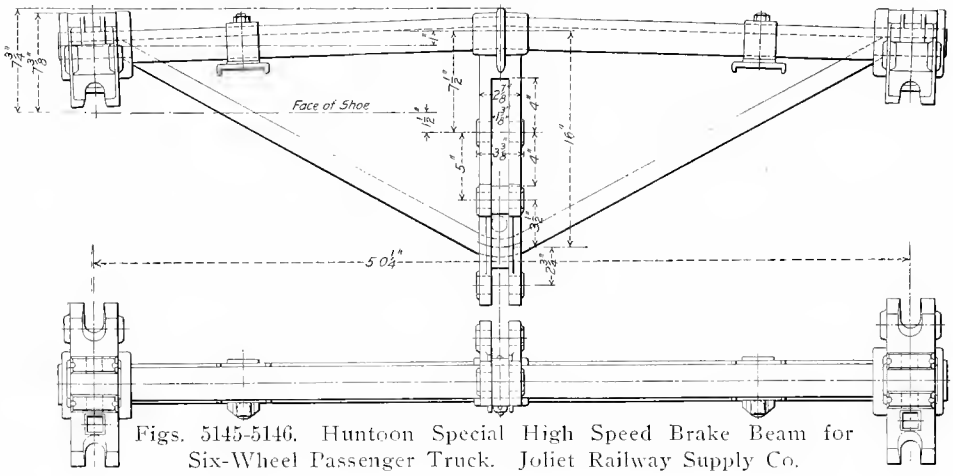
Figs. 5137-5139. Pressed Steel Brake Beam. Pressed Steel Car Co.



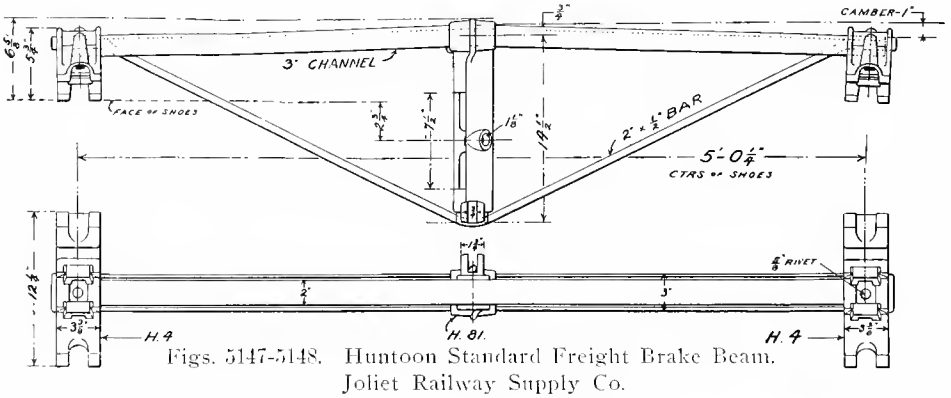
Figs. 5140-5142. Pressed Steel Double Trussed Brake Beam. Pressed Steel Car Co.



Figs. 5143-5144. Huntoon Brake Beam for Four-Wheel Passenger Truck. Joliet Railway Supply Co.



Figs. 5145-5146. Huntoon Special High Speed Brake Beam for Six-Wheel Passenger Truck. Joliet Railway Supply Co.



Figs. 5147-5148. Huntoon Standard Freight Brake Beam. Joliet Railway Supply Co.

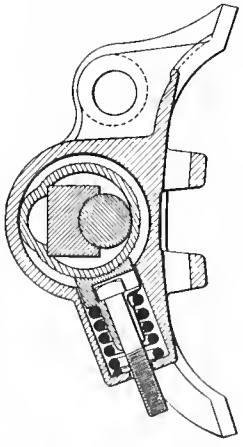
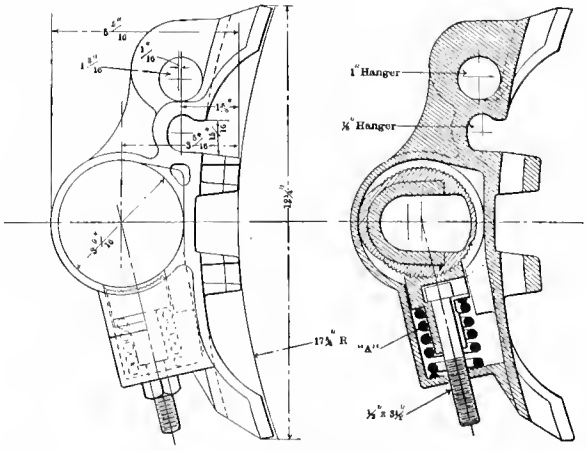


Fig. 5149. Pullman Standard Self-Adjusting Head and Sleeve.



Figs. 5150-5151. Self-Adjusting Head and Sleeve for "Creco" Freight Brake Beam. Chicago Railway Equipment Co.

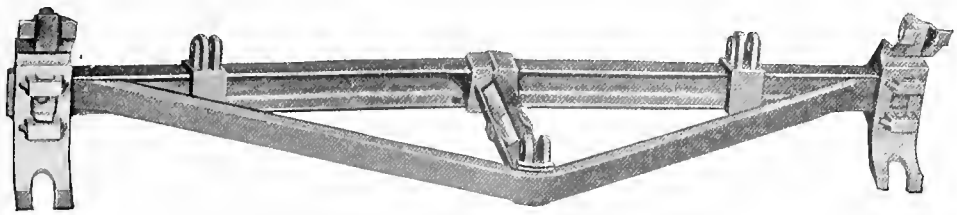


Fig. 5152. Huntoon Heavy Freight Brake Beam.
Joliet Railway Supply Co.

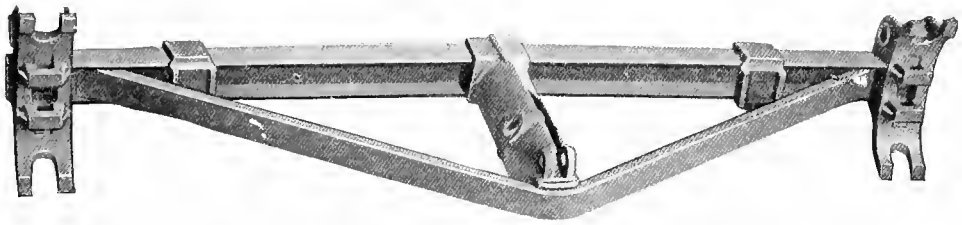


Fig. 5153. Huntoon Standard Passenger Brake Beam.
Joliet Railway Supply Co.

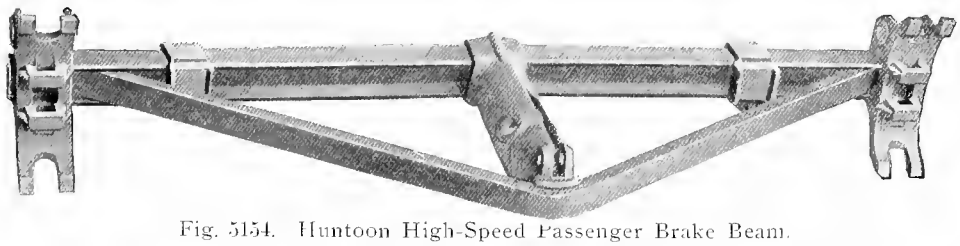


Fig. 5154. Huntoon High-Speed Passenger Brake Beam.
Joliet Railway Supply Co.

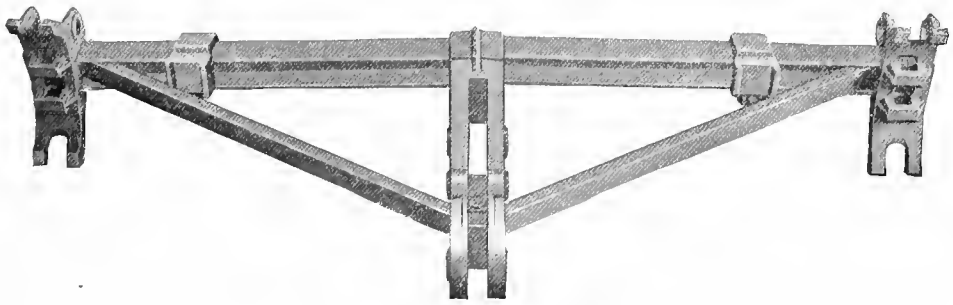


Fig. 5155. Huntoon High Speed Passenger Brake Beam.
Joliet Railway Supply Co.

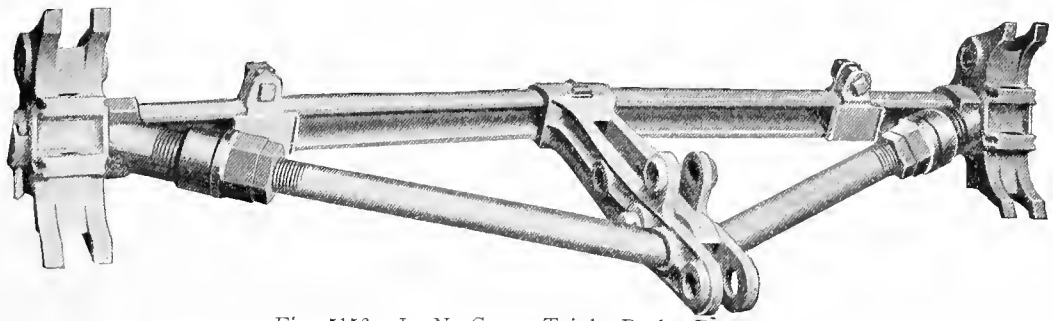


Fig. 5156. L. N. Creco Triple Brake Beam.
Chicago Railway Equipment Co.

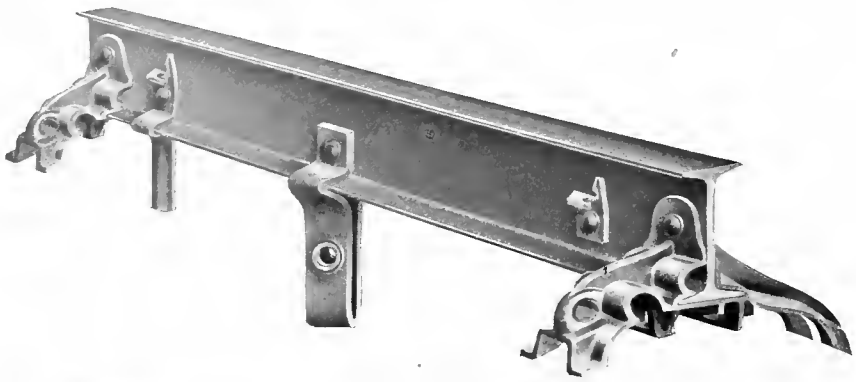


Fig. 5157. Vanderbilt I-Beam Brake Beam with Wheel Guard and Chain Clip.

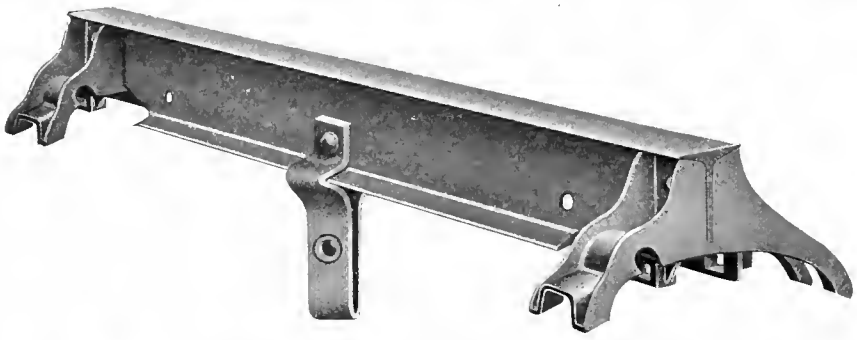


Fig. 5158. Vanderbilt I-Beam Brake Beam for Application to Trucks where Space is Limited.

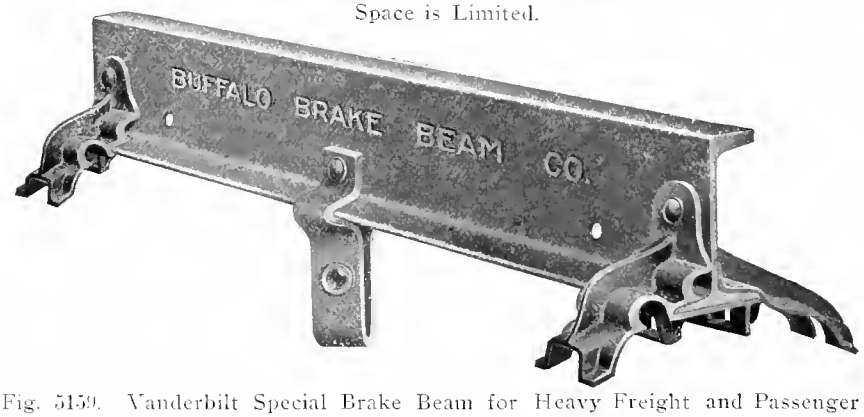
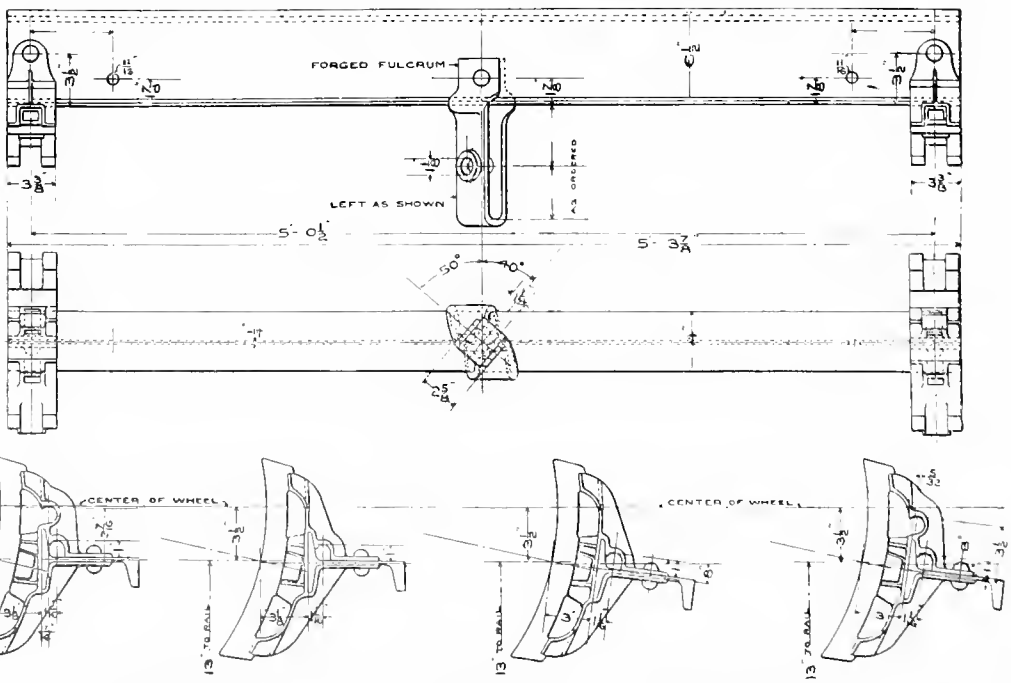
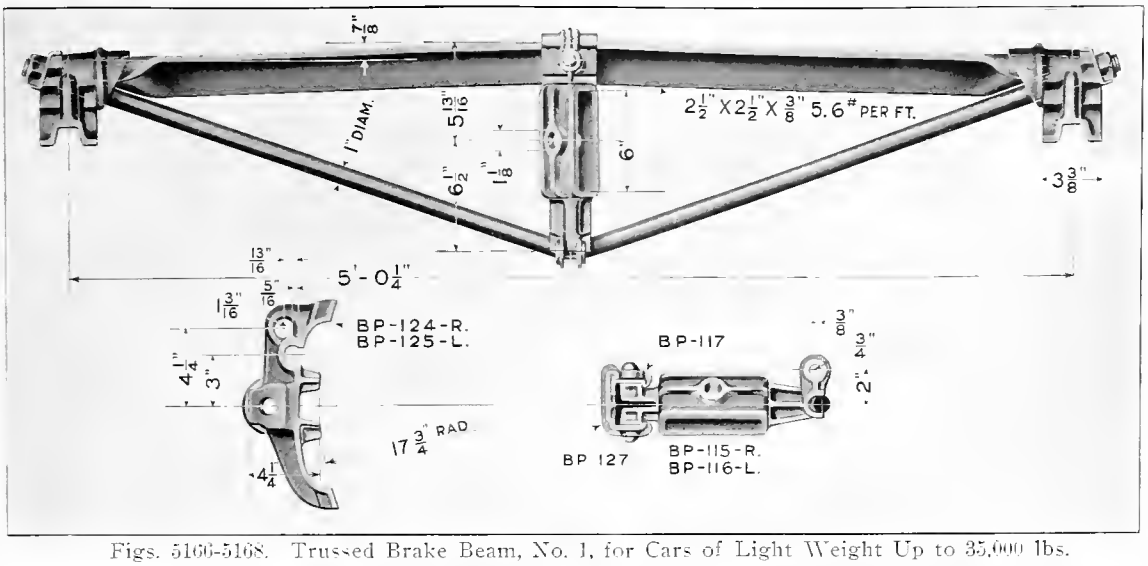


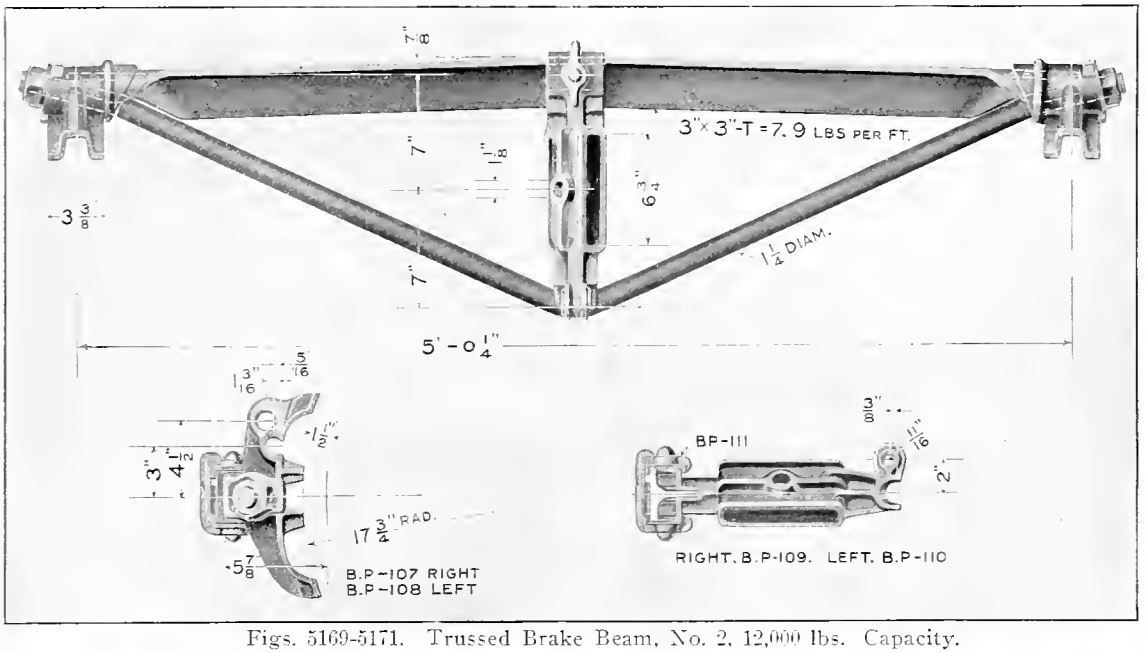
Fig. 5159. Vanderbilt Special Brake Beam for Heavy Freight and Passenger Service.



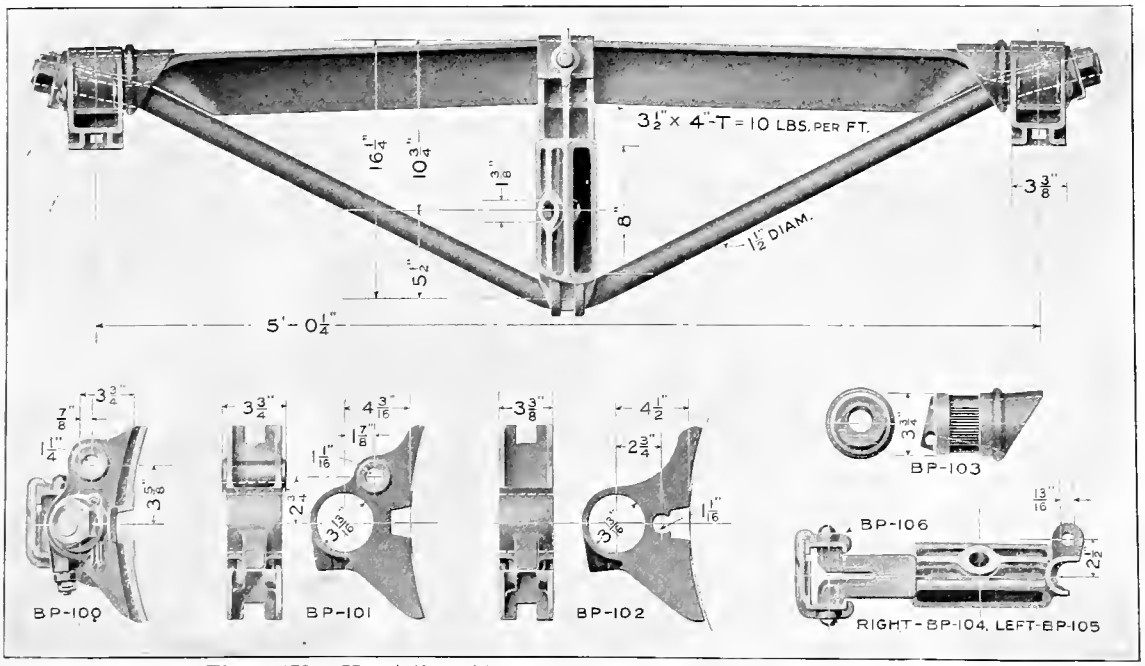
Figs. 5160-5165. Buffalo Special Brake Beam. Buffalo Brake Beam Co.



Figs. 5166-5168. Trussed Brake Beam, No. 1, for Cars of Light Weight Up to 35,000 lbs.



Figs. 5169-5171. Trussed Brake Beam, No. 2, 12,000 lbs. Capacity.



Figs. 5172-5177. Adjustable High Speed Trussed Brake Beam, No. 3.
Buffalo Brake Beam Co.

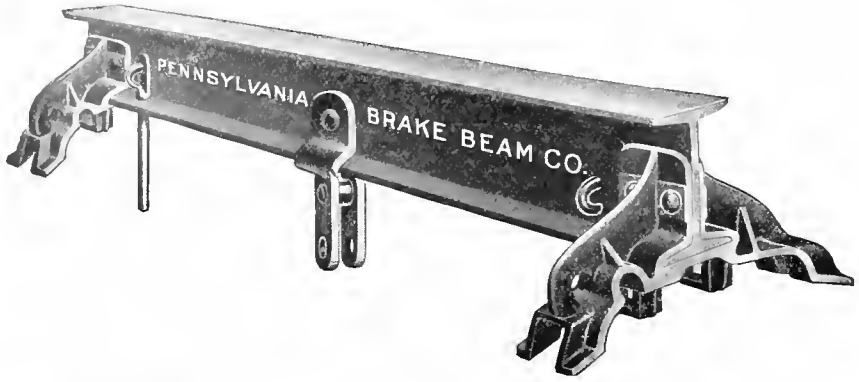


Fig. 5178. Standard I-Beam Brake Beam, Drop Forged Fulcrums.

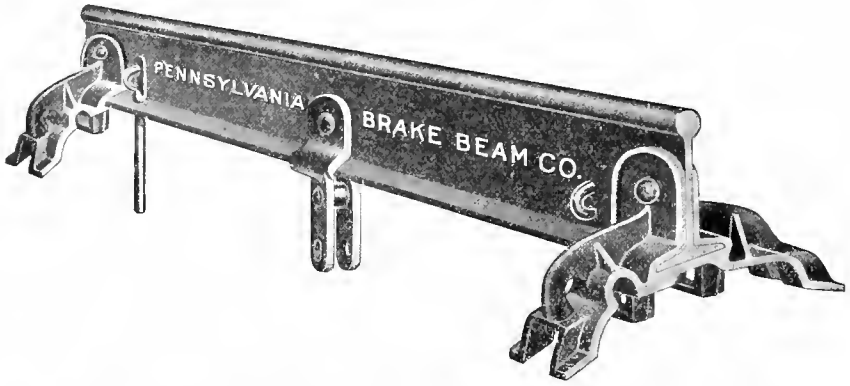


Fig. 5179. Standard Deck Beam Brake Beam, Malleable Fulcrums.

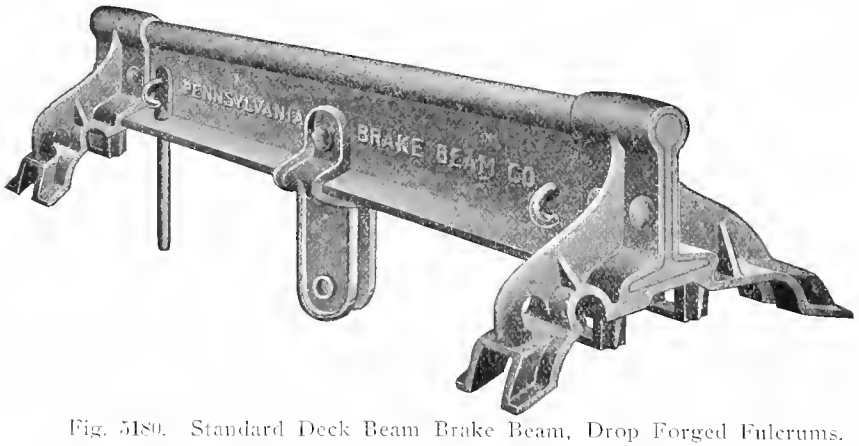


Fig. 5180. Standard Deck Beam Brake Beam, Drop Forged Fulcrums.

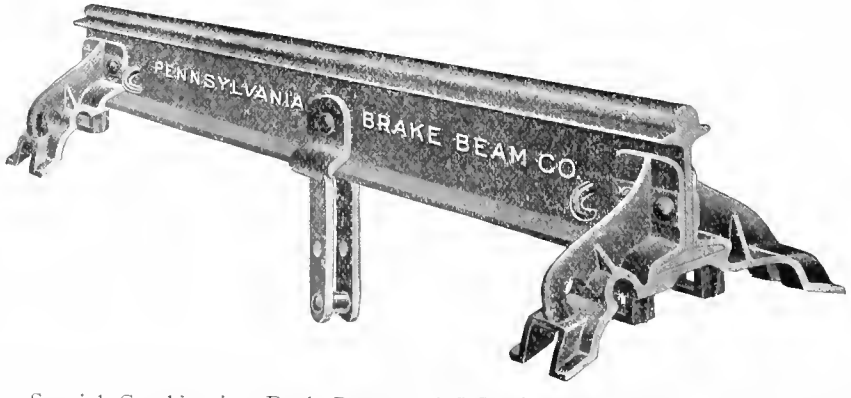


Fig. 5181. Special Combination Deck Beam and I-Section Brake Beam, Drop Forged Fulcrum. Pennsylvania Brake Beam Co.

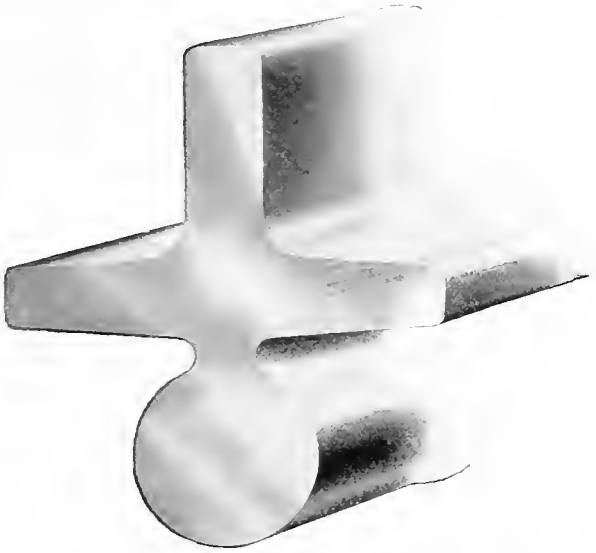
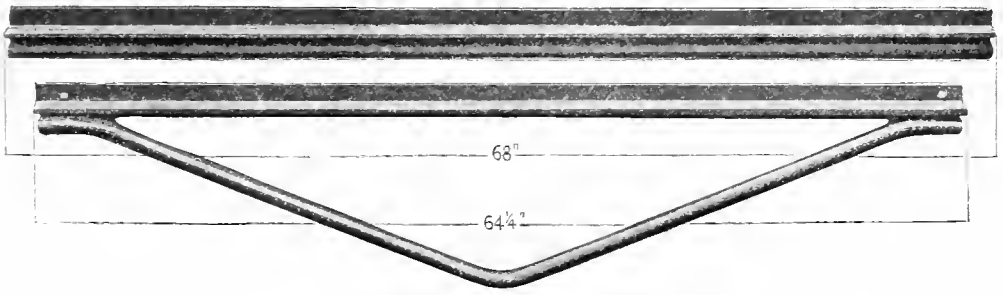


Fig. 5182. Detail of Davis Section.



Figs. 5183-5184. Davis Solid Truss Details.

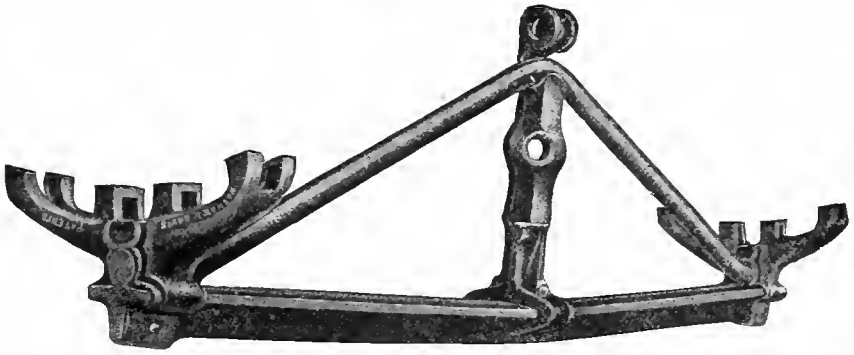


Fig. 5185. Davis Solid Truss Brake Beam, No. 3, for 100,000 lbs. Capacity Cars.

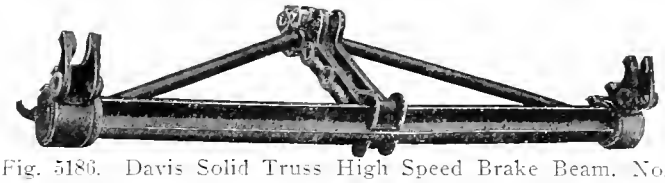


Fig. 5186. Davis Solid Truss High Speed Brake Beam, No. 4, with "D" Adjustable Head, Single Link Hanger.

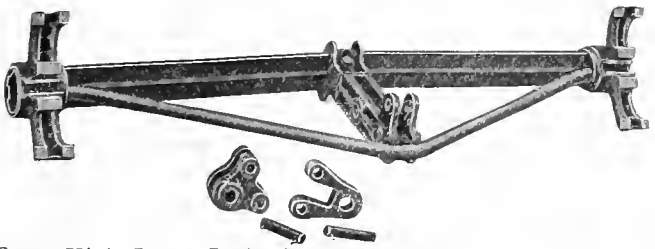


Fig. 5187. Davis Solid Truss High Speed Brake Beam, No. 4, with "F" Adjustable Head Loop Hanger.

Davis Solid Truss Brake Beam Co.

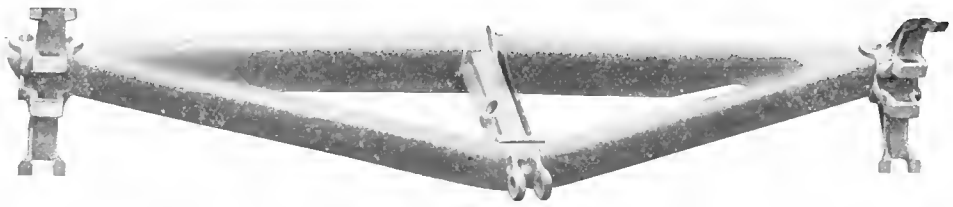


Fig. 5188. Pressed Steel Trussed Brake Beam. Pressed Steel Car Co.

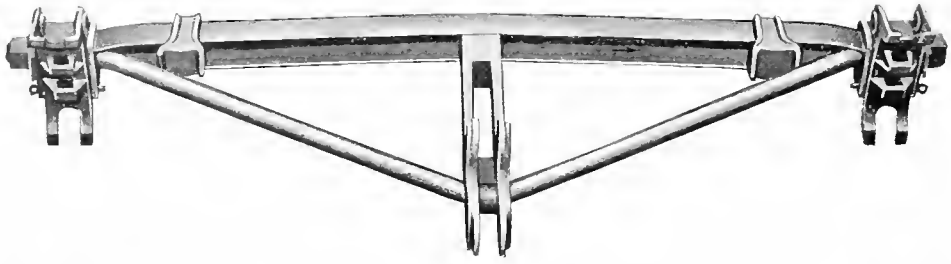


Fig. 5189. High Speed Passenger Brake Beam. Simplex Railway Appliance Co.

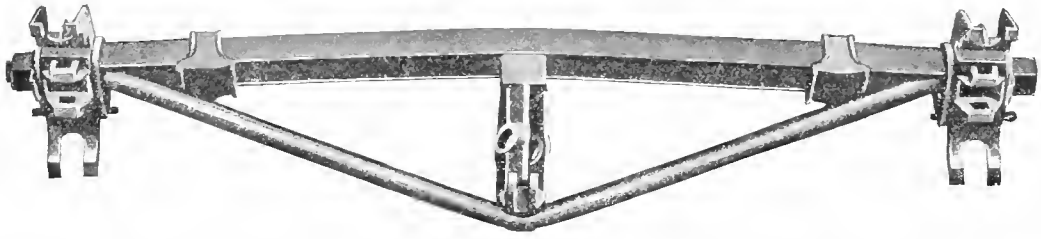


Fig. 5190. Hercules Passenger Brake Beam. Simplex Railway Appliance Co.

Fig. 5191. Acme Freight Brake Beam. Simplex Railway Appliance Co.

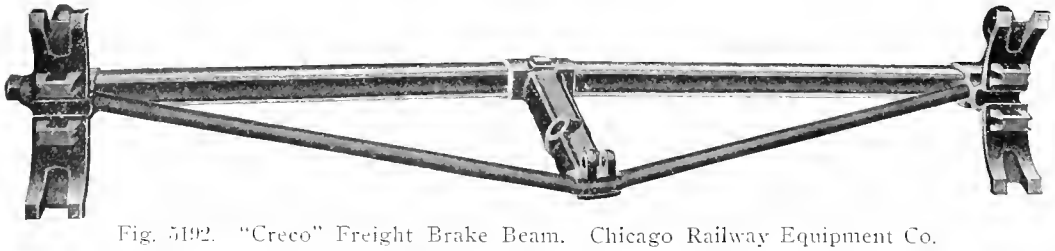


Fig. 5192. "Creco" Freight Brake Beam. Chicago Railway Equipment Co.

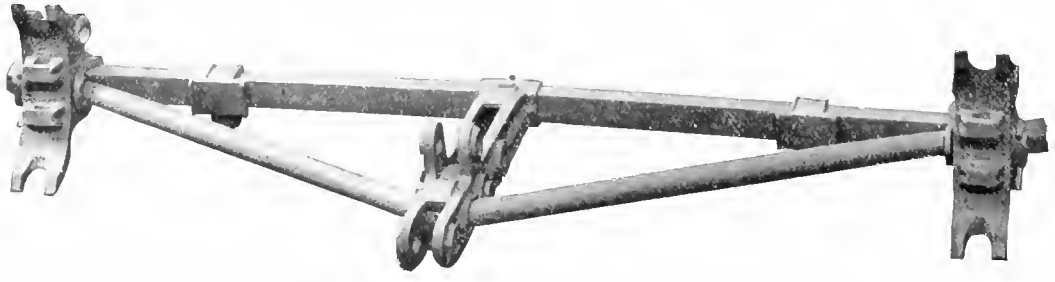


Fig. 5193. "Diamond Special" Triple Brake Beam for 6-Wheel Passenger Trucks. Chicago Railway Equipment Co.

Figs. 5194-5195.
Safety Hanger.
Buffalo Brake Beam Co.

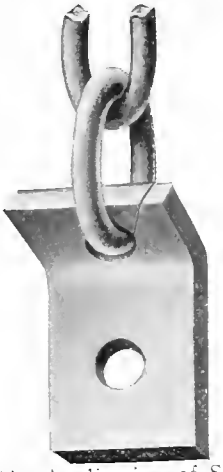


Fig. 5196. Application of Safety Chain to Chain Clip.

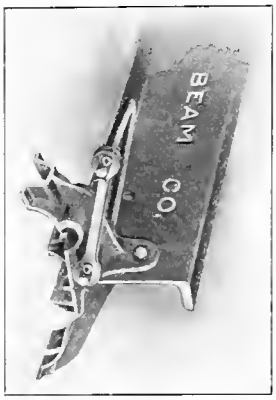


Fig. 5198.
Application of Safety Hanger.

Fig. 5199.
18-Inch Malleable Iron Brake Wheel.
The National Malleable Castings Co.

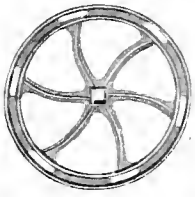
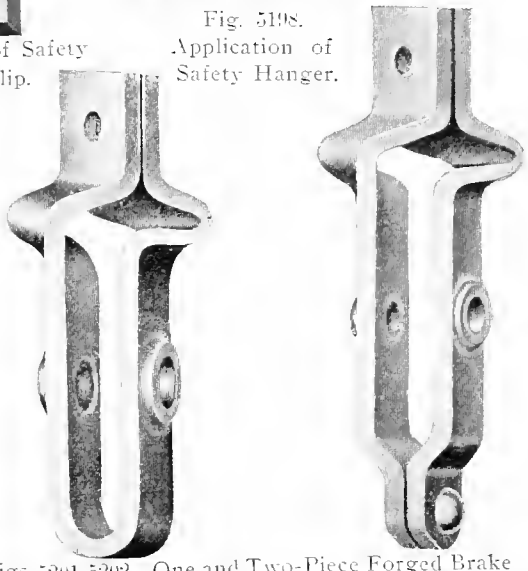
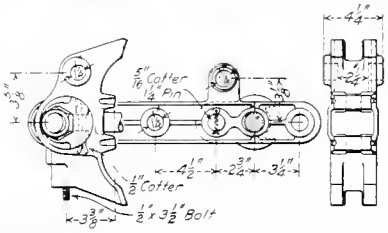


Fig. 5200.
14 and 16-Inch Malleable Iron Brake Wheel.



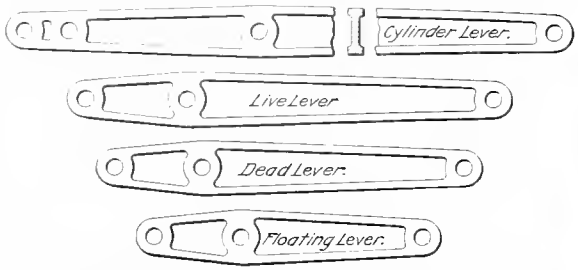
Figs. 5201-5202. One and Two-Piece Forged Brake Beam Fulcrums. Buffalo Brake Beam Co.

Figs. 5203-5204. Feasible Drop Brake Staff.
U. S. Metal & Mfg. Co.

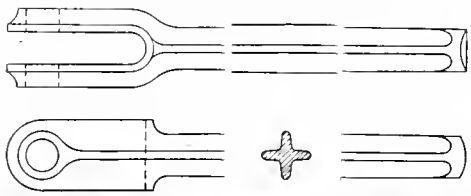


Figs. 5205-5206. Pullman Standard Self-Adjusting Head and Sleeve. Chicago Ry. Eqpt. Co.

Figs. 5207-5208. Ostermann Drop Brake Mast. Ostermann Mfg. Co.

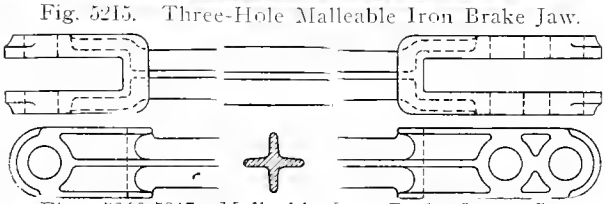


Figs. 5209-5212. Malleable Iron Brake Levers.



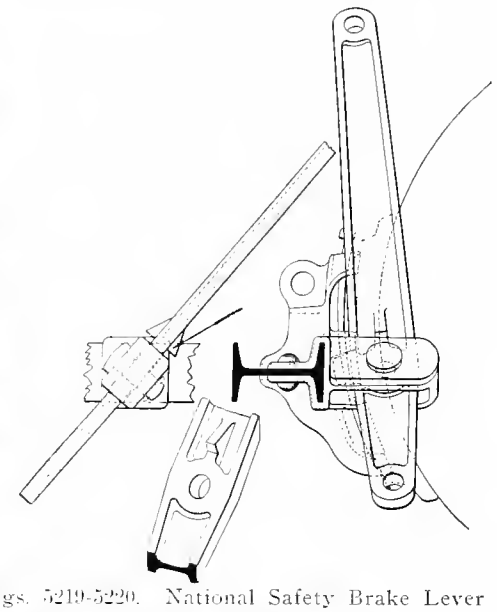
Figs. 5213-5214. Malleable Iron Cylinder, Push Rod.

Fig. 5215. Three-Hole Malleable Iron Brake Jaw.



Figs. 5216-5217. Malleable Iron Brake Lever Strut.

Fig. 5218. National Safety Brake Lever.



Figs. 5219-5220. National Safety Brake Lever and Application.

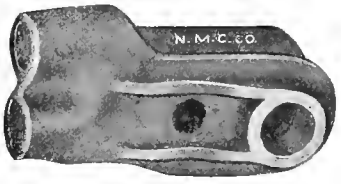


Fig. 5221. One-Hole Malleable Iron Brake Jaw.

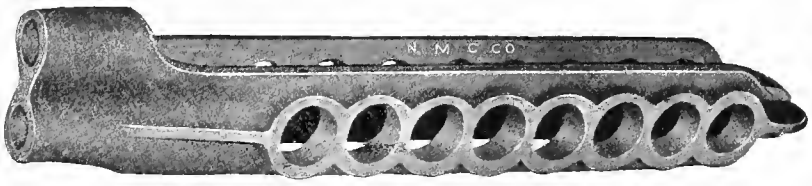


Fig. 5223. Malleable Iron Dead Lever Guide.
National Malleable Castings Co.

Fig. 5222. Two-Hole Malleable Iron Brake Jaw.

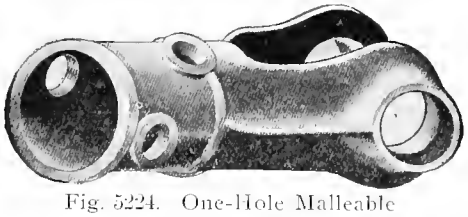
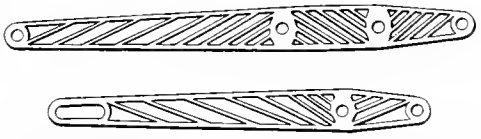


Fig. 5224. One-Hole Malleable Iron Brake Jaw.



Figs. 5225-5226. Malleable Iron Brake Levers.
Dayton Malleable Iron Co.

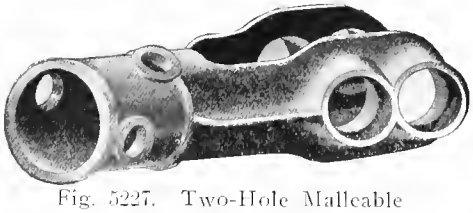


Fig. 5227. Two-Hole Malleable Iron Brake Jaw.

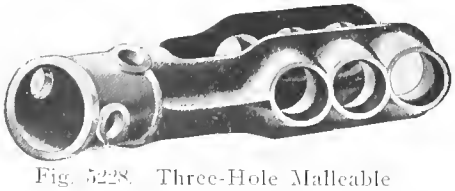
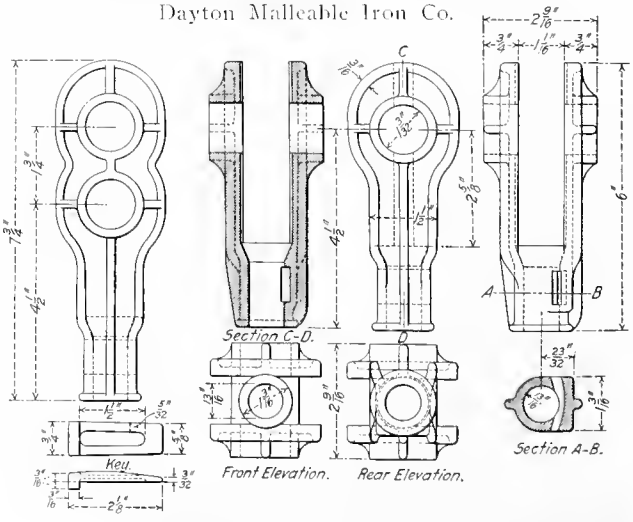


Fig. 5228. Three-Hole Malleable Iron Brake Jaw.
Western Railway Equipment Co.



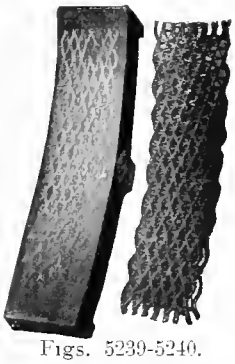
Figs. 5229-5234. "Creco" Brake Jaw.
Chicago Railway Equipment Co.

Fig. 5235.
Wheel Truing Brake Shoe with Flange. Abrasive Insert.
Wheel Truing Brake Shoe Co.

Fig. 5236.
Plain Cast Iron Brake Shoe.

Fig. 5237.
Congdon Shoe with Wrought Iron or Steel Inserts.

Fig. 5238.
Streeter Shoe with White Iron Inserts.



Figs. 5239-5240.
"Diamond S" Shoe with Expanded Steel Inserts.

Fig. 5241. Corning Shoe with Chilled Ends and Soft Iron Inserts.
Unflanged Car Shoes, Body Metal Cast Iron.

Fig. 5242. "U" Shoe with Inclined Ends Chilled.

Figs. 5243-5244.
Steel Back and Lug.

Fig. 5245. Steel Back Brake Shoe.
Weight, 20 lbs.

Fig. 5246. Steel Back Holding Broken Parts Together.

Fig. 5247. Scrap Steel Back Brake Shoe.
Weight, 5 lbs.

Figs. 5248-5249.
Steel Back and Lug.

Fig. 5250. Steel Back and Lug, Flanged Shoe.

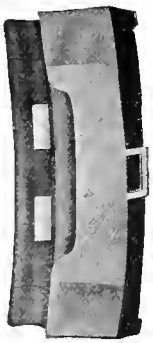


Fig. 5251.
"Diamond S" Type, Flanged Shoe.

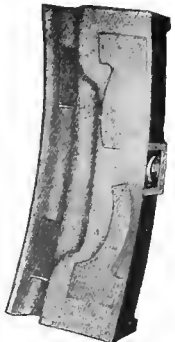


Fig. 5252.
Streeter Type, Flanged Shoe.

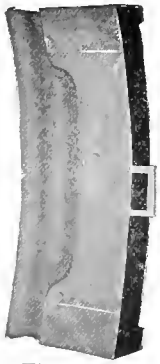
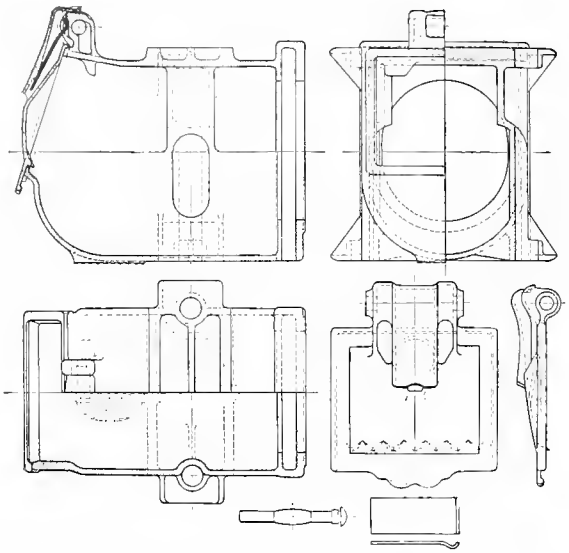


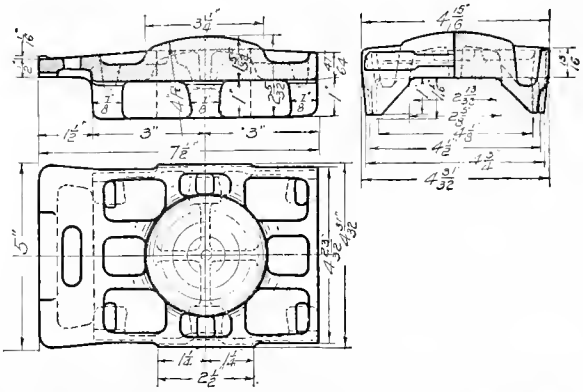
Fig. 5253.
Chilled Type, Flanged Shoe.

Flanged Coach Brake Shoes.

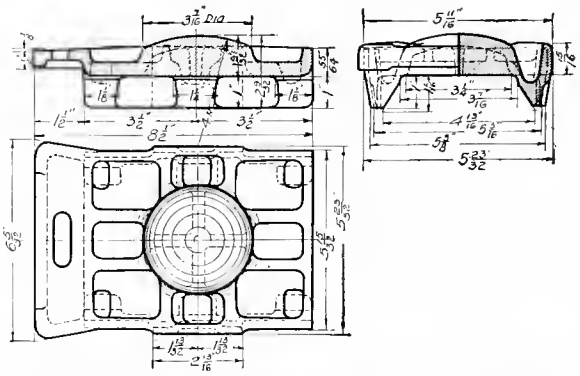
American Brake Shoe & Foundry Co.



Figs. 5254-5257. National Journal Box for 4¼-in. x 8-in., 5-in. x 9-in., 5½-in. x 10-in. and 6-in. x 11-in. Journals, Arch Bar Truck.



Figs. 5258-5260. National Equalizing Journal Box Wedge for 4¼-in. x 8-in. Journal.



Figs. 5261-5263. National Equalizing Journal Box Wedge for 5-in. x 9-in. Journal

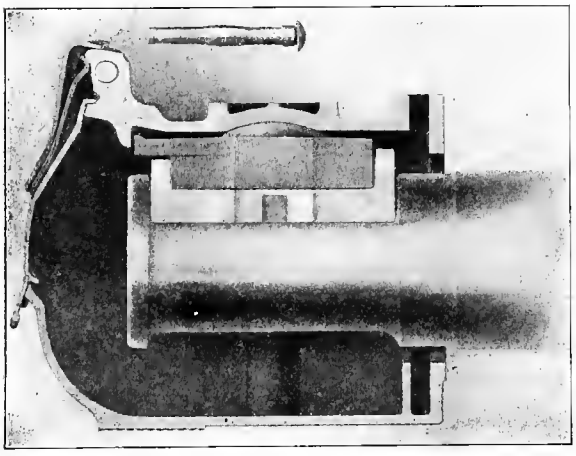
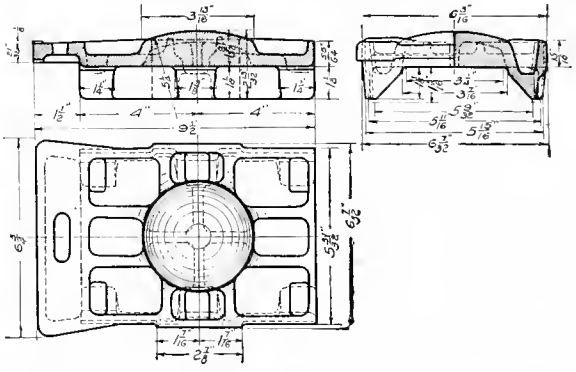


Fig. 5264. National Equalizing Wedge.



Figs. 5265-5267. National Equalizing Journal Box Wedge for 5½-in. x 10-in Journal.

Fig. 5268. National Journal Box.

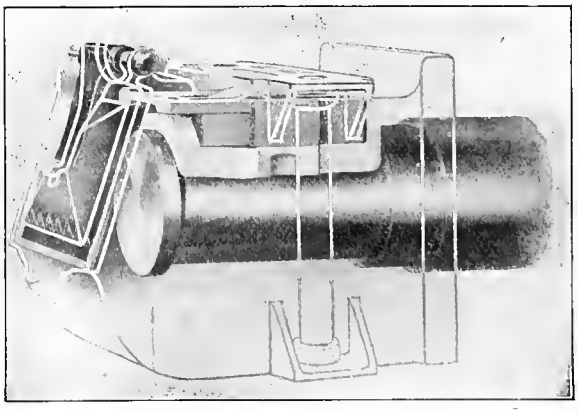
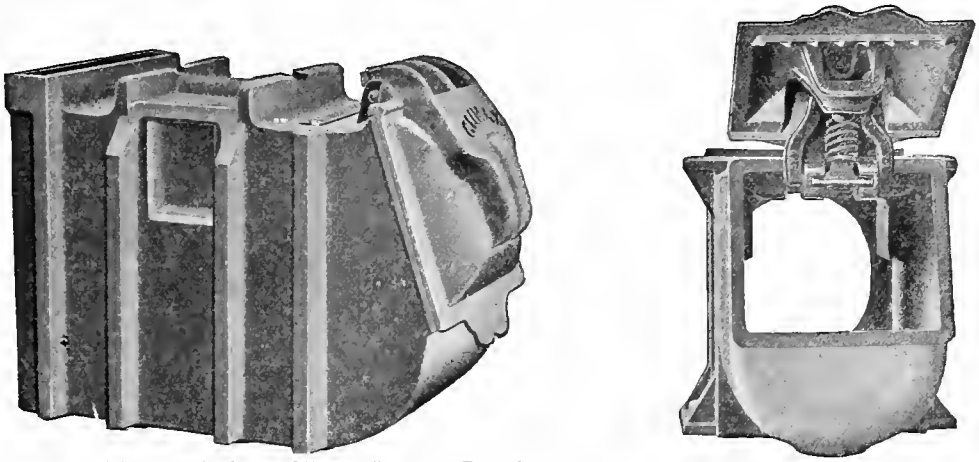
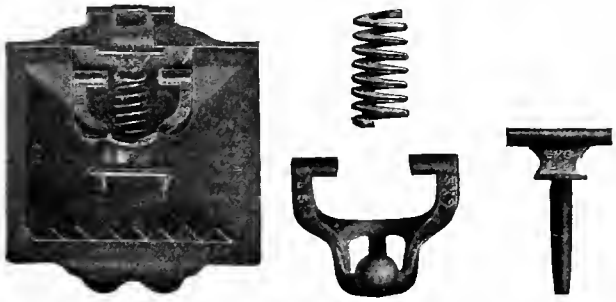


Fig. 5269. National Journal Box and Equalizing Wedge.

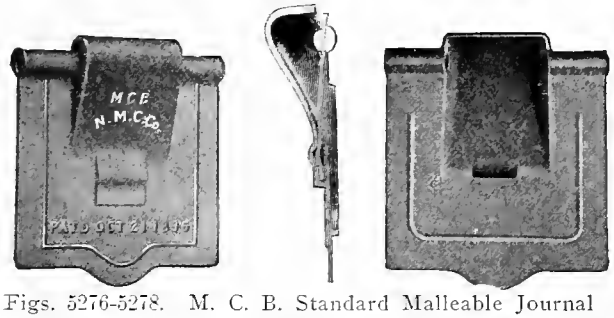
The National Malleable Castings Co.



Figs. 5270-5271. Climax Journal Box for Passenger Cars and Open View.



Figs. 5272-5275. Climax Journal Box Lid and Parts in Detail.



Figs. 5276-5278. M. C. B. Standard Malleable Journal Box Lids made for 3¾-in. x 7-in., 4¼-in. x 8-in., 5-in. x 9-in. and 5½-in. x 10-in. size Boxes.

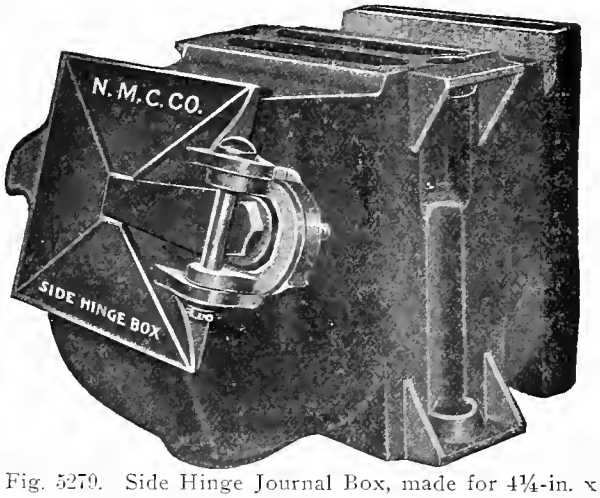
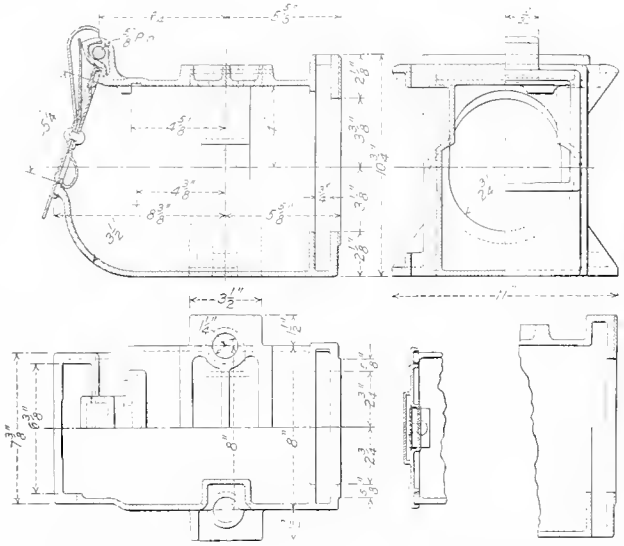


Fig. 5279. Side Hinge Journal Box, made for 4¼-in. x 8-in., 5-in. x 9-in. and 5½-in. x 10-in. Journals, Arch Bar Truck.

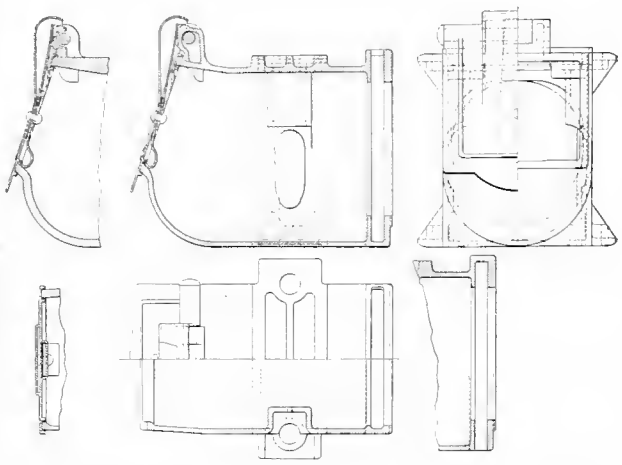
The National Malleable Castings Co.

Fig. 5280. Gould Journal Box with Inset Lid and Inset or Slotted Dust Guard.

Fig. 5281. Gould Passenger Journal Box with Inset Lid and Dust Guard.



Figs. 5282-5285. Standard M. C. B. Journal Box with "Creco" Lid for Journal 4¼ in. x 8 in.



Figs. 5286-5290. Standard M. C. B. Journal Box with "Creco" Lid for Journal 5 in. x 9 in. and 5½ in. x 10 in.

Chicago Railway Equipment Co.

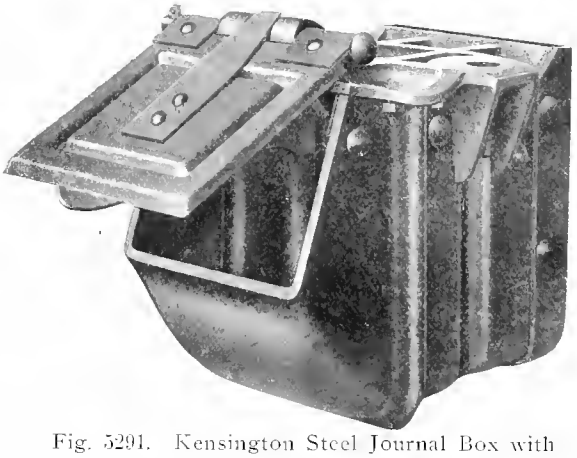


Fig. 5291. Kensington Steel Journal Box with Outside Lid Spring.

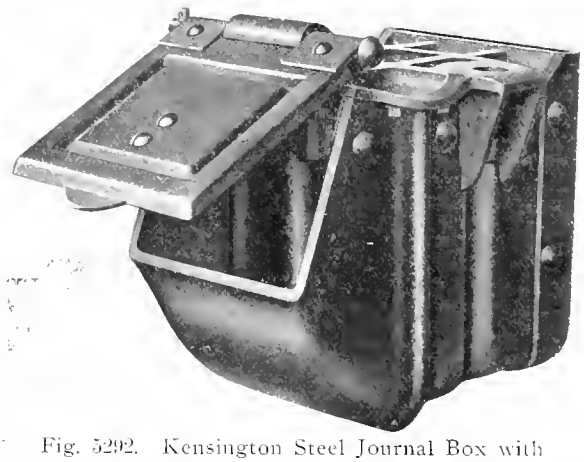


Fig. 5292. Kensington Steel Journal Box with Inside Lid Spring.

Union Spring & Manufacturing Co.

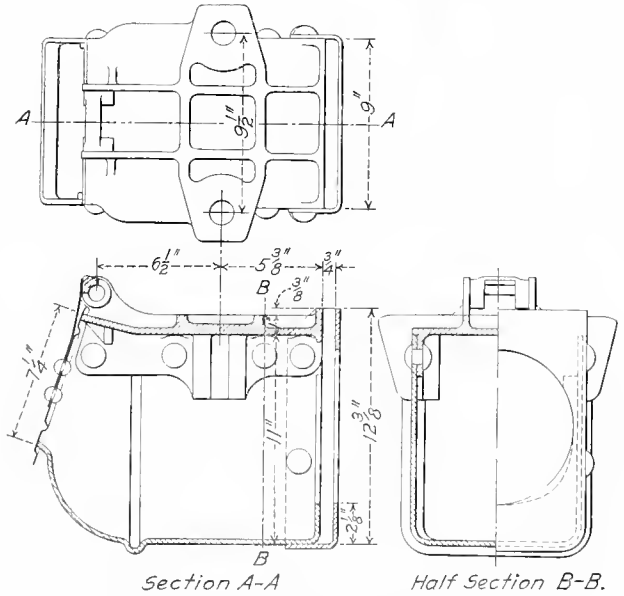
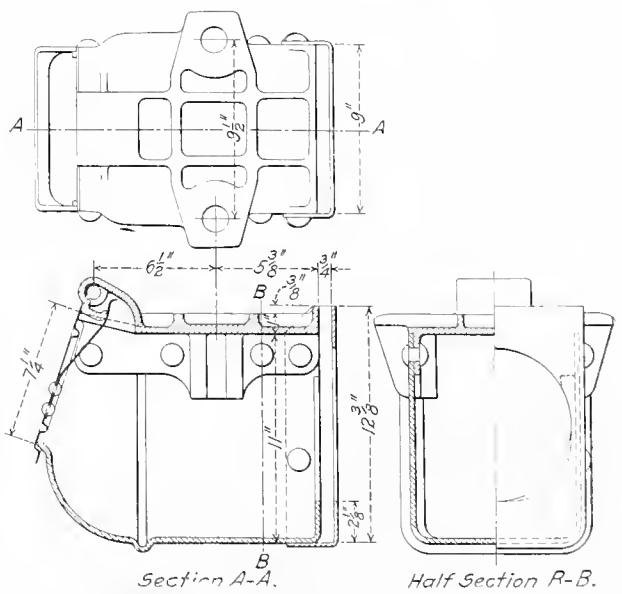
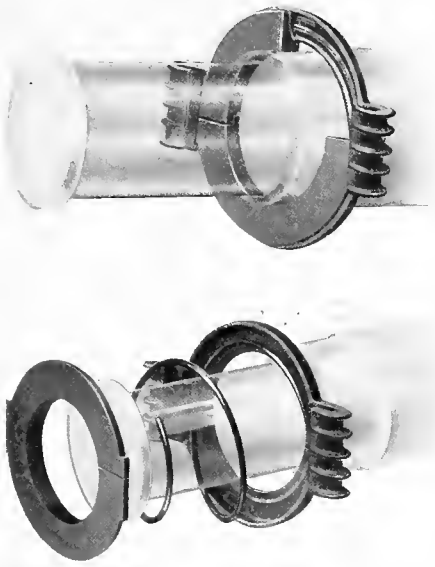


Fig. 5293-5295. Kensington Steel Journal Box with Outside Lid Spring.



Figs. 5296-5298. Kensington Steel Journal Box with Inside Lid Spring.

Union Spring & Manufacturing Co.



Figs. 5299-5300. McCord Outside Dust Guard.

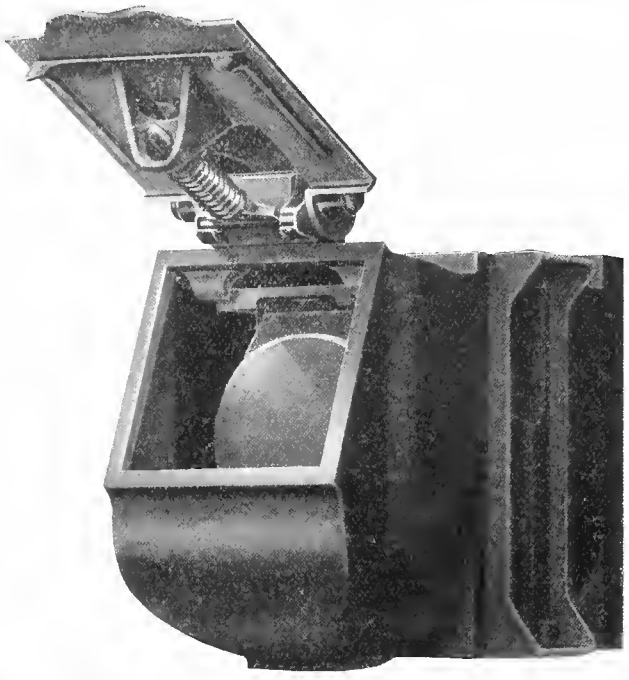


Fig. 5301. McCord Journal Box for Arch-Bar Truck.

Fig. 5302. McCord Passenger Journal Box with Steel Inserts and Outside Dust Guard.

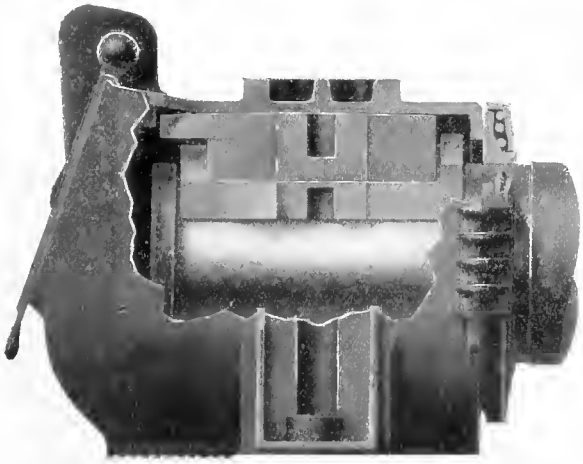
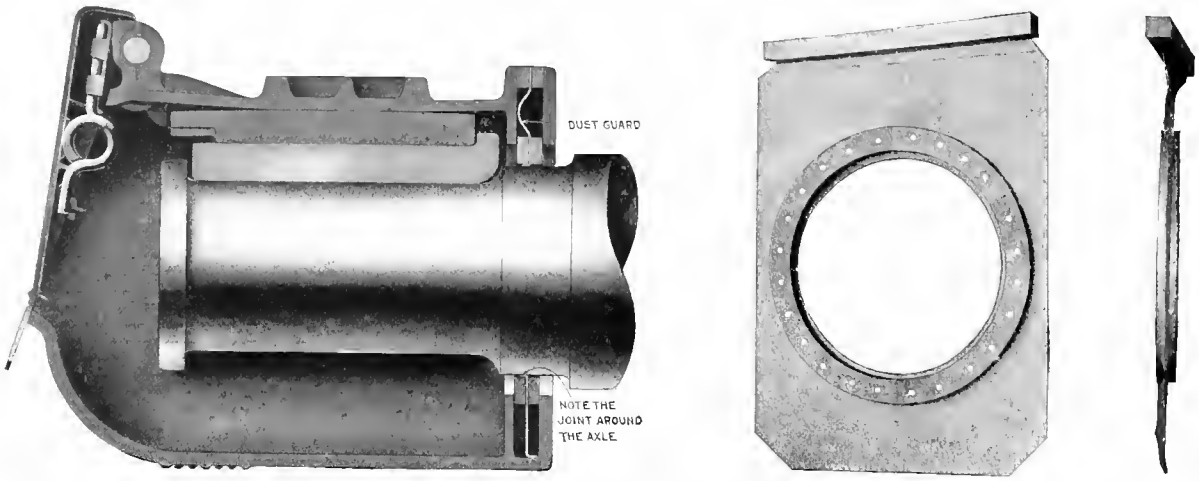


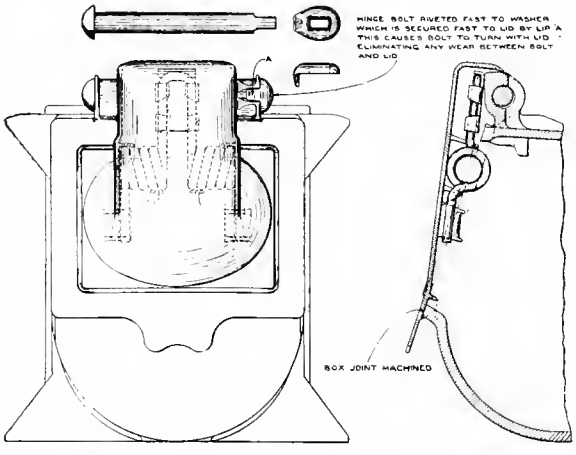
Fig. 5304. McCord Journal Box with Outside Dust Guard.

Fig. 5305. McCord Journal Box for Arch-Bar Truck.

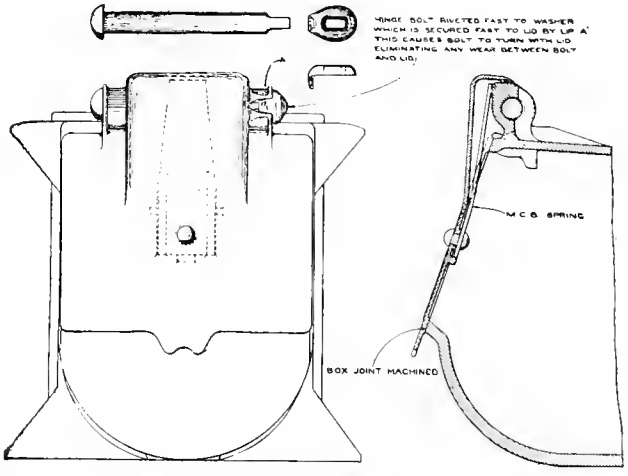
McCord & Co.



Figs. 5306-5308. Symington Journal Box with Symington Flexible Dust Guard.

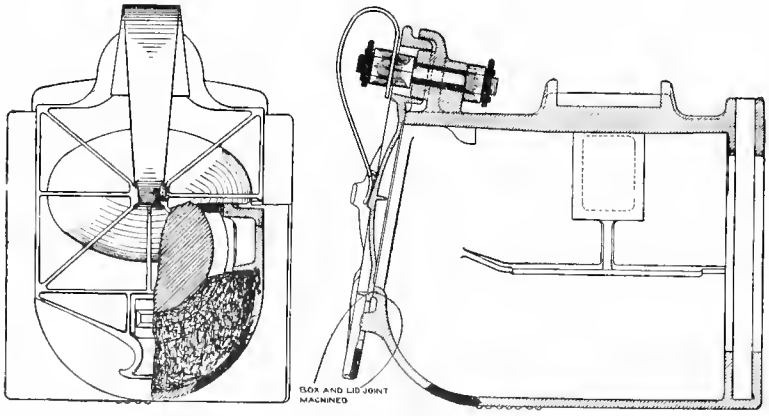


Figs. 5309-5310. Symington M. C. B. Freight Journal Box with Torsion Spring Lid.



Figs. 5311-5312. Symington M. C. B. Freight Journal Box with Flat Spring Lid.

T. H. Symington Co.



Figs. 5313-5314. Symington Passenger Journal Box Lid with Pivot Lid and Central Spring Pressure.
T. H. Symington Co.

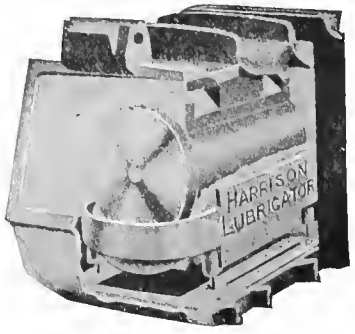
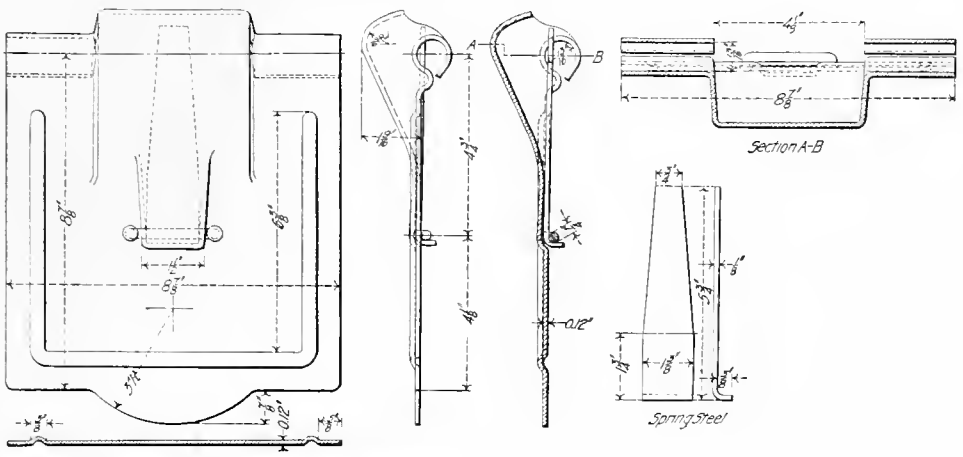
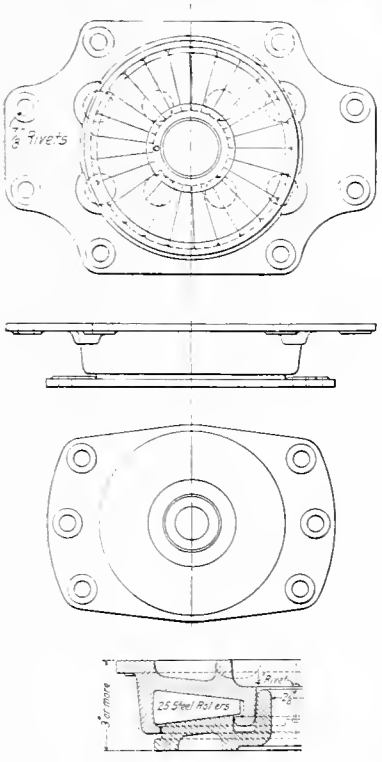


Fig. 5315. Harrison Lubricator.
Harrison-Williams Co.



Figs. 5316-5320. Davis Pressed Steel Journal Box Lid and Spring. Davis Solid Truss Brake Beam Co.



Figs. 5324-5327. Barber Roller Bearing Center Plate. Standard Car Truck Co.

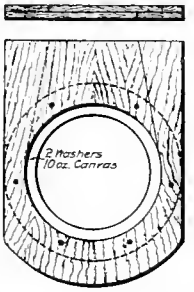


Fig. 5321. Waycott Supply Co. Waycott Dust Guard.

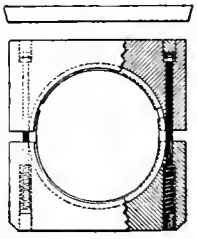


Fig. 5322. Harrison Dust Guard. Harrison Dust Guard Co.

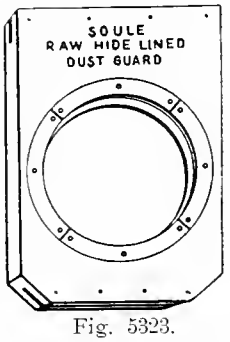
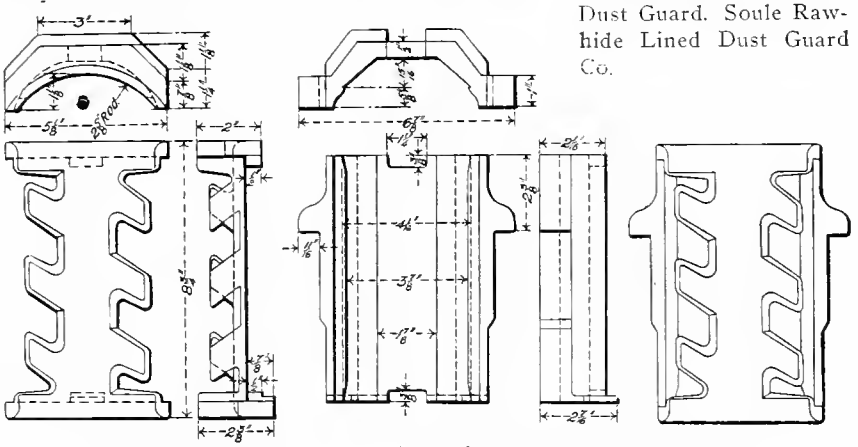
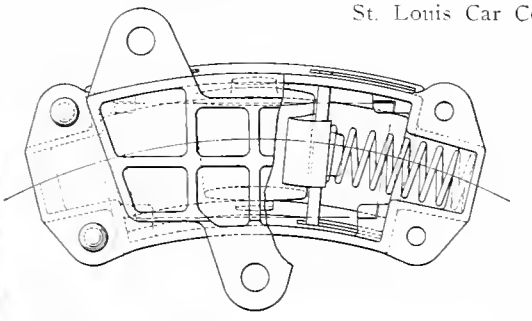


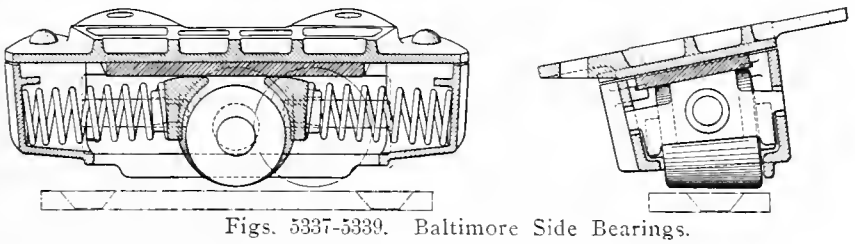
Fig. 5323. Soule Rawhide Lined Dust Guard. Soule Rawhide Lined Dust Guard Co.



Figs. 5328-5334. Spiral Journal Bearing for 5-in. x 9-in. Journals. St. Louis Car Co.

Figs. 5335-5336. Baltimore Ball Bearing.





Figs. 5337-5339. Baltimore Side Bearings. T. H. Symington Co.

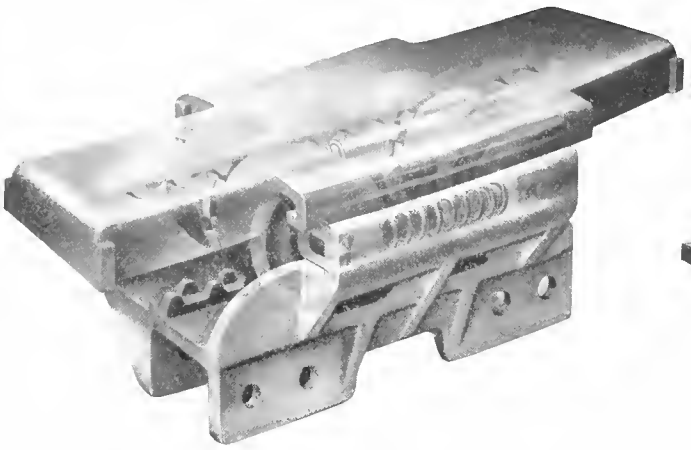


Fig. 5340. Miner Roller Side Bearing for Six-Wheel Passenger Trucks.

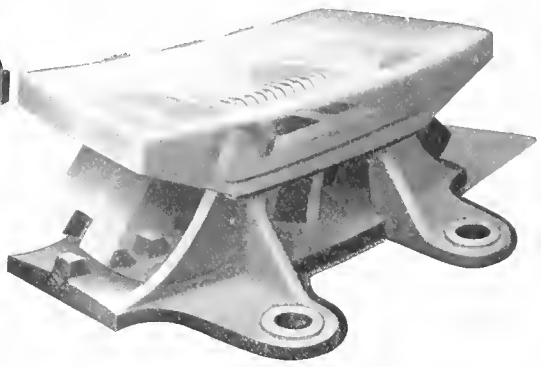
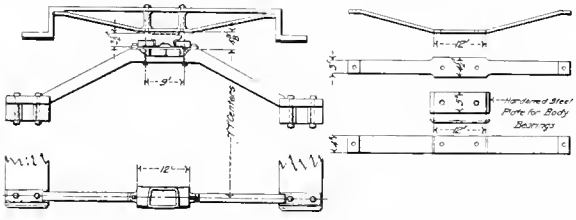
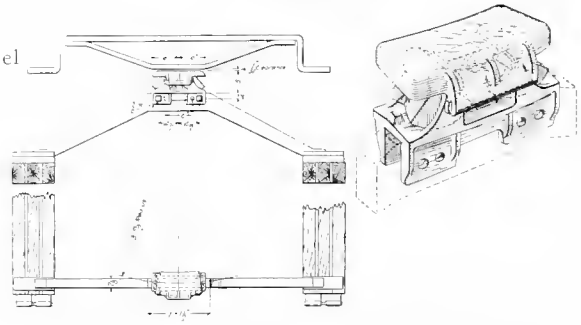


Fig. 5341. Gravity Side Bearing.
W. H. Miner Co.



Figs. 5342-5345. Application of "Creco" Roller Side Bearing to Six-Wheel Truck Bearing Bridge.
Chicago Railway Equipment Co.



Figs. 5346-5348. Application of Gravity Side Bearing to Six-Wheel Passenger Truck Bridge.
W. H. Miner Co.

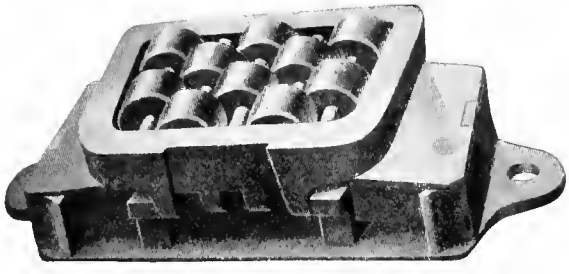
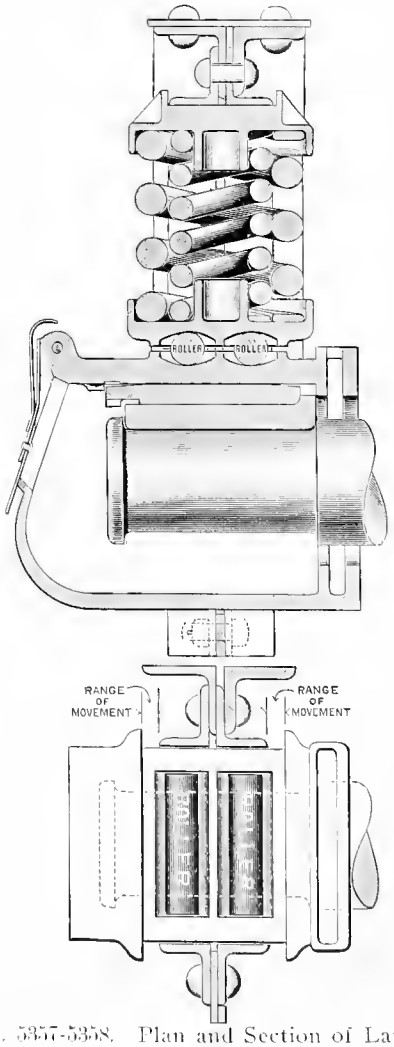
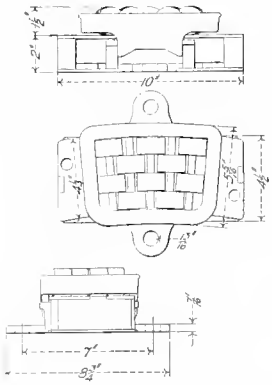
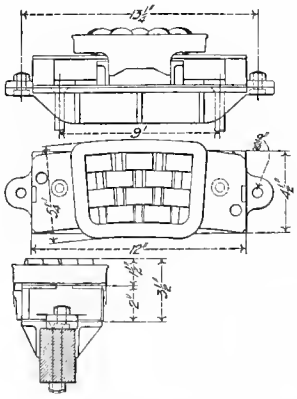


Fig. 5349. "Creco" Side Bearing, Style 4A, for Passenger Trucks.
Chicago Railway Equipment Co.





Figs. 5350-5352.
"Creco" Roller Side Bearing, Style 3A, for Freight Trucks.



Figs. 5354-5356.
"Creco" Roller Side Bearing, Style 7A for Six-Wheel Passenger Trucks.

Figs. 5357-5358. Plan and Section of Lateral Motion Device for Pedestal Trucks.

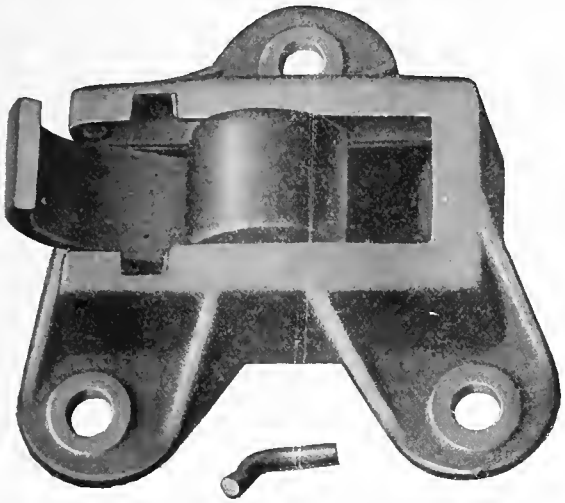


Fig. 5359. Body Roller, Closed Top, Side Bearing, Showing Parts.
Edwin S. Woods & Co.

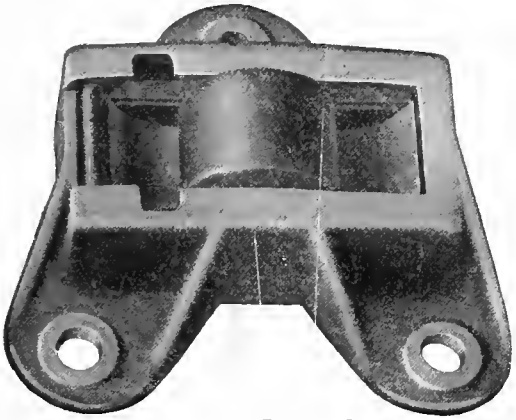
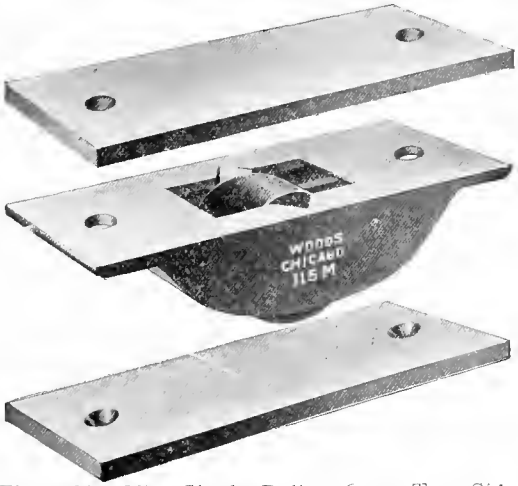


Fig. 5362. Body Roller, Closed Top, Side Bearing.
Edwin S. Woods & Co.



Figs. 5364-5365. Single Roller, Open Top, Side Bearing for Freight Cars.
Edwin S. Woods & Co.

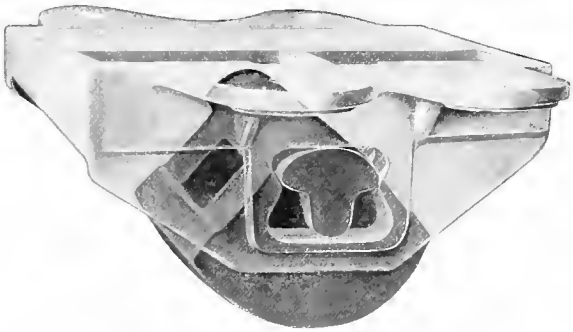


Fig. 5360. Cardwell Rocker Side Bearing.
Cardwell Mfg. Co.

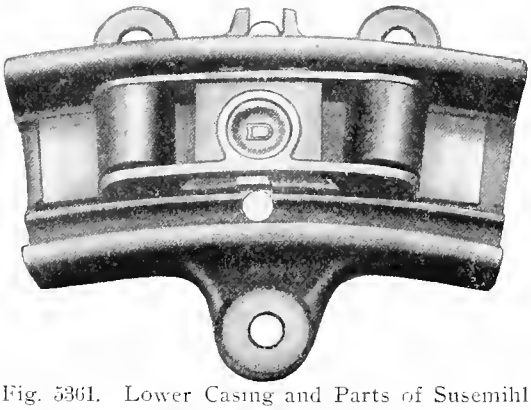


Fig. 5361. Lower Casing and Parts of Susemihl Side Bearing.
American Steel Foundries.

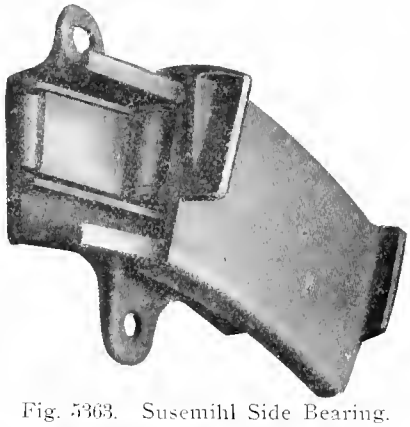


Fig. 5363. Susemihl Side Bearing.
American Steel Foundries.

Fig. 5366. Single Roller, Open Top, Side Bearing for Passenger Cars.
Edwin S. Woods & Co.

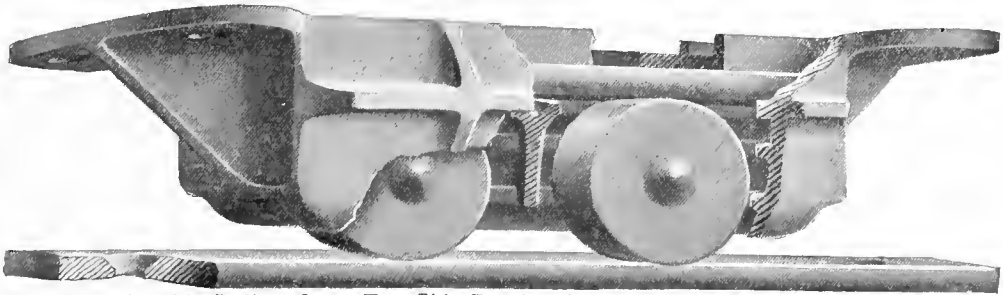


Fig. 5367. Double Roller, Open Top Side Bearing for Four-Wheel Trucks. Edwin S. Woods & Co.

Fig. 5368. Single-Coil Controller Spring.

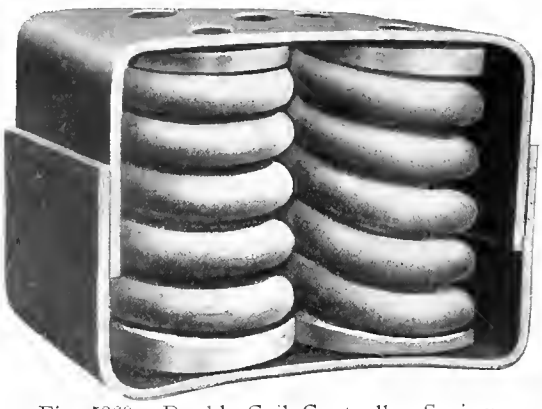


Fig. 5369. Double-Coil Controller Spring.
Simplex Railway Appliance Co.

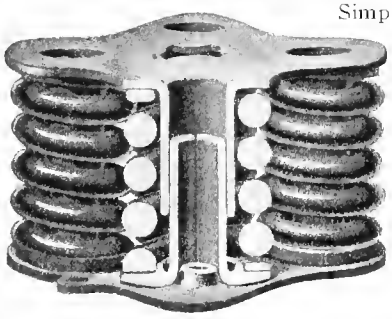
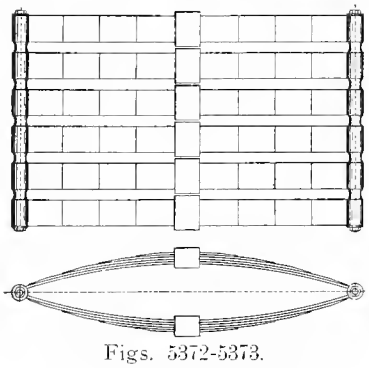
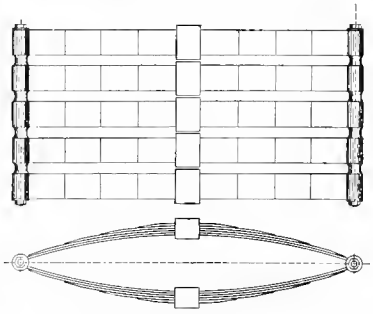


Fig. 5370. McCord Spring Dampener. McCord & Co.

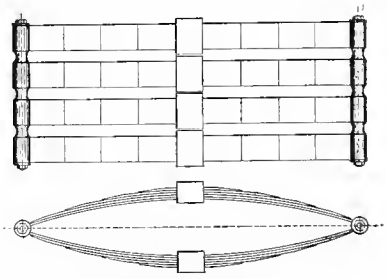
Fig. 5371. Four-Coil Bolster Spring.



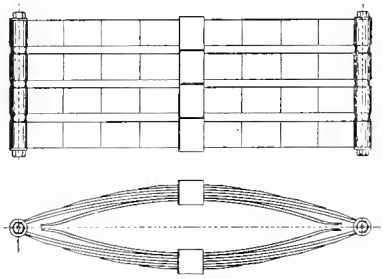
Figs. 5372-5373.
Sextuple Elliptic Spring.



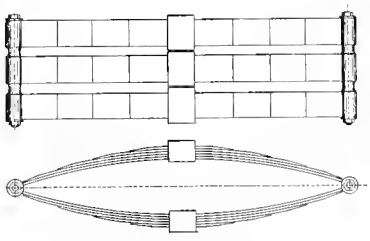
Figs. 5374-5375.
Quintuple Elliptic Spring.



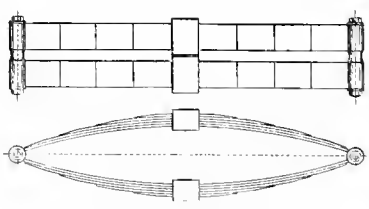
Figs. 5376-5377.
Quadruple Elliptic Spring.



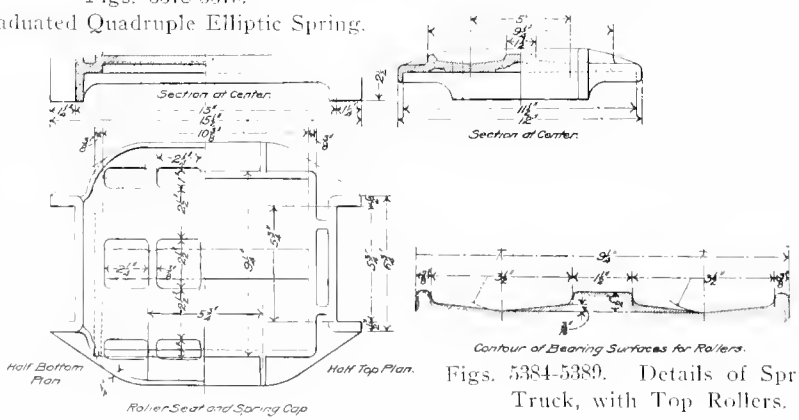
Figs. 5378-5379.
Graduated Quadruple Elliptic Spring.



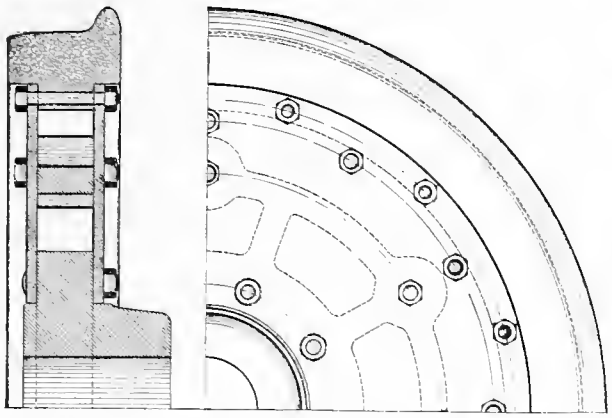
Figs. 5380-5381.
Triple Elliptic Spring.



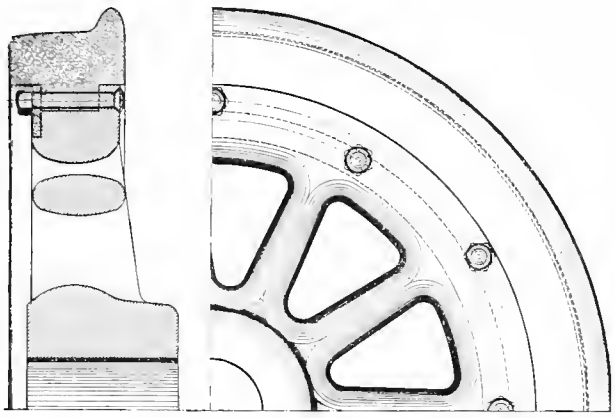
Figs. 5382-5383.
Double Elliptic Spring.



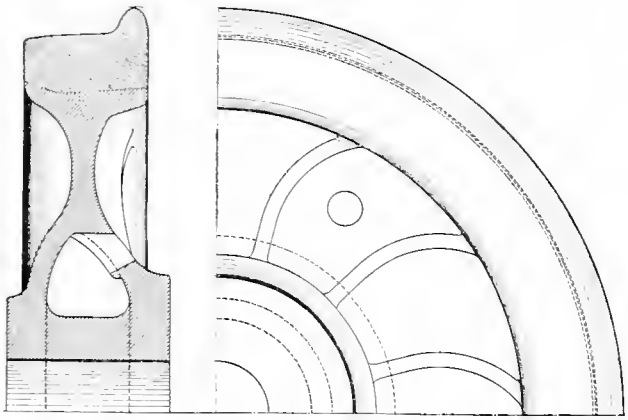
Figs. 5384-5389. Details of Spring Caps and Seats for Barber Truck, with Top Rollers. Standard Car Truck Co.



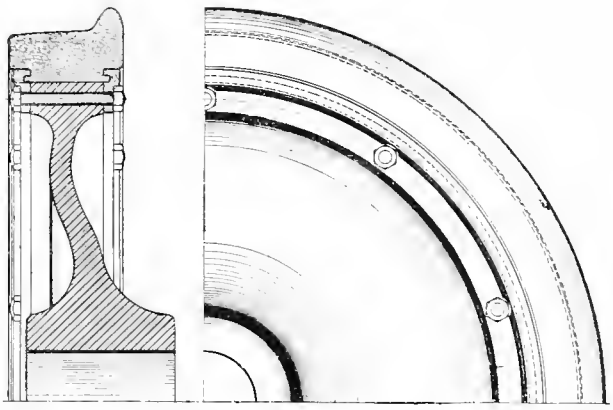
Figs. 5390-5391. Paige Plate Coach Wheel. Cast Iron Spider with Steel Plates Secured by Bolts.



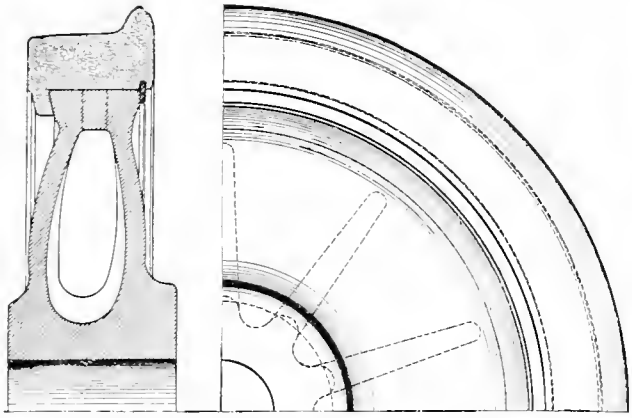
Figs. 5392-5393. Paige Spoke Coach Wheel. Cast Iron Spoke Center with Tire Secured by Shrinkage Retaining Rings and Bolts.



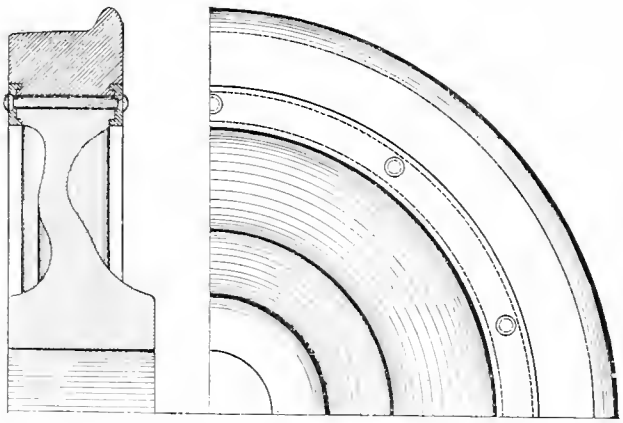
Figs. 5394-5395. Fused Coach Wheel. Cast Iron Plate Center with Tire Secured by Welding.



Figs. 5396-5397. National, No. 6, Coach Wheel. Wrought Iron Disc Center with Tire Secured by Shrinkage and Mansell Retaining Rings.

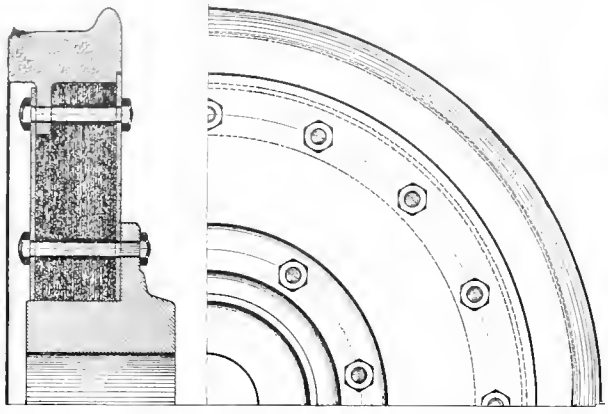


Figs. 5398-5399. National, No. 2, Coach Wheel. Cast Iron Double Plate Center, having Internal Ribs with Tire Secured by Shrinkage and Gibson Retaining Ring.

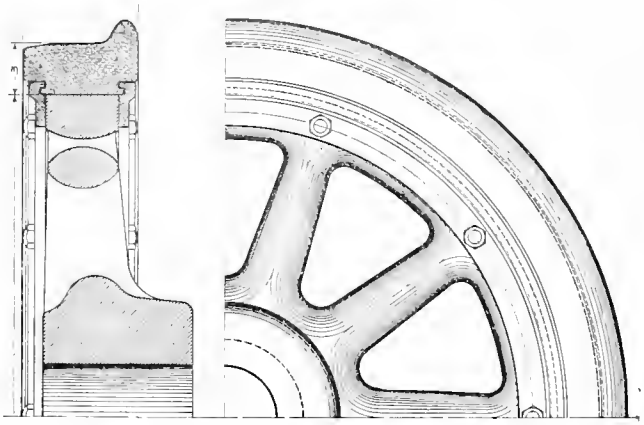


Figs. 5400-5401. National, No. 6, Coach Wheel. Wrought Iron Disc Center with Tire Secured by Shrinkage and Double Lip Retaining Rings.

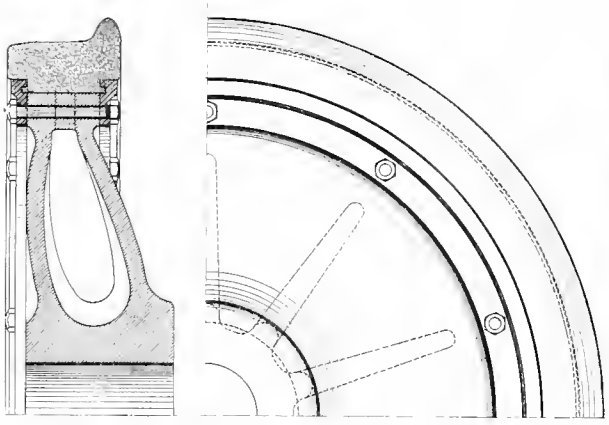
Railway Steel-Spring Co.



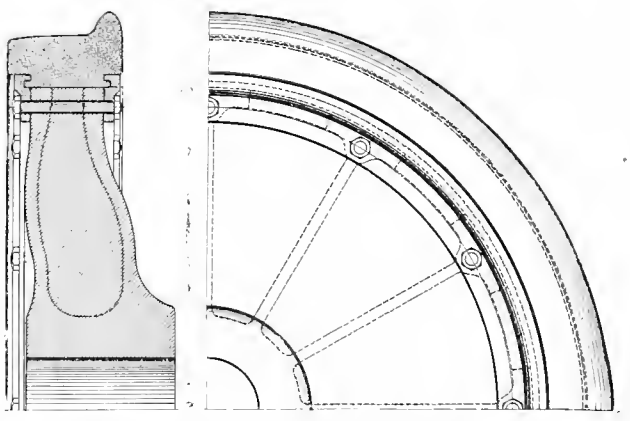
Figs. 5402-5403. Allen, No. 1, Coach Wheel. Compressed Paper Center with Tire Secured by Bolts.



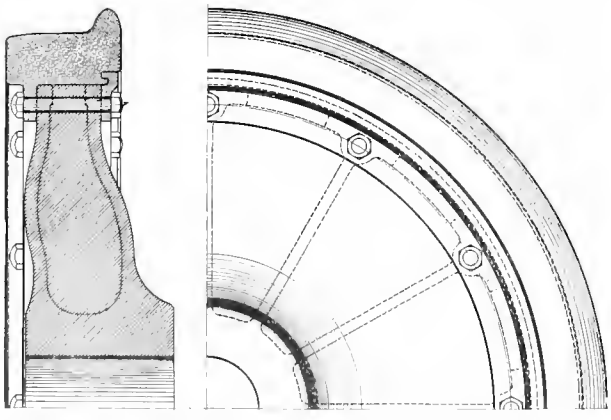
Figs. 5404-5405. National, No. 3, Coach Wheel. Cast Iron Spoke Center with Tire Secured by Shrinkage and Mansell Retaining Rings.



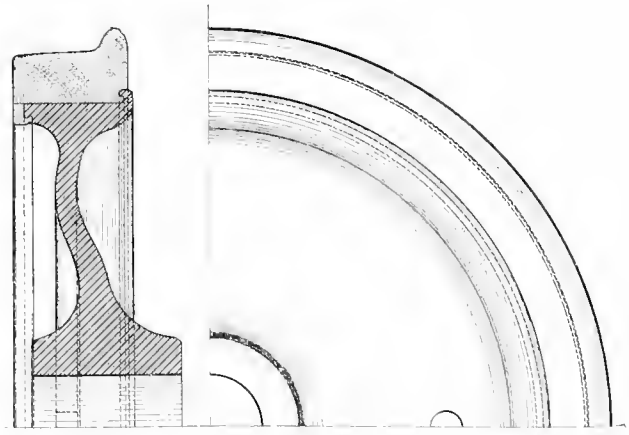
Figs. 5406-5407. National, No. 4, Coach Wheel. Cast Iron Double Plate Center, having Internal Ribs, with Tire Secured by Shrinkage and Mansell Retaining Rings.



Figs. 5408-5409. Allen No. 9, Coach Wheel. Cast Iron Double Plate Center with Tire Secured by Shrinkage and Mansell Retaining Rings.

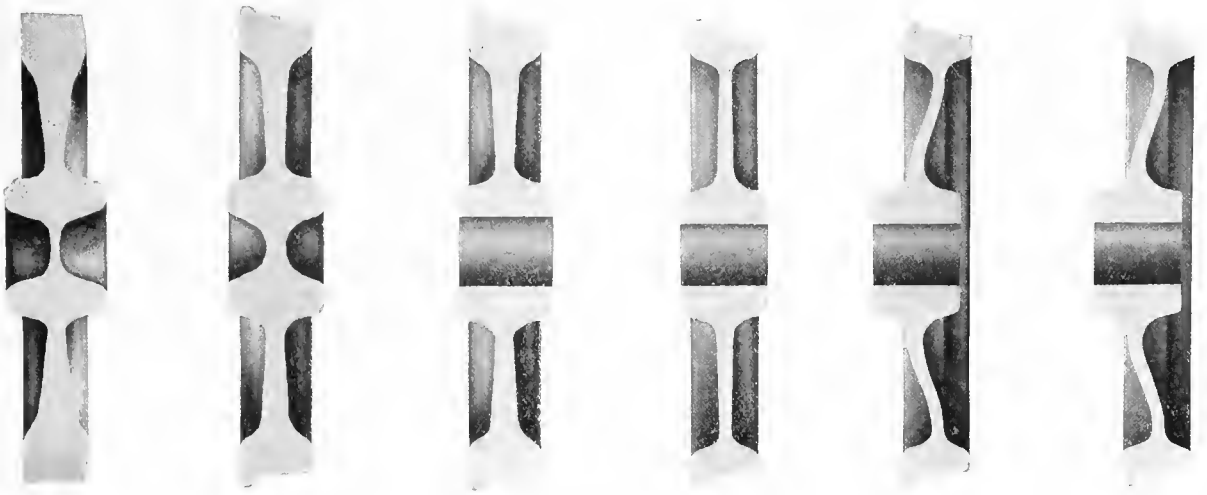


Figs. 5410-5411. Allen, No. 11, Coach Wheel. Cast Iron Double Plate Center, having Internal Spokes, with Tire Secured by Shinkage, Bolts and Mansell Retaining Ring.

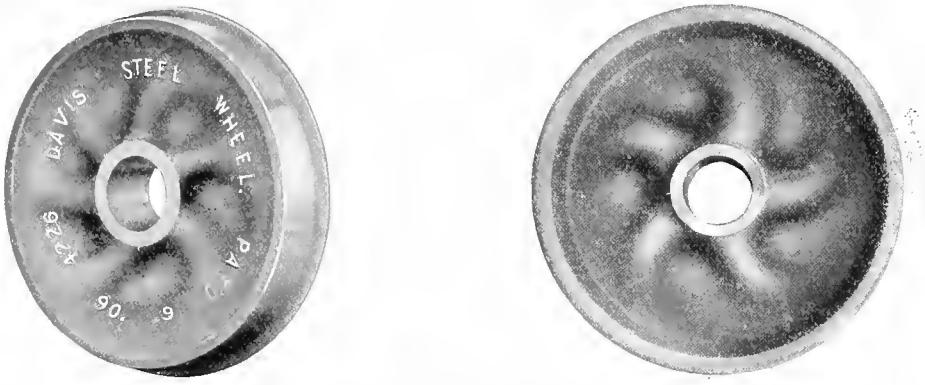


Figs. 5412-5413. Boies, No. 2, Coach Wheel. Wrought Iron Disc Center with Tire Secured by Shrinkage and Integral Lock.

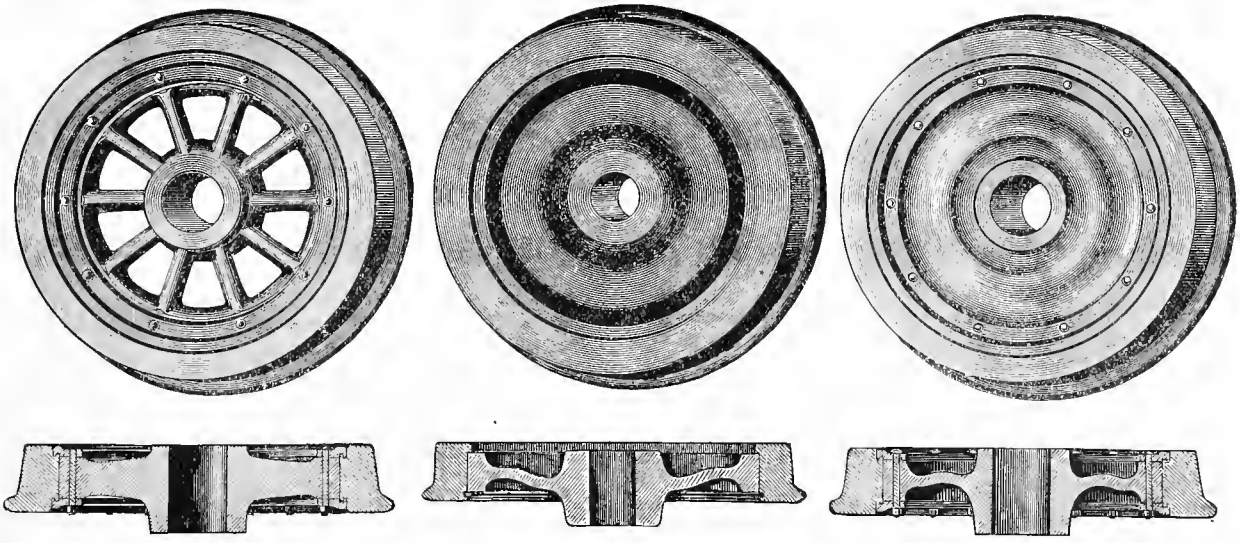
Railway Steel Spring Co.



Figs. 5414-5419. Six Stages of Manufacture of Schoen Steel Wheels.
Carnegie Steel Co.



Figs. 5420-5421. Davis Steel Wheel. American Steel Foundries.

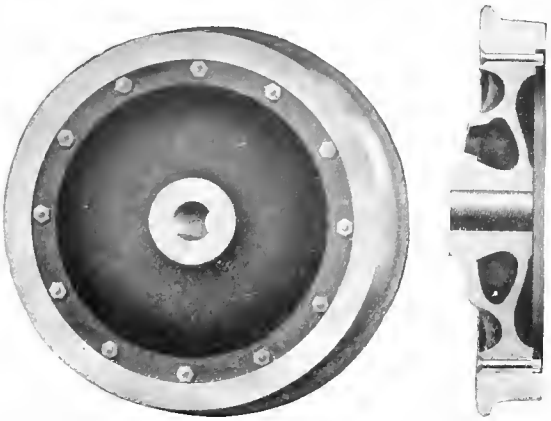


Figs. 5422-5423. No. 3 Krupp Wheel,
Cast Iron Spoke Center.
Tire Secured by Wrought Iron Retaining Rings.

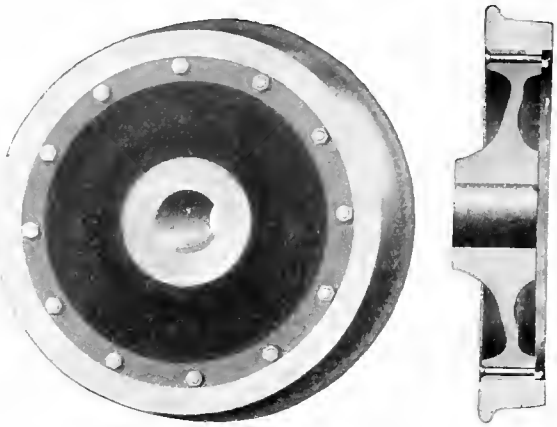
Figs. 5424-5425. No. 14 Krupp Wheel,
Forged Steel Disc Center.
Steel Tire Secured with Bute Fastening.

Figs. 5426-5427. No. 1 Krupp Wheel,
Forged Steel Disc Center.
Tire Secured by Wrought Iron Retaining Rings.

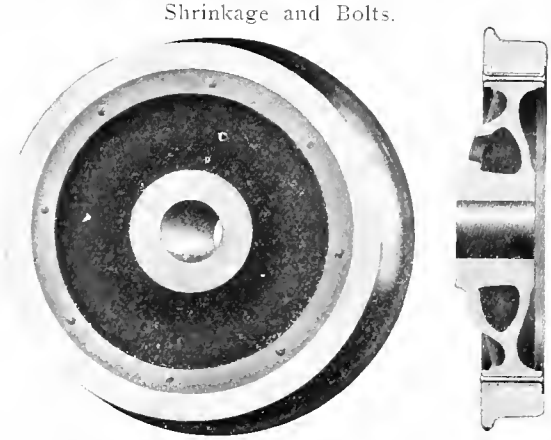
Thomas Prosser & Son.



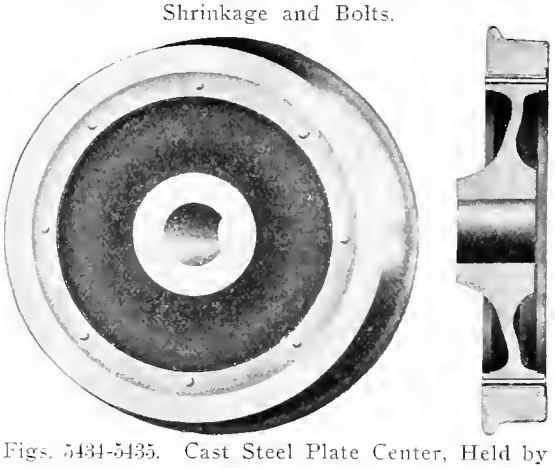
Figs. 5428-5429. Cast Iron Plate Center, Held by Shrinkage and Bolts.



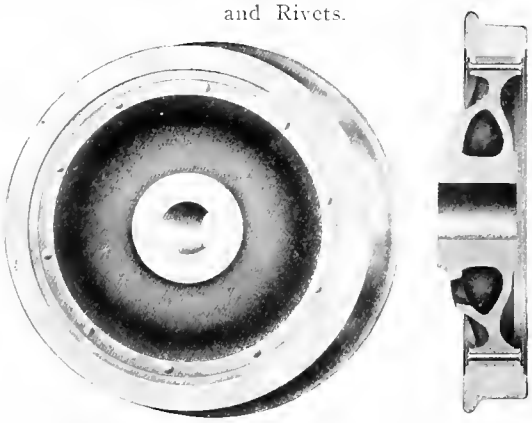
Figs. 5430-5431. Cast Steel Plate Center, Held by Shrinkage and Bolts.



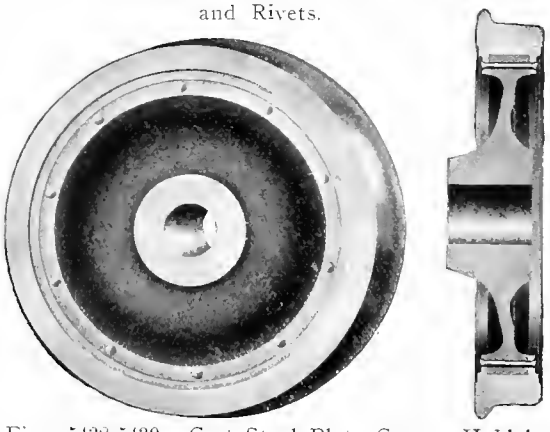
Figs. 5432-5433. Cast Iron Plate Center, Held by Shrinkage, Double Lip Retaining Rings and Rivets.



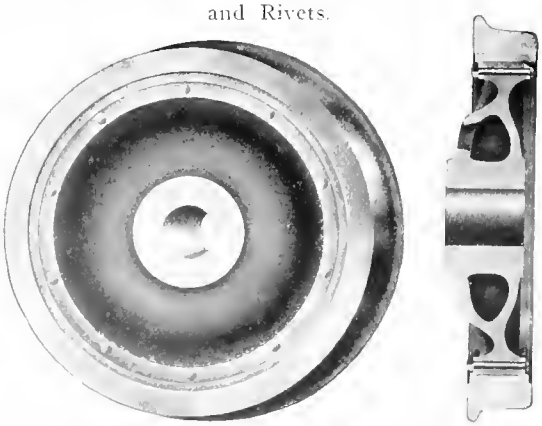
Figs. 5434-5435. Cast Steel Plate Center, Held by Shrinkage, Double Lip Retaining Rings and Rivets.



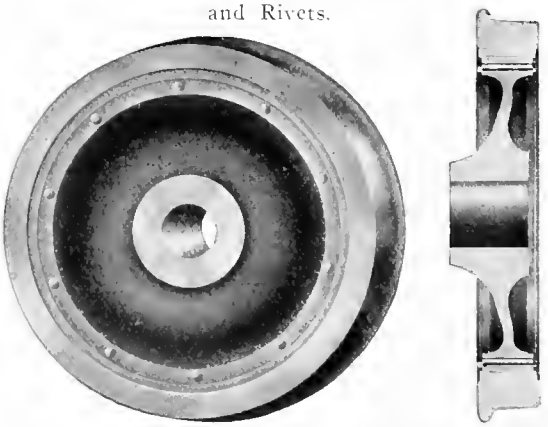
Figs. 5436-5437. Cast Iron Plate Center, Held by Shrinkage, Mansell Retaining Rings and Rivets.



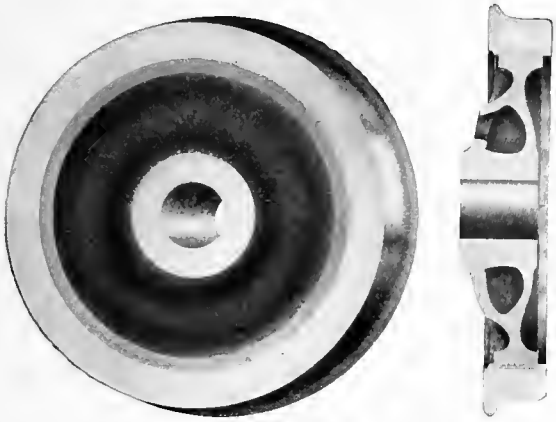
Figs. 5438-5439. Cast Steel Plate Center, Held by Shrinkage, Mansell Retaining Rings and Rivets.



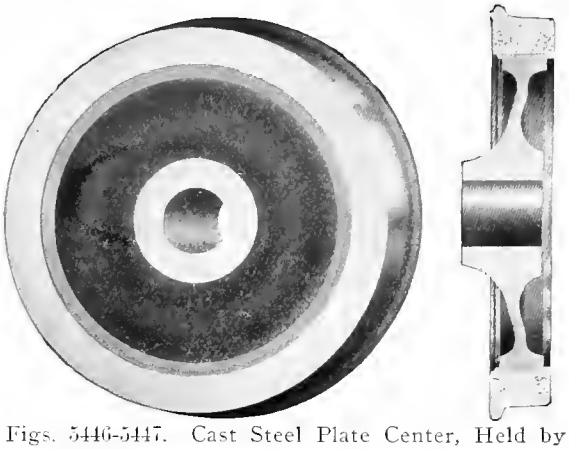
Figs. 5440-5441. Cast Iron Plate Center, Held by Shrinkage, Mansell Retaining Rings and Bolts.



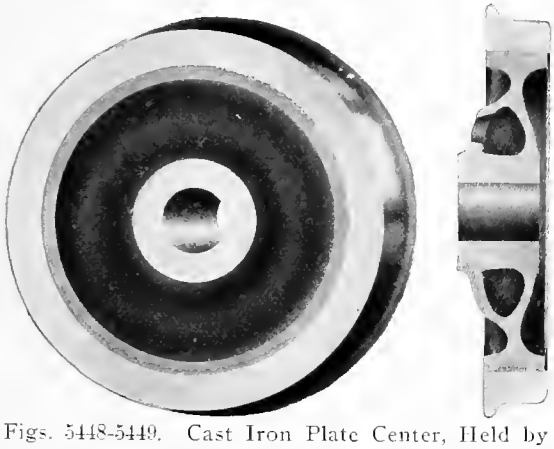
Figs. 5442-5443. Cast Steel Plate Center, Held by Shrinkage, Mansell Retaining Rings and Bolts.



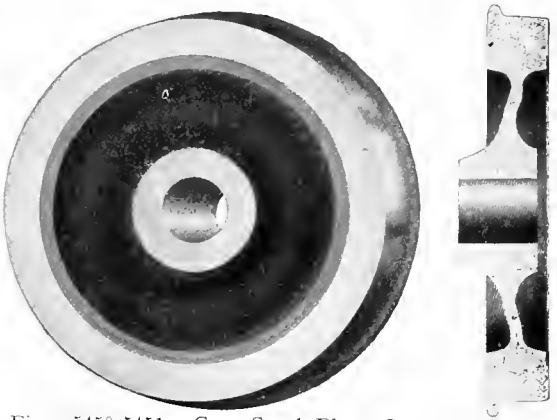
Figs. 5444-5445. Cast Iron Plate Center, Held by Shrinkage and Gibson Retaining Ring.



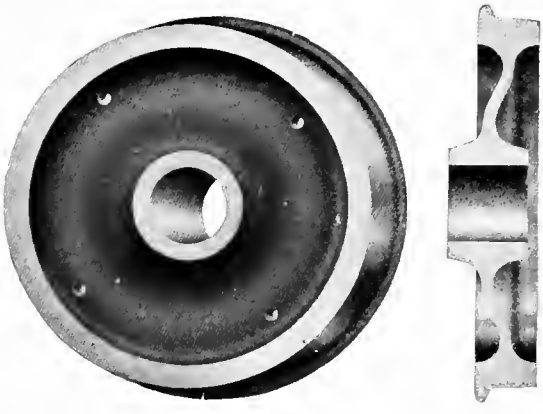
Figs. 5446-5447. Cast Steel Plate Center, Held by Shrinkage and Gibson Retaining Ring.



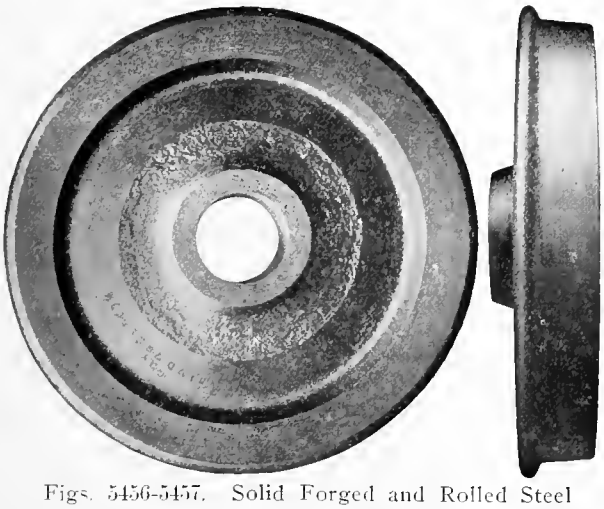
Figs. 5448-5449. Cast Iron Plate Center, Held by Shrinkage and Shoulder.



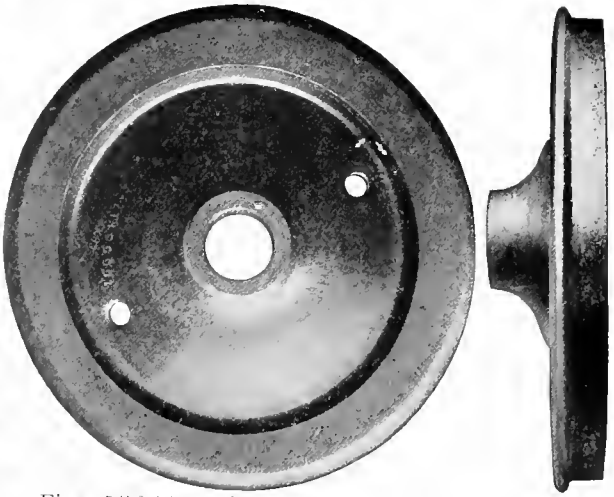
Figs. 5450-5451. Cast Steel Plate Center, Held by Shrinkage and Shoulder.



Figs. 5452-5453. Solid Rolled Steel Wheel. Standard Steel Works Co.



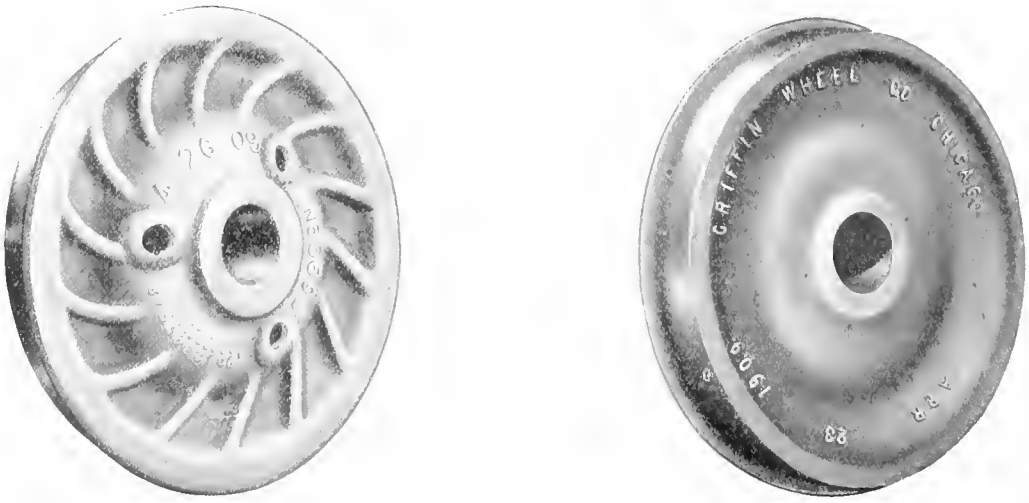
Figs. 5456-5457. Solid Forged and Rolled Steel Freight Car Wheel. Carnegie Steel Co.



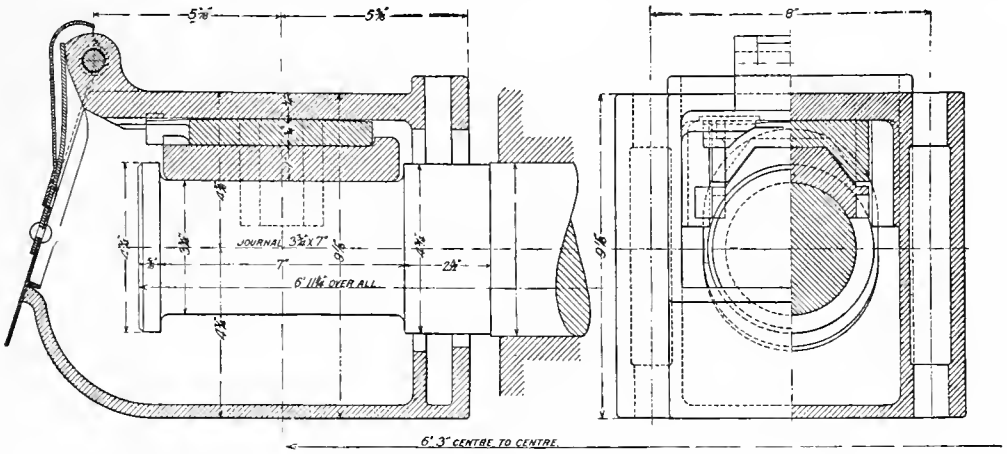
Figs. 5458-5459. Solid Forged and Rolled Steel Interurban Car Wheel.

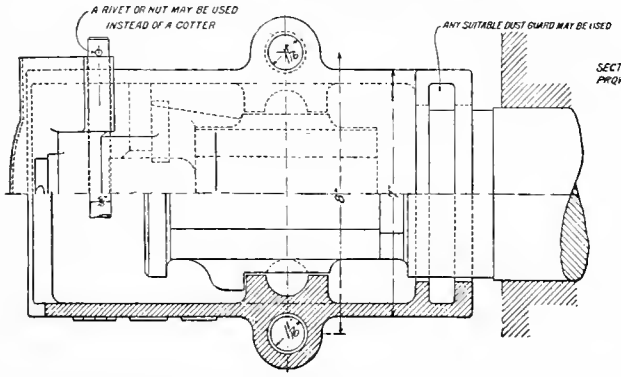
Figs. 5460-5461. 33-Inch Channel Spoke Cast Iron Wheel for Electric Motor Cars, City Service.

Figs. 5462-5463. 33-Inch Double Plate Cast Iron Wheel for Electric Motor Cars, Interurban Service.

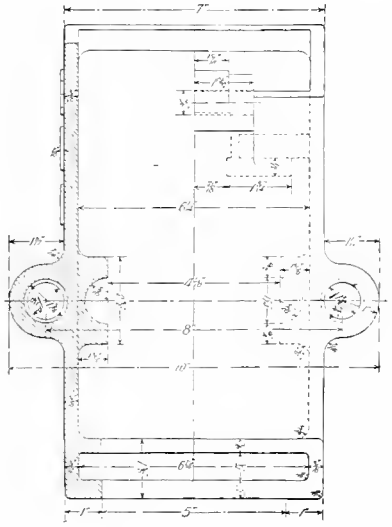


Figs. 5464-5465. 33-Inch, 665-lb. Double Plate Cast Iron Wheel for 80,000 lbs. Capacity Freight Cars. Griffin Wheel Co.

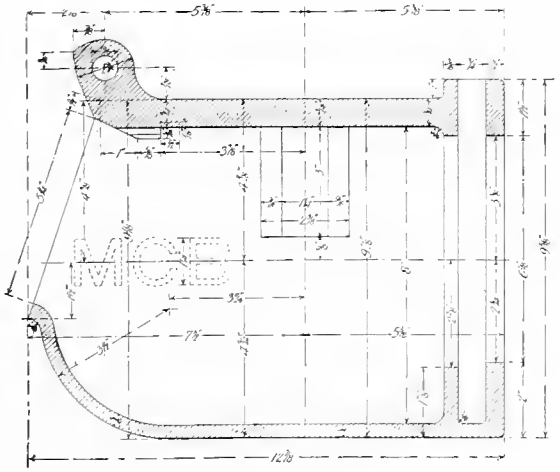


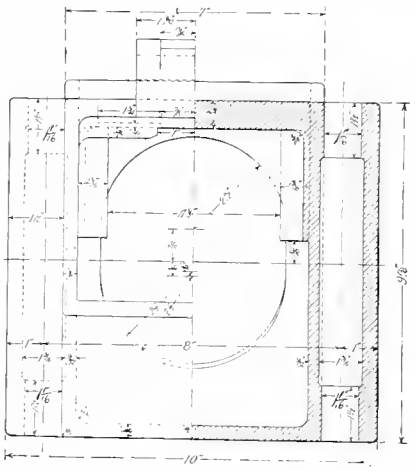


SECTION OF BOX MAY BE MADE EITHER CIRCULAR OR SQUARE BELOW THE CENTER LINE, PROVIDED ALL THE ESSENTIAL DIMENSIONS ARE ADHERED TO.



Figs. 5466-5468. Standard Journal Box and Contained Parts for Journal 3¾ in. x 7 in. Sheet 1.





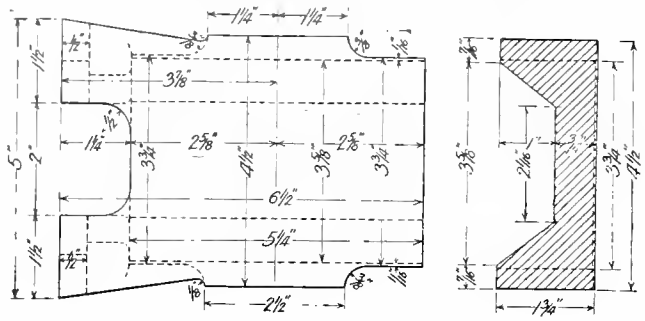
WIDTH OF BOX OVER ALL WHERE LID FITS SHOULD BE 7¼ INCHES IN ACCORDANCE WITH BALLOT OF 1892 INSTEAD OF 7 INCHES, AS SHOWN HERE. SEE PLATE III B PROCEEDINGS 1892

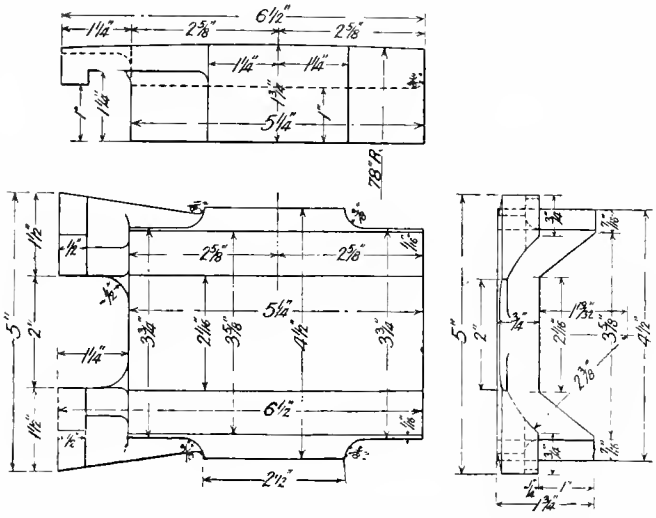
NOTE

IF THE METHOD OF MOULDING DOES NOT PERMIT OF PLACING THE LETTERS M.C.B. ON THE SIDE OF THE JOURNAL BOX, THEY MAY BE PLACED ON THE TOP BETWEEN THE HINGE LUG & THE ARCH BAR SEAT

SECTION OF BOX MAY BE MADE EITHER CIRCULAR OR SQUARE BELOW THE CENTER LINE, PROVIDED ALL THE ESSENTIAL DIMENSIONS ARE ADHERED TO. WHEN JOURNAL BOX IS MADE OF MALLEABLE IRON, REDUCTION IN THICKNESS OF METAL AND CORING TO LIGHTEN WEIGHT IS PERMISSIBLE, PROVIDED ALL THE ESSENTIAL DIMENSIONS WHICH AFFECT INTERCHANGEABILITY AND THE PROPER FITTING OF CONTAINED PARTS, ARE ADHERED TO.

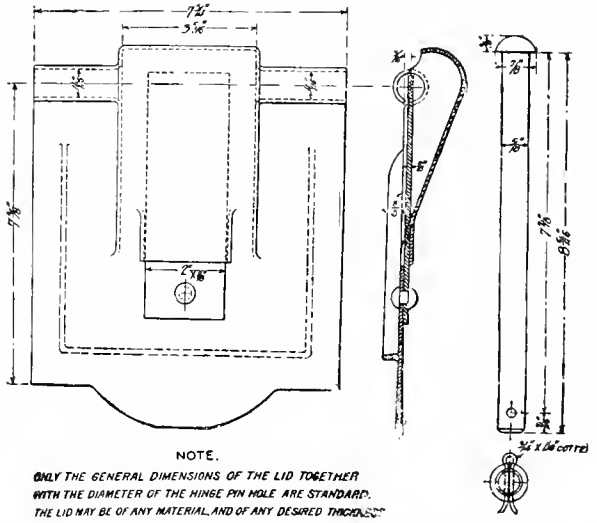
Figs. 5469-5471. Standard Journal Box for Journal 3¾ in. x 7 in. Sheet 2.



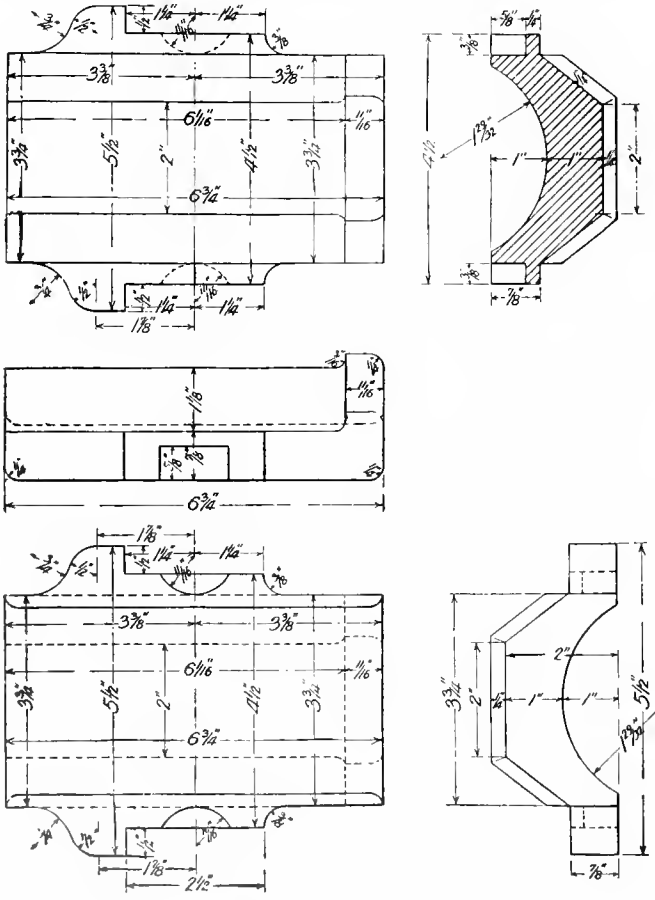


NOTE.—*Skeleton wedge of malleable iron or steel may be used provided the essential dimensions are adhered to. The lid spring may be of any design and may be secured to the lid by any practicable method, provided that it works properly on the standard box and is of the designated section, 2 in. x ⅛ in. A rivet or nut may be used instead of a cotter in hinge pin if preferred.*

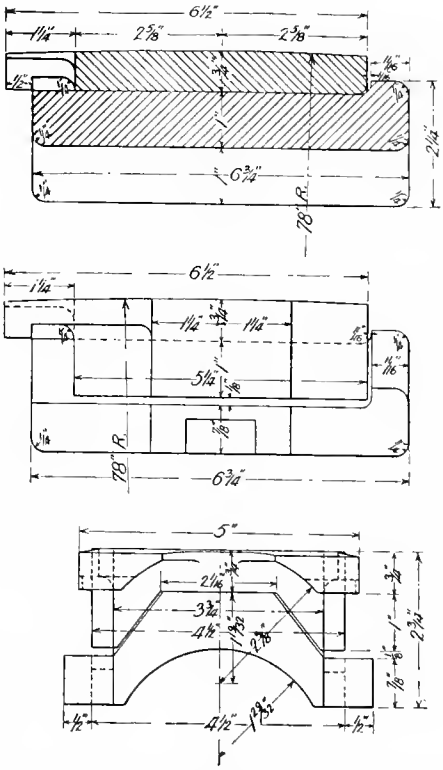
Figs. 5472-5476. Standard Wedge for Journal 3¾ in. x 7 in. Sheet 3.



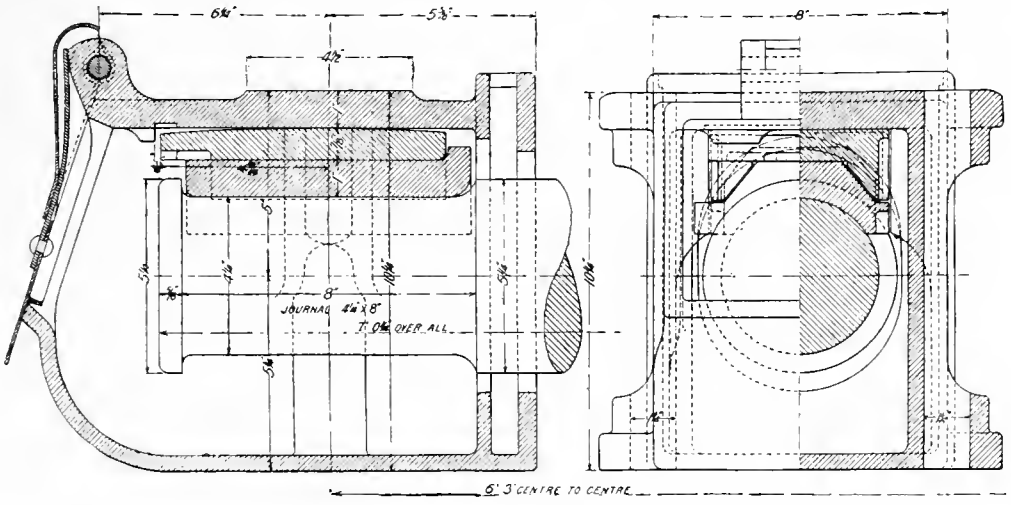
Figs. 5477-5479. Standard Journal Box Lid and Pin for Journal 3¾ in. x 7 in. Sheet 3.

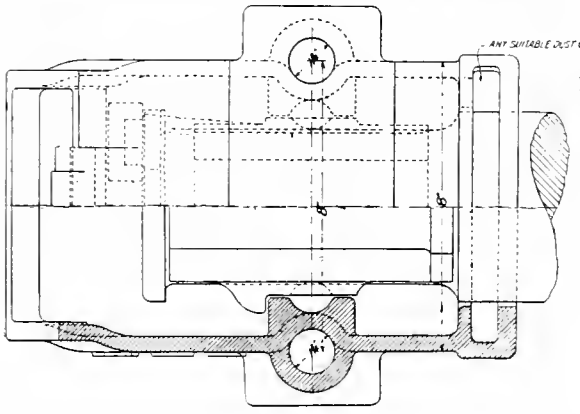


Figs. 5480-5484. Standard Bearing for Journal 3¾ in. x 7 in. Sheet 3.

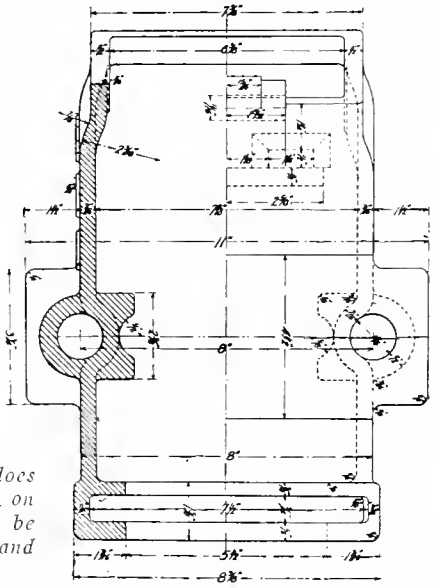


Figs. 5485-5487. Standard Bearing and Wedge Assembled, for Journal 3¾ in. x 7 in. Sheet 3.



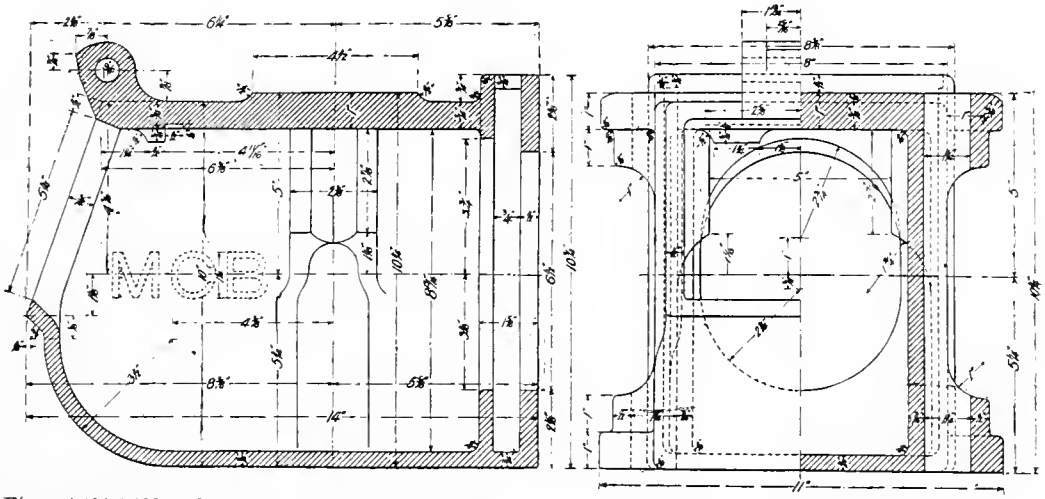


SECTION OF BOX MAY BE MADE EITHER CIRCULAR OR SQUARE BELOW THE CENTER LINE PROVIDED ALL THE ESSENTIAL DIMENSIONS ARE ADHERED TO



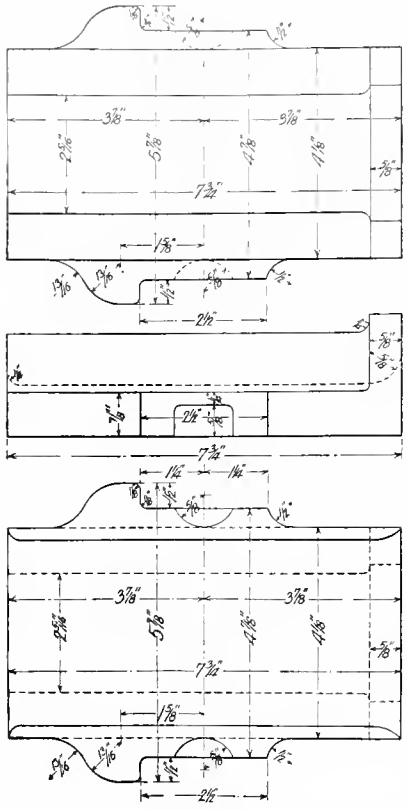
Figs. 5488-5490.
Standard Journal Box and Contained Parts for Journal, 4¼ in. x 8 in. Sheet 4.

NOTE.—*If the method of molding does not permit of placing the letters M. C. B. on the side of the journal box, they may be placed on the top between the hinge lug and the arch bar seat.*

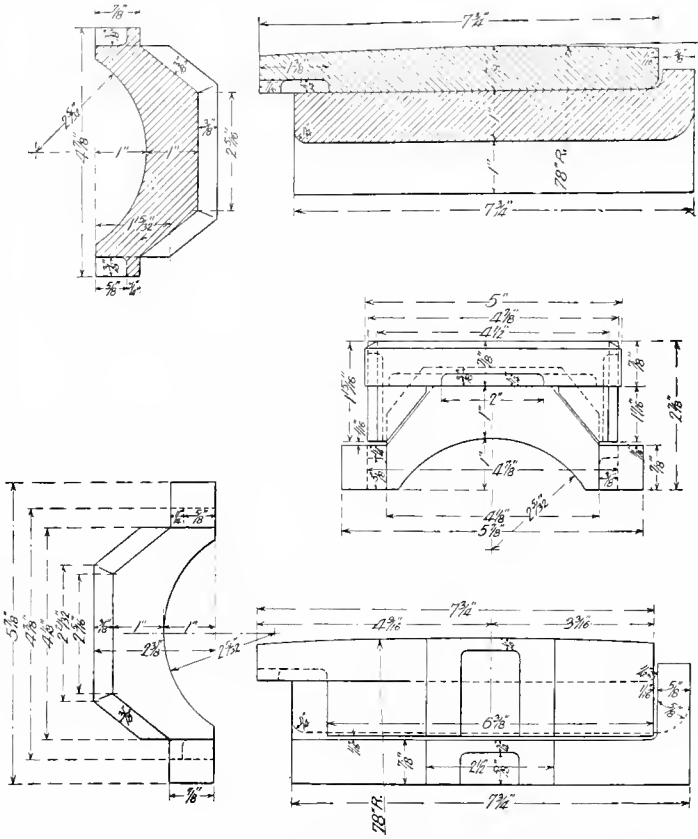


Figs. 5491-5493. Standard Journal Box for Journal, 4¼ in. x 8 in. Sheet 5.

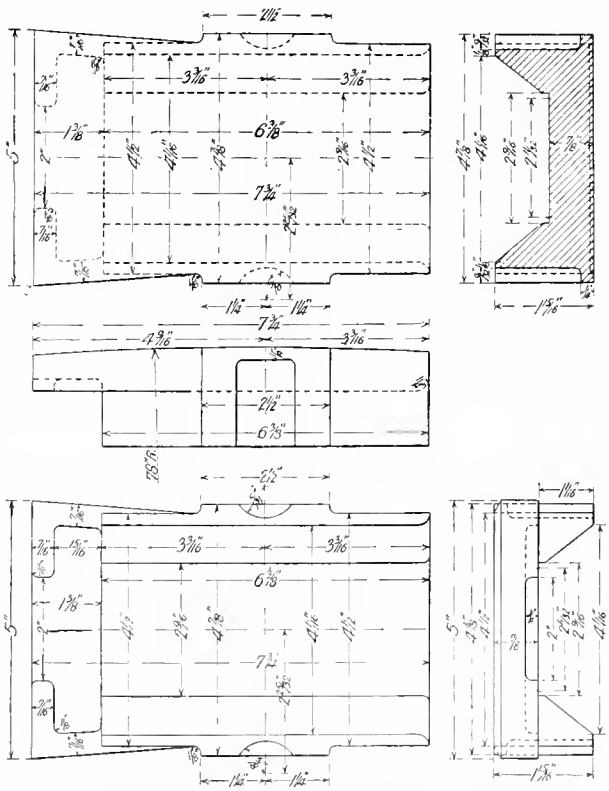
SECTION OF BOX MAY BE MADE EITHER CIRCULAR OR SQUARE BELOW THE CENTER LINE. PROVIDED ALL THE ESSENTIAL DIMENSIONS ARE ADHERED TO.
WHEN JOURNAL BOX IS MADE OF MALLEABLE IRON, REDUCTION IN THICKNESS OF METAL AND CORING TO LIGHTEN WEIGHT IS PERMISSIBLE, PROVIDED ALL THE ESSENTIAL DIMENSIONS WHICH AFFECT INTERCHANGEABILITY AND THE PROPER FITTING OF CONTAINED PARTS, ARE ADHERED TO.



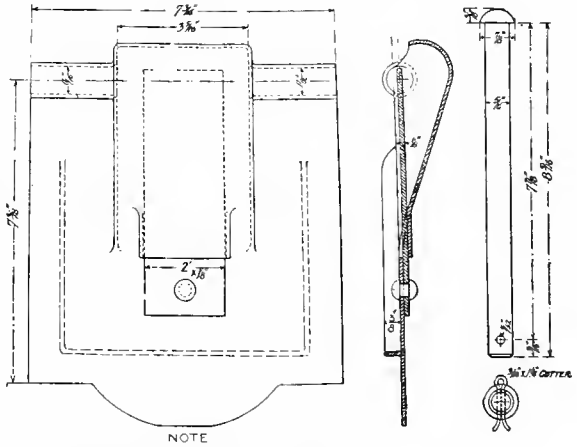
Figs. 5494-5498. Standard Bearing for Journal, 4¼ in. x 8 in. Sheet 6.



Figs. 5499-5501. Standard Bearing and Wedge Assembled, for Journal, 4¼ in. x 8 in. Sheet 6.



Figs. 5502-5506. Standard Wedge for Journal, 4¼ in. x 8 in. Sheet 6.

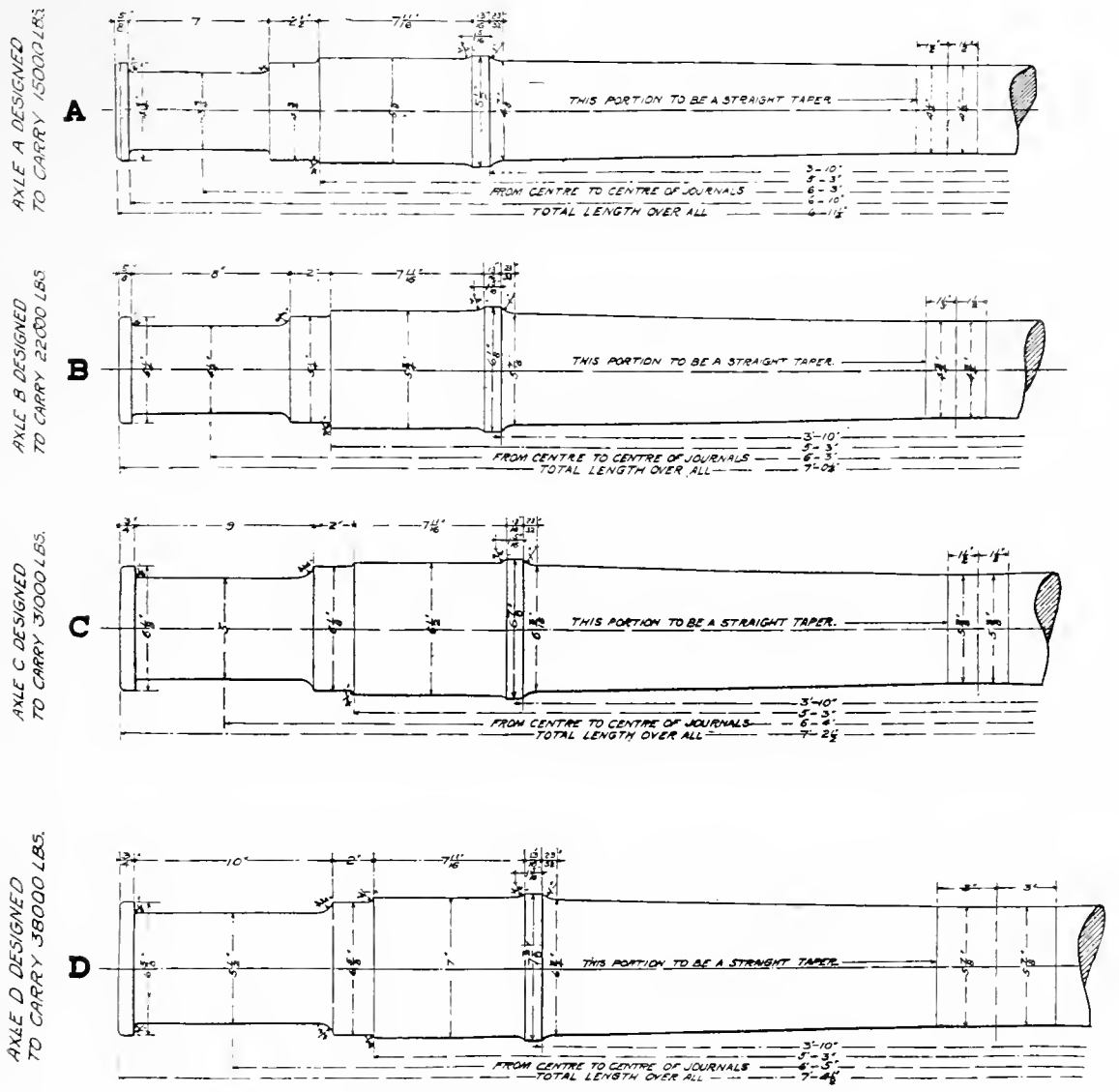


NOTE

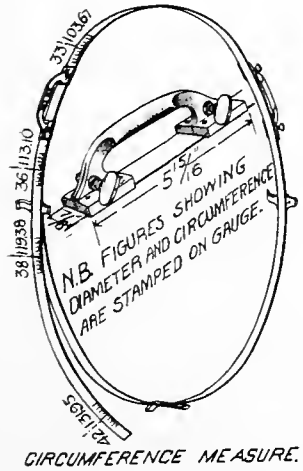
ONLY THE GENERAL DIMENSIONS OF THE LID, TOGETHER WITH THE DIAMETER OF THE HINGE PIN HOLE, ARE STANDARD. THE LID MAY BE OF ANY MATERIAL AND OF ANY DESIRED THICKNESS.

Figs. 5507-5509. Standard Journal Box Lid and Pin for Journal, 4¼ in. x 8 in. Sheet 6.

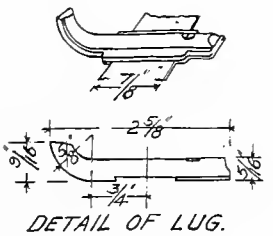
NOTE.—*Skeleton wedge of malleable iron or steel may be used provided the essential dimensions are adhered to. The lid spring may be of any design and may be secured to the lid by any practicable method, provided that it works properly on the standard box and is of the designated section, 2 in. x ⅜ in. A rivet or nut may be used instead of a cotter in hinge pin if preferred.*



Figs. 5510-5513. Standard Axles. Sheet 7.



CIRCUMFERENCE MEASURE.



DETAIL OF LUG.

Figs. 5514-5517. Standard Wheel Circumference Measure. Sheet 7.

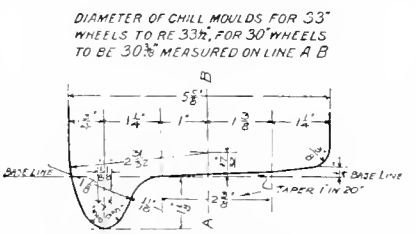
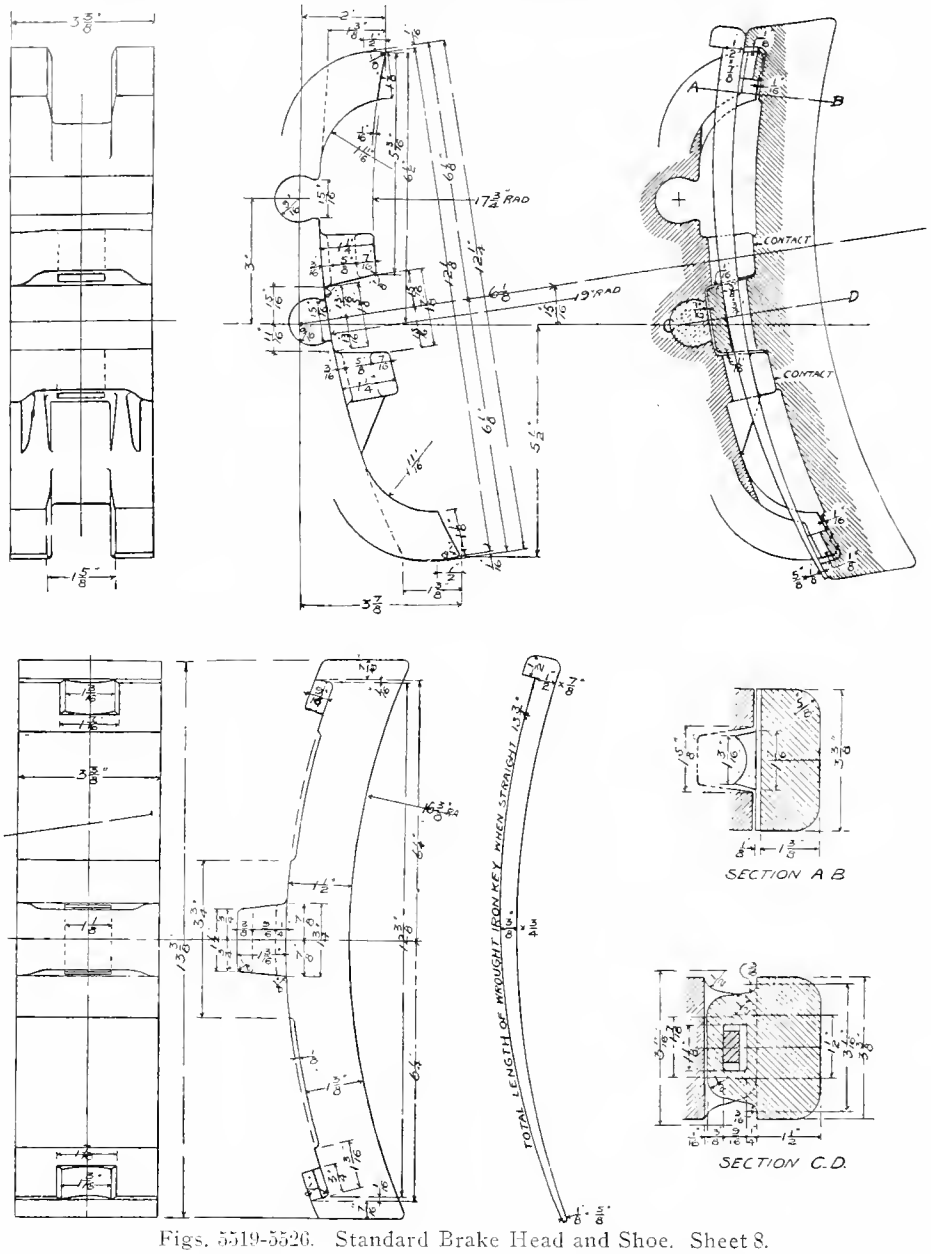
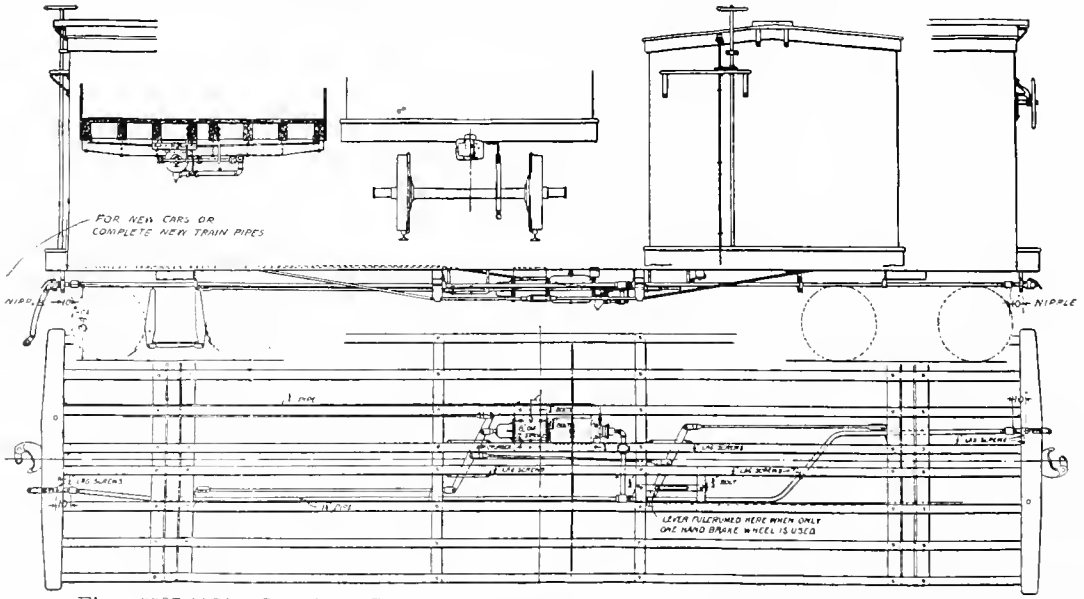


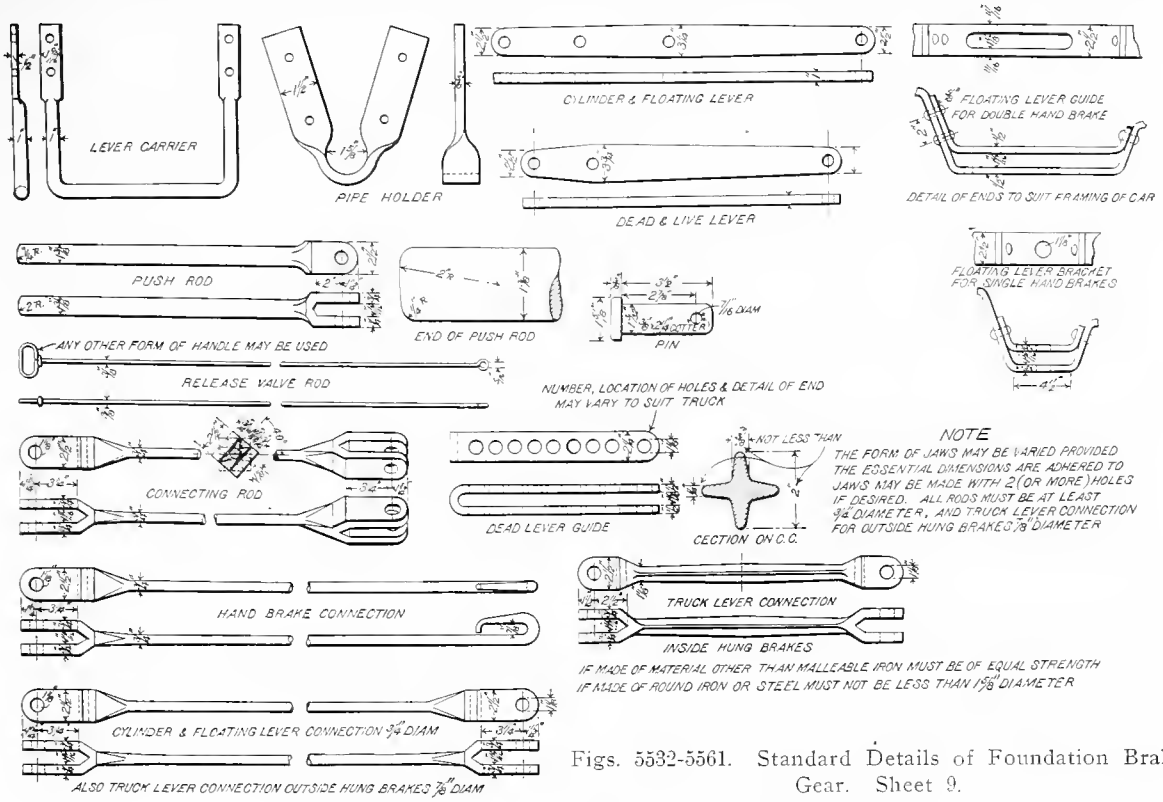
Fig. 5518. Standard Wheel Tread and Flange. Sheet 7.



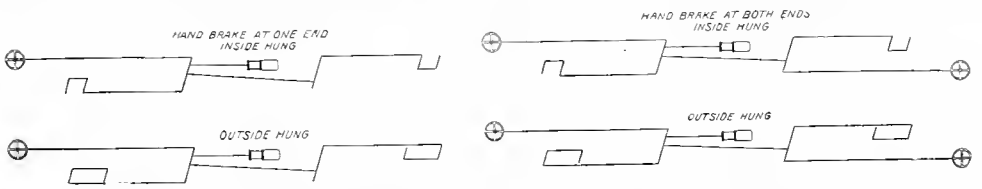
Figs. 5519-5526. Standard Brake Head and Shoe. Sheet 8.



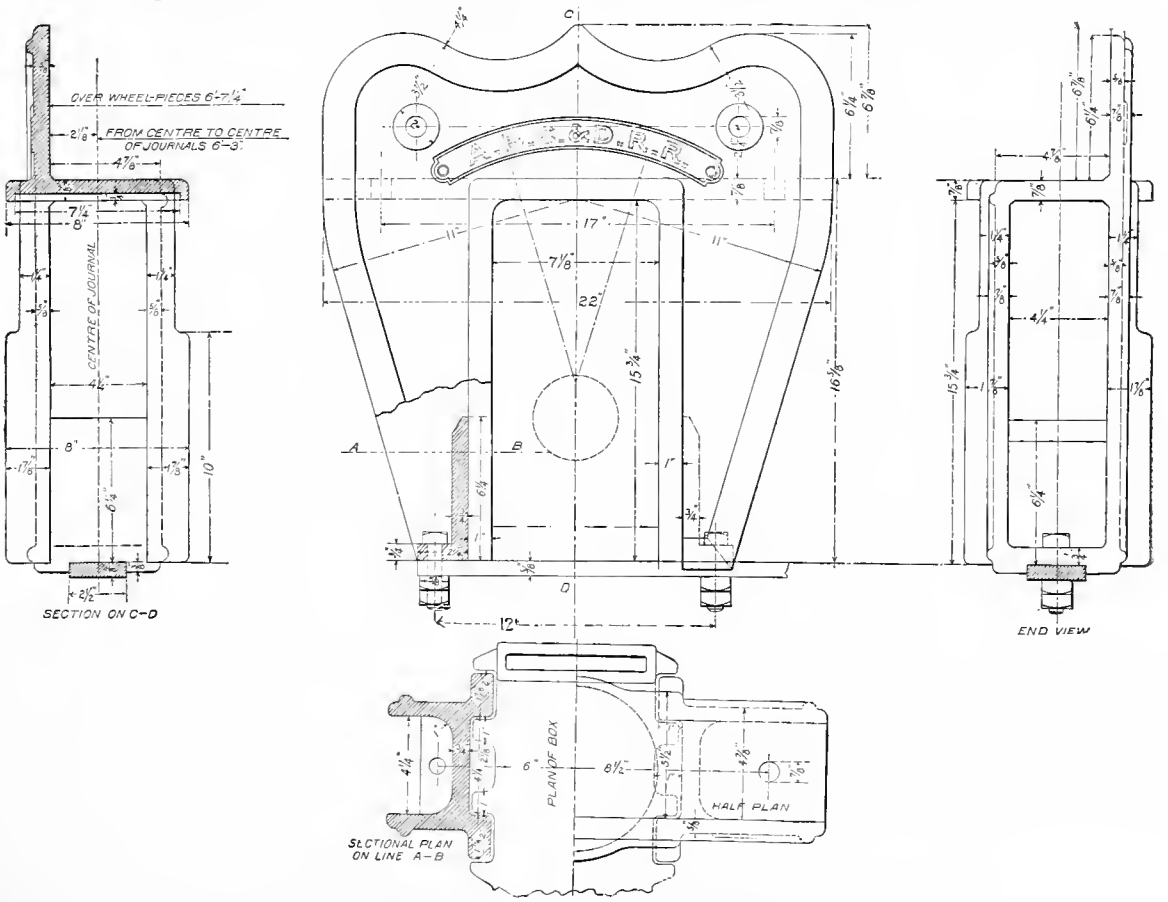
Figs. 5527-5531. Standard General Arrangement of Air Brakes on Freight Cars. Sheet 9.



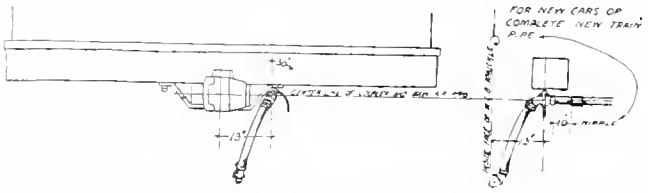
Figs. 5532-5561. Standard Details of Foundation Brake Gear. Sheet 9.



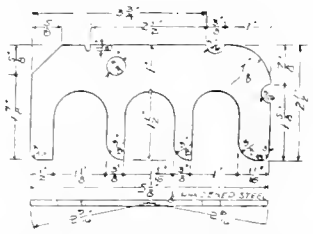
Figs. 5562-5565. Standard Arrangement of Brake Levers and Connections. Sheet 9.



Figs. 5566-5569. Standard Pedestal for Journals, 3¾ in. x 7 in. Sheet 10.



Figs. 5570-5571. Standard Location of Main Air Pipe on Freight Cars. Sheet 9.



Figs. 5573-5574. Standard Worn Coupler Limit and Wheel Defect Gage. Sheet 12.

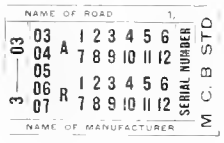
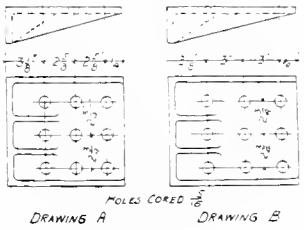
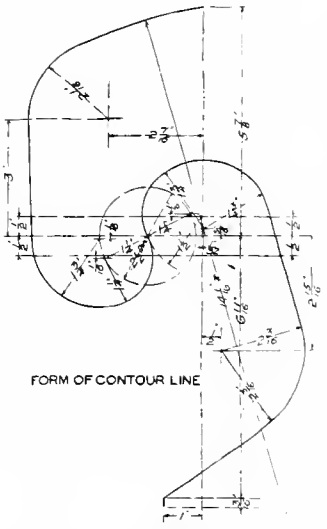


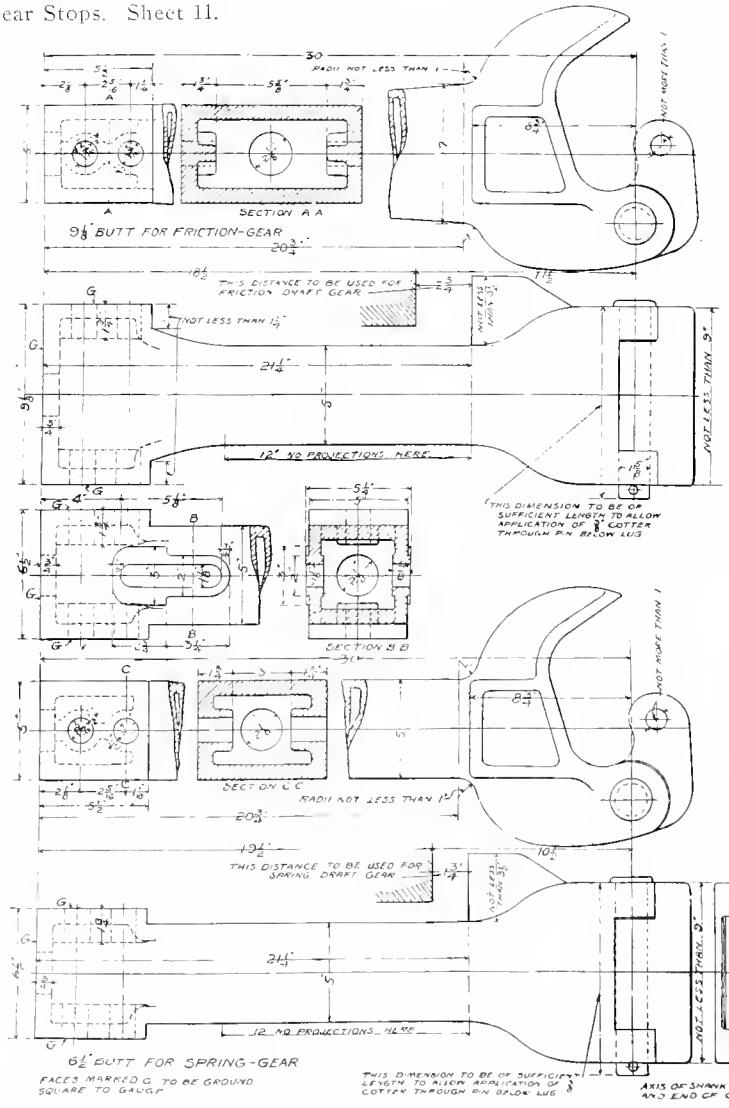
Fig. 5572. Standard Label for Air Brake Hose. Sheet 9.

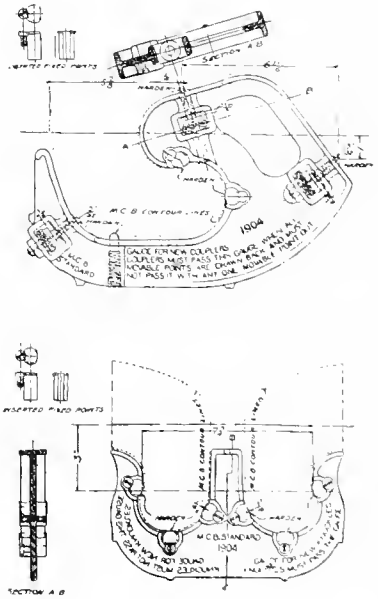
NOTE.—*The total lift of locking pin shall be not more than 6 in. All couplers must have an eyelet for locking device located immediately above locking pin hole, on all new types of couplers after January 1st, 1909. Space between back of coupler horn and inside face of knuckle to be 9¼ in. and minimum thickness of front wall of coupler to be 1¼ in. 1¼-in. rivets to be used for attaching yokes to coupler butts.*



Figs. 5575-5578. Standard Draft Gear Stops. Sheet 11.







Figs. 5579-5597. Standard Automatic Coupler, Coupler Limit Gage and Knuckle Limit Gage. Sheet 11.

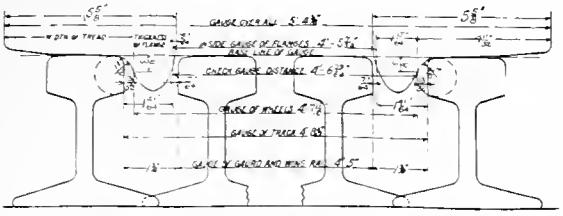


Fig. 5598. Standard Terms and Gaging Points for Wheels and Track. Sheet 12.

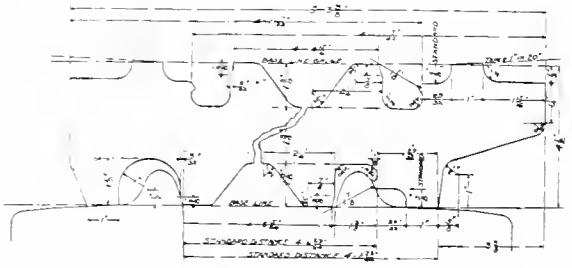


Fig. 5600. Standard Reference Gage for Mounting and Inspecting Wheels, as Used for Mounting. Sheet 12.

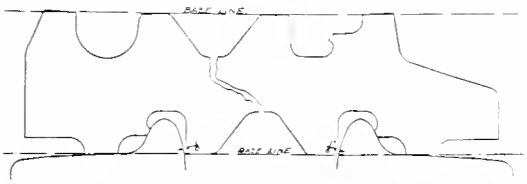


Fig. 5604. Standard Reference Gage for Mounting and Inspecting Wheels, as Used for Inspecting. Sheet 12.

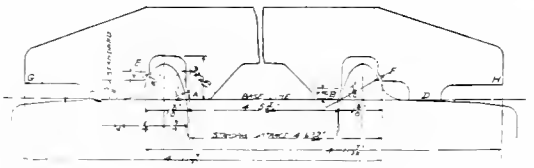


Fig. 5599. Standard Wheel Check Gage. Sheet 12.

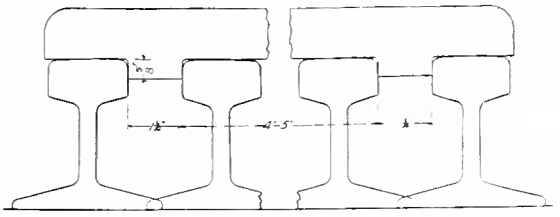
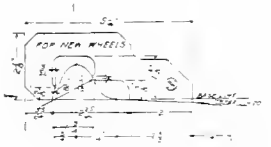
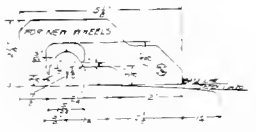


Fig. 5601. Standard Guard Rail and Frog Wing Gage. Sheet 12.

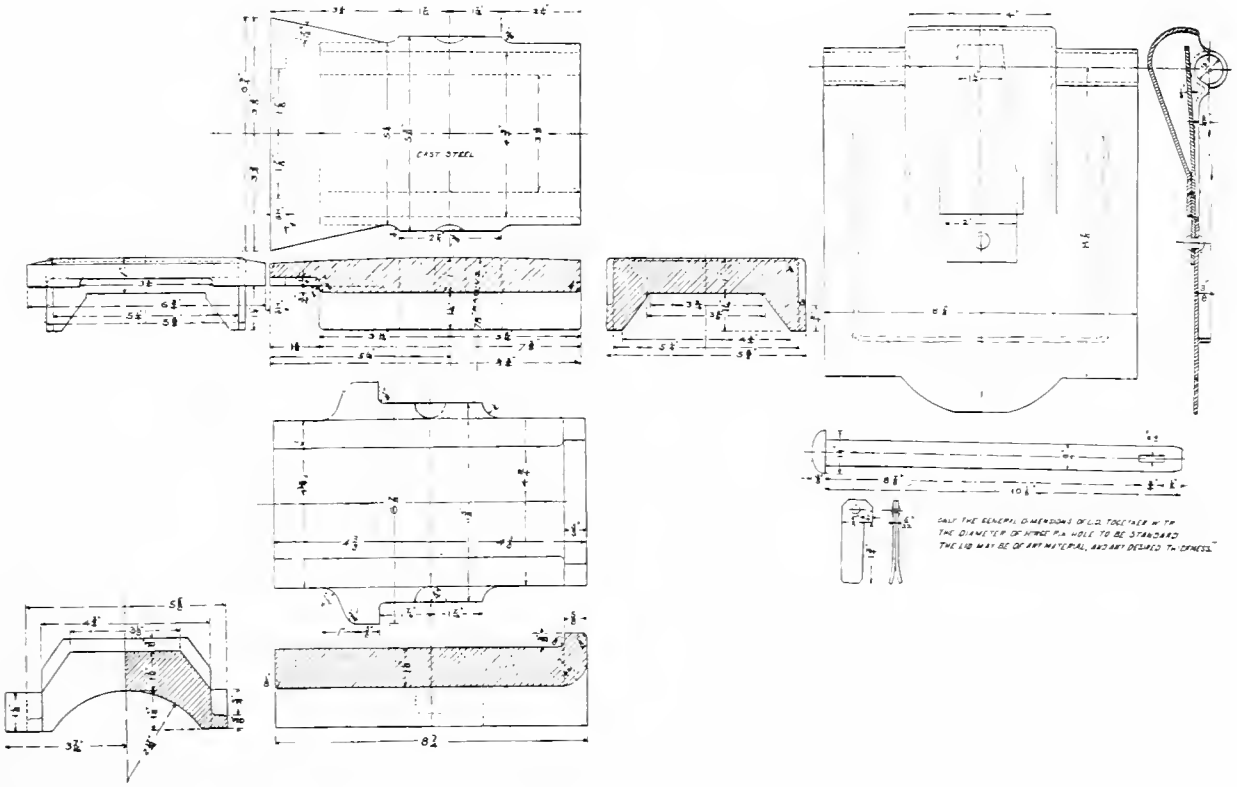


Max. Flange Thickness Gage.

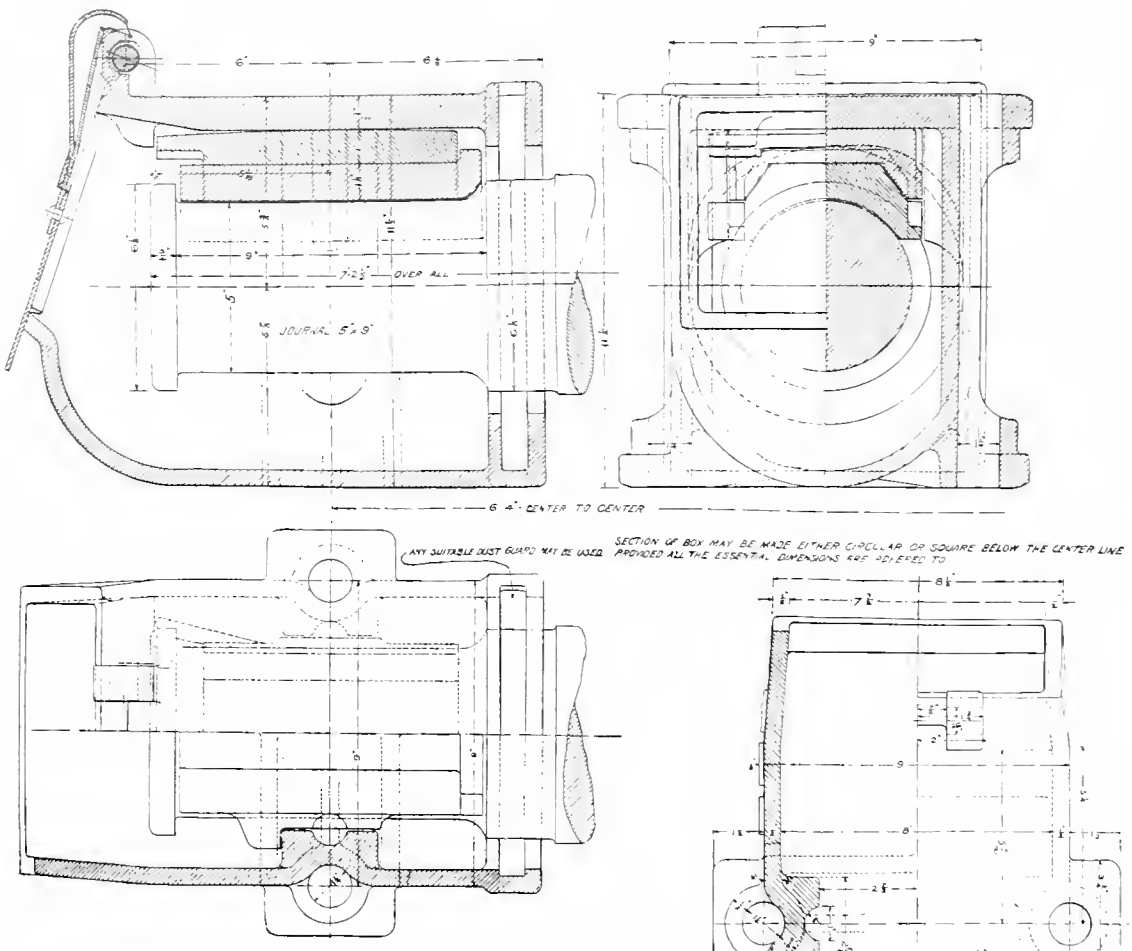


Min. Flange Thickness Gage.

Figs. 5602-5603. Standard Flange Thickness Gages. Sheet 12.

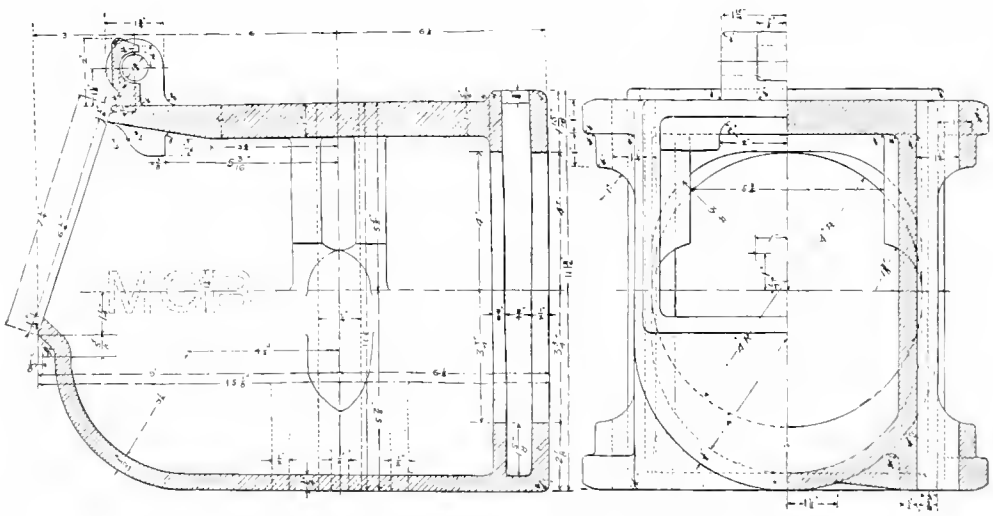


Figs. 5605-5614. Standard Bearing, Wedge and Lid for Journal, 5 in. x 9 in. Sheet 15.

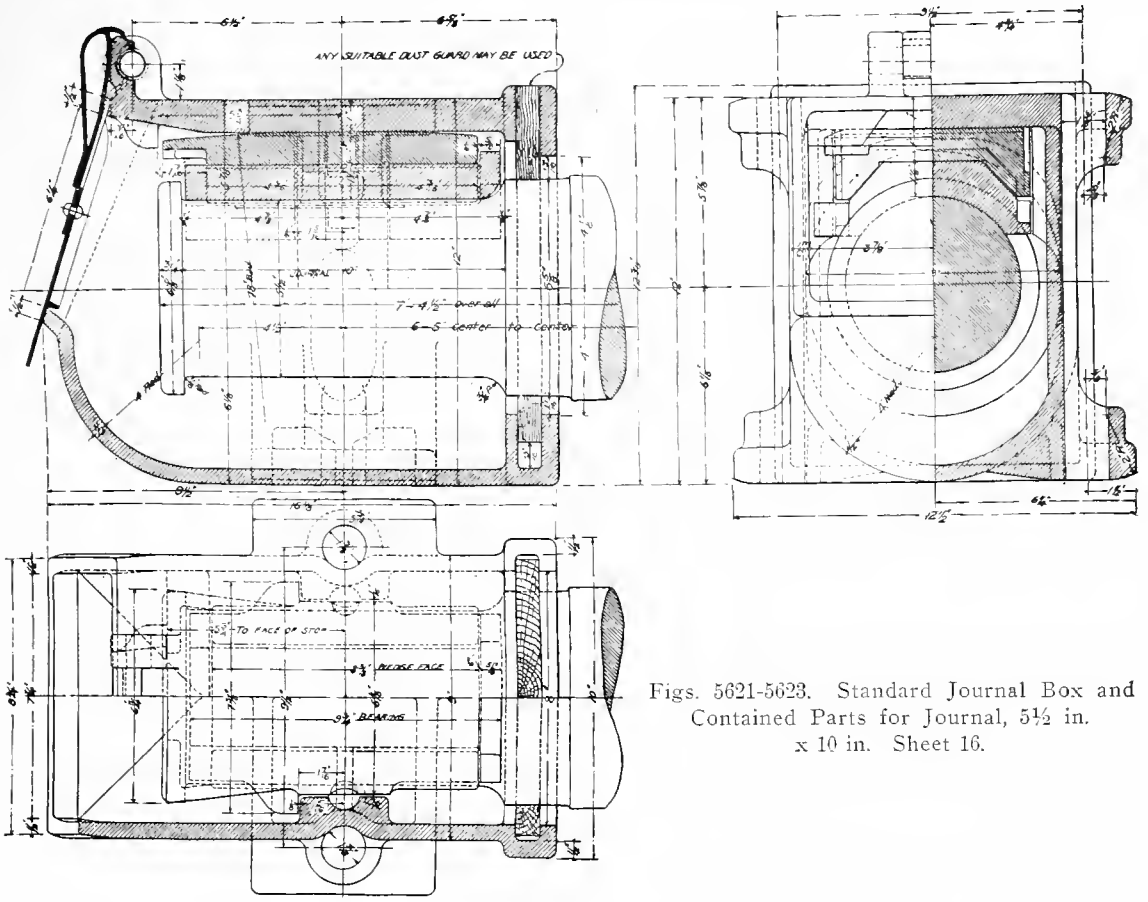


Figs. 5615-5617. Standard Journal Box and Contained Parts for Journal, 5 in. x 9 in. Sheet 13.

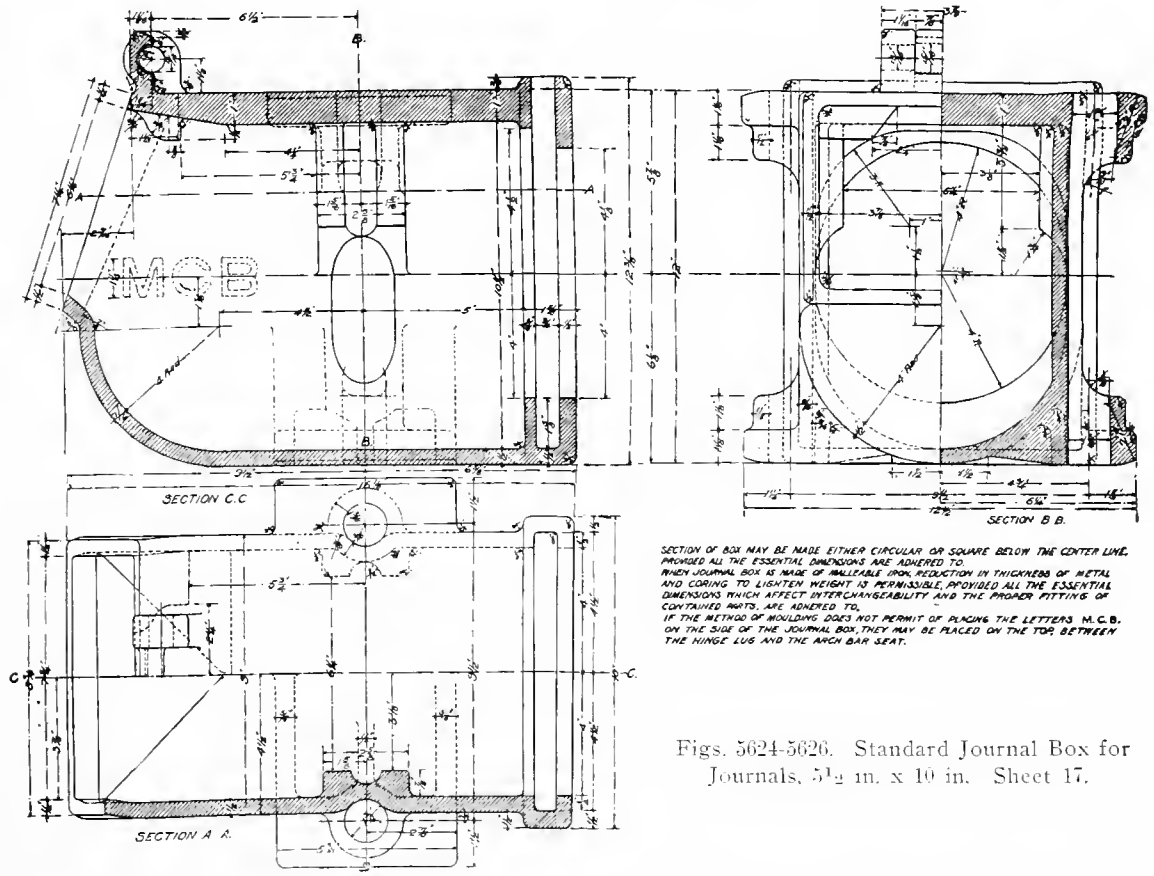
SECTION OF BOX MAY BE MADE EITHER CIRCULAR OR SQUARE BELOW THE CENTER LINE PROVIDED ALL THE ESSENTIAL DIMENSIONS ARE ADHERED TO.
WHEN JOURNAL BOX IS MADE OF MALLEABLE IRON, REDUCTION IN THICKNESS OF METAL AND CORING TO LIGHTEN WEIGHT IS PERMISSIBLE, PROVIDED ALL THE ESSENTIAL DIMENSIONS WHICH AFFECT INTERCHANGEABILITY AND THE PROPER FITTING OF CONTAINED PARTS ARE ADHERED TO.
IF THE METHOD OF MOULDING DOES NOT PERMIT OF PLACING THE LETTERS M C B ON THE SIDE OF THE JOURNAL BOX, THEY MAY BE PLACED ON THE TOP BETWEEN THE HINGE LUG AND THE ARCH BAR SEAT.



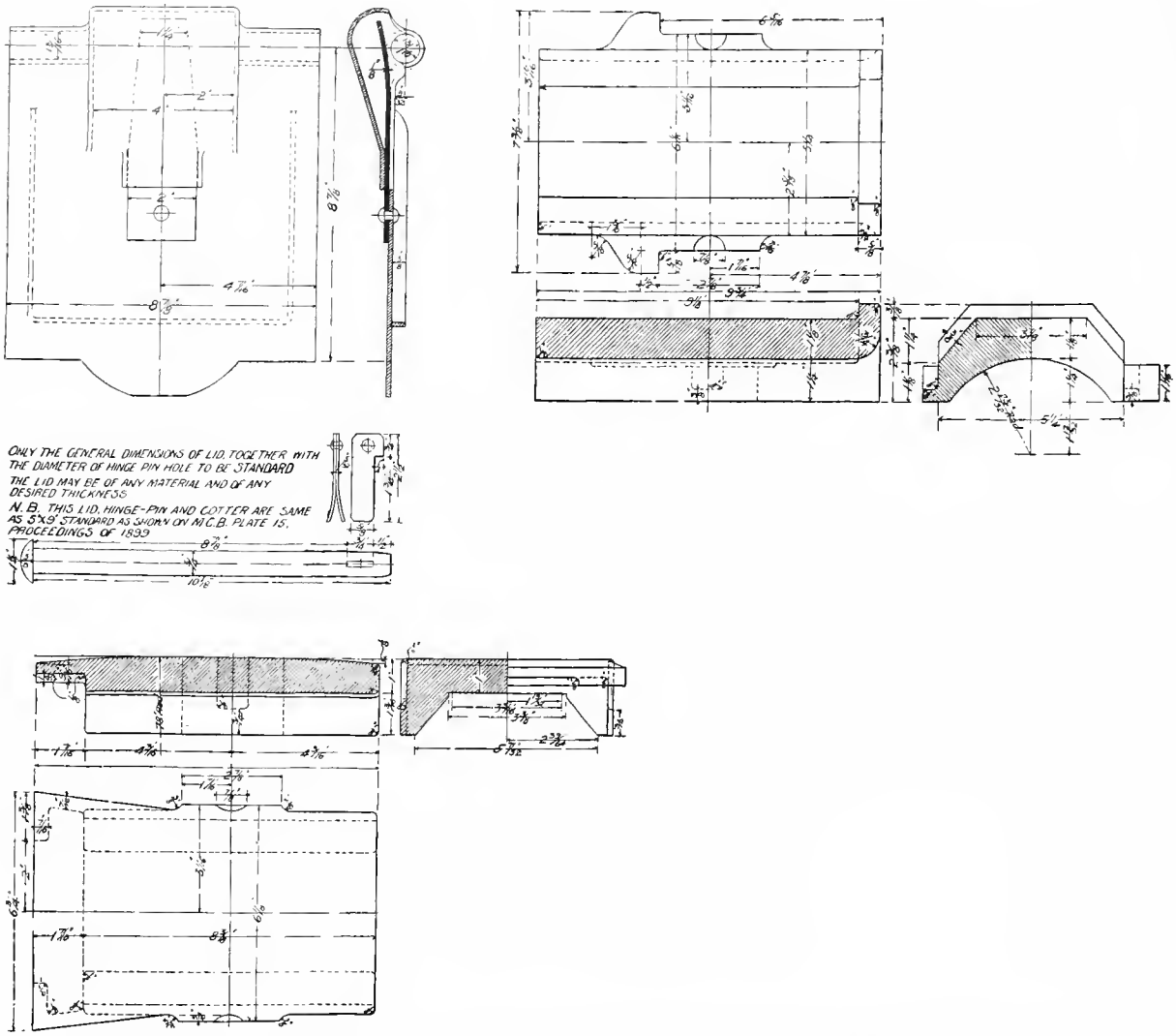
Figs. 5618-5620. Standard Journal Box for Journal, 5 in. x 9 in. Sheet 14.



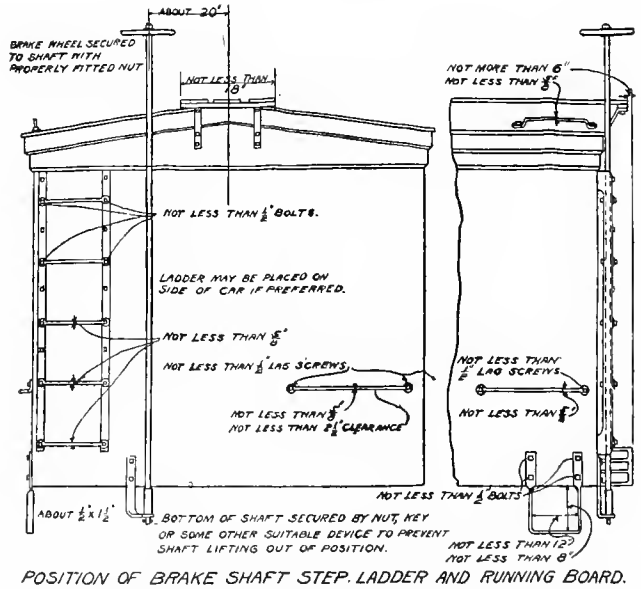
Figs. 5621-5623. Standard Journal Box and Contained Parts for Journal, 5½ in. x 10 in. Sheet 16.



Figs. 5624-5626. Standard Journal Box for Journals, 5½ in. x 10 in. Sheet 17.

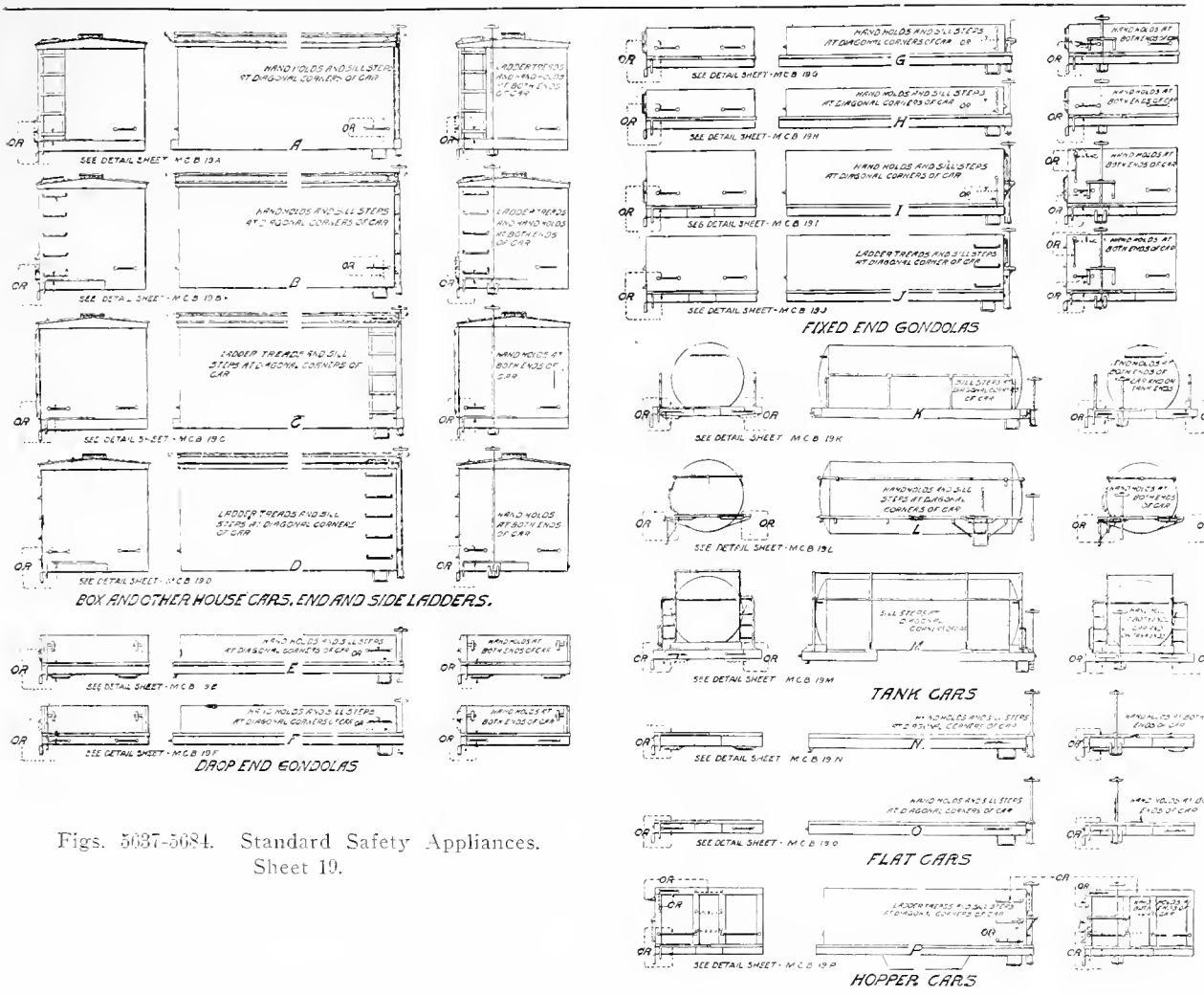


Figs. 5627-5634. Standard Journal Bearing, Wedge and Lid for Journal, 5½ in. x 10 in. Sheet 18.

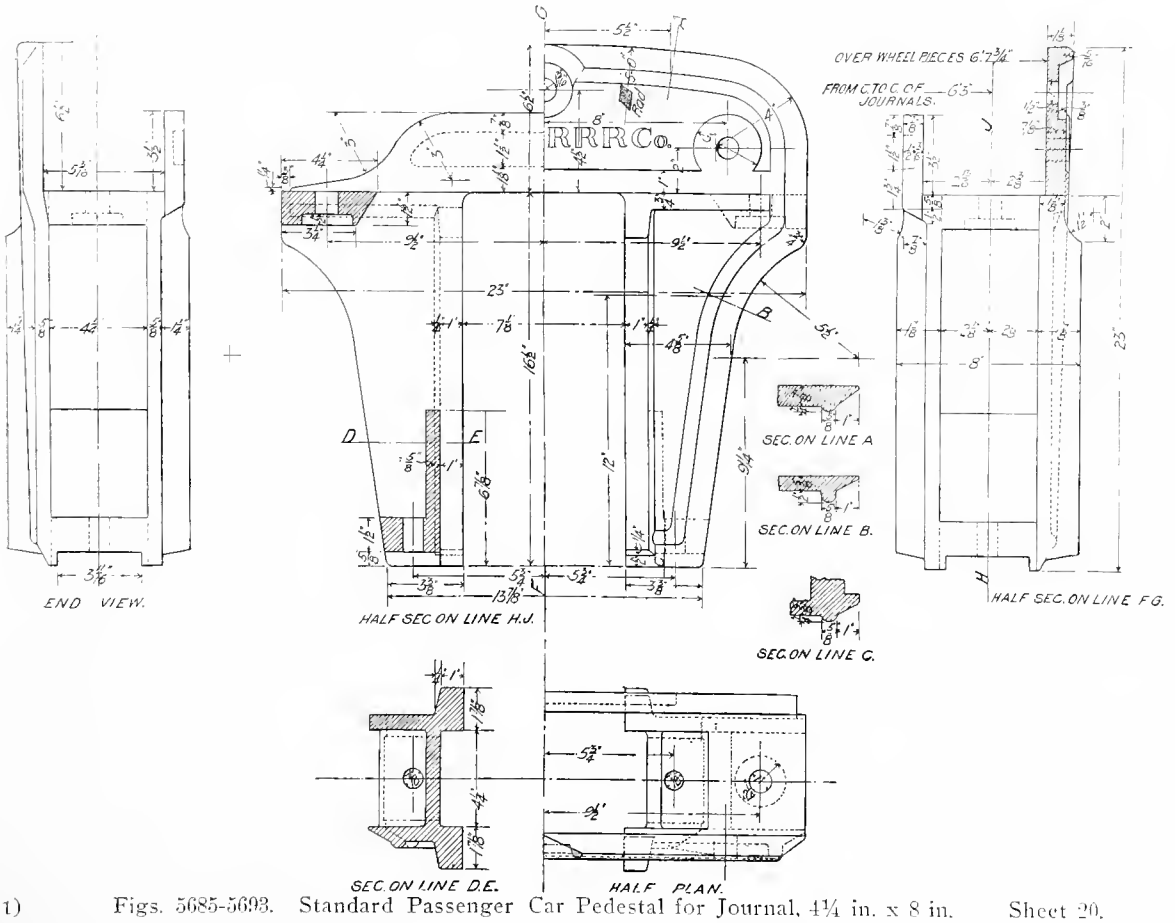


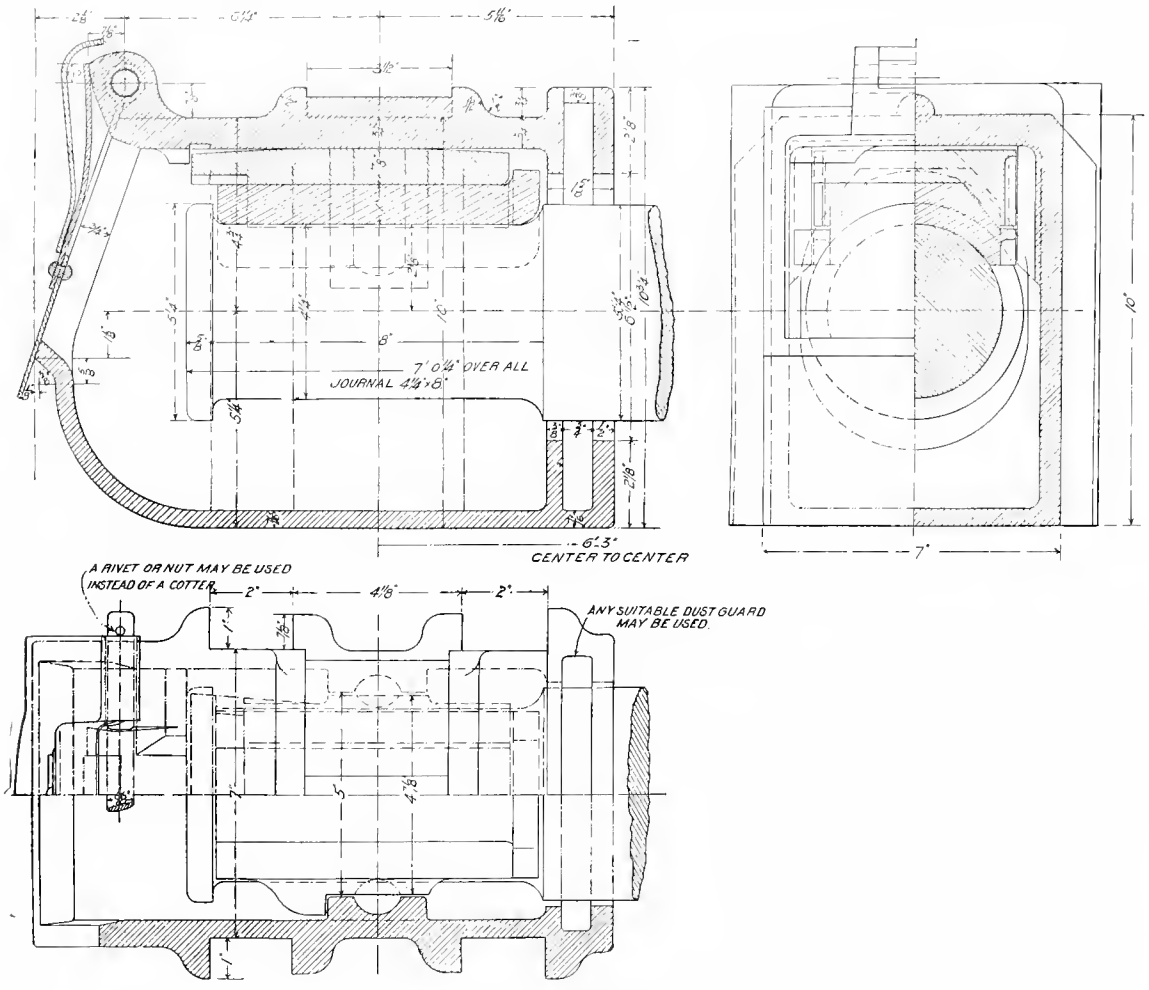
POSITION OF BRAKE SHAFT STEP, LADDER AND RUNNING BOARD.

Figs. 5635-5636. Standard Position of Brake Shaft Step, Ladder and Running Board. Sheet 19.

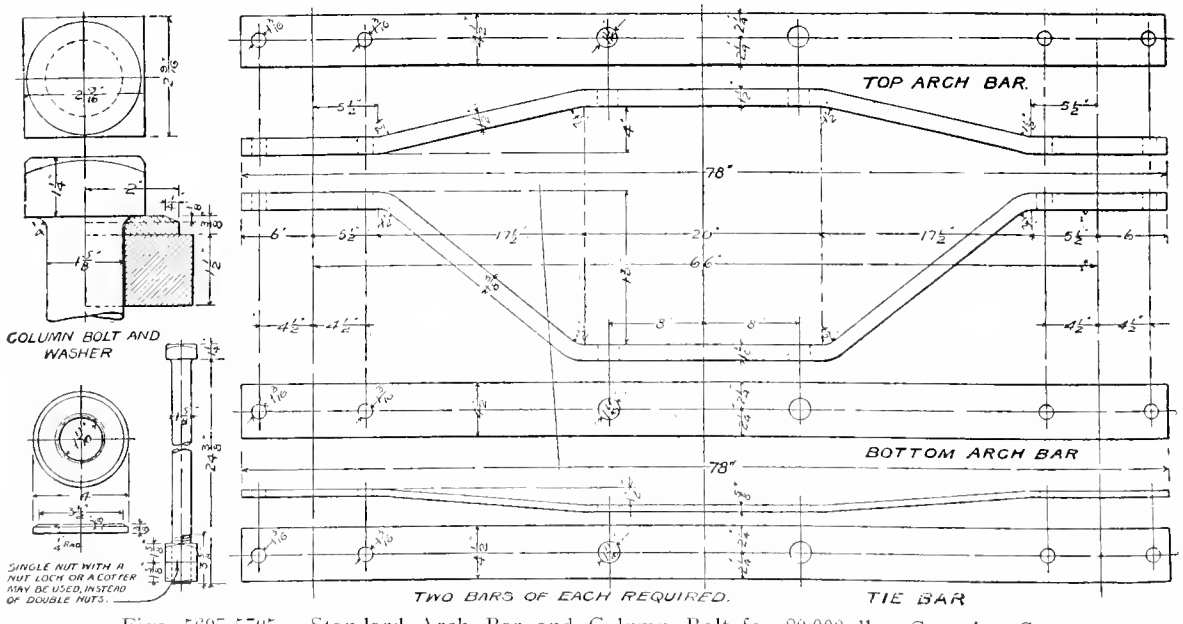


Figs. 5637-5684. Standard Safety Appliances. Sheet 19.





Figs. 5694-5696.
Standard Journal Box and Contained
Parts for Journal 4¼ in. x 8 in.
for Passenger Cars.
Sheet 21.



Figs. 5697-5705. Standard Arch Bar and Column Bolt for 80,000 lbs. Capacity Car.

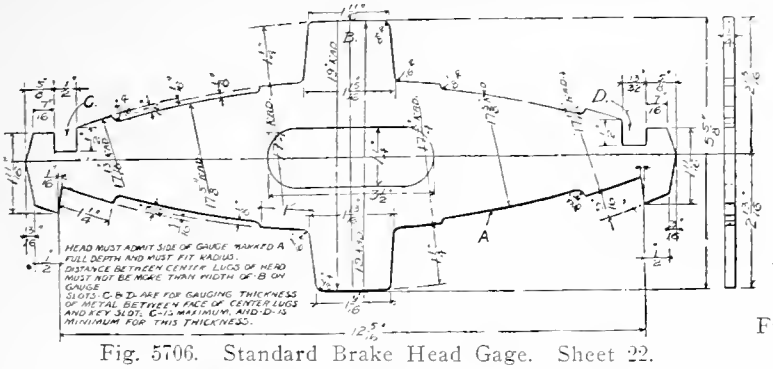


Fig. 5706. Standard Brake Head Gage. Sheet 22.

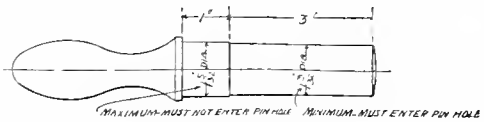
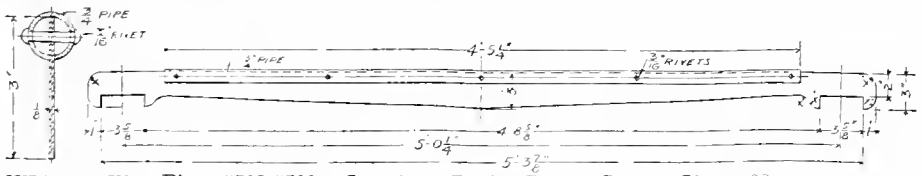


Fig. 5707. Standard Lever Pin Hole Gage. Sheet 22.



Figs. 5708-5709. Standard Brake Beam Gage. Sheet 22.

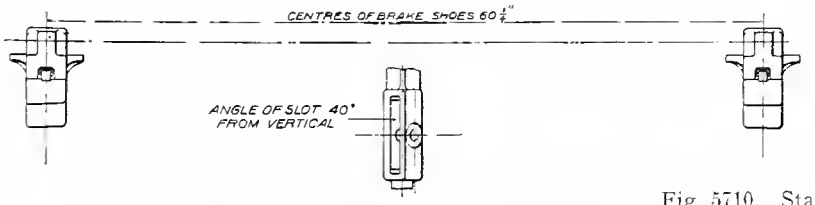
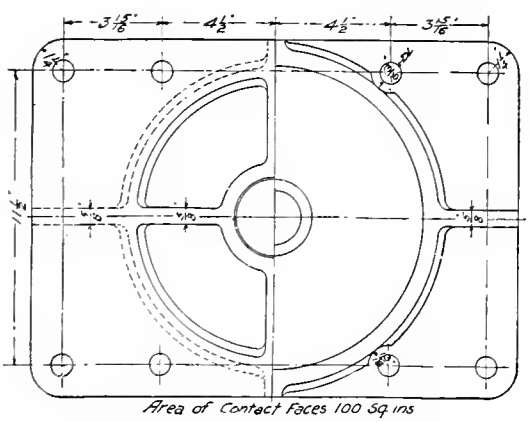
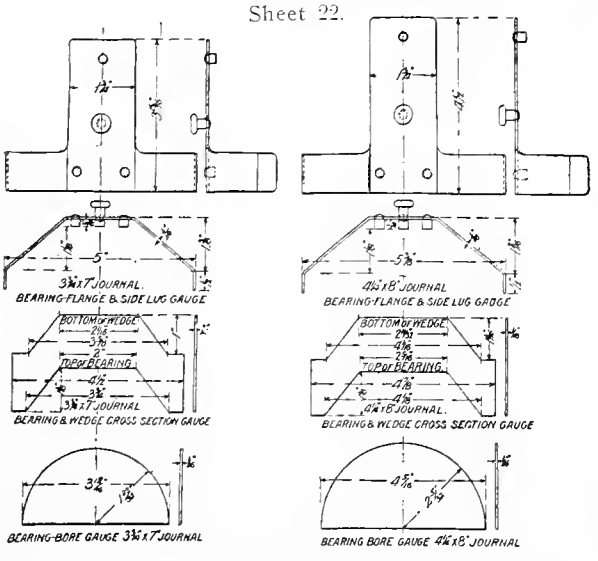
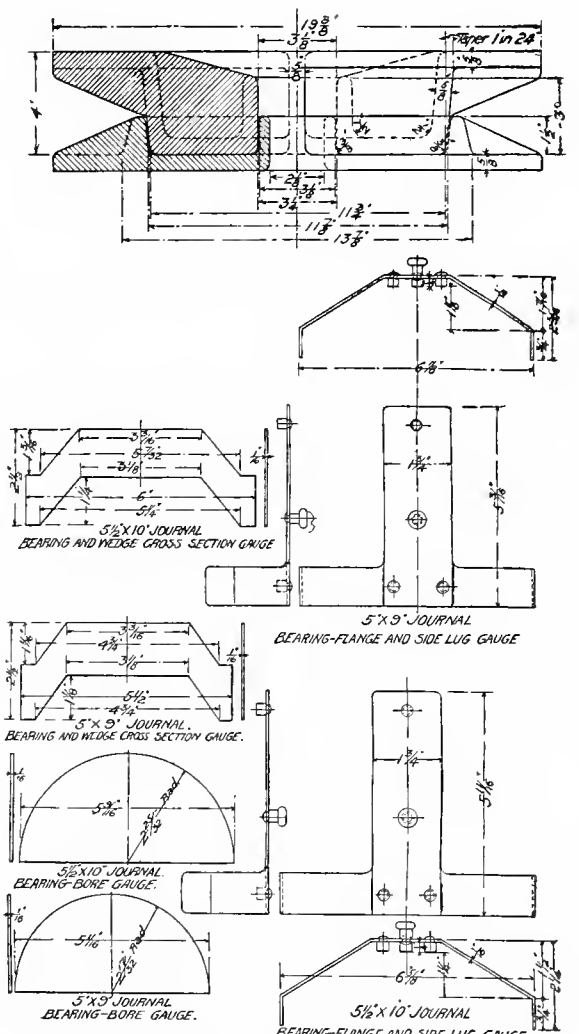


Fig. 5710. Standard Dimensions for Metal Brake Beams. Sheet 22.

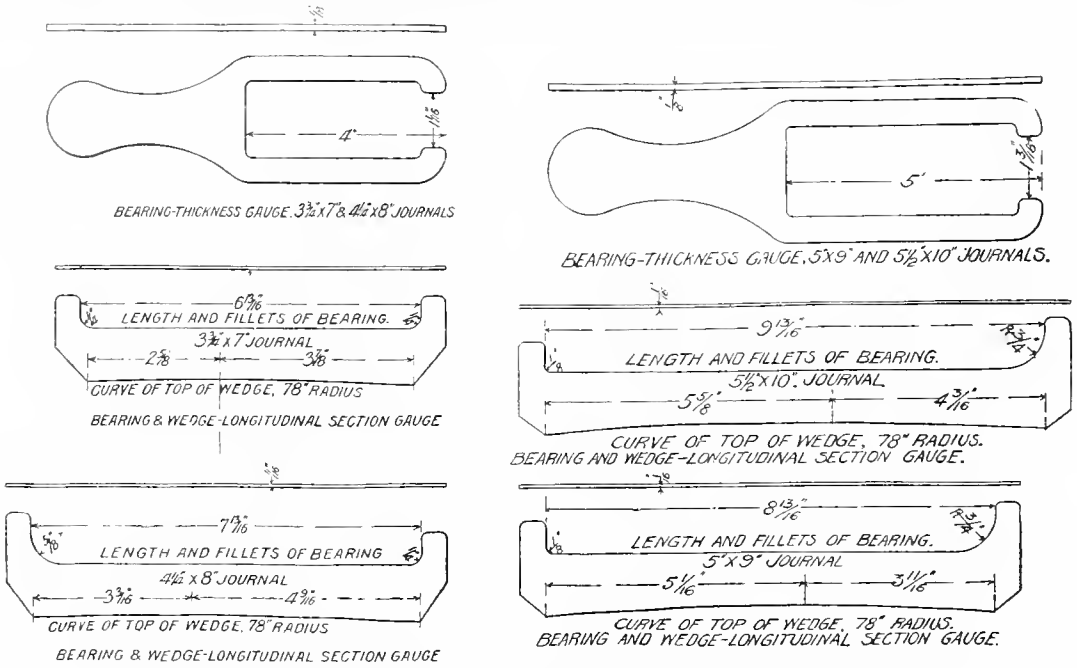


Figs. 5711-5712. Standard Center Plate for Freight Cars. Sheet 22.

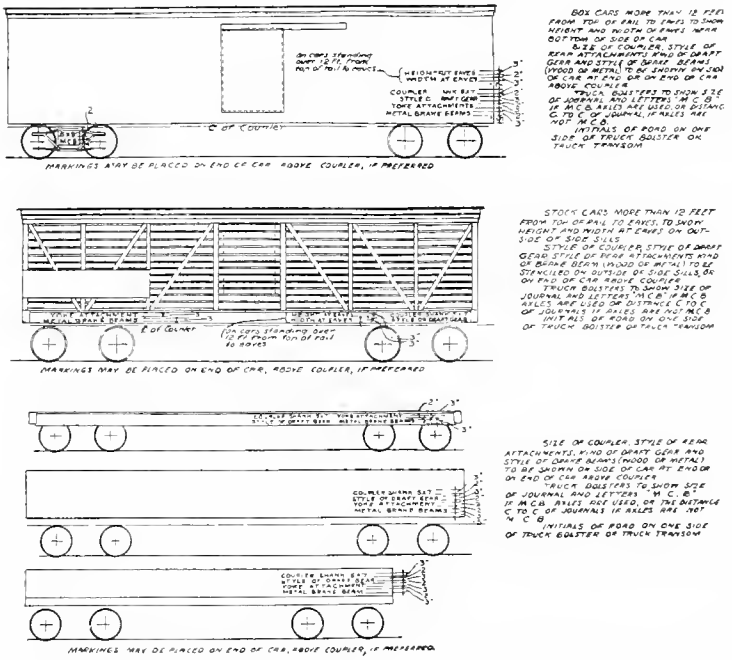




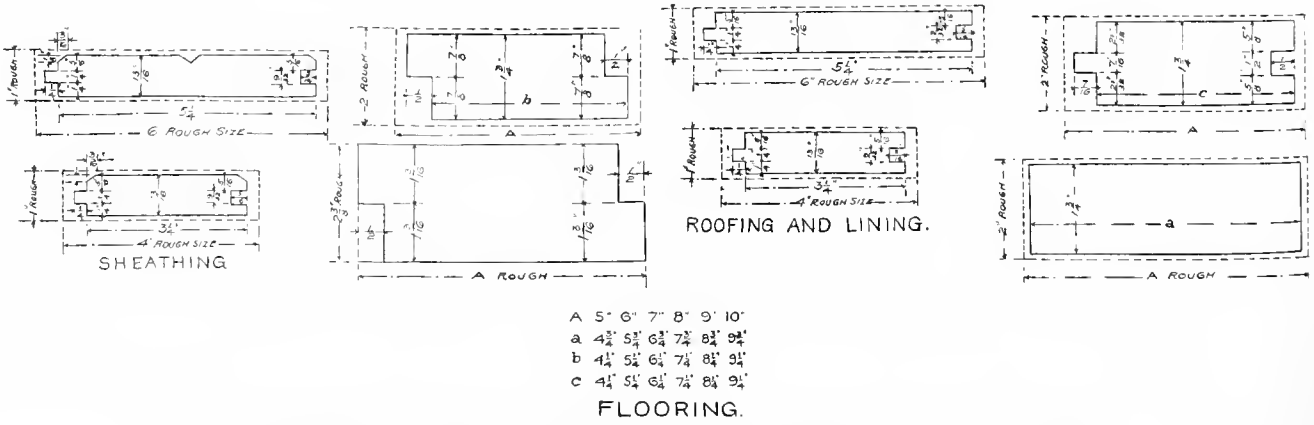
Figs. 5713-5731. Standard Journal Bearing and Wedge Gages for Journals, 3¾ in. x 7 in., 4¼ in. x 8 in., 5 in. x 9 in. and 5½ in. x 10 in. Sheet 23.



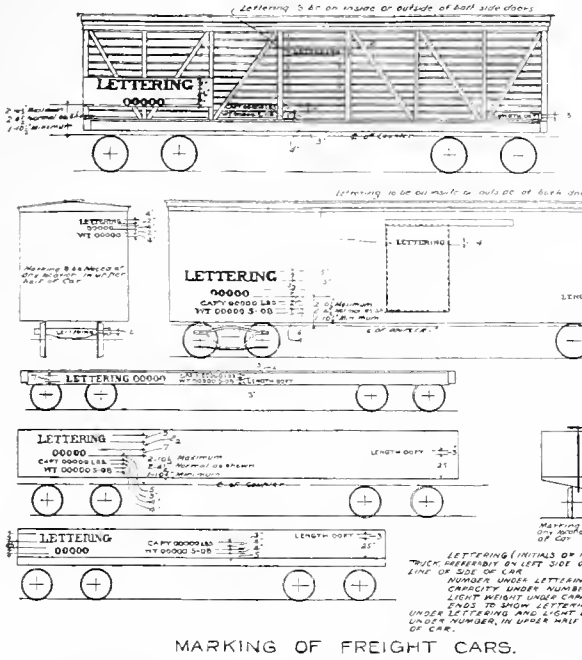
Figs. 5732-5743. Standard Journal Bearing and Wedge Gages for Journals, 3¾ in. x 7 in., 4¼ in. x 8 in., 5 in. x 9 in. and 5½ in. x 10 in. Sheet 23.



Figs. 5744-5748. Standard Marking of Freight Cars. Sheet 24.



Figs. 5749-5756. Standard Sheathing, Flooring, Roofing and Lining. Sheet 24.



Figs. 5757-5765. Standard Marking of Freight Cars. Sheet A.

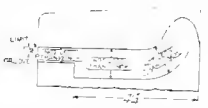
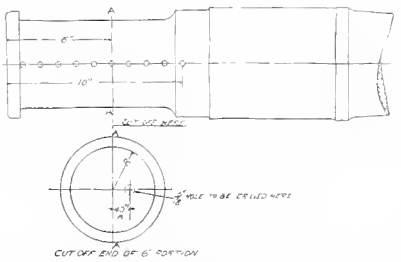
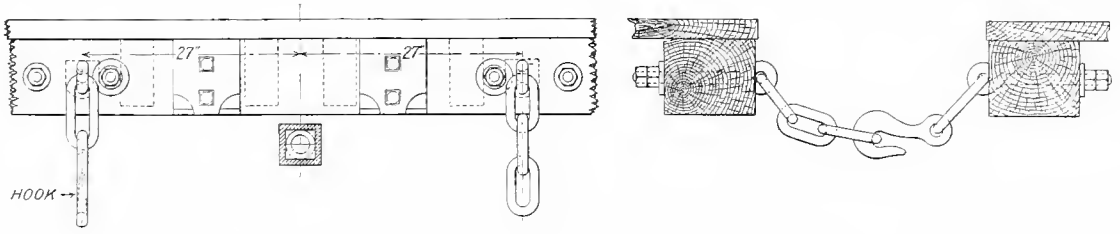


Fig. 5766. Steel Tire Limit Figure. Sheet A.



Figs. 5767-5768. Manner of Taking Borings from Axles for Analysis. Sheet A.



Figs. 5769-5770. Safety Chains for Wooden Underframe Freight Cars. Sheet A.

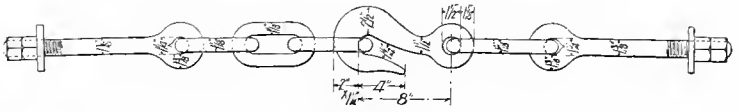
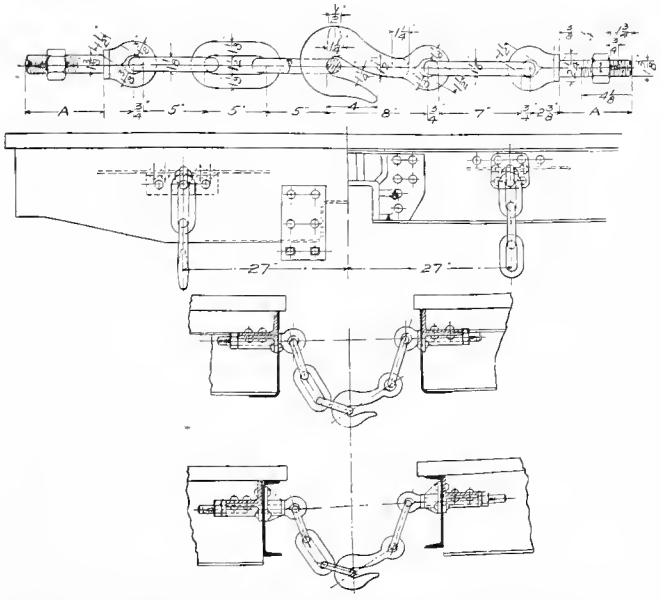
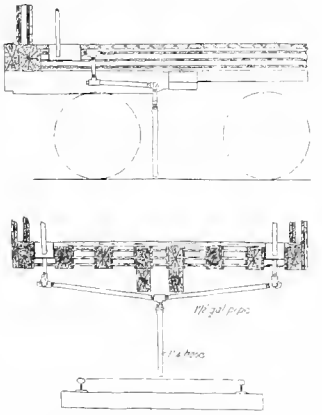


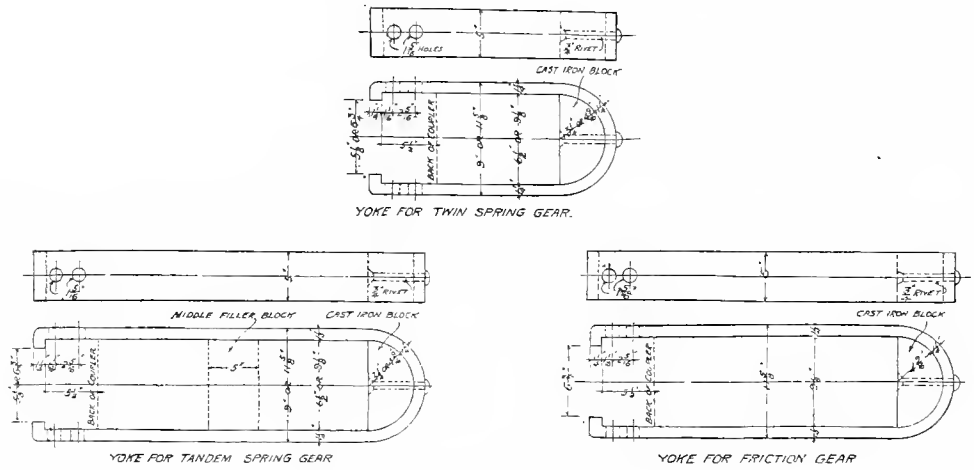
Fig. 5771. Permanent Safety Chains for Wooden Underframe Freight Cars.



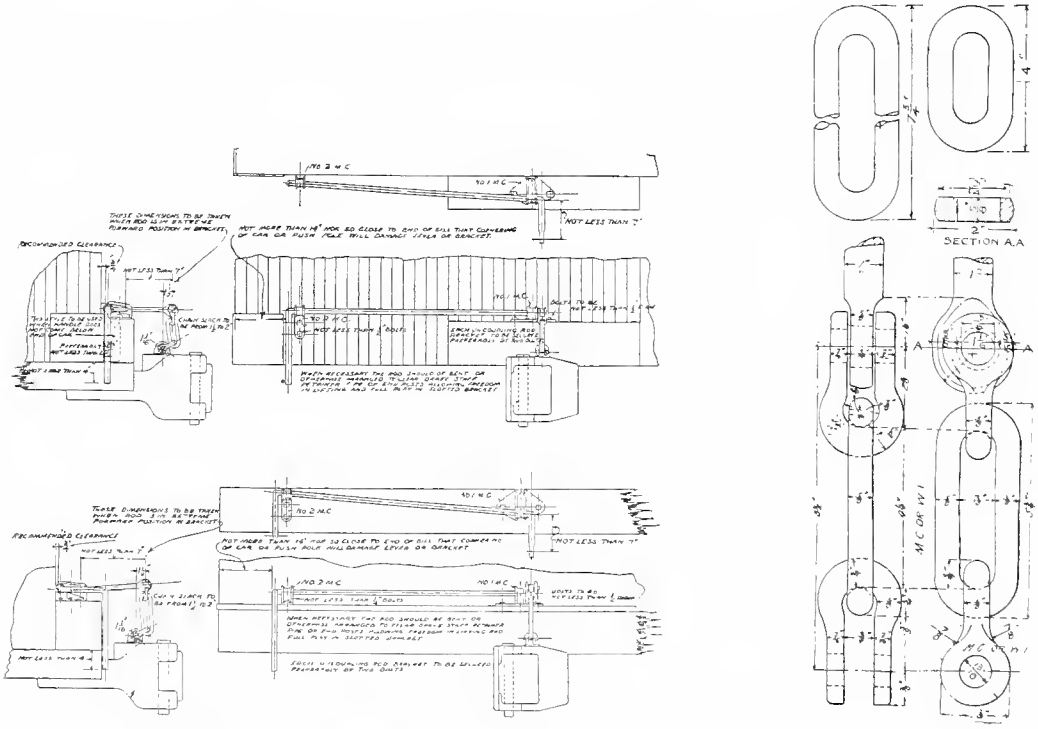
Figs. 5772-5775. Permanent Safety Chains for Steel Underframe Freight Cars. Sheet A.



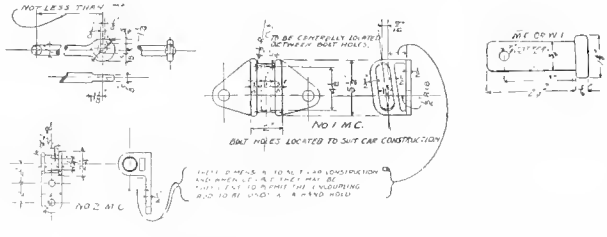
Figs. 5776-5778. Collection of Salt Water Drippings. Sheet A.



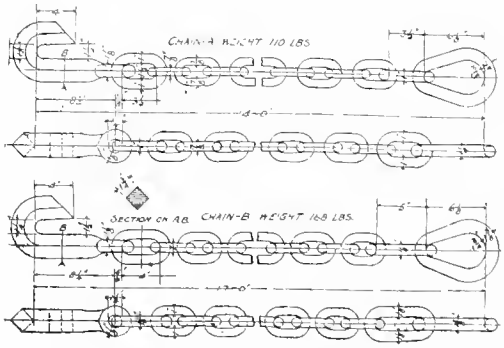
Figs. 5779-5784. Recommended Practice for Automatic Coupler Attachments. Sheet B.



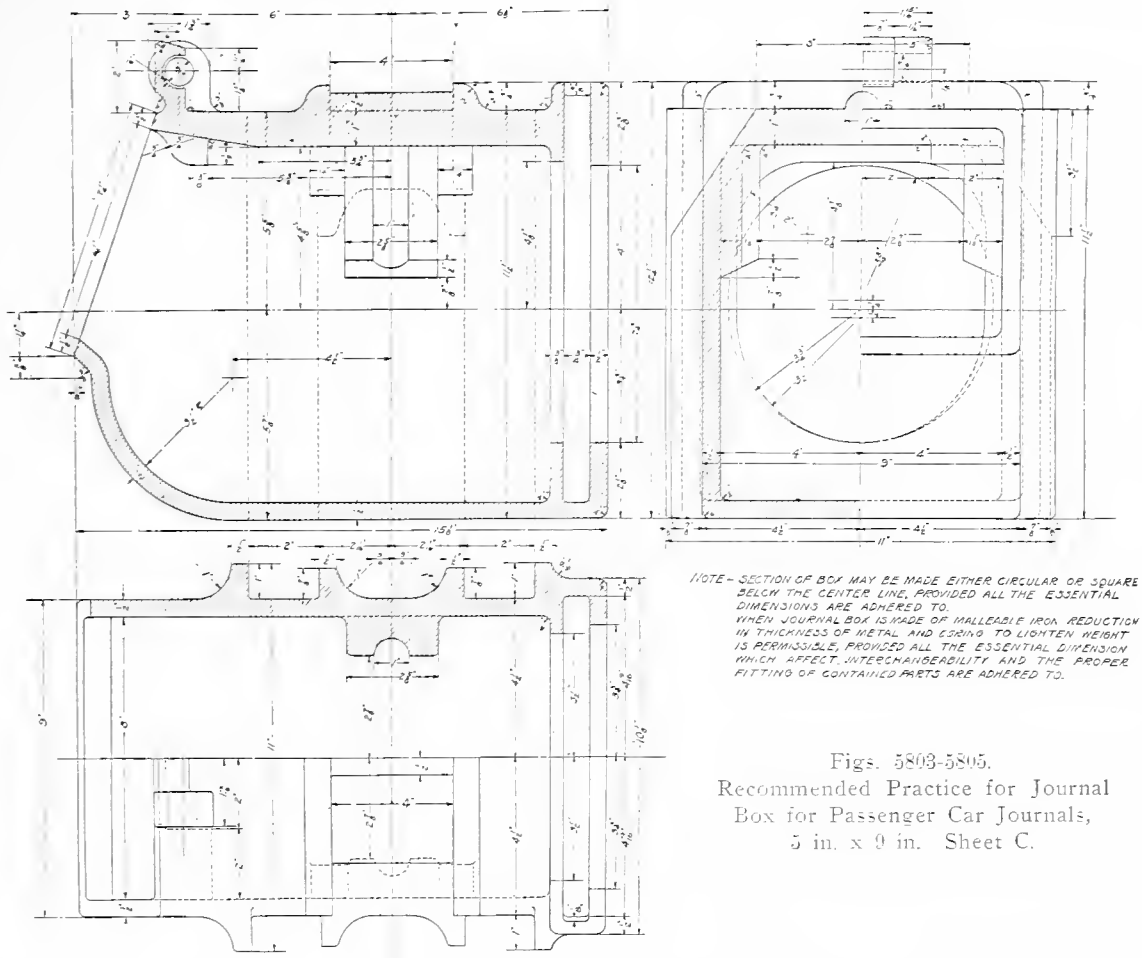
Figs. 5785-5792. Recommended Practice for Uncoupling Attachments. Sheet B.



Figs. 5793-5798. Uncoupling Rod and Brackets. Sheet B.

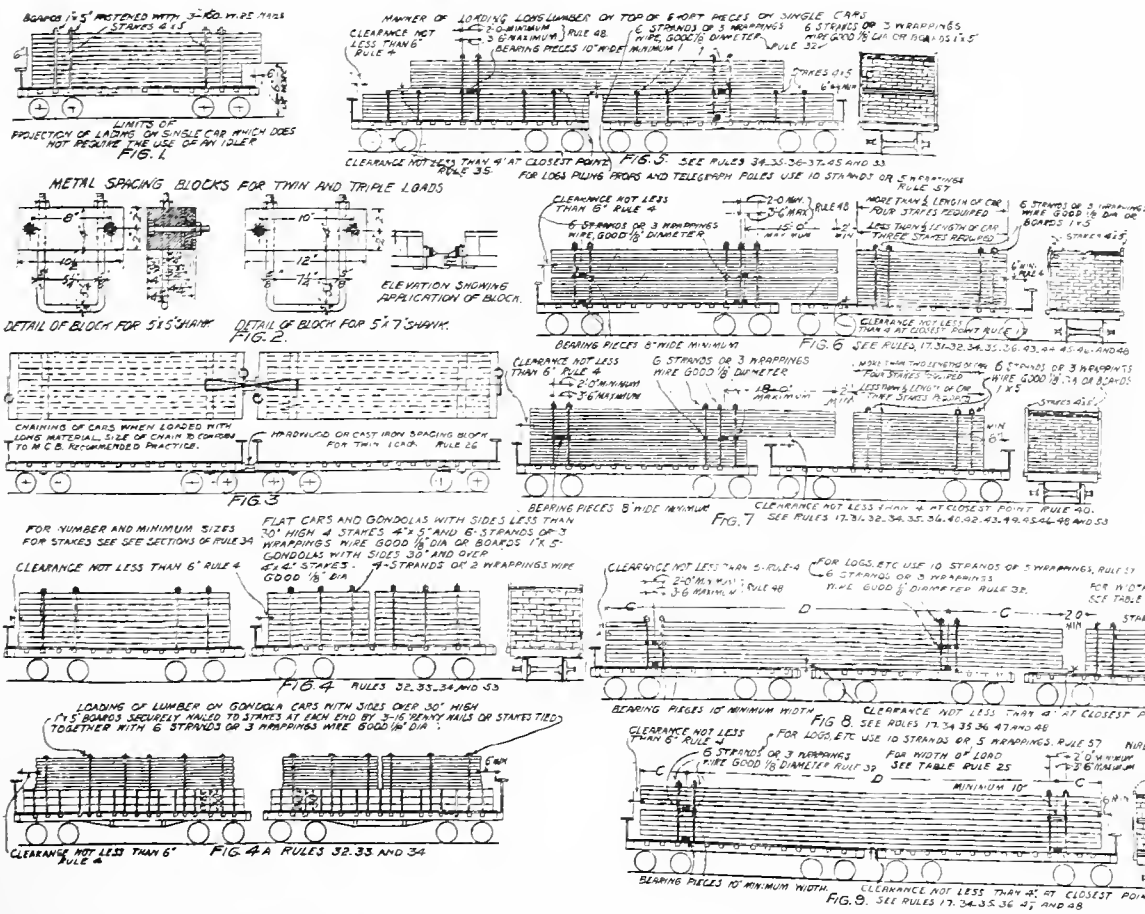


Figs. 5799-5802. Temporary Chains for Cars Carrying Double Loads. Sheet B.



NOTE – SECTION OF BOX MAY BE MADE EITHER CIRCULAR OR SQUARE BELOW THE CENTER LINE, PROVIDED ALL THE ESSENTIAL DIMENSIONS ARE ADHERED TO.
WHEN JOURNAL BOX IS MADE OF MALLEABLE IRON REDUCTION IN THICKNESS OF METAL AND CORING TO LIGHTEN WEIGHT IS PERMISSIBLE, PROVIDED ALL THE ESSENTIAL DIMENSION WHICH AFFECT INTERCHANGEABILITY AND THE PROPER FITTING OF CONTAINED PARTS ARE ADHERED TO.

Figs. 5803-5805.
Recommended Practice for Journal Box for Passenger Car Journals, 5 in. x 9 in. Sheet C.



Figs. 5806-5822. Recommended Practice for Loading Long Materials on Open Cars. Sheet D.

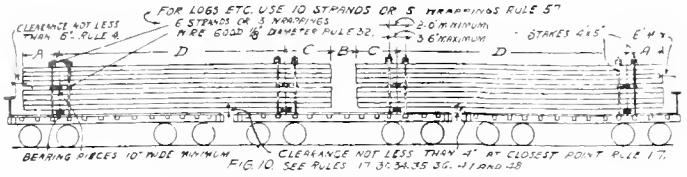


FIG. 10. SEE RULES 17 31 34 35 36 41 AND 48

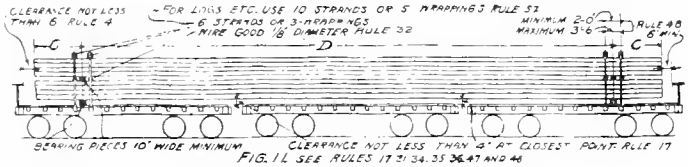
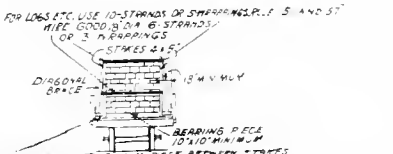


FIG. 11. SEE RULES 17 31 34 35 36 47 AND 48



END VIEW OF FIG. 12.
FIG. 12A.

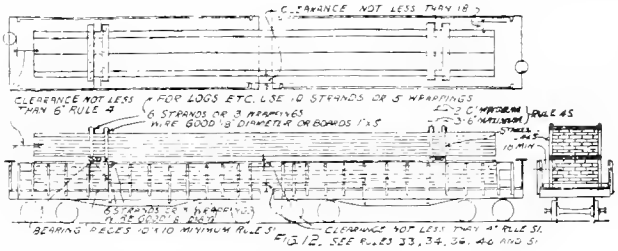
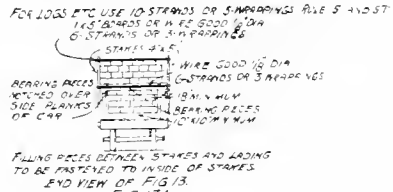
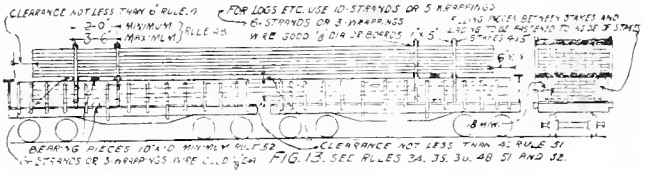


FIG. 12. SEE RULES 33, 34, 36, 46 AND 51



END VIEW OF FIG. 13.
FIG. 13A.



6 STRANDS OR 3 WRAPPINGS WIRE COLD 1/2" FIG. 13. SEE RULES 3A, 35, 36, 48 51 AND 52.

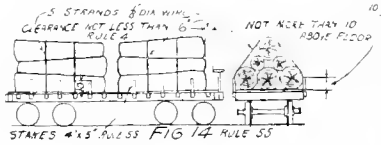


FIG 14 RULE 55

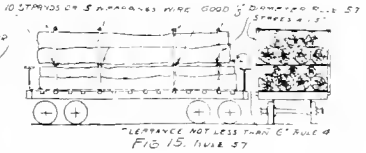


FIG. 15. RULE 57

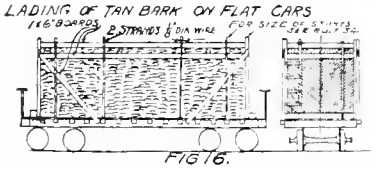


FIG 16.

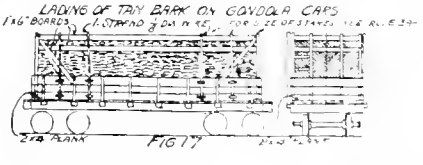


FIG 17

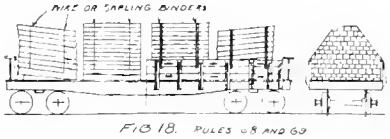


FIG 18. RULES 68 AND 69

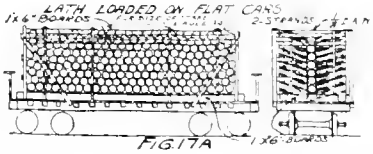


FIG 17A

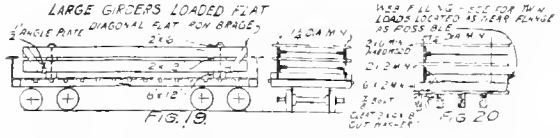


FIG. 19. FIG 20

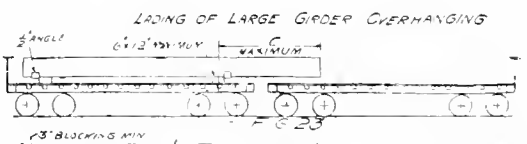
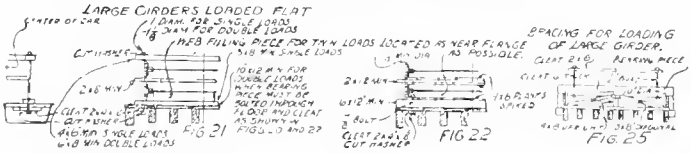


FIG 23
FIG 24



Figs. 5823-5852. Recommended Practice for Loading Long Material on Open Cars. Sheet D.

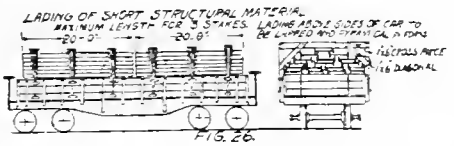


FIG. 26.

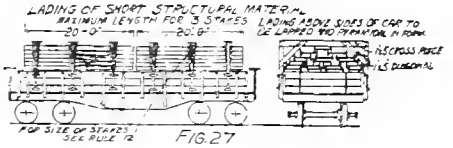


FIG. 27

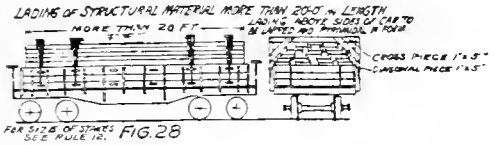


FIG. 28

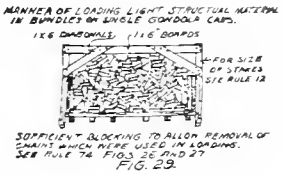


FIG. 29.

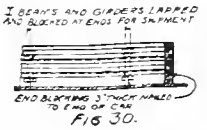


FIG 30.

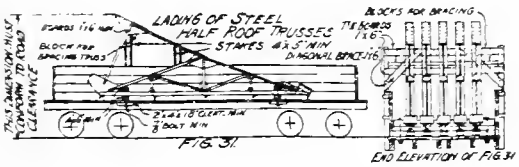


FIG. 31.

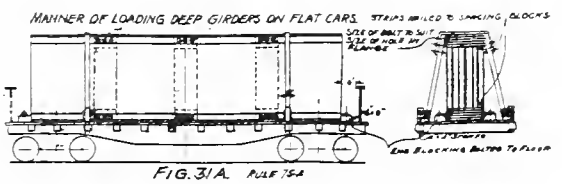


FIG. 31A. RULE 75A

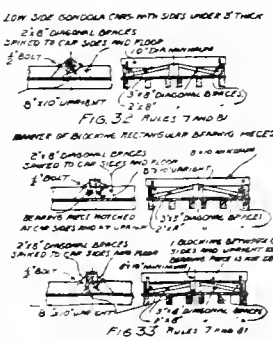


FIG. 32 RULES 7 AND 81

FIG. 33 RULES 7 AND 81

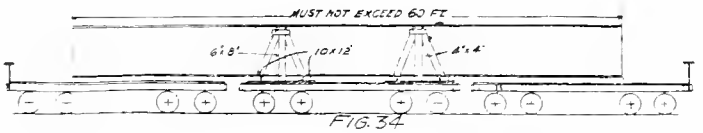


FIG. 34

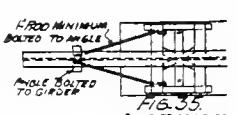


FIG. 35.
RULES 72 85 86 87 AND FIG 34.

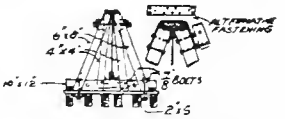


FIG. 36. RULES 72 85 86 87 AND FIG 34

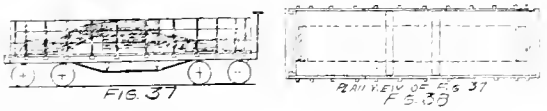


FIG. 37

FIG. 38

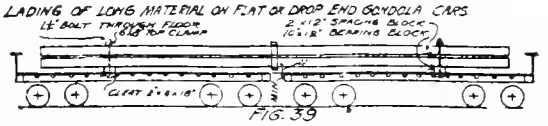


FIG. 39

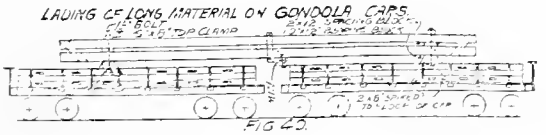
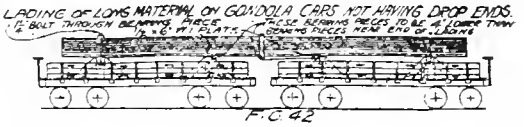


FIG 40.



F.C 42

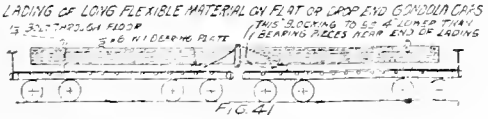


FIG. 41

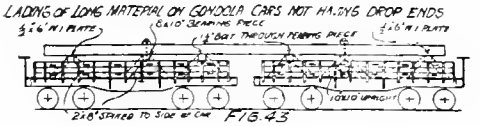


FIG. 43

Figs. 5853-5880. Recommended Practice for Loading Long Material on Open Cars. Sheet D1.

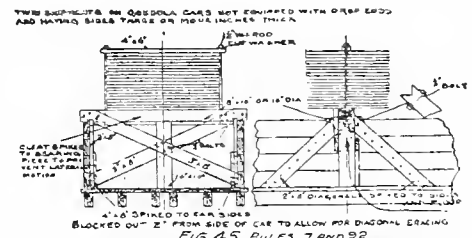


FIG. 45 RULES 7 AND 92

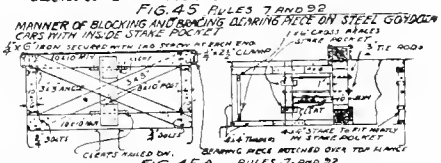


FIG. 45A. RULES 7 AND 92.

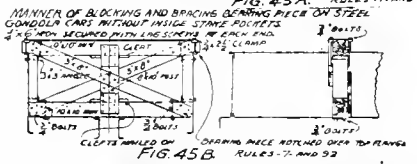


FIG. 45B. RULES 7 AND 92

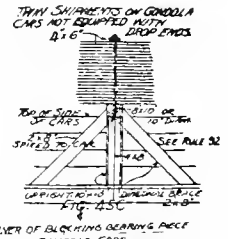


FIG. 45C

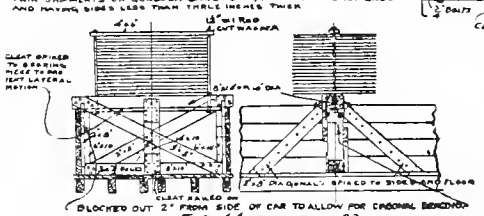


FIG 44 RULES 7 AND 92

½" KEEP OF BLOCKING ROUND BEARING PIECES

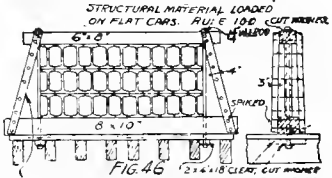
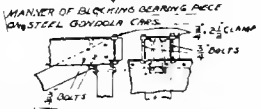


FIG 46 2½"x 8" CLEAT, CUT WASHER

BUILT UP SIDE TIES CAN BE USED AND NAILED IF SUBSTANTIALLY MADE.



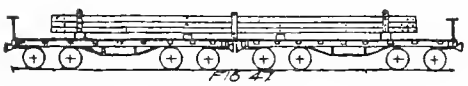


FIG 47

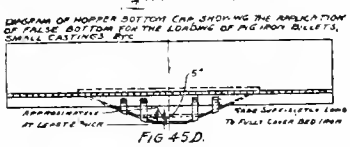


FIG 45D.

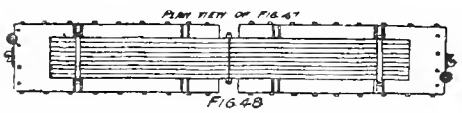


FIG 48

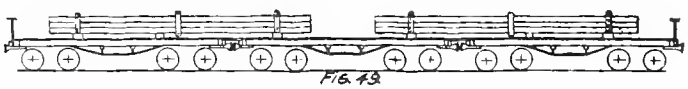


FIG 49

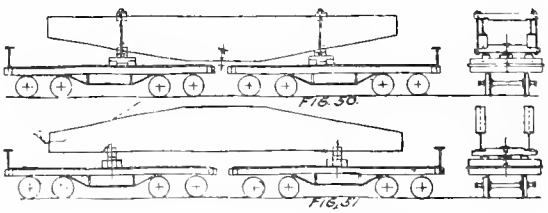
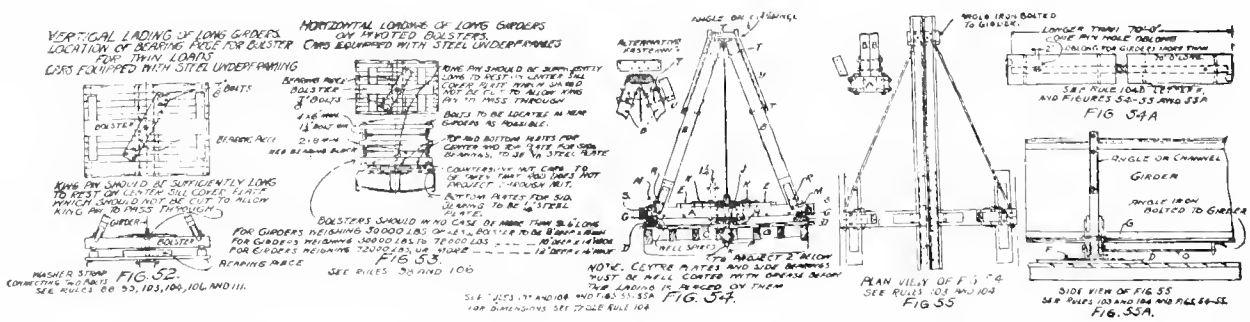
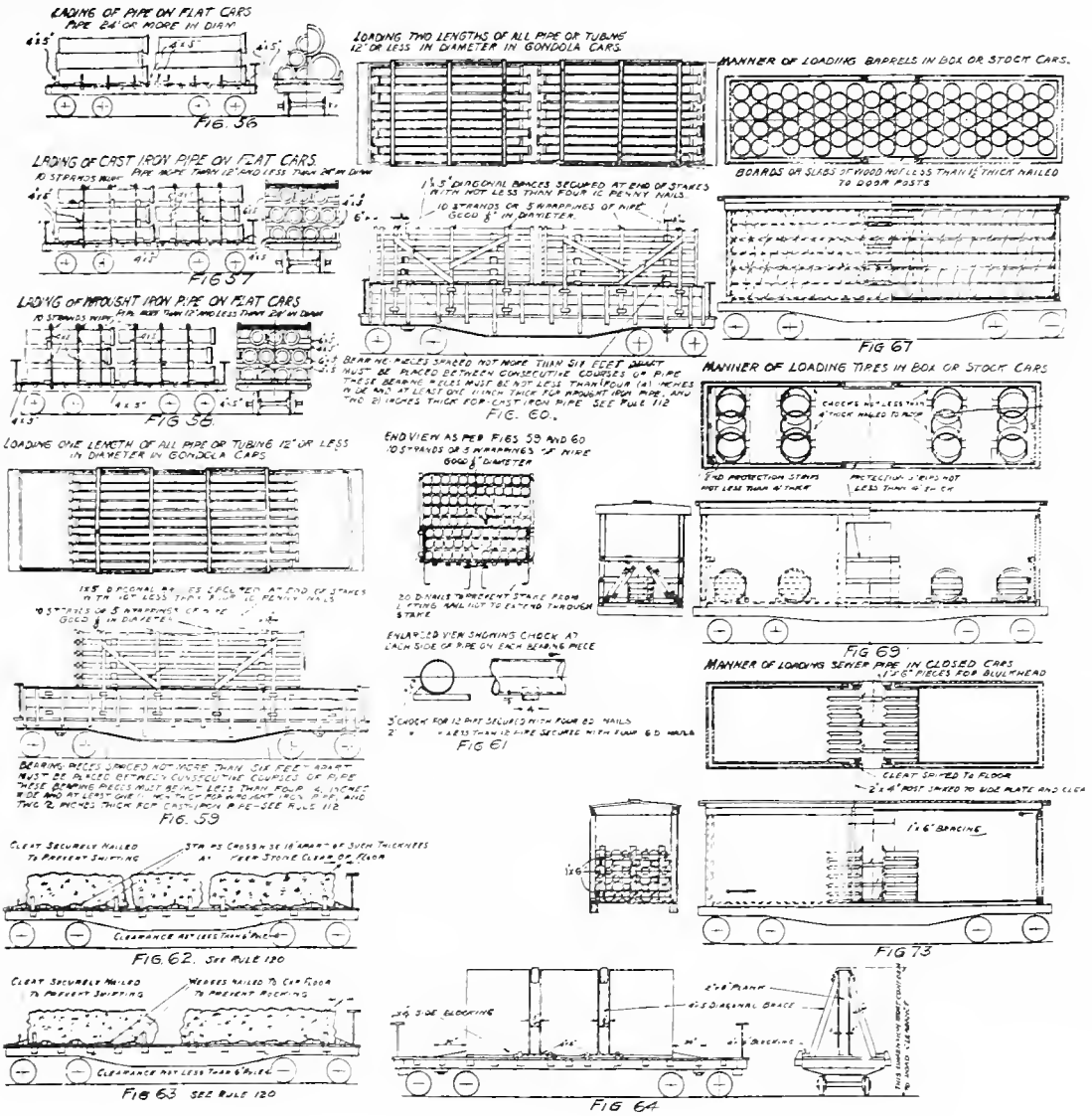


FIG 50.

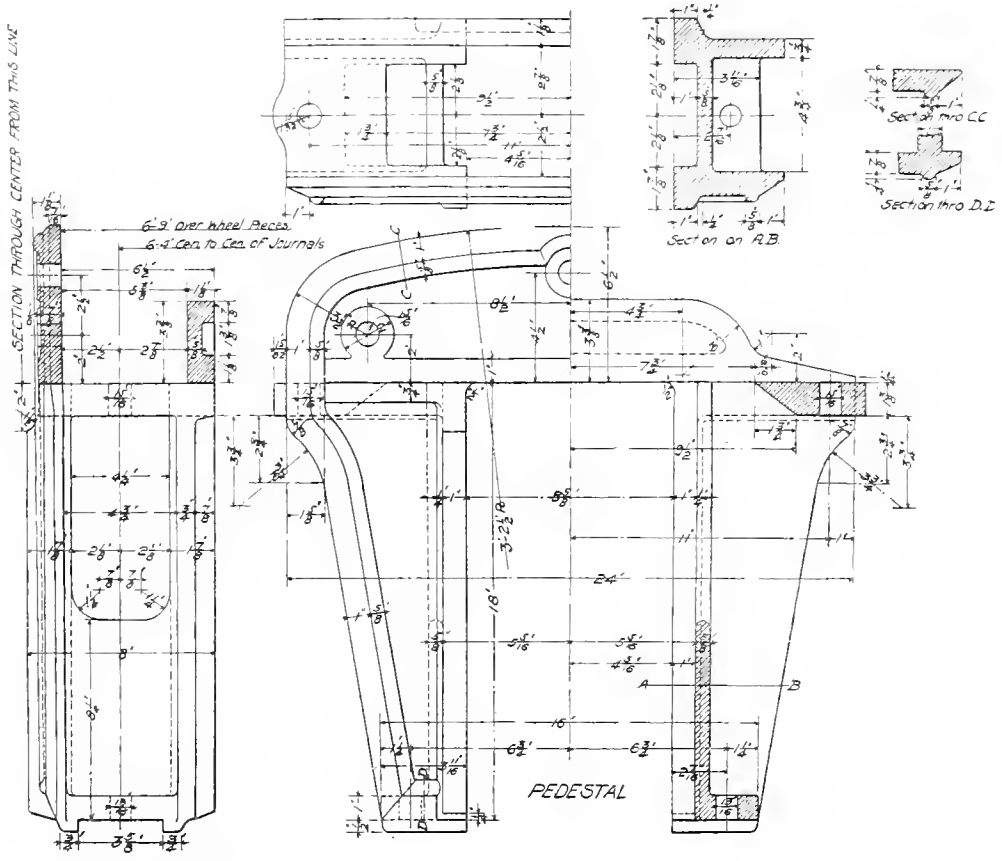
FIG 51.



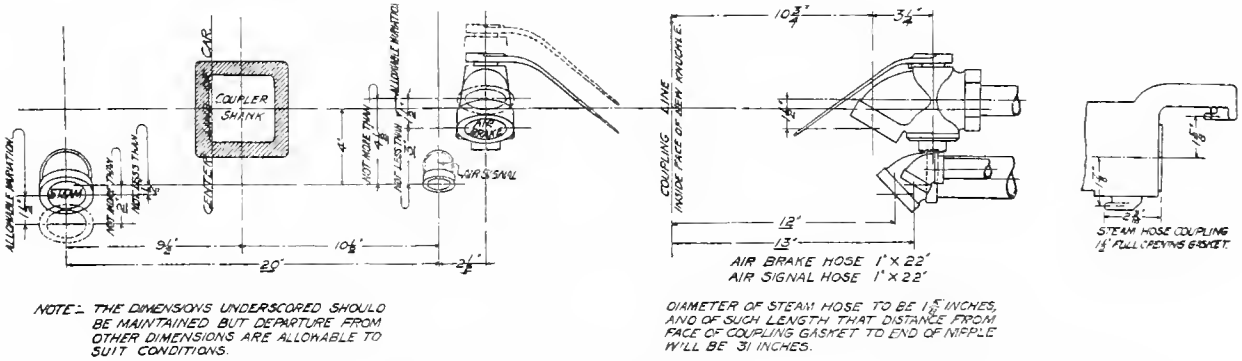
Figs. 5881-5907. Recommended Practice for Loading Long Material on Open Cars. Sheets D and D1.



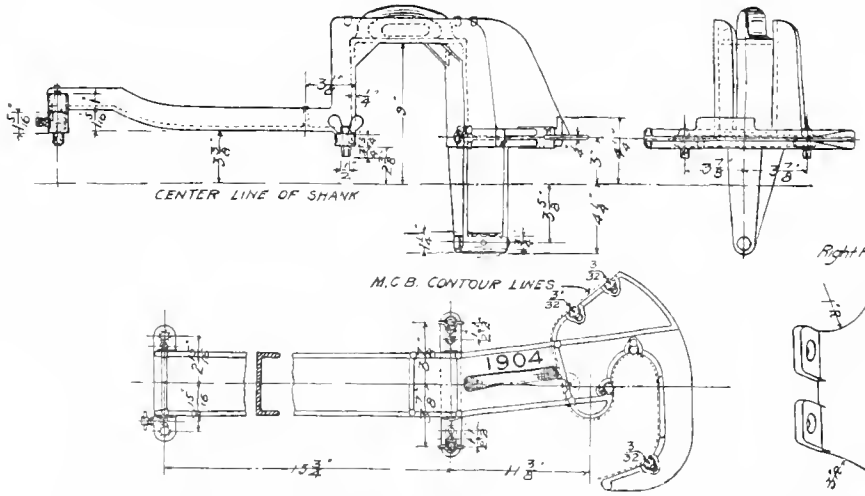
Figs. 5908-5938. Recommended Practice for Loading Long Material on Open Cars. Sheet D1



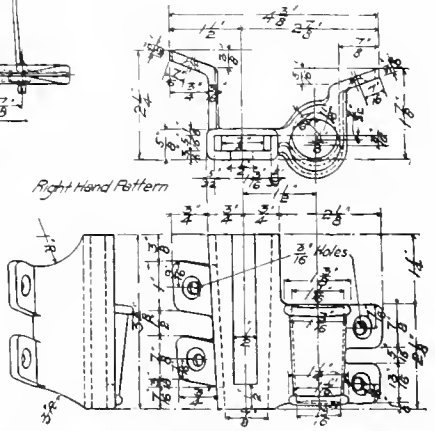
Figs. 5939-5943. Passenger Car Pedestal for Journal 5 in. x 9 in. Sheet E.



Figs. 5944-5947. Recommended Location for Steam and Air Line Connections. Sheet E.



Figs. 5948-5950. Twist Gage for Automatic Couplers. Sheet G.



Figs. 5951-5952. Combination Lamp Holder and Flag Bracket. Sheet E.

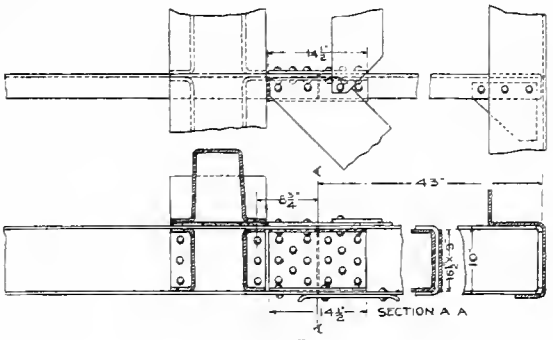


FIG. A.

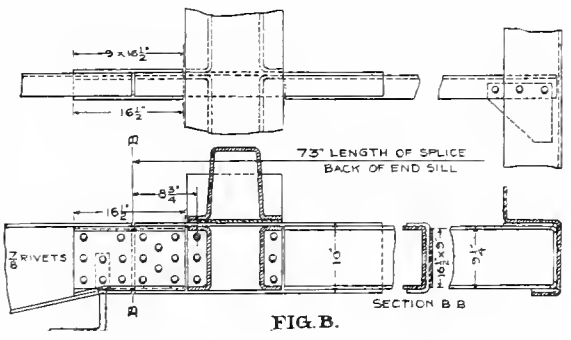


FIG. B.

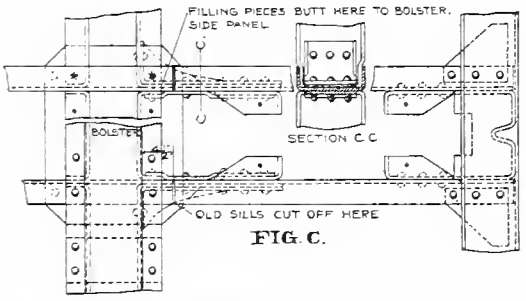


FIG. C.

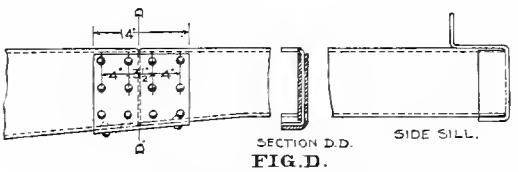
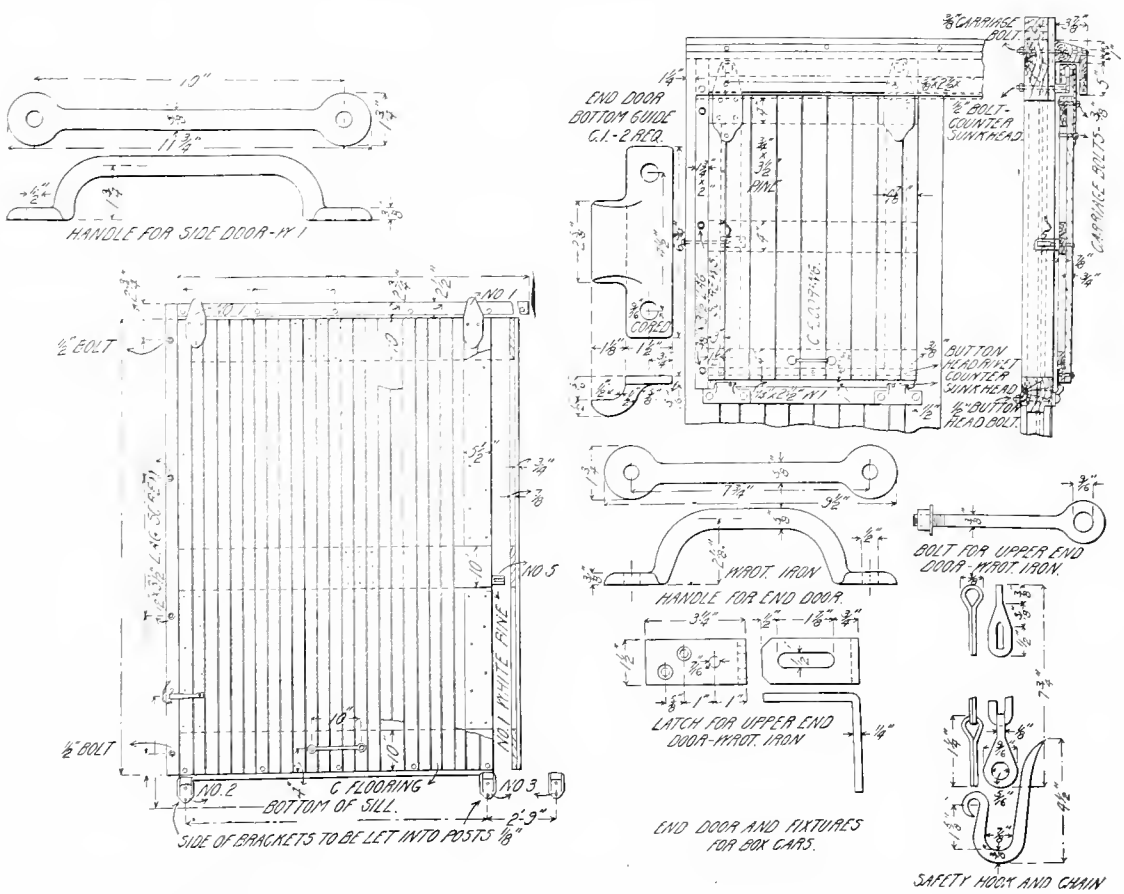


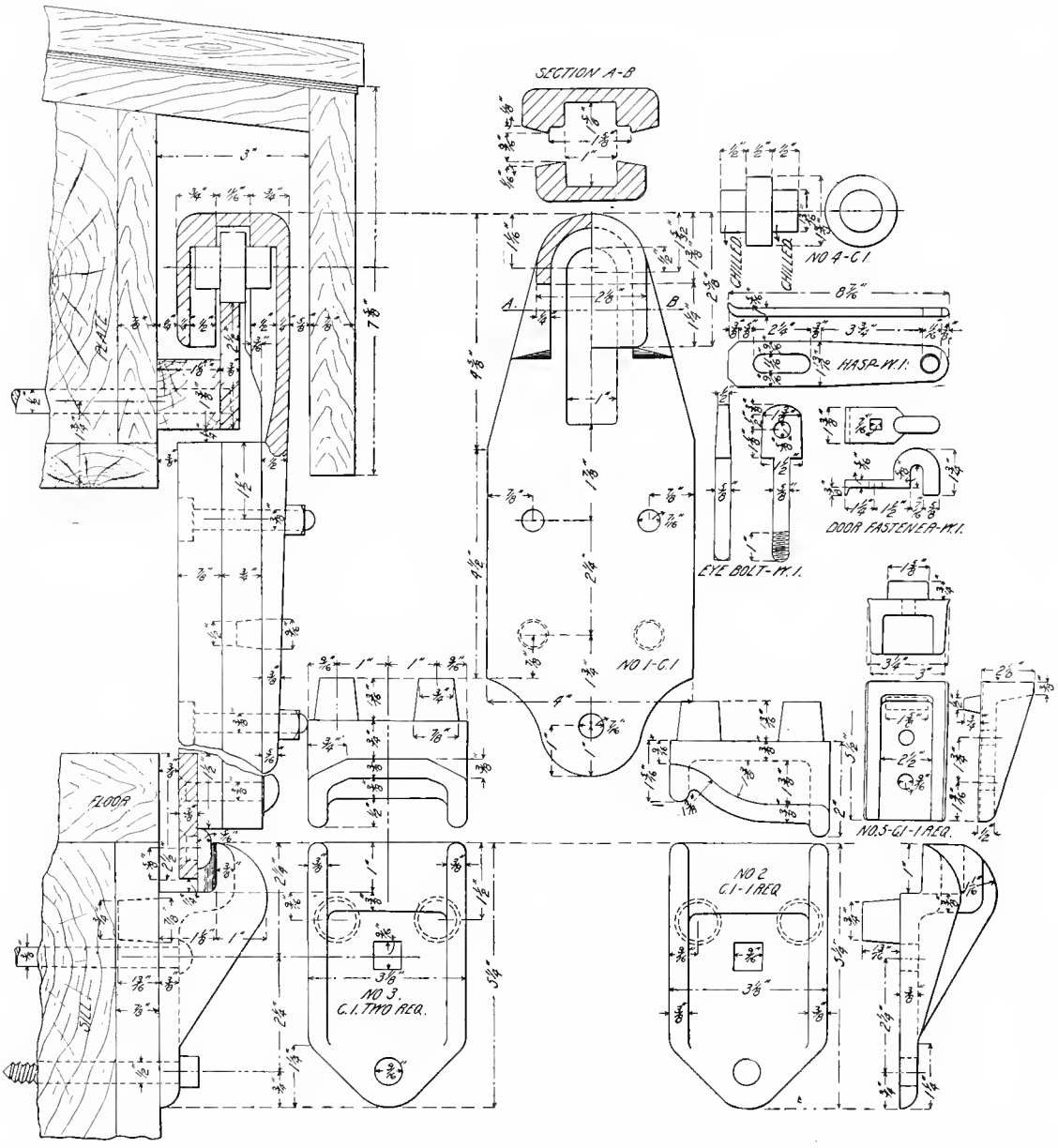
FIG. D.

SPLICING OF SILLS.

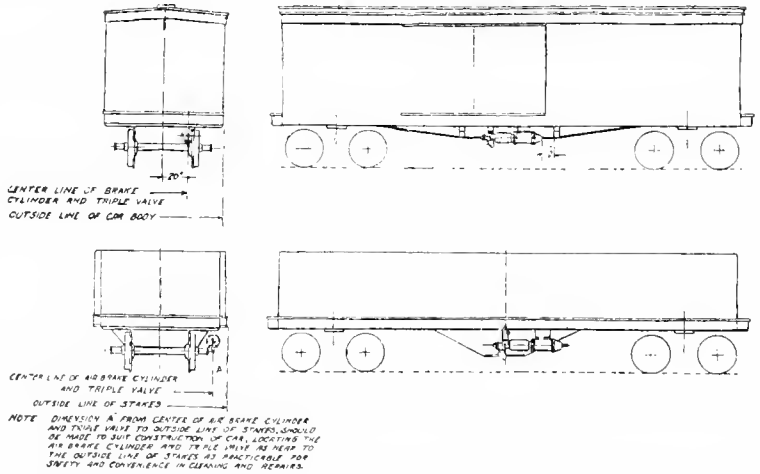
Figs. 5953-5960. Recommended Practice for Splicing Sills on Steel Cars. Sheet G.



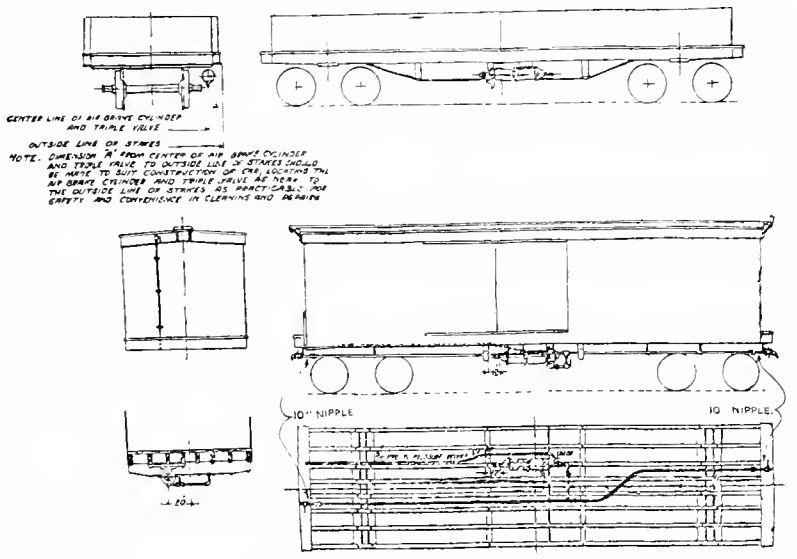
Figs. 5961-5971. Recommended Practice for Box Car Side and End Doors. Sheet F.



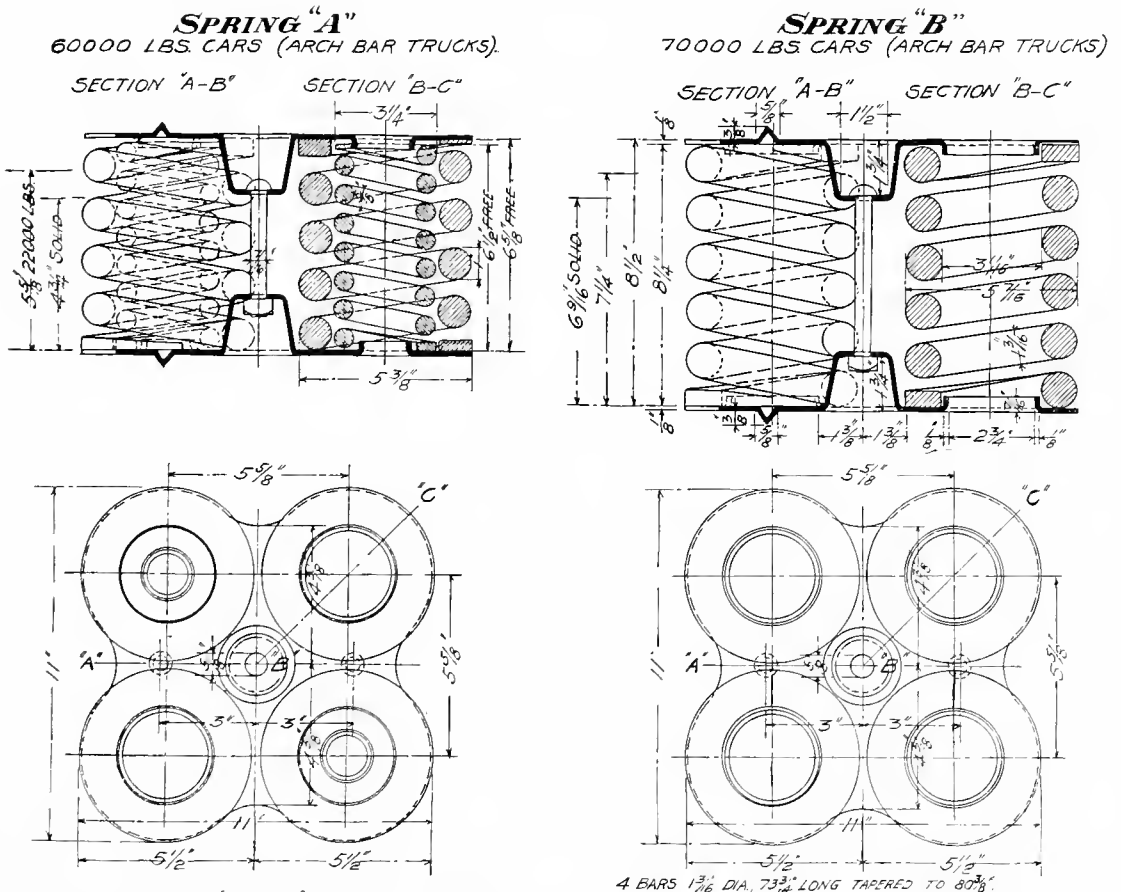
Figs. 5972-5999. Recommended Practice for Box Car Side and End Doors. Sheet F.



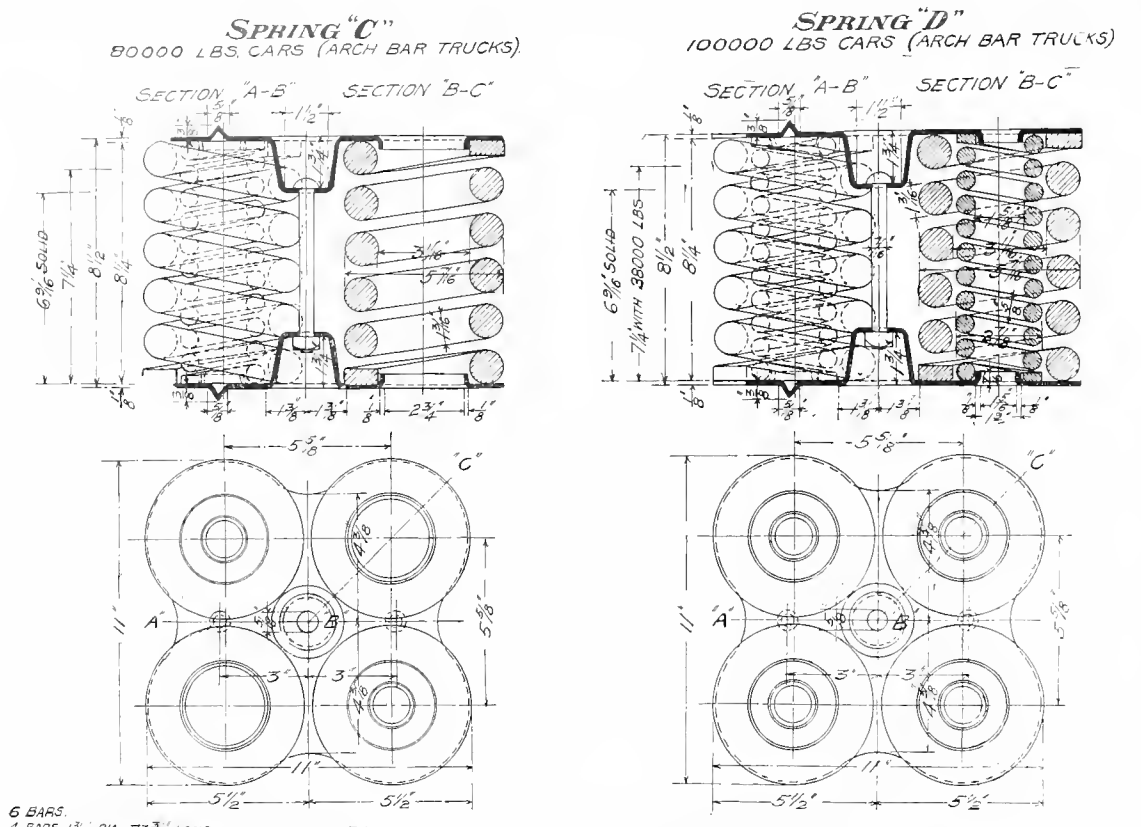
Figs. 6000-6003. Recommended Practice for Location of Air Brake Parts on Cars. Sheet G.



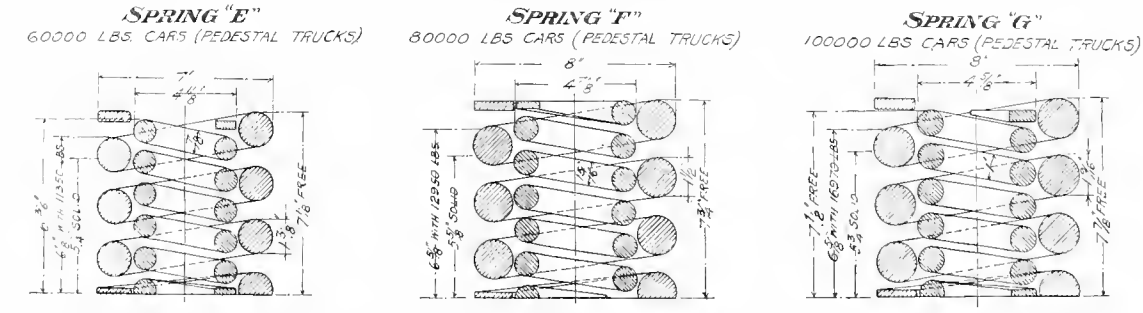
Figs. 6004-6009. Recommended Practice for Location of Air Brake Parts on Cars. Sheet G.



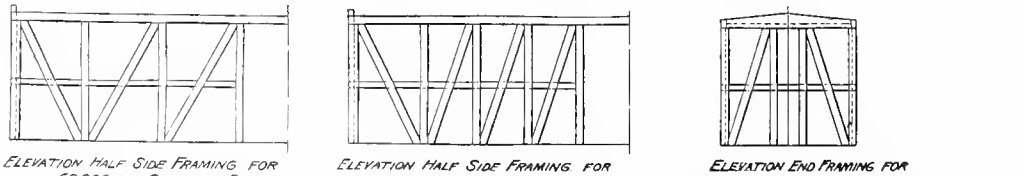
Figs. 6010-6013. Recommended Practice for Springs and Spring Caps for Arch Bar Trucks, 60,000 lbs. and 70,000 lbs. Capacity. Sheet H.



Figs. 6014-6017. Recommended Practice for Springs and Spring Caps for Arch Bar Trucks, 80,000 lbs. and 100,000 lbs. Capacity. Sheet H.



Figs. 6018-6020. Recommended Practice for Springs for Pedestal Trucks. Sheet H.

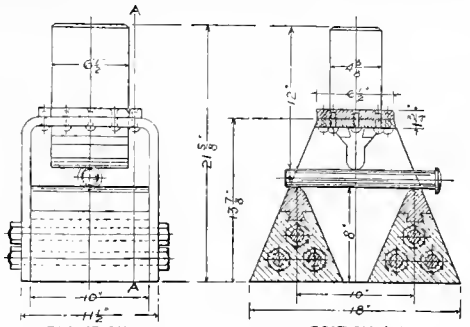


ELEVATION HALF SIDE FRAMING FOR 60,000-LB. CAPACITY CARS.

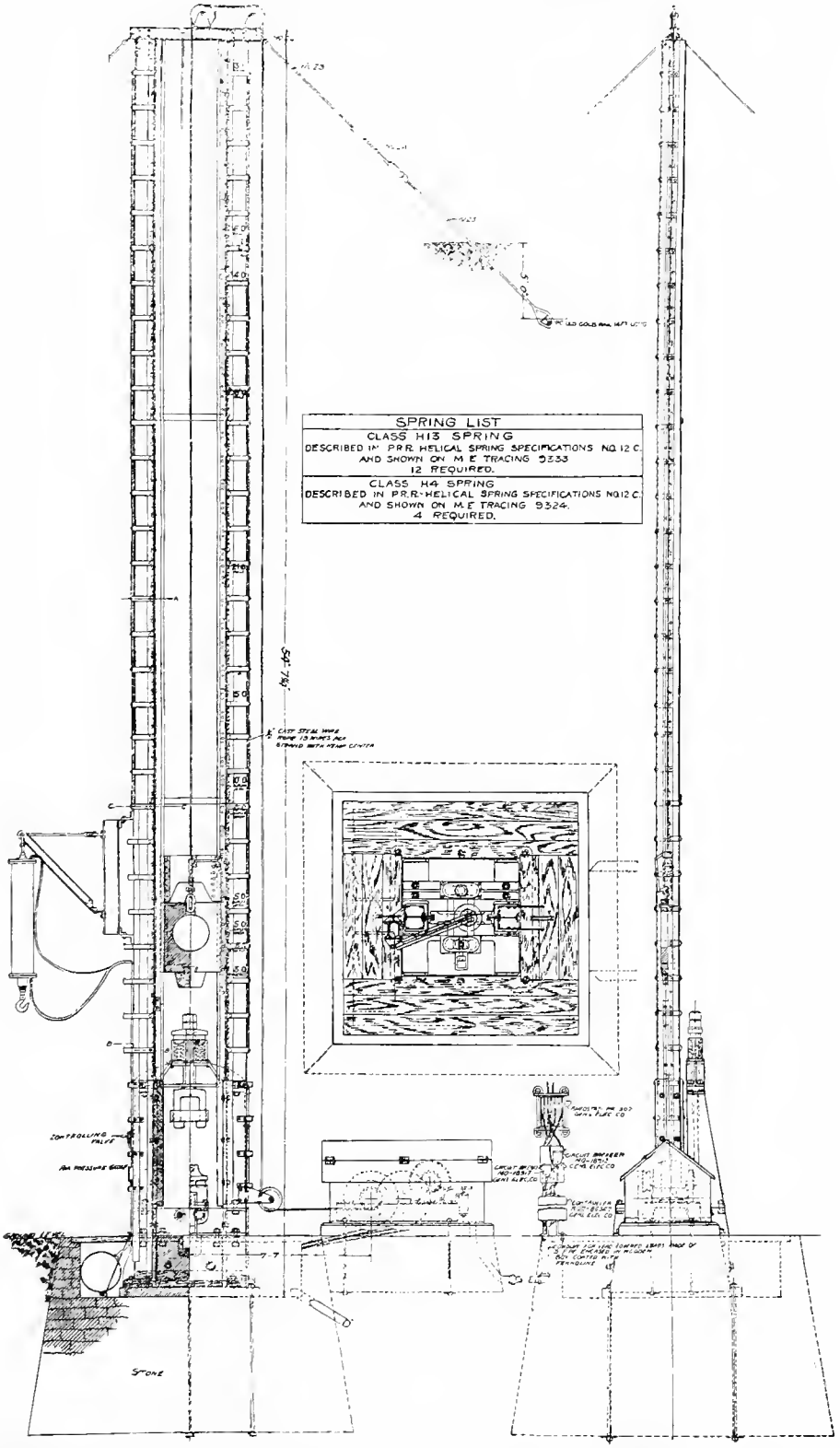
ELEVATION HALF SIDE FRAMING FOR 80,000 AND 100,000-LB. CAPACITY CARS.

ELEVATION END FRAMING FOR 60,000, 80,000 AND 100,000-LB. CAPACITY CARS.

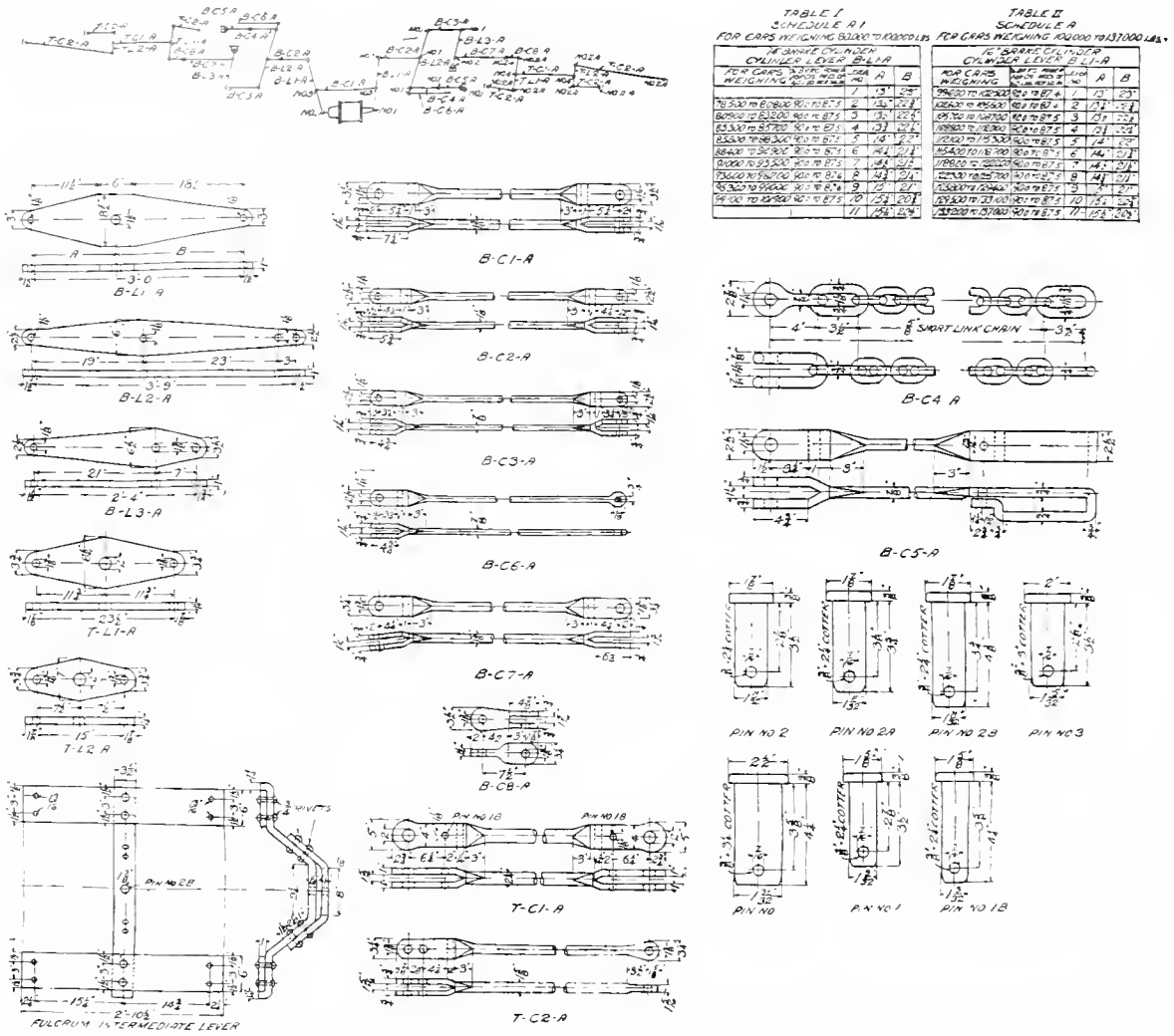
Figs. 6021-6023. Recommended Practice for Framing of Box Cars. Sheet K.



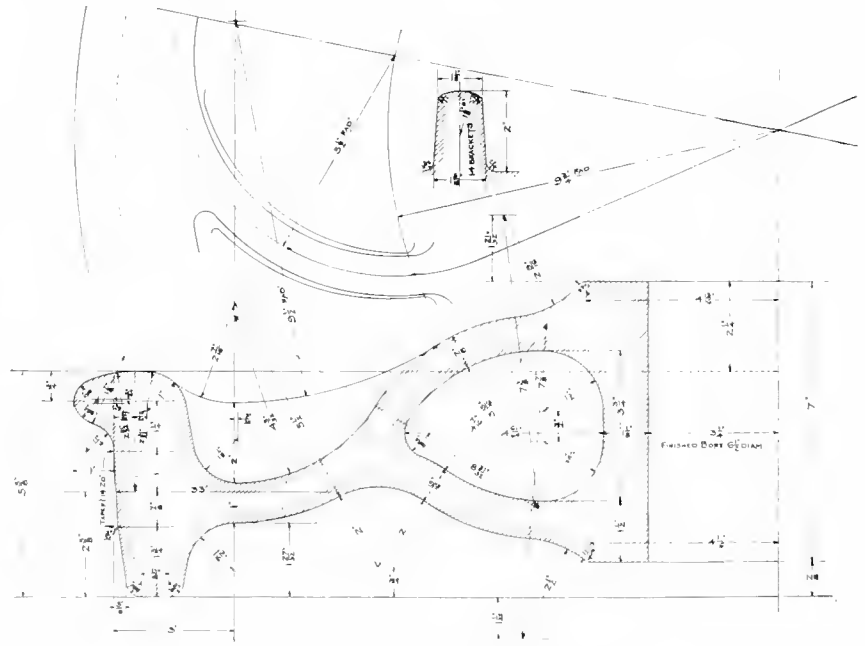
APPARATUS FOR DROP TEST OF KNUCKLE PIVOT PINS

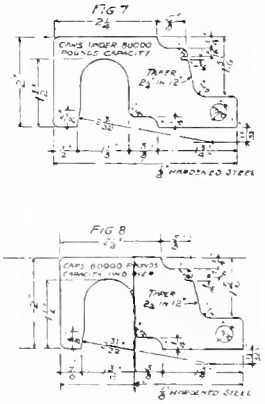


(567) Figs. 6024-6027. Recommended Practice for Drop Test Machine for M. C. B. Couplers. Sheet I.



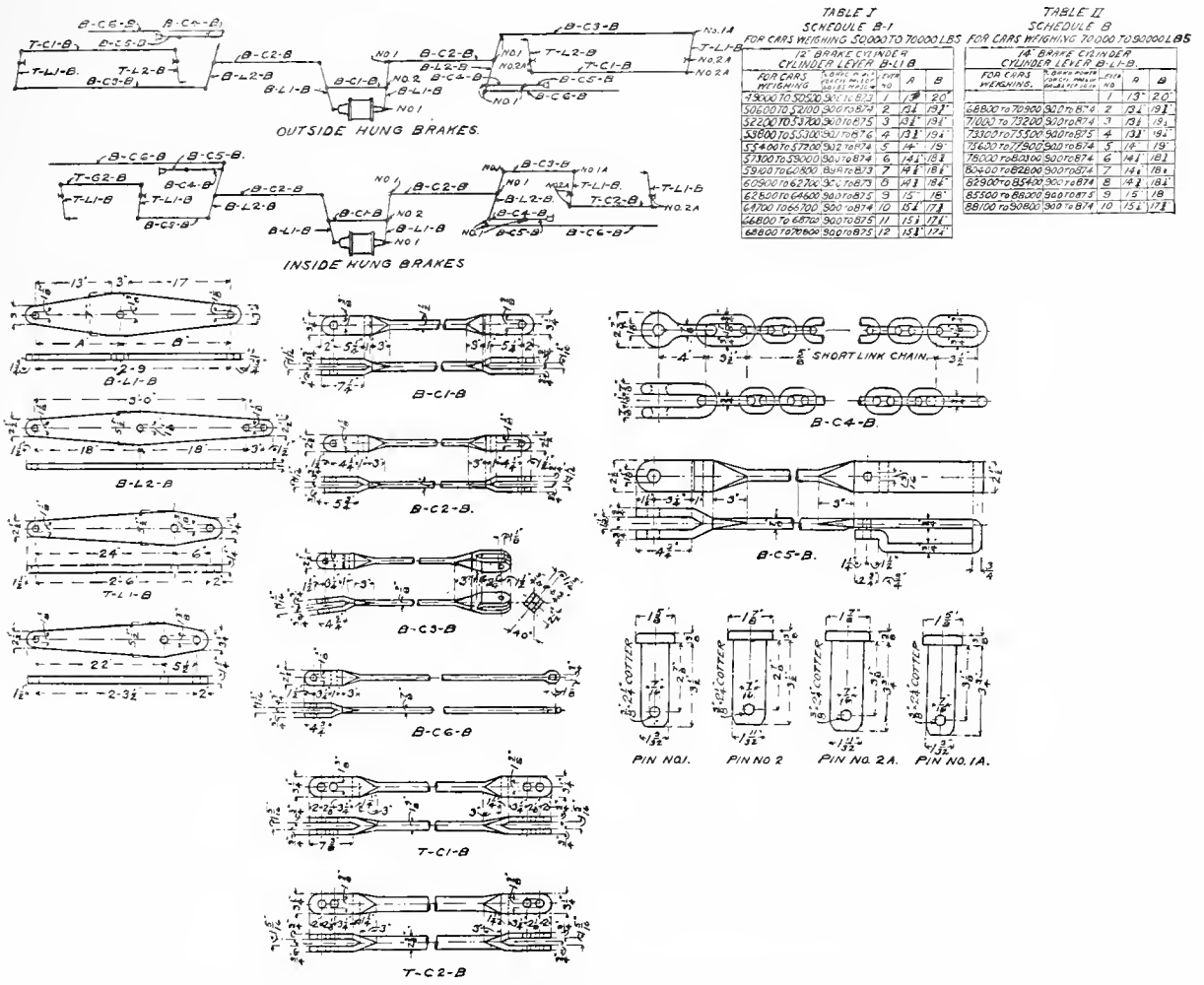
Figs. 6028-6067. High-Speed Foundation Brake Gear for Six-Wheel Passenger Trucks. Sheet J.





Figs. 6068-6069. Standard Limit Gage for Remounting Cast Iron Wheels. Sheet J.

Fig. 6070. Recommended Practice for Cast Iron Wheel for 60,000 lbs. Capacity Cars. Maximum 625 lbs., Minimum 615 lbs. Sheet J.



Figs. 6071-6100. Recommended Practice for High Speed Foundation Brake Gear for Four-Wheel Passenger Trucks. Sheet K.

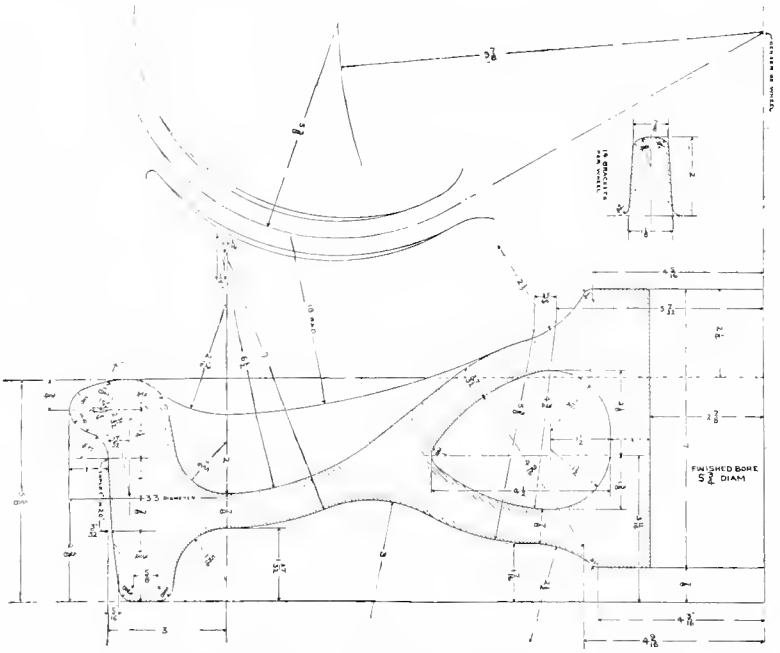
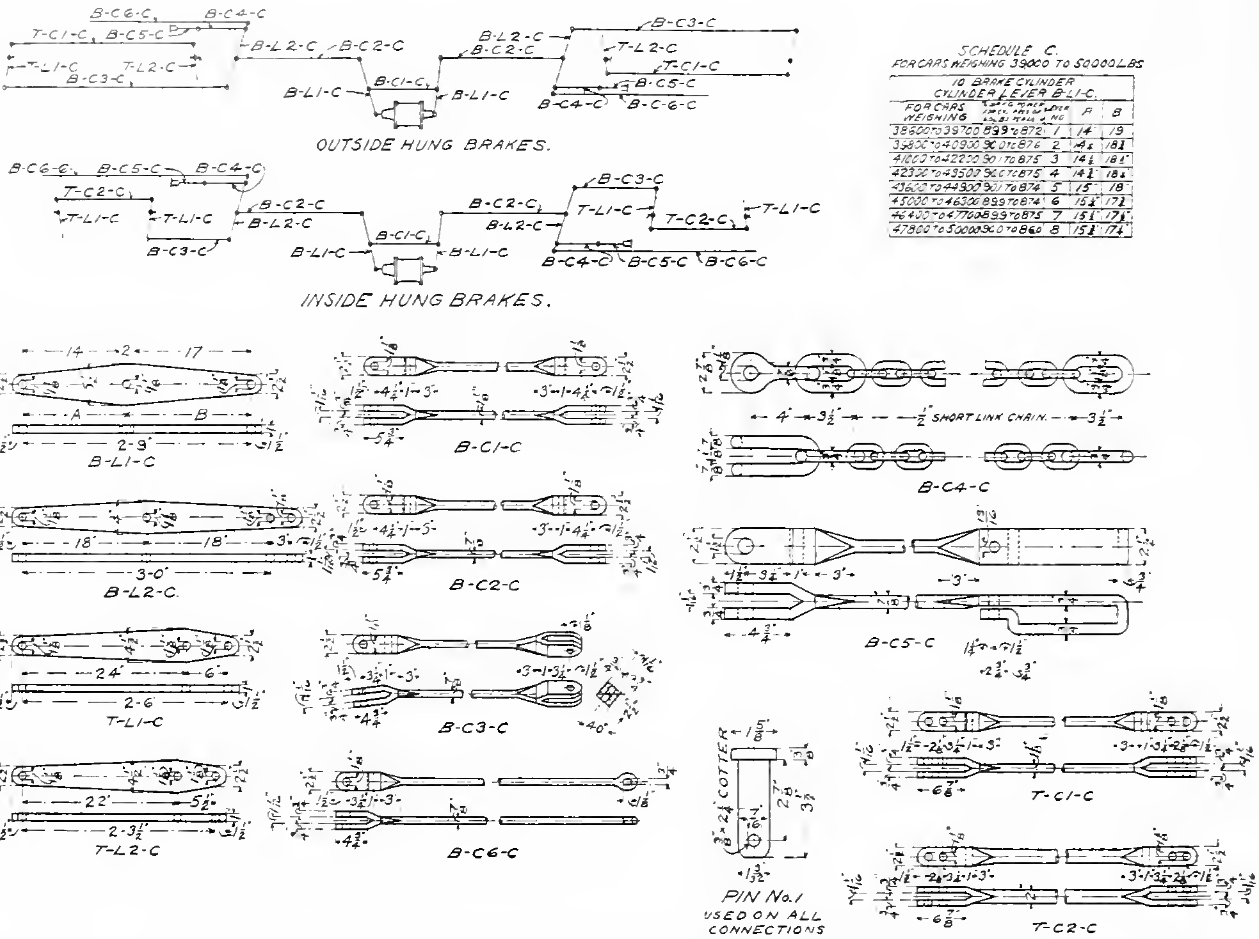


Fig. 6101. Recommended Practice for Cast Iron Wheel for 80,000 lbs. Capacity Cars. Maximum 675 lbs., Minimum 665 lbs. Sheet J.



SCHEDULE C.
FOR CARS WEIGHING 39000 TO 50000 LBS

10 BRAKE CYLINDER CYLINDER LEVER B-L1-C.				
FOR CARS WEIGHING	[illegible]	LEVER NO	A	B
38600 TO 39700	899 TO 872	1	14"	19
39800 TO 40900	900 TO 876	2	14¼	18¾
41000 TO 42200	901 TO 875	3	14½"	18½"
42300 TO 43500	900 TO 875	4	14¾"	18¼
43600 TO 44900	901 TO 874	5	15"	18"
45000 TO 46300	899 TO 874	6	15¼"	17¾
46400 TO 47700	899 TO 875	7	15½"	17½"
47800 TO 50000	900 TO 860	8	15¾	17¼"

Figs. 6102-6176. Recommended Practice for High-Speed Foundation Brake Gear for Four-Wheel Passenger Trucks. Sheet L.

Figs. 6177-6182. Recommended Practice for Lettering for Freight Cars. Sheet M.

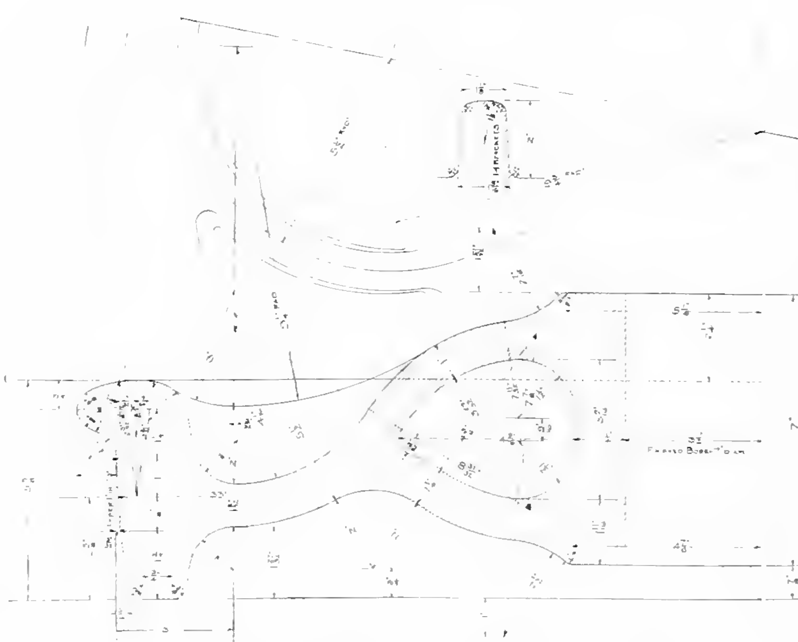


Fig. 6183. Recommended Practice for Cast Iron Wheel for 100,000 lbs. Capacity Cars. Maximum 725 lbs., Minimum 715 lbs. Sheet J.

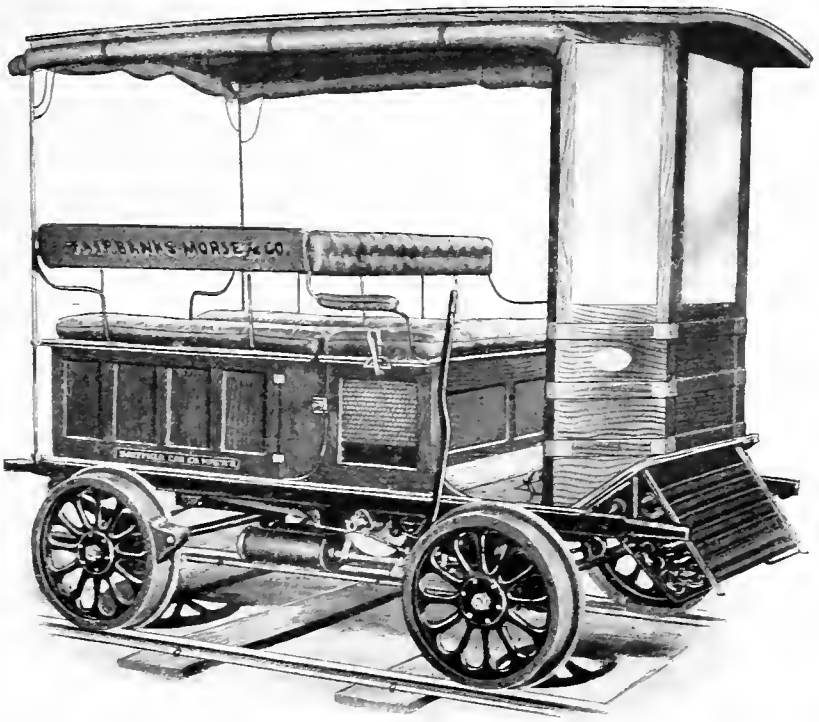


Fig. 6184.
No. 16. Inspection Gasolene Motor Car.
Type A.

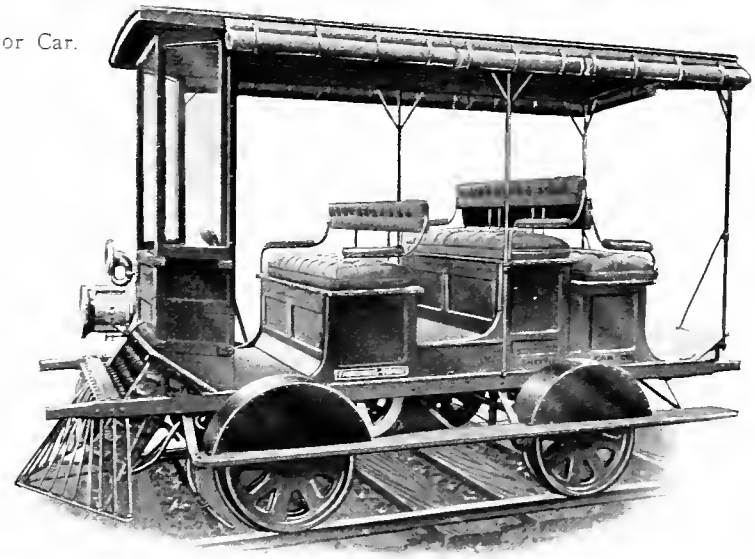


Fig. 6185.
No. 16. Inspection Gasolene Motor Car
Type C.

Fig. 6186. No. 21. Inspection Gasolene Motor Car.
Fairbanks, Morse & Co.

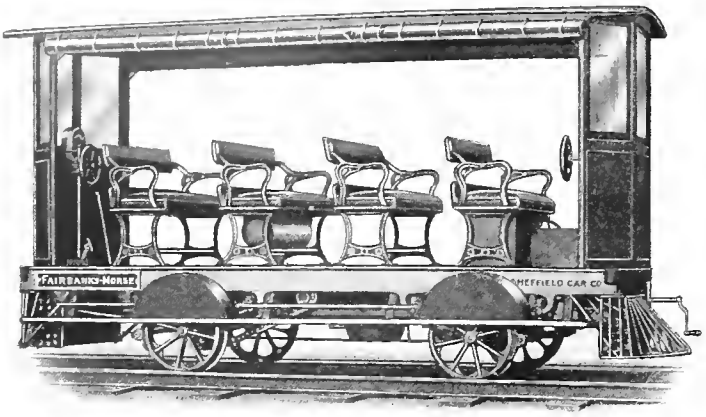


Fig. 6187. No. 22. Inspection Gasolene Motor Car.

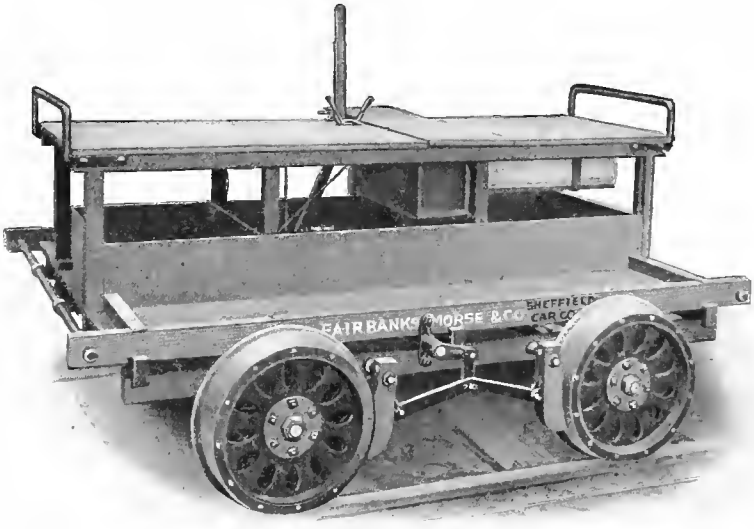


Fig. 6188. No. 26. Section Gasolene Motor Car.

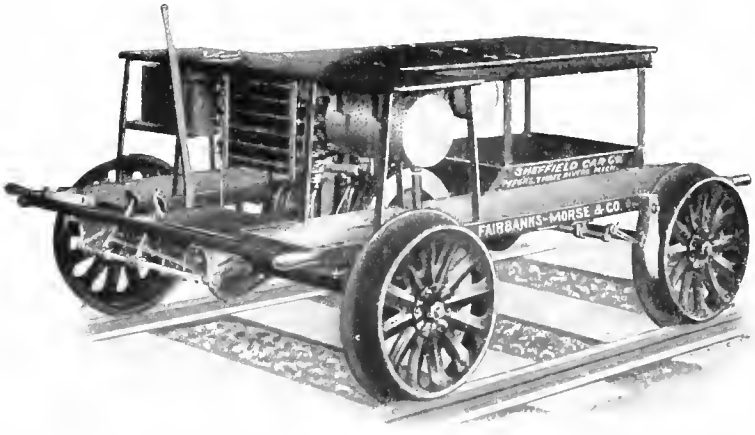


Fig. 6189. No. 14. Section Gasolene Motor Car. Automobile Type.

Fairbanks, Morse & Co.

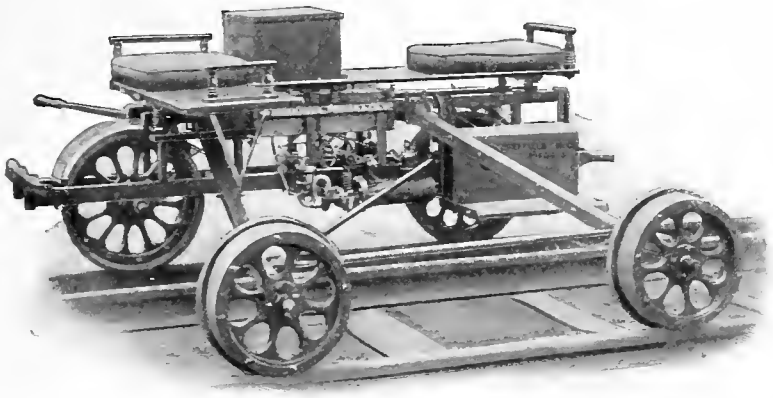


Fig. 6190. No. 2J. Inspection Gasolene Motor Car.
Fairbanks, Morse & Co.

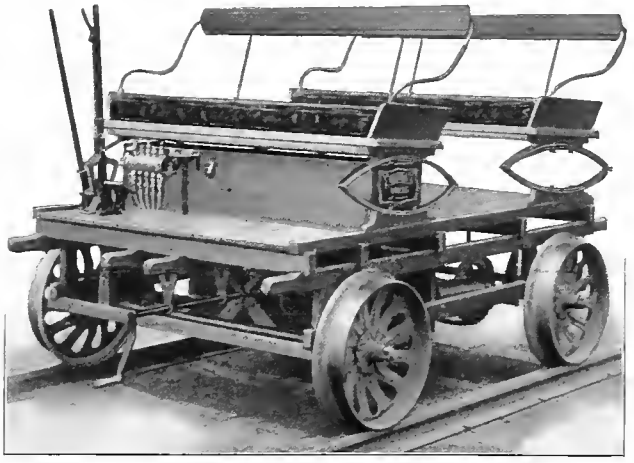


Fig. 6191. No. 16. Inspection Gasolene Motor Car.
The Buda Foundry & Mfg. Co.

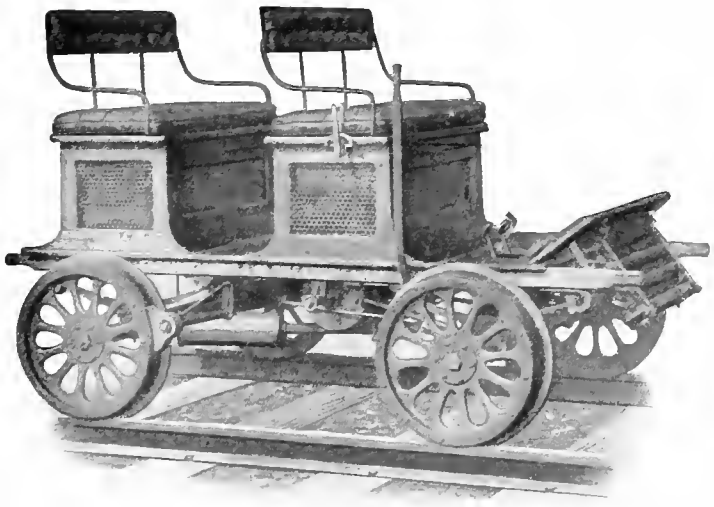


Fig. 6192. No. 15. Motor Inspection Car.
Fairbanks, Morse & Co.

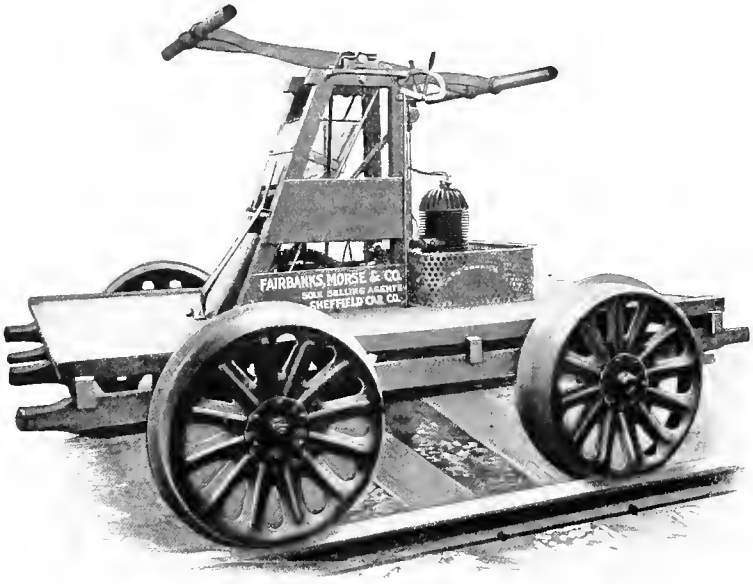


Fig. 6193. No. 13. Gasolene Hand Car.
Fairbanks, Morse & Co.

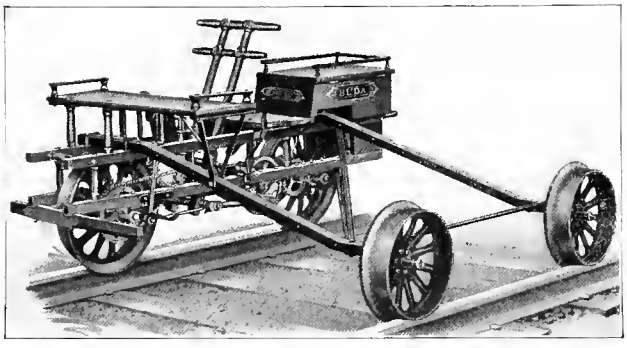


Fig. 6194. Buda No. 12. Motor Velocipede Car.

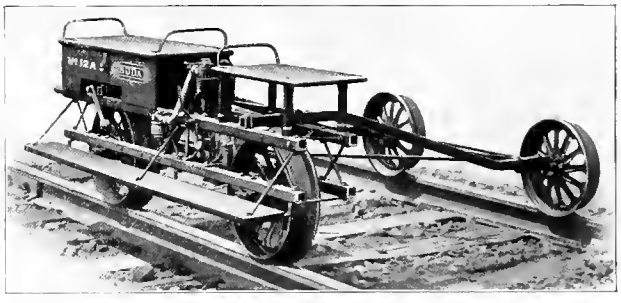


Fig. 6195. Buda No. 12A. Motor Velocipede Car.
The Buda Foundry & Mfg. Co.

Fig. 6196. No. 9. Inspection Hand Car.
Kalamazoo Railway Supply Co.

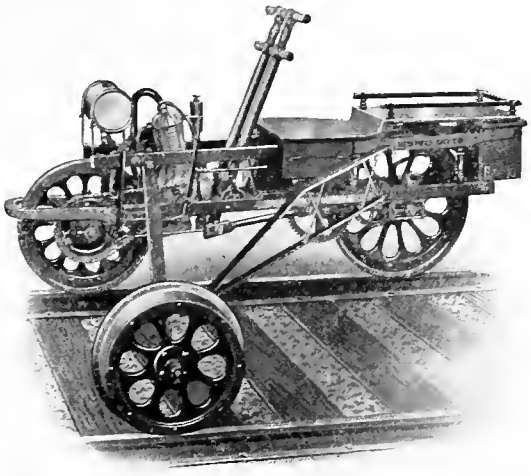


Fig. 6197. No. 0. Gasolene Motor Inspection Car.
Fairbanks, Morse & Co.

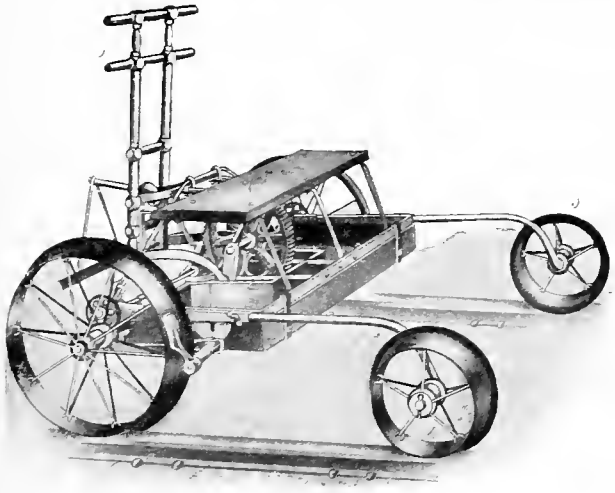


Fig. 6198. No. 7. Steel Velocipede Car.

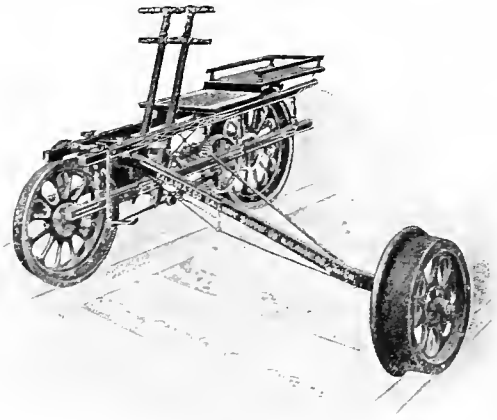


Fig. 6199. No. 12. Velocipede Car.
Kalamazoo Railway Supply Co.

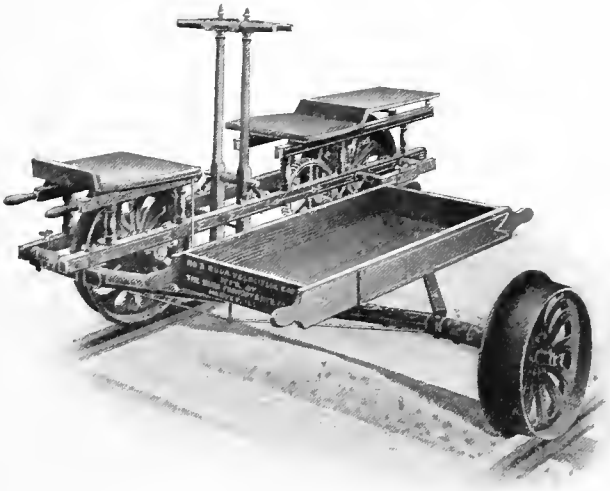


Fig. 6200. No. 3. Velocipede Car.
The Buda Foundry & Mfg. Co.

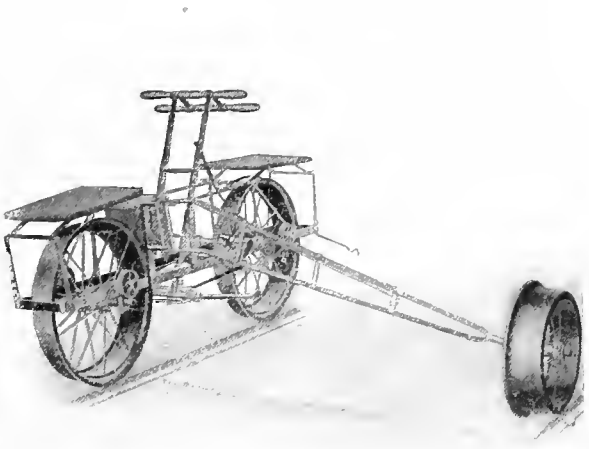


Fig. 6201. No. 0. Steel Velocipede Car.
Kalamazoo Railway Supply Co.

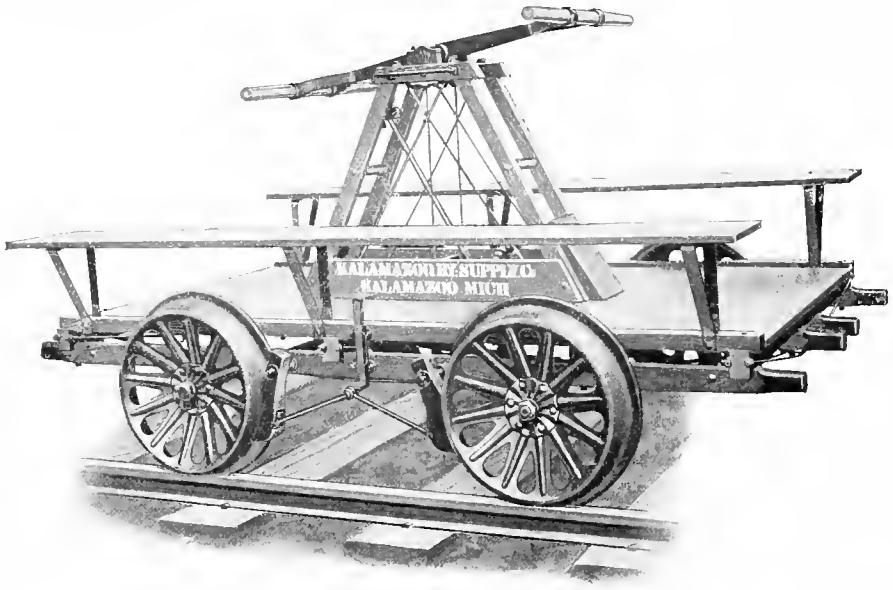


Fig. 6202. No. 2. Section Hand Car with Side Seats.
Kalamazoo Railway Supply Co.

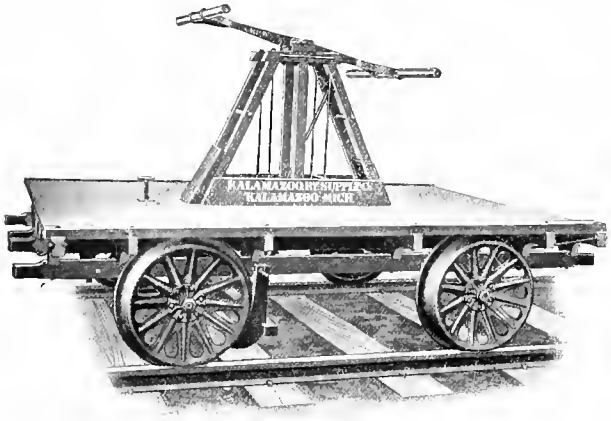


Fig. 6203. No. 3. Bridge Gang Hand Car.

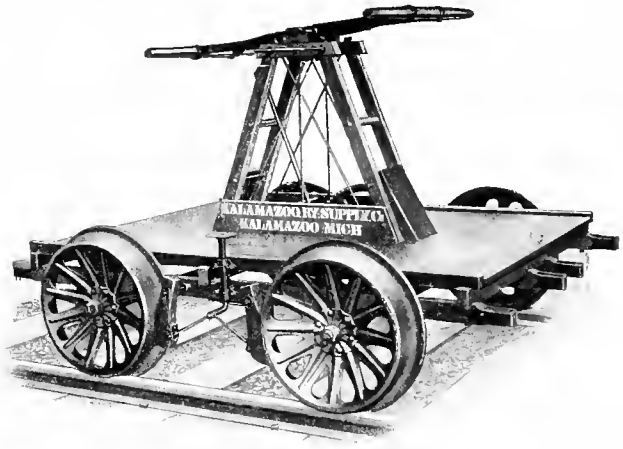


Fig. 6204. No. 1. Section Hand Car.
Kalamazoo Railway Supply Co.

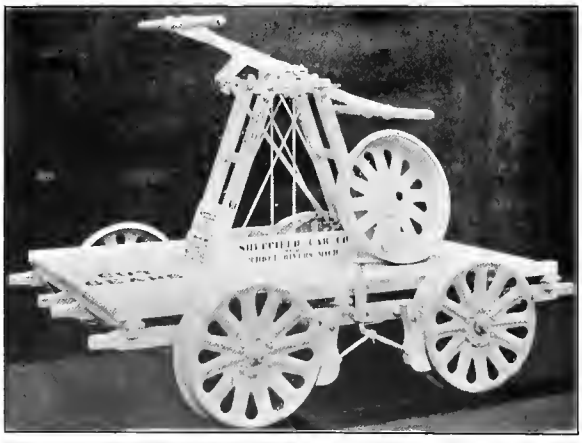


Fig. 6205. Hand Car.
Fairbanks, Morse & Co.

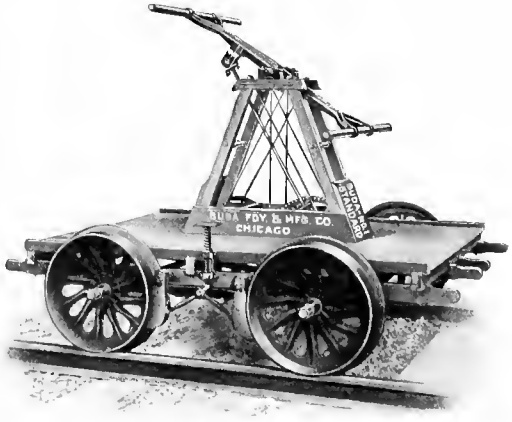


Fig. 6206. No. 1. Hand Car with Steel Wheels.
The Buda Foundry & Mfg. Co.

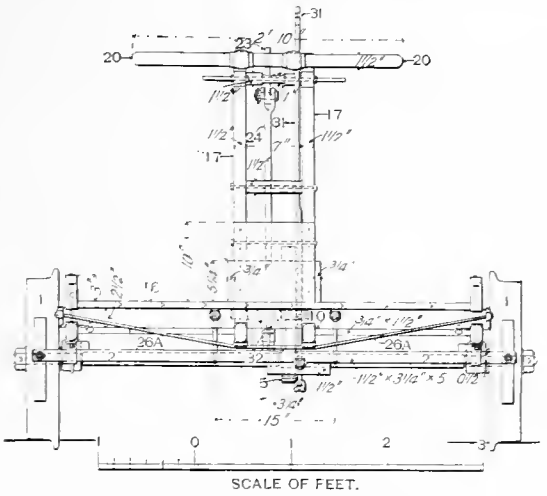


Fig. 6207. End Elevation.

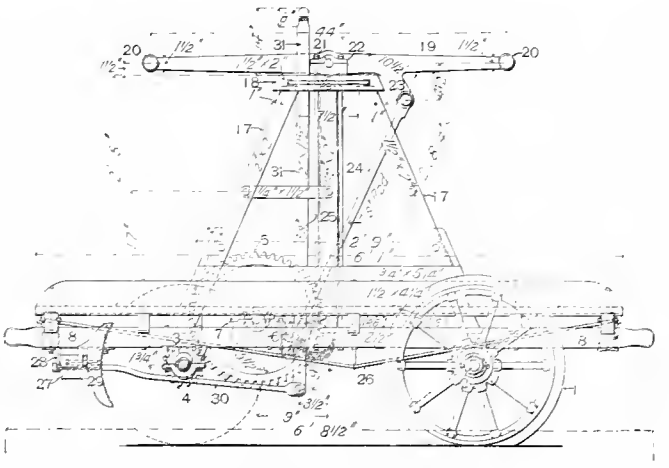


Fig. 6208. Side Elevation.

Names of Parts of Hand Car.

Figs. 6207-6209.

1 *Wheel*
2 *Axle*
3 *Journal Box*
4 *Pinion*
5 *Gear Wheel*
6 *Crank Shaft*
7 *Crank Shaft Bearings*
8 *Side Sills*
9 *End Sills*
10 *Center Sills*
16 *Floor*
17 *Lever Frame Post*
18 *Lever Frame Cap*
19 *Hand Car Lever*
20 *Lever Handle*
21 *Lever Shaft*
22 *Lever Shaft Bearings*
23 *Bell Crank*
24 *Connecting Rod*
25 *Lever Frame Tie Rod*
26 *Hand Car Truss Rod*
26a *Cross Frame Truss Rod*
27 *Brake Beam*
28 *Brake Beam Hanger*
29 *Brake Head*
30 *Brake Rod*
31 *Brake Lever*

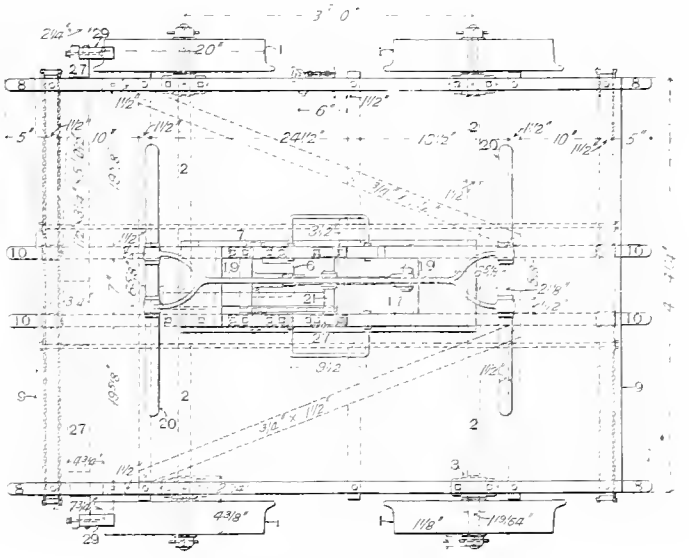


Fig. 6209. Plan.
Hand Car. Wabash Railroad.

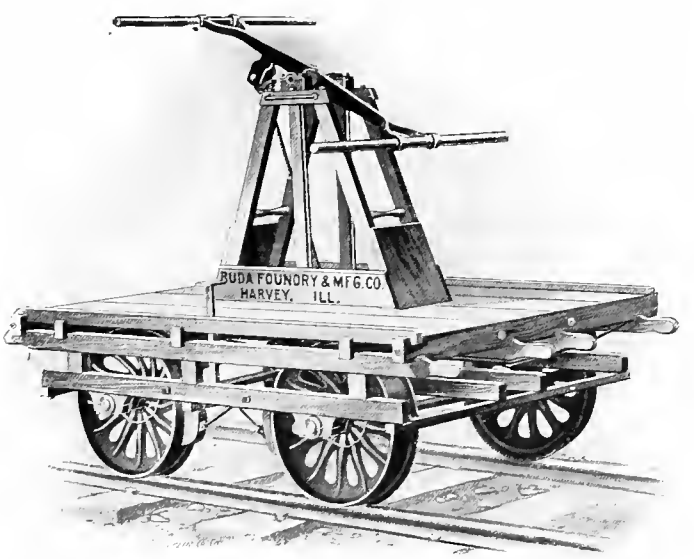


Fig. 6210. No. 3. Narrow Gage Hand Car.
The Buda Foundry & Mfg. Co.

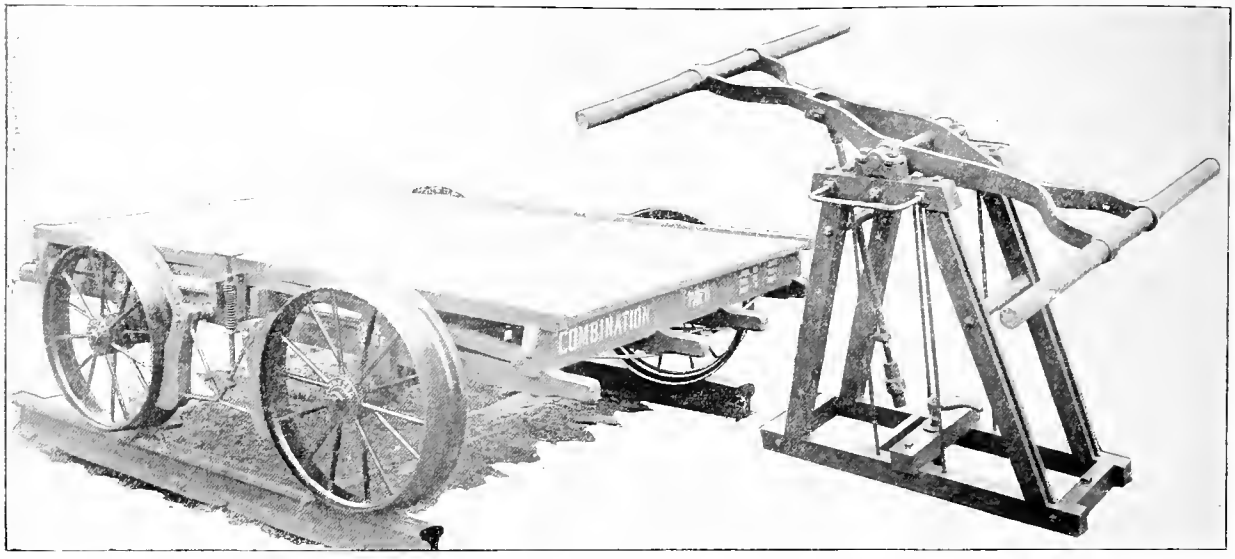


Fig. 6211. Combination Walking Beam Hand and Push Car. The Walking Beam Frame May be Detached as Shown. Turnbuckle Pitman Connection.

Fig. 6212. No. 16. Push Car.

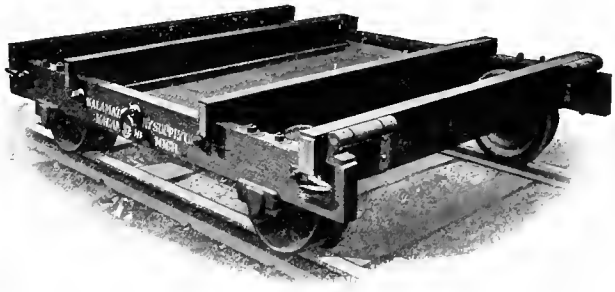
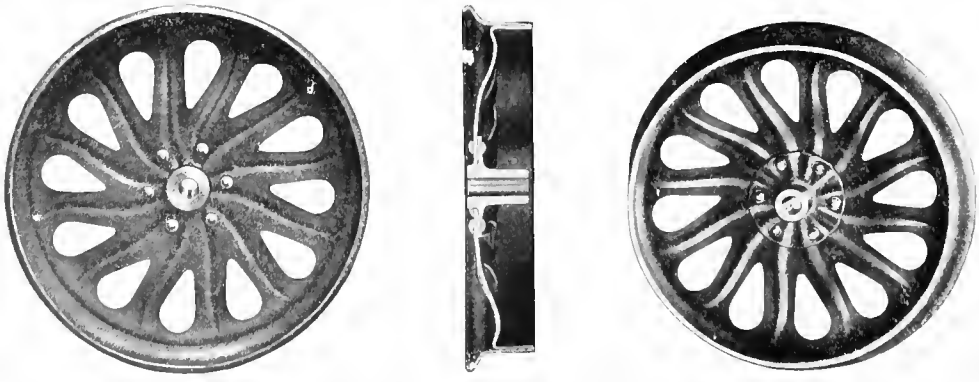


Fig. 6213. No. 8½. Track Laying or Rail Car.
Kalamazoo Railway Supply Co.

Fig. 6214. No. 4. Push Car.
Fairbanks, Morse & Co.



Figs. 6215-6217. Pressed Steel Hand Car Wheels.
The Buda Foundry & Mfg. Co.

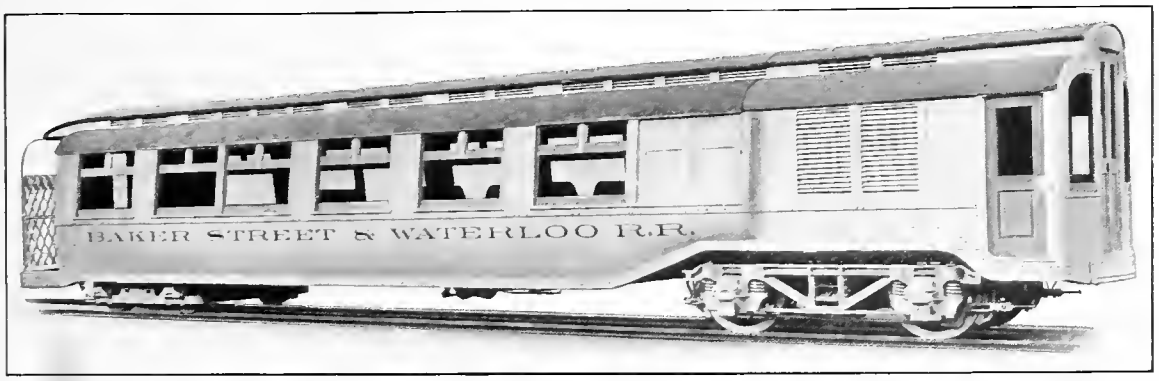


Fig. 6218. All Steel Subway Car. Baker Street & Waterloo.
American Car & Foundry Co., Builders.

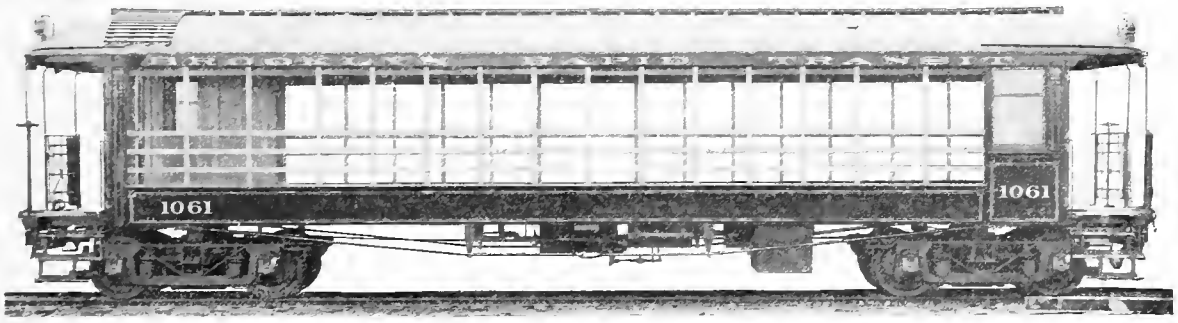


Fig. 6219. Convertible Elevated Motor Car. Brooklyn Rapid Transit Co.
John Stephenson Co., Builders.

Fig. 6220. Elevated Motor Car. Interborough Rapid Transit Co.
Wason Mfg. Co., Builders.

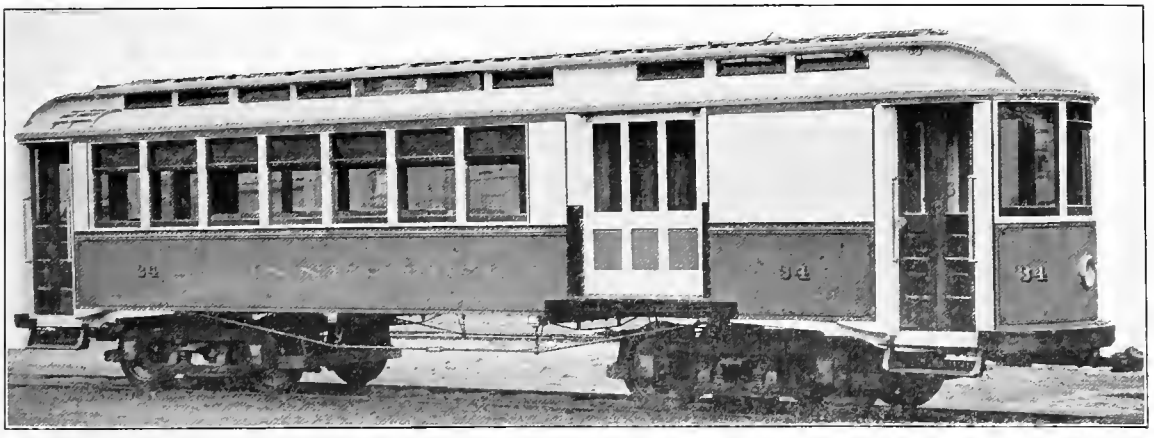


Fig. 6221. Combination Passenger and Baggage Electric Car.
Wason Mfg. Co., Builders.

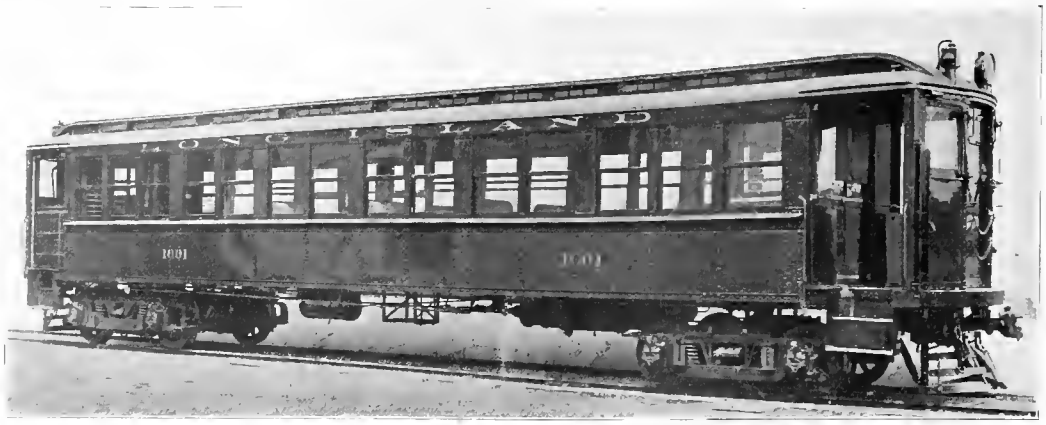


Fig. 6222. Steel Motor Car for Suburban Service. Gibbs Patents. Long Island R. R. American Car & Foundry Co., Builders.

Fig. 6223. Interior of Convertible Elevated Motor Car B. R. T. John Stephenson Co., Builders.

Fig. 6224. Interior of Steel Subway Car.

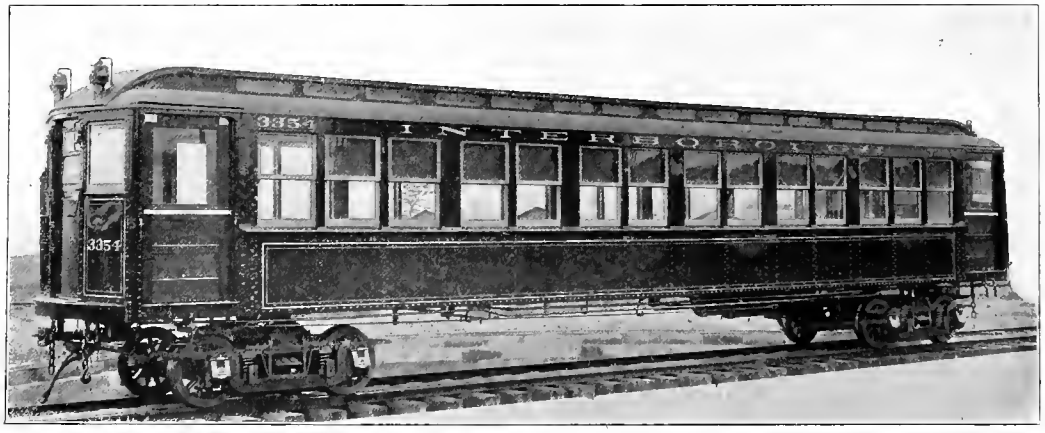


Fig. 6225. Steel Subway Car. Gibbs Patents. Interborough Rapid Transit Co. American Car & Foundry Co., Builders.
(Drawings of this car are shown in Figs. 655-638.)

Fig. 6226. Electric Division Baggage Car. West Jersey & Seashore. Wason Mfg. Co., Builders.

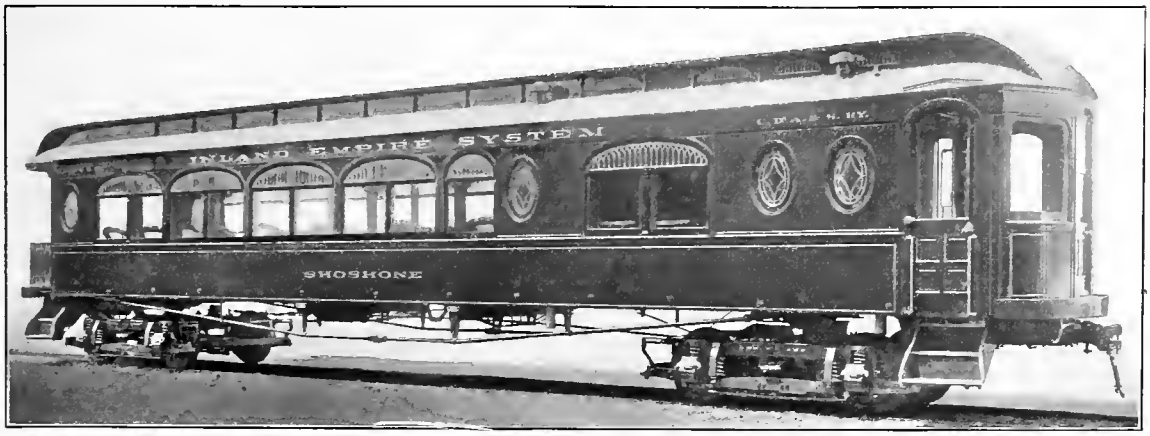


Fig. 6227. Drawing Room Car.

Fig. 6228. Interior of Drawing Room Car.

Fig. 6229. Interior of "Washington" Type Car.

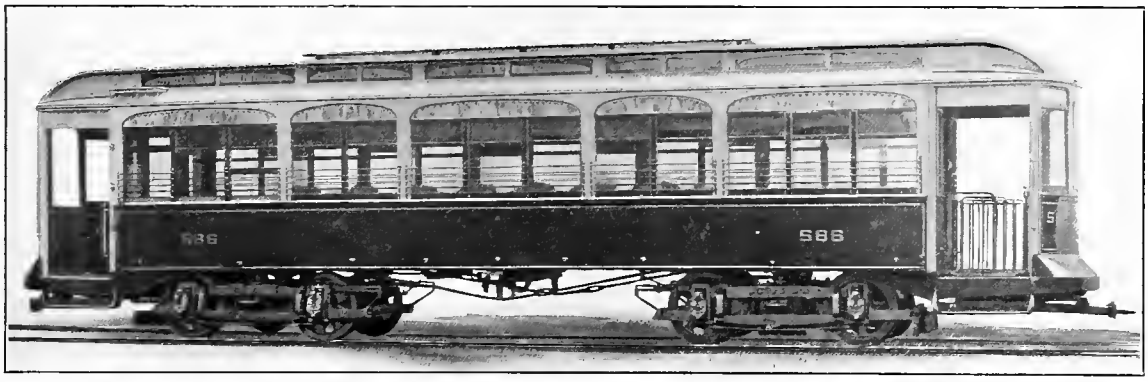


Fig. 6230. "Washington" Type Car.

Fig. 6231. Private Car "Josephine."
The J. G. Brill Co., Builders.

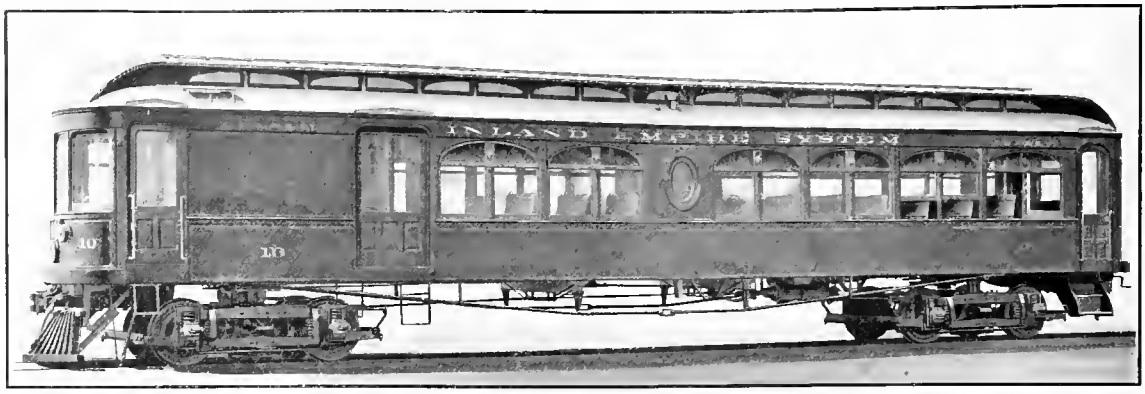


Fig. 6232. Combination Passenger, Smoking and Baggage Car.

Fig. 6233. Interior of Combination Passenger, Smoking and Baggage Car.

Fig. 6234. Interior of Semi-Convertible Car.
(Exterior shown in Fig. 6238.)

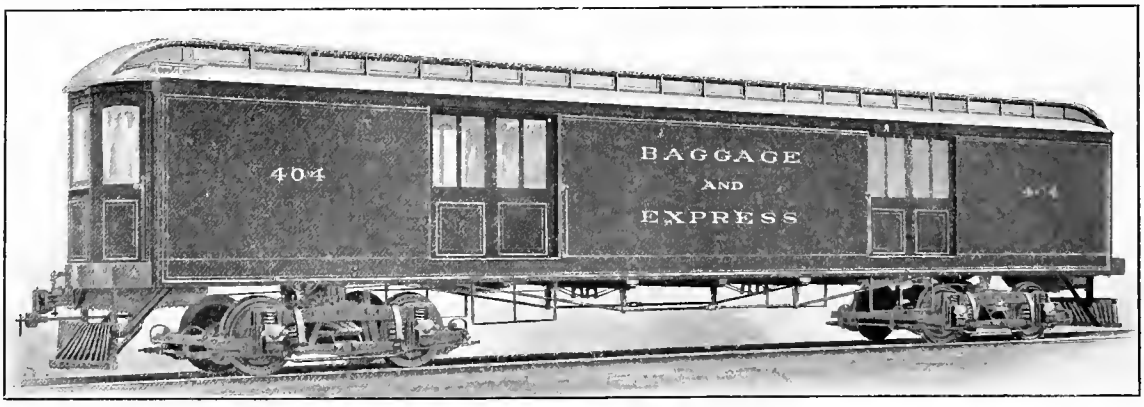


Fig. 6235. Baggage and Express Car.

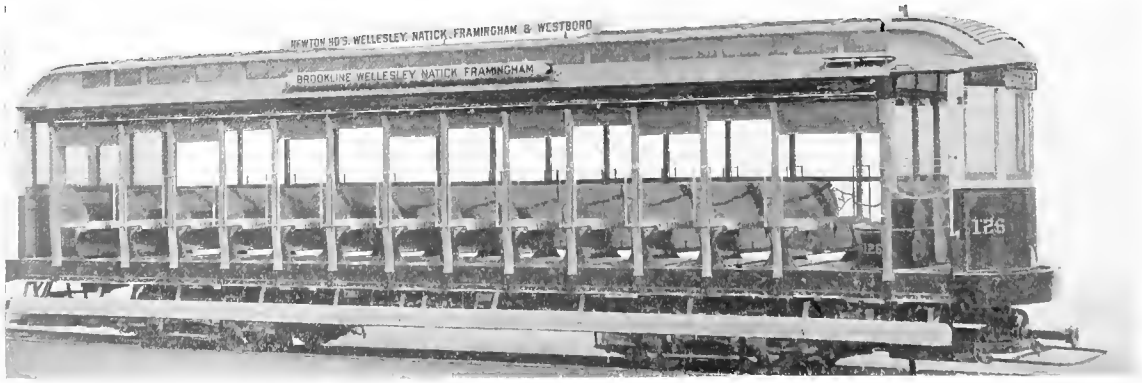


Fig. 6236. 14-Bench, "Narragansett" Type, Open Car.
The J. G. Brill Co., Builders.

Fig. 6237. Convertible Car.
(Both window sashes and metal panels slide into roof pockets.)

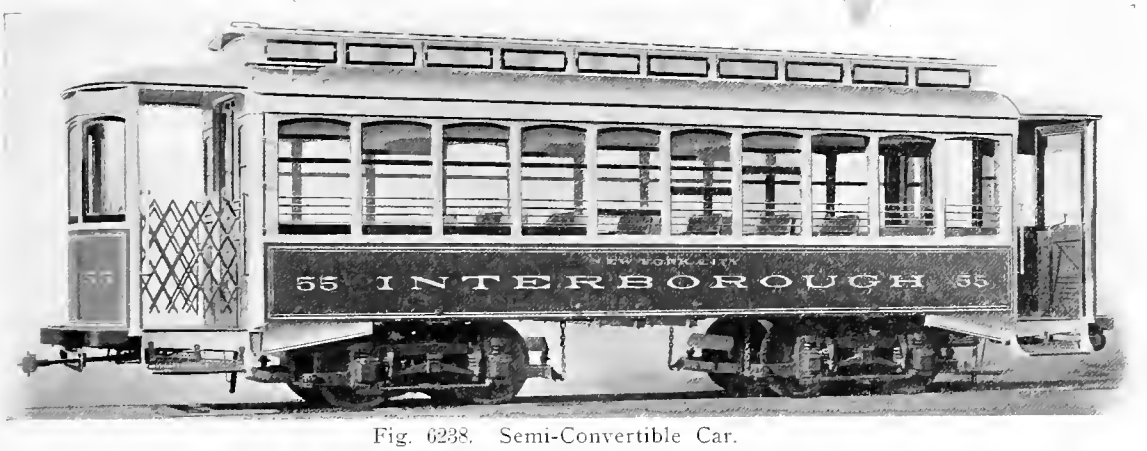


Fig. 6238. Semi-Convertible Car.
(The window pockets are in the side roofs.)

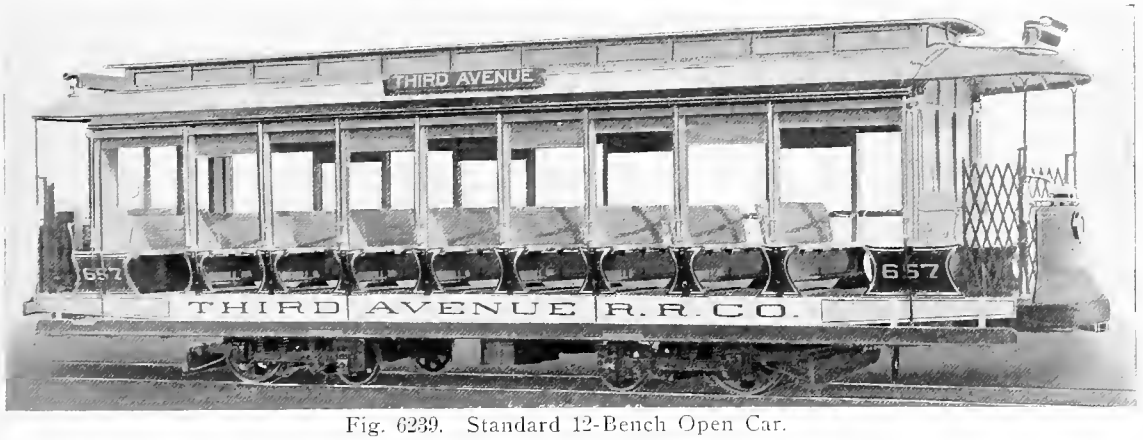


Fig. 6239. Standard 12-Bench Open Car.

Fig. 6240. Standard 10-Bench Open Car.
The J. G. Brill Co., Builders.

Fig. 6241. Standard P-A-Y-E Car. Metropolitan Street Railway Co. Jewett Car Co., Builders.

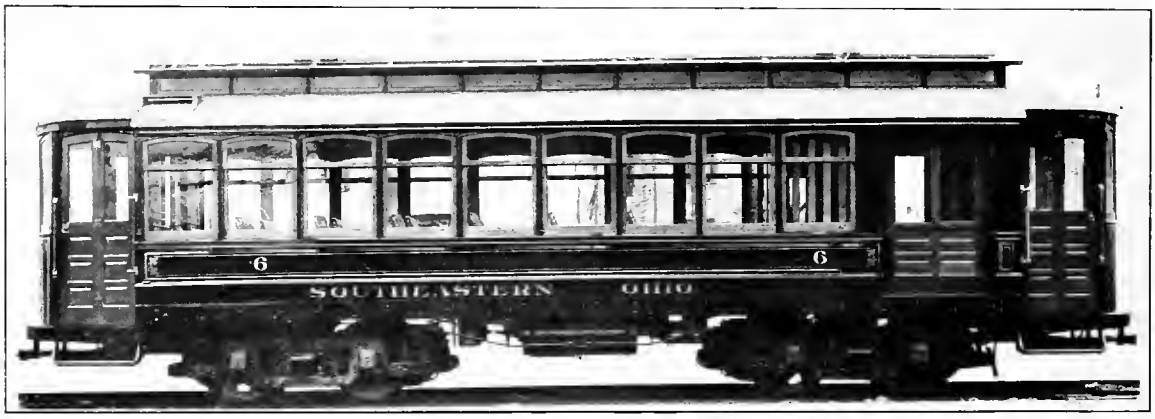


Fig. 6242. Electric Street Car. Southeastern Ohio Ry., Light & Power Co. Jewett Car Co., Builders.

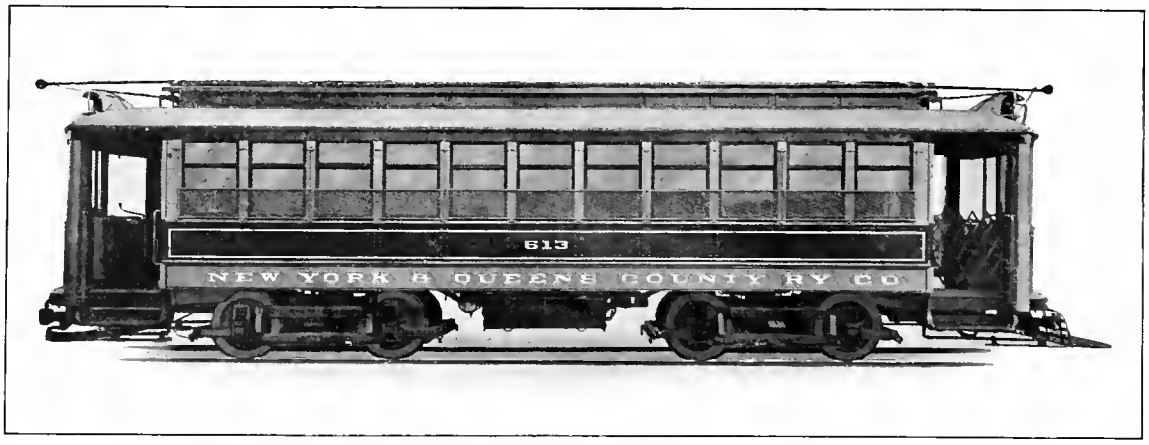


Fig. 6243. All Steel Electric Street Car. New York & Queens County Ry. Co.
American Car & Foundry Co., Builders.

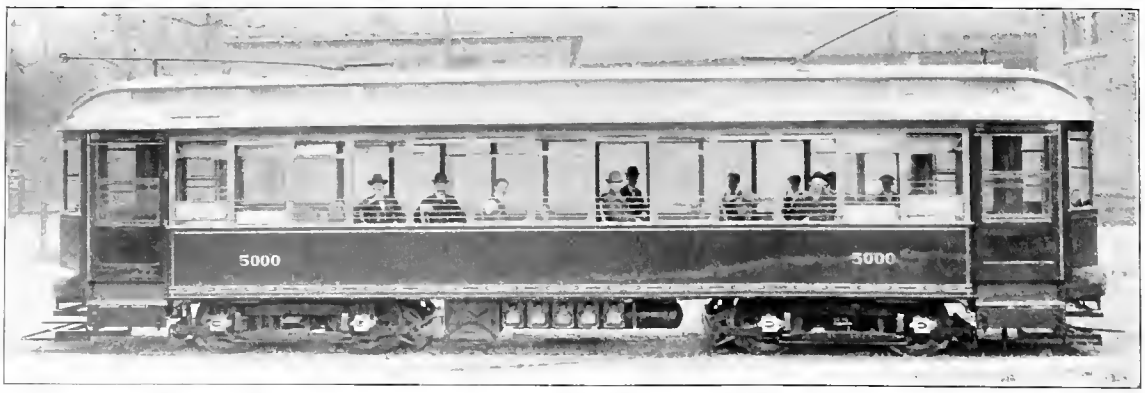


Fig. 6244. Steel Electric Street Car. Boston Rapid Transit Co.

Fig. 6245. High Speed Interurban Car. St. Louis Car Co., Builders.

Fig. 6246. Interior of Elevated Car.
Northwestern Elevated R. R., Chicago.
St. Louis Car Co., Builders.

Fig. 6247. Interior of High Speed Interurban Car. Canton-Akron Ry.
St. Louis Car Co., Builders.

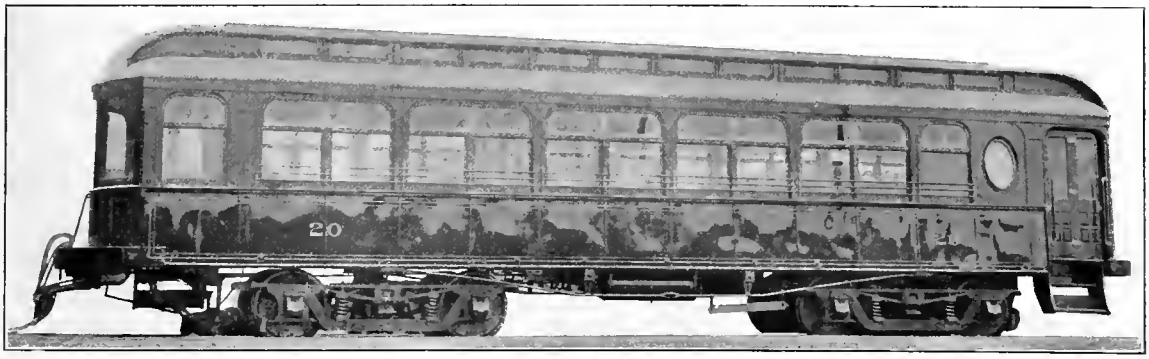


Fig. 6248. High Speed Interurban Car for Cleveland & Eastern Ry.
St. Louis Car Co., Builders.

Fig. 6249. High Speed Electric Interurban Car. Jewett Car Co., Builders.

Fig. 6250. Interior of High Speed Electric, Passenger, Baggage and Smoking Car.

Fig. 6251. Interior of Standard Interurban Car. Jewett Car Co., Builders.

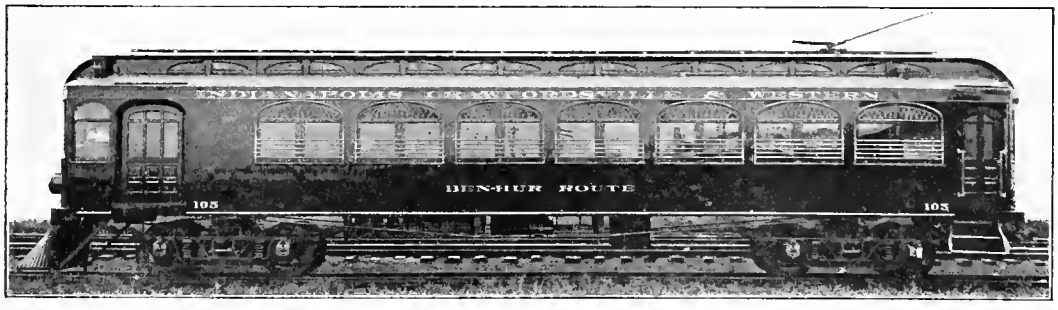


Fig. 6252. High Speed Electric Passenger, Baggage and Smoking Car. Jewett Car Co., Builders.

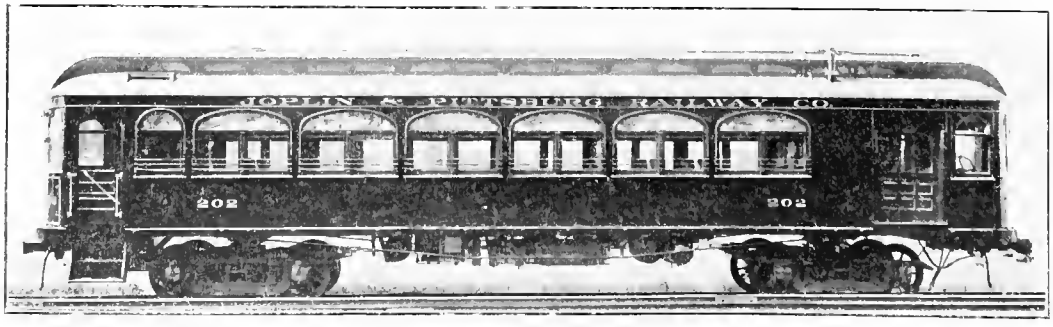


Fig. 6253. High Speed Electric Interurban Car.

Fig. 6255. High Speed Electric Interurban Car. Jewett Car Co., Builders.

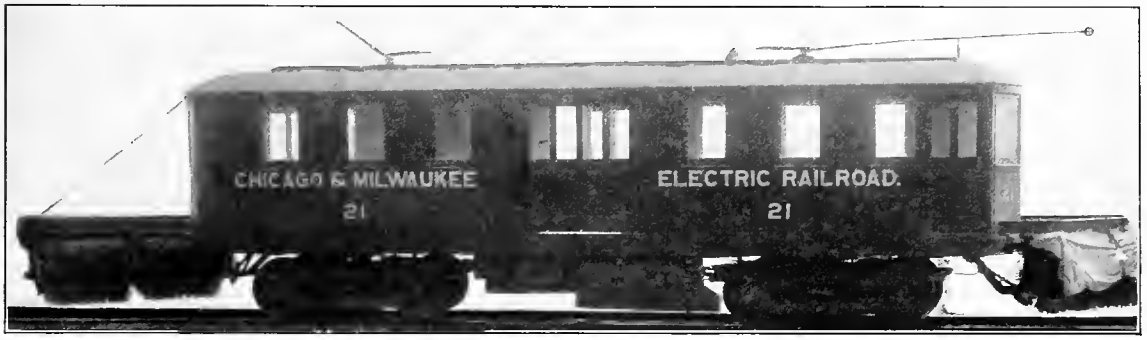


Fig. 6256. Snow Sweeper. McGuire-Cummings Mfg. Co., Builders.

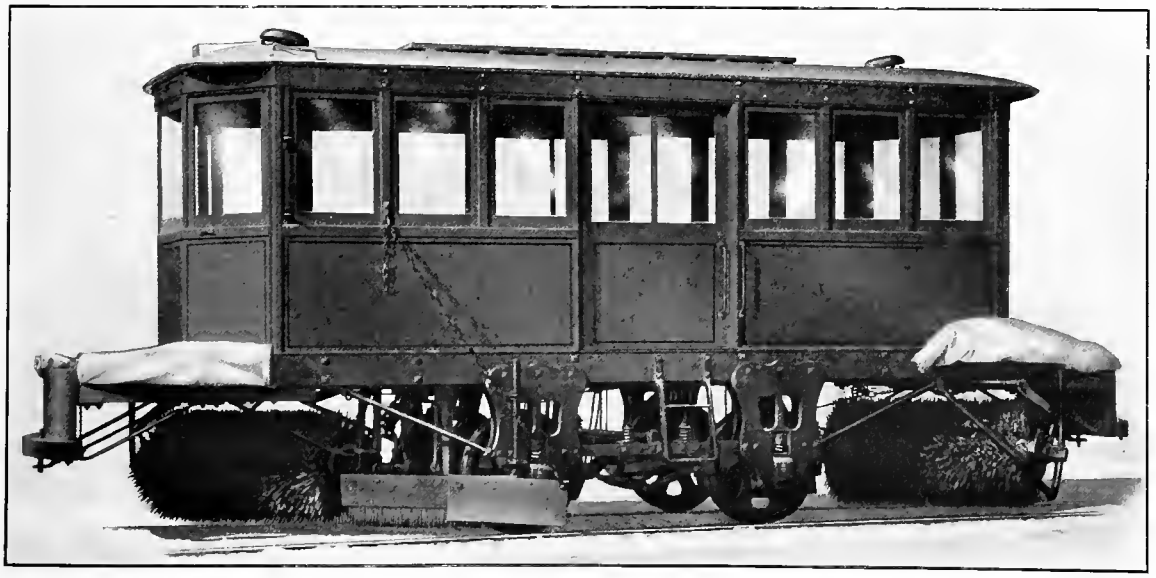


Fig. 6257. Standard Snow Sweeper. The J. G. Brill Co., Builders.

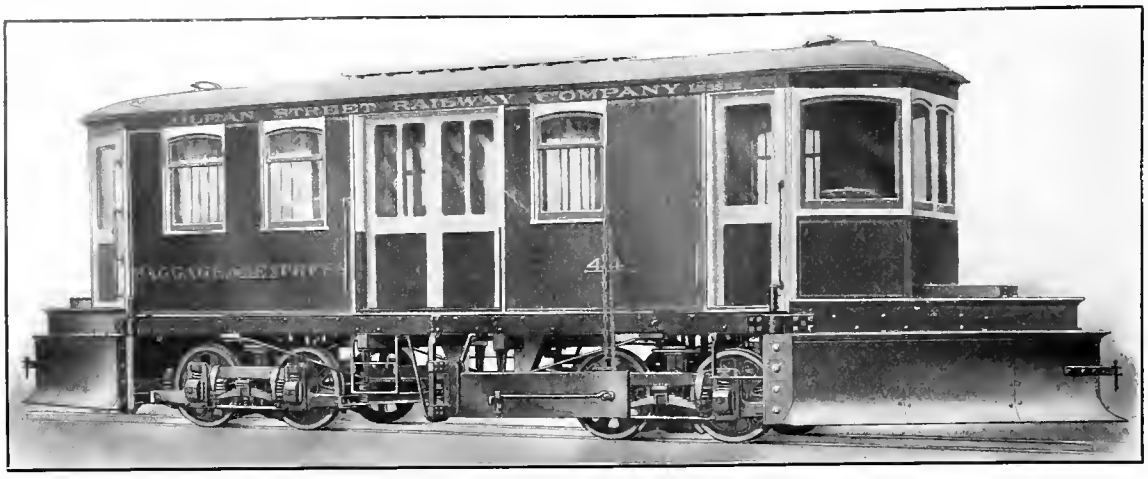


Fig. 6258. Baggage and Express Car, with Removable Snow Plows.
The J. G. Brill Co., Builders.

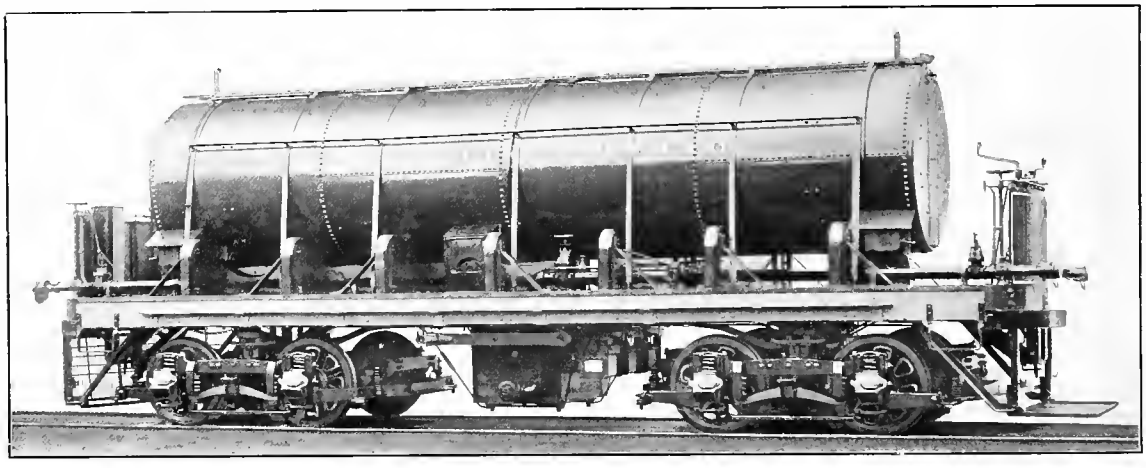


Fig. 6259. Centrifugal Sprinkling Car. The J. G. Brill Co., Builders.

Fig. 6260. Pneumatic Sprinkling Car. McGuire-Cummings Mfg. Co., Builders.

Fig. 6261. Gasolene Motor Car, No. 19. Open Type.
Fairbanks, Morse & Co.

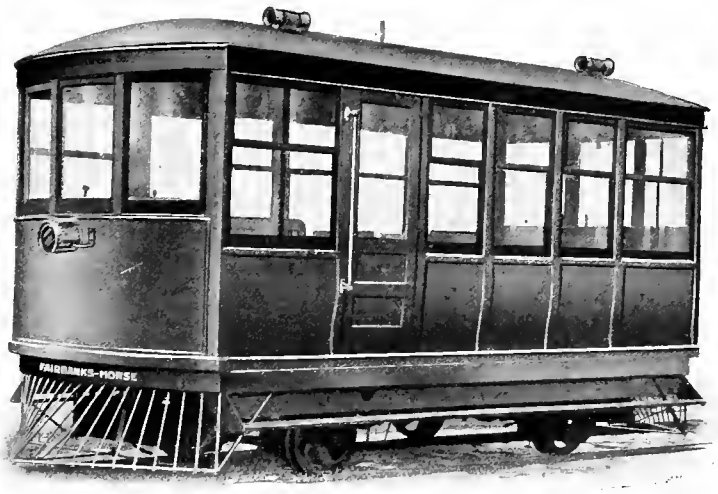


Fig. 6262. Gasolene Motor Car, No. 19. Enclosed Type.
Fairbanks, Morse & Co.

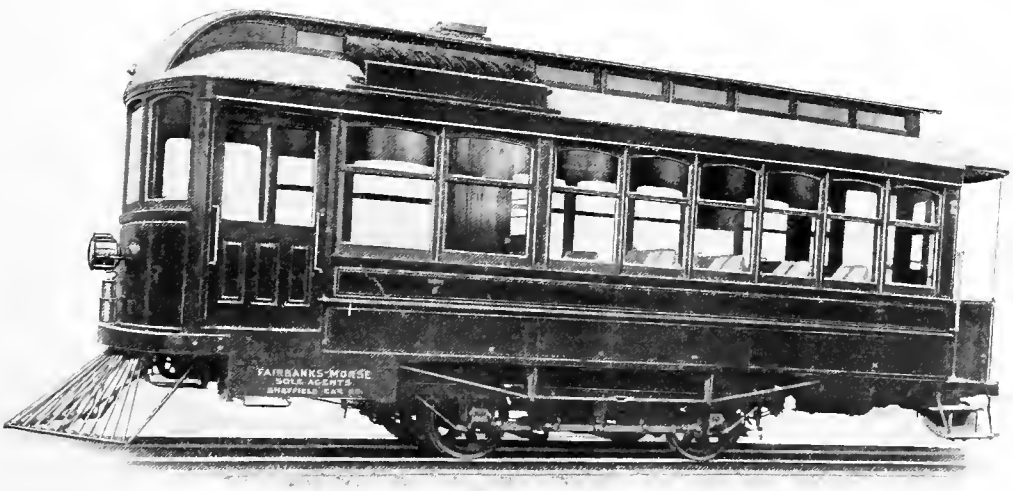
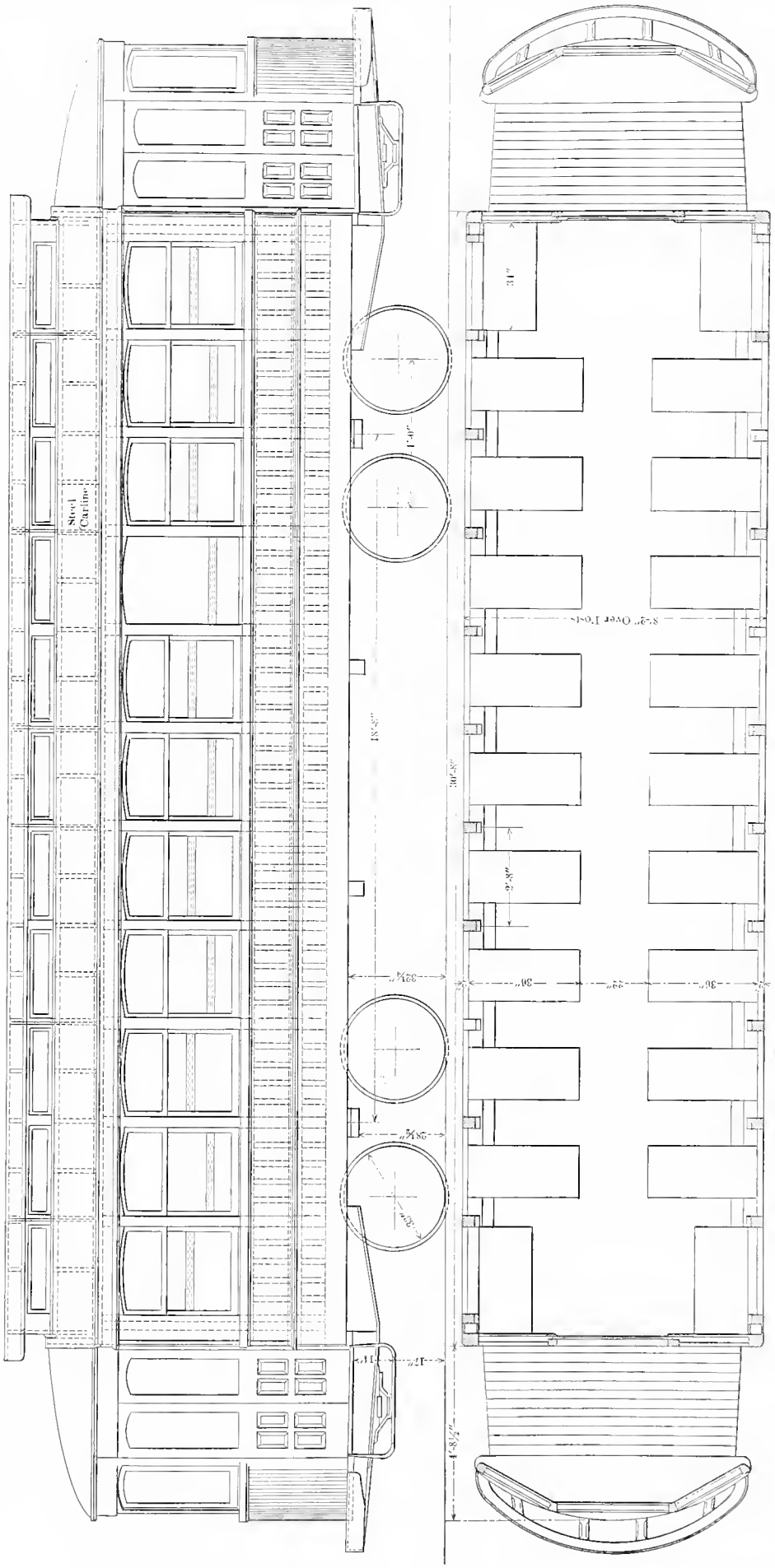
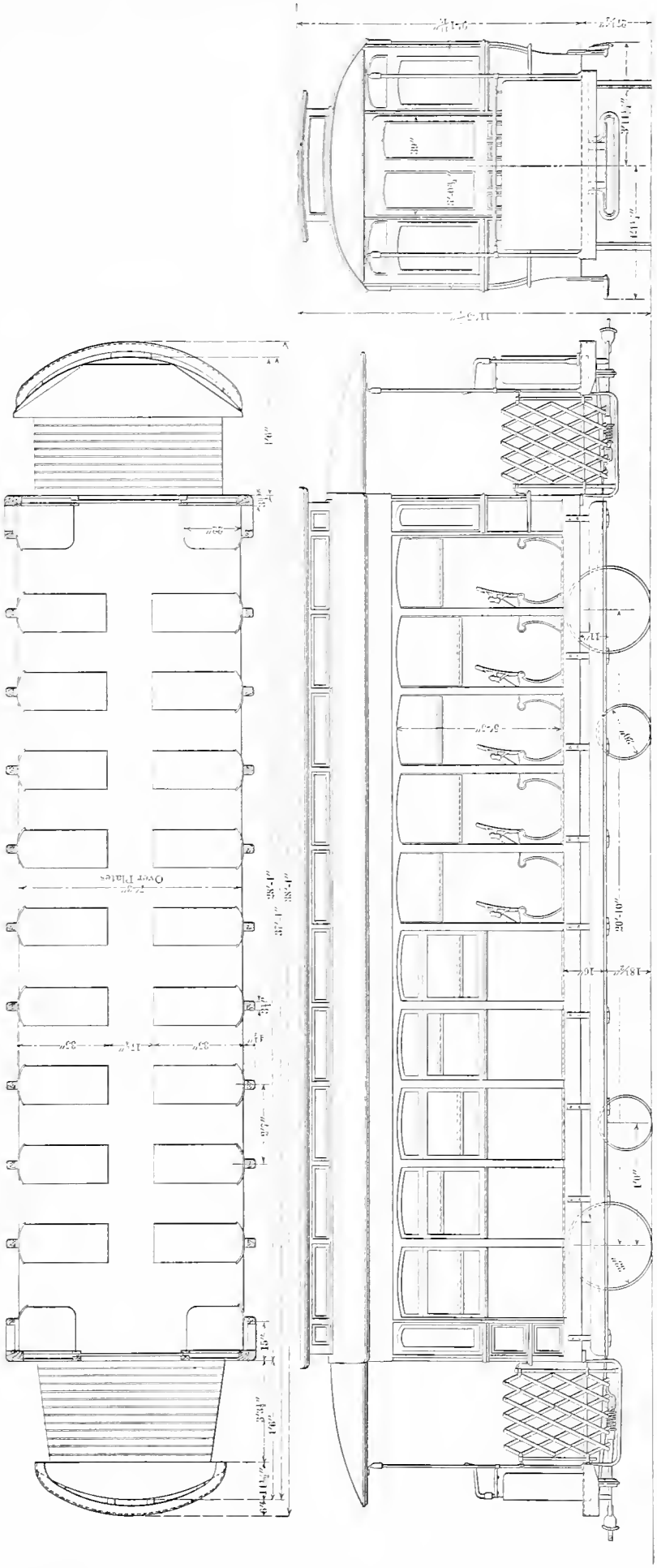


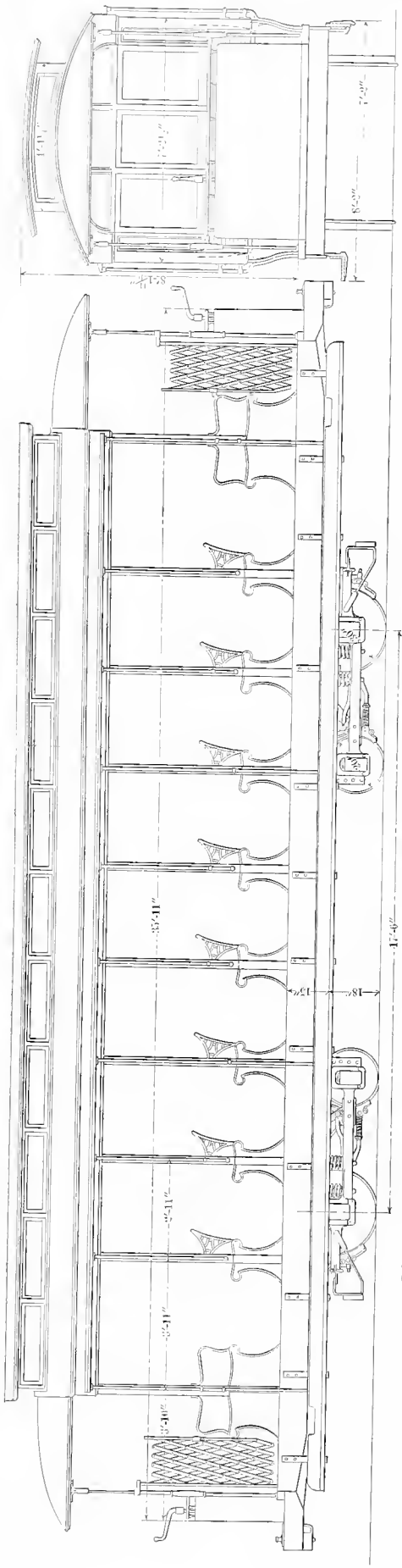
Fig. 6263. Gasolene Motor Car, No. 24. Enclosed Type.
Fairbanks, Morse & Co.



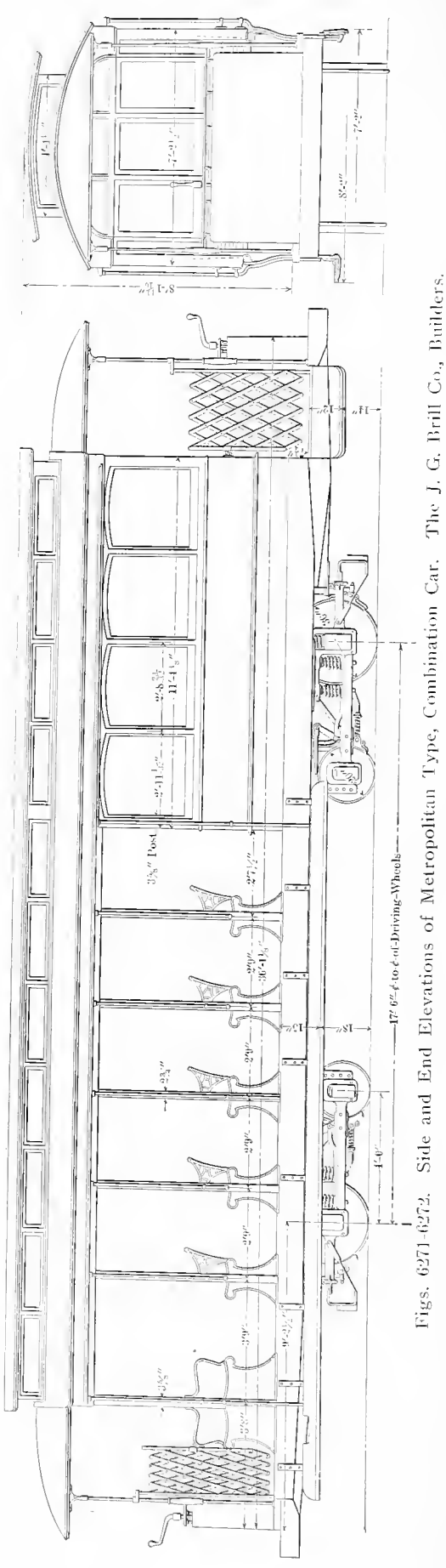
Figs. 6264-6265. Plan and Side Elevation of Brill's Semi Convertible Car. The J. G. Brill Co., Builders.



Figs. 6266-6268. Plan and Elevations of Brill's Convertible Car, Showing Half the Side Panels Raised. The J. G. Brill Co., Builders.



Figs. 6269-6270. Side and End Elevations of Metropolitan Type, Open Car. The J. G. Brill Co., Builders.



Figs. 6271-6272. Side and End Elevations of Metropolitan Type, Combination Car. The J. G. Brill Co., Builders.

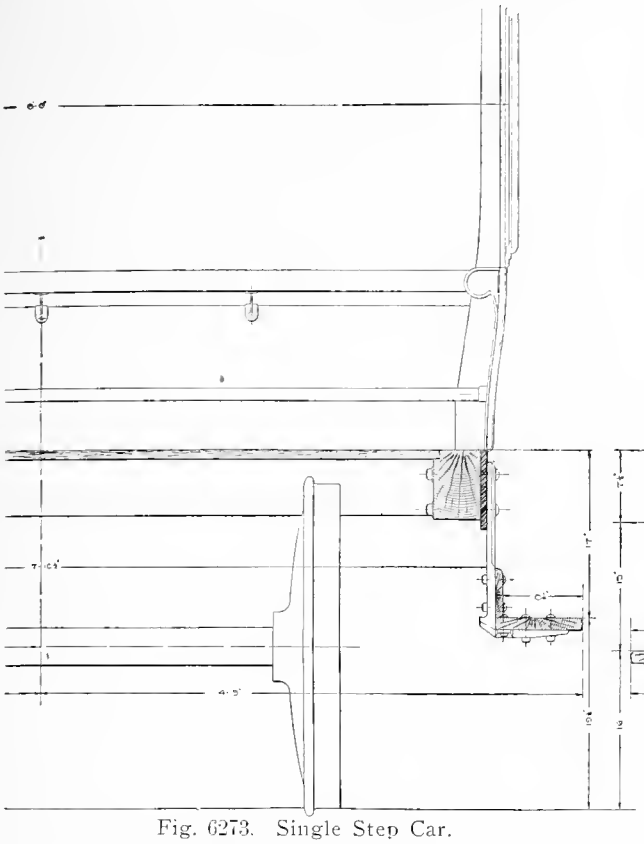


Fig. 6273. Single Step Car.

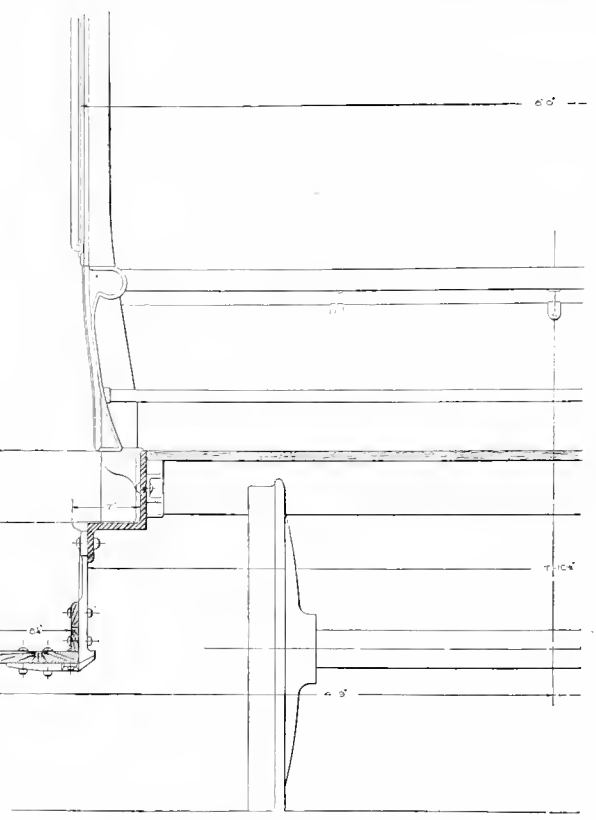


Fig. 6274. "Narragansett" Car.

Sections of Standard Single Step and "Narragansett" Cars Showing Different Forms of Construction.

Fig. 6275. Panels and Windows Lowered.

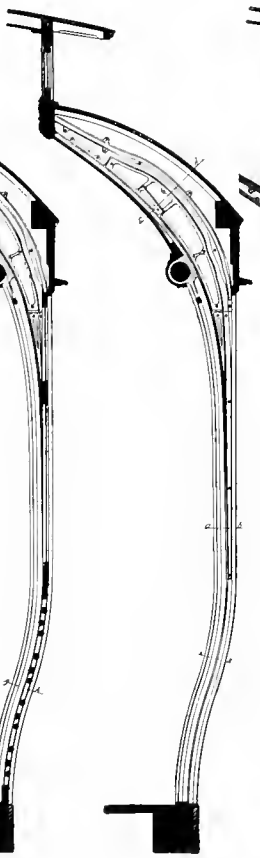


Fig. 6276. Showing Details of Grooves.

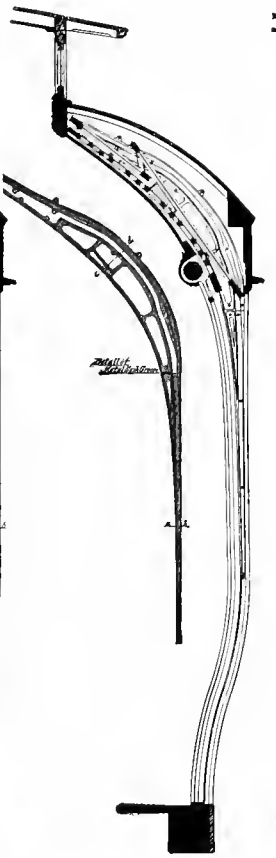


Fig. 6277. Panels and Windows Stored in Roof Pocket.

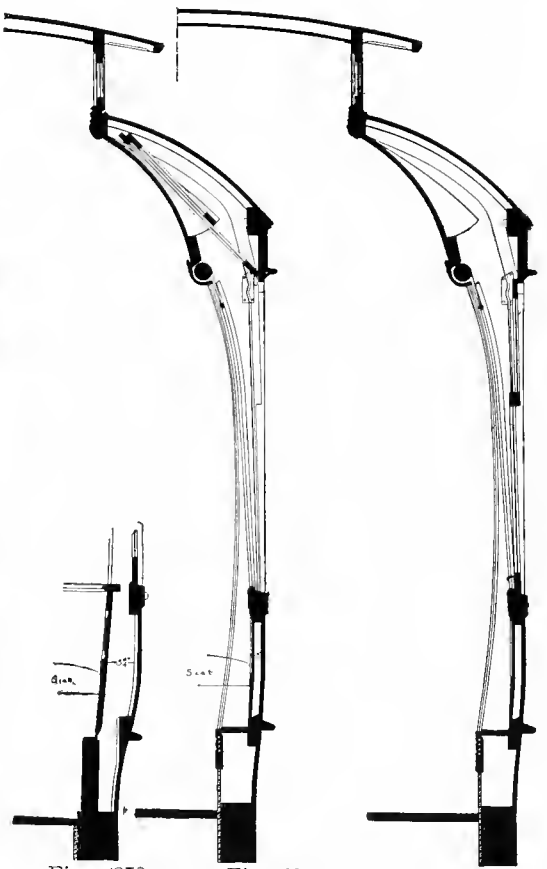
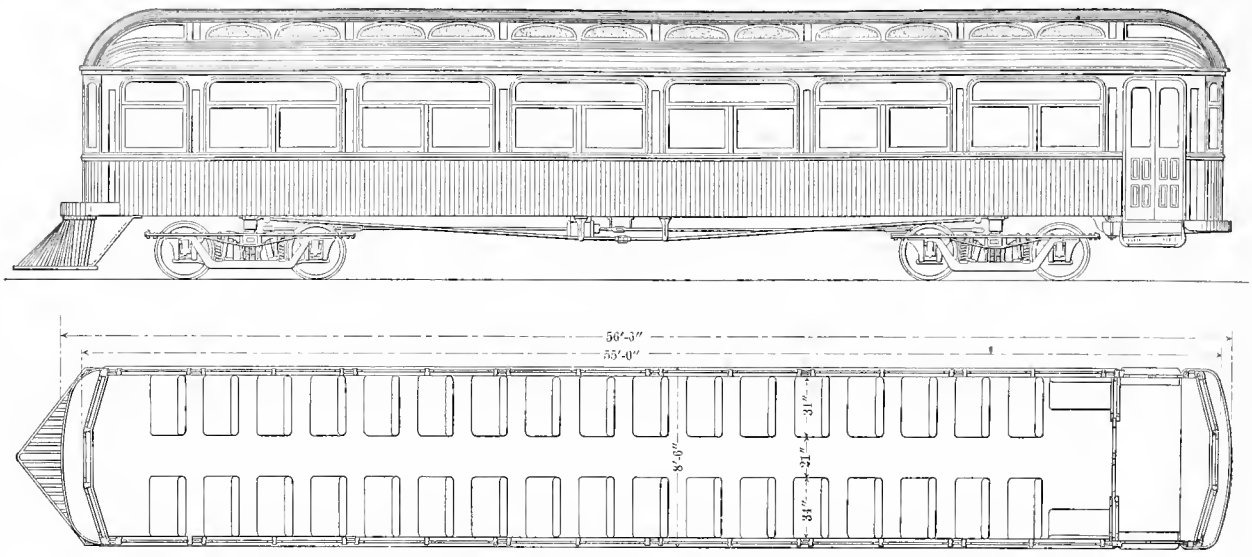


Fig. 6278. Standard Car.

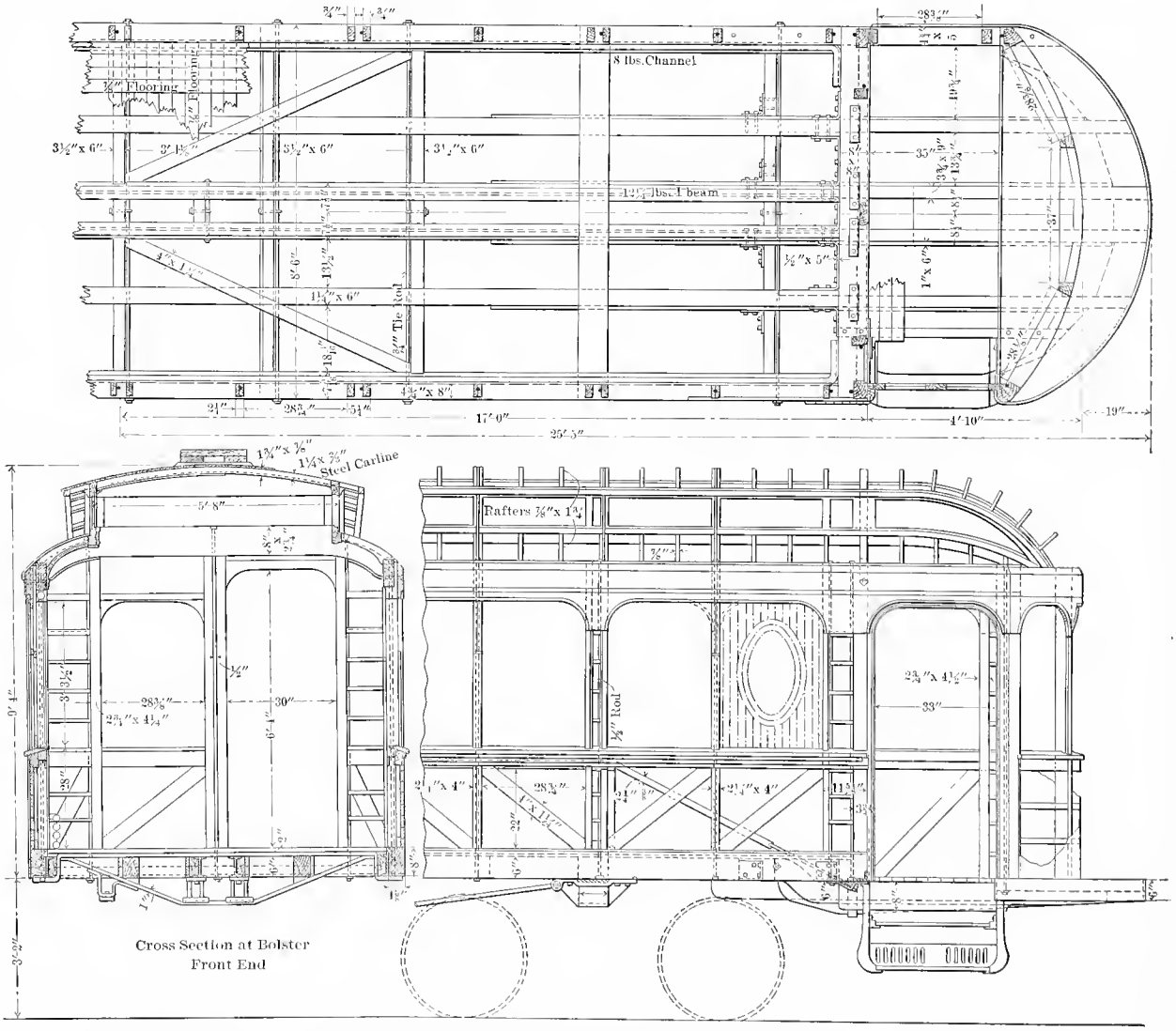
Fig. 6279. Semi-Convertible Car. Sashes Raised.

Fig. 6280. Semi-Convertible Car. Sashes Lowered.

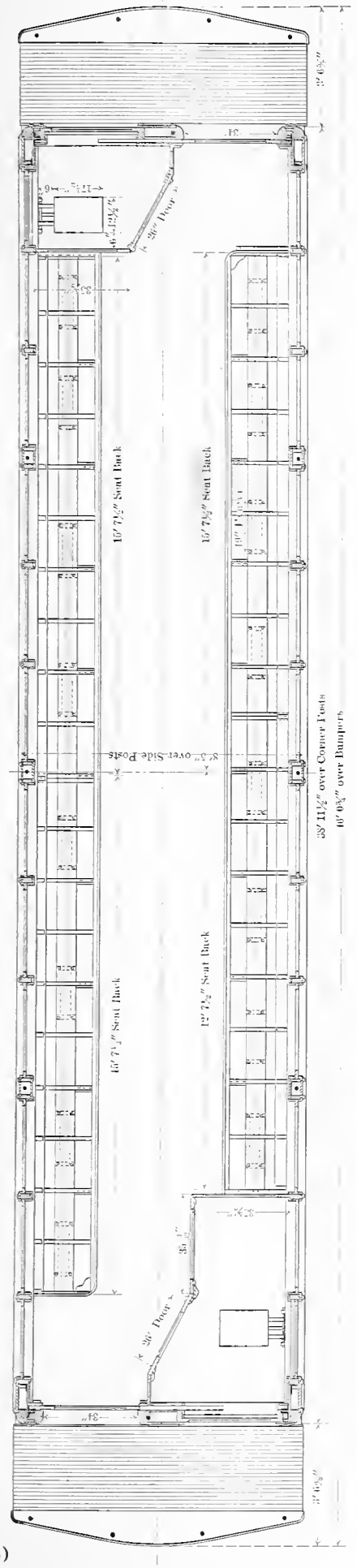
Figs. 6275-6277. Sections of Brill's Convertible Car. Figs. 6278-6280. Sections of Brill's Semi-Convertible Car.
The J. G. Brill Co., Builders.

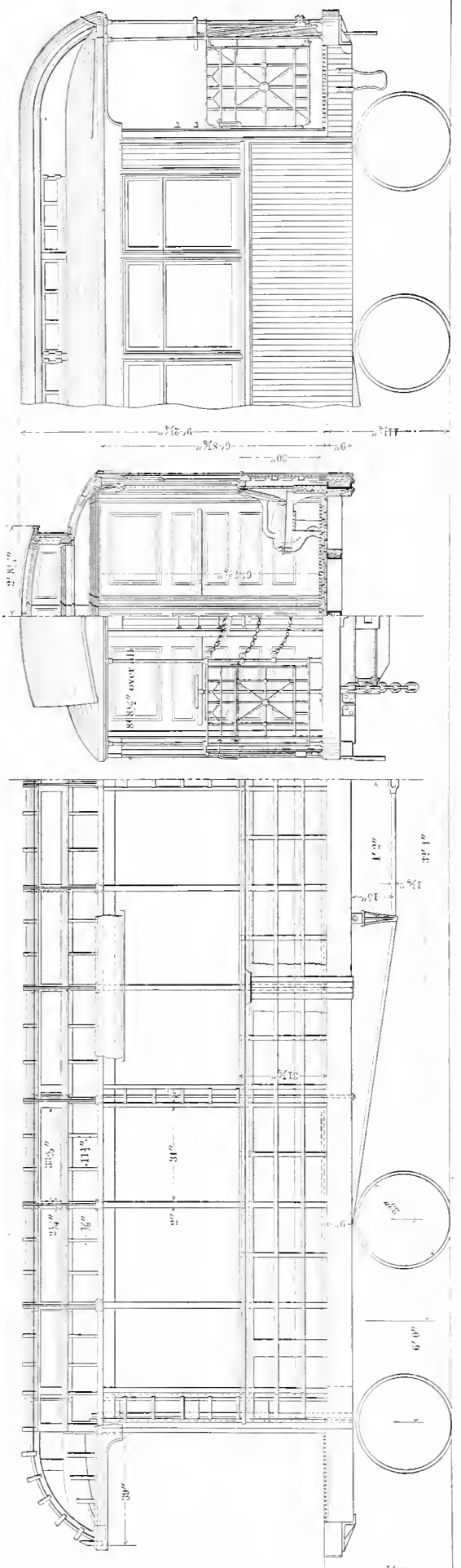


Figs. 6281-6282. Side Elevation and Floor Plan of 55-ft. Electric Interurban Car.
Cleveland & Eastern. St. Louis Car Co., Builders.



Figs. 6283-6285. Part Side Elevation, Plan and Section of Framing of 55-ft. Electric Interurban Car.
Cleveland & Eastern. St. Louis Car Co., Builders.





Figs. 6286-6289. Electric Motor Car for Northwestern Elevated R. R., Chicago. St. Louis Car Co., Builders.

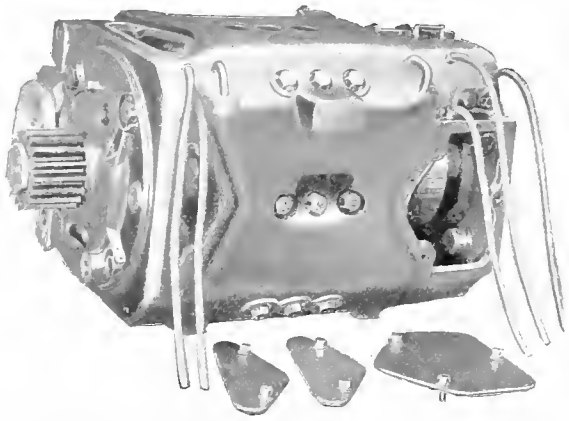


Fig. 6290. G. E.-207 Railway Motor. Front View.

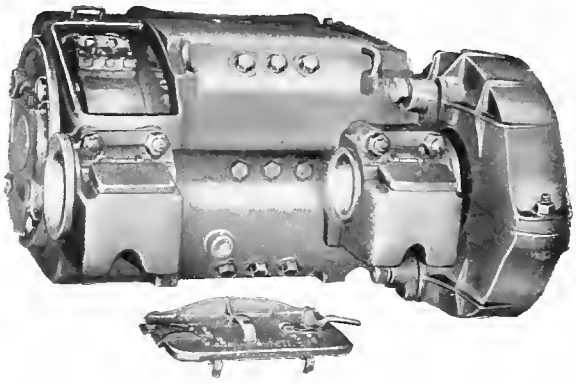
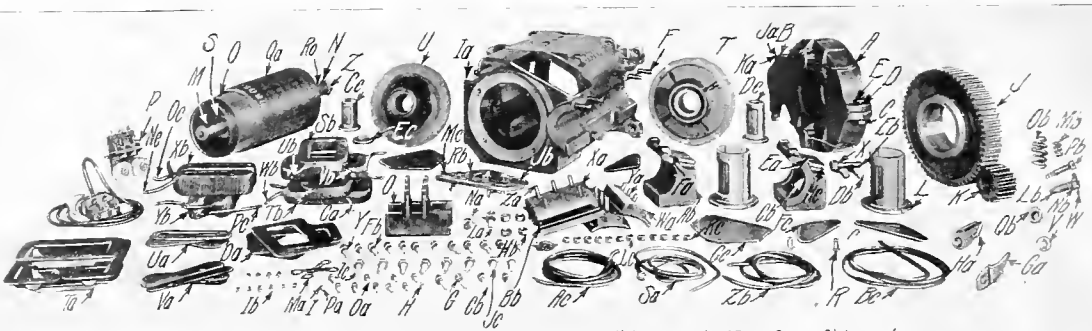


Fig. 6291. G. E.-207 Railway Motor. Rear View.



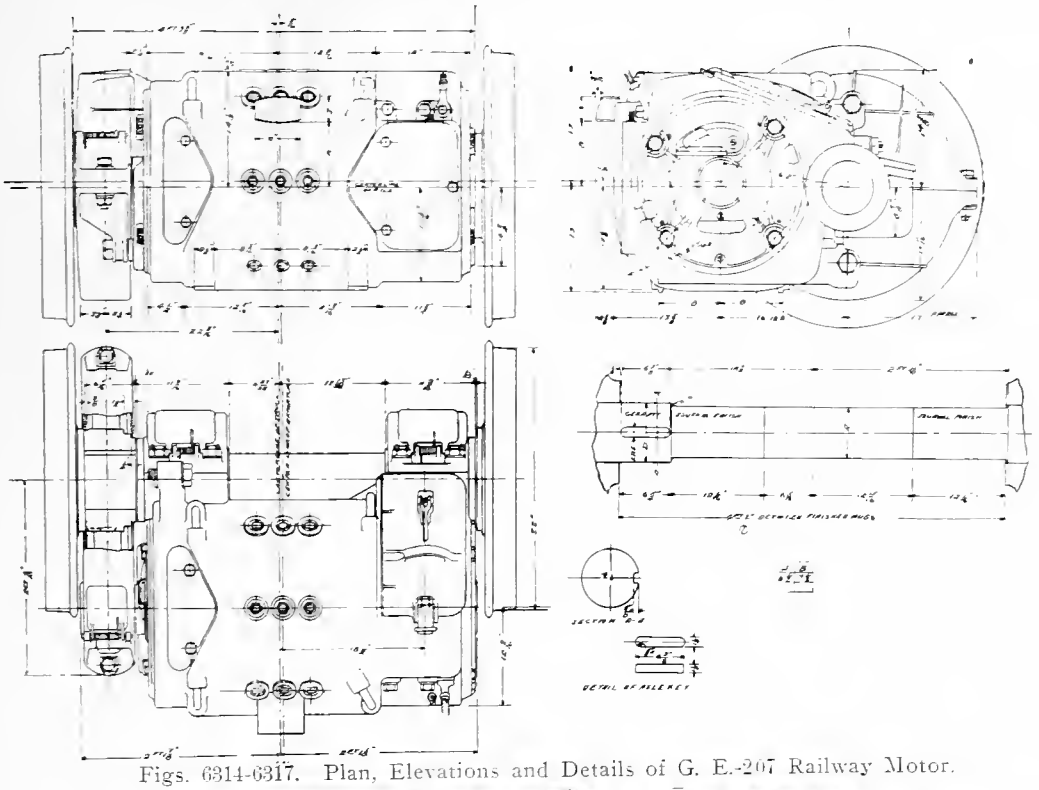
- ⊗ A Gear Case, complete
- ✝ B Lid for Oil Hole for Gear Case
- C Bolt 1⅜"-7, 5¼ Sq H
- D Lock Washer Cat. No 50218
- E Nut 1⅜"-7 Rex
- F Stud for Axle Cap
- G Lock Washer Cat. No. 16135
- H " " " 16137
- I " " " 16136
- ⊗ J Gear
- ⊗ K Pinion
- L Axle Bearing Lining (Give Bore)
- M Armature Shaft Bore
- N Pinion Nut Cat No 83581
- ✝ O Commutator, complete
- ✱ P Brush Holder complete
- O Commutating Pole Piece
- R Bushing for Cables
- ✱ S Thrust Collar
- T Frame Head Pinion End
- U " " " Commutator End
- V Washer (1/16 X 1½ X 125)
- W Spring Cotter Cat. No. 15207
- X Lock Washer Cat. No. 24868
- Y " " " " 16130
- Z " " " " 59390
- Aa Brush Holder, complete
- Ba Terminal for Ground Cable
- ● Ca Terminal for Field Coil Leads
- 卐 Da Pad for Exciting Field Coil
- Ea Spring for Oil Well Lid
- Fa Hinge Pin for Oil Well Lid
- Ga Frame Head Cover, Pinion end
- Ha " " " Commutator end
- 卐 Ia Magnet Frame, complete
- ✝ Ja Spring for Gear Case Oil Hole Lid
- ✝ Ka Hinge Pin for Gear Case Oil Hole Lid
- La Bolt for Axle Cap (1½-7, 4½ Hex. H.)
- Ma Spl Lock Washer Plate for Axle Cap Stud
- Na " " " for Axle Cap Bolts
- Oa Bolt for Covers (⅜"-11, 1⅜ Hex. H.)
- Pa Bolt for Ground Terminal Cat. No. 44909
- ○ Qa Armature, complete, Includes Pinion
- Ra Key for Pinion (¾ X 4⅝ one end round)
- 卐 Sa Ground Cable, complete with Terminal
- 卐 Ta Flange for Exciting Field Coil
- 卐 Ua Flange for Commutating Field Coil
- 卐 Va Spring Pad for Commutating Field Coil
- Wa Laminated Pole Piece with Stud Axle Side
- Xa " " " " except Axle Side
- Ya Stud for Laminated Pole Piece Axle Side
- Za " " " " except Axle Side
- Ab Axle Bearing Cap Pinion End
- Bb " " " Commutator end
- Cb Dowel Pin for Axle Bearing Cap
- Db Bolt for Gear Cover Suspension Cat No 34081
- Eb " " " " (½-6, 4⅝ Hex. H.)
- Fb Bolt for Commutating Pole Piece (⅜-9, 7⅜ Hex H.)
- Gb Bolt for Brush Holder Support (⅜-9, 3⅜ Hex. H.)
- Hb Nut for Axle Cap Stud Cat. No. 9852
- Ib Connector for Cable Terminal
- Jb Cam with Eye Bolt & Cotch Nut for Top Magnet Frame Cover
- Lb Bolt for Frame Head Cover Spring, Pinion end
- Mb Spring for Frame Head Cover, Pinion end
- Nb Nut for Frame Head Bolt Pinion end
- Ob Spring for Frame Head Cover, Comm. end
- Pb Bolt for Frame Head Cover Spring, " "
- Qb Spl Washer for Frame Head Bolt " "
- 卐 Rb Top Cover for Magnet Frame complete
- ⊗ Sb Exciting Field Coil complete with Terminals and Leads. Side
- ✱ Tb " " " " " " " " Top and Bottom
- Ub Lead with Left-hand Threaded Terminal for Side Exciting Field Coils 8" long
- Vb " " " " " " " " " " 7"
- Wb " " Right-hand " " " Top & Bottom " " " 7" (Sides
- ◉ Xb Commutating Field Coil, complete with Terminals & Leads Top Axle & Bottom Suspension
- ✱ Yb " " " " " " " " Top Suspension & Bottom Axle Sides
- 卐 Zb Cable with Right-hand Threaded Terminal for Commutating Field Coil
- 卐 Ac " " Left-hand " " " Exciting Field Coils
- 卐 Bc " " Right-hand " " " " " "
- Cc Armature Bearing Lining Pinion end Cat. No 41960
- Dc " " " Commutator end Cat. No 59822
- Ec Cover with Packing for Armature Bearing Lining, Pinion end
- Fc Ventilating Cover for Magnet Frame, Pinion end
- Gc Ventilating Cover for Magnet Frame, Commutator end
- Hc Lid with Packing for Axle Bearing Cap Oil Well
- Ic Bolt for Frame Head Commutator End (1¼-7 2¾ Hex. H drilled for Cotter Pin)
- Jc " " " Pinion " " 2⅜ " " " " "
- Kc Nut for Exciting Pole Piece Studs Axle Side (1-8, ⅞ Hex. H.)
- Lc " " " " " " Except Axle Side Cat. No. 154443
- Mc Spring with Rivets for Magnet Frame Cover (Field Coil 11 long
- Nc Lead with L.H. Threaded Terminal for Top Axle & Bottom Suspension Side Commutating
- Oc " " " " " " " " " " " " 9 long
- Pc Lead with R.H. " " " " Suspension and Bottom Axle Side Commutating Field Coils

✝ Cat. No 100845 for 600 Volt Motor Cat. No. 100846 for 600-1200 Volt Motor
⇌ " " 100797 " " " " " " 100801 " " " " "
✱ " " 100798 " " " " " " 100802 " " " " "
◉ " " 100799 " " " " " " 100803 " " " " "
✹ " " 100800 " " " " " " 100804 " " " " "

✝ Give Cat. No. of Gear Case 卐 Give Voltage and form of Motor ✹ For details see photograph number (304143)
⊗ Cat. No. Stamped on Gear, Pinion and Gear Case ○ Specify number of teeth in Pinion
● State whether Right or Left-hand Thread ✱ State whether Commutator or Pinion End

Figs. 6293-6313. Details of G. E.-207 Railway Motor.

General Electric Co.



Figs. 6314-6317. Plan, Elevations and Details of G. E.-207 Railway Motor.

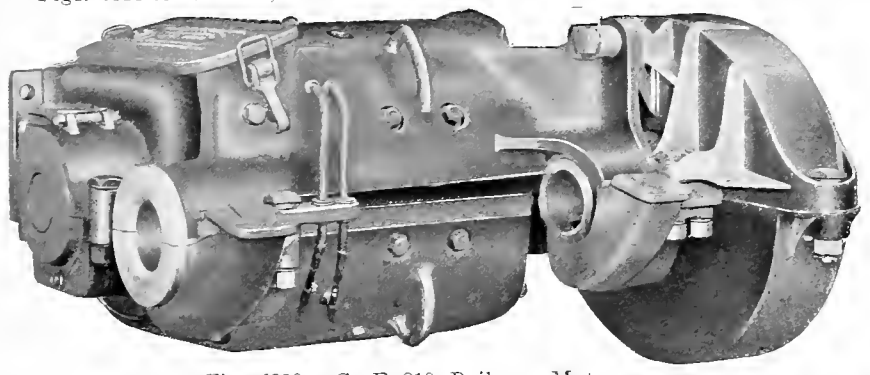


Fig. 6318. G. E.-219 Railway Motor.

Fig. 6319. Three-Light Cluster for Deck Lights.

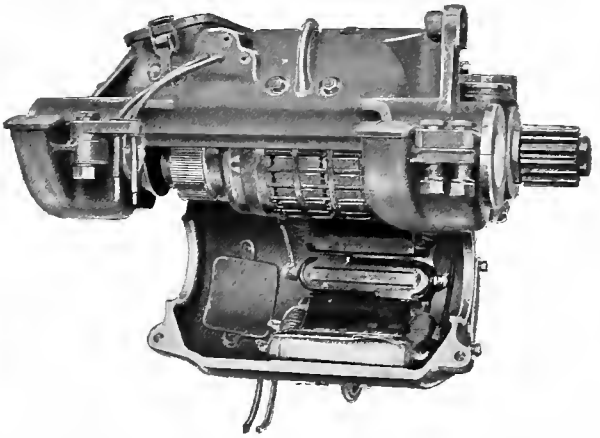


Fig. 6323. G. E.-219 Railway Motor, Lower Frame Dropped and Armature Ready for Removal.

Fig. 6320. Keyless Lamp Socket for Cluster.

Fig. 6321. Three-way Snap Switch for Lighting Circuit.

Figs. 6324-6327. Keyless Lamp Sockets and Bases. General Electric Co.

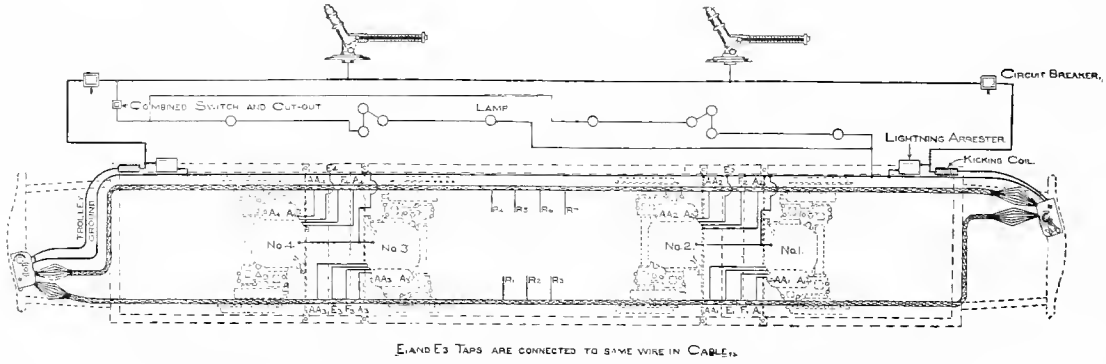


Fig. 6328. Car Wiring for Two Series-Parallel Controllers and Four Motors.

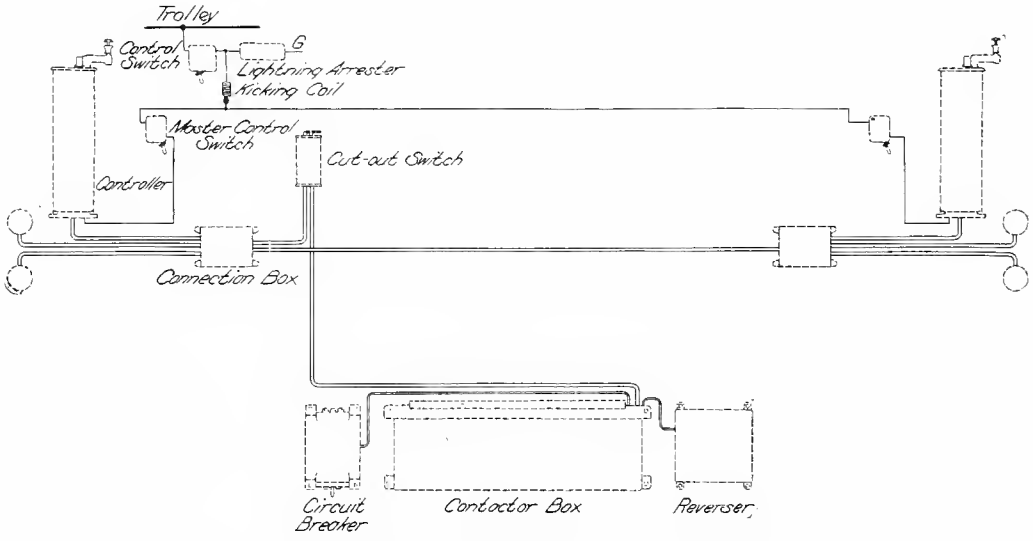


Fig. 6329. Control Wiring, Sprague-General Electric. Type M Control.

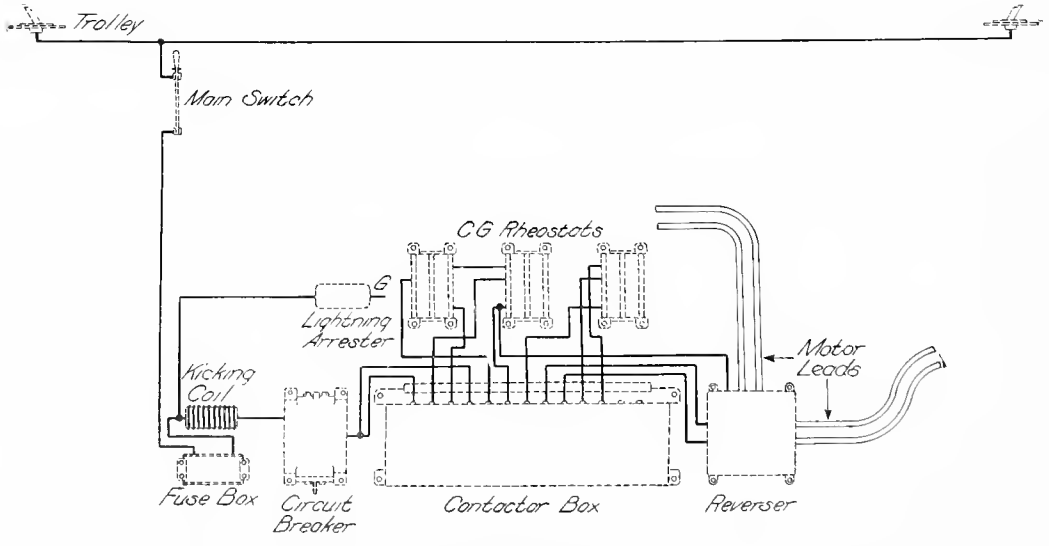


Fig. 6330. Motor Wiring, Sprague-General Electric. Type M Control.
General Electric Co.

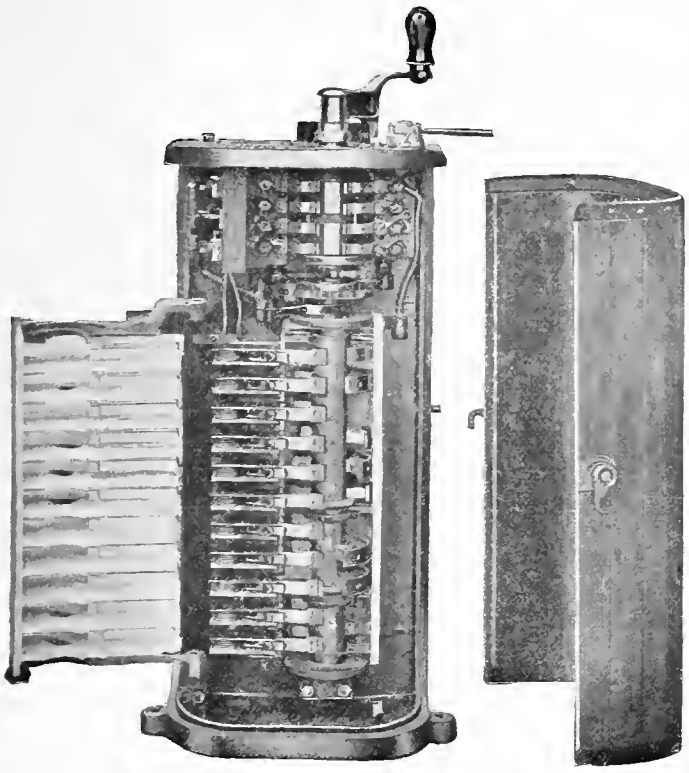


Fig. 6331-6332. K-35 Series-Parallel Controller.

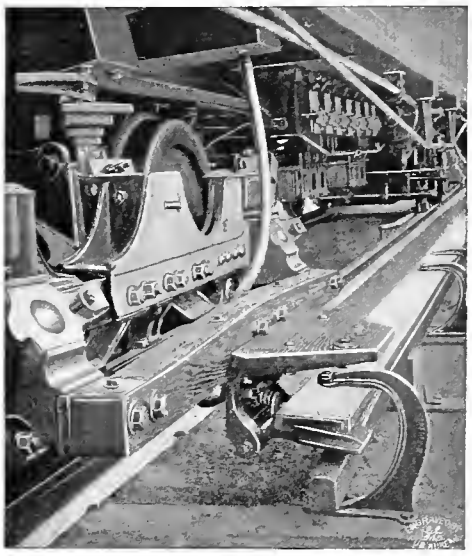


Fig. 6333. Third-Rail Shoe Mounted on Car Truck.

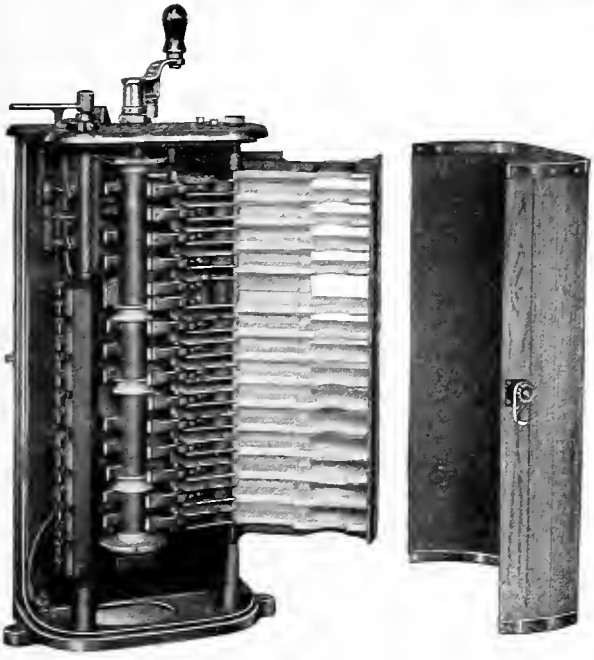
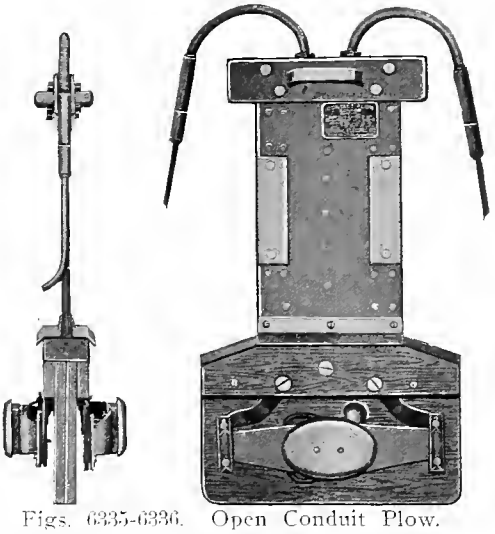


Fig. 6334. K-36-B Series-Parallel Controller.



Figs. 6335-6336. Open Conduit Plow.

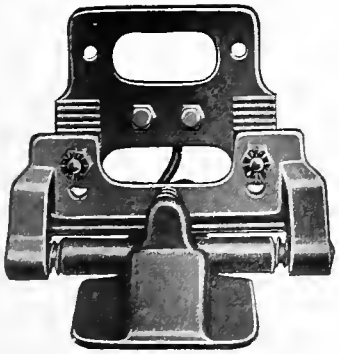


Fig. 6337. Spring Type Collector for Over-Running Third Rail.

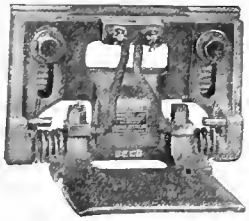


Fig. 6338. Spring Type Collector for Under-Running Third Rail. General Electric Co.

Fig. 6339. Gravity Type Collector for Over-Running Third Rail.

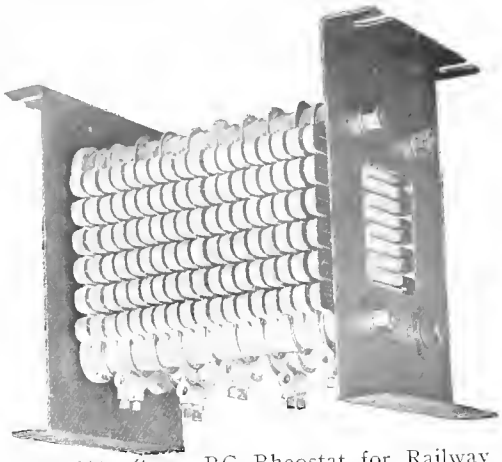


Fig. 6340. Type RG Rheostat for Railway Service.

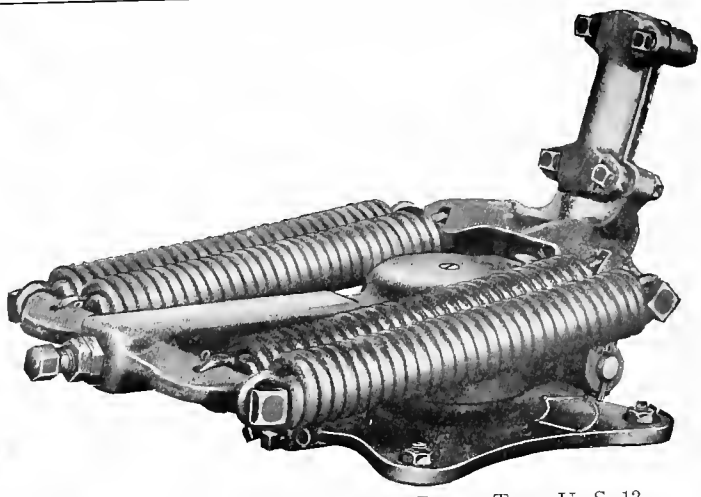
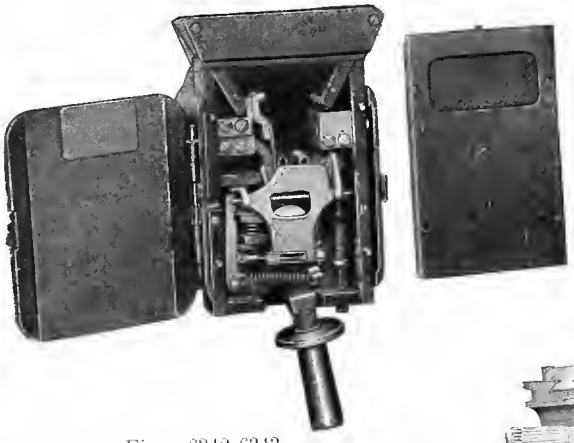


Fig. 6341. Roller Bearing Trolley Base. Type U. S.-13.



Figs. 6342-6343. Open View of Type M. R. Circuit Breaker.

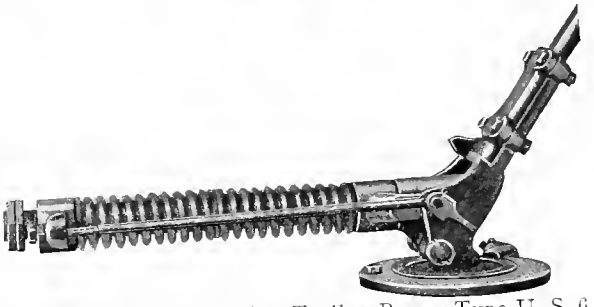


Fig. 6344. Sleeve Bearing Trolley Base. Type U. S.-6.

Fig. 6345. Commutator Construction, G.E.-216 Railway Motor.

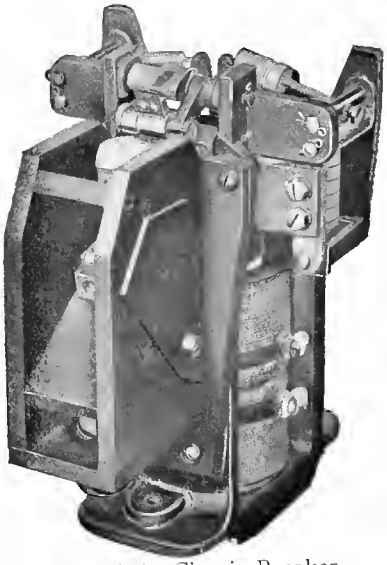
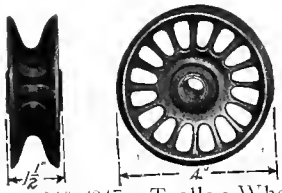


Fig. 6348. Circuit Breaker.

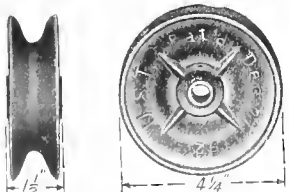
Fig. 6349. Type M. R. Circuit Breaker.



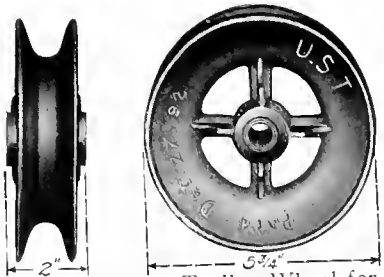
Figs. 6346-6347. Trolley Wheel Sleet Cutter.

Fig. 6352. Trolley Harp, Slow Speed Type.

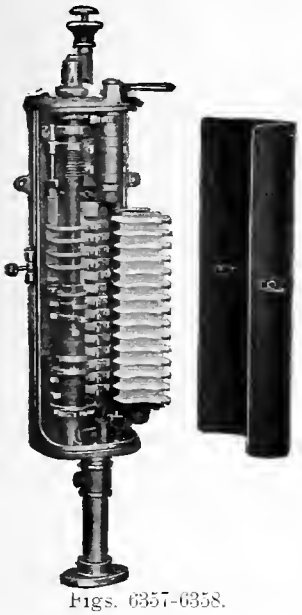
Fig. 6353. Trolley Harp, High Speed Type.



Figs. 6350-6351. Trolley Wheel for City Service.



Figs. 6355-6356. Trolley Wheel for High Speed Service.



Figs. 6357-6358.
Master Controller.

Figs. 6359-6360. Master Controller, Automatic Control.

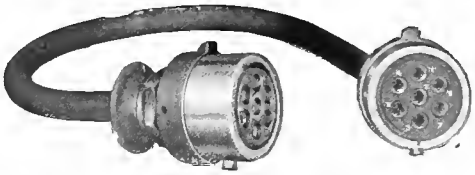


Fig. 6361. Coupler Socket.

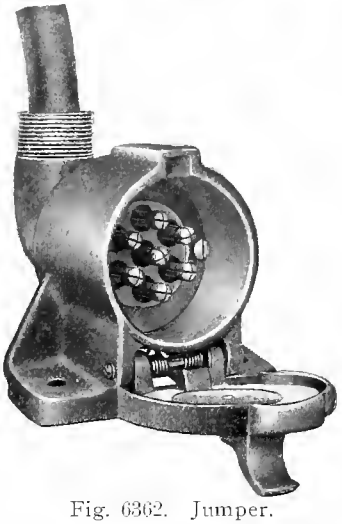
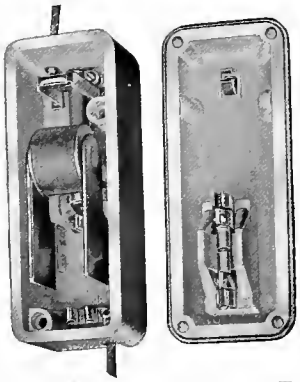


Fig. 6362. Jumper.

Fig. 6363. Type M, Form D, Lightning Arrester.



Figs. 6364-6365. Open View of Type M, Form D, Lightning Arrester.

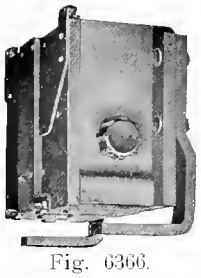


Fig. 6366.
Reversed in Box.

Fig. 6367. Extra Heavy Lightning Switch and Cut-Out.

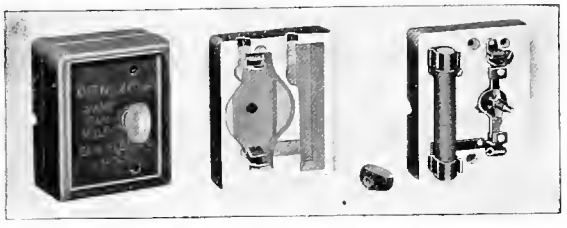


Fig. 6368. Lightning Switch and Cut-Out.

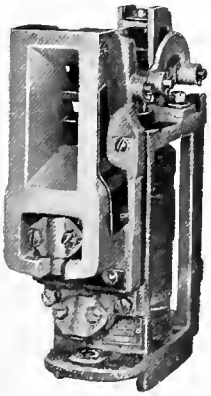


Fig. 6369.
Contactor.

Fig. 6371. Brush Holder for G.E.-216 Railway Motor.

General Electric Co.

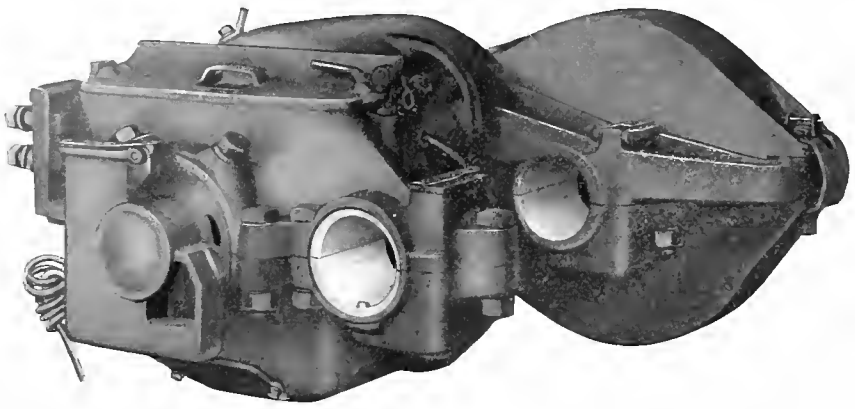


Fig. 6372. Westinghouse Commutating Pole Direct-Current Railway Motor with Split Frame.

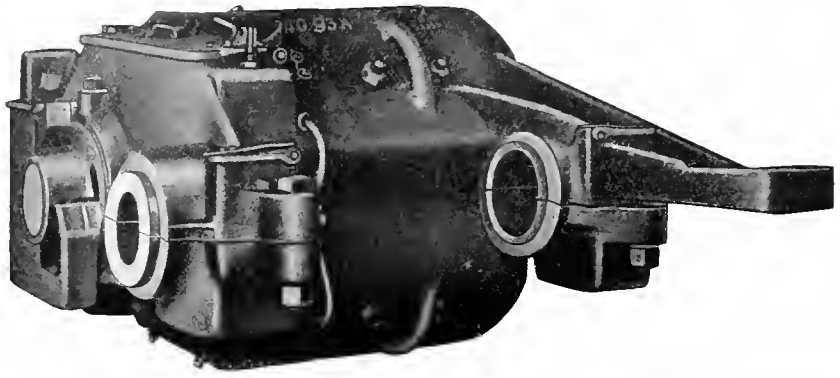


Fig. 6373. Westinghouse No. 93A. Direct-Current Railway Motor.

Fig. 6374. Armature for Westinghouse 93A Railway Motor.

Fig. 6375. Westinghouse No. 304. Direct-Current Railway Motor with Solid Frame.

Westinghouse Electric & Mfg. Co.

Figs. 6377-6378.
Hand Connectors for Motor Leads and Car Wiring.

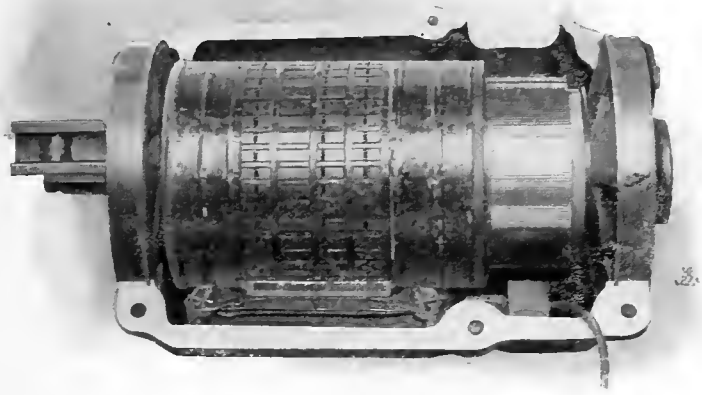


Fig. 6376. Westinghouse No. 121. Direct-Current Railway Motor with Upper Half of Frame Removed.

Fig. 6379. M. P. Lightning Arrester for Railway Service.

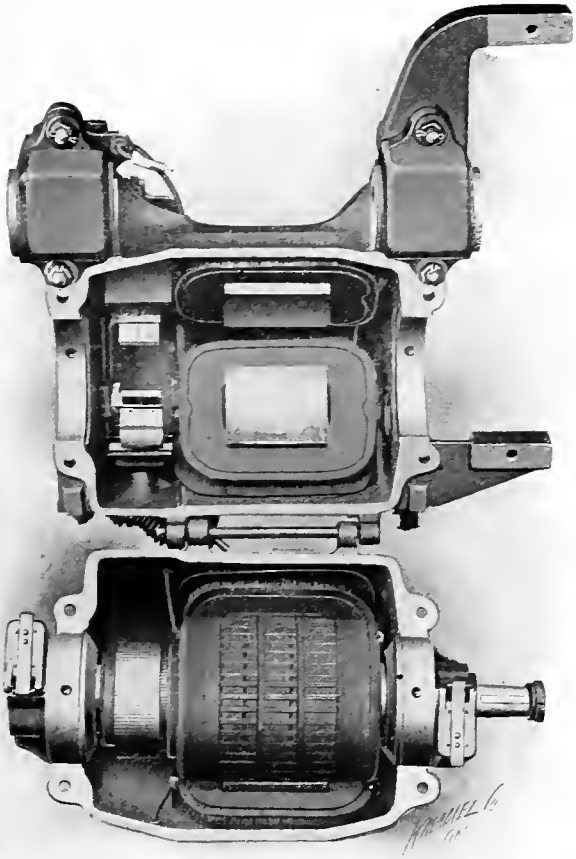


Fig. 6381. Westinghouse No. 92A. Direct Current Railway Motor, Lower Field Down.

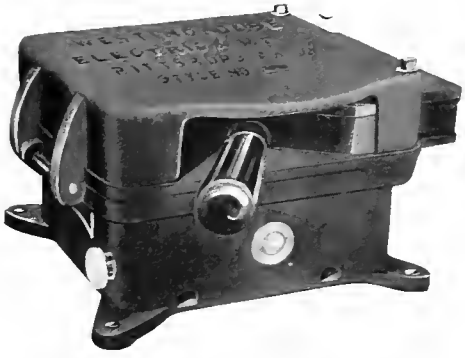


Fig. 6382. Westinghouse Car Type Circuit Breaker.

Fig. 6383. Direct-Current Car Circuit Breaker.

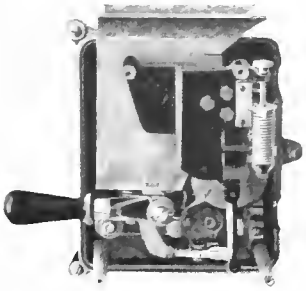


Fig. 6384. Open View Circuit Breaker for Car Service.

Figs. 6385-6387. Westinghouse,
Type B-23, Direct-Current Controller.

Figs. 6388-6390.
Westinghouse, Type K-10, Direct-Current Controller

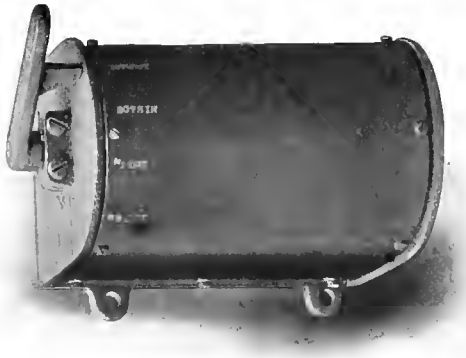


Fig. 6391. Motor Control Cut-Out
for Two 200-h.p. D. C. Motors.

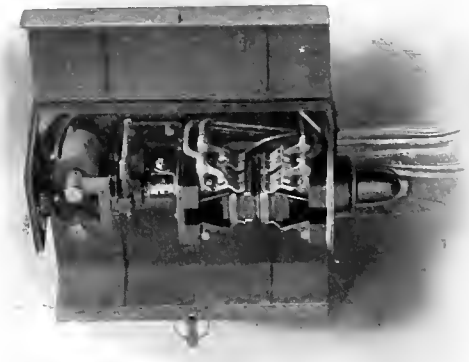


Fig. 6392. Type No. 176-C. Reverse Switch
for Two 200-h.p. D. C. Motors.

Westinghouse Unit Switch System of Multiple Control.

Fig. 6393. Type No. 250. Unit Switch Group, Front View. Cover Removed, Showing Interlocking Contacts.

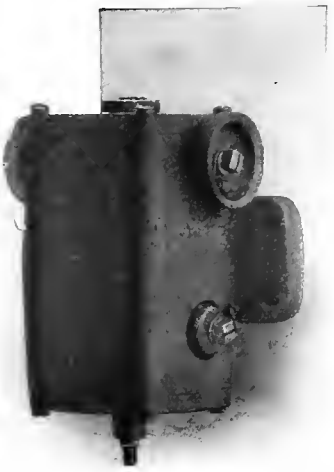


Fig. 6394. Line Relay.

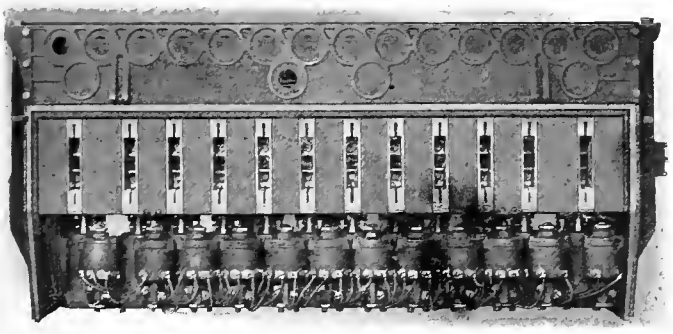
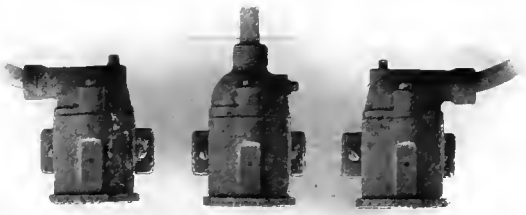
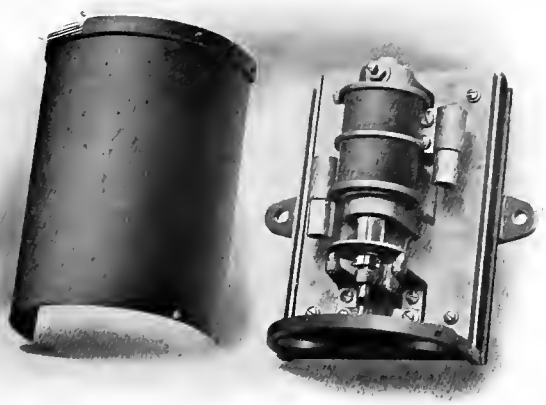


Fig. 6395. Type No. 250. Unit Switch Group, Rear View. Cover Removed, Showing Circuit Breakers.



Figs. 6396-6398. Seven-Point Connector Sockets, Right Hand, Left Hand and Straight.



Figs. 6399-6400. Series Limit Switch.

Fig. 6401. Junction Box.

Parts of Westinghouse Unit Switch System of Multiple Control for Two 200-h.p. Direct-Current Motors under Each Car.

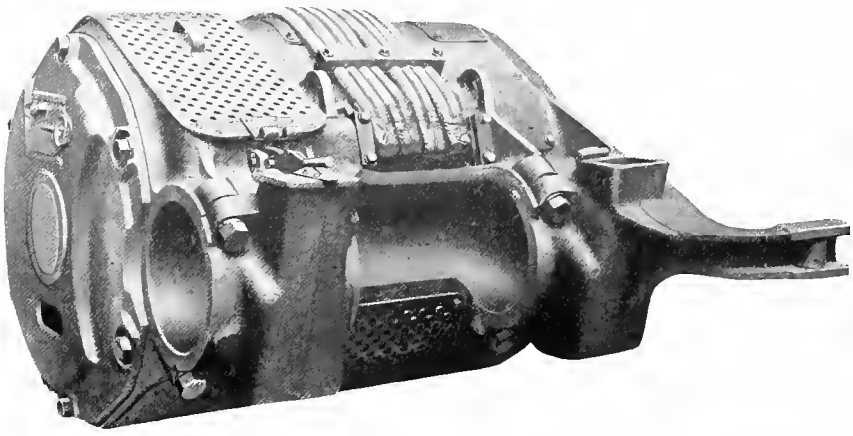


Fig. 6402. Westinghouse, No. 156. Alternating-Current Railway Motor.

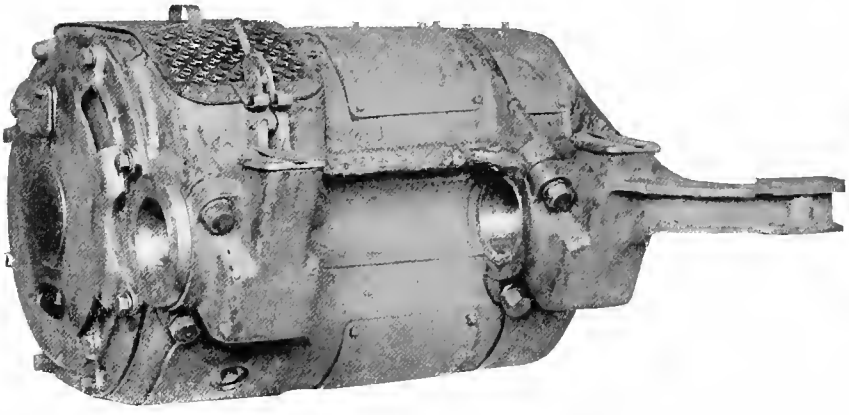


Fig. 6403. Westinghouse, No. 132. Single-Phase Alternating-Current Railway Motor.

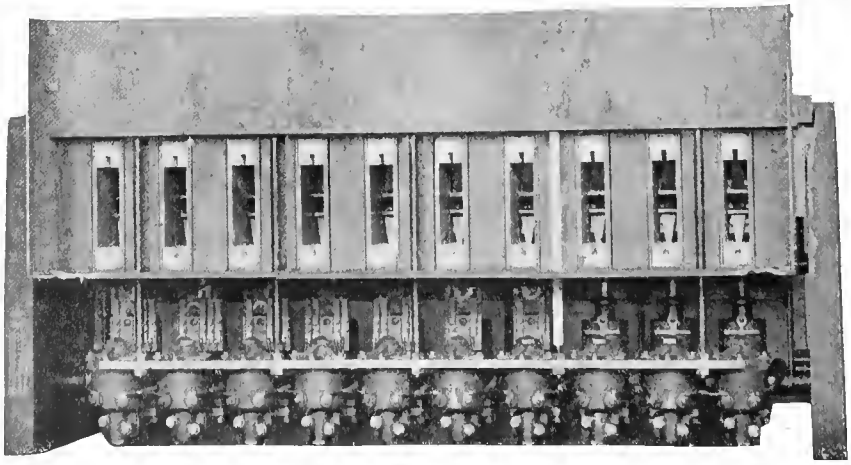


Fig. 6404. Unit Switch Group for Westinghouse System of Multiple Control for Alternating Current.

Westinghouse Electric & Mfg. Co.

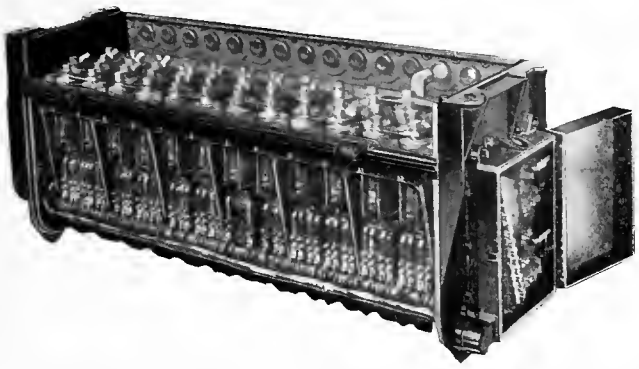


Fig. 6405. Type 251. Switch Group for Automatic Unit Switch Control.

Fig. 6406. Drum Controller for Westinghouse Four 50-h.p. Alternating-Current Motor Equipment.

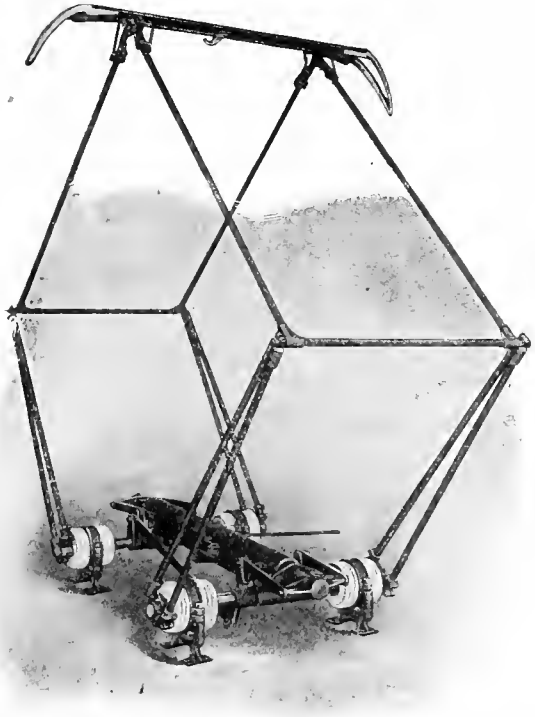


Fig. 6407. Westinghouse Pantagraph Trolley, Raised.
Westinghouse Electric & Mfg. Co.

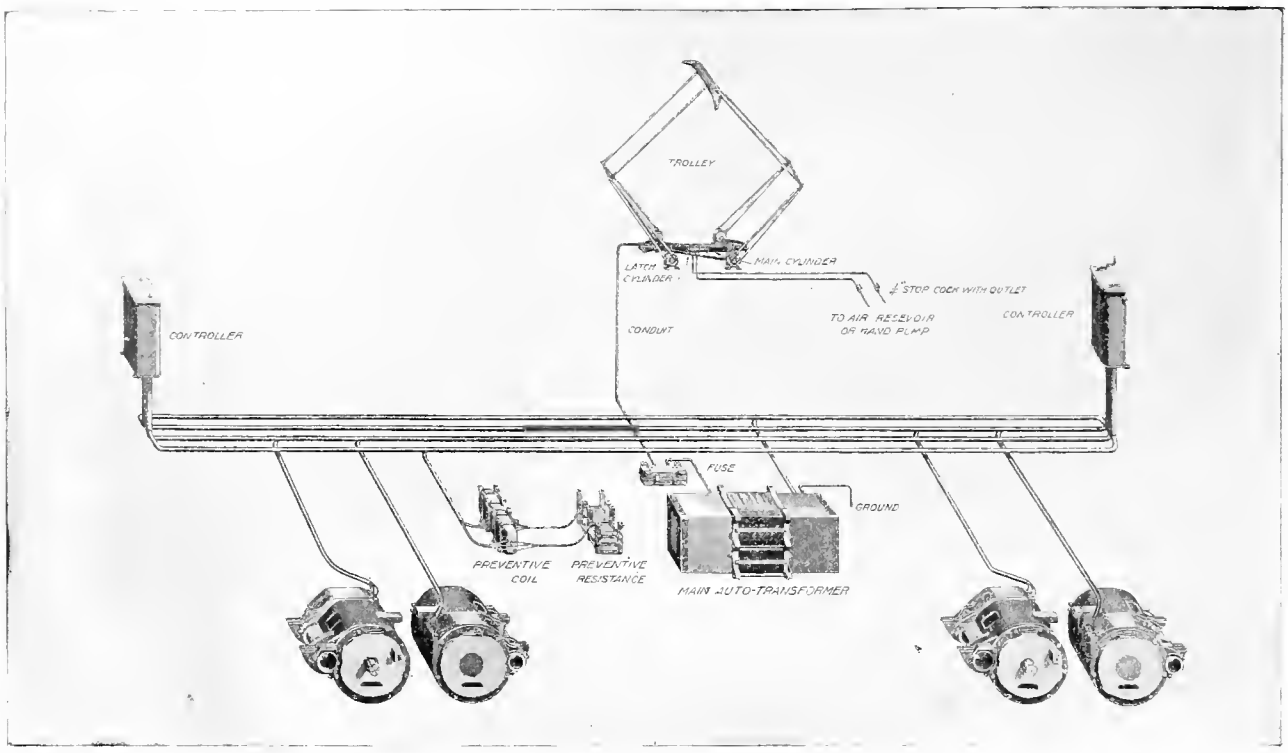


Fig. 6408. Diagram of Wiring and Apparatus for Westinghouse Hand Control for Alternating-Current Equipment.

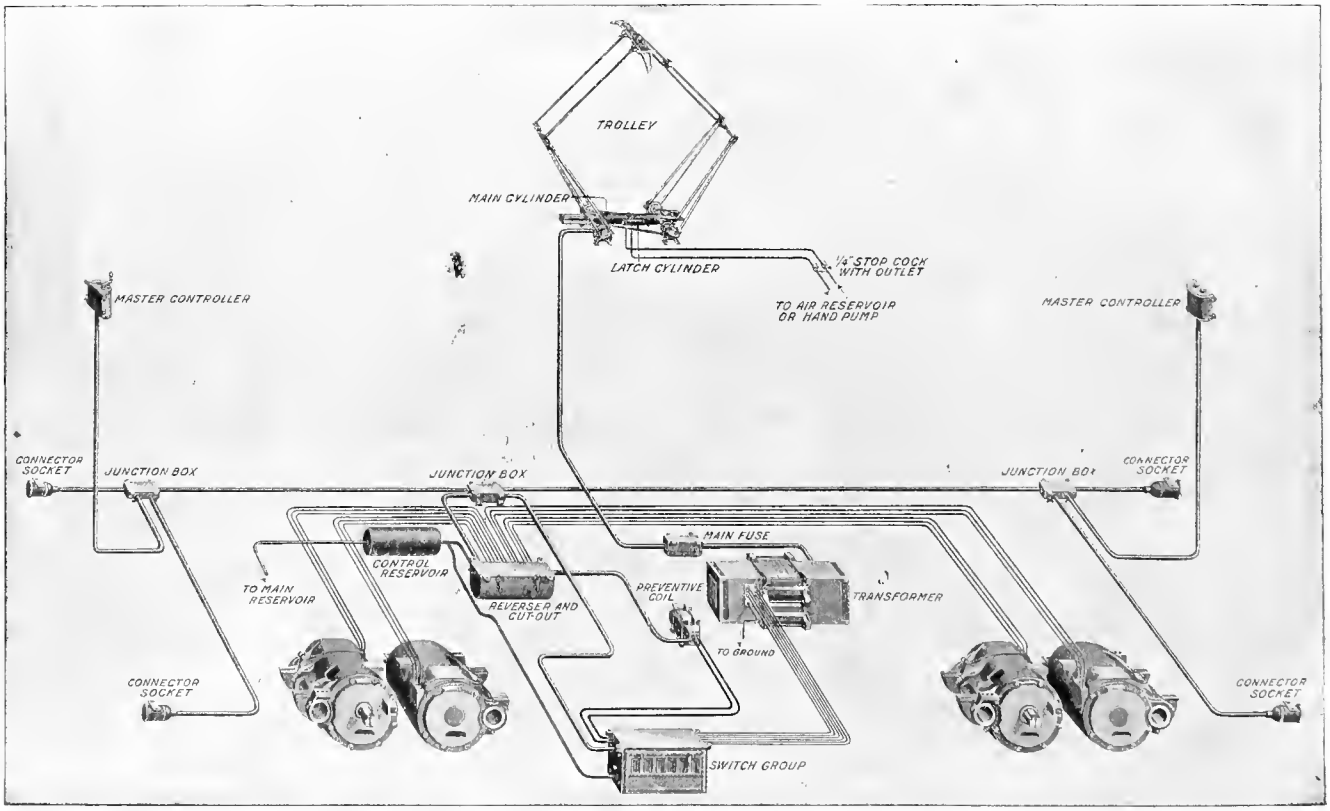


Fig. 6409. Diagram of Wiring and Apparatus for Westinghouse Unit Switch System of Multiple Control for Alternating-Current Equipment.
Westinghouse Electric & Mfg. Co.

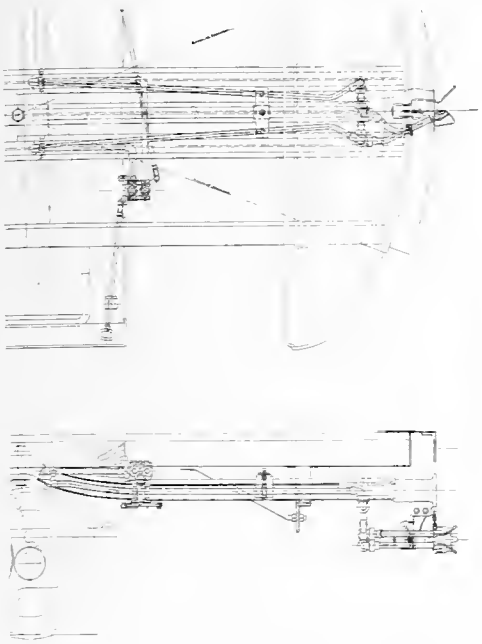


Fig. 6410. Westinghouse Automatic Air Coupler, with Flexible Metallic Joints and Cut-Out Device.

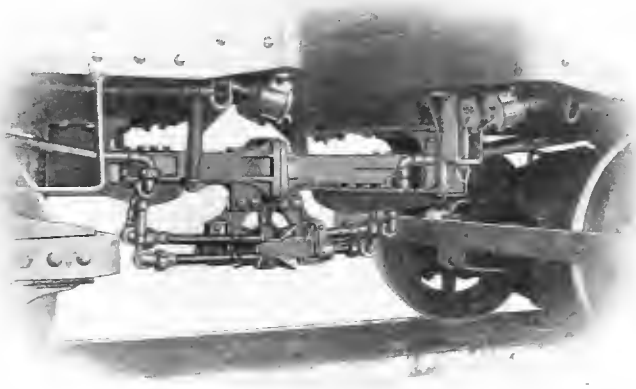


Fig. 6411. Westinghouse Automatic Air Coupler, with Flexible Metallic Joints.

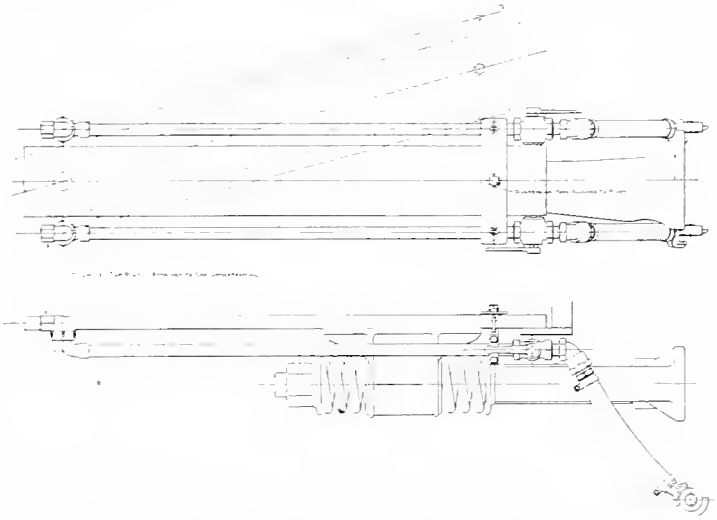


Fig. 6412. Westinghouse Swivel Joints as Applied with Radial Drawbars.

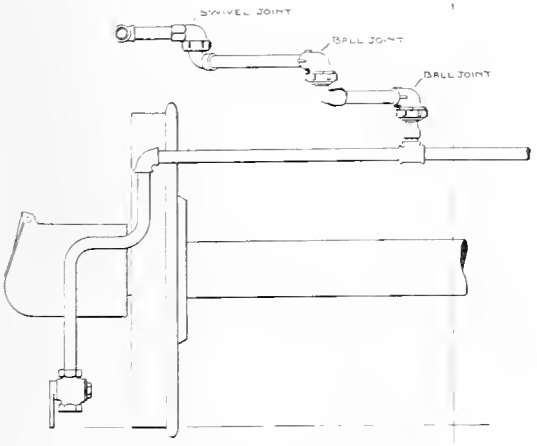


Fig. 6413. Train Line Connection to Emergency Trip Valve on Truck.

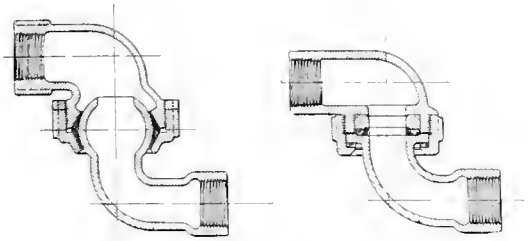


Fig. 6414. Cross-Sections of Westinghouse Metallic Joints.

Westinghouse Automatic Air & Steam Coupler Co.

Fig. 6415. "Winner" Pushover Back Seat with Steel Pedestal.

Fig. 6416. "Winner" Pushover Back Seat, with Cast or Pressed Steel Pedestal and Self- Adjusting Foot Rest.

Fig. 6417. "Winner" Pushover Back Seat, with Cast or Pressed Steel Pedestal and Self-Adjusting Foot Rest.

Fig. 6418. "Winner" Pushover Back Seat, with Cast or Pressed Steel Pedestal.

The J. G. Brill Co.

Fig. 6419. "Winner" Pushover Back Seat, with Cricket Legs.

Fig. 6420. "Winner" Pushover Back Seat, with Cricket Legs.

The J. G. Brill Co.

Fig. 6421. No. 60. Street Car Seat. Flyover Type.

Fig. 6422. No. 35½. Street Car Seat. Stationary Type.

Scarritt-Comstock Furniture Co.

Fig. 6423. Walkover Seat, No. 99-B. Frieze Plush Upholstery. City Service.

Fig. 6424. Walkover Seat, No. 97-E. Rattan Upholstery. City Service.

Fig. 6425. Walkover Seat, No. 84. Rattan Upholstery. City Service.

Fig. 6426. Walkover Seat, No. 199-A. Rattan Upholstery. City Service.

Fig. 6427. Walkover Seat, No. 99-EE. Leather Upholstery. Interurban Service.

Fig. 6428. Walkover Seat, No. 99-E. Rattan Upholstery. Suburban Service.

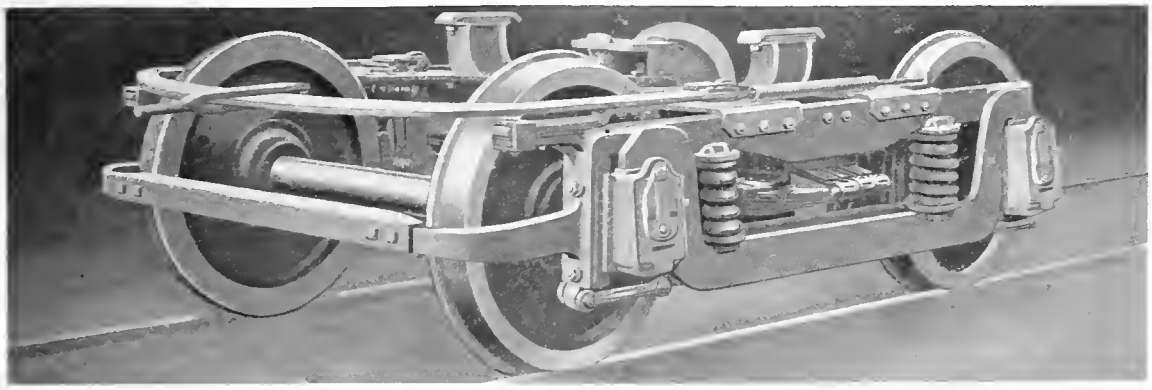


Fig. 6429. Motor Truck, No. 27-MCB, Solid Forged Side Frames.

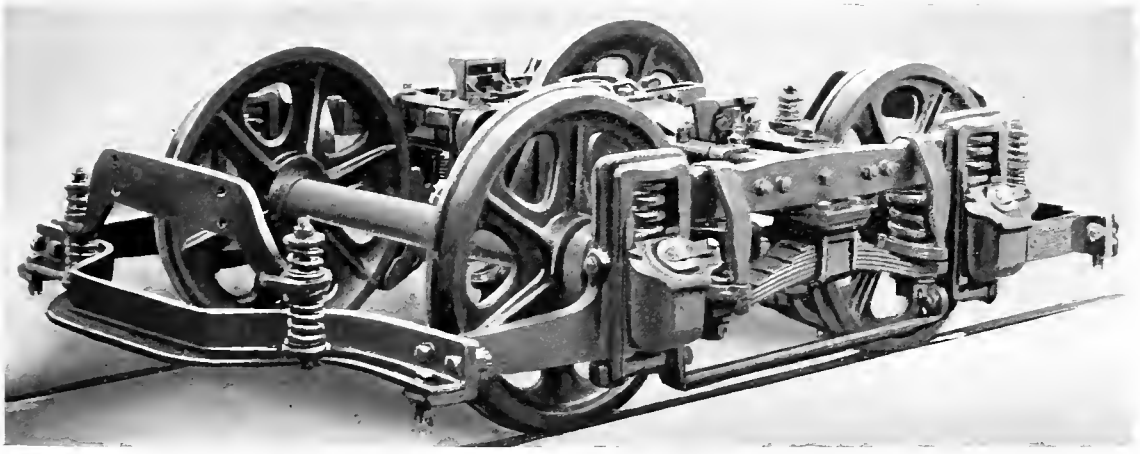


Fig. 6430. No. 27-GE1 Truck. Solid Forged Side Frames.

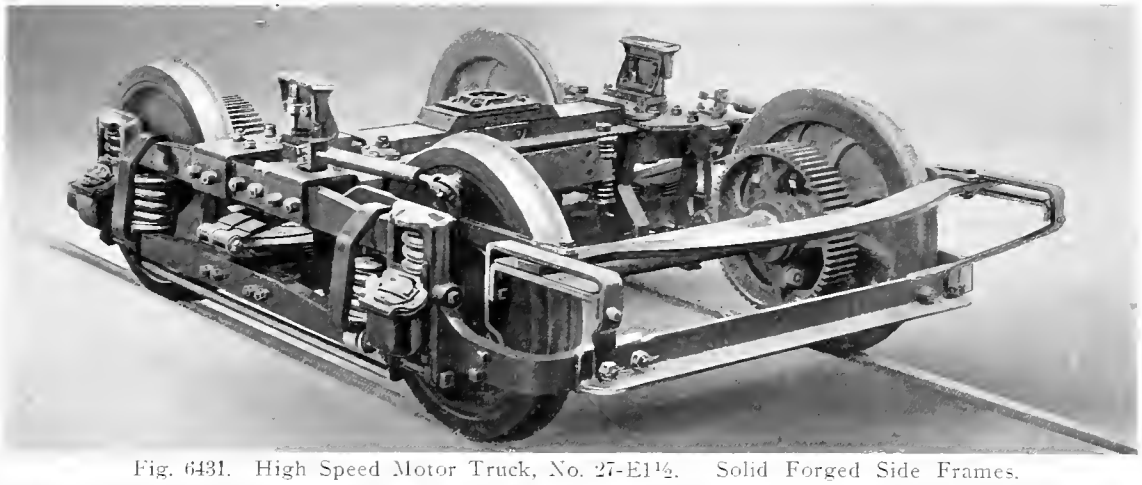


Fig. 6431. High Speed Motor Truck, No. 27-E1½. Solid Forged Side Frames.

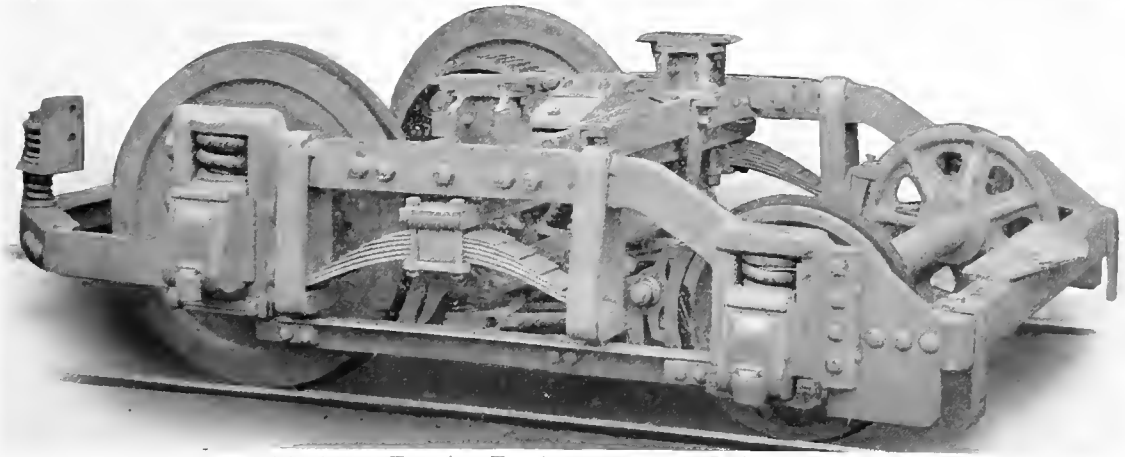


Fig. 6432. Maximum Traction Truck, No. 39-E1. Solid Forged Side Frames.
The J. G. Brill Co.

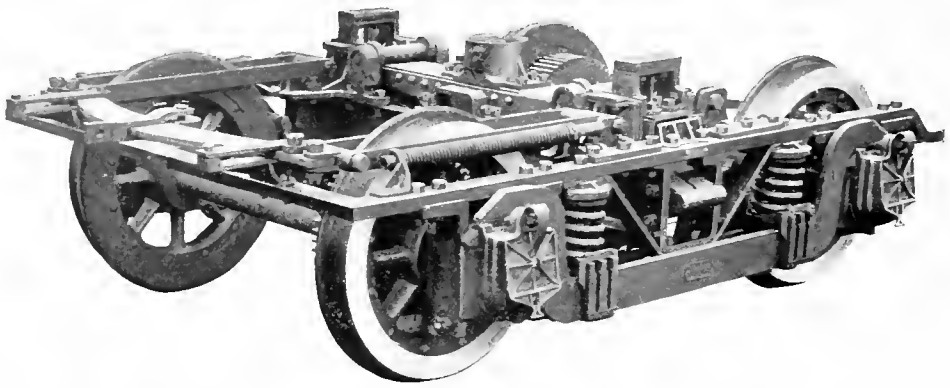
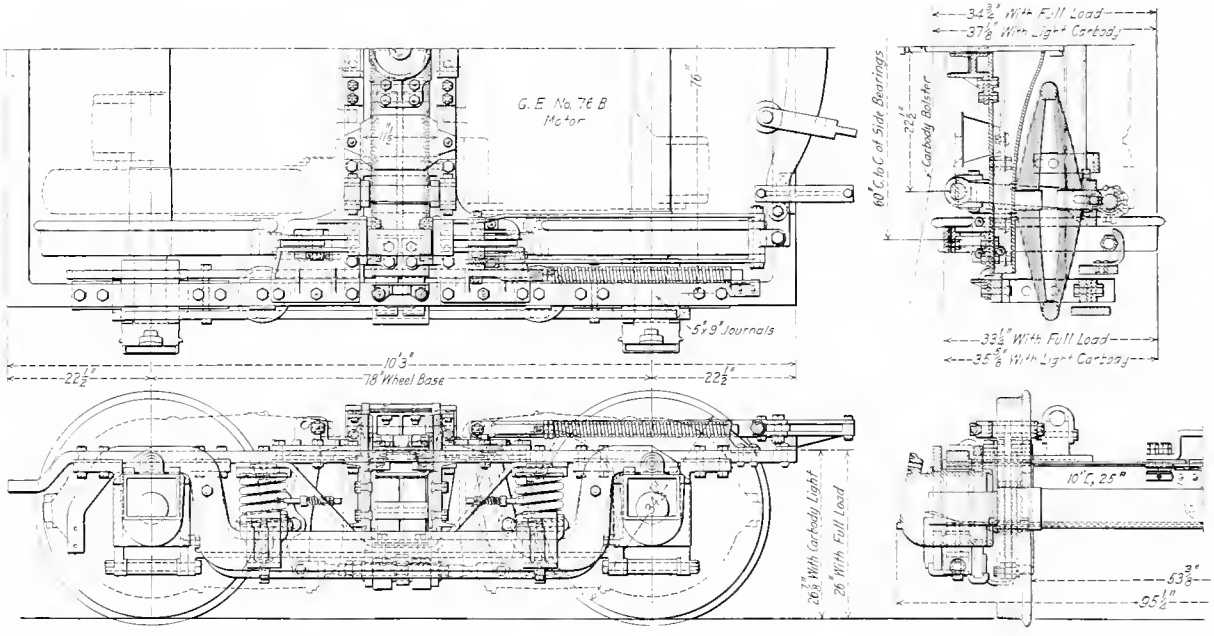
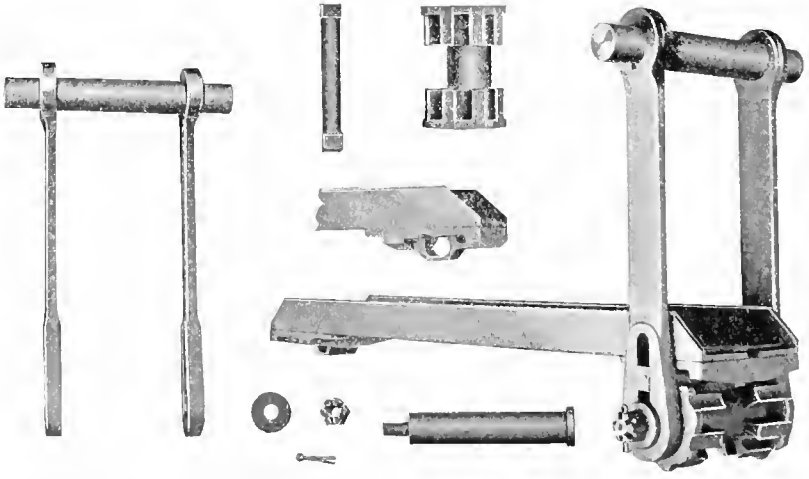


Fig. 6433. High Speed Electric Motor Truck, Type "A." Capacity 60,000 lbs. Interurban Service.



Figs. 6434-6437. Elevations, Plan and Cross-Section of Type "A" Truck.



Figs. 6438-6443. Details of Device for Adjusting Height of Car Body as Applied to Type "A" Truck. Applicable to any Swinging Bolster Truck.

American Locomotive Co.

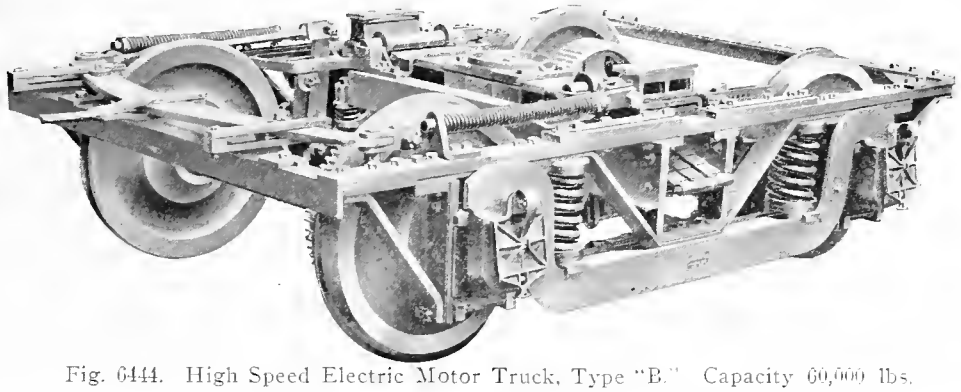
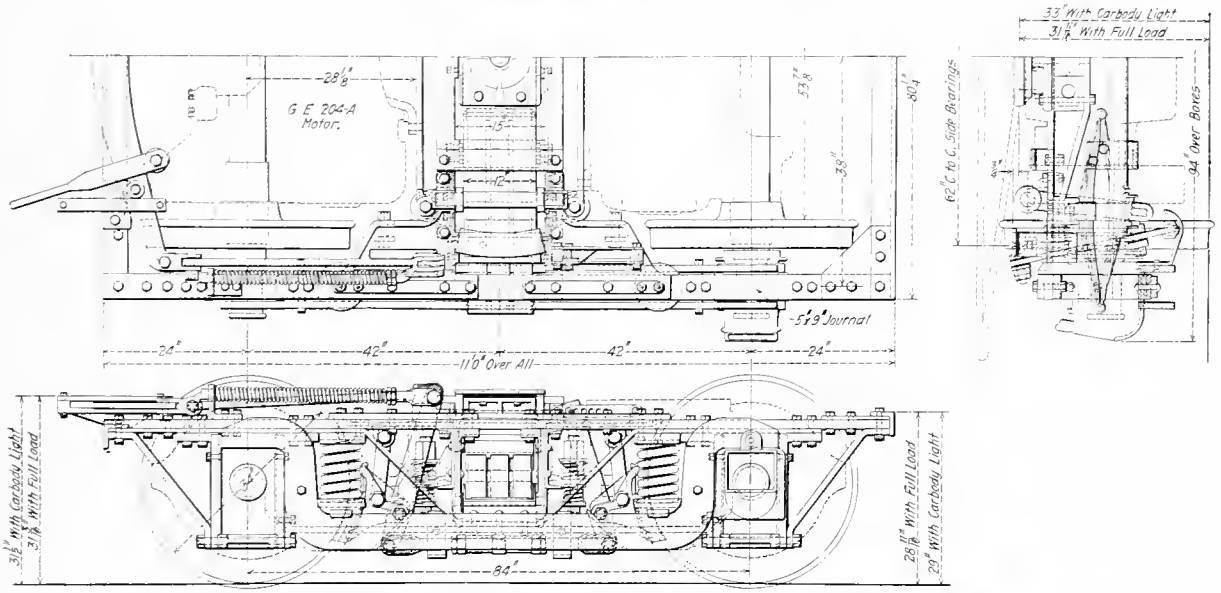


Fig. 6444. High Speed Electric Motor Truck, Type "B." Capacity 60,000 lbs. Elevated, Subway and Interurban Service.



Figs. 6445-6447. Elevation, Plan and Cross-Section of Type "B" Truck.

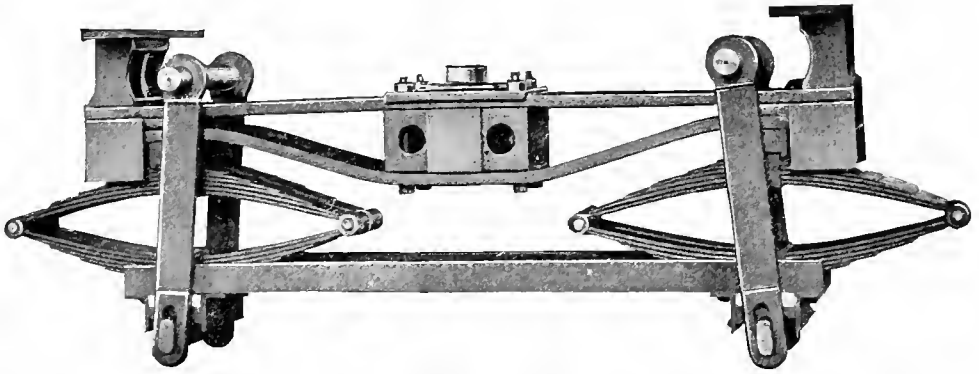
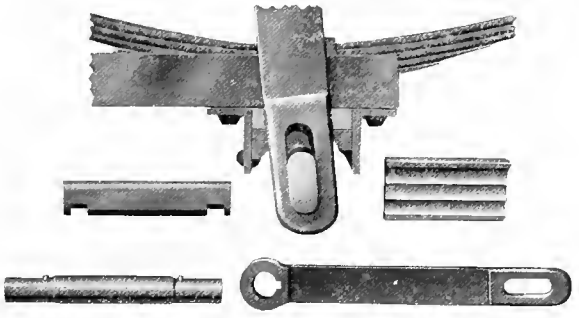


Fig. 6448. Device for Adjusting Angularity of Swing Links and Height of Car Body as Applied to Type "B" Truck. Applicable to any Swinging Bolster Truck.



Figs. 6449-6453. Details of Adjusting Device, Type "B" Truck. American Locomotive Co.

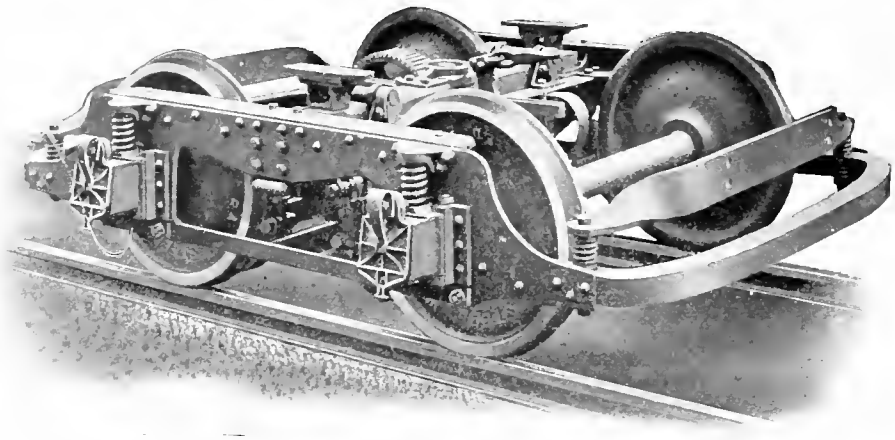
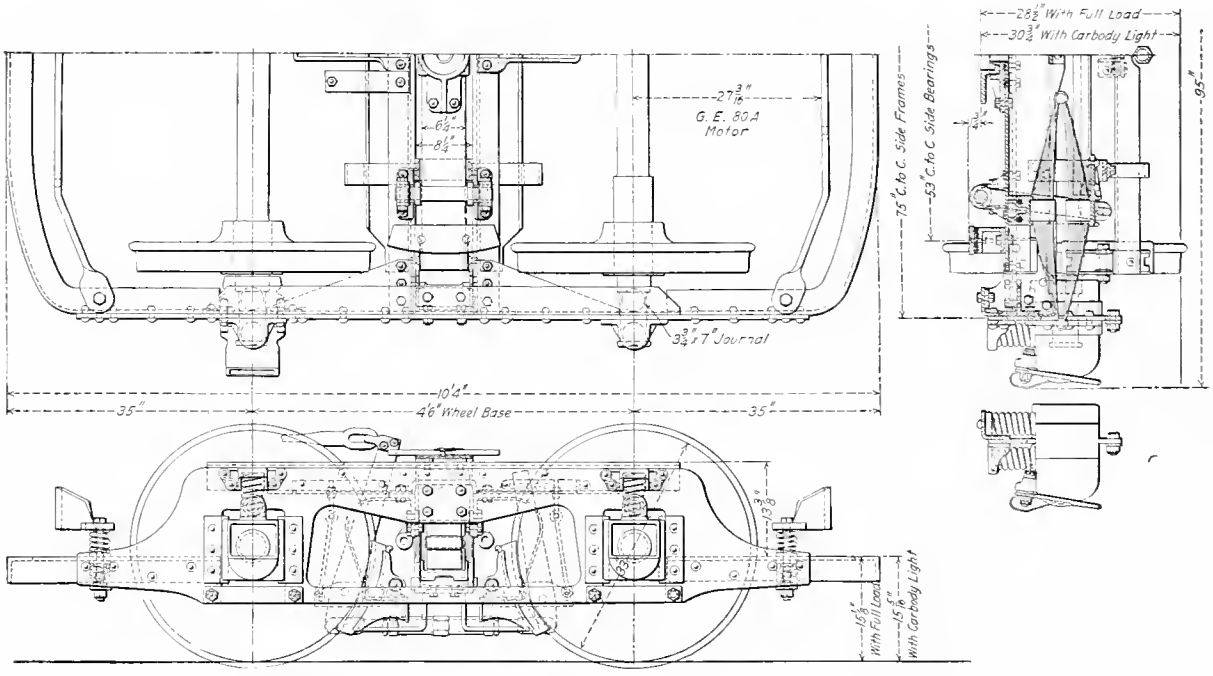


Fig. 6454. Short Wheel Base Electric Motor Truck, Type "S," with Steel Plate Frames and Pressed Steel Bolster. City Service.



Figs. 6455-6457. Elevation, Plan and Cross-Section of Type "S" Truck.

Fig. 6458. Pressed Steel Truck Bolster for Type "S" Truck.

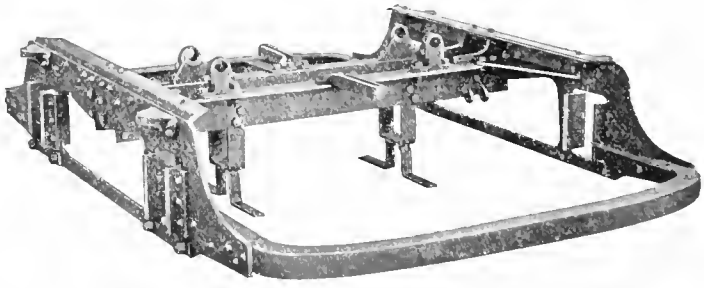


Fig. 6459. Steel Plate Truck Frames for Type "S" American Locomotive Co.

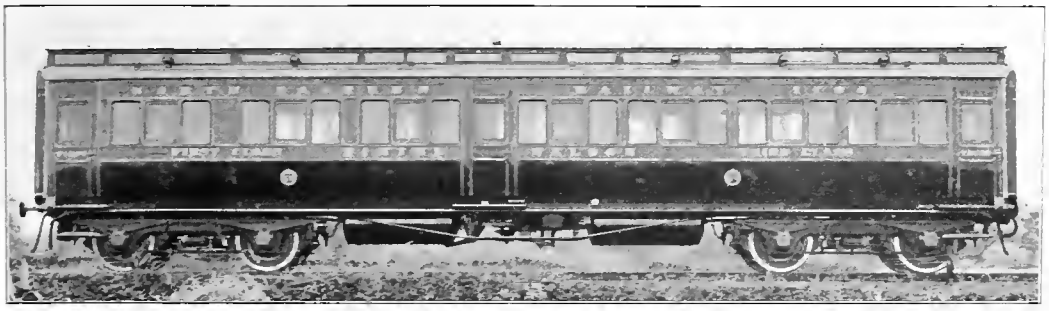


Fig. 6460. Composite First and Third-Class Dining Saloon. North Eastern.

Fig. 6461. Interior of Third-Class Dining Saloon. North Eastern.

Fig. 6462. Interior of First-Class Dining Saloon. North Eastern.

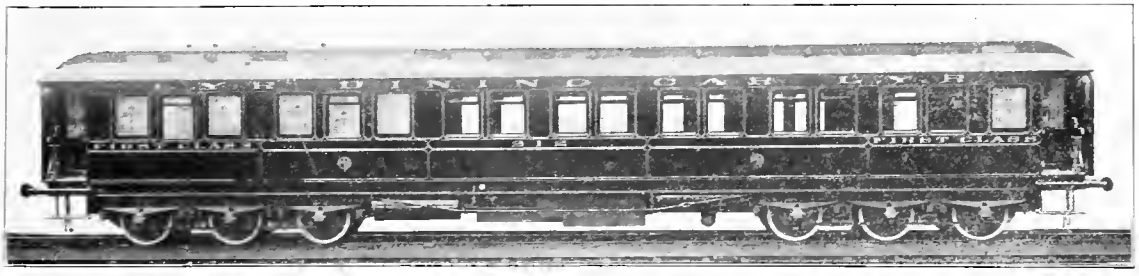


Fig. 6463. First-Class Dining Car. Lancashire & Yorkshire.

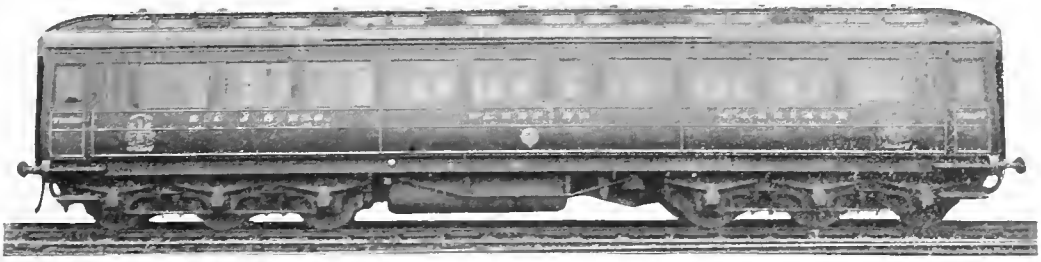


Fig. 6464. Corridor Sleeping Car. East Coast Joint Stock.

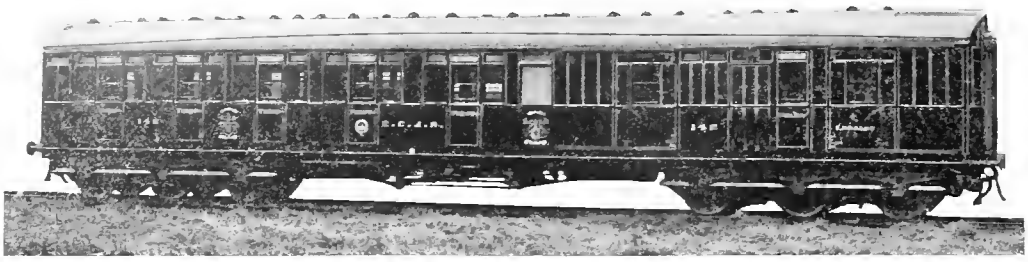


Fig. 6465. Composite First and Third-Class Bogie Corridor Carriage. East Coast Joint Stock.

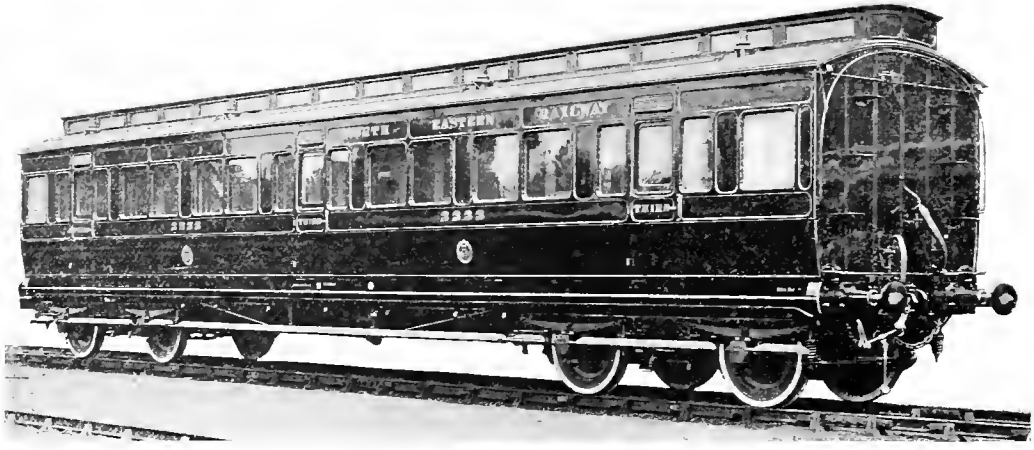


Fig. 6466. Third-Class Bogie Carriage. North Eastern.

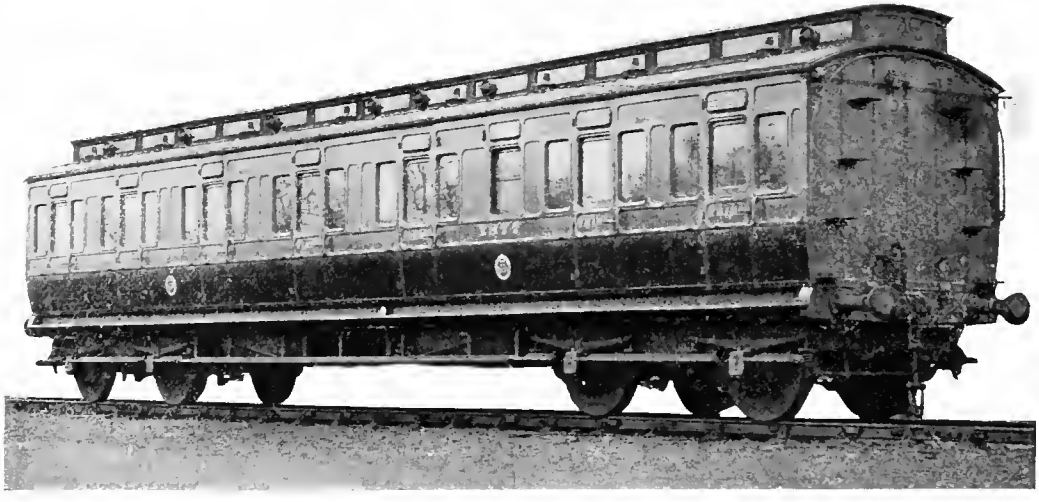


Fig. 6467. Composite First and Third-Class Bogie Carriage. North Eastern.

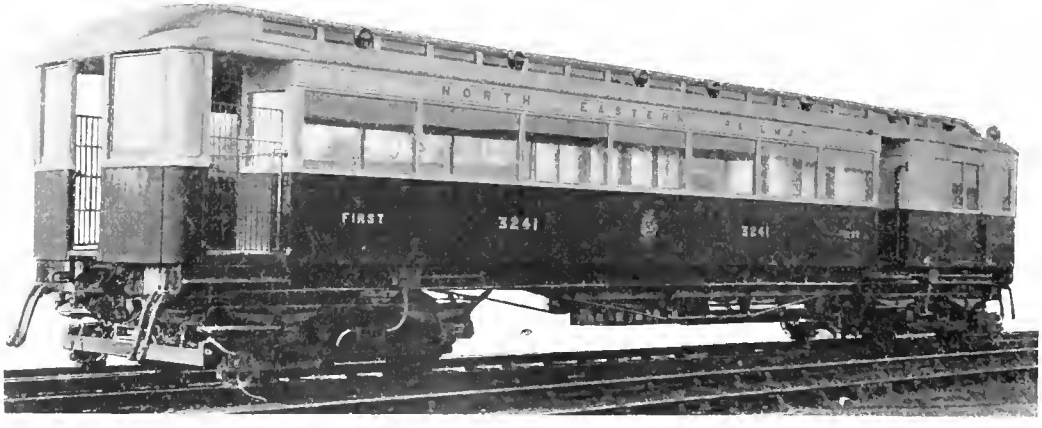
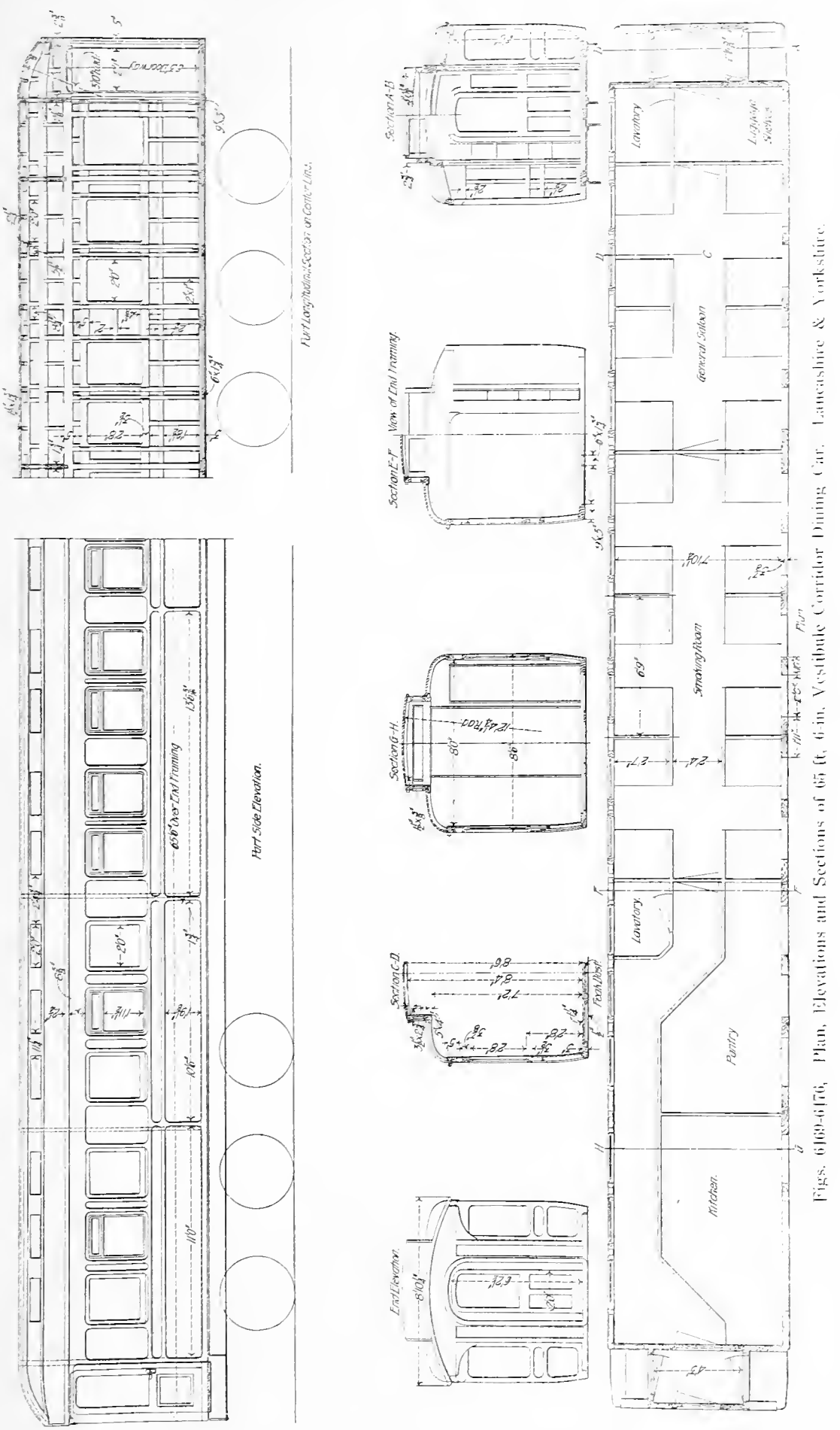
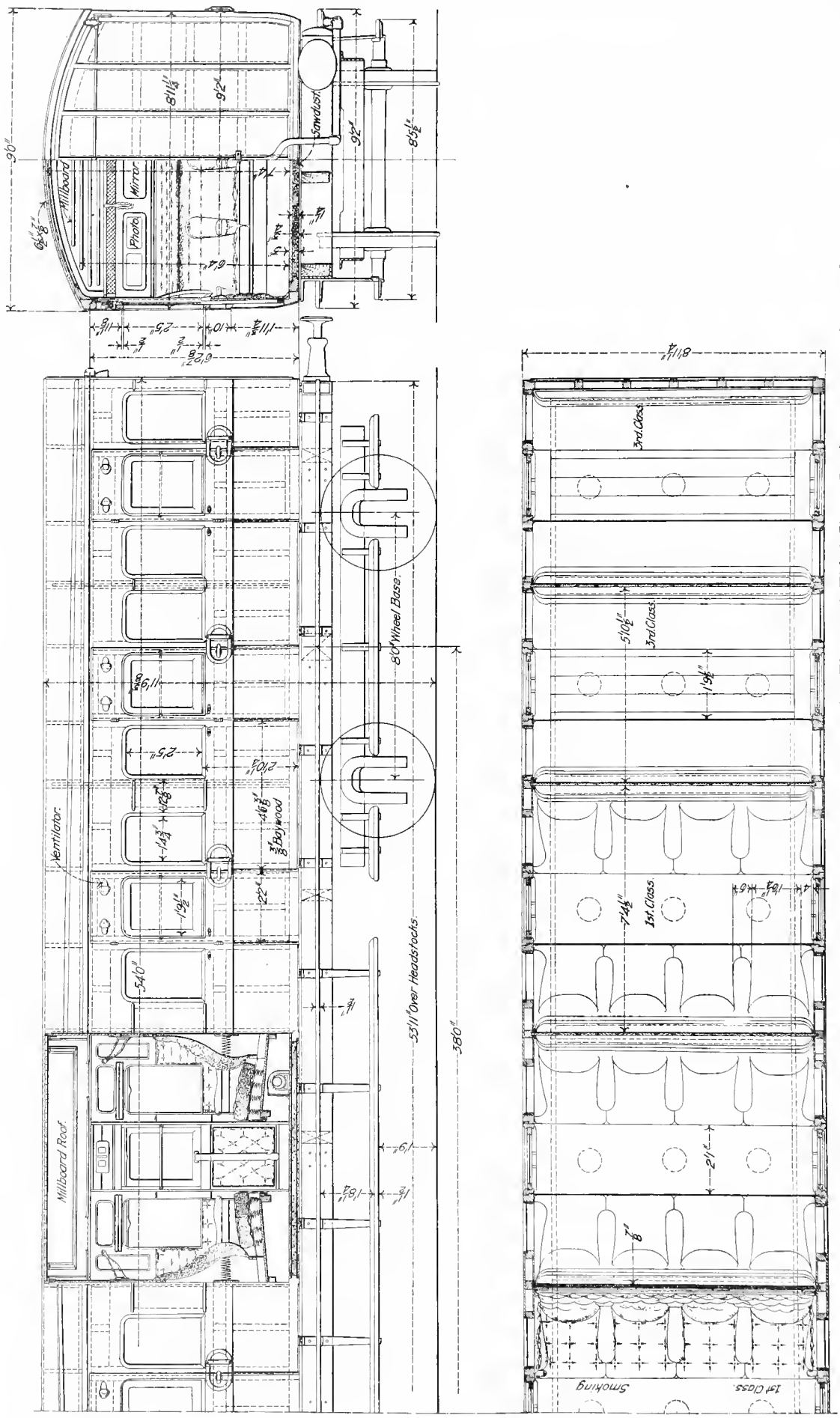


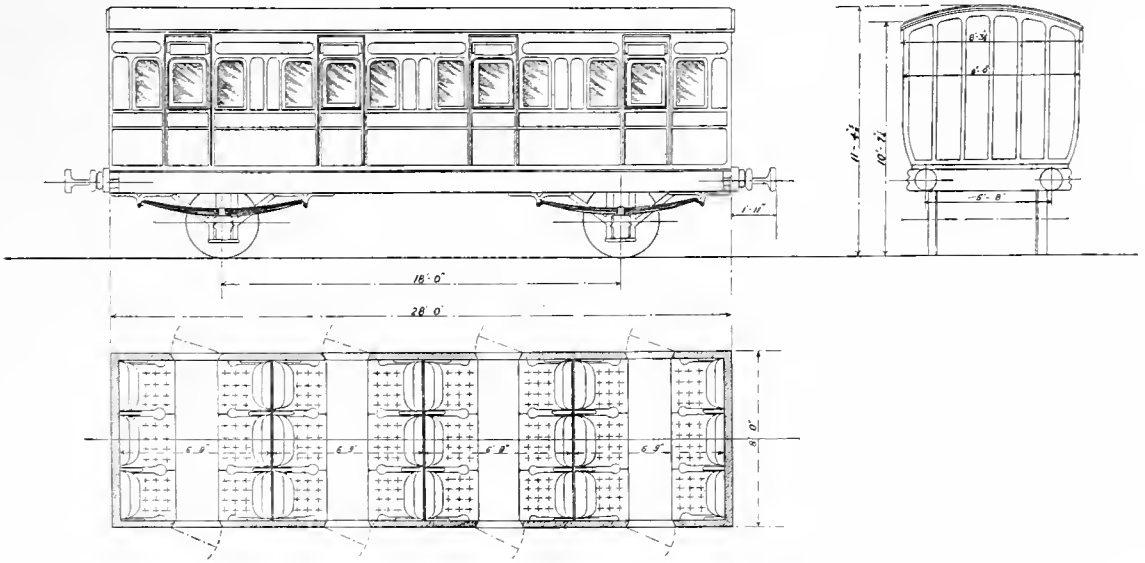
Fig. 6468. Electric Motor Car. North Eastern.



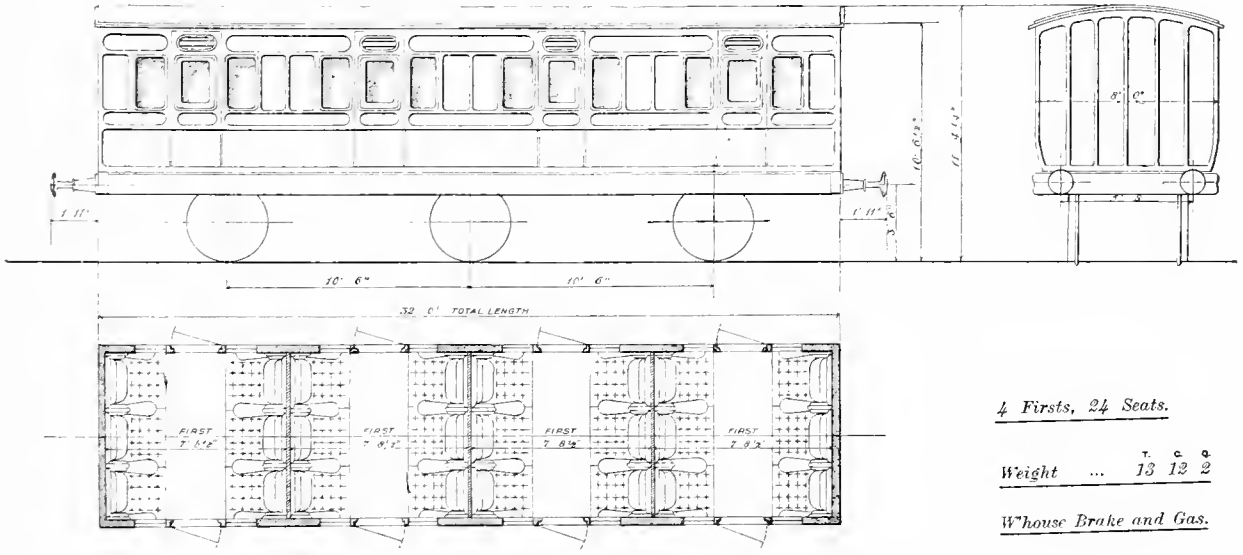
Figs. 6469-6476. Plan, Elevations and Sections of 65 ft. 6 in. Vestibule Corridor Dining Car. Lancashire & Yorkshire



Figs. 6477-6479. Plan, Sections and Elevations of 51-ft. Composite First and Third-Class Carriage. Lancashire & Yorkshire.



Figs. 6480-6482. First-Class Carriage, 24 Seats. North Eastern.



4 Firsts, 24 Seats.

	T.	C.	Q.
Weight ...	13	12	2

Whouse Brake and Gas.

Figs. 6483-6485. First-Class Carriage, 24 Seats. North Eastern.

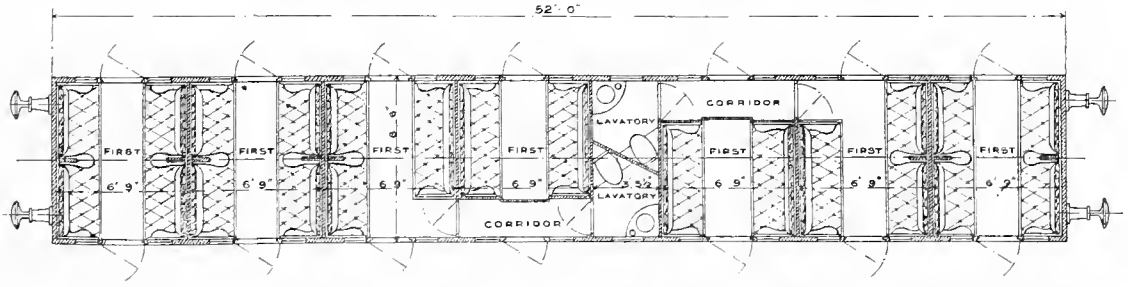


Fig. 6486. Plan of Lavatory First-Class 4-Wheel Bogie Carriage, 50 Seats. North Eastern.

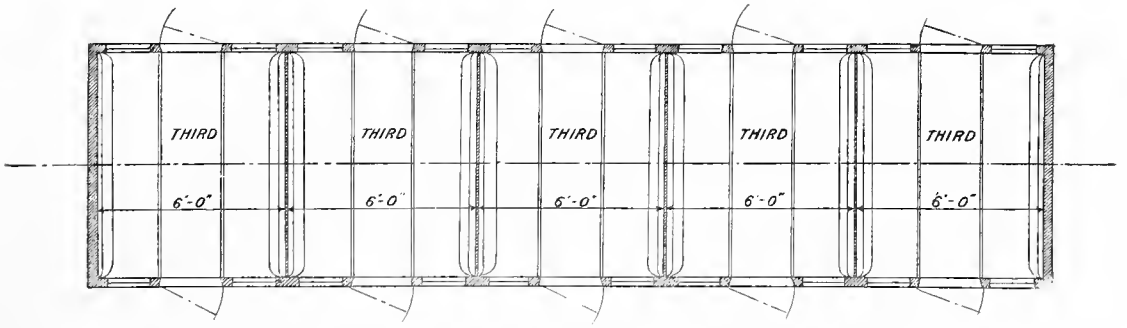
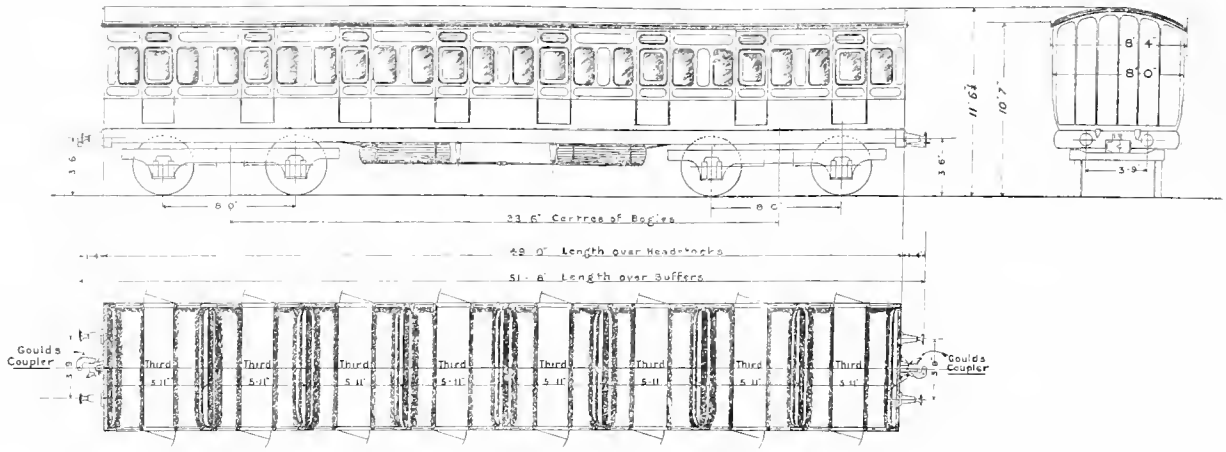


Fig. 6487. Plan of Third-Class Carriage, 4 Wheels, 50 Seats. North Eastern.



Figs. 6488-6490. Third-Class Carriage, 4-Wheel Bogies, 80 Seats. North Eastern.

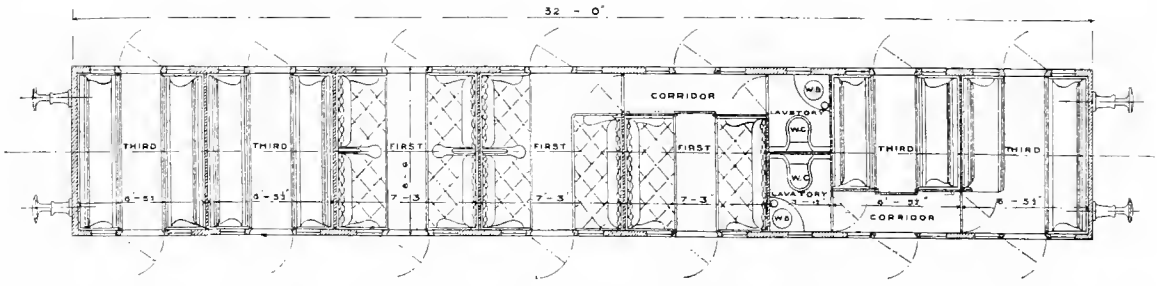


Fig. 6491. Plan of Lavatory Composite Carriage, 4-Wheel Bogies, 55 Seats. North Eastern.

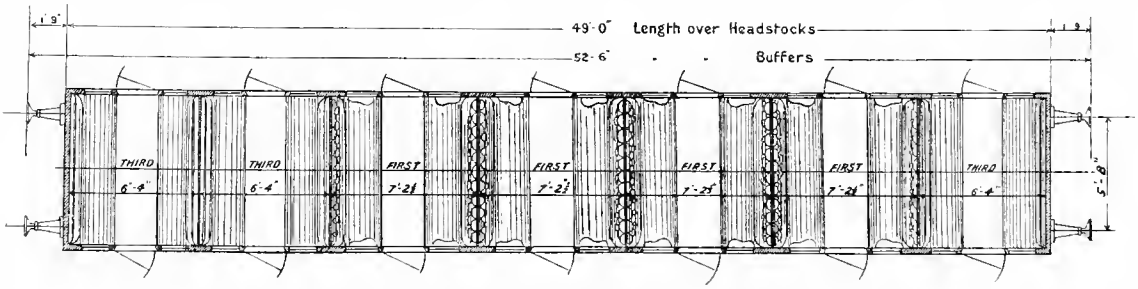
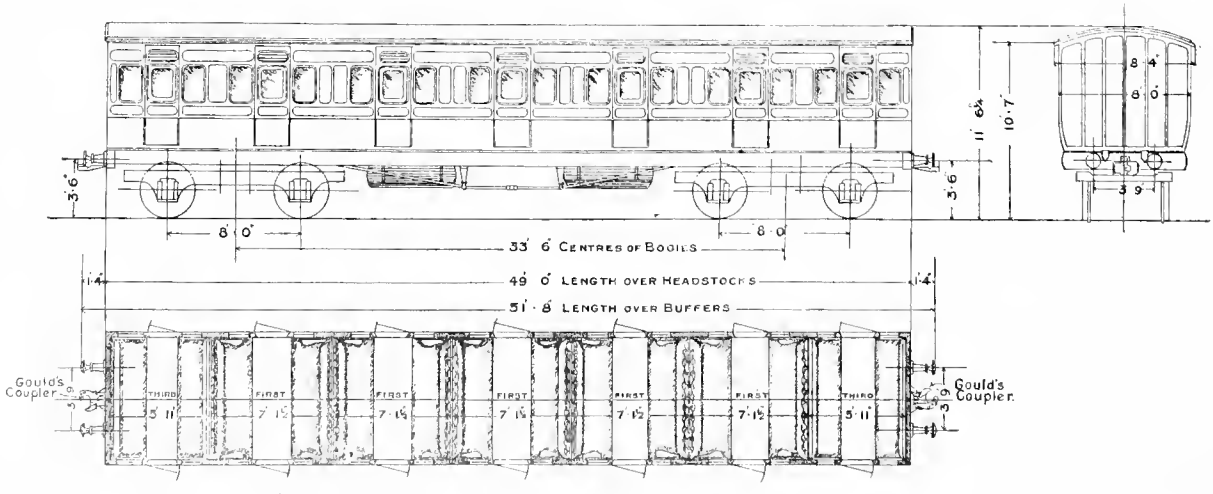
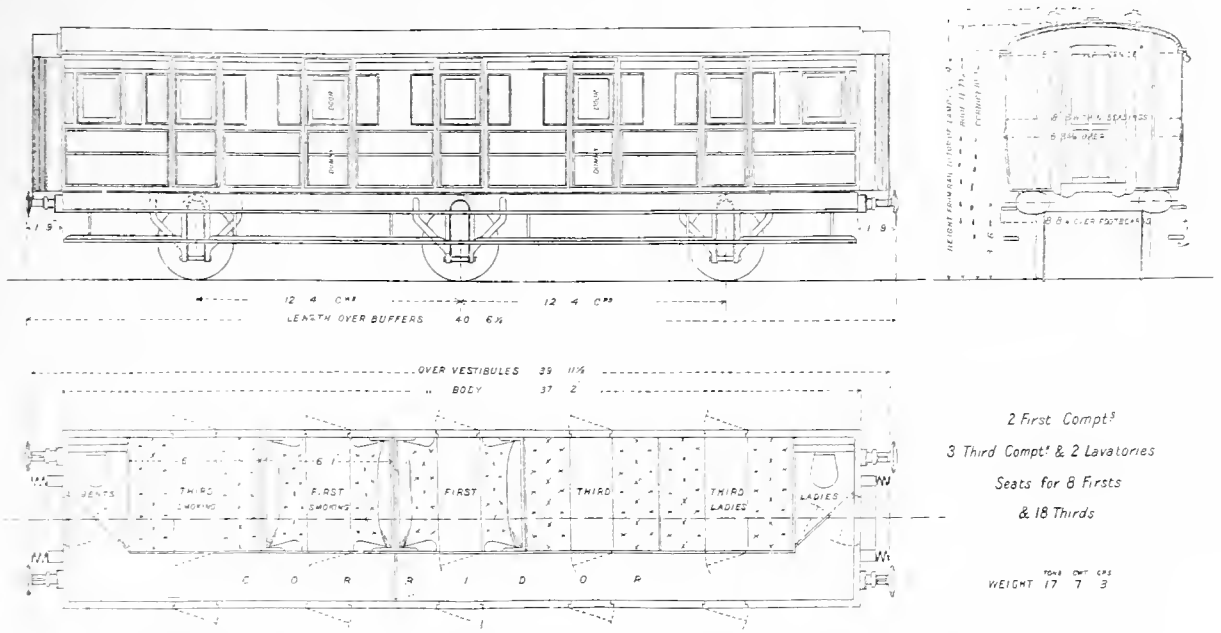


Fig. 6492. Plan of Composite Carriage, 4-Wheel Bogies, 62 Seats. North Eastern.



Figs. 6493-6495. Composite Carriage, 60 Seats. North Eastern.



Figs. 6496-6498. Corridor Composite First and Third-Class Carriage. East Coast Joint Stock.

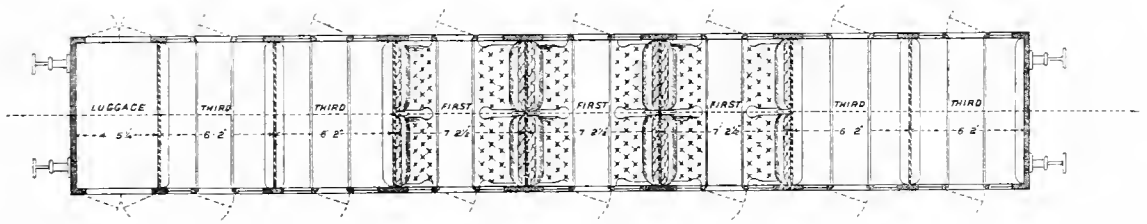


Fig. 6499. Luggage Composite First and Third-Class 4-Wheel Bogie Carriage, 64 Seats. North Eastern.

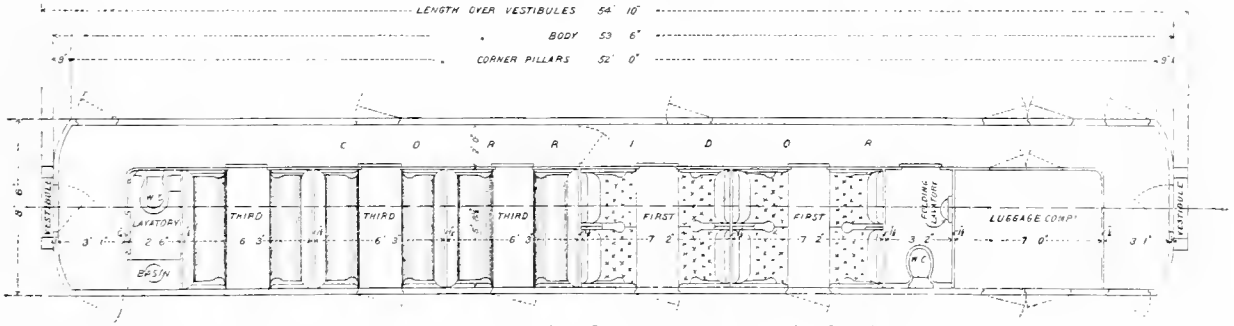


Fig. 6500. Corridor Composite First and Third-Class 4-Wheel Bogie Carriage, 26 Seats. E. C. J. S.

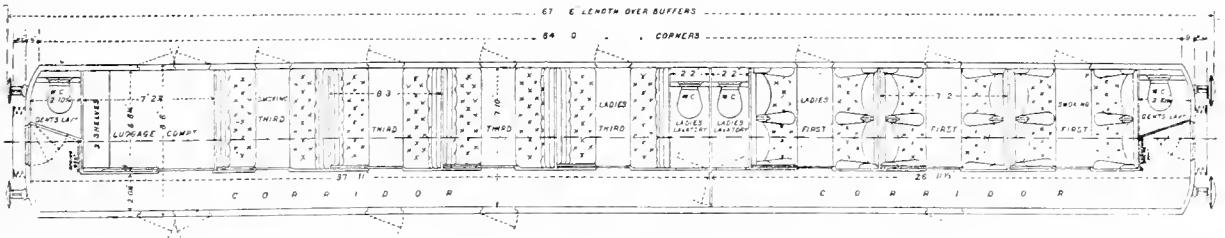


Fig. 6501. Corridor Composite First and Third-Class 6-Wheel Bogie Carriage, 36 Seats. E. C. J. S.

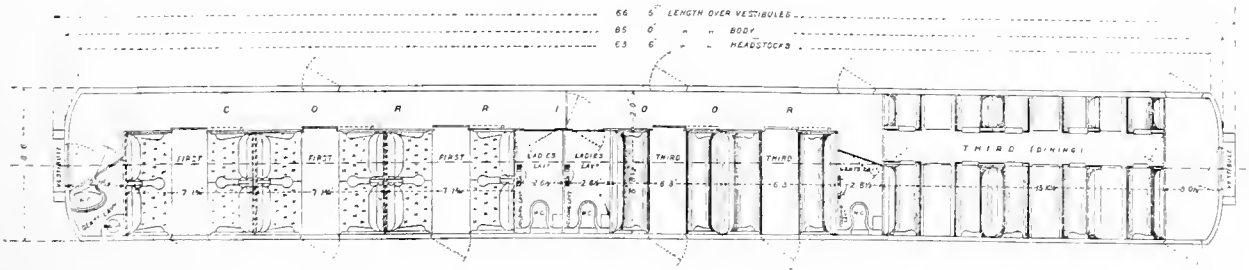
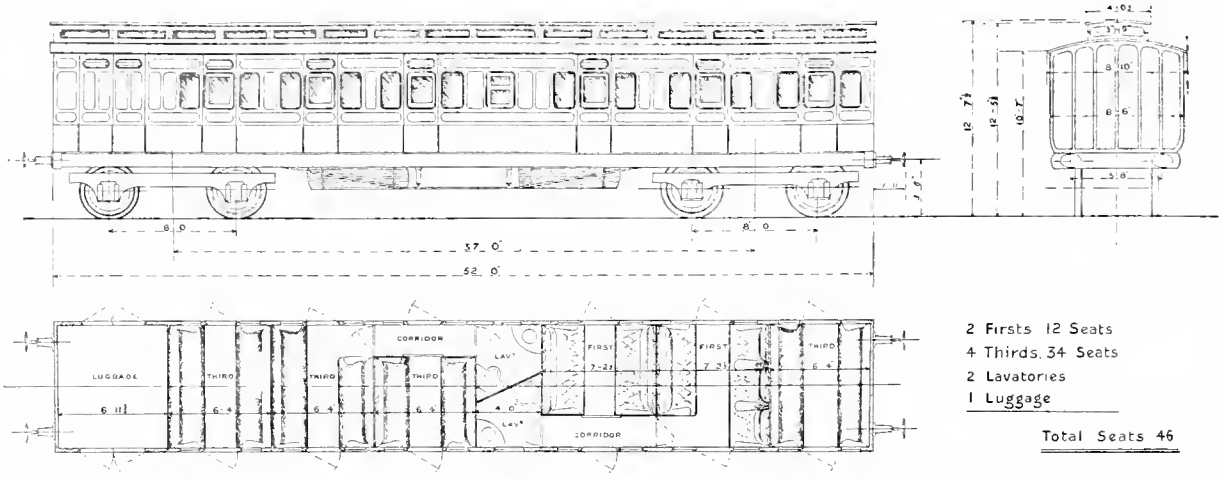


Fig. 6502. Corridor Composite First and Third-Class 6-Wheel Bogie Carriage, 30 Seats. E. C. J. S.



Figs. 6503-6505. Lavatory and Luggage Composite First and Third-Class Carriage. North Eastern.

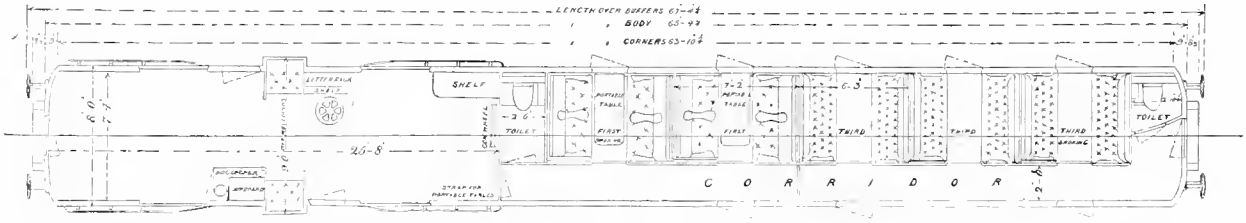


Fig. 6506. Composite First and Third-Class Carriage and Brake Van. E. C. J. S. Six-Wheel Bogies, 26 Seats.

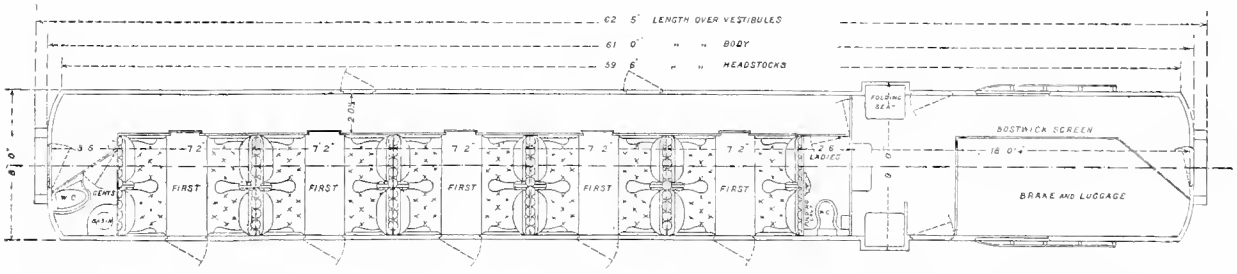
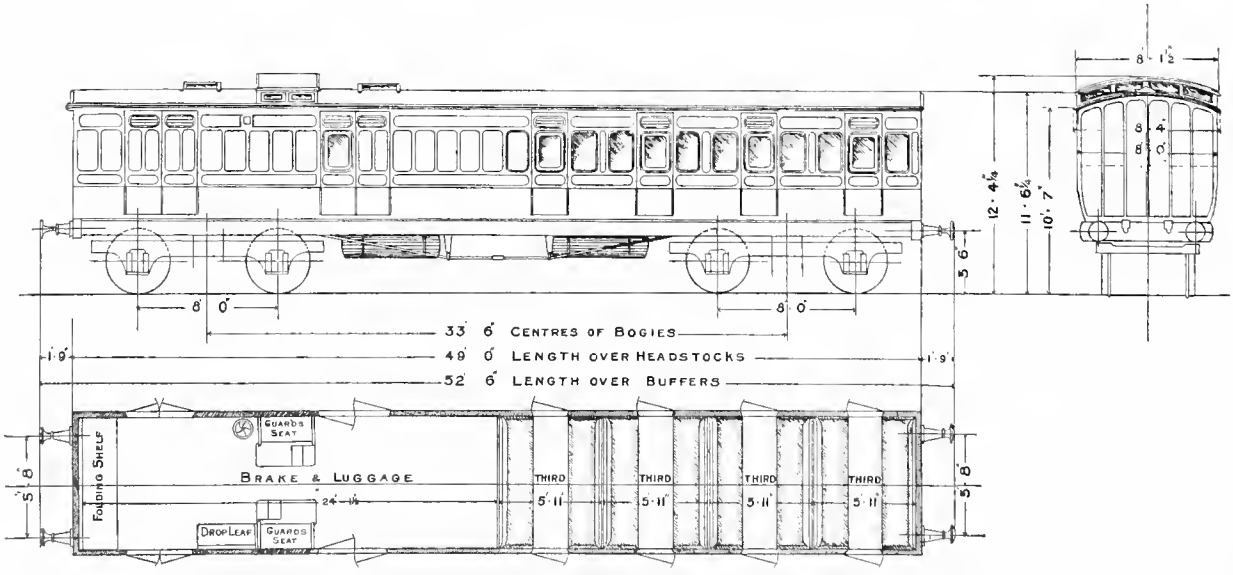


Fig. 6507. First-Class Corridor Carriage and Brake Van. Six-Wheel Bogies, 20 Seats. East Coast Joint Stock.



Figs. 6508-6510. Third-Class Carriage and Brake Van, 40 Seats. North Eastern.

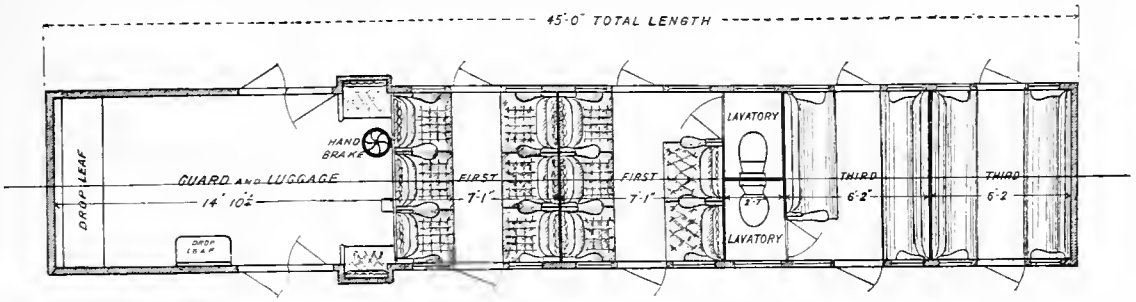
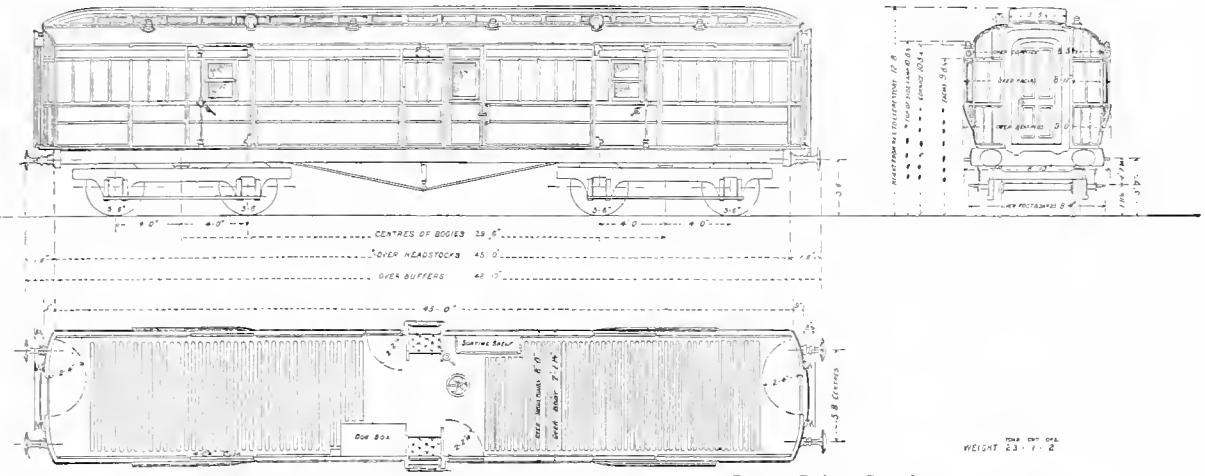
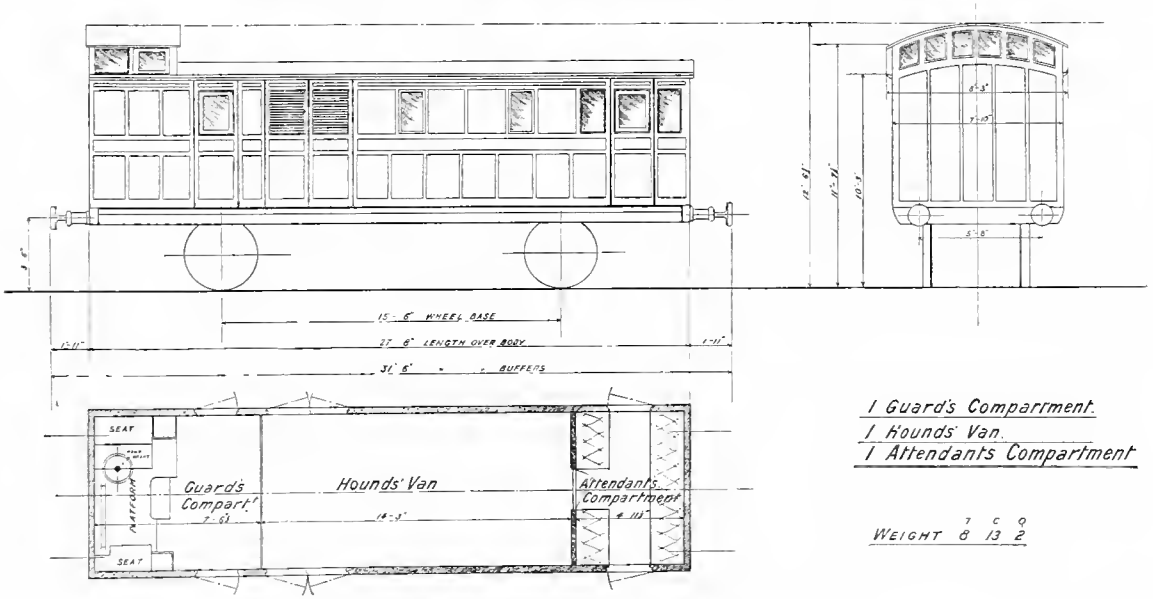


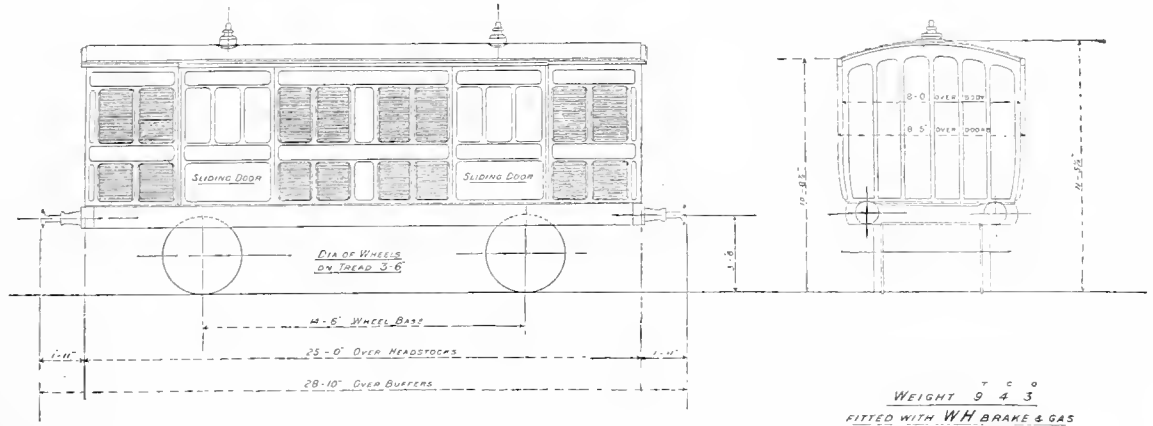
Fig. 6511. Composite First and Third-Class Carriage and Brake Van. North Eastern. Four-Wheel Bogies. 29 Seats.



Figs. 6512-6514. Bogie Brake Van. East Coast Joint Stock.



Figs. 6515-6517. Hounds' Van. North Eastern.



Figs. 6518-6519. Milk Van. North Eastern.

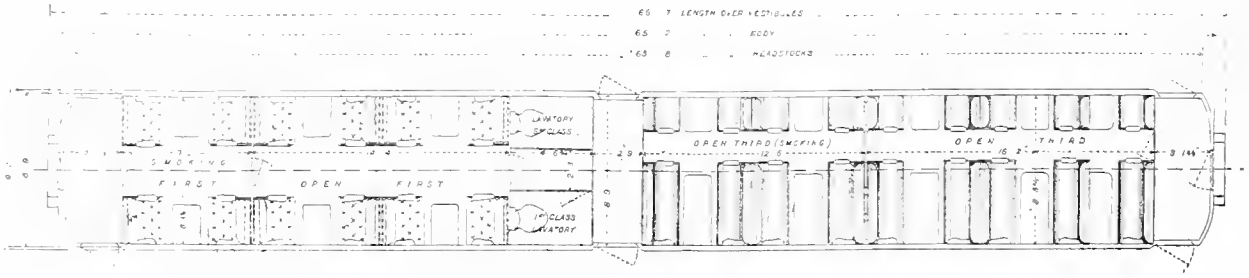
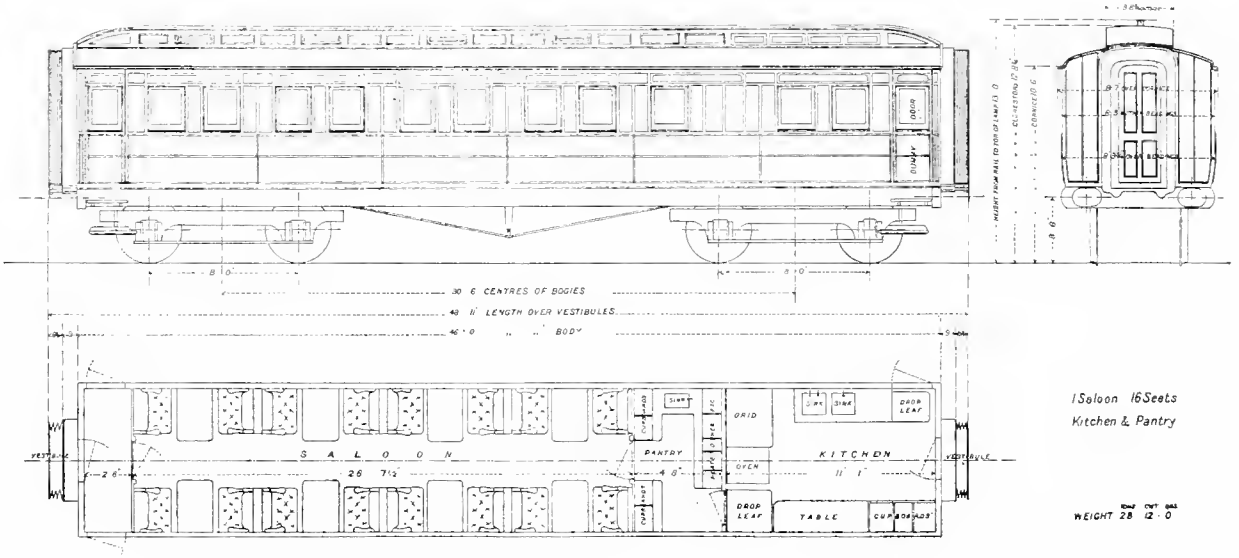
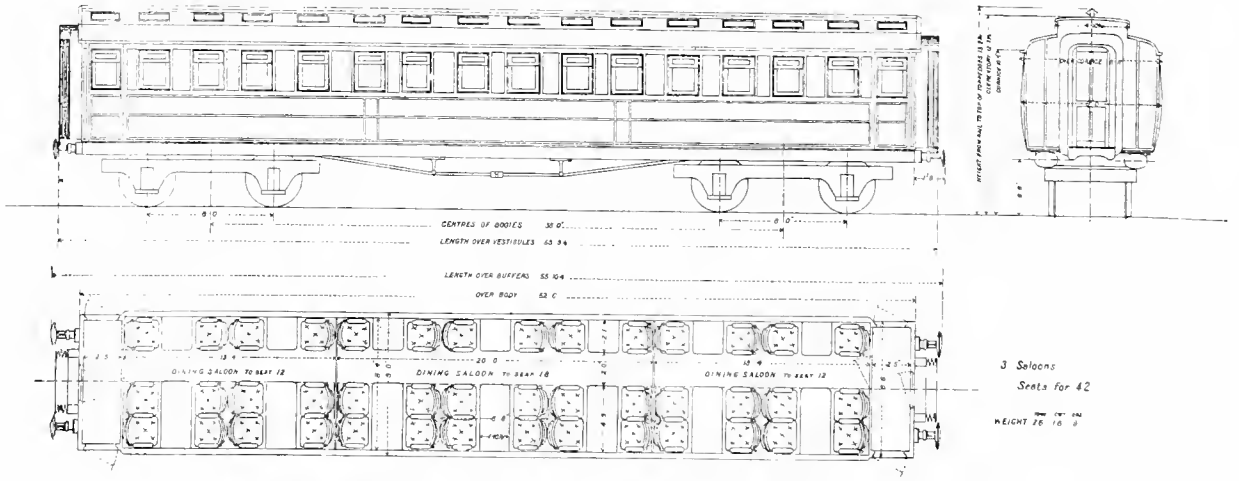


Fig. 6520. Open Composite First and Third-Class Carriage. E. C. J. S. Six-Wheel Bogies. 48 Seats.



Figs. 6521-6523. First-Class Dining Saloon and Kitchen. East Coast Joint Stock.



Figs. 6524-6526. Third-Class Dining Saloon. East Coast Joint Stock.

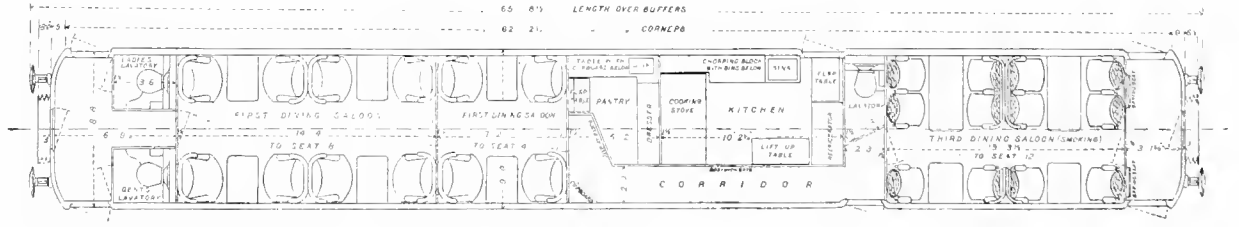
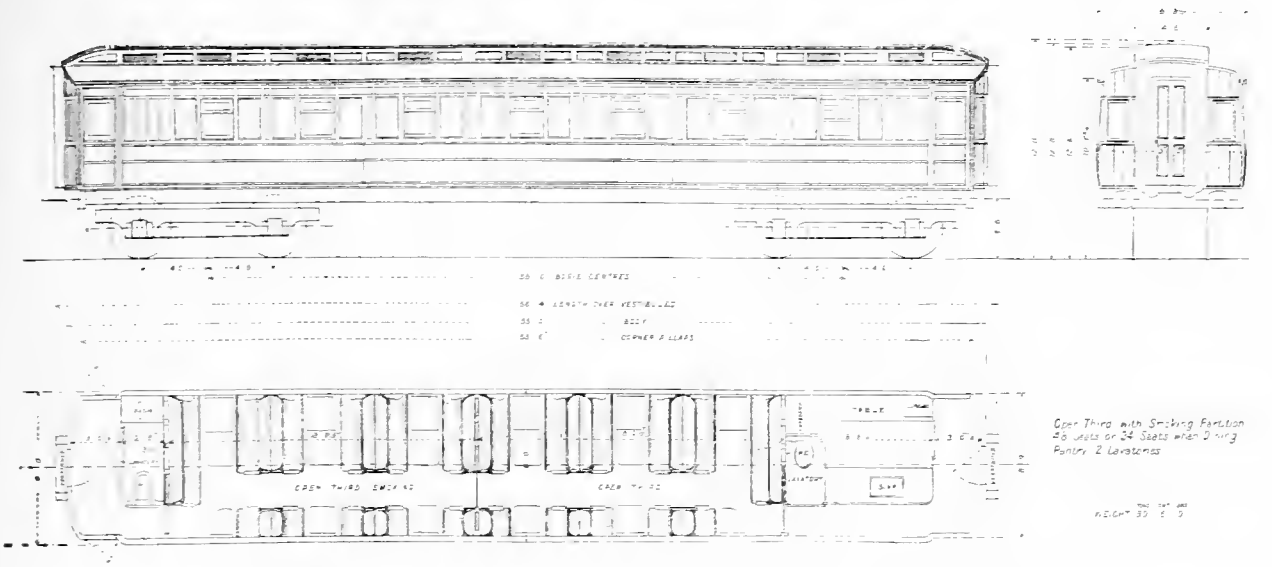
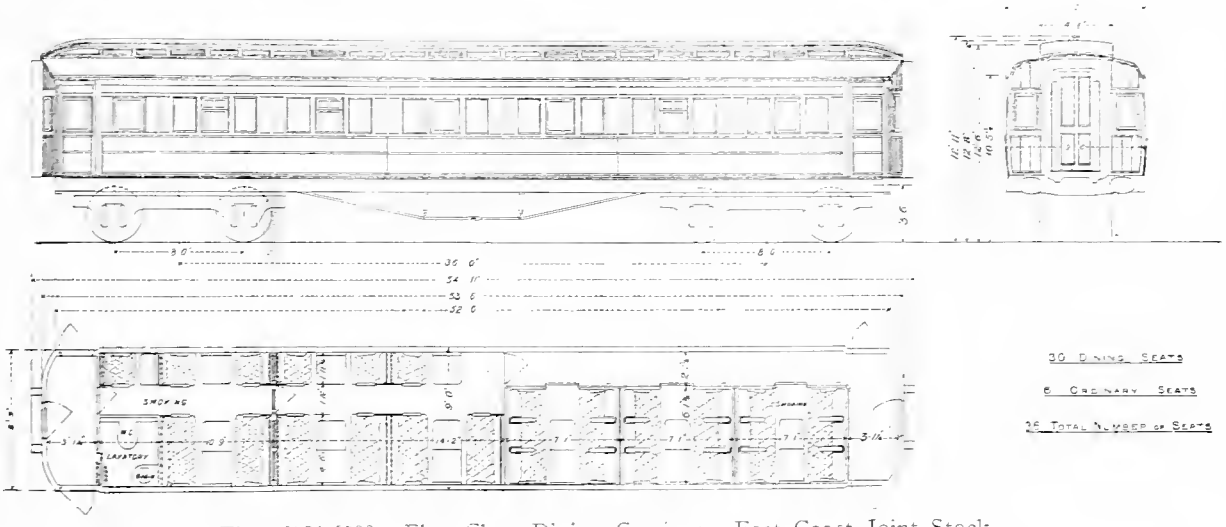


Fig. 6527. Composite First and Third-Class Dining Saloon and Kitchen. E. C. J. S. Six-Wheel Bogies. 24 Seats.



Figs. 6528-6530. Open Third-Class Carriage and Pantry. East Coast Joint Stock.



Figs. 6531-6533. First-Class Dining Carriage. East Coast Joint Stock.

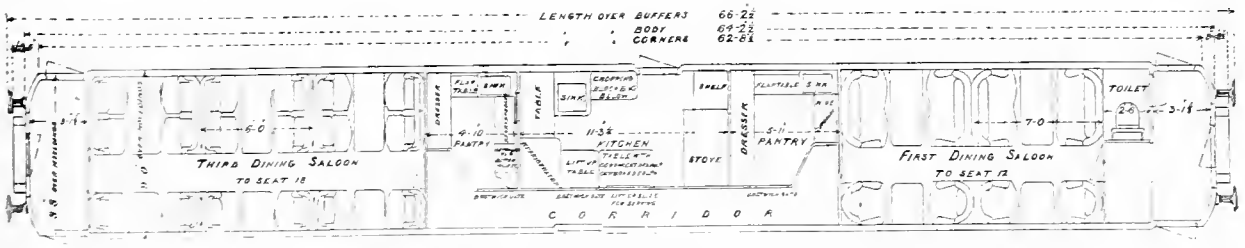


Fig. 6534. Composite First and Third-Class Dining Saloon with Kitchen. E. C. J. S. Six-Wheel Bogies. 36 Seats.

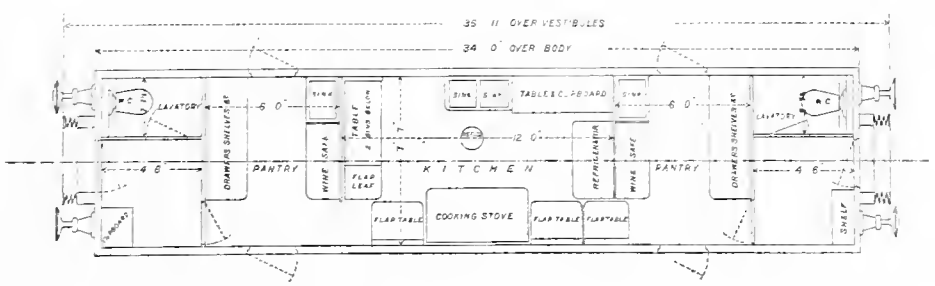


Fig. 6535. Six-Wheel Kitchen Car for Through Trains. E. C. J. S.

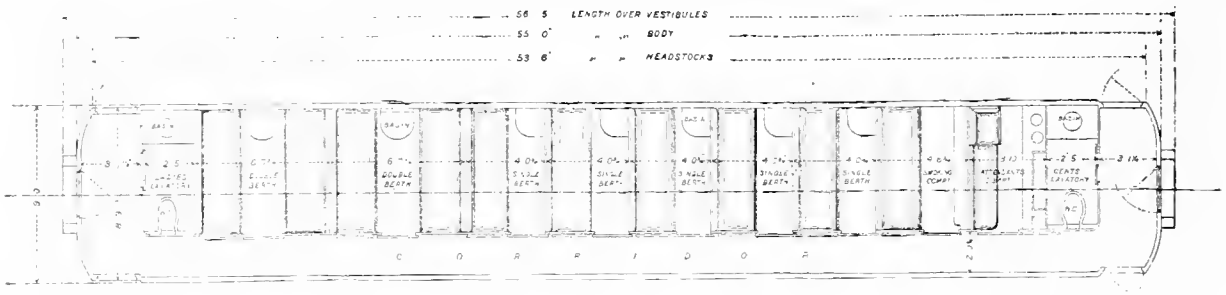


Fig. 6536. First-Class Sleeping Carriage. Six-Wheel Bogies. 9 Berths, 3 Seats. East Coast Joint Stock.

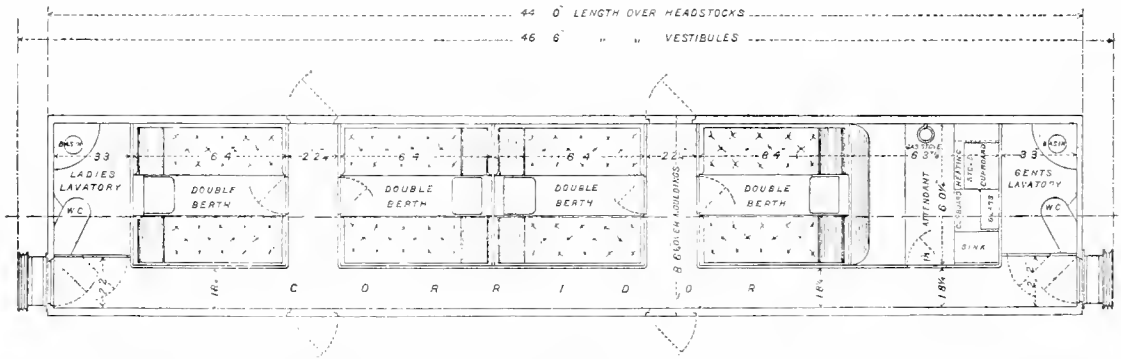


Fig. 6537. First-Class Sleeping Car. Four-Wheel Bogies. 8 Berths. East Coast Joint Stock.

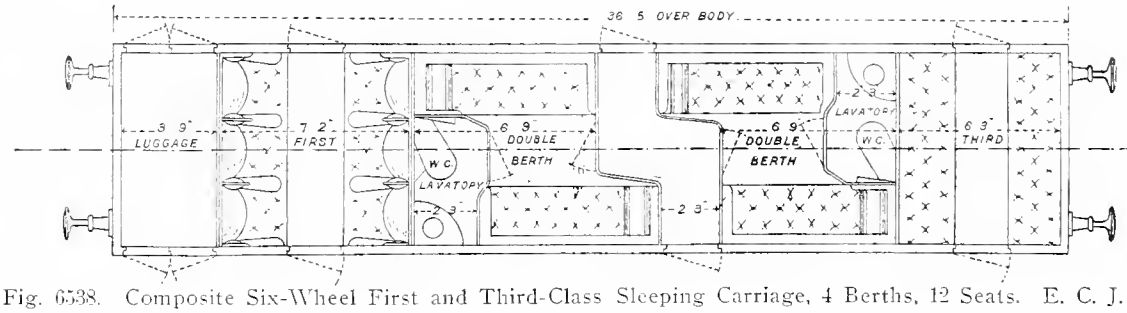


Fig. 6538. Composite Six-Wheel First and Third-Class Sleeping Carriage, 4 Berths, 12 Seats. E. C. J. S.

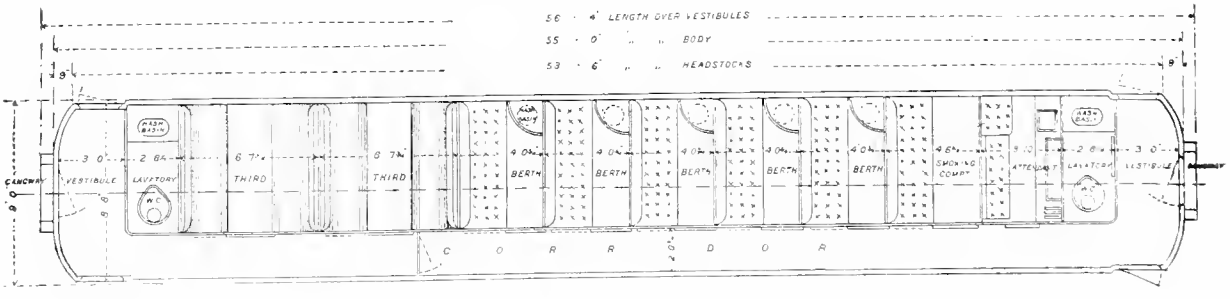


Fig. 6539. Composite Sleeping Carriage. Six-Wheel Bogies. 5 Berths, 15 Seats. East Coast Joint Stock.

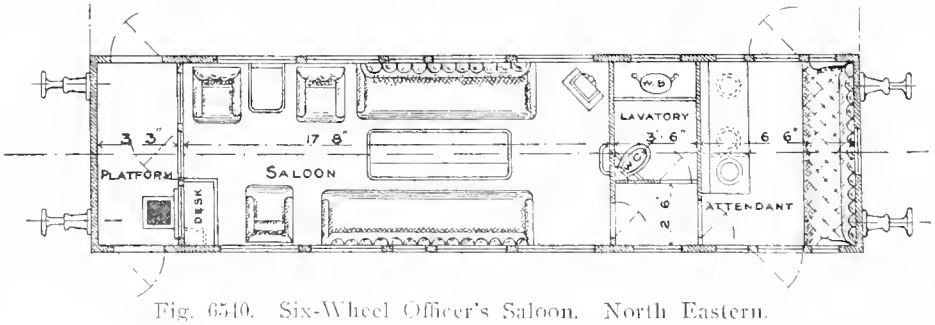


Fig. 6540. Six-Wheel Officer's Saloon. North Eastern.

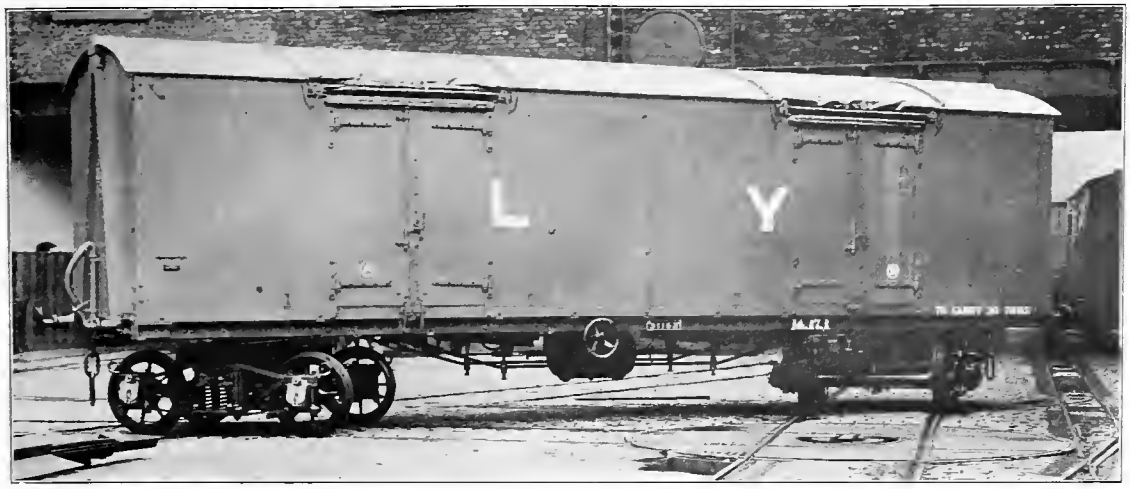


Fig. 6541. 30-Ton Bogie Covered Goods Wagon. Lancashire & Yorkshire.

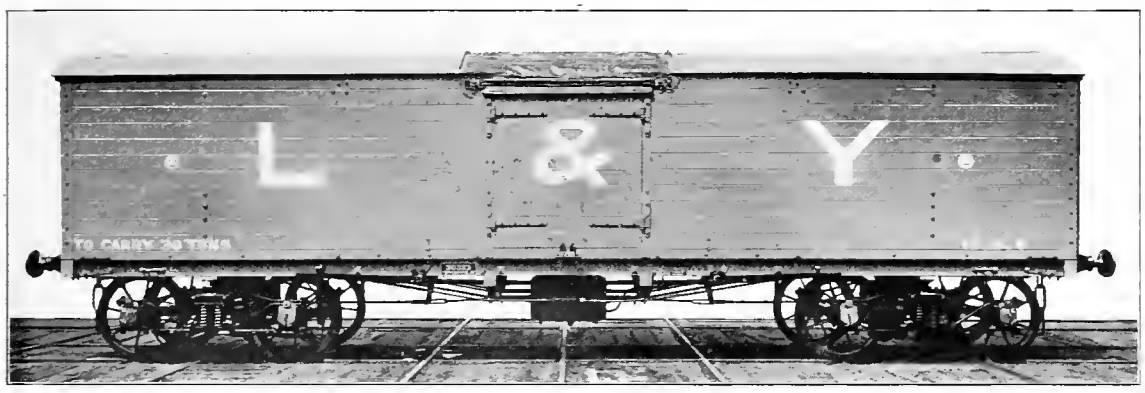


Fig. 6542. 30-Ton Bogie Covered Goods Wagon. Lancashire & Yorkshire.

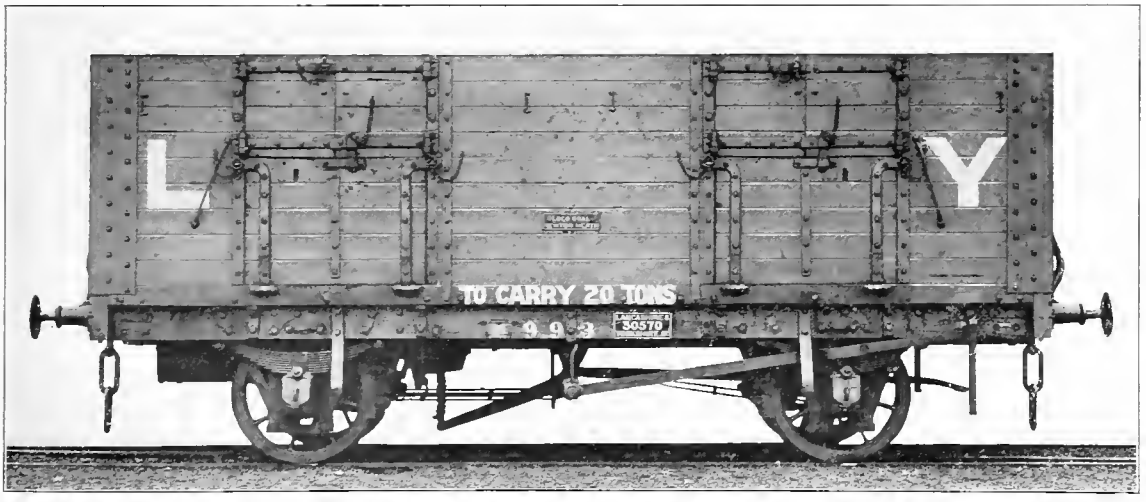


Fig. 6543. 20-Ton Locomotive Coal Wagon. Lancashire & Yorkshire.

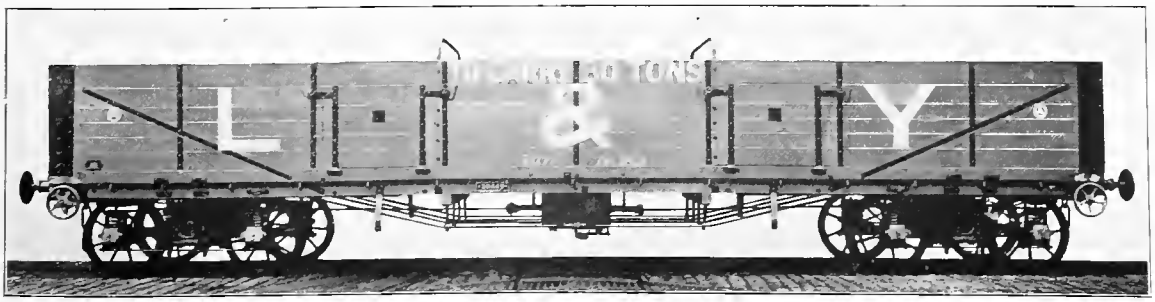


Fig. 6544. 30-Ton Bogie Open Goods Wagon. Lancashire & Yorkshire.

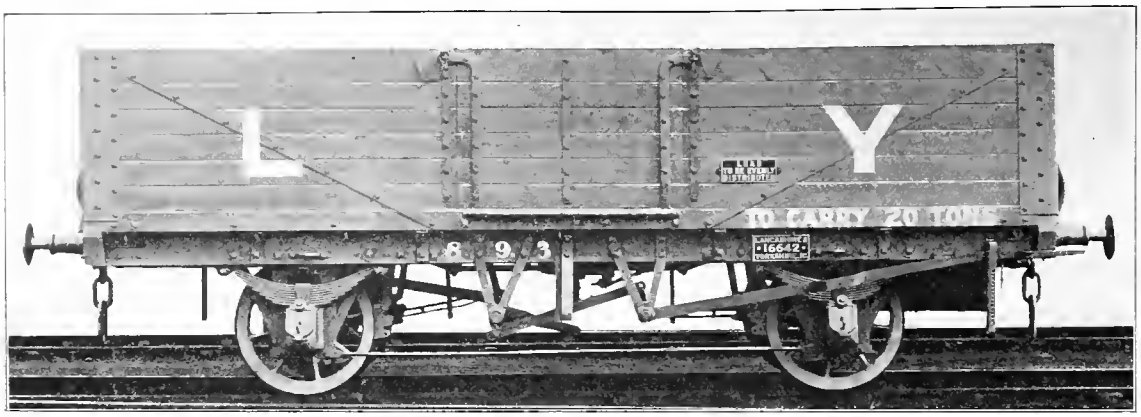


Fig. 6545. 20-Ton Open Fruit Wagon. Lancashire & Yorkshire.

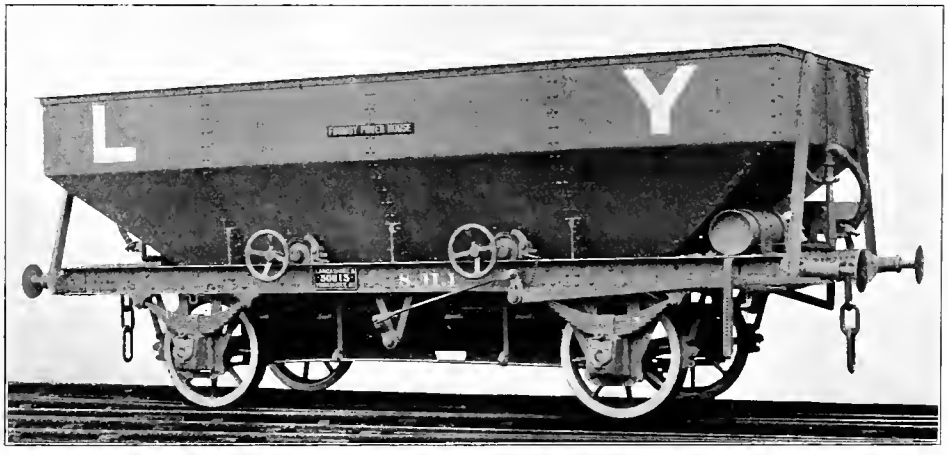


Fig. 6546. 20-Ton Steel Hopper Mineral Wagon. Lancashire & Yorkshire.

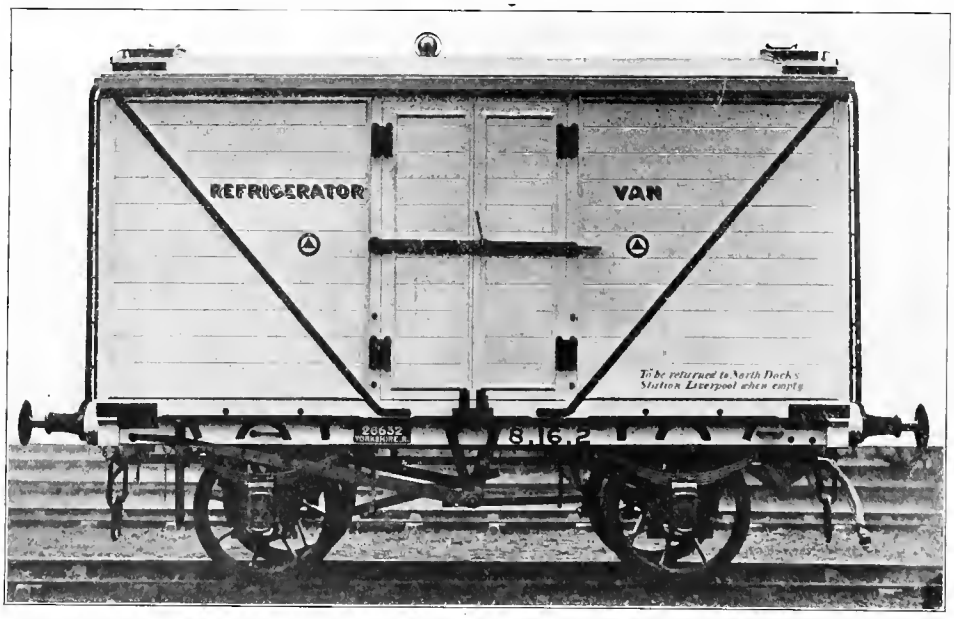
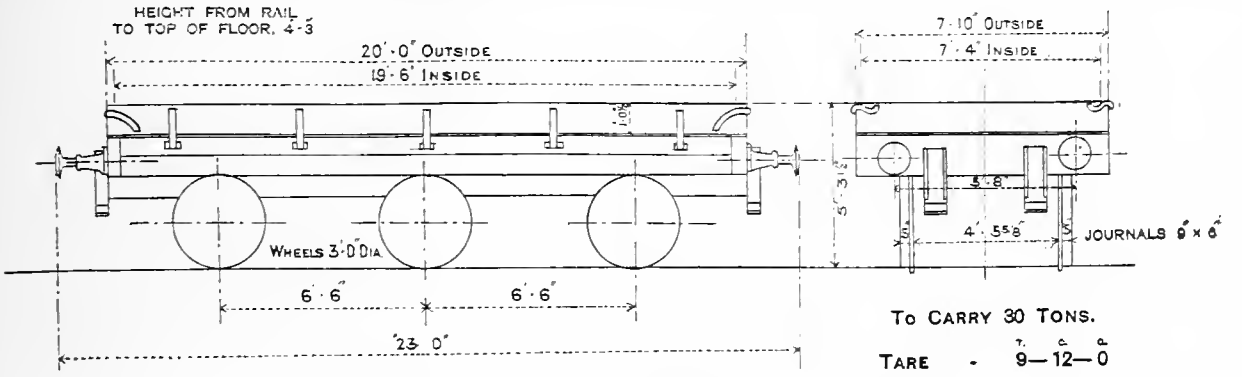
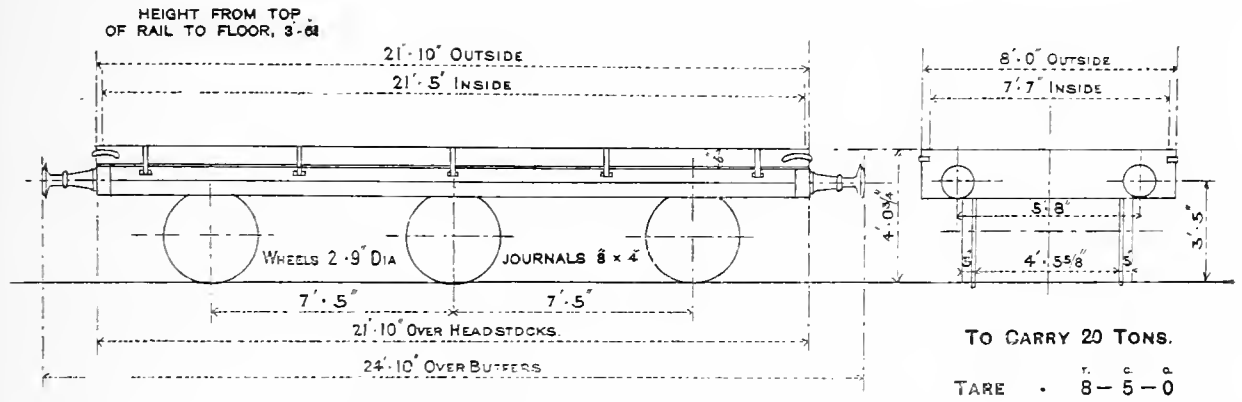


Fig. 6547. 7-Ton Refrigerator Van. Lancashire & Yorkshire.

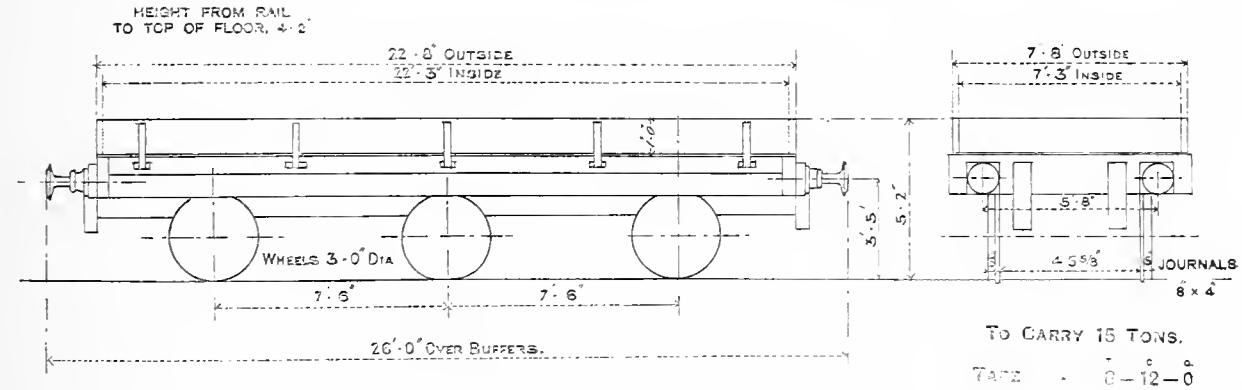
Fig. 6548. 52-Ton Well Wagon. Lancashire & Yorkshire.



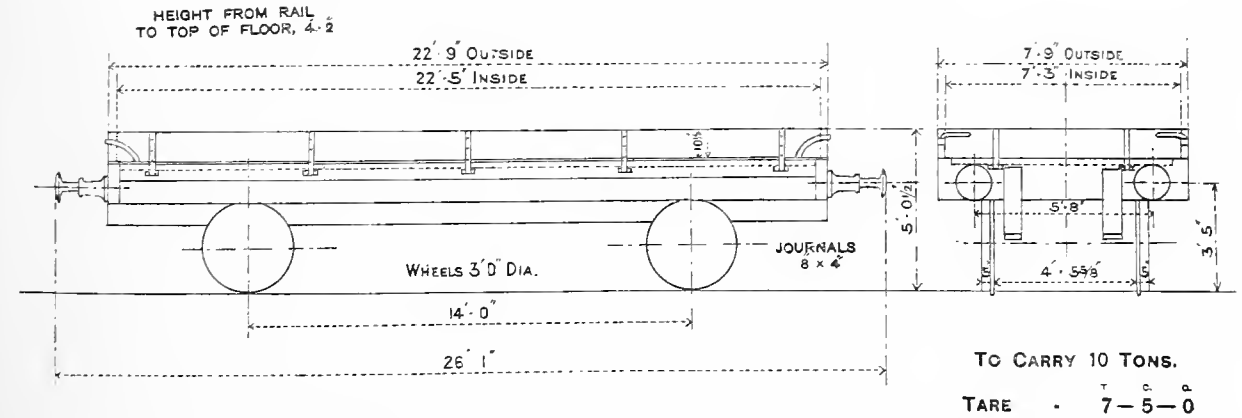
Figs. 6549-6550. 30-Ton Goods Wagon. North Eastern.



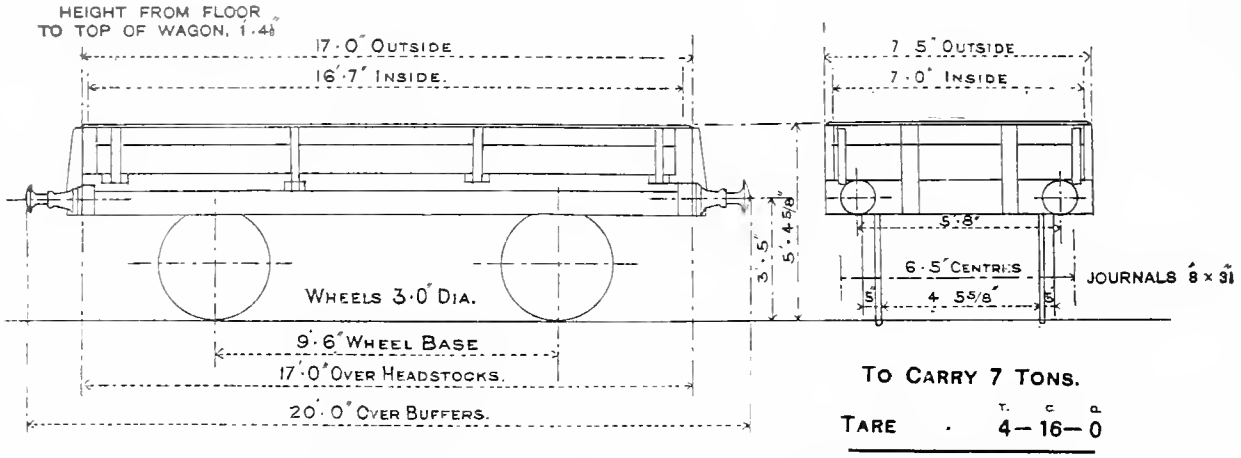
Figs. 6551-6552. 20-Ton Goods Wagon. North Eastern.



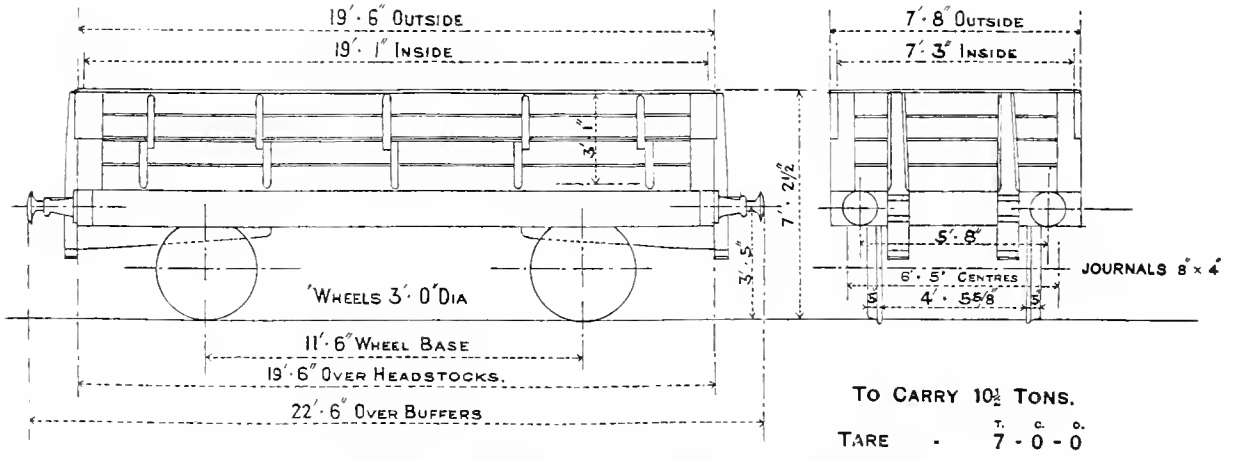
Figs. 6553-6554. 15-Ton Goods Wagon. North Eastern.



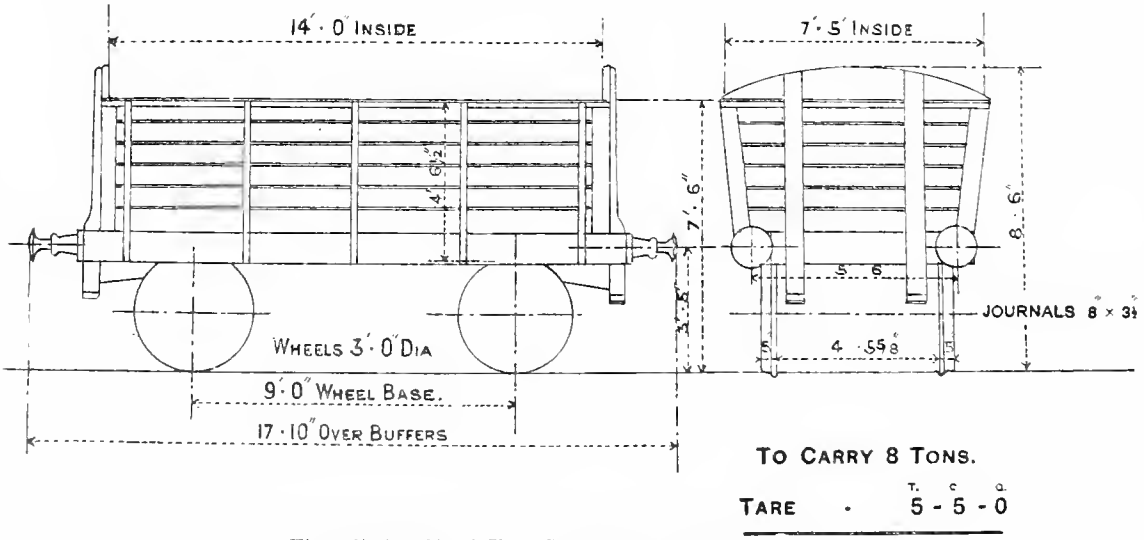
Figs. 6555-6556. 10-Ton Low Sided Goods Wagon. North Eastern.



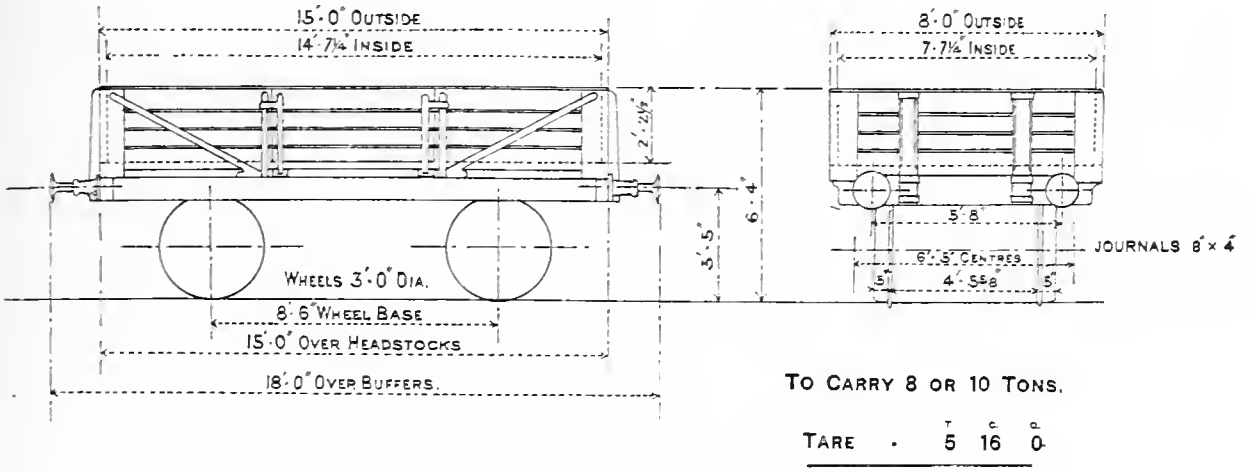
Figs. 6557-6558. 7-Ton Low Sided Goods Wagon. North Eastern.



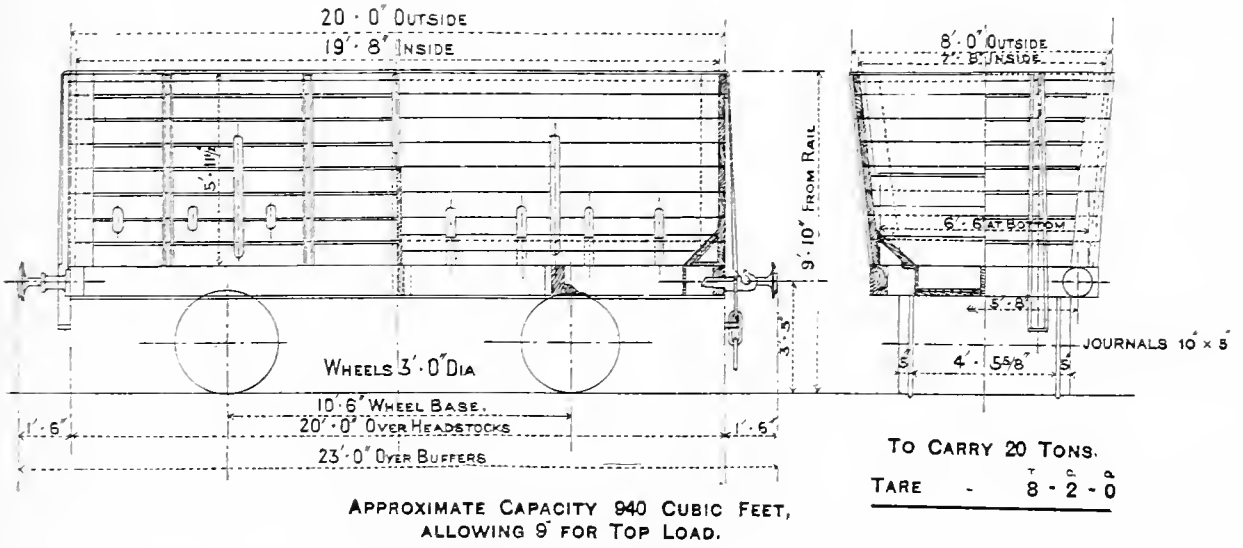
Figs. 6559-6560. 10½-Ton Ballast Wagon. North Eastern.



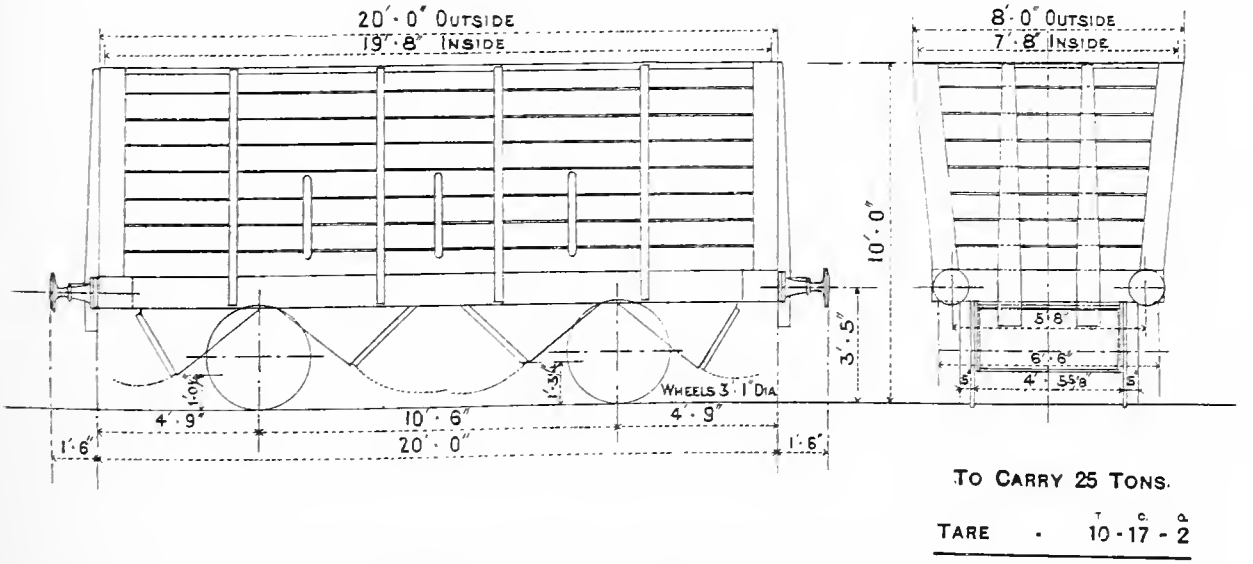
Figs. 6561-6562. 8-Ton Coal Wagon. North Eastern.



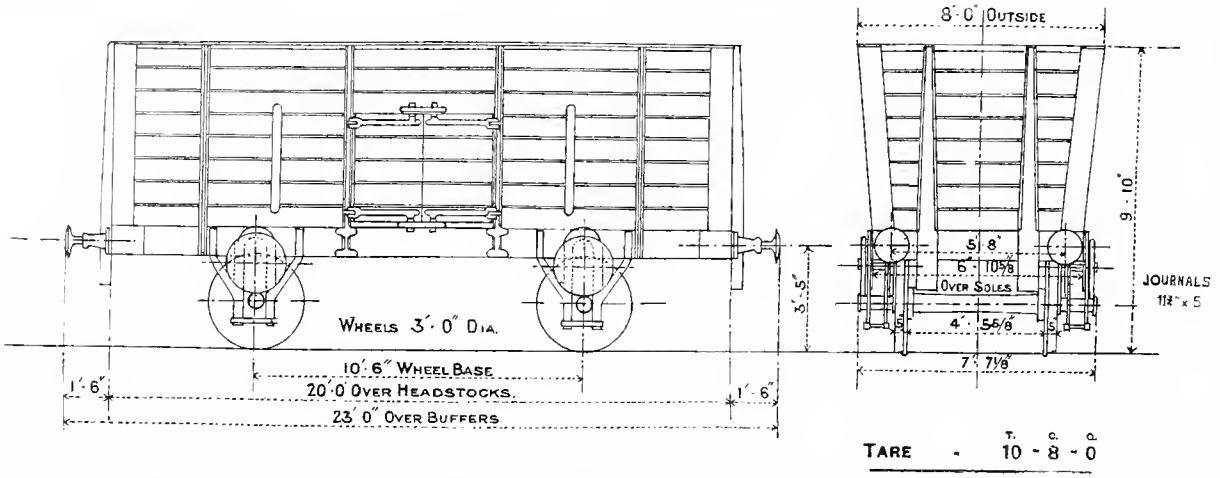
Figs. 6563-6564. 8-Ton Open Goods Wagon. North Eastern.



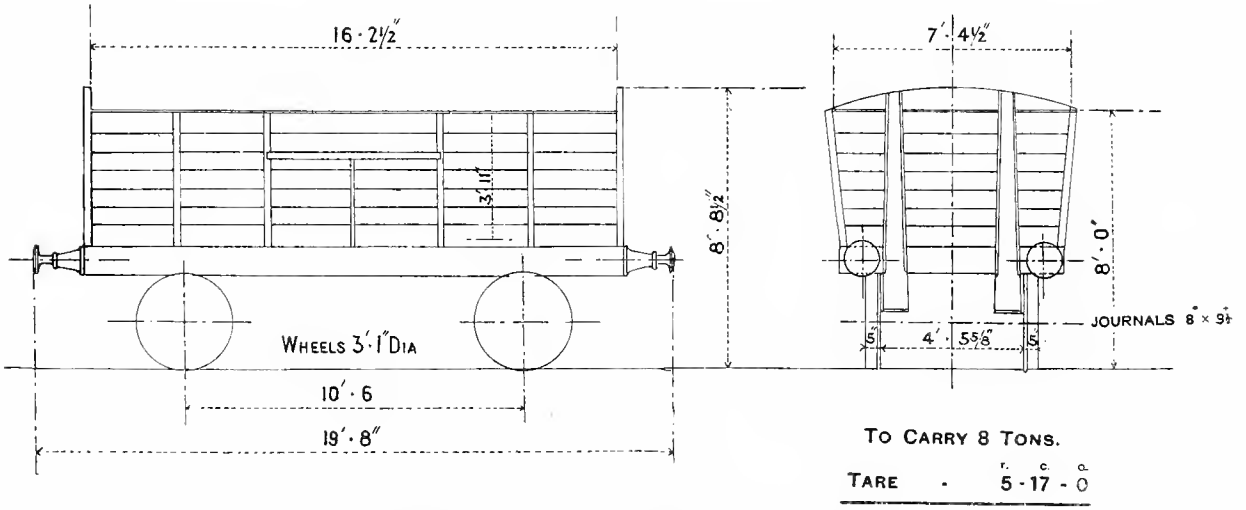
Figs. 6566-6567. 20-Ton Coal Wagon. North Eastern.



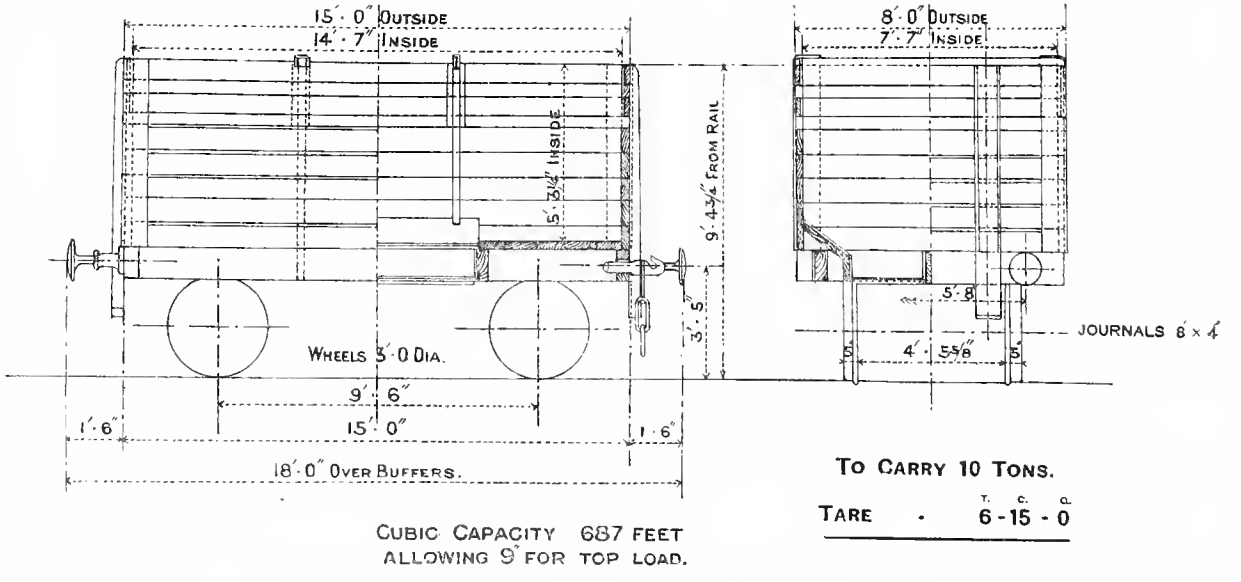
Figs. 6568-6569. 25-Ton Coal Wagon. North Eastern.



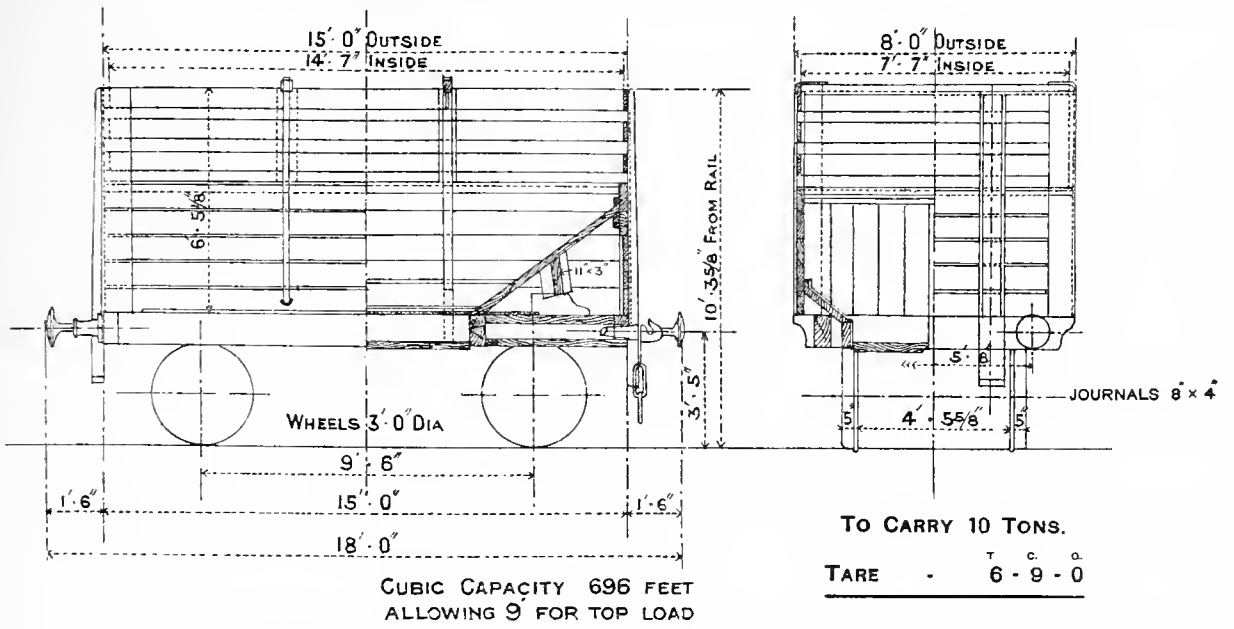
Figs. 6570-6571. 23-Ton Locomotive Coal Wagon with Anti-Friction Gear. North Eastern.



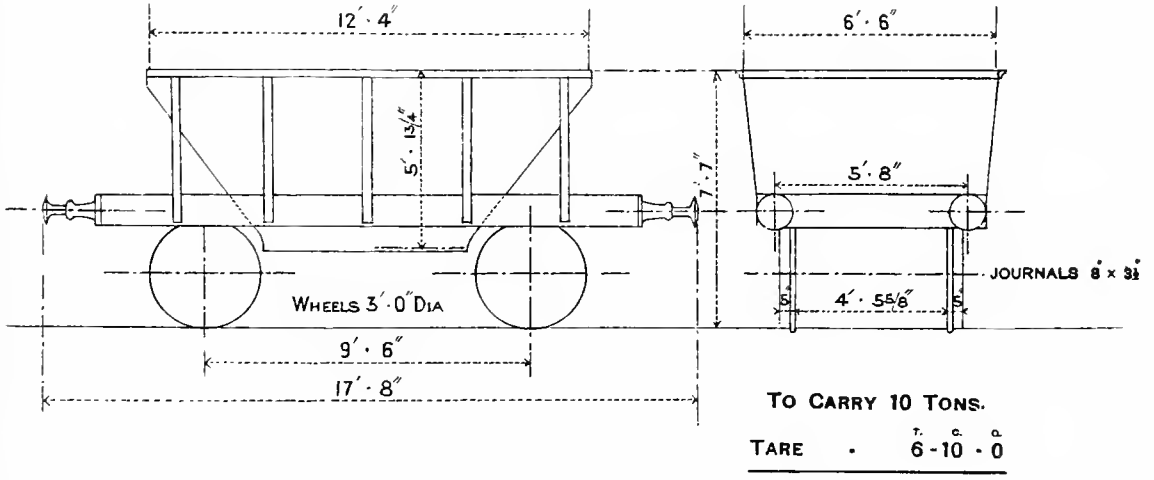
Figs. 6572-6573. 8-Ton Coke Wagon. North Eastern.



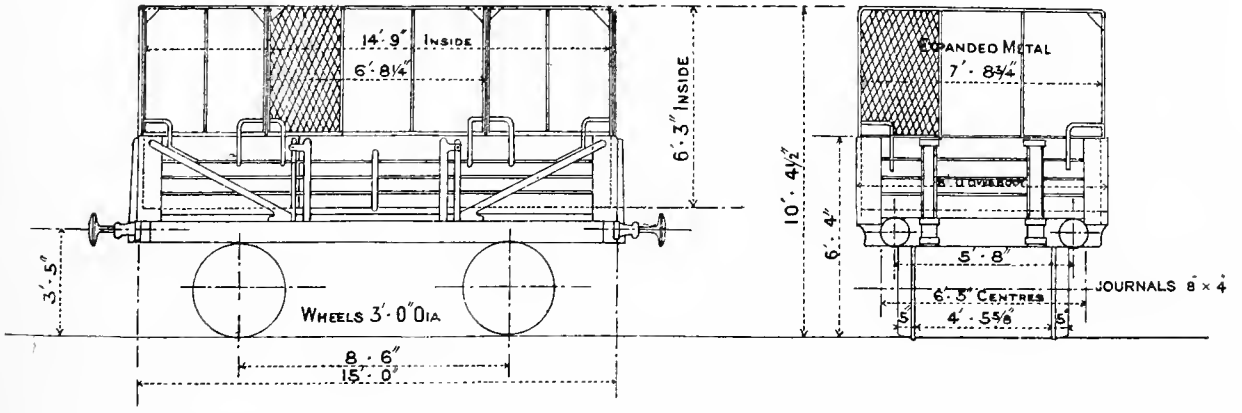
Figs. 6574-6575. 10-Ton Railed Coke Wagon. North Eastern.



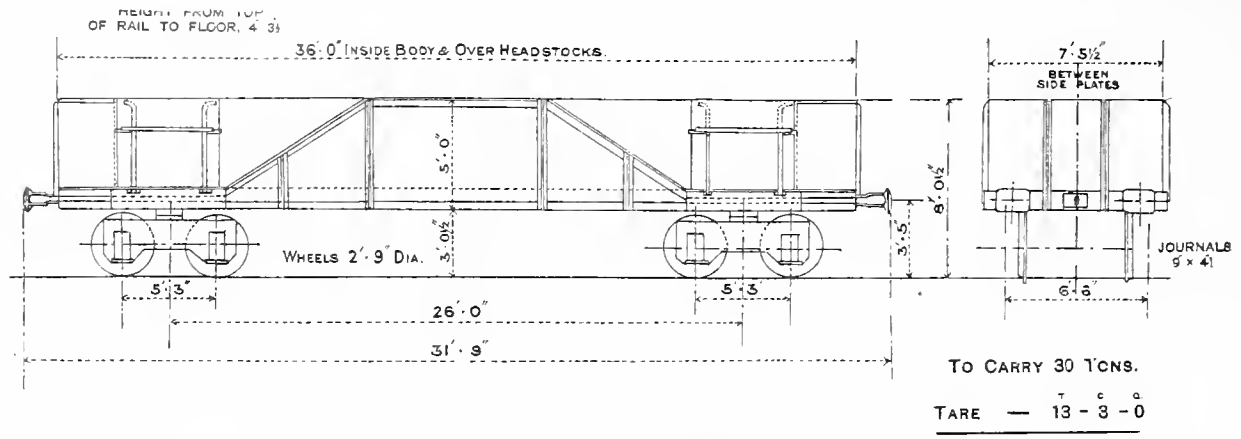
Figs. 6576-6577. 10-Ton Coke Wagon with Extra Top Rail. North Eastern.



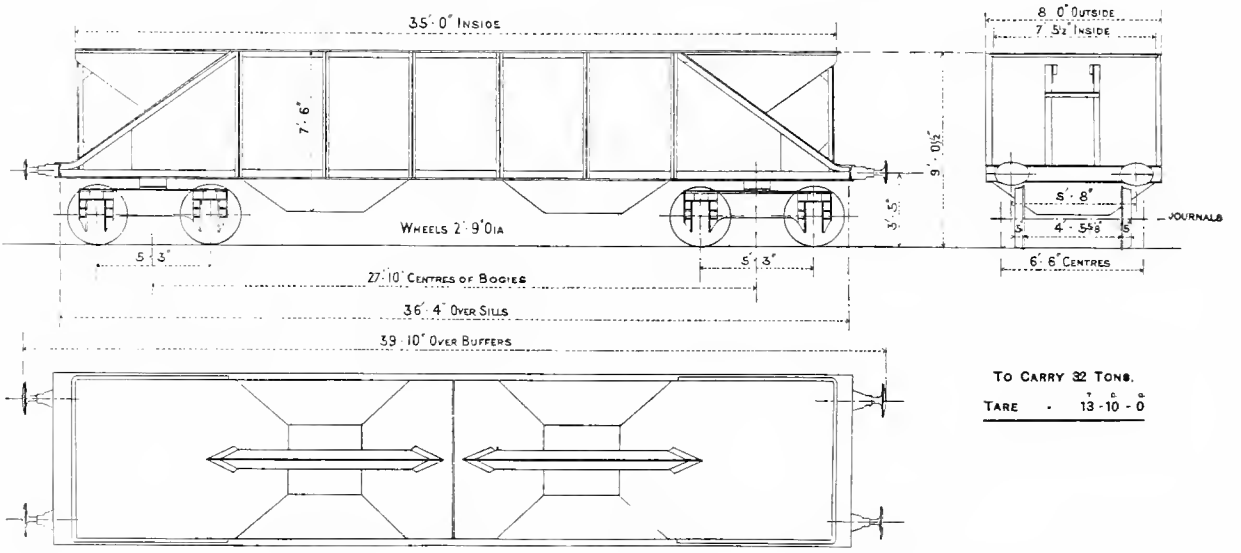
Figs. 6578-6579. 10-Ton Iron Ore Wagon. North Eastern.



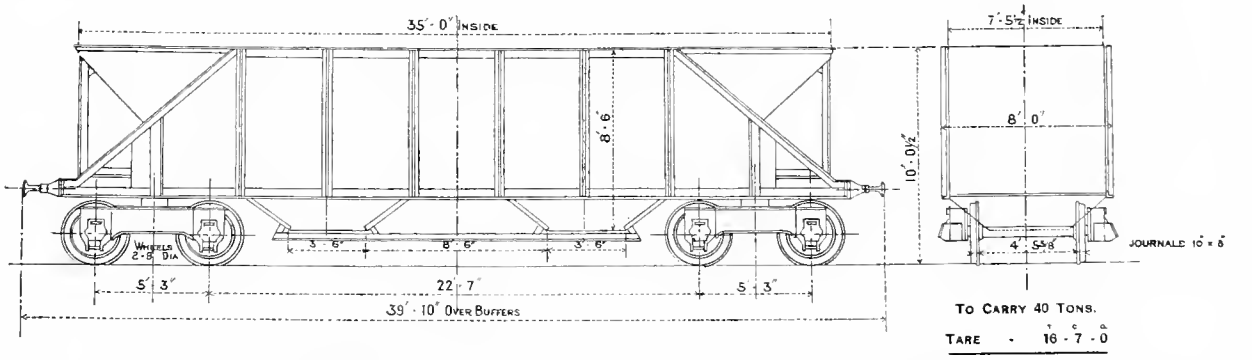
Figs. 6580-6581. 10-Ton Open Goods Wagon with Expanded Metal Frames. North Eastern.



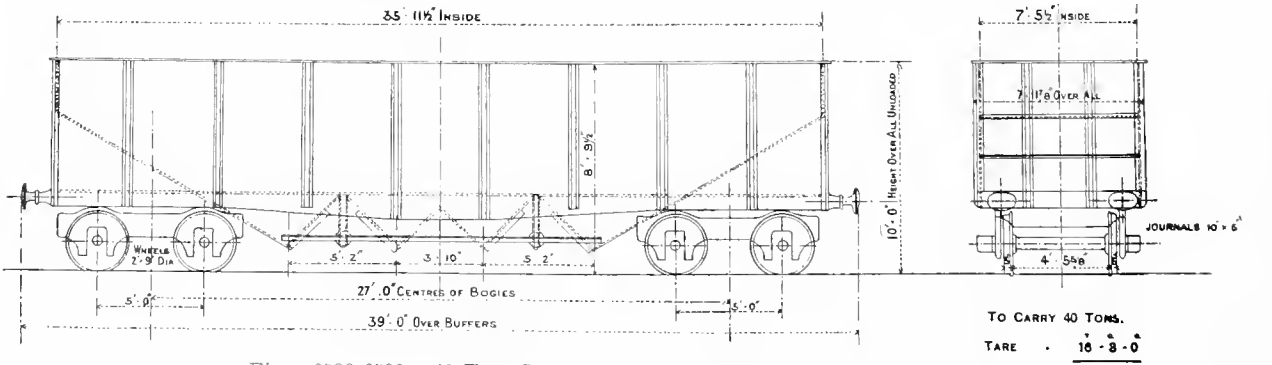
Figs. 6582-6583. 30-Ton Steel Goods Wagon. North Eastern.



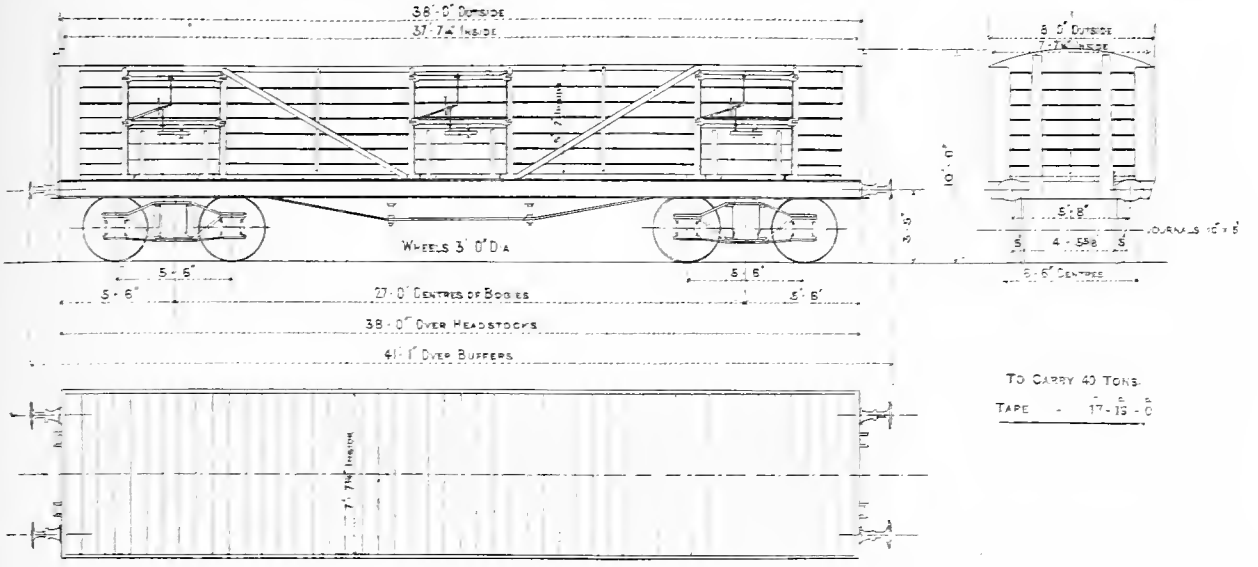
Figs. 6584-6586. 32-Ton Steel Hopper Coal Wagon. North Eastern.



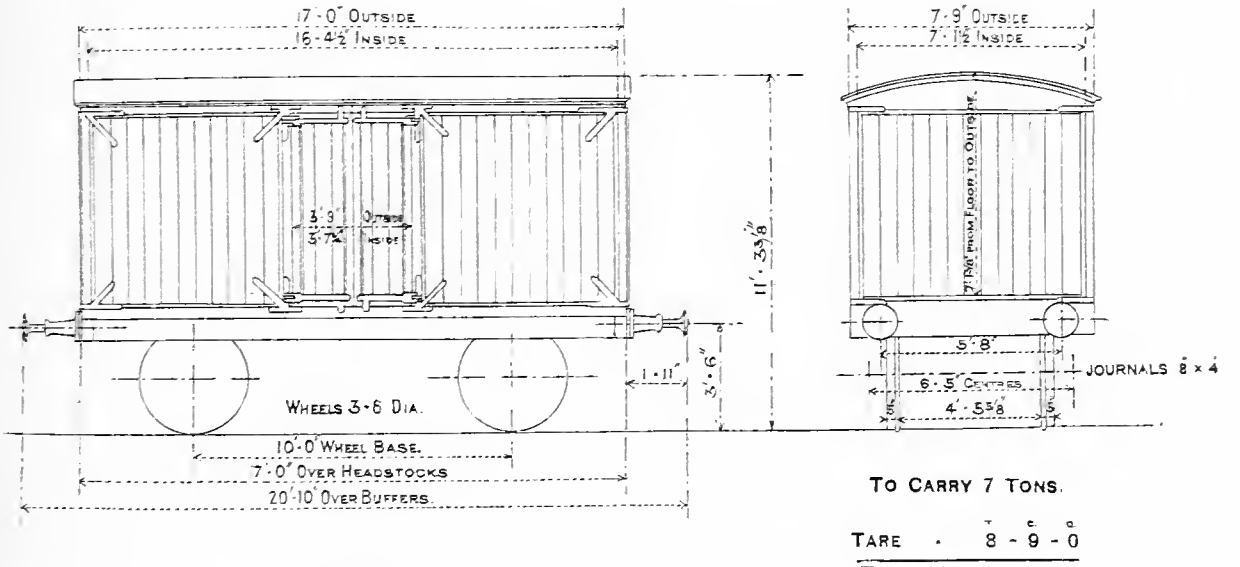
Figs. 6587-6588. 40-Ton Steel Hopper Coal Wagon. North Eastern.



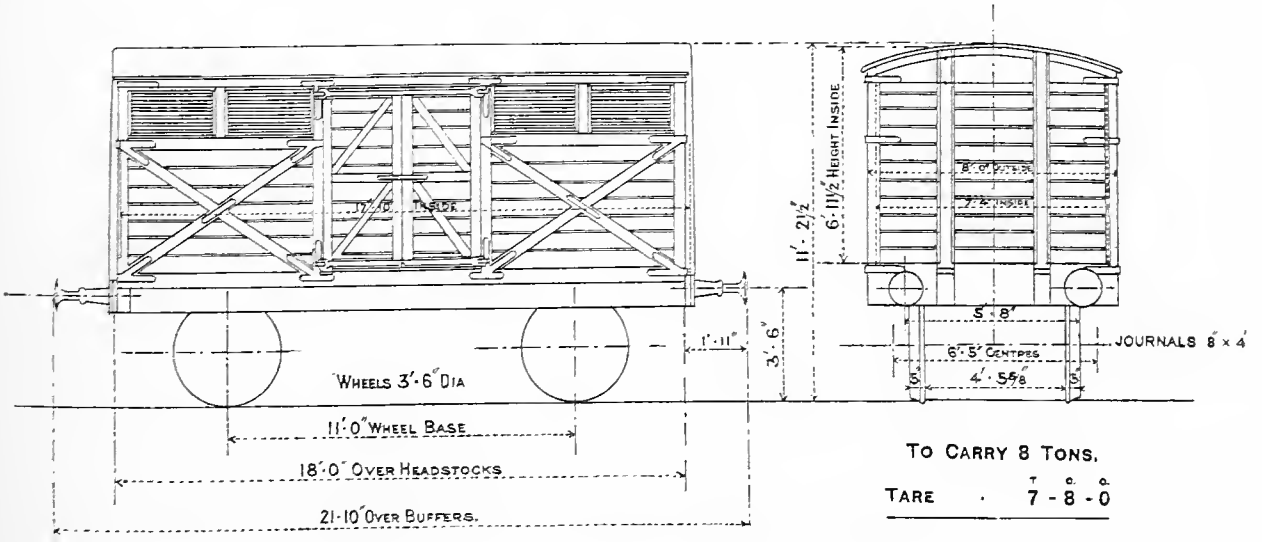
Figs. 6589-6590. 40-Ton Steel Hopper Coal Wagon. North Eastern.



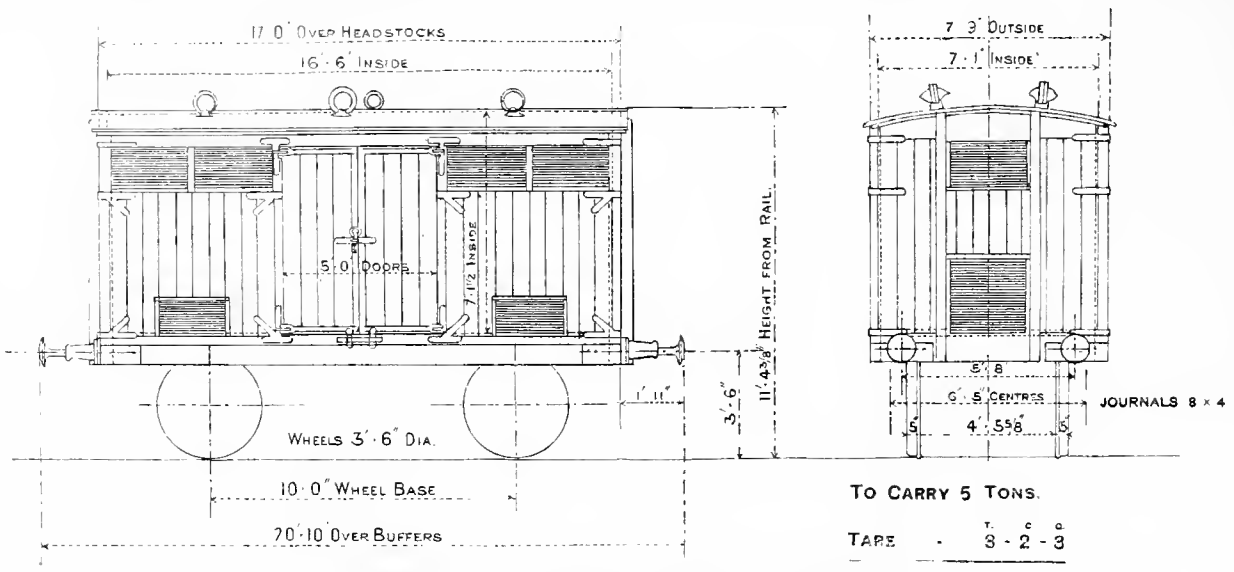
Figs. 6591-6593. 40-Ton Steel Underframe Locomotive Coal and Sleeper Wagon. North Eastern.



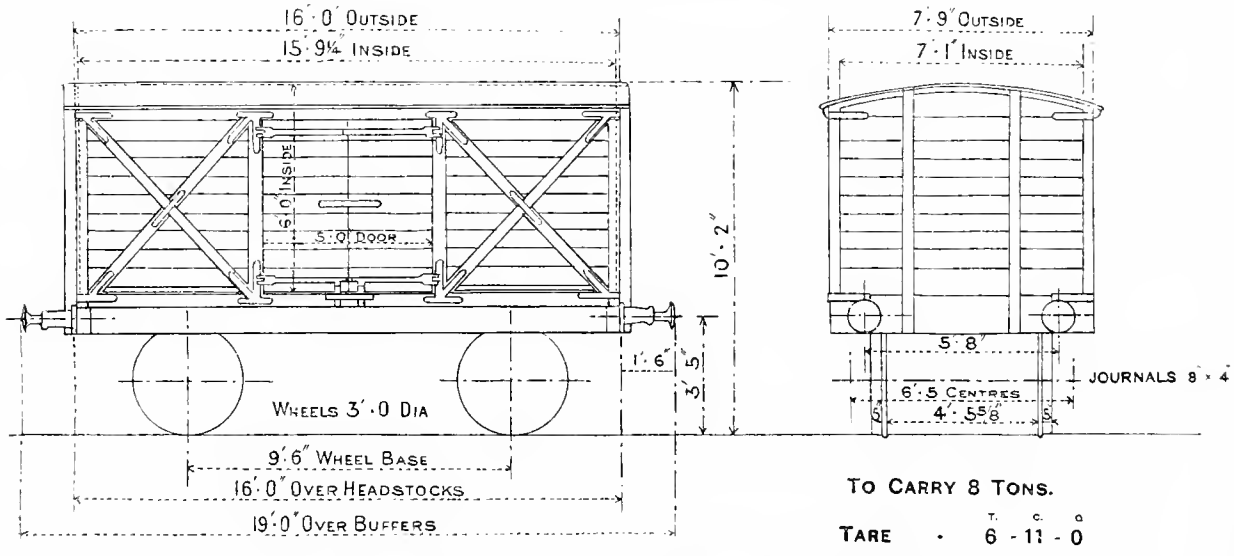
Figs. 6594-6595. 7-Ton Insulated Meat Van. North Eastern.



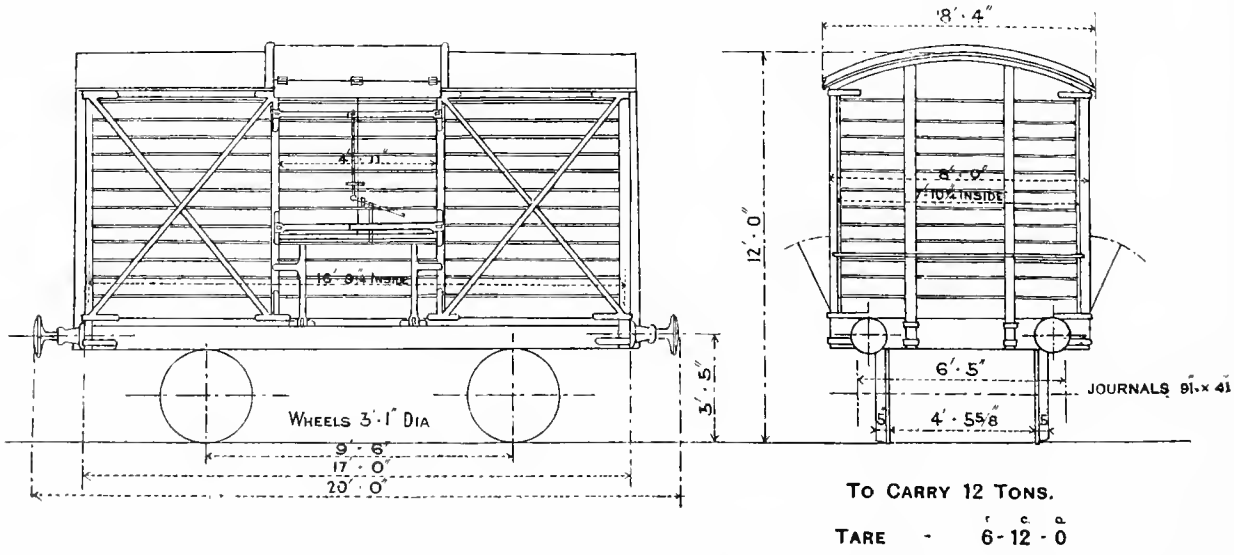
Figs. 6596-6597. 8-Ton Covered Fruit and Fish Wagon. North Eastern.



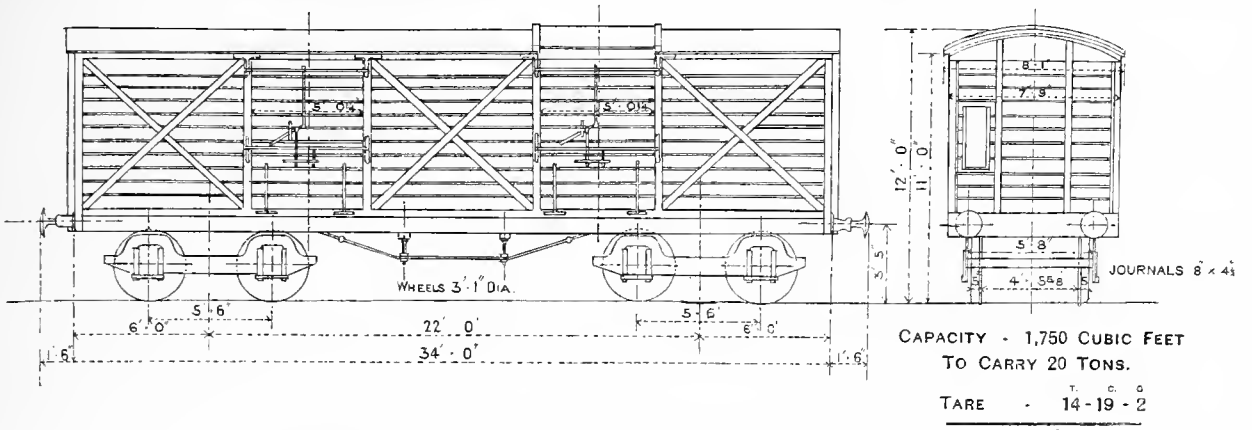
Figs. 6598-6599. 5-Ton Perishable Goods Van. North Eastern.



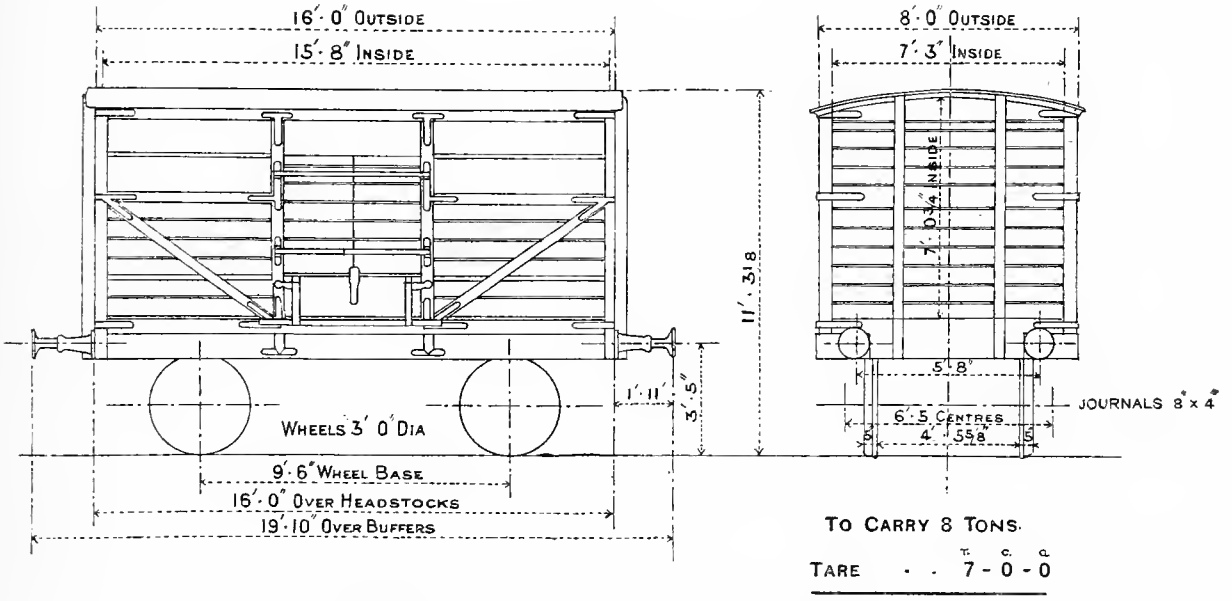
Figs. 6600-6601. 8-Ton Covered Goods Wagon. North Eastern.



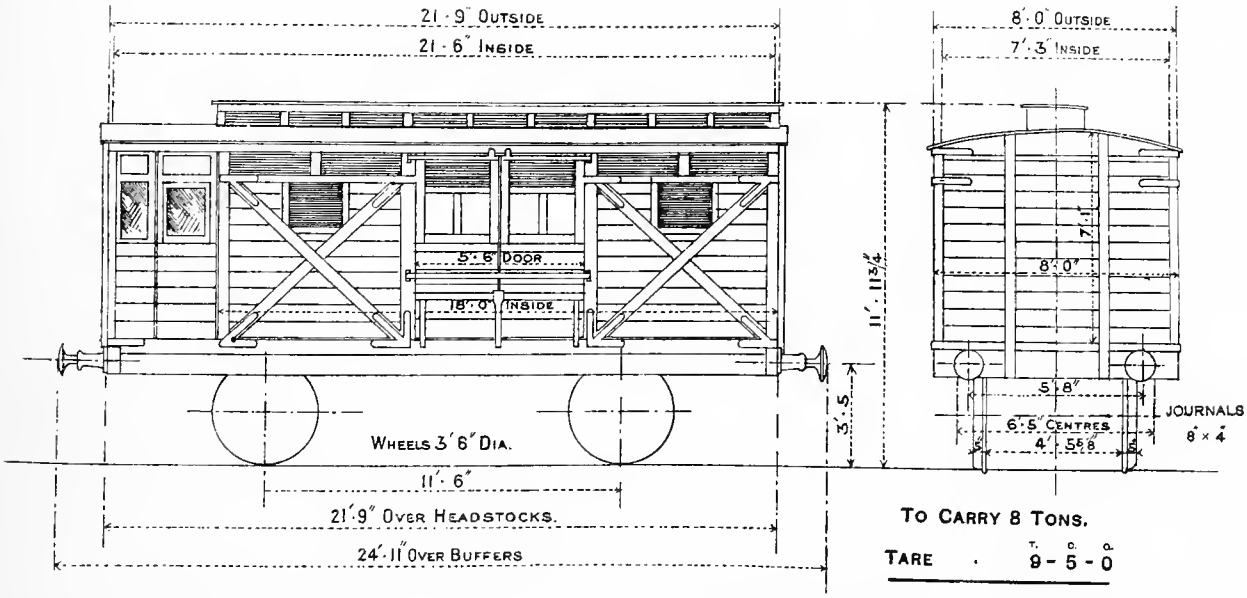
Figs. 6602-6603. 12-Ton Covered Goods Wagon. North Eastern.



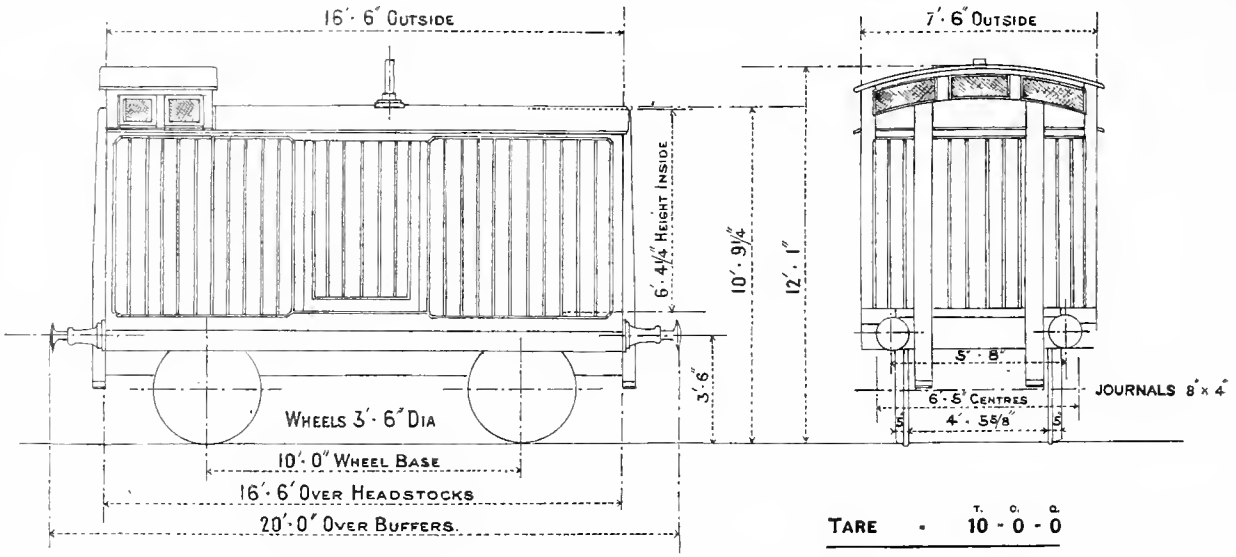
Figs. 6604-6605. 20-Ton Covered Goods Wagon. North Eastern.



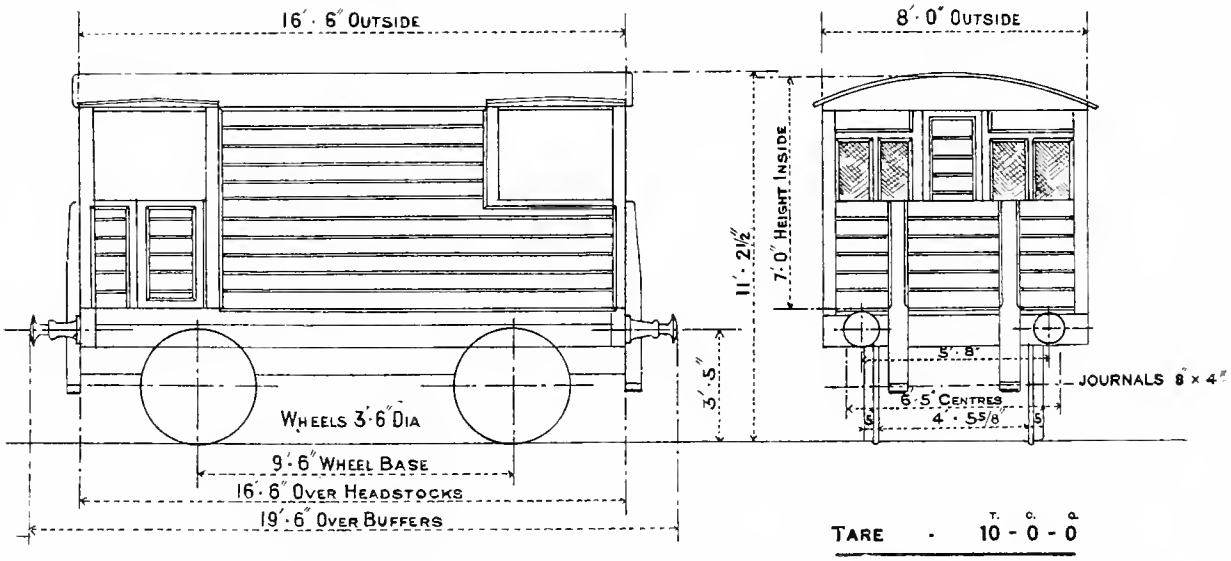
Figs. 6606-6607. 8-Ton Cattle Wagon. North Eastern.



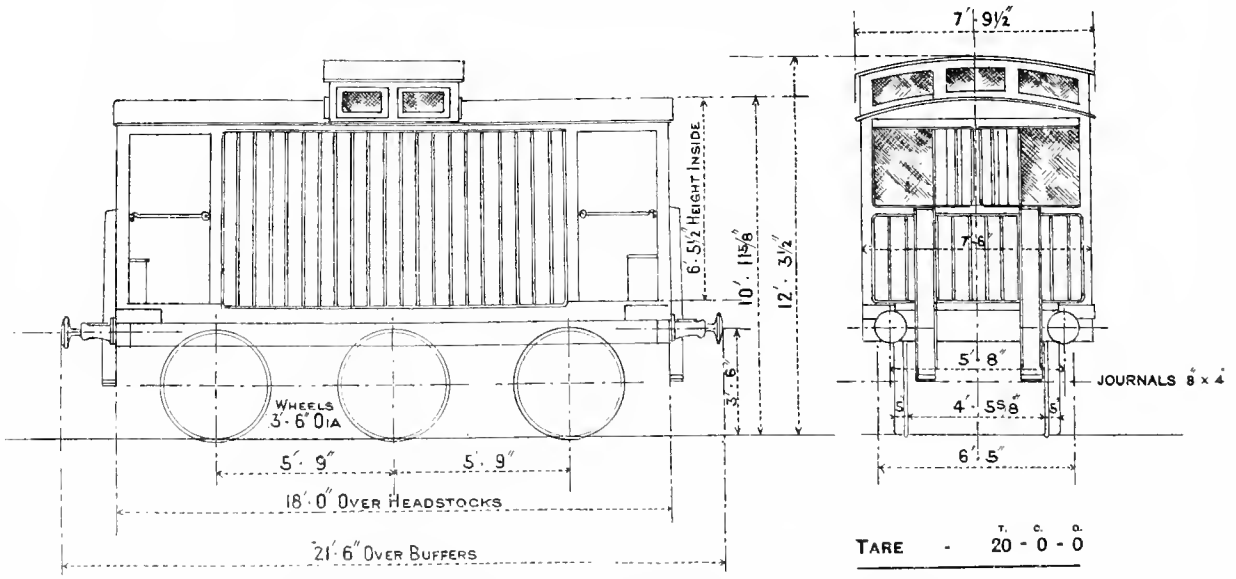
Figs. 6608-6609. 8-Ton Special Cattle Wagon with Attendant's Compartment. North Eastern.



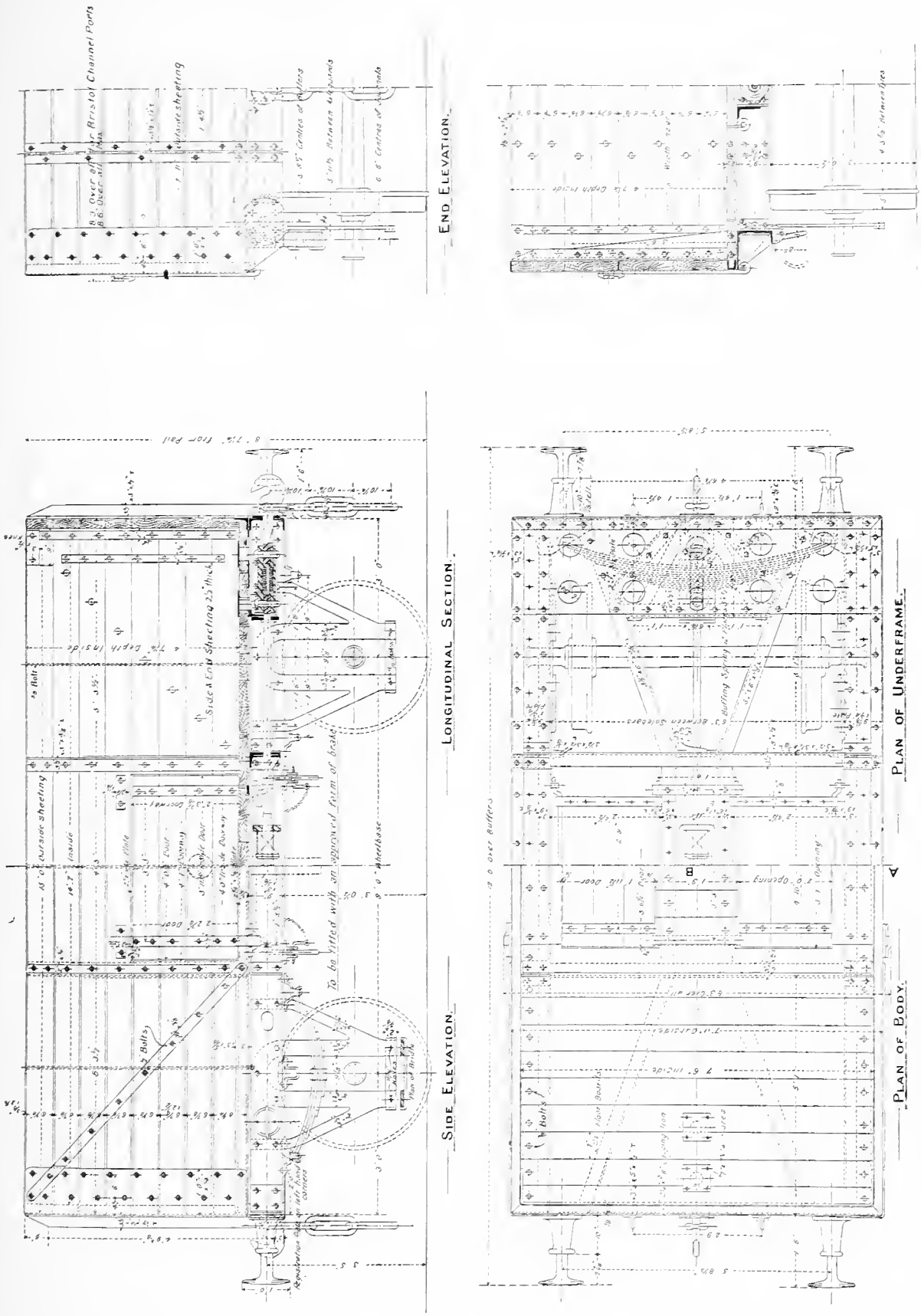
Figs. 6610-6611. 10-Ton Goods Brake Van. North Eastern.



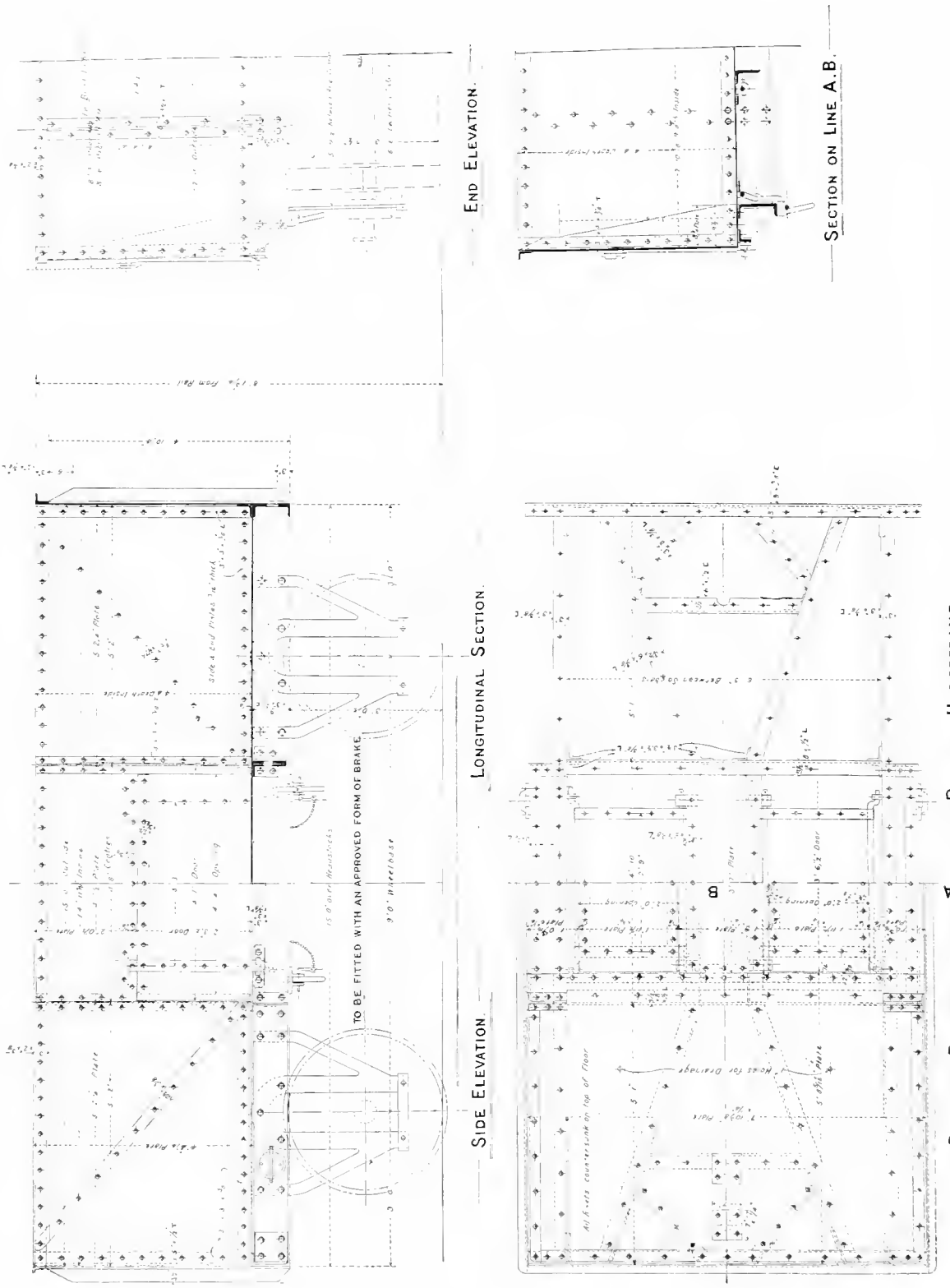
Figs. 6612-6613. 10-Ton Mineral Brake Van. North Eastern.



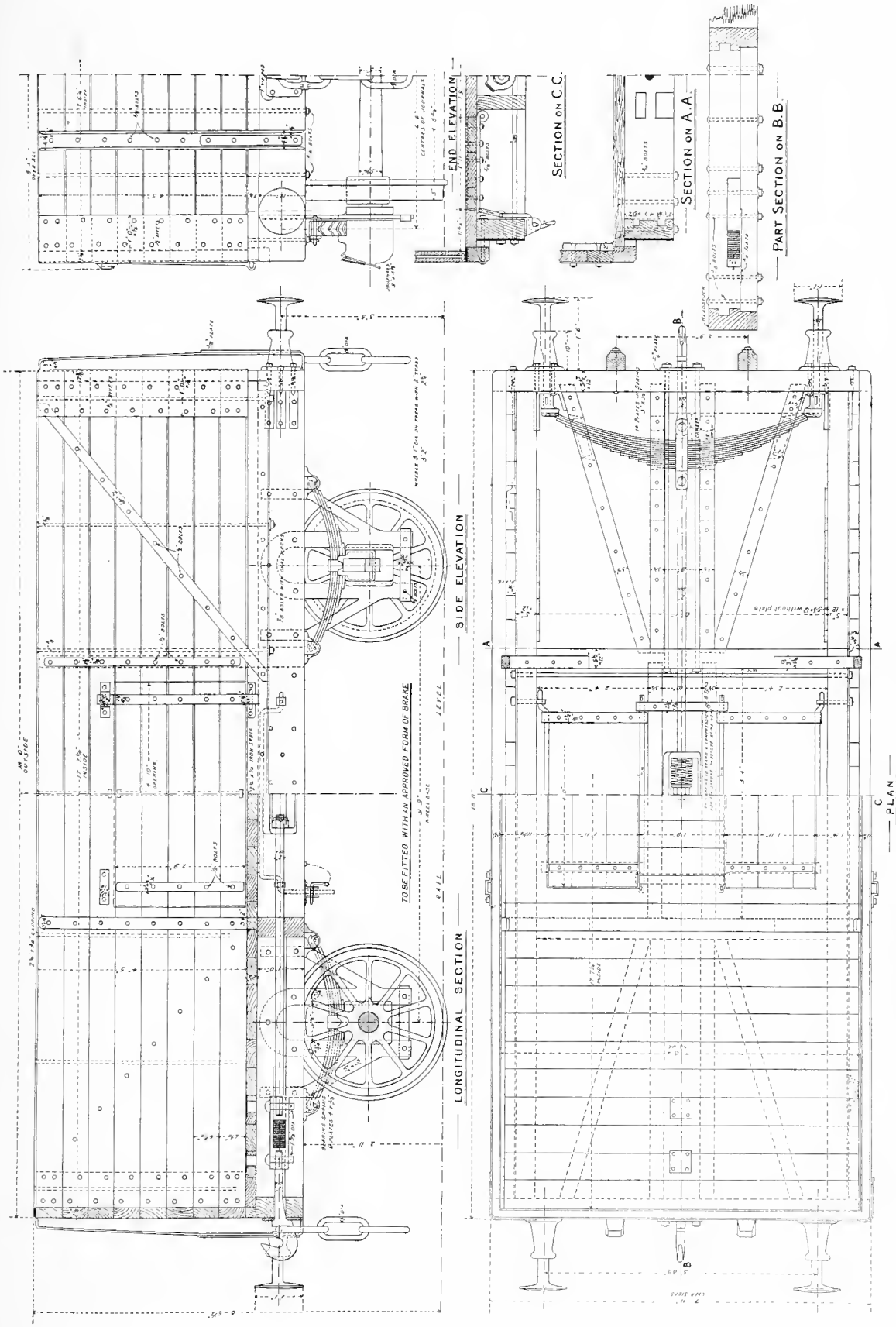
Figs. 6614-6615. 20-Ton Goods Brake Van. North Eastern.



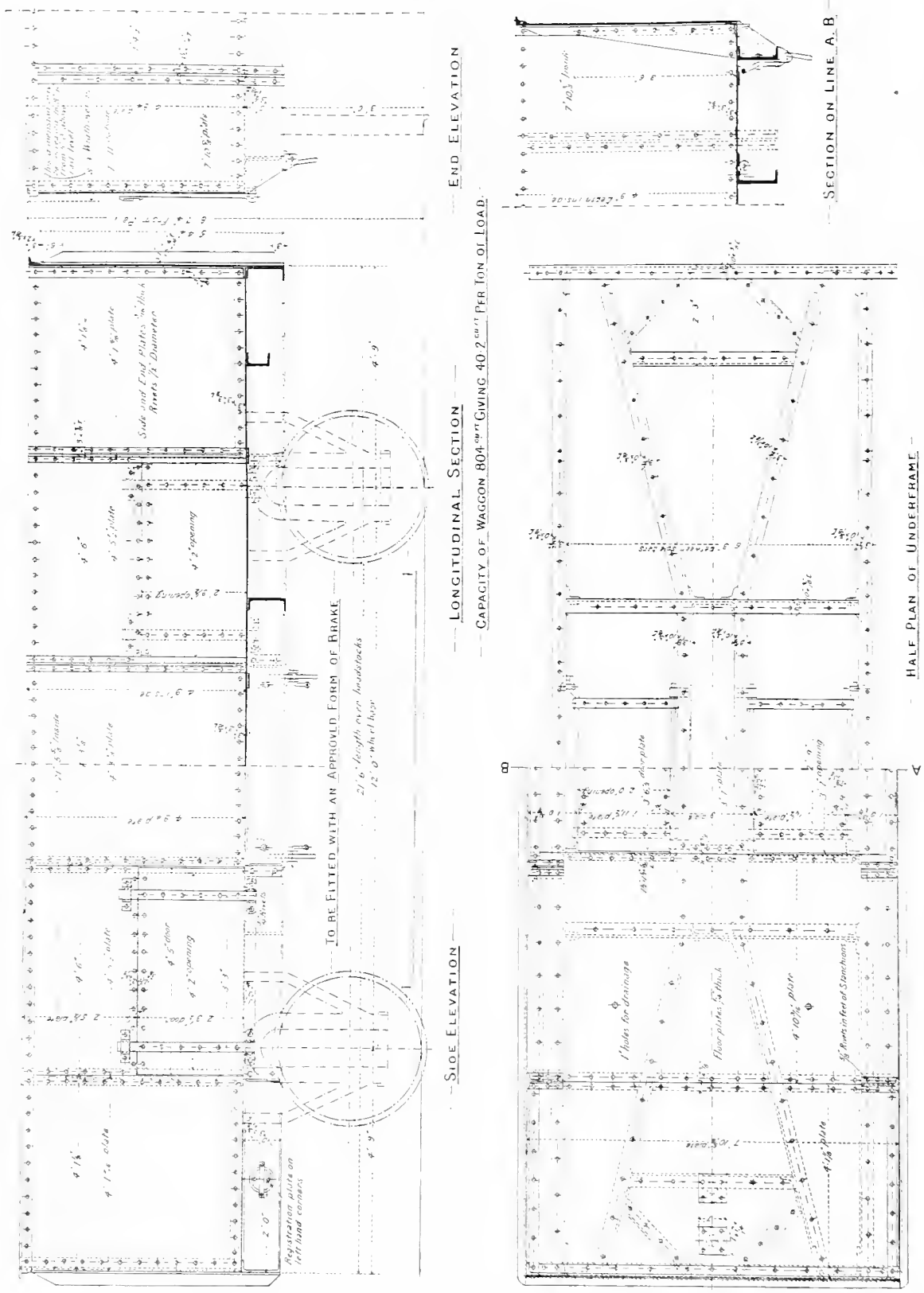
Figs. 6616-6619. Private Owners' 8, 10 and 12-Ton Open Wagons with Steel Underframe and Wooden Body



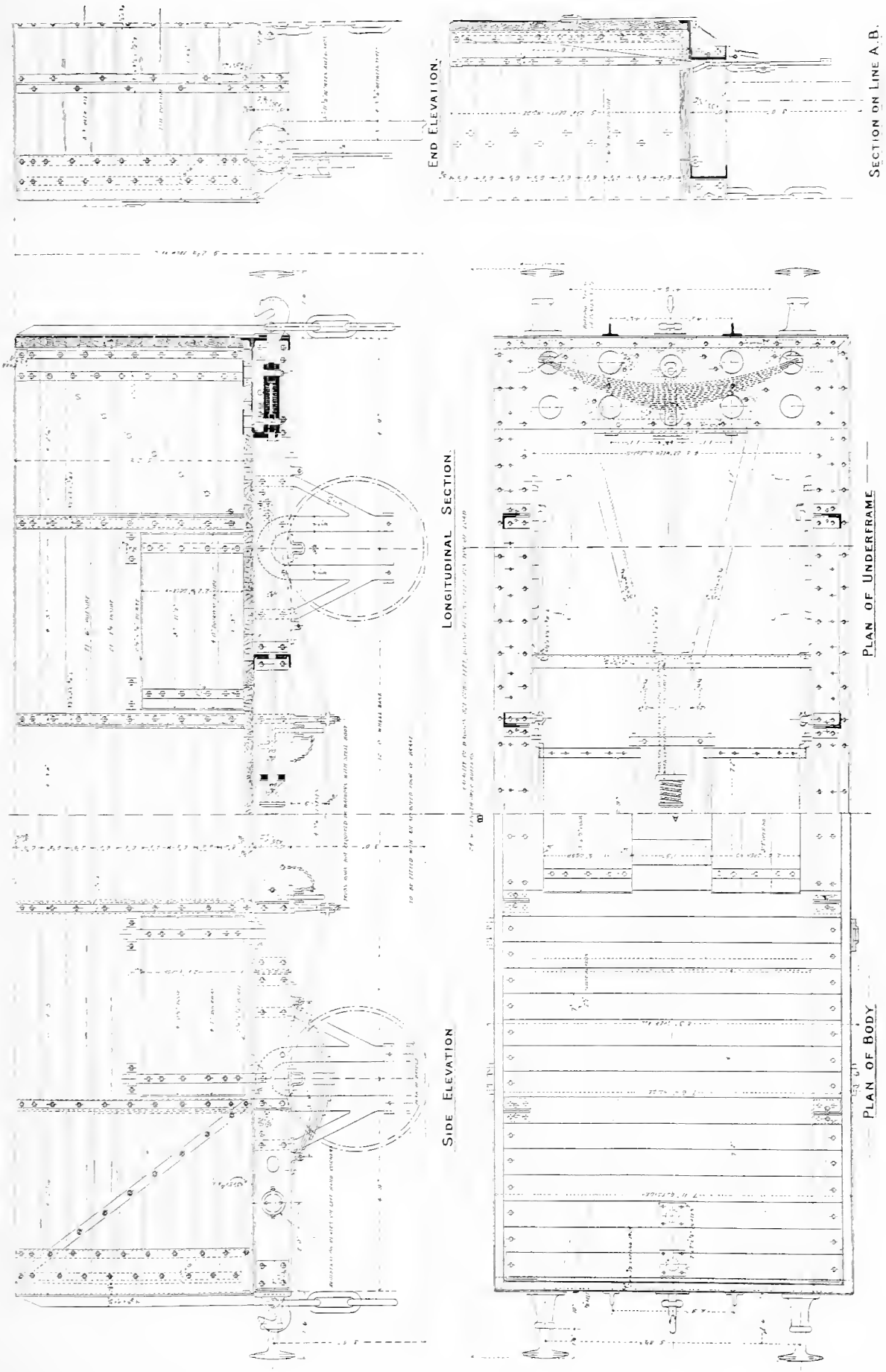
Figs. 6620 6623. Private Owners' 8, 10 and 12-Ton Open Wagons with Steel Underframe and Metal Body.



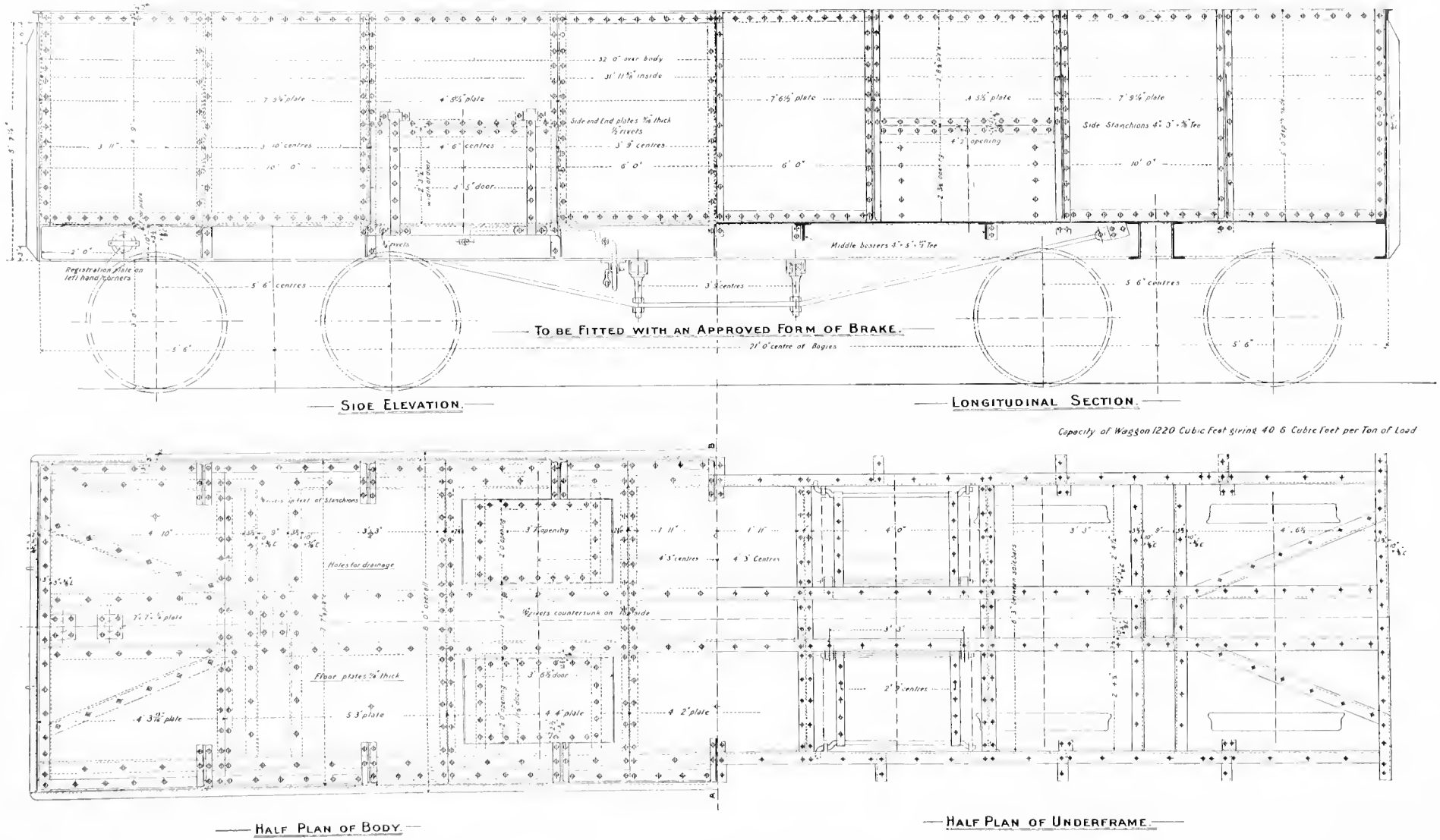
Figs. 6624-6629. Private Owners' 15-Ton Open Wagon with Wooden Underframe and Body.



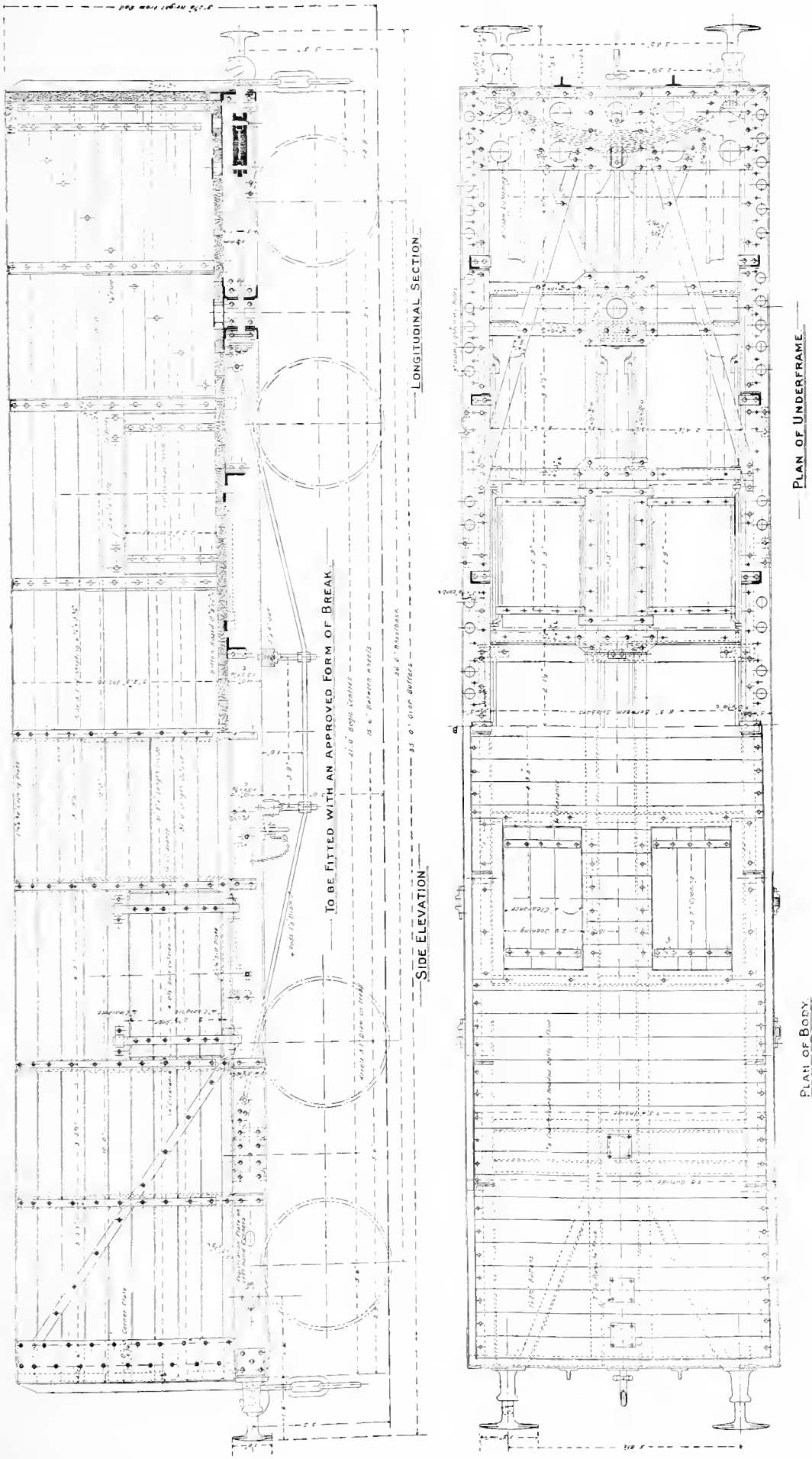
Figs. 6630-6633. Private Owners' 20-Ton Open Wagon with Steel Underframe and Metal Body.



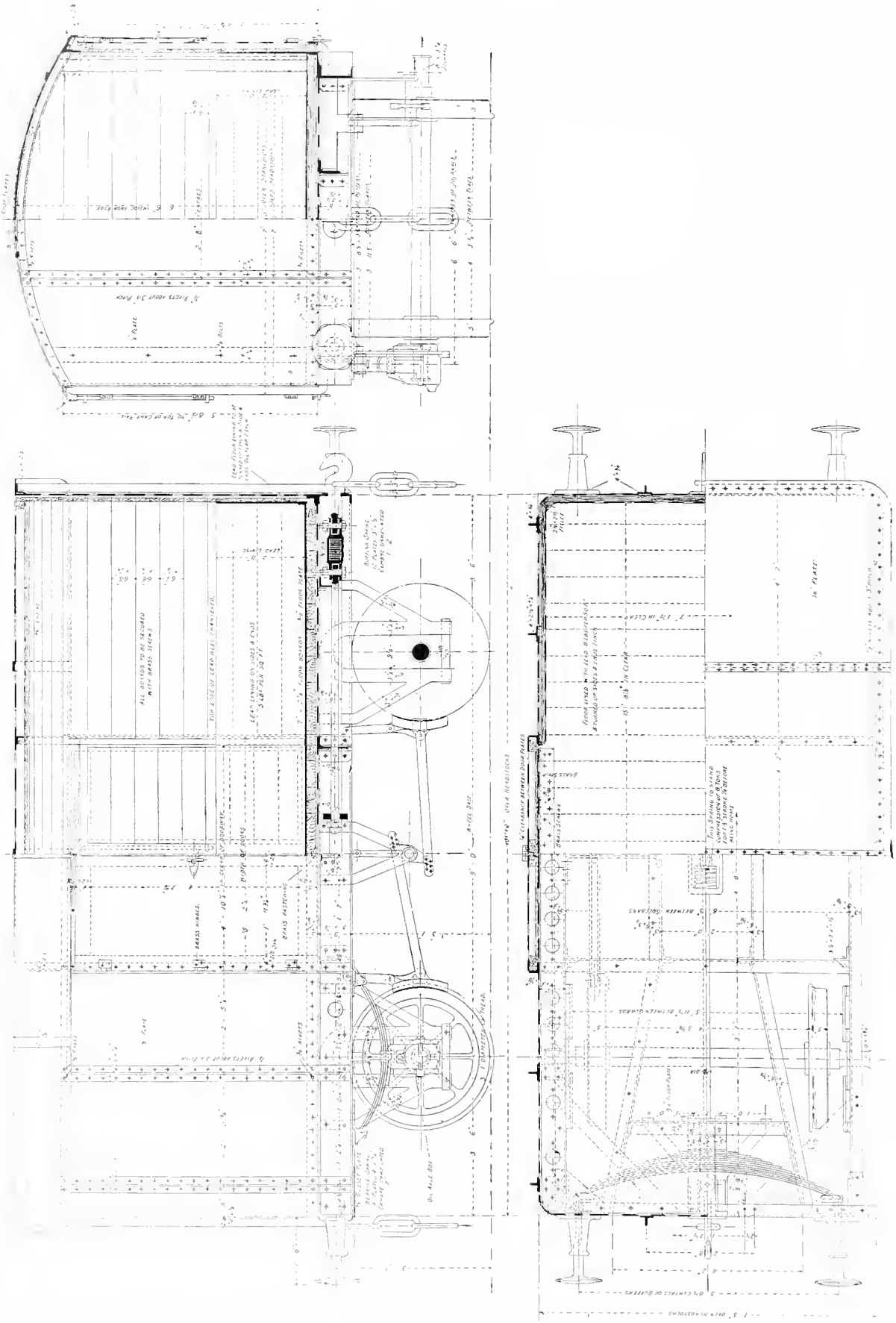
Figs. 6634-6637. Private Owners' 20-Ton Open Wagon with Steel Underframe and Wooden Body.



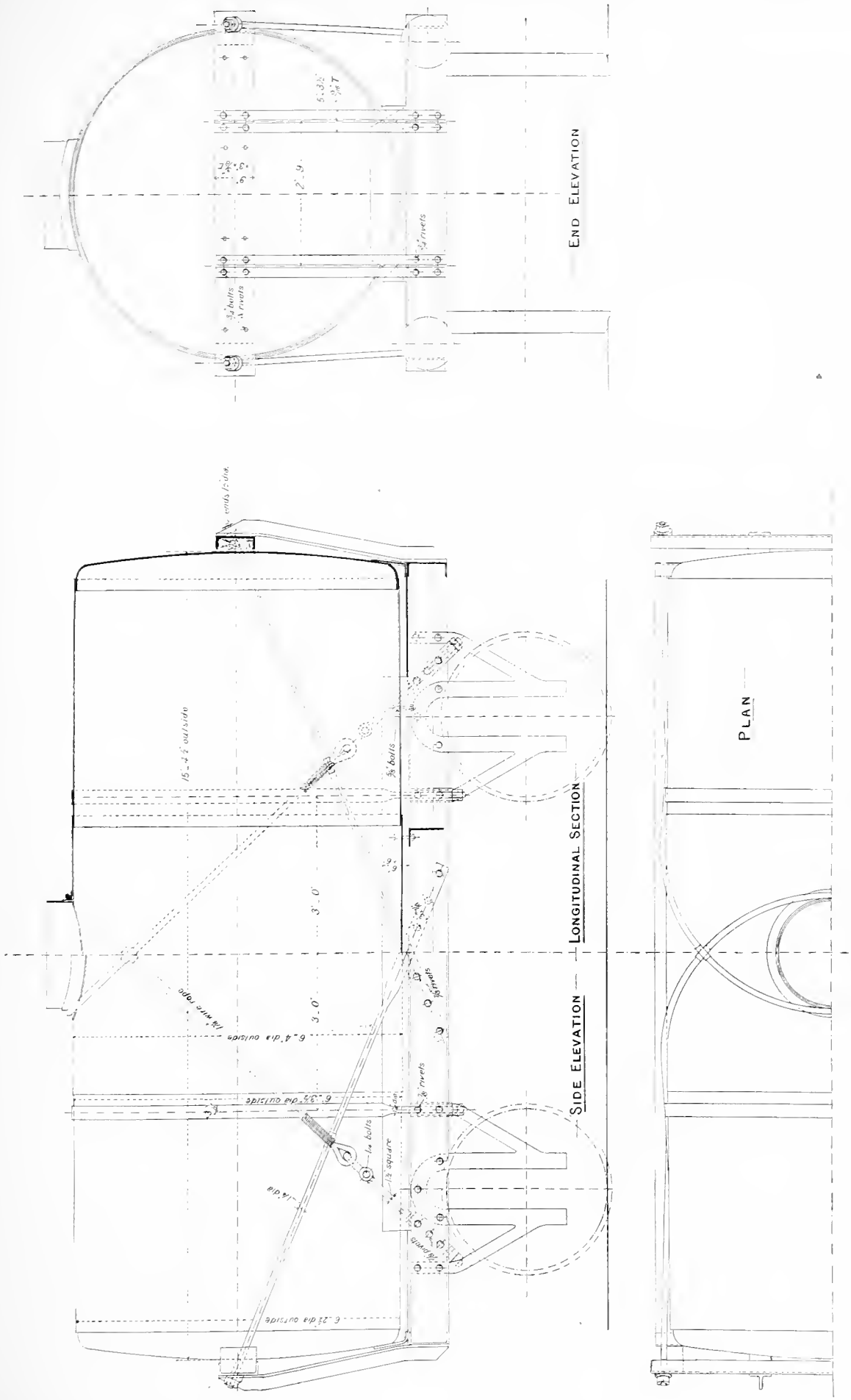
Figs. 6638-6639. Private Owners' 30-Ton Open Wagon with Steel Underframe and Metal Body.



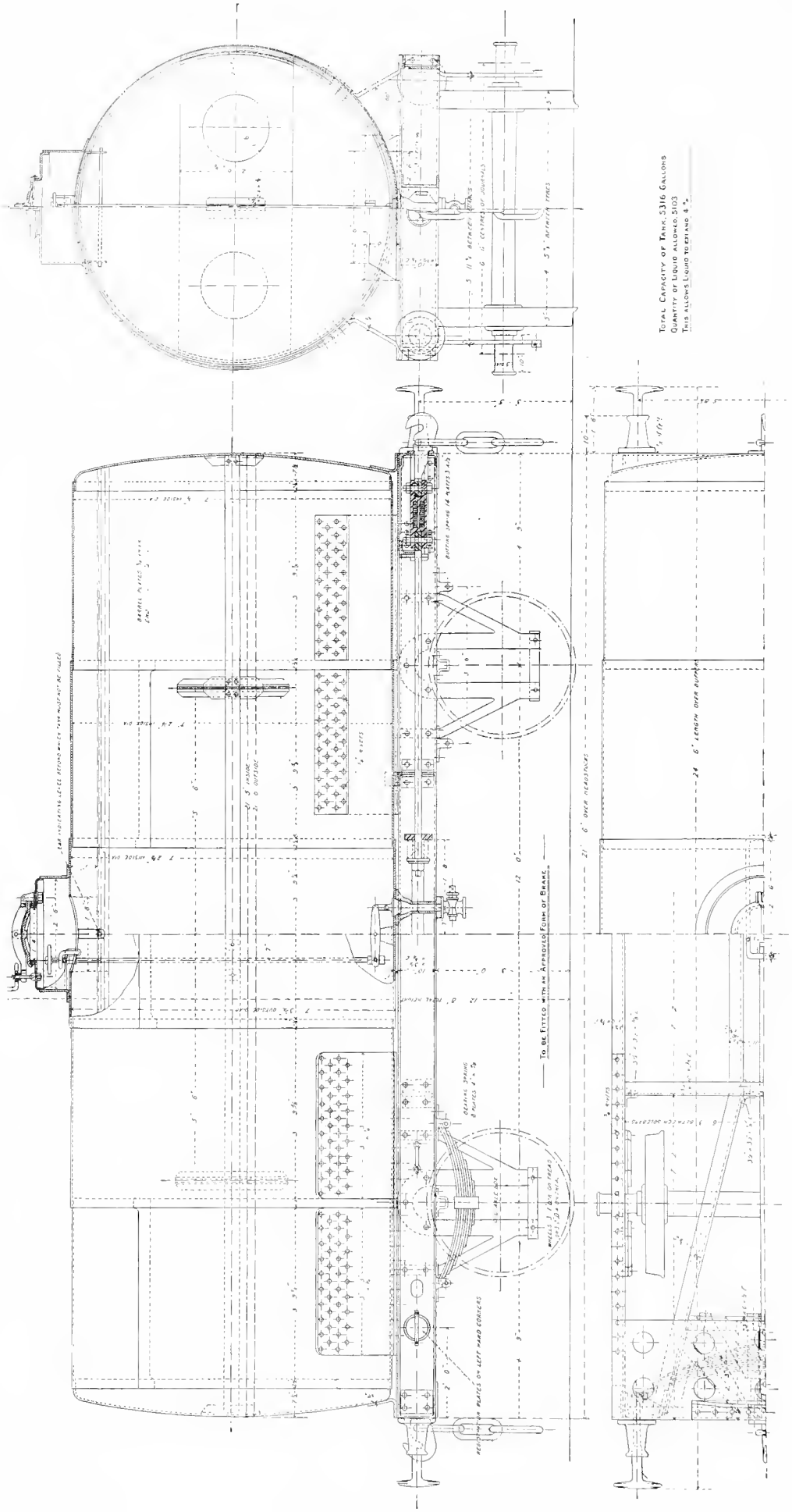
Figs. 6640-6641. Private Owners' 30-Ton Open Wagon with Steel Underframe and Wooden Body.



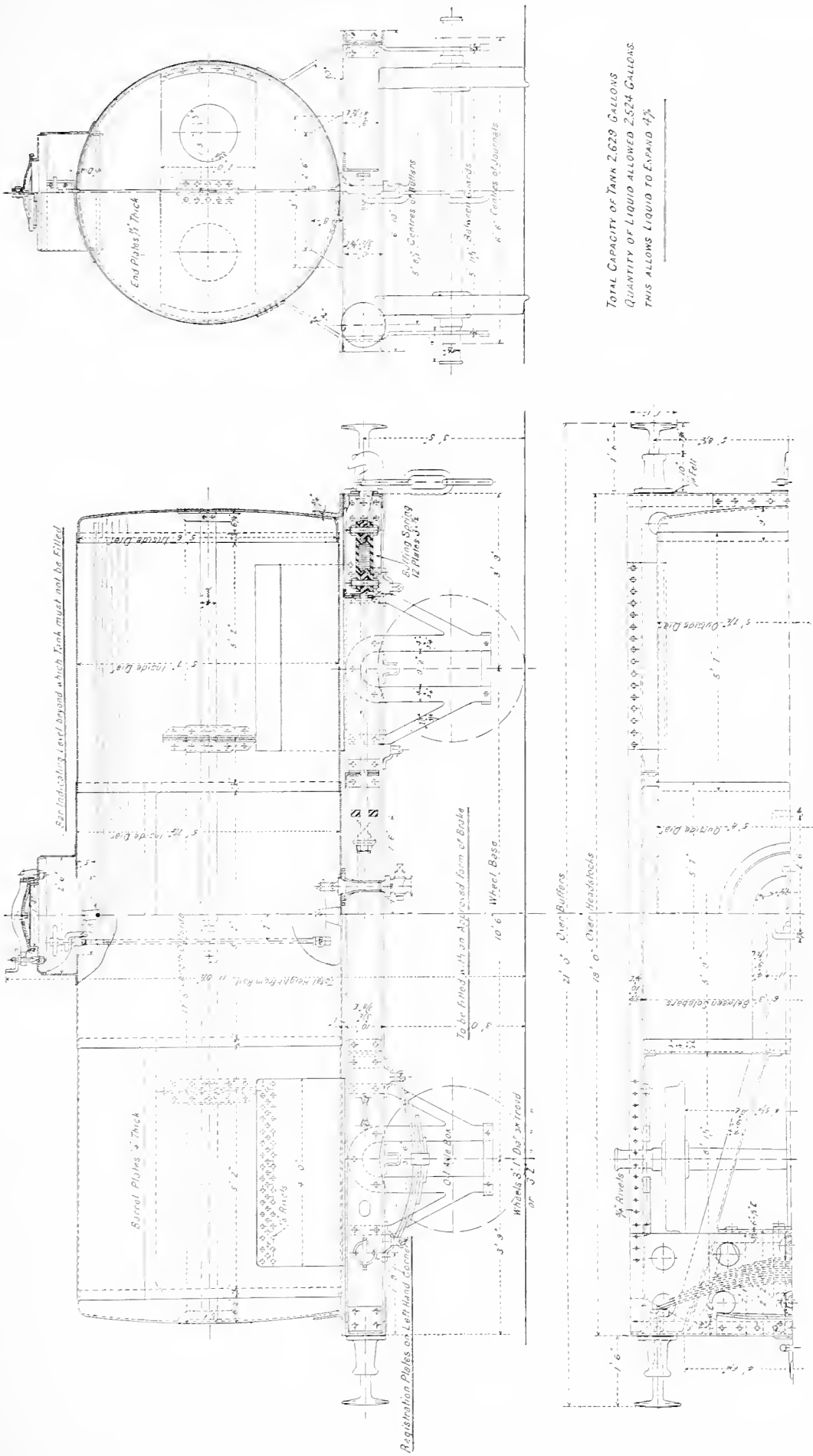
Figs. 6642-6644. Private Owners' Gunpowder Van with Steel Underframe and Wooden Body.



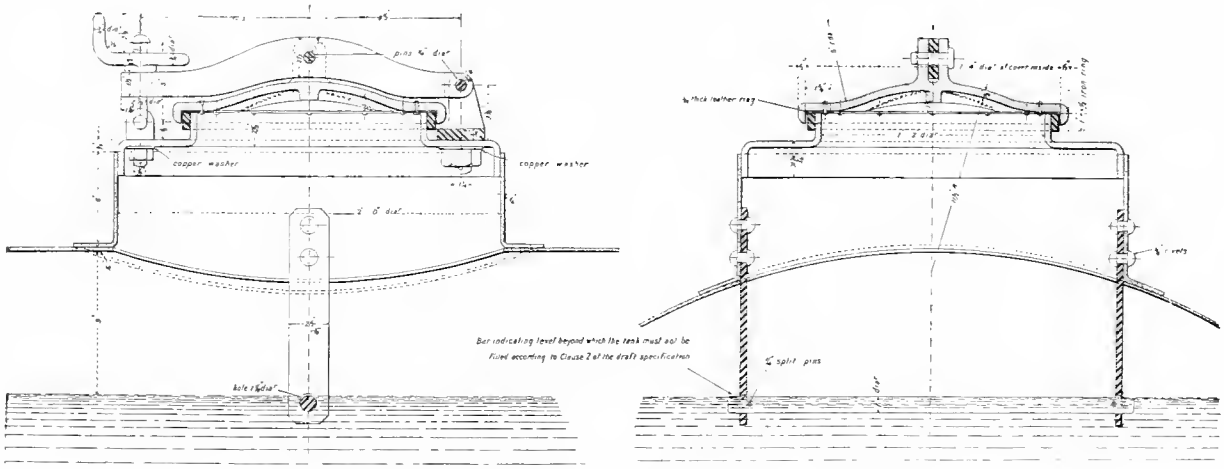
Figs. 6645-6647. Private Owners' Tank Car for Carrying Inflammable Liquids.



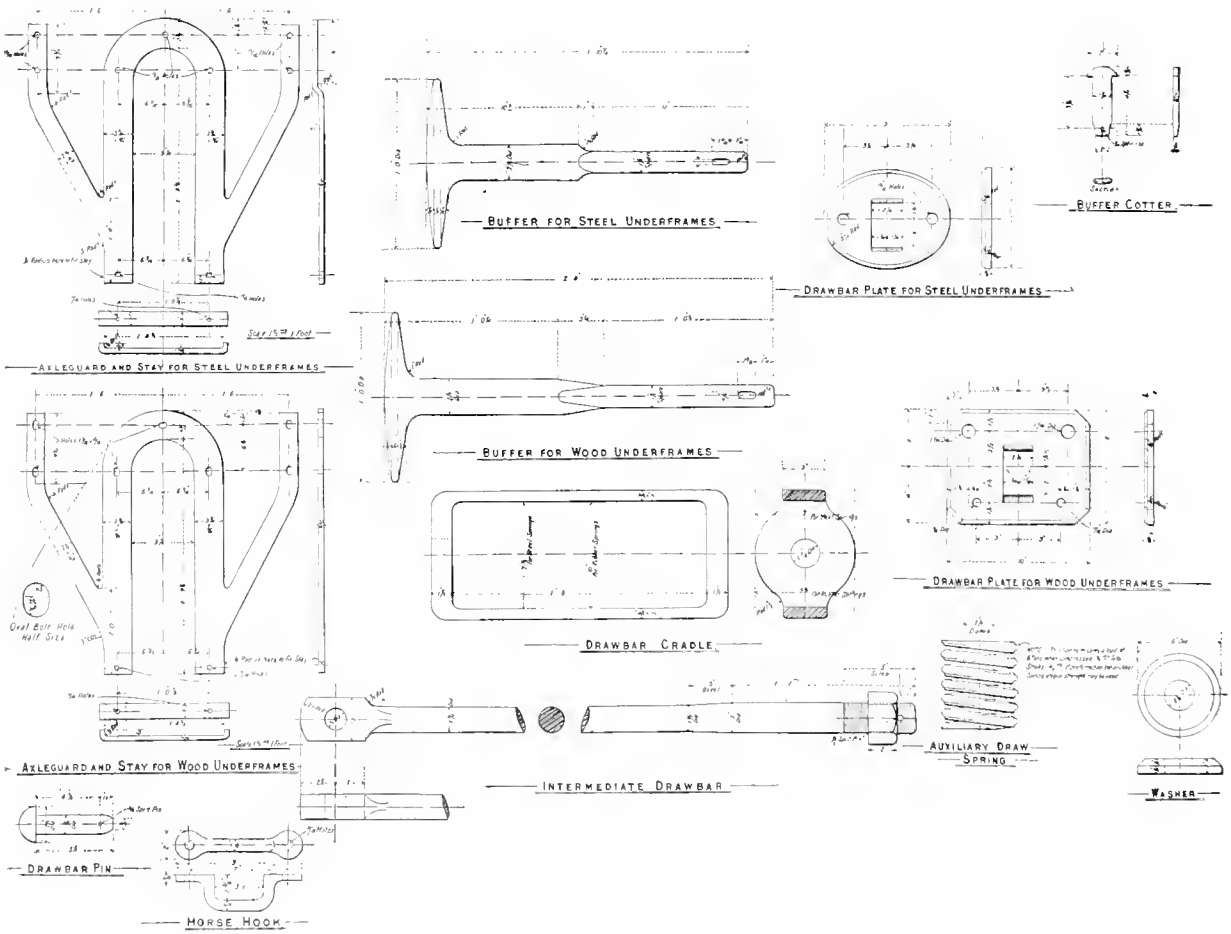
Figs. 6648-6650. Private Owners' 20-Ton Tank Car with Steel Underframe.



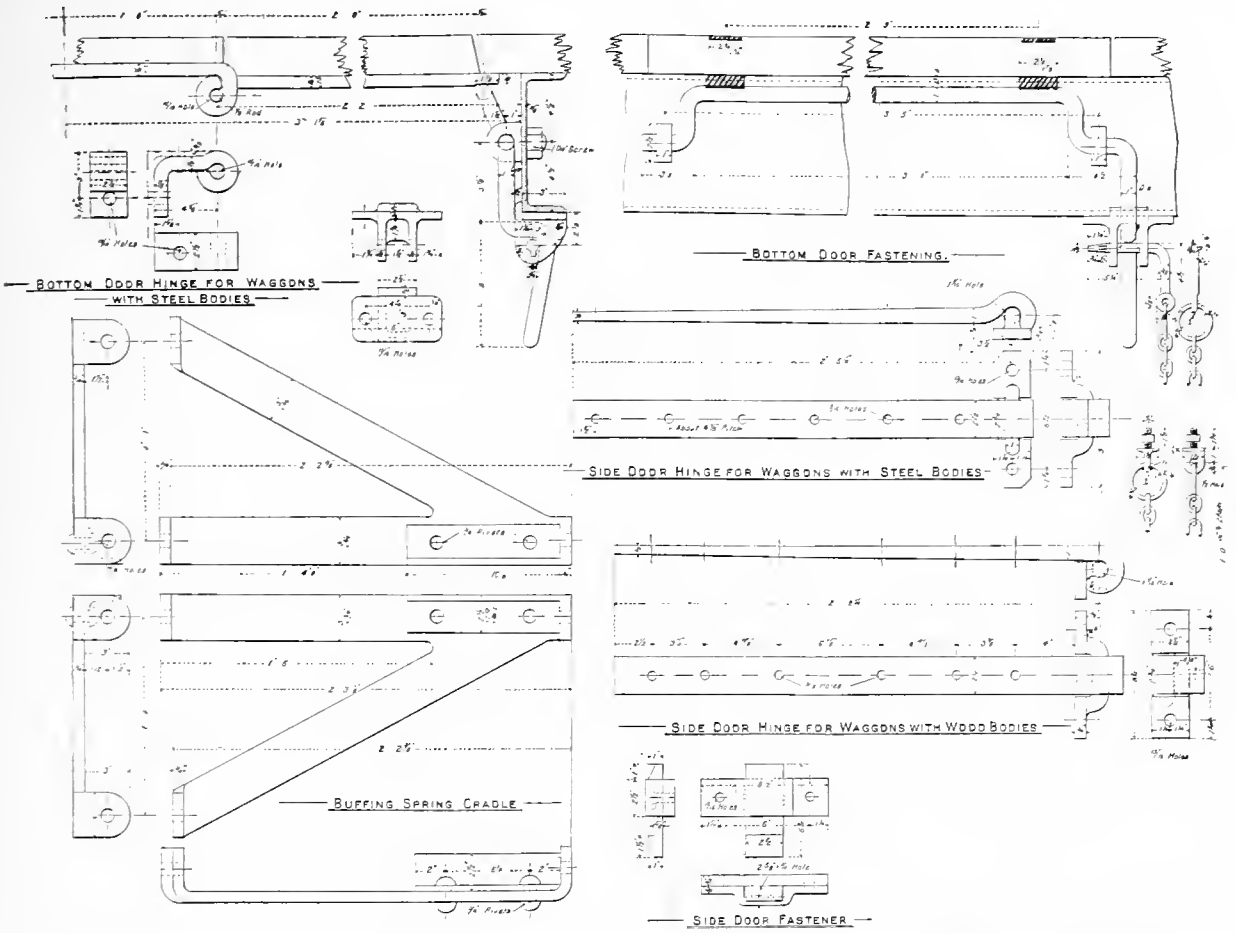
Figs. 6651-6653. Private Owners' 10-Ton Tank Car with Steel Underframe.



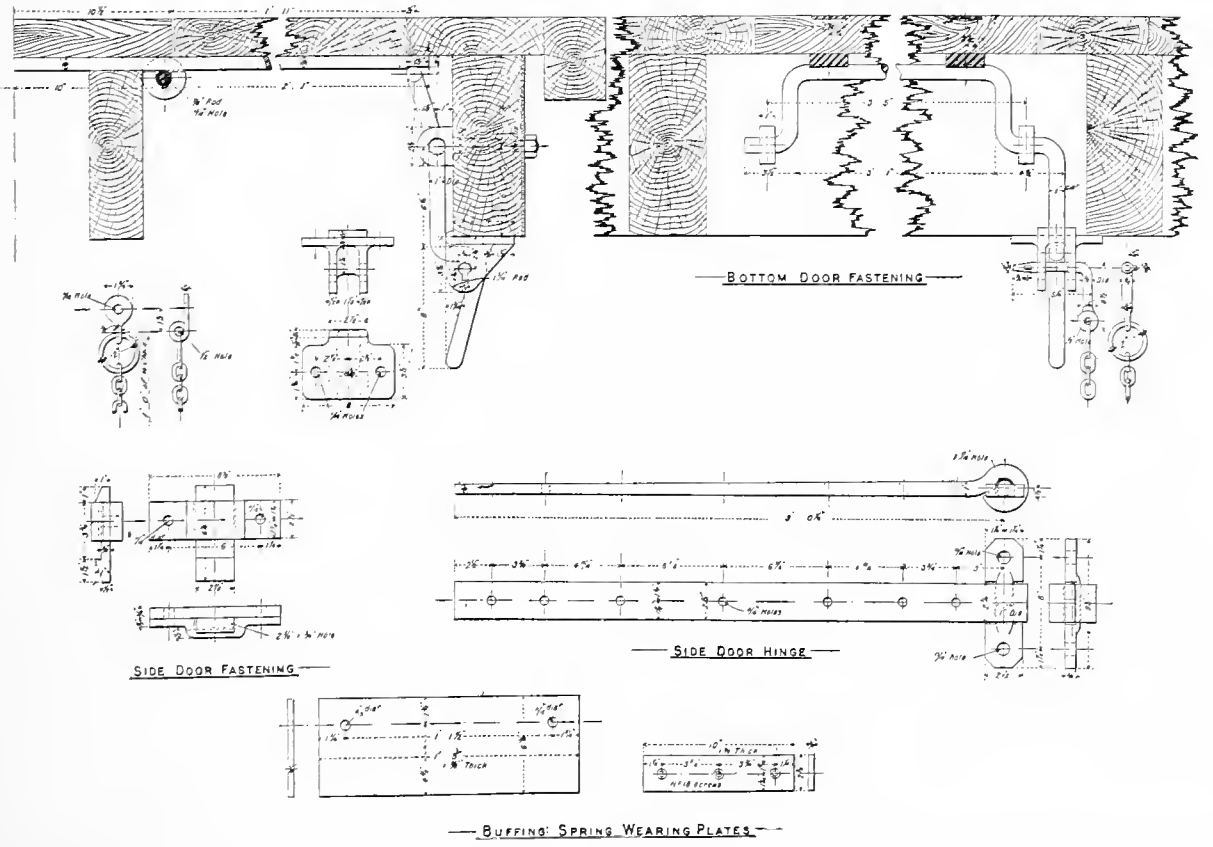
Figs. 6654-6655. Details of Manhole and Cover for Tank Cars.



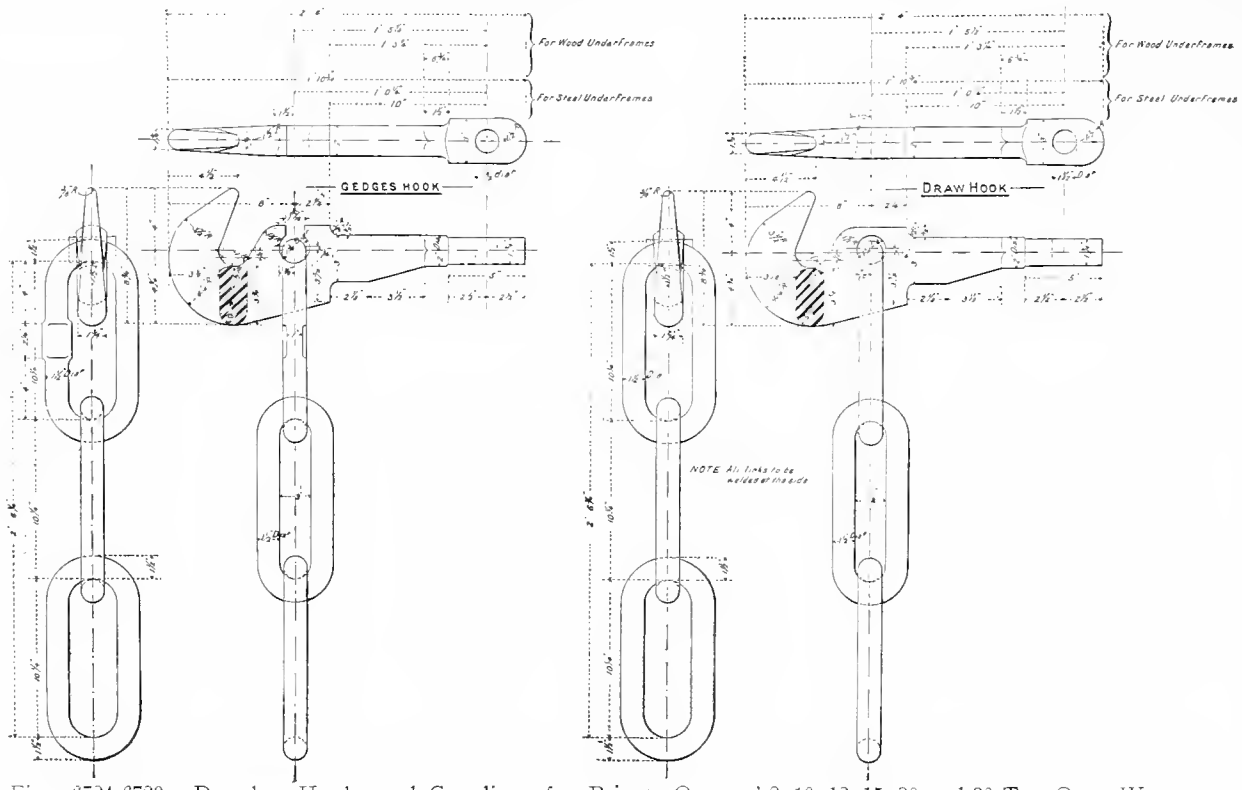
Figs. 6656-6683. Ironwork Details of Private Owners' 8, 10 and 12-Ton Open Wagons.



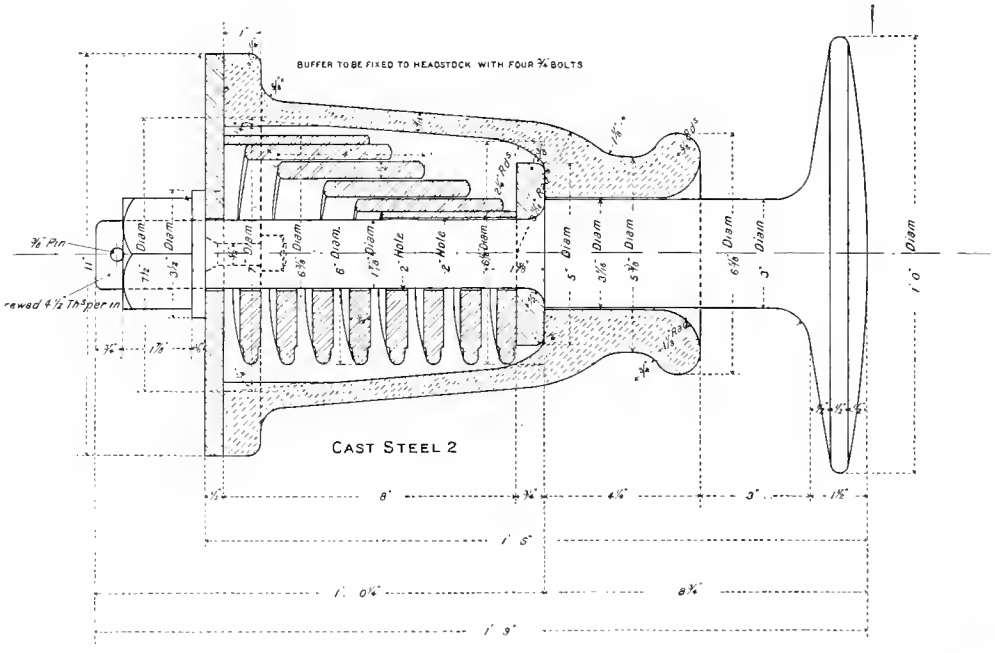
Figs. 6684-6707. Ironwork Details of Private Owners' 8, 10 and 12-Ton Open Wagons with Steel Underframes.

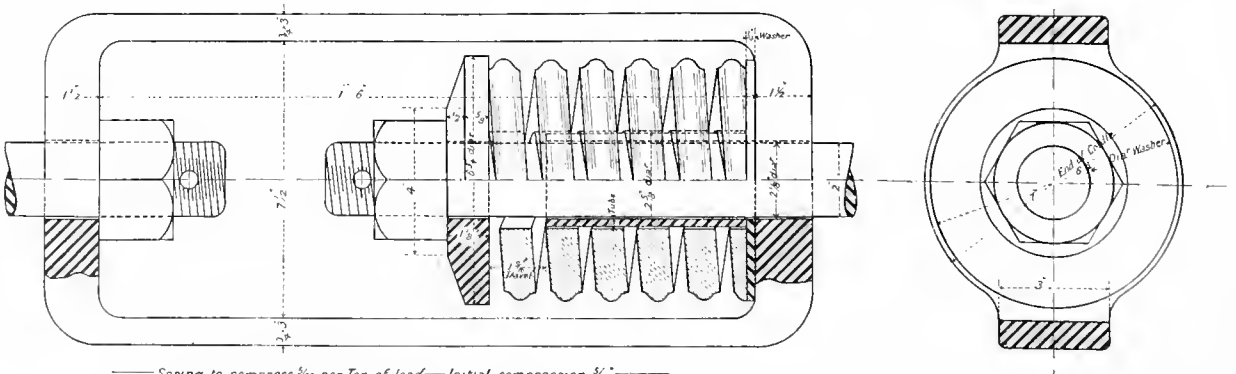


Figs. 6708-6723. Ironwork Details of Private Owners' 8, 10 and 12-Ton Open Wagons with Wood Underframes.

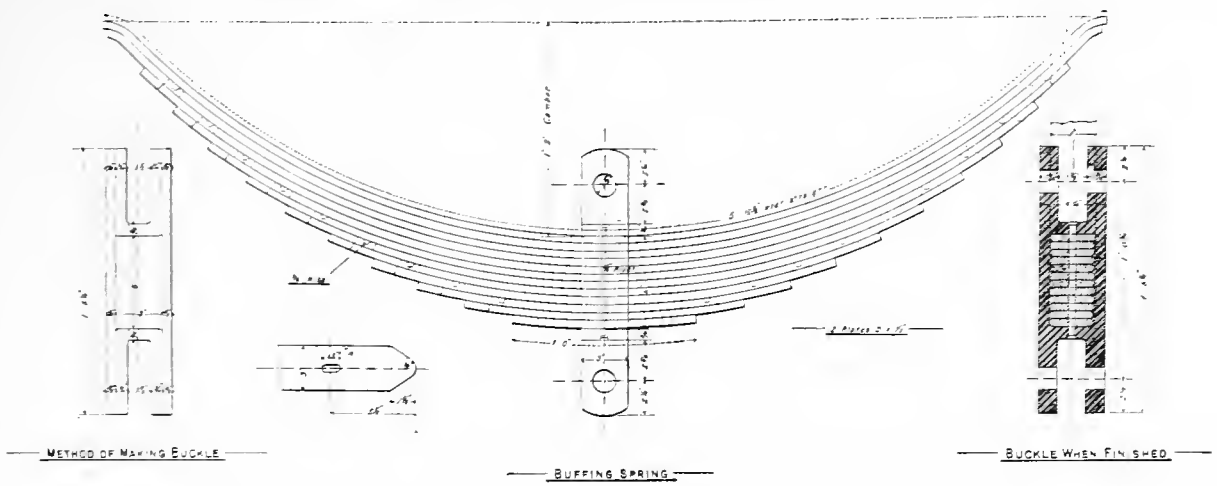


Figs. 6724-6729. Drawbar Hooks and Couplings for Private Owners' 8, 10, 12, 15, 20 and 30-Ton Open Wagons.

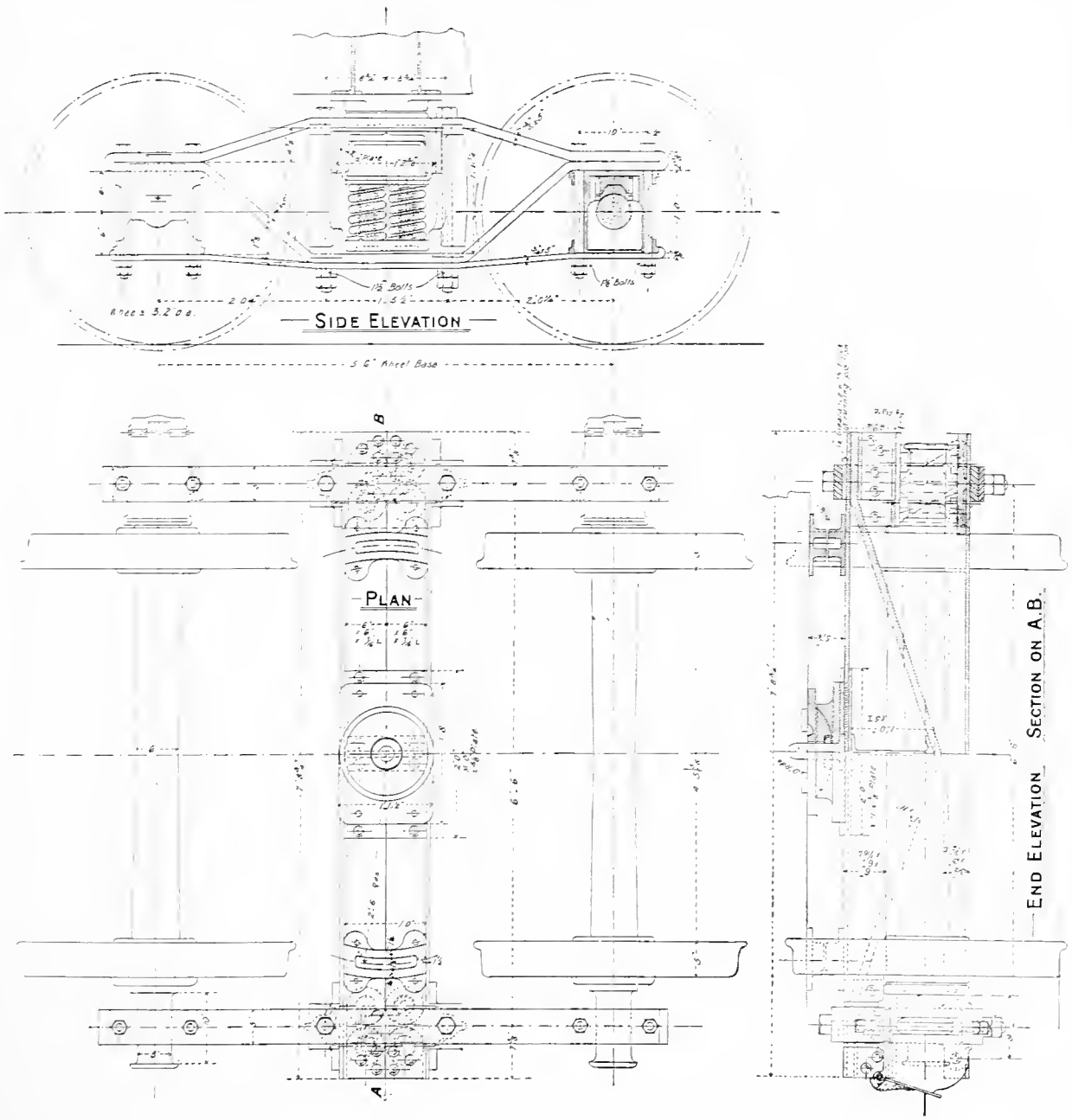




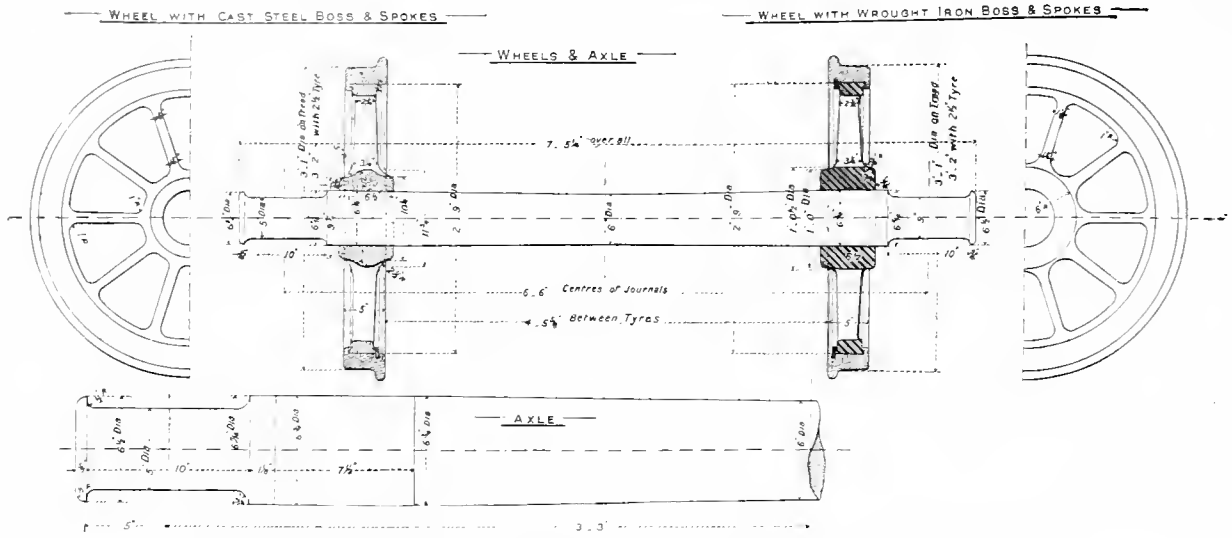
Figs. 6730-6732. Self-Contained Buffers for Private Owners' 8 and 10-Ton Wagons.



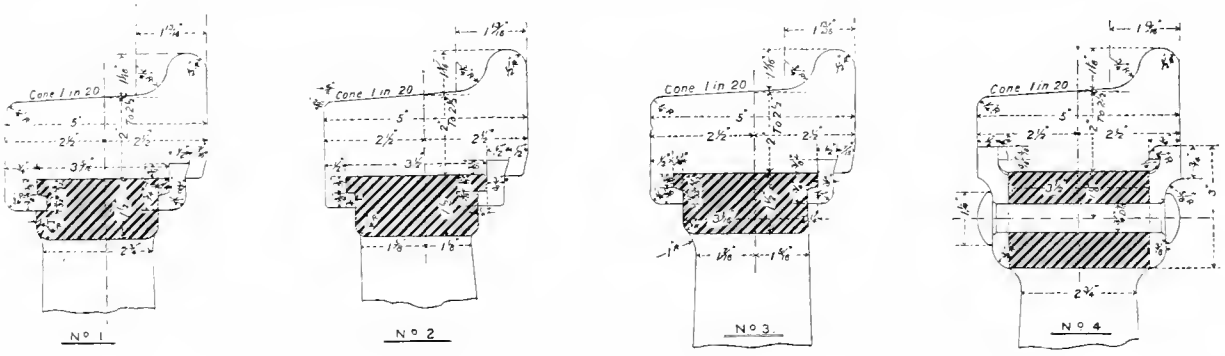
Figs. 6733-6736. Buffing Spring for Private Owners' 8, 10 and 12-Ton Wagons.



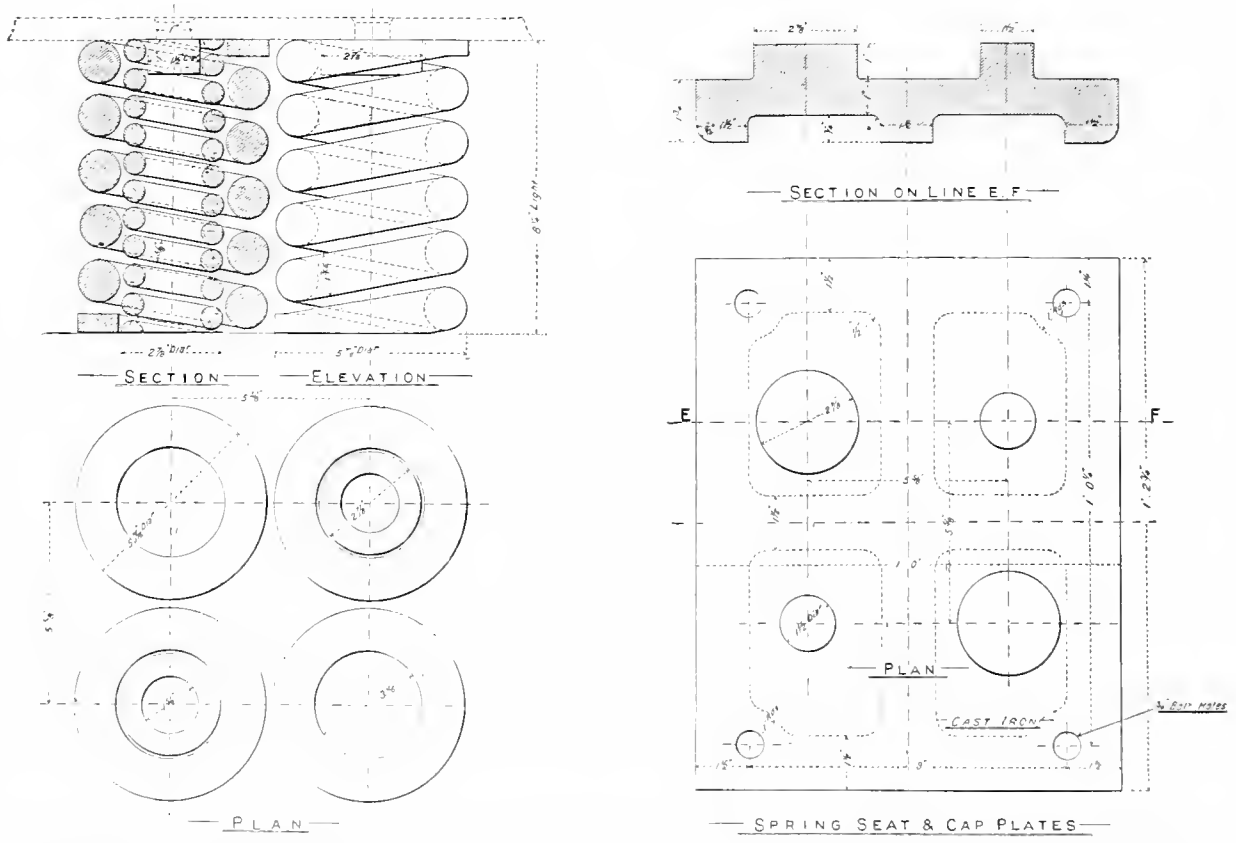
Figs. 6737-6738. Arch Bar Bogie Truck for Private Owners' 30-Ton Open Wagons.



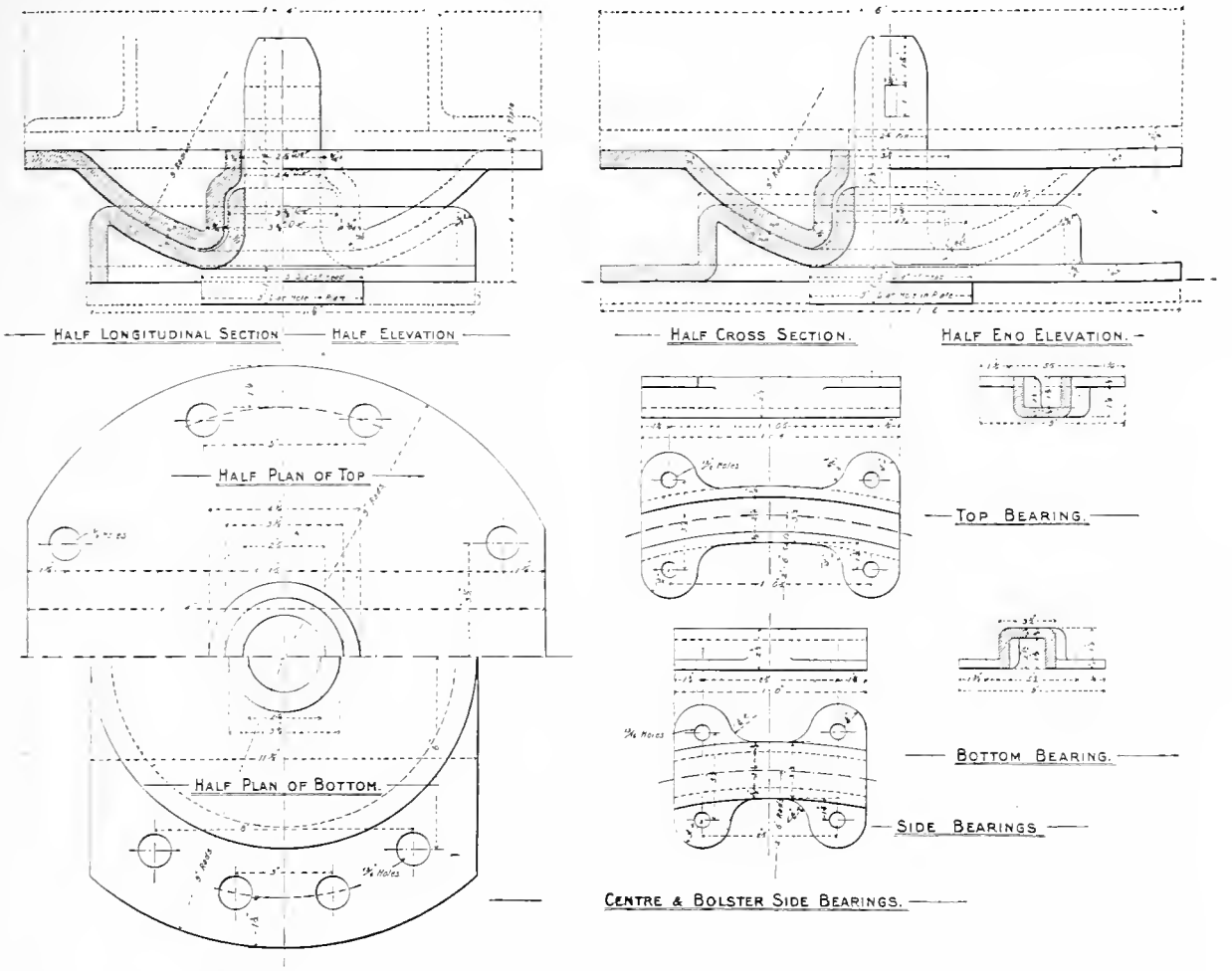
Figs. 6739-6742. Wheels and Axles for Private Owners' 20-Ton Open Wagon.



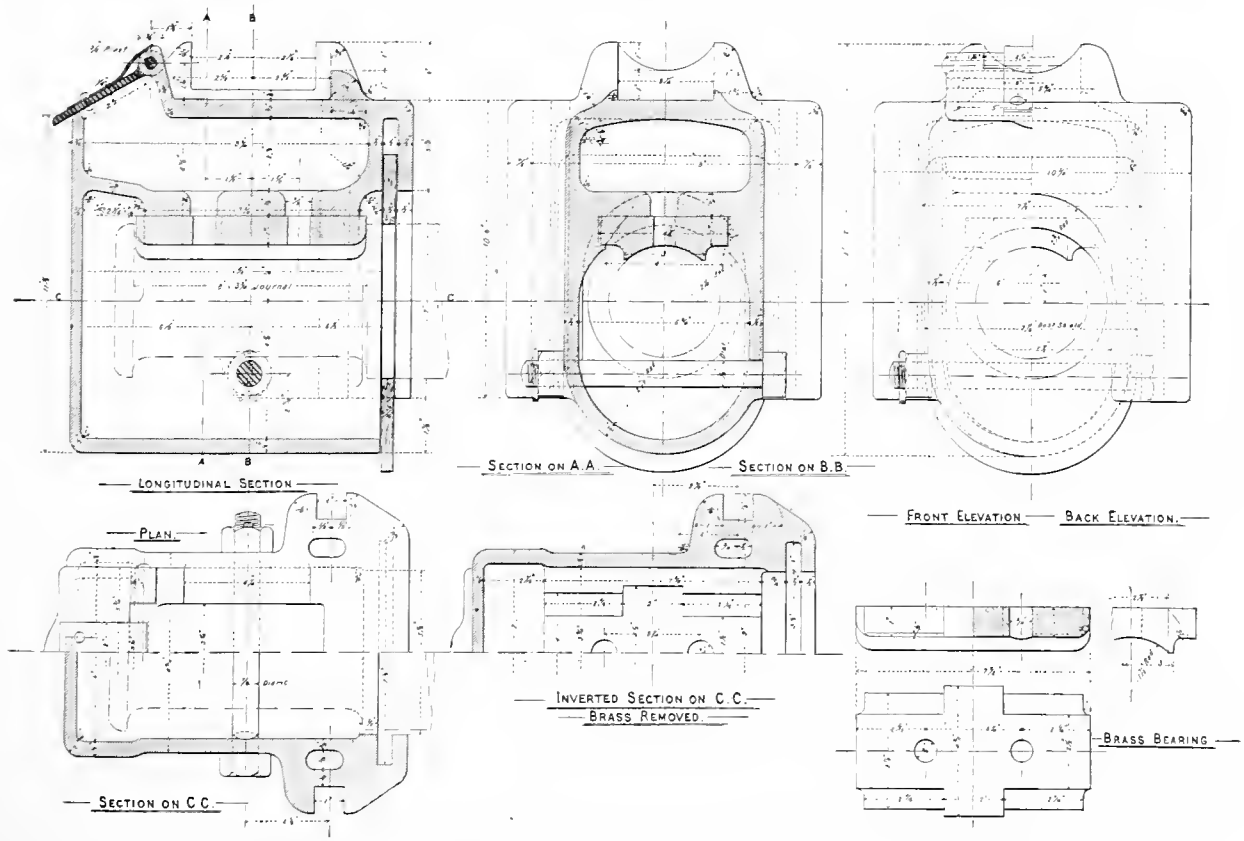
Figs. 6743-6746. Tire Sections for Private Owners' 20-Ton Wagon Wheels.



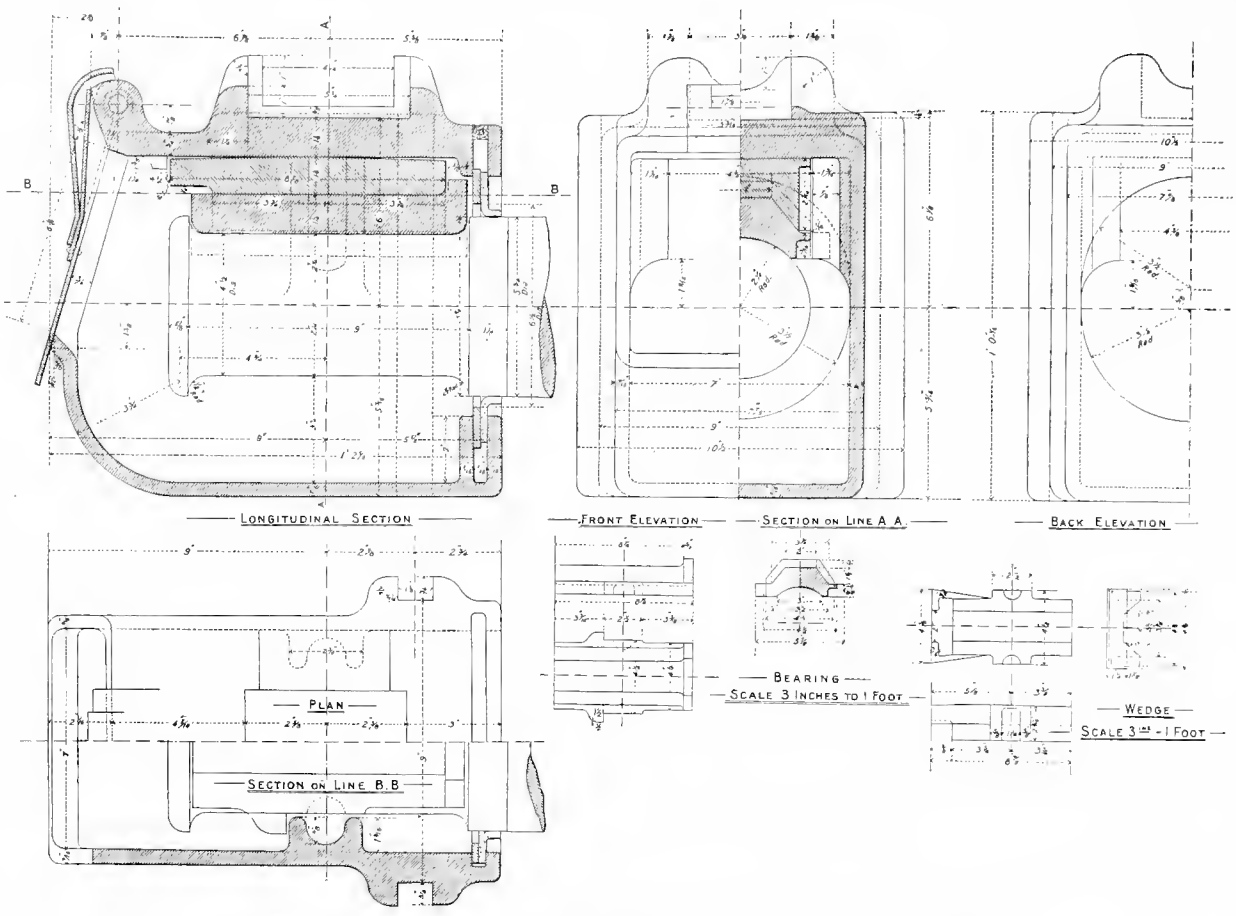
Figs. 6747-6750. Springs, Spring Seat and Spring Cap for Arch Bar Truck for Private Owners' 30-Ton Wagons.



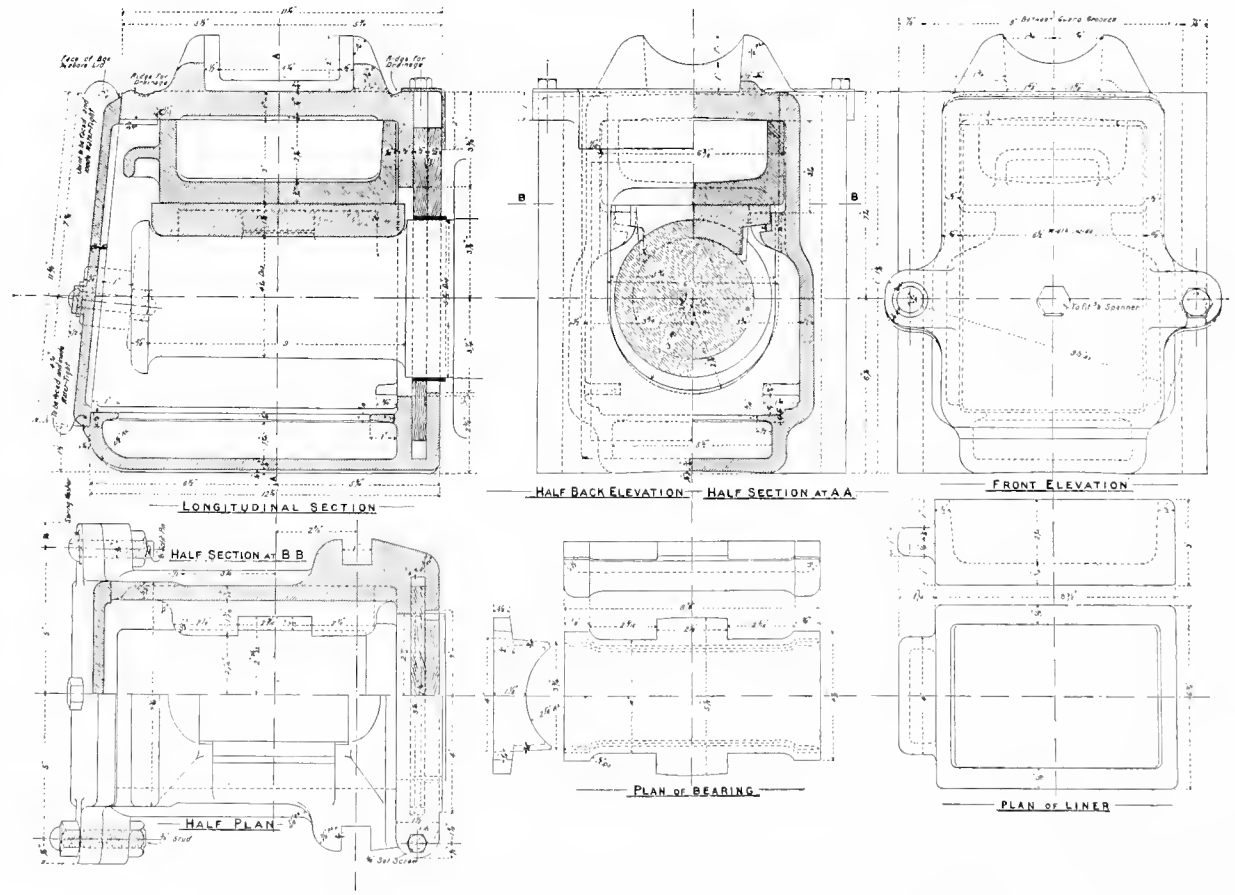
Figs. 6751-6759. Center Plate and Side Bearings for 30-Ton Arch Bar Bogie Truck.



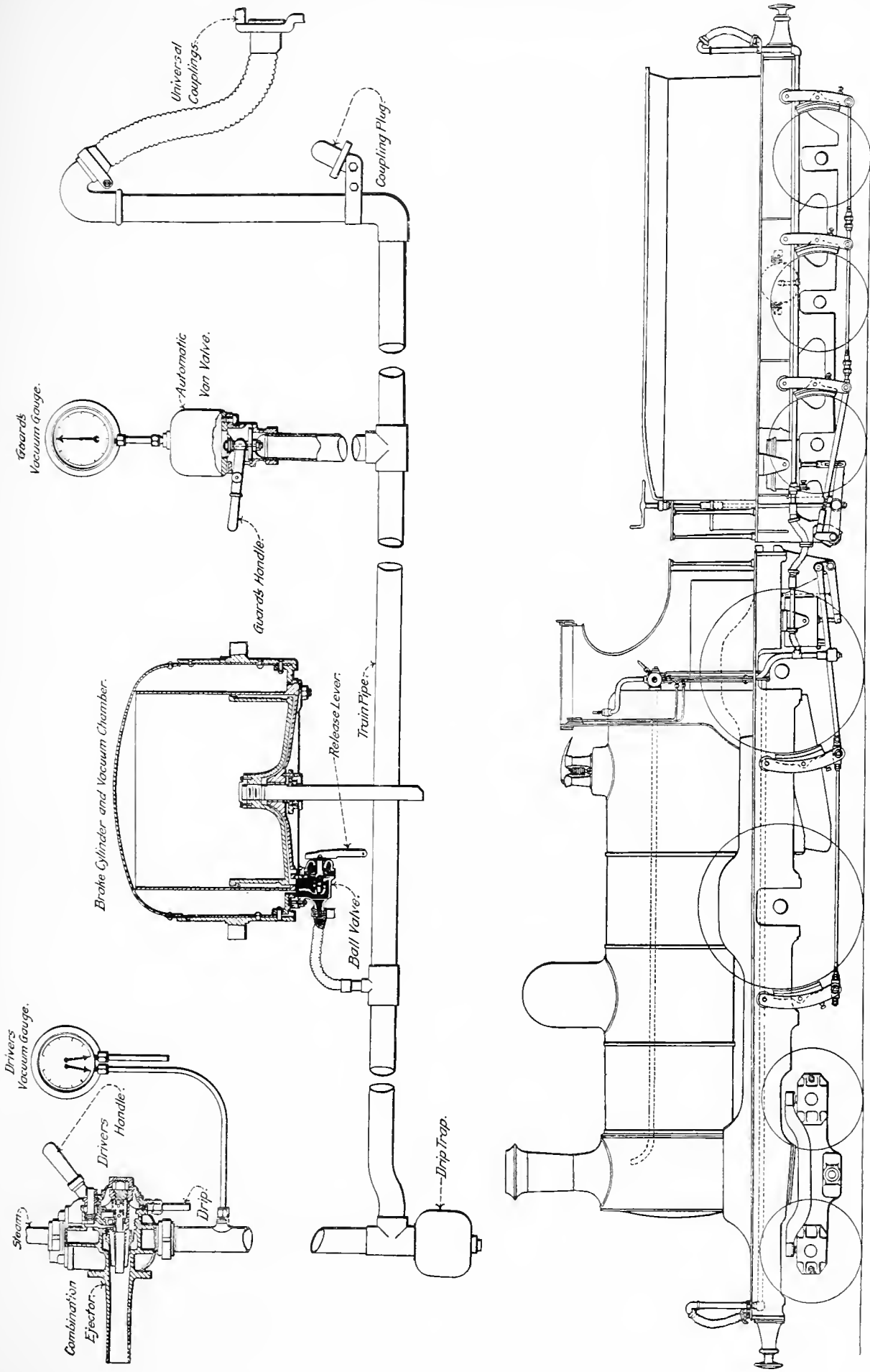
Figs. 6760-6767. Grease Axle Box for Private Owners' 8 and 10-Ton Wagons.



Figs. 6768-6776. Oil Axle Box for Private Owners' 12 and 15-Ton Wagons.



Figs. 6777-6784. Oil Axle Box for Private Owners' 12-Ton Wagons.



Figs. 6785-6787. Application of Vacuum Brake to Locomotive and Tender. Vacuum Brake Co., Ltd.

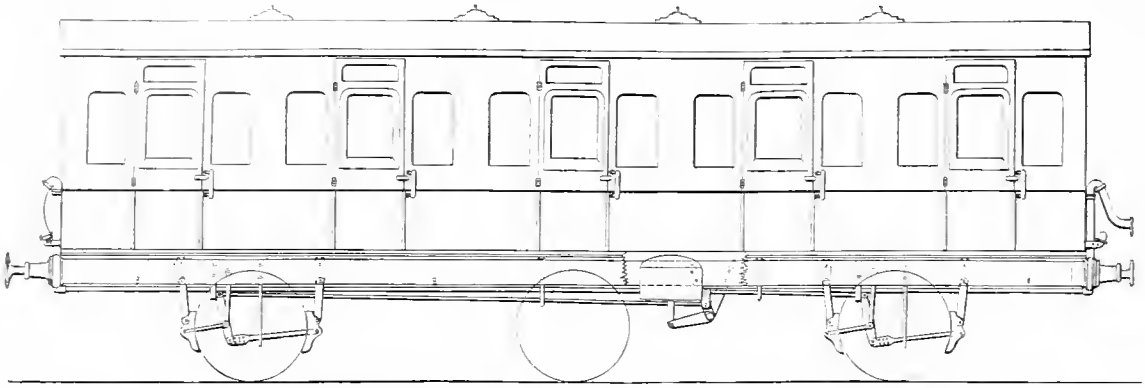


Fig. 6788. Application of Vacuum Brake to Carriage.

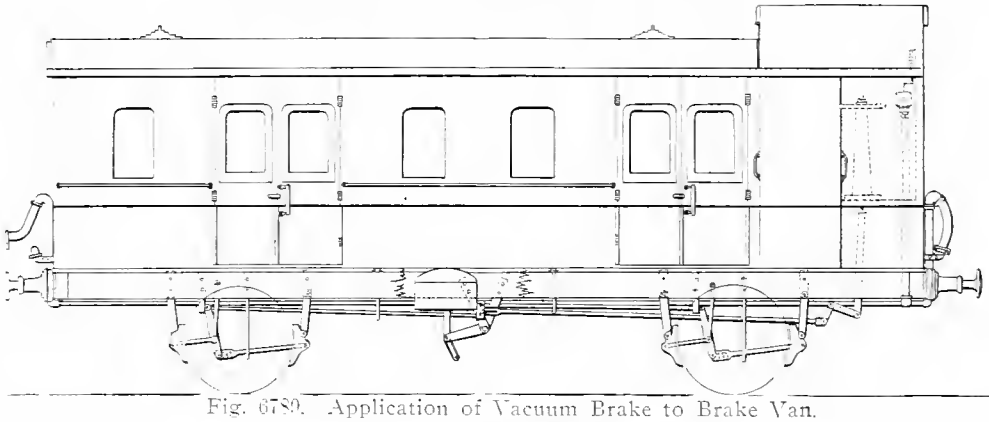


Fig. 6789. Application of Vacuum Brake to Brake Van.

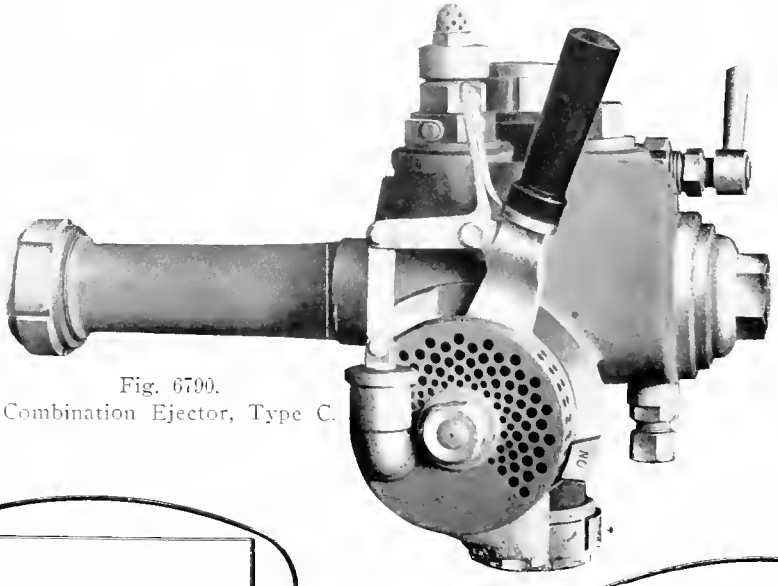


Fig. 6790.
Combination Ejector, Type C.

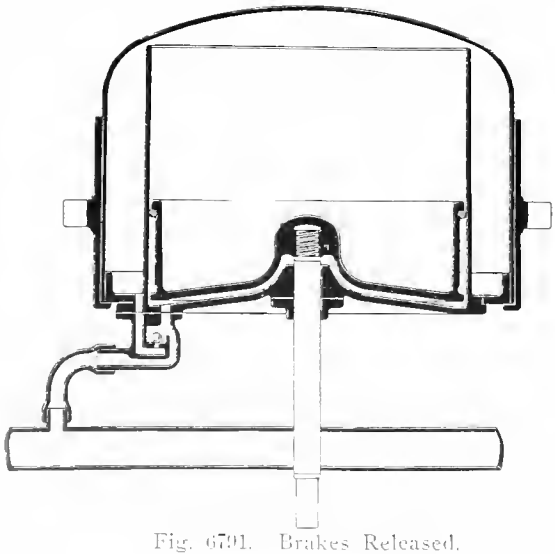


Fig. 6791. Brakes Released.

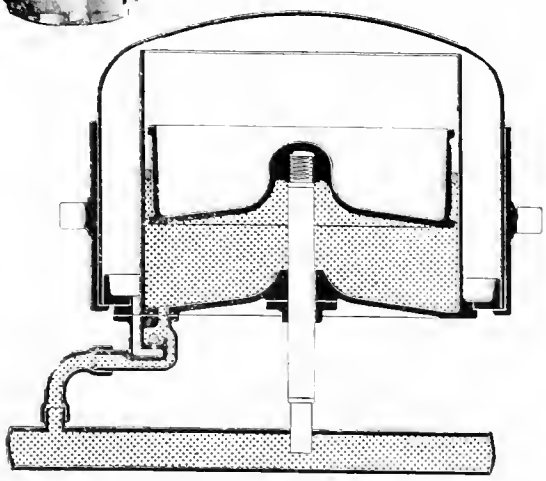


Fig. 6792. Brakes Applied.

Vacuum Brake Cylinder and Ball Valve. Vacuum Brake Co., Ltd.

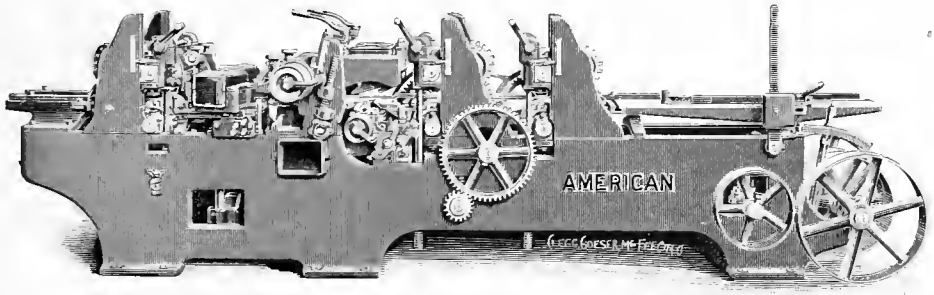


Fig. 6793. No. 131. American Planer and Matcher. Works 9 in. and 15 in. Wide by 6 in. Thick.

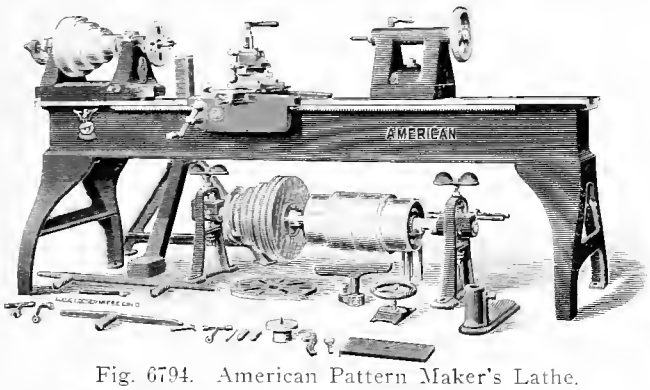


Fig. 6794. American Pattern Maker's Lathe.

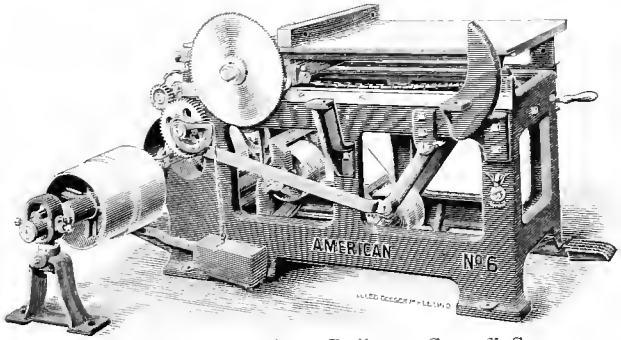


Fig. 6795. No. 6. American Railway Cut-off Saw.

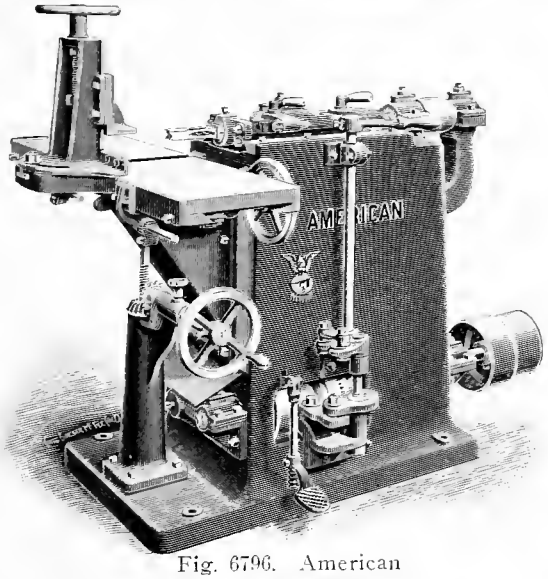


Fig. 6796. American Hollow Chisel Mortiser.

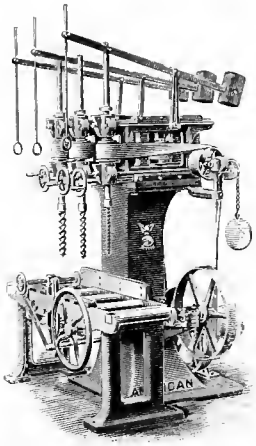


Fig. 6797. American Three-Spindle Car Borer.

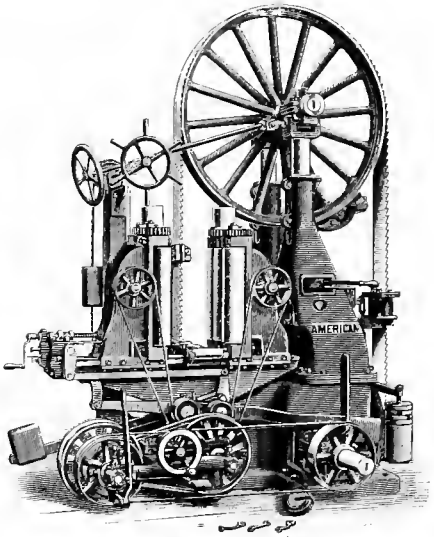


Fig. 6798. American 60-in. Band Re-Saw.

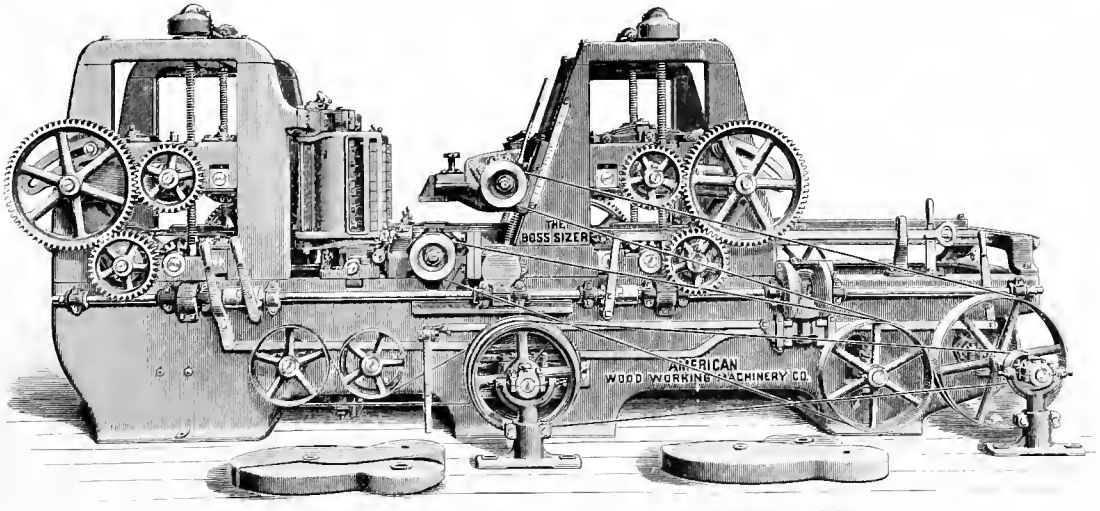


Fig. 6799. American Eight-Roll Boss Sizer.
American Wood Working Machinery Co.

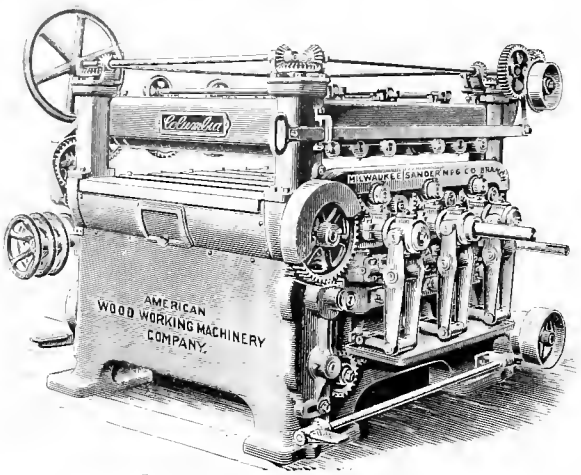


Fig. 6800. Columbia Sander.

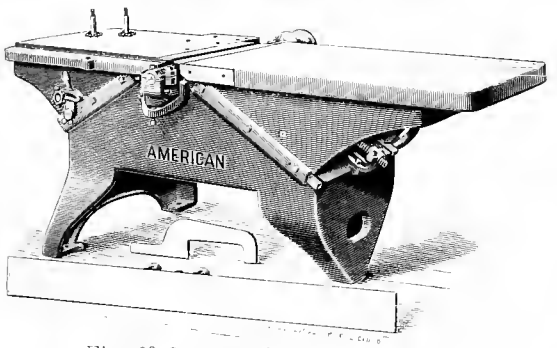


Fig. 6802. American Buzz Planer.

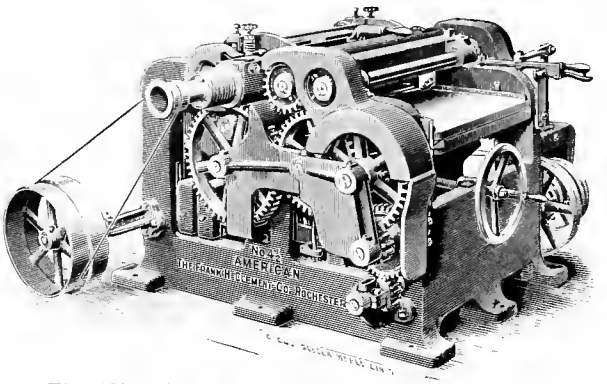


Fig. 6801. No. 4½. American Single Surfacer.

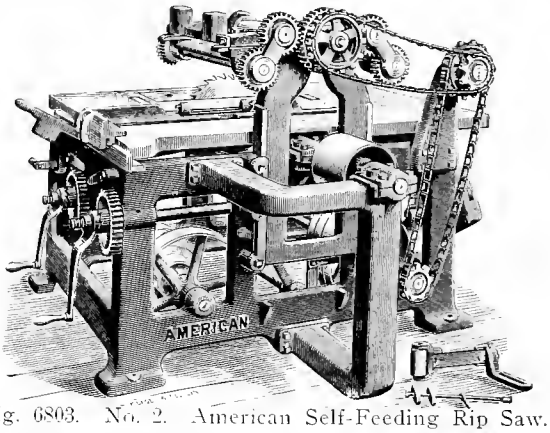


Fig. 6803. No. 2. American Self-Feeding Rip Saw.

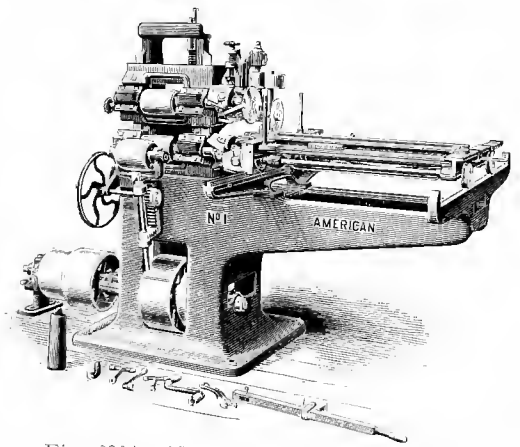


Fig. 6804. No. 1. American Tenoner.

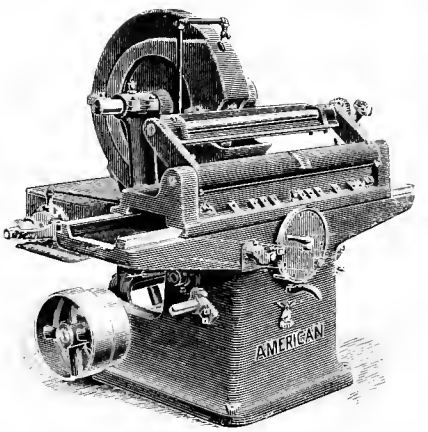


Fig. 6805. No. 200. American Automatic Knife Grinder.

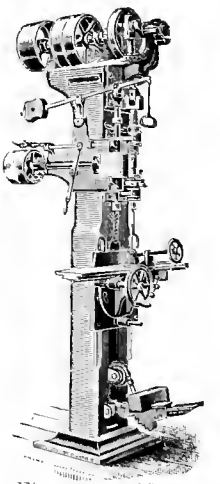


Fig. 6806. No. 1. American Mortiser and Borer.

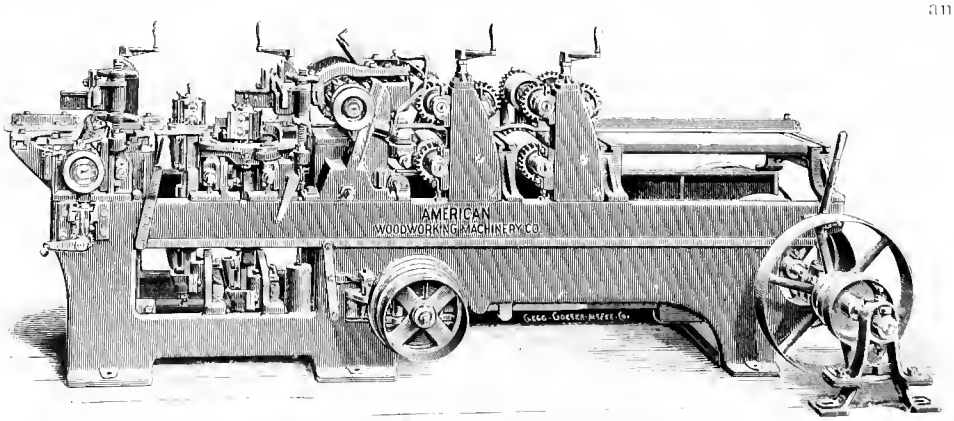


Fig. 6807. American Inside Molder.
American Wood Working Machinery Co.

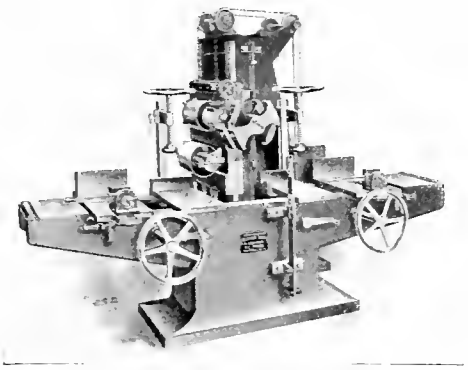


Fig. 6808. No. 525. Vertical Automatic Car Sill Tenoning Machine.

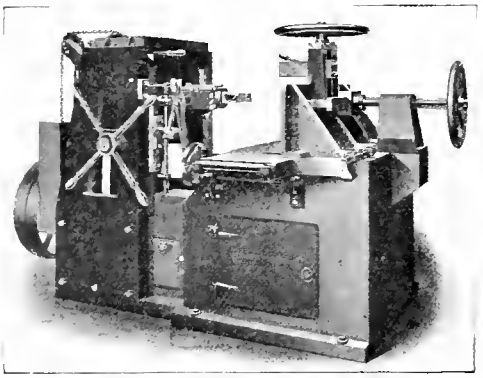


Fig. 6809. No. 218. Extra Range Automatic Hollow Chisel Mortiser.

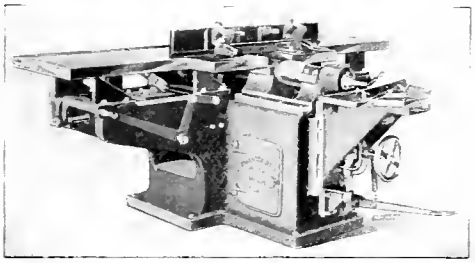


Fig. 6810. No. 575. Universal Wood Worker with Boring and Mortising Attachments.

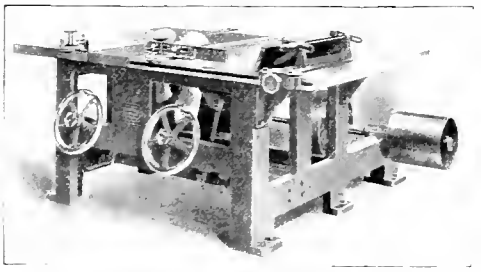


Fig. 6811. No. 475. Cabinet Maker's Double Saw Bench.

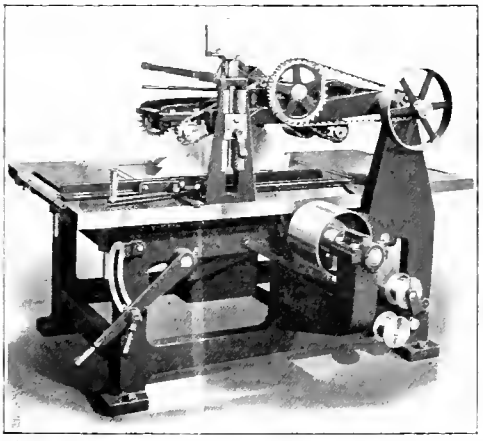


Fig. 6812. No. 428. Heavy Self-Feeding Rip Saw Table.

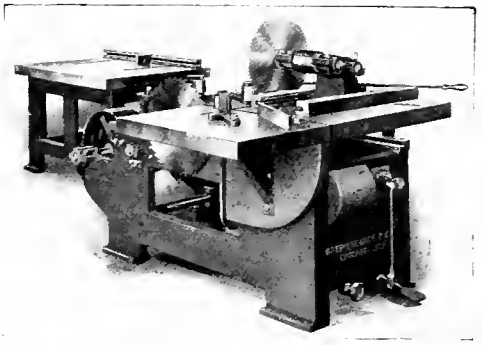


Fig. 6813. No. 474. Automatic Car Brace Cutter.

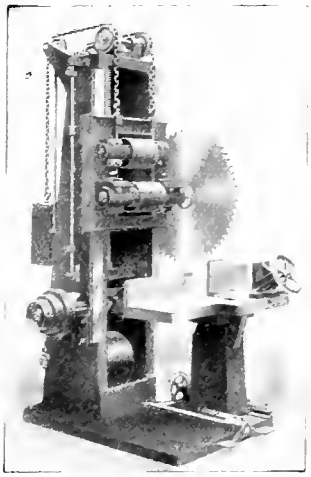


Fig. 6814. No. 520. Vertical Automatic Cut-off Saw and Gainer.

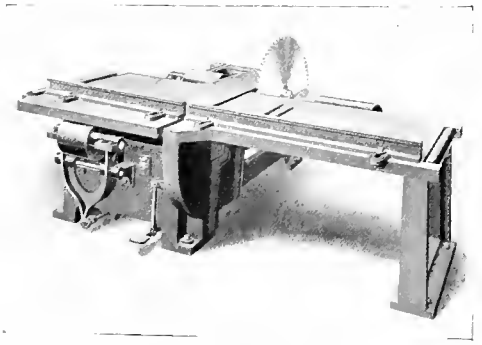


Fig. 6815. No. 456. Automatic Railway Cut-off Saw.

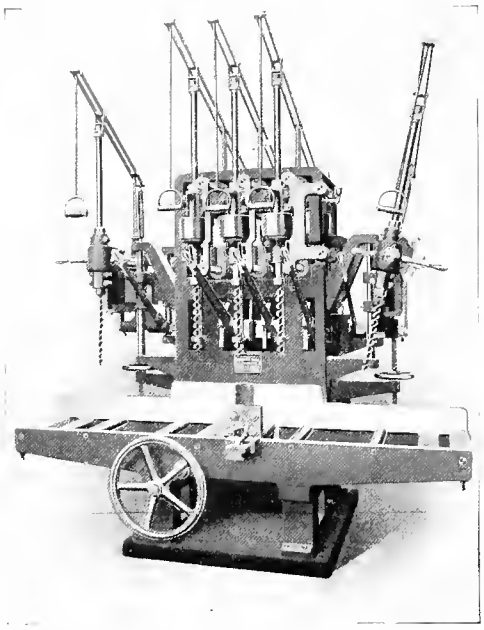


Fig. 6816. No. 327. Vertical
Car Boring Machine with Universal Spindles.

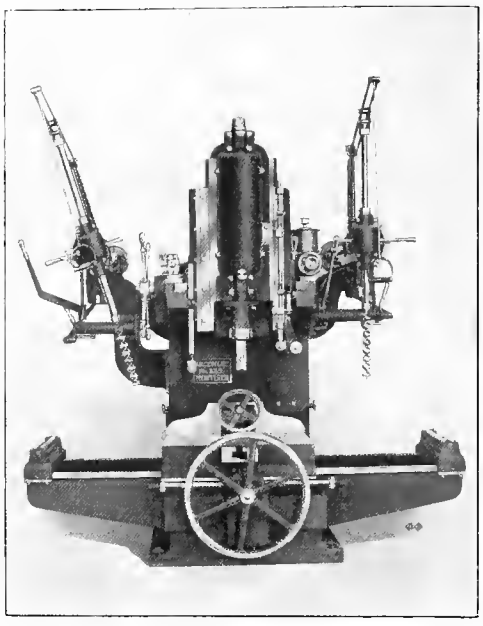


Fig. 6817. No. 238. Extra Range
Vertical Hollow Chisel Car Mortiser.

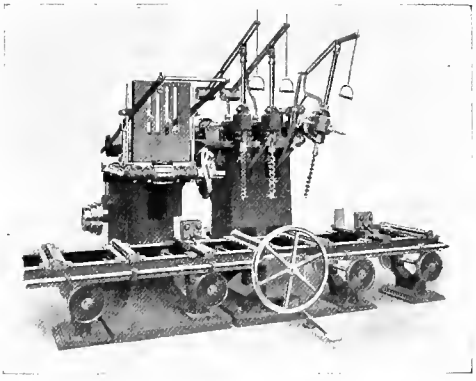


Fig. 6818. No. 505. Combined Medium Range
Car Gainer and Vertical Boring Machine.

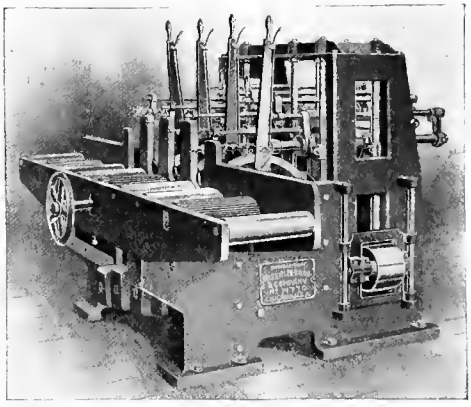


Fig. 6819. No. 306. Extra Range
Horizontal Car Boring Machine.

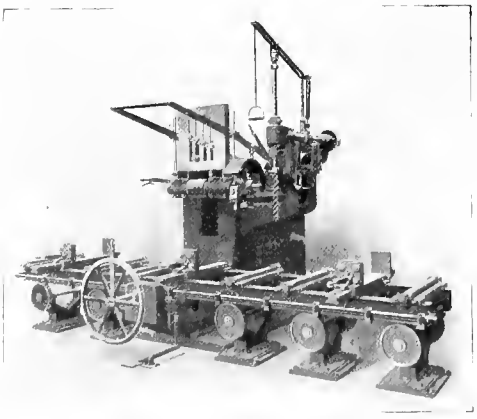


Fig. 6820. No. 512. Extra Range
Automatic Car Gainer with Boring Attachment.

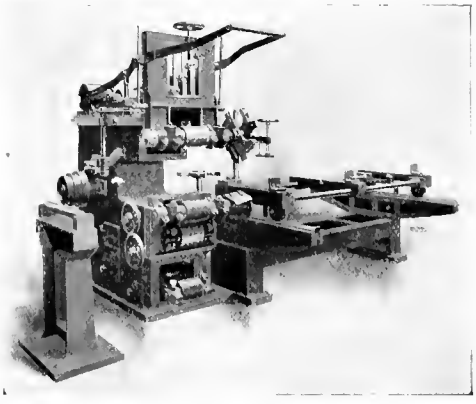


Fig. 6821. No. 528. Combined Automatic
Car Gainer and Horizontal Tenoner.

Greenlee Bros. & Co.

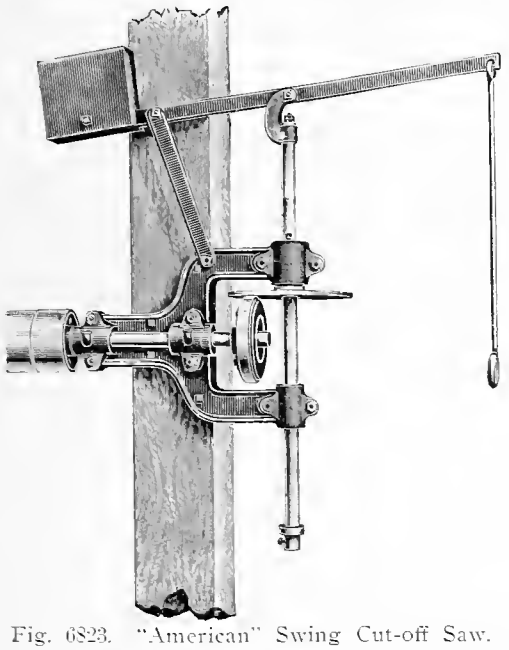


Fig. 6823. "American" Swing Cut-off Saw.

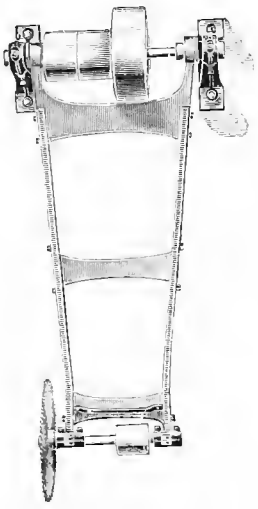


Fig. 6822. "American" Noiseless Post Borer.

American Saw Mill Machinery Co.

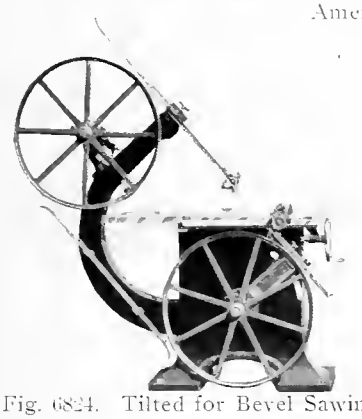


Fig. 6824. Tilted for Bevel Sawing.

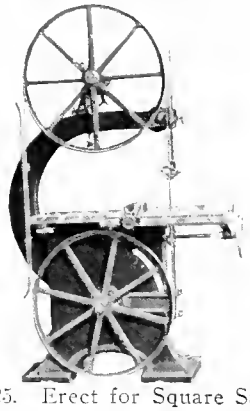


Fig. 6825. Erect for Square Sawing.

Crescent Angle Band Saw. Crescent Machine Co.

TABLE OF POWER REQUIRED TO DRIVE WOODWORKING MACHINES BY ELECTRIC MOTOR.
Data Compiled from Actual Installations Made by The Crocker-Wheeler Co.

Type of Machine.	Maker's Number.	Maker.	Will Take Stock.	Horse Power of Motor to Drive.	Connection Between Motor and Machine.	Counter Shaft or Motor Speed. R. P. M.
Boring Machine, Car	321	S. A. Woods.	12 in. x 14 in.	7½ to 10	Geared to Counter Shaft	875
Boring Machine, Universal	52	Fay & Egan.	20 in. Stroke.	3	Belted to Machine	375
Box Joint Machine	...	.....	12 in. x 1 in.	10	Belted to Counter Shaft	....
Drill, Post	...	.....	42 in. x 7 in.	2	Belted to Counter Shaft	....
Friezer or Shaper, Single Spindle	8	Fay & Egan.	.....	2	Geared to Friction Clutch	700
Grinder	226	S. A. Woods.	30 in. to 42 in. long.	5	Coupled to Counter Shaft	350
Gainer, Automatic Car	315	S. A. Woods.	24 in. x 20 in.	15	Coupled to Counter Shaft	500
Grinder, Auto Knife	2	Fay & Egan.	32 in. Long.	2	Geared to Counter Shaft	350
Hardwood Floorer	19	S. A. Woods.	9 in. x 6 in.	40	Coupled to Counter Shaft	950
Hardwood Floorer	24	S. A. Woods.	9 to 30 in. x 6 in.	40 to 60	Coupled to Counter Shaft	950
Lathe, 16 in. Wood	...	Fay & Egan.	16 in. Swing.	2	Geared to Spindle	....
Mortiser and Borer	71	Fay & Egan.	Mortise, 4½ in. Deep.	2	Geared to Counter Shaft	500
Mortiser and Borer, Blind Stile	...	Fay & Egan.	Mortise, 2¼ in. Deep.	3	Belted to Counter Shaft	....
Mortiser, Hollow Chisel	305	S. A. Woods.	12 in. x 14 in.	15	Coupled to Counter Shaft	800
Molder, Inside	107	S. A. Woods.	12 and 15 in. x 6 in.	20 to 35	Coupled to Counter Shaft	850
Molding Machine, 6 in. 4 Side	2	Fay & Egan.	6 in. x 3½ in.	8	Belted to Counter Shaft	900
Molding Machine, Outside	128	S. A. Woods.	13 in. x 6 in.	22½ to 15	Coupled to Driving Shaft	950
Molding Machine, Upright	141	Fay & Egan.	40 in. x 56 in. Table.	9½ max. 4 min.	Coupled to Cutter Head	1,100
Panel Raiser, Double	...	S. A. Woods.	Raises up to 5 in.	7½	Belted to Driving Shaft	....
Planer and Jointer	1	Fay & Egan.	.....	3	Geared to Counter Shaft	6,000
Planer and Matcher	20	S. A. Woods.	15 in. x 6 in.	40 to 60	Coupled to Counter Shaft	950
Planer and Matcher, Heavy	10	S. A. Woods.	30 in. x 12 in.	25 to 55	Coupled to Counter Shaft	900-950
Planer and Matcher, Heavy	12	S. A. Woods.	30 in. x 8 in.	25 to 50	Coupled to Counter Shaft	900-1,000
Planer, Dimension	32	Fay & Egan.	24 in. x 24 in.	25	Belted to Counter Shaft	900
Planer, Double Cylinder	18	Fay & Egan.	30 in. x 8 in.	20	Belted to Counter Shaft	....
Planer, Pony	...	Am. Wd. Wkg. Mach. Co.	24 in. x 6 in.	5	.....	....
Re-Saw, Band	36	Fay & Egan.	36 in. x 20 in.	30	Geared to Machine	500
Re-Saw, Band	182	S. A. Woods.	8 in. x 13 in.	8 to 15	Coupled to Driving Shaft	600
Saw, Band	60	Fay & Egan.	34 in. x 28 in. Table.	5	Geared to Machine	....
Saw and Dado Machine	5	Fay & Egan.	14 in. Saw, 17 x 3½ in.	5	Belted to Counter Shaft	....
Saw, Auto. Ry. Cut-Off	2	Fay & Egan.	20 in. Saw.	10	Geared to Counter Shaft	....
Saw, Rip	153	S. A. Woods.	24 in. Saw.	25	Belted to Saw Arbor	750
Saw, Scroll	6	Fay & Egan.	32 in. x 38 in. Table.	1	Belted to Crank Shaft	1,400
Saw, Self Feed Rip	2½	Fay & Egan.	22 in. Saw.	15	Belted to Counter Shaft	....
Sizer	4	S. A. Woods.	30 in. x 24 in.	40 to 70	Coupled to Counter Shaft	900 to 950
Sizer	8	S. A. Woods.	30 in. x 16 in.	30 to 60	Coupled to Counter Shaft	900 to 950
Surfacer, Single	93	S. A. Woods.	24 in. x 6 in.	7½ to 10	Belted to Counter Shaft	1,100
Surfacer, Single or Double	59	S. A. Woods.	15 to 30 in. x 6 in.	20 to 40	Coupled to Counter Shaft	950
Surfacer, 6 Roll Double	51	S. A. Woods.	30 in. x 12 in.	17½ to 30	Coupled to Counter Shaft	900
Tenoning Machine	5½	Fay & Egan.	Medium Size.	5	Coupled to Counter Shaft	....
Wood Worker	2	Fay & Egan.	.....	5	Belted to Driving Shaft	....

Semi-enclosed shunt-wound motors are recommended for most of the service in a woodworking establishment, though the most desirable practice will always depend on local conditions.

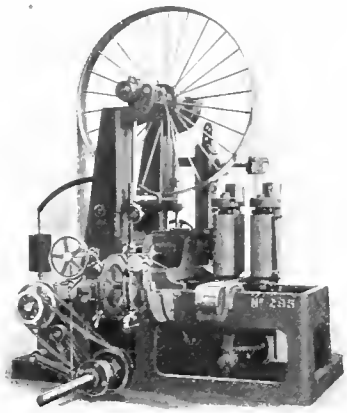


Fig. 6826. Berlin, No. 285, Band Resaw. For Saws up to 8 in. Wide.

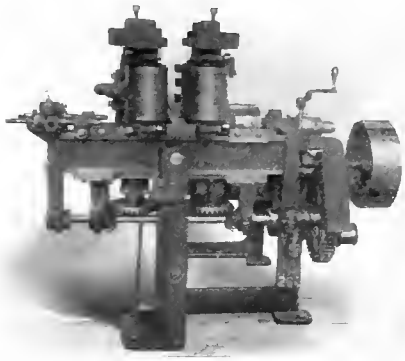


Fig. 6827. Berlin, No. 261. Circular Resaw. Built in 24, 30 or 36-in. Sizes.

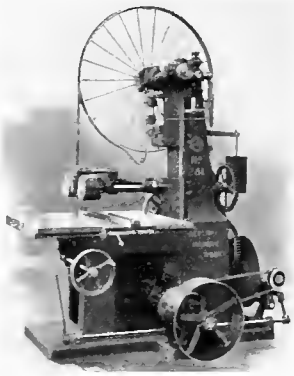


Fig. 6828. Berlin, No. 281, Band Rip Saw. For Blades up to 4 in. Wide.

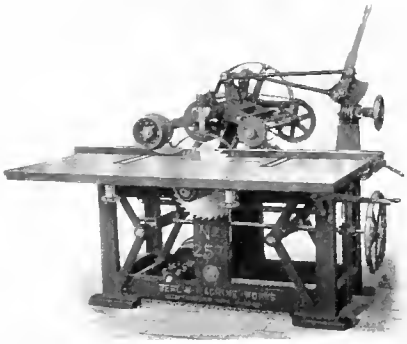


Fig. 6829. Berlin, No. 257, Self-Feed Rip Saw. Used with or without Countershaft.

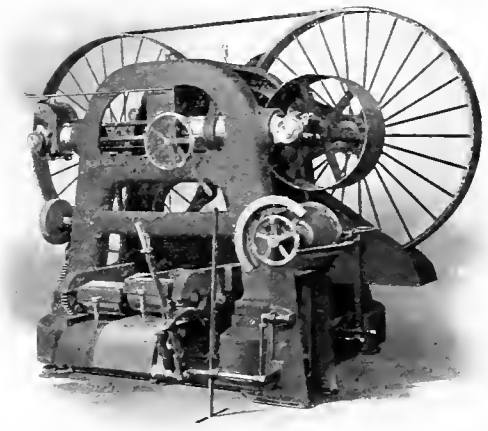


Fig. 6830. Berlin, No. 286, Horizontal Saw Mill Resaw. For 10-in Saw, 7-ft. Wheels.

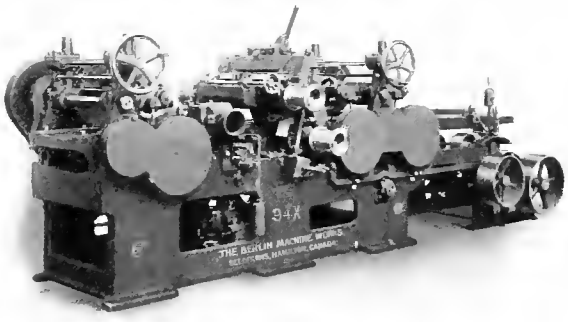


Fig. 6831. Berlin "94X" Planer and Matcher for Producing High Grade Work at Fast Feeds.

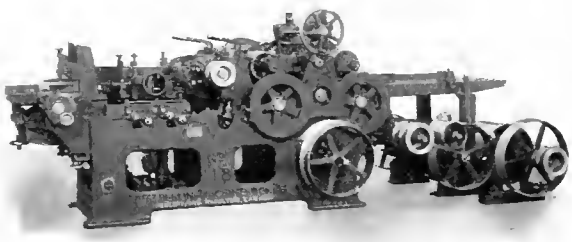


Fig. 6832. Berlin, No. 118, Inside Molder. Built 10, 12 and 15 in. Wide. Opening 6 in.

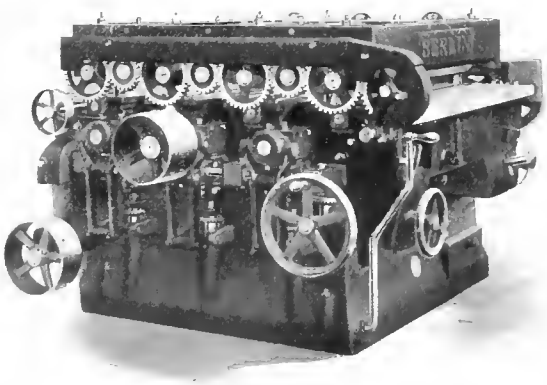


Fig. 6833. New Berlin Sander, Equipped with Spiral or Straight Opening Drums.

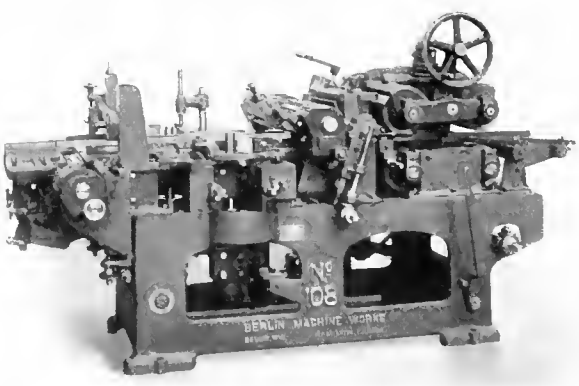


Fig. 6834. Berlin, No. 108, Open-Side Molder. Built 10, 12 and 15 in. Wide. Opening 8 in.

Berlin Machine Works.

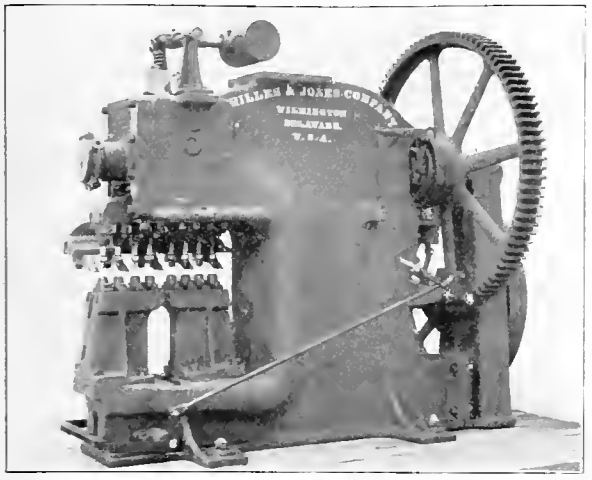


Fig. 6835. Special Multiple Punch.

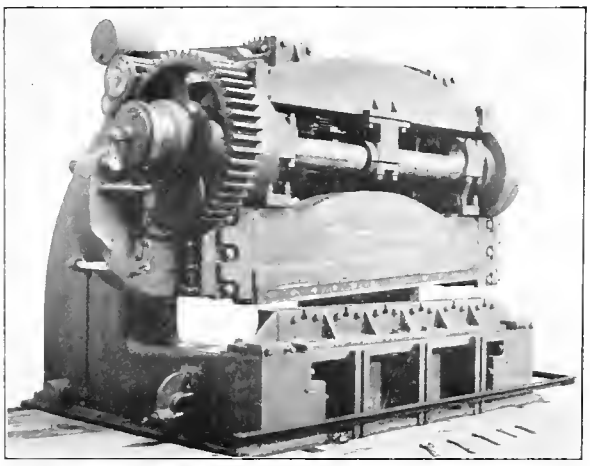


Fig. 6836. Heavy Plate Shear.

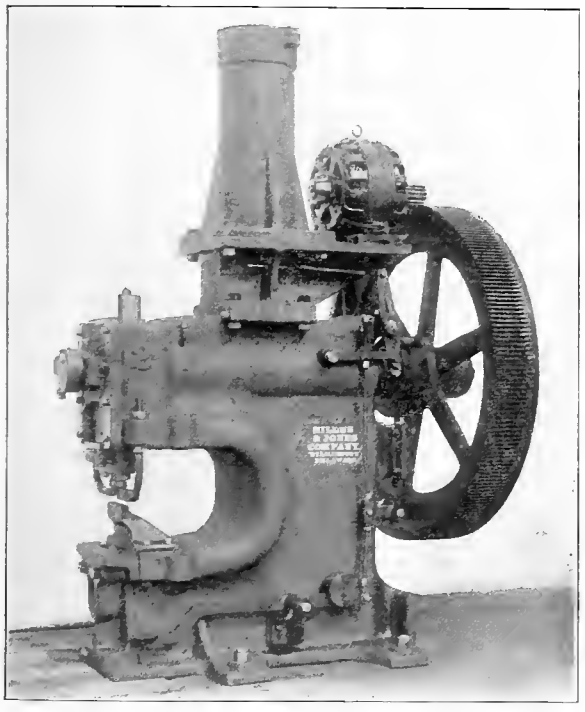


Fig. 6837. Improved Rapid Action Punch.

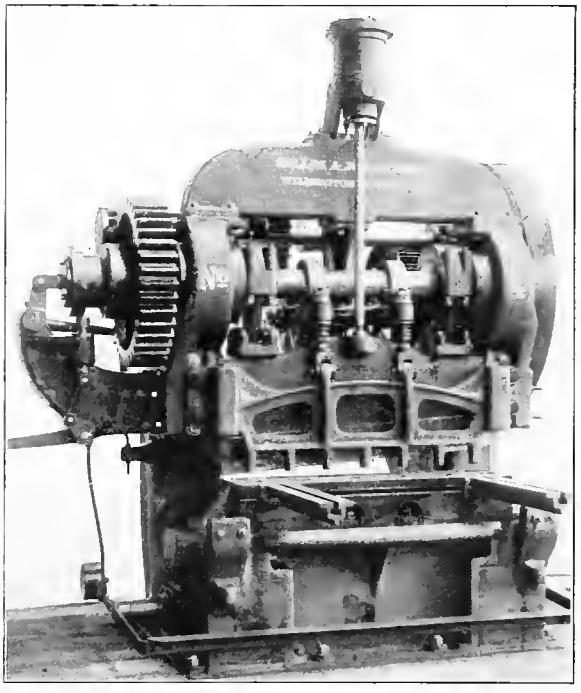


Fig. 6838. Small Gate Shear.

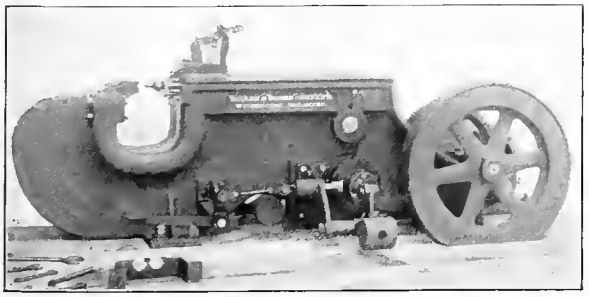


Fig. 6839. Improved Horizontal Punch.

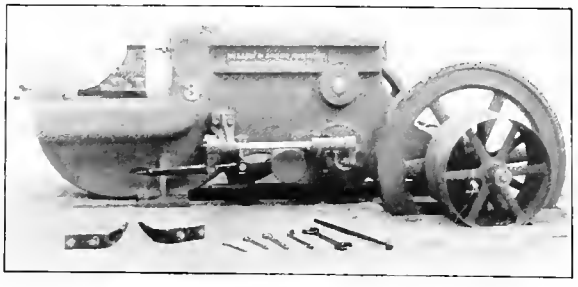


Fig. 6841. Horizontal Punch with Adjustable Die Block.

Hilles & Jones Co.

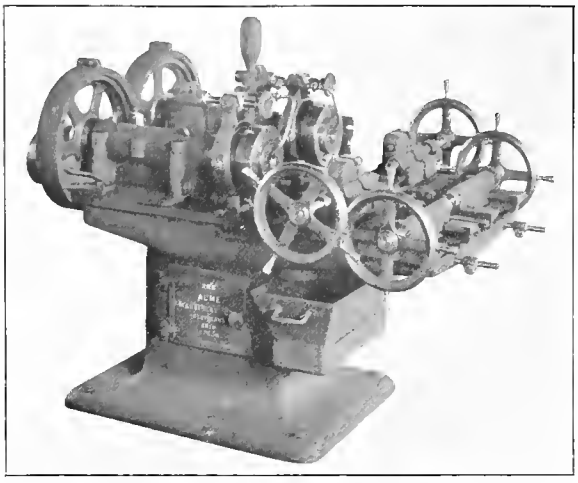


Fig. 6842. 1½-Inch Double Bolt Cutter.
Can be fitted with holders for threading pipe nippers
Acme Machinery Co.

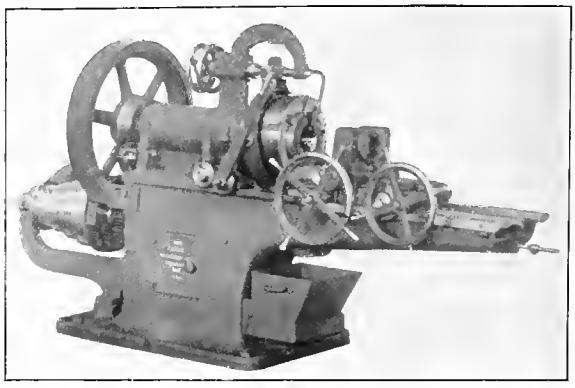


Fig. 6843. 4-Inch Bolt Cutter.
Acme Machinery Co.

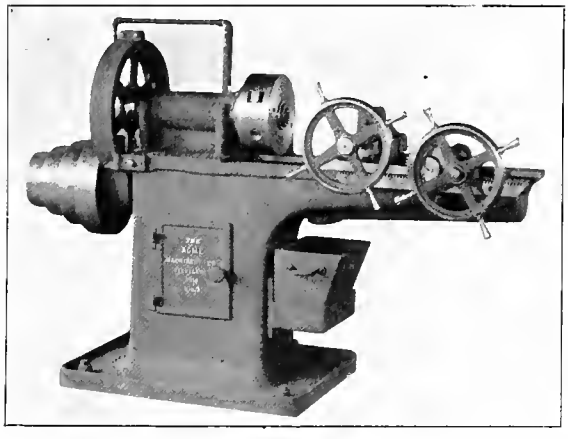


Fig. 6844. Single Bolt Cutter.
Acme Machinery Co.

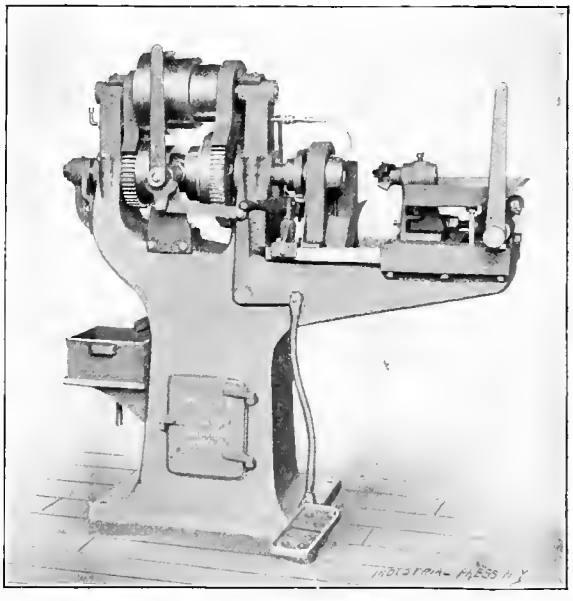


Fig. 6845. Nut Facing Machine.
Detrick & Harvey Mch. Co.

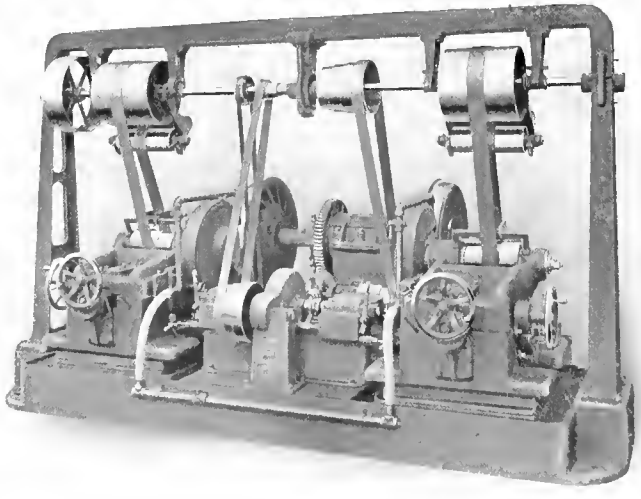


Fig. 6846. Car Wheel Grinder. Norton Grinding Co.

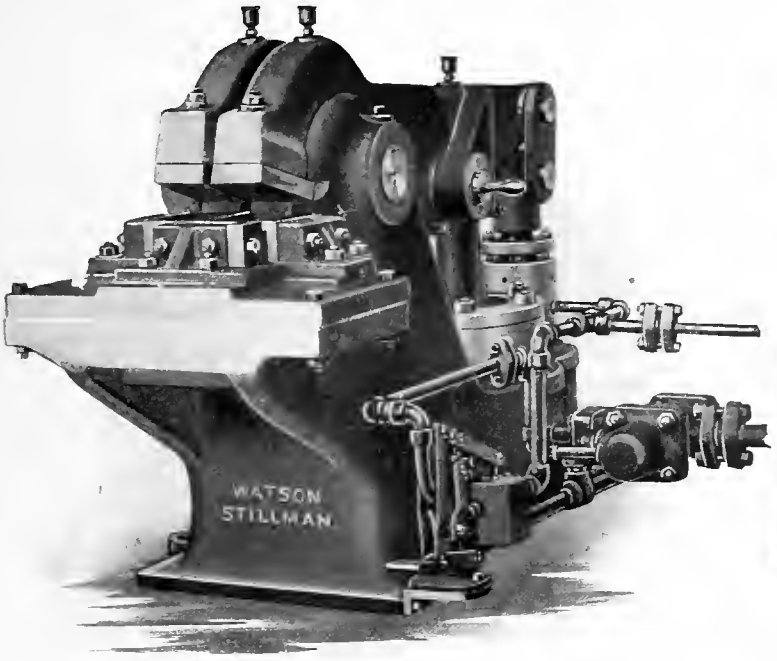


Fig. 6847. Hydraulic Coping Machine.
Watson-Stillman Co.

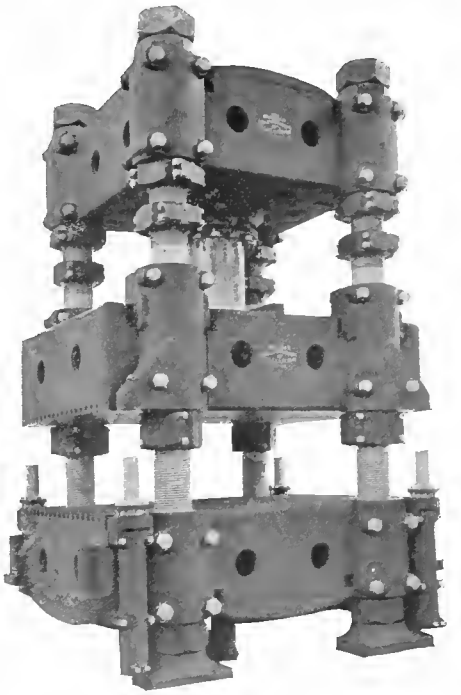


Fig. 6848. 1,000-Ton Press.
Morgan Engineering Co.

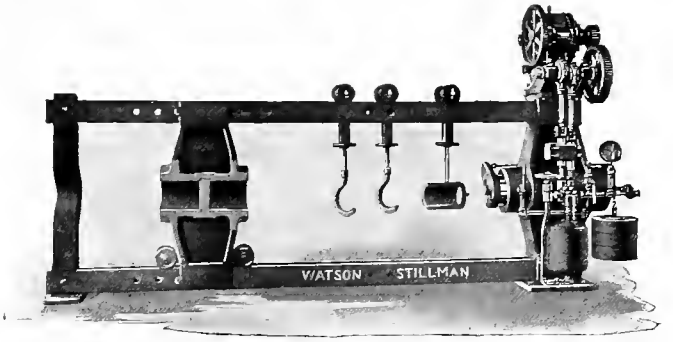


Fig. 6849. Hydro-Pneumatic Wheel Press. Built in 19 Sizes, Capacities 60 to 600 Tons. Watson-Stillman Co.

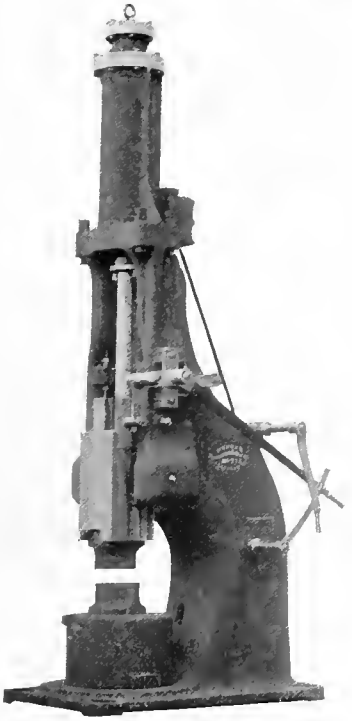


Fig. 6850. Single Stand Hammer.
Morgan Engineering Co.

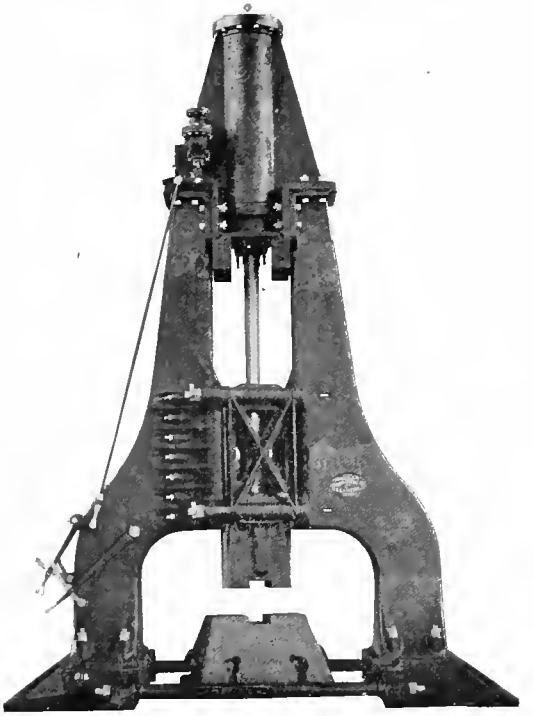


Fig. 6851. Double Stand Hammer.
Morgan Engineering Co.

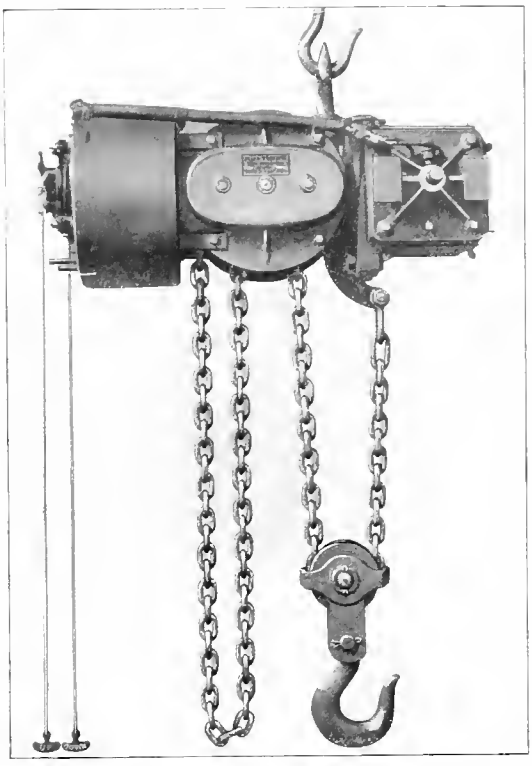


Fig. 6852. Type C Electric Chain Block.

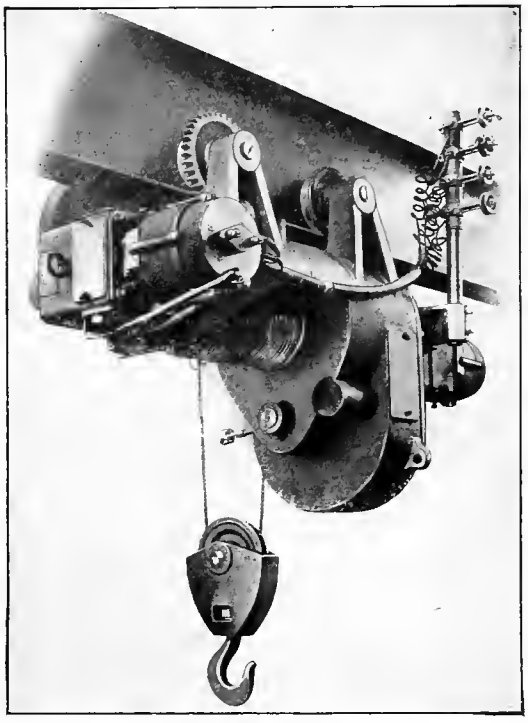


Fig. 6853. Type PL Electric Express Trolley Hoist.

Fig. 6854. Type E Electric Crane Trolley.

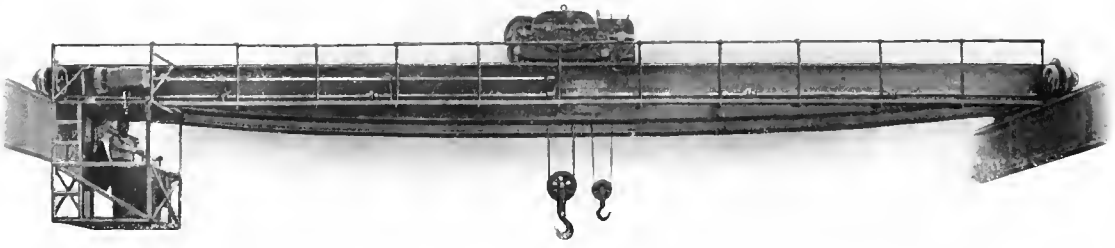


Fig. 6855. Standard Northern, Type E, 4-Motor Electric Traveling Crane.
Northern Engineering Works.

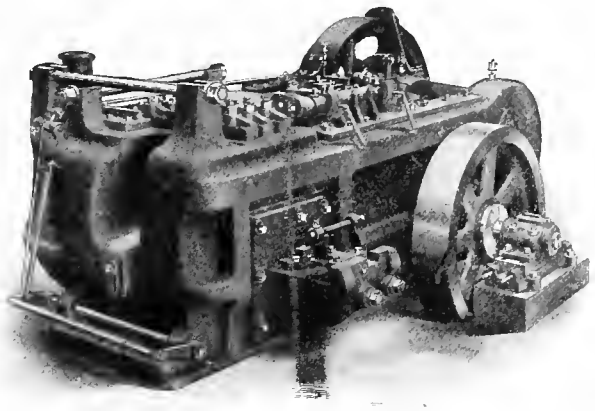
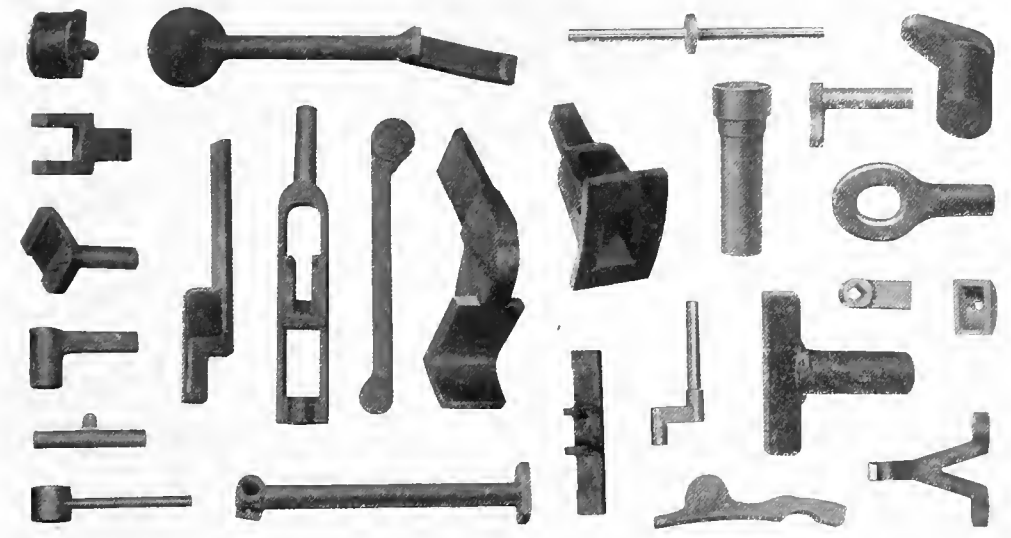


Fig. 6856. Bolt-Heading, Upsetting and Forging Machine.
Built in Sizes from ¾-in. to 6-in.



Figs. 6857-6881. Forgings Made on Ajax Machine..

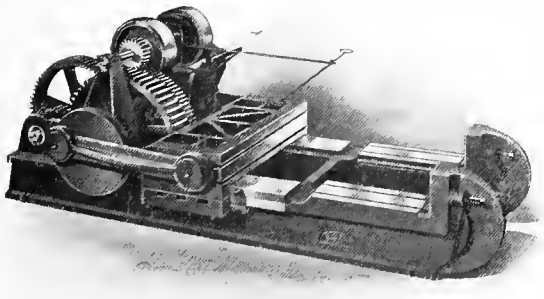


Fig. 6882. Standard Bulldozer.
Built in Sizes Nos. 3 to 12. Belt or Motor Driven, with Single or Double Friction Clutches.

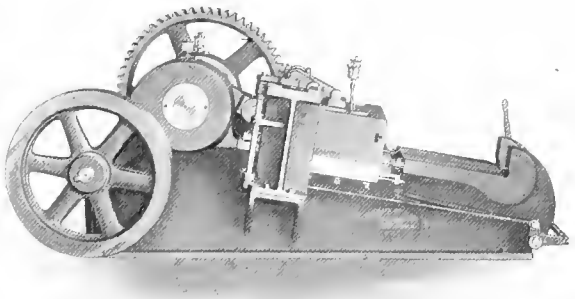


Fig. 6883. High Speed Bulldozer.
Built in Sizes Nos. 1 to 5. Stop Motion Device.

Ajax Manufacturing Co.

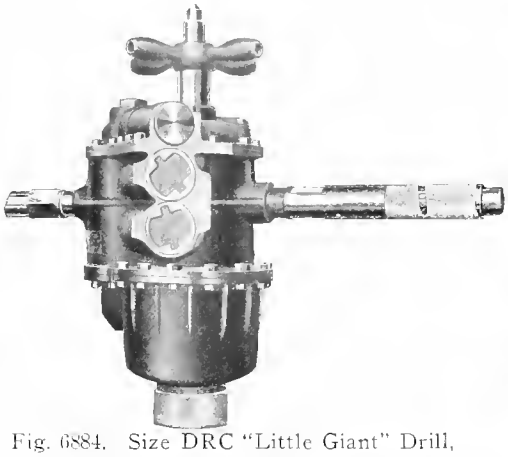


Fig. 6884. Size DRC "Little Giant" Drill, with Compound Gear for Extreme Heavy Work.

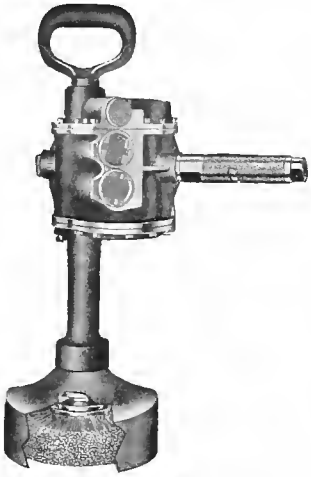


Fig. 6885. No. 4 "Little Giant" Grinder or Buffer.

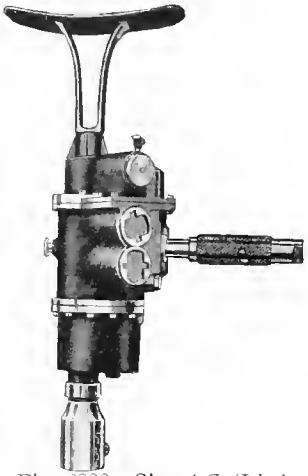


Fig. 6886. Size AC "Little Giant" Drill, Fitted with any Style Chuck Desired.

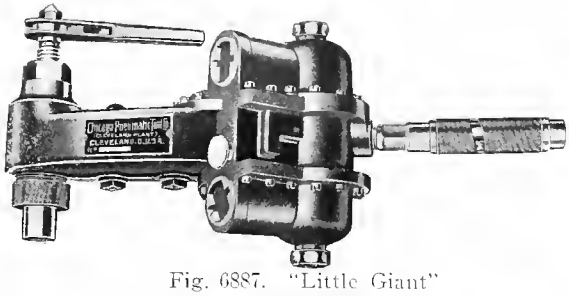


Fig. 6887. "Little Giant" Corner Drill.

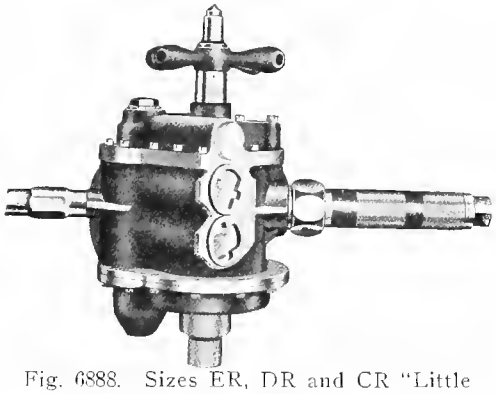


Fig. 6888. Sizes ER, DR and CR "Little Giant" Reversible Drills, with Throttle Handle Reverse.

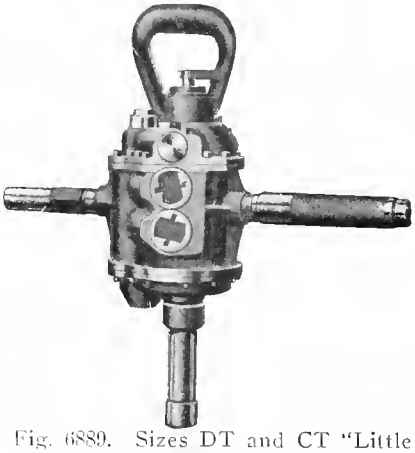
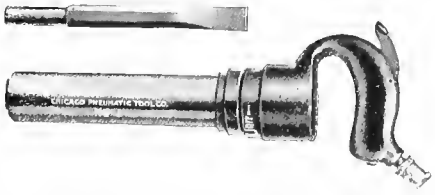


Fig. 6889. Sizes DT and CT "Little Giant" Flue Rolling and Tapping Machines.



Figs. 6890-6891. "Boyer" Chipping and Calking Hammers.

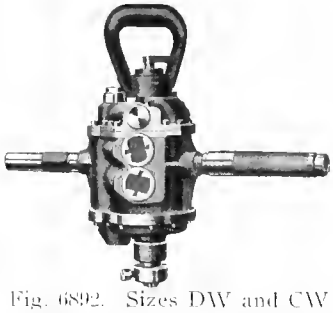


Fig. 6892. Sizes DW and CW "Little Giant" Wood Boring Machines, Spade Handle Reverse.

Fig. 6893. "Keller" Chipping and Calking Hammers.

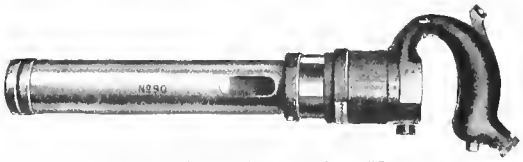


Fig. 6895. "Boyer" Riveting Hammers.

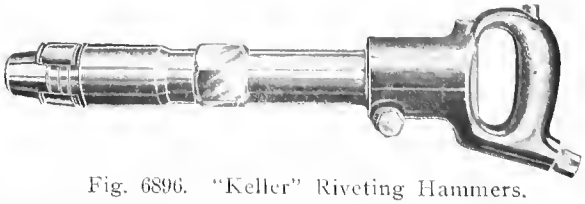


Fig. 6896. "Keller" Riveting Hammers.

Chicago Pneumatic Tool Co.

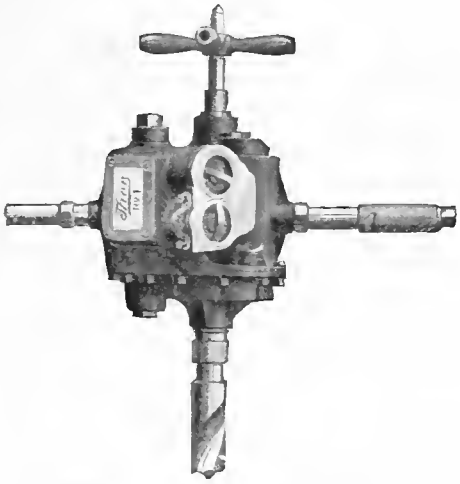


Fig. 6897. Thor Piston Air Drill, No. 1. Made in 8 Sizes.

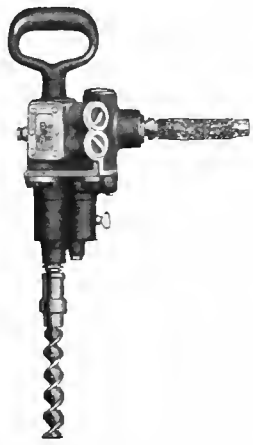


Fig. 6898. Thor Pneumatic Wood Boring Machine, No. 6.

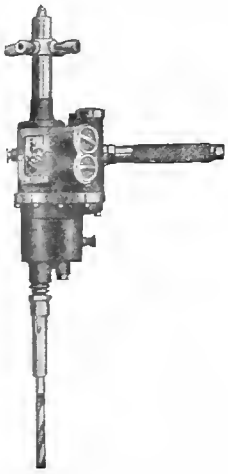


Fig. 6899. Thor Breast and Screw Feed Drill, No. 3.

Fig. 6900. Thor One-Piece Pneumatic Long Stroke Riveting Hammer, No. 90. Made in 3 Sizes.

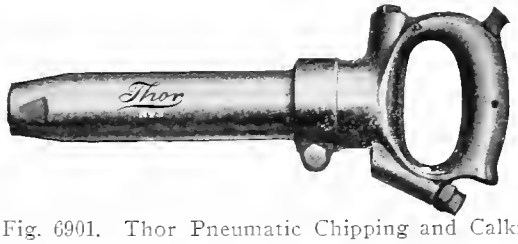


Fig. 6901. Thor Pneumatic Chipping and Calking Hammer, No. 3. Made in 5 Sizes.

Fig. 6902. Thor Pneumatic Light Riveting Hammer.

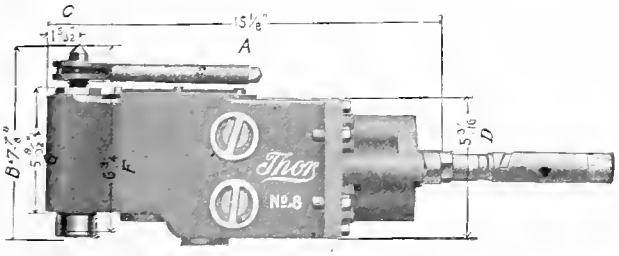


Fig. 6903. Thor Close Quarter Piston Air Drill, No. 8. Made in 2 Sizes.

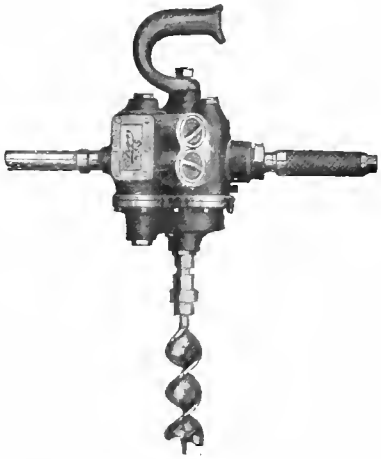


Fig. 6904. Thor Reversible Wood Boring Machine, No. 5.

Independent Pneumatic Tool Co.

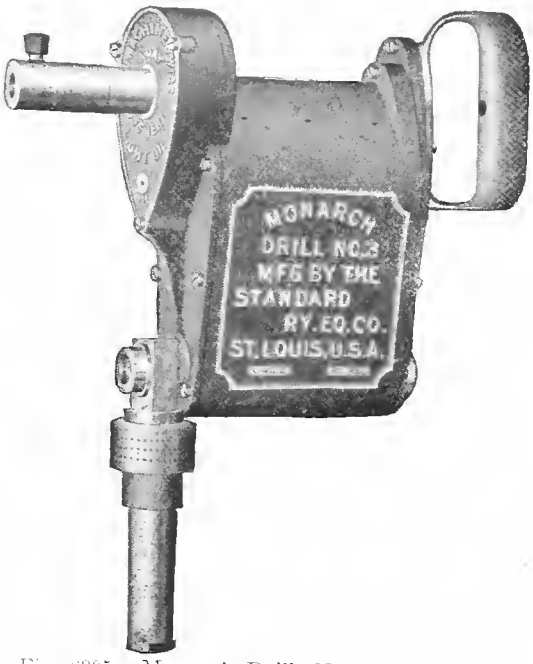


Fig. 6905. Monarch Drill, No. 3, for Wood Boring.

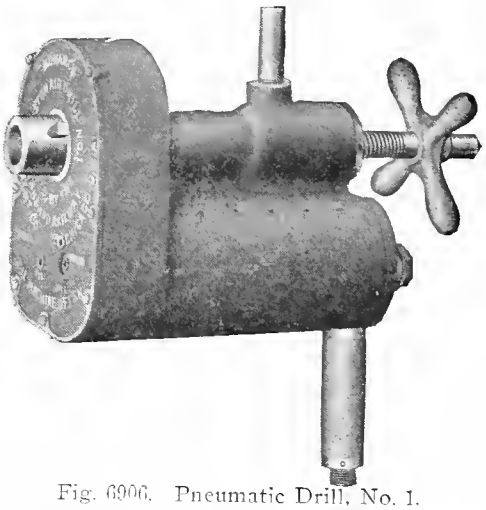


Fig. 6906. Pneumatic Drill, No. 1.

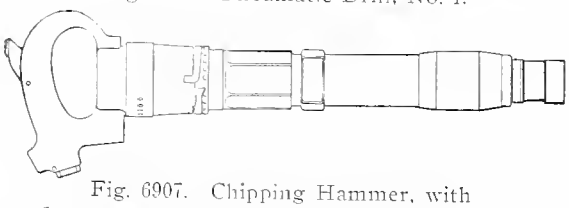


Fig. 6907. Chipping Hammer, with Improved Locking Device. Made in 8 Sizes, C, D, E, F, G, H, I and L.
Standard Railway Equipment Co.

Fig. 6909. "Imperial" Wood Boring Machine.
Ingersoll-Rand Co.

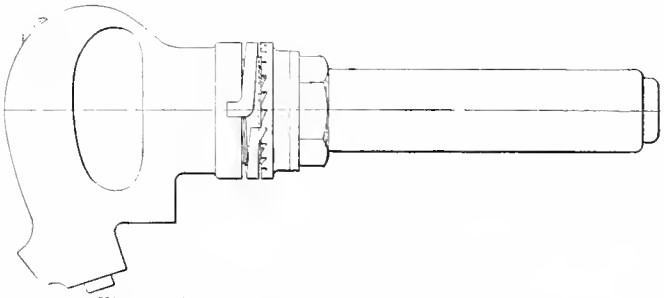


Fig. 6908. Riveting Hammer, No. 60, with Improved Locking.
Standard Railway Equipment Co.

Fig. 6910. "Imperial" Long Stroke Riveting Hammer.

Fig. 6911. "Imperial" Chipping Hammer.

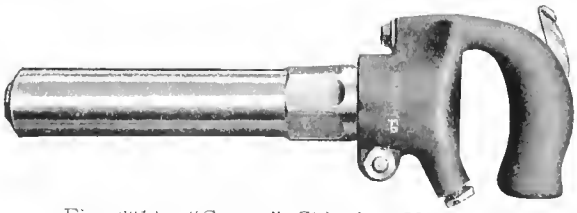


Fig. 6912. "Crown" Chipping Hammer.

Fig. 6913. "Crown" Riveting Hammer.

Ingersoll-Rand Co.

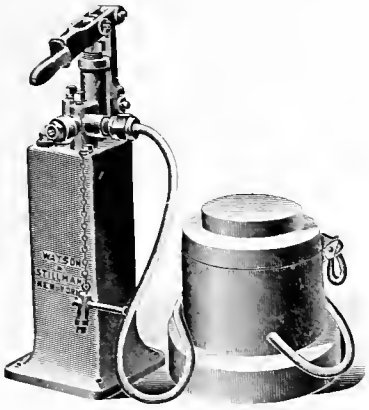


Fig. 6914. Independent Pump Jack
Watson-Stillman Co.

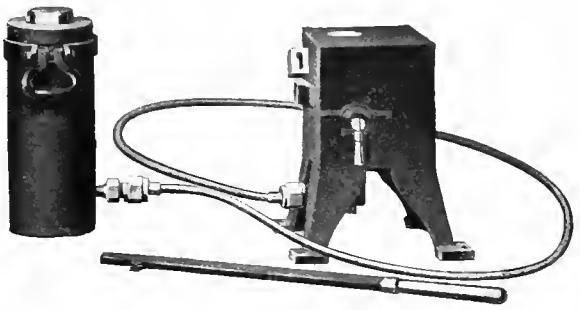


Fig. 6915. Independent Pump Jack.
Richard Dudgeon.

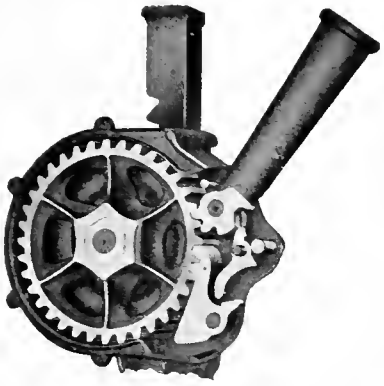


Fig. 6916. Operating Mechanism of Geared Lever Jack, No. 200. Set for Raising.

Fig. 6917. Horizontal Claw Jack, with Reinforced Cistern.

Fig. 6918. Round Base Jack.

Fig. 6919. Oblong Base Jack.

Richard Dudgeon.

Fig. 6920. Automatic Geared Lever Jack, No. 200.

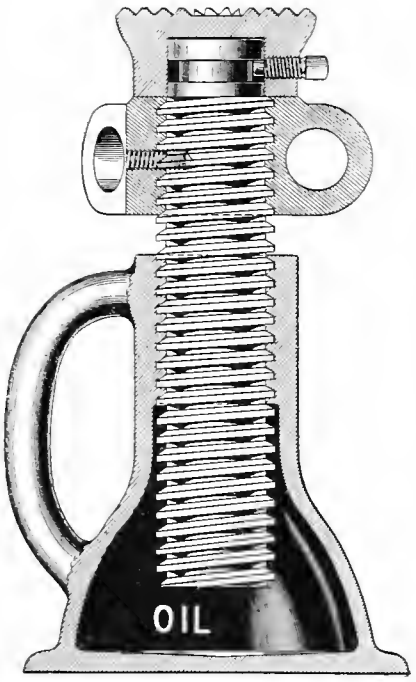
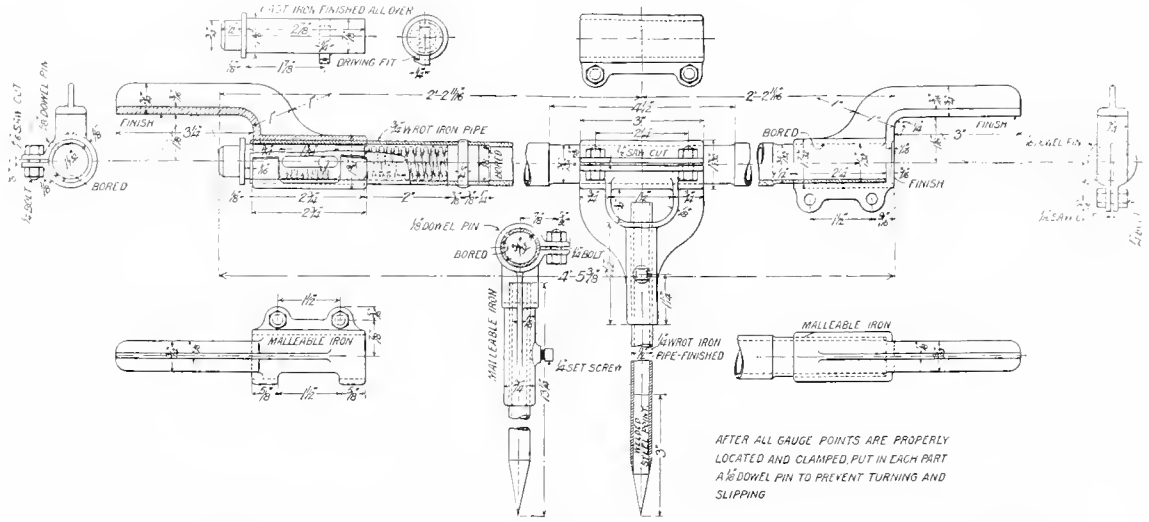


Fig. 6921. Cross-Section of Bell Base Jack.

Joyce-Cridland Co.



Figs. 6922-6930. Gage for Locating Car Wheels Equidistant from Center of Axle. Pratt & Whitney.

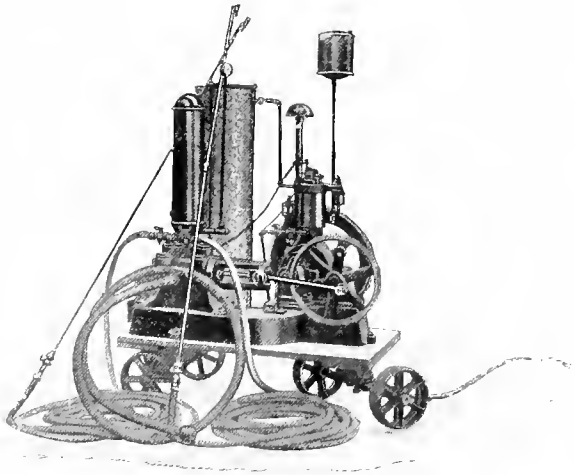


Fig. 6931. Buckeye Power Outfit.

Fig. 6932. Buckeye Oil Paint Sprayer.

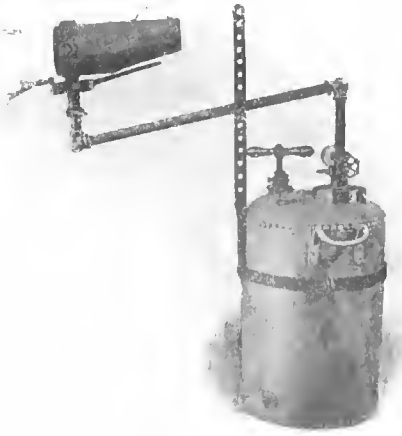


Fig. 6933. Buckeye Heater.

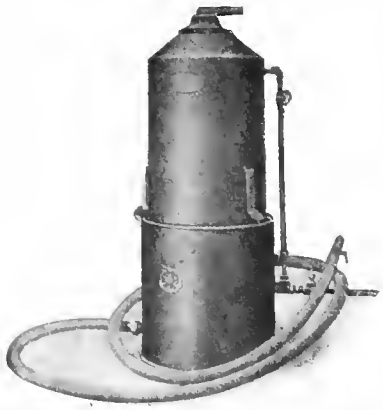


Fig. 6934. Buckeye Sand Blast Machine.

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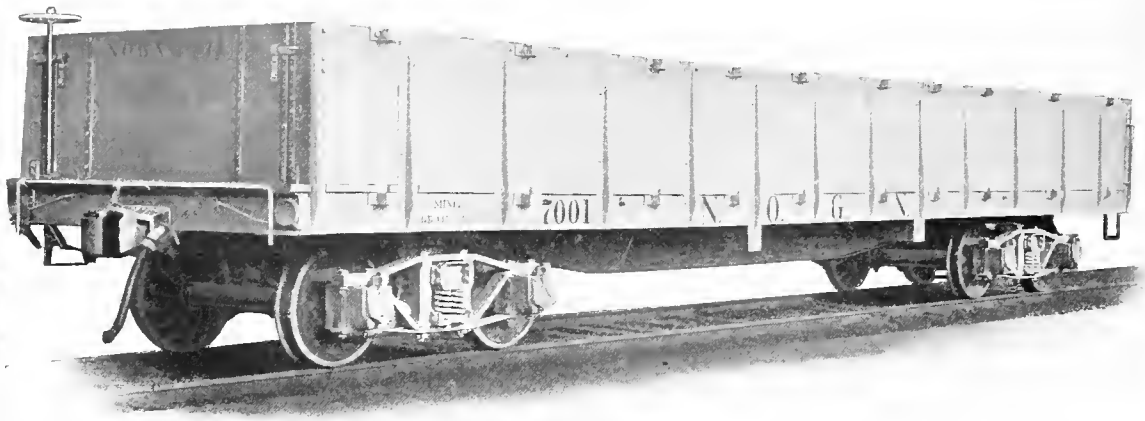

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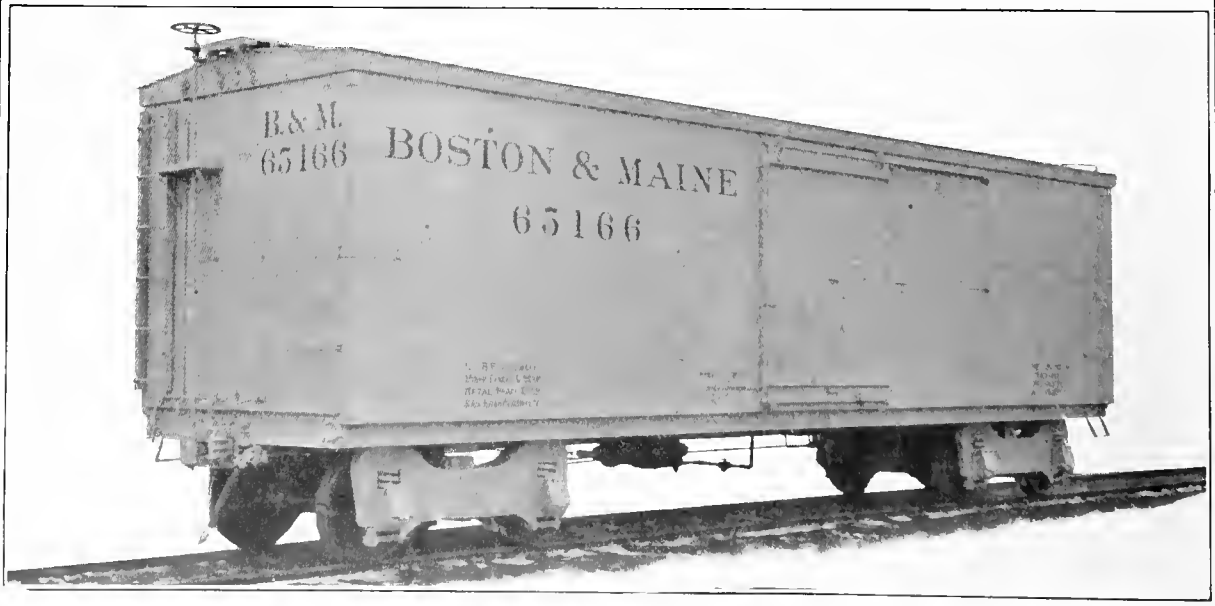

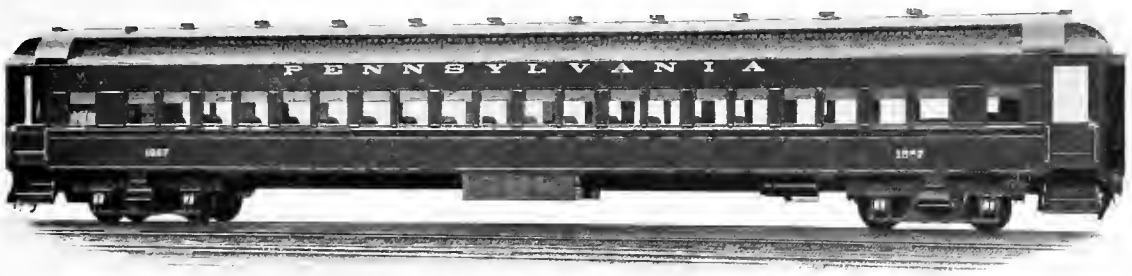

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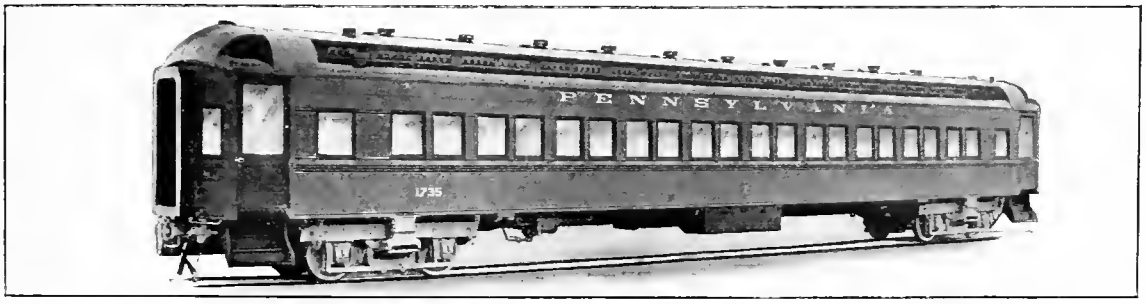

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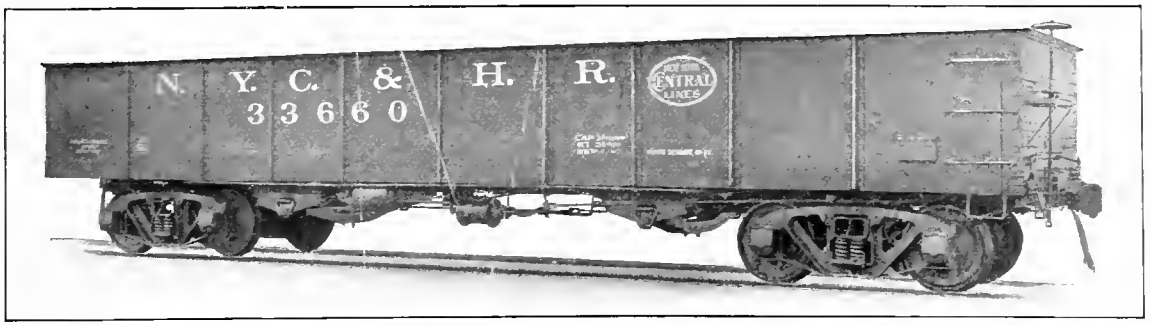

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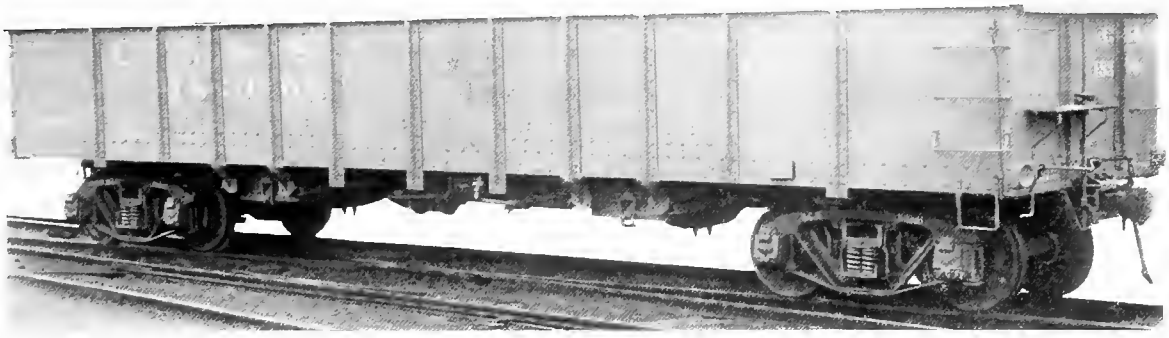

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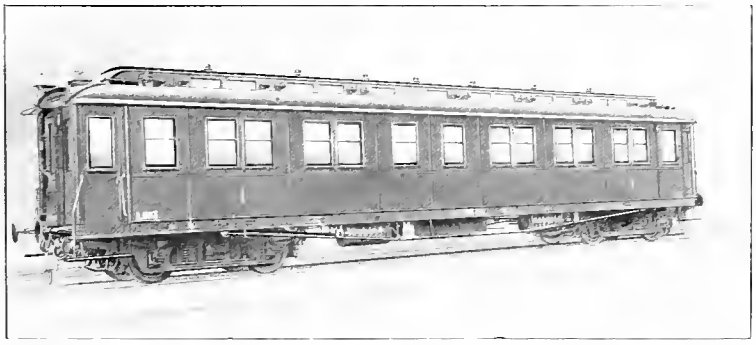

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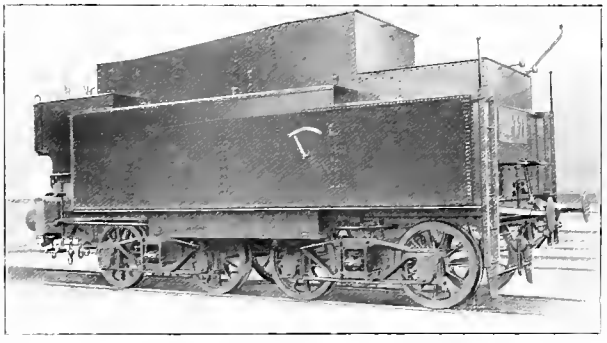

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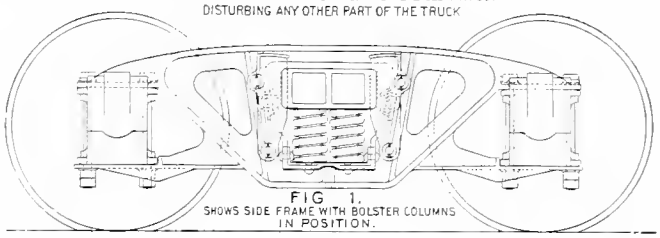

FIG 1.
SHOWS SIDE FRAME WITH BOLSTER COLUMNS IN POSITION.

The superiority of a cast steel side frame for trucks of the Arch Bar type over the built-up frame on account of the decrease in the number of parts and the possibility of securing greater strength where additional strength is required, thereby reducing the expense of repairs and maintenance, is becoming very generally recognized.

The Buhoup Side Frame embodies all the desirable features so far developed in cast steel side frames, and has in addition distinctive desirable features peculiarly its own.

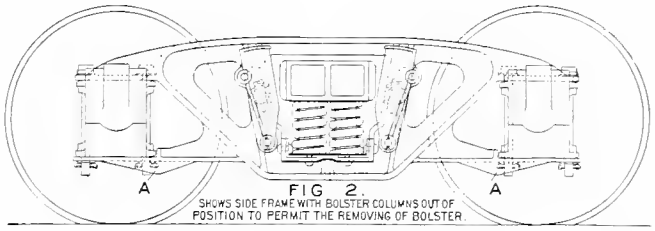

FIG 2.
SHOWS SIDE FRAME WITH BOLSTER COLUMNS OUT OF POSITION TO PERMIT THE REMOVING OF BOLSTER.

NOTE: IF DESIRED FRAMES CAN BE MADE WITHOUT EXTENSIONS A-A AND A TIE BAR USED INSTEAD OF THEM.

Adjustable Bolster Columns which permit the insertion of the Bolster after the balance of the truck has been assembled, and which also permits of removing and replacing bolsters without disturbing any other part of the truck.

Brake Hanger Supports cast integral with adjustable columns.

Lower Journal Box Extensions AA cast integral with the frame dispensing with the use of tie bars and the use of nuts on journal box bolts, a split key being all that is required.

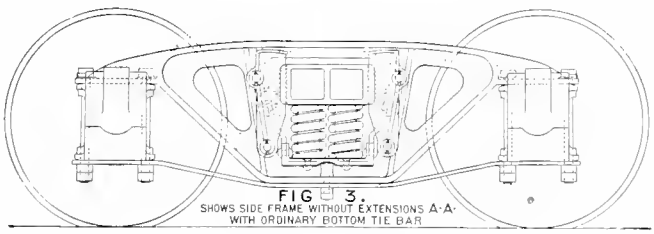

FIG 3.
SHOWS SIDE FRAME WITHOUT EXTENSIONS A-A WITH ORDINARY BOTTOM TIE BAR

Furnished if desired for use with ordinary bottom tie bar as shown in Fig. 3.

Design can be changed so as to be interchangeable with Standard Side Frames on any railroad.

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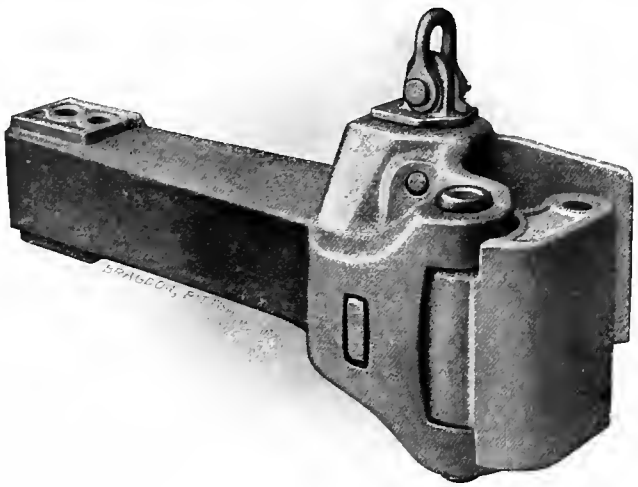

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The most complete, strongest and the largest used passenger coupler equipment on the market. Has important and desirable features not possessed by any other coupler equipment.

The Buhoup Vestibule

A complete, effective and thoroughly up-to-date and satisfactory vestibule; easy to apply and cheap to maintain.

STEEL CASTINGS, MALLEABLE IRON CASTINGS

FOR RAILROAD AND CAR WORK

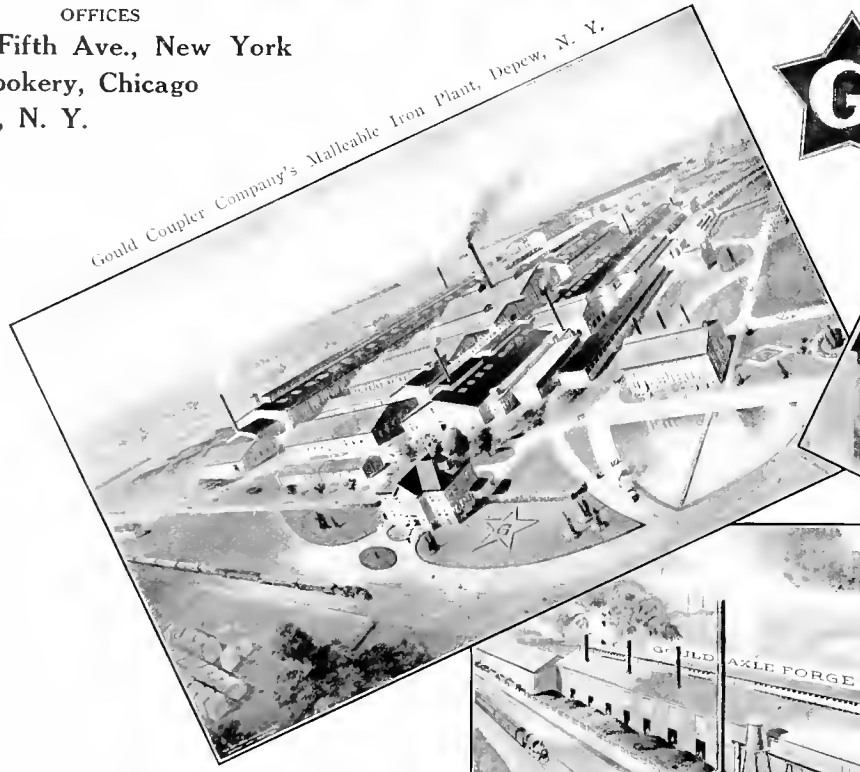
GOULD COUPLER CO.

OFFICES

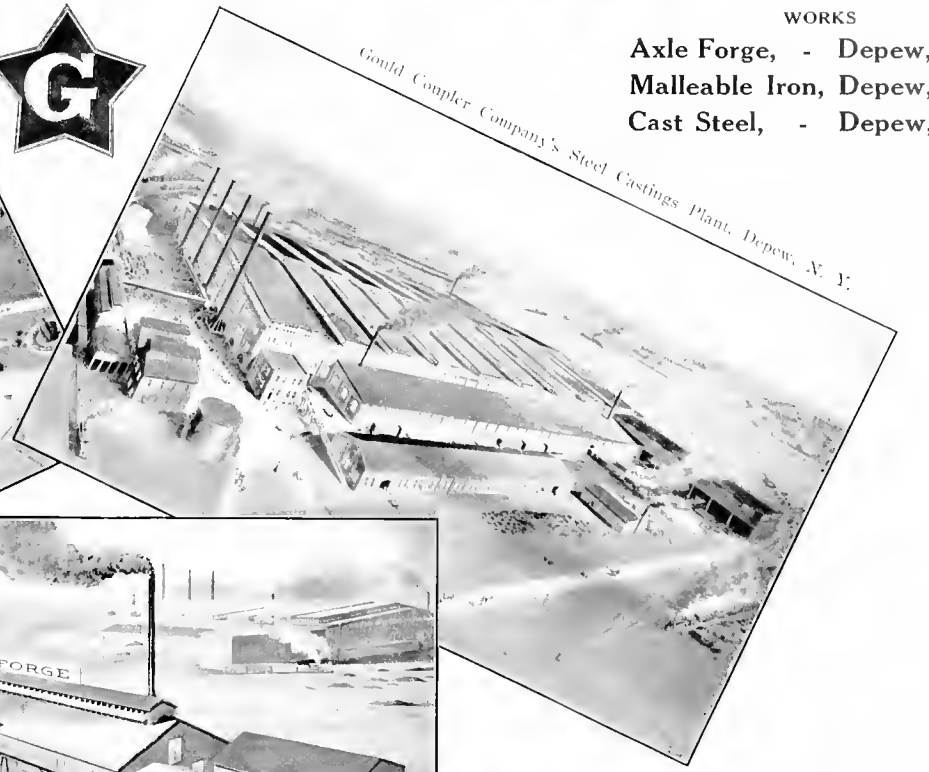
341-7 Fifth Ave., New York
The Rookery, Chicago
Depew, N. Y.

WORKS

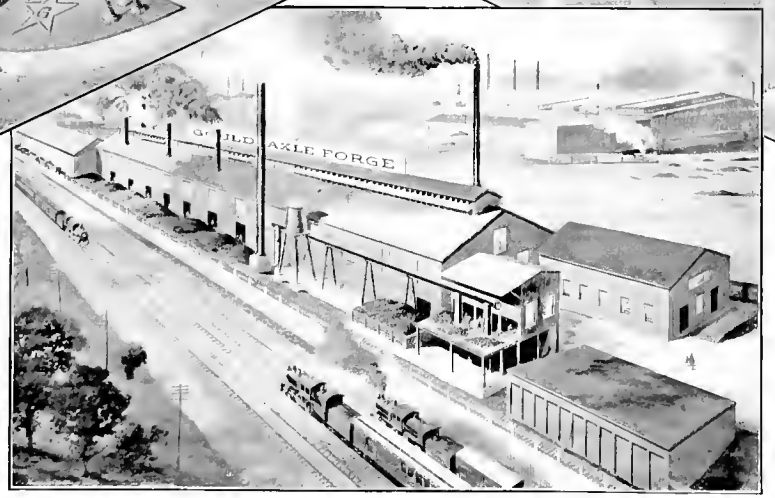
Axle Forge, - Depew, N. Y.
Malleable Iron, Depew, N. Y.
Cast Steel, - Depew, N. Y.



Gould Coupler Company's Malleable Iron Plant, Depew, N. Y.



Gould Coupler Company's Steel Castings Plant, Depew, N. Y.



Gould Coupler Company's Axle Forge, Depew, N. Y.

MANUFACTURERS OF

Gould M. C. B. Freight, Pilot, Tender and Passenger Couplers
Gould Vestibules, wide and narrow
Gould Continuous Platforms and Buffers for wood sills
Gould Continuous Platforms and Buffers with steel underframing
Gould Steel Platforms with Friction Buffers
Gould Friction Draft Gear for passenger equipment
Gould Trap-Door Rigging
Gould Journal Boxes
Gould Malleable Iron Draft Beams

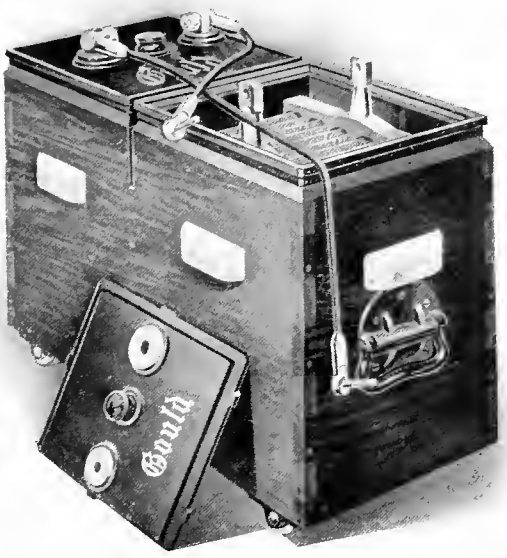
(See pages 264, 265, 269, 279, 293, 294, 295, 316, 317 and 525.)

MANUFACTURERS OF

Gould Twin Type of Draft Gears
Gould Tandem Type of Draft Gears
Uncoupling Brackets, special type
Malleable Iron Castings, scientifically annealed
Car and Engine Axles, reworked wrought iron or open-hearth [steel
Truck Frames
Cast-Steel Bolsters
Cast-Steel End Sills
Miscellaneous Castings
Gould Friction Draft Gear
Hartman Ball-Bearing Center Plates and Side Bearings

(See pages 264, 265, 295 and 505.)

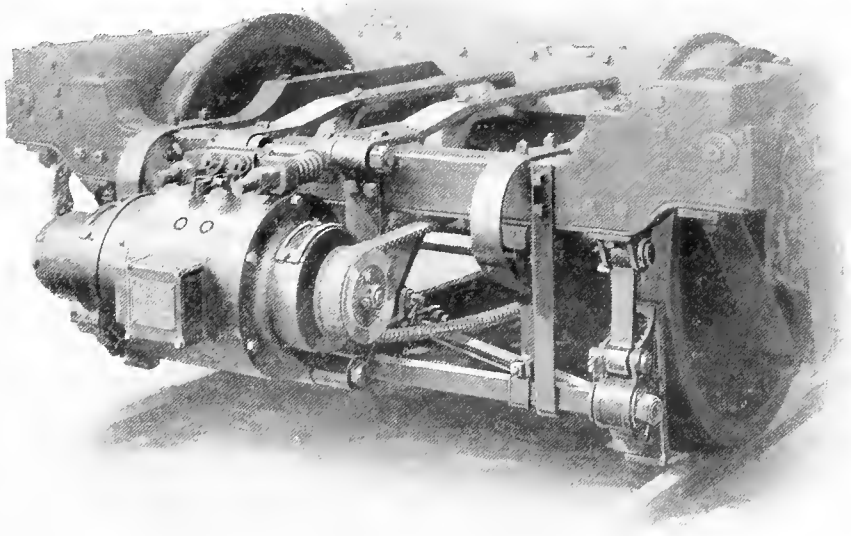
Gould Storage Battery Co., 341-347 Fifth Ave., N. Y.



GOULD
CAR
LIGHTING
BATTERIES

GOULD
ELECTRIC CAR LIGHTING

GOULD
AXLE
SYSTEM OF
LIGHTING



(See pages 403-404.)

Gould Coupler Company, 341-347 Fifth Ave., N. Y.

The Adams & Westlake Co.

MANUFACTURERS OF

Railway and Steamship Supplies

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HUDSON TERMINAL BLDG.
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ESTABLISHED 1869

NON-SWEATING STEEL AUTOMATIC ENGINE SIGNAL LAMPS
ACETYLENE GAS CAR LIGHTING SYSTEM
AXLE GENERATION ELECTRIC CAR LIGHTING SYSTEM
ACME BURNER OIL CAR LIGHTING SYSTEM
NON-SWEATING STEEL SEMAPHORE AND BLOCK SIGNAL LAMPS
NON-SWEATING PRESSED STEEL SWITCH LAMPS
STEEL AND WIRE GUARD LANTERNS
TRAM AND COACH TRIMMINGS
VESTIBULE FITTINGS
SASH LOCKS AND LIFTS
BASKET RACKS
RECLINING CHAIRS

NON-SWEATING STEEL COACH AND CABOOSE TAIL LAMPS
WHITE METAL WASHSTANDS AND FOLDING LAVATORIES
STEEL AND BRASS SWITCH LOCKS
DOOR LOCKS AND HINGES
STEAMSHIP FITTINGS
LONG TIME BURNERS
HEAD LIGHTS
HEAD LININGS

ADLAKE

"National" Storage Batteries

FOR ALL PURPOSES

THE STANDARD BATTERY FOR CAR LIGHTING SERVICE

ANY CAPACITY
ANY TYPE
ANY METHOD
OF ASSEMBLY

BLISS-SYSTEM-MOSKOWITZ

ELECTRIC TRAIN LIGHTING

ECONOMY RELIABILITY EFFICIENCY

These three all-important considerations are thoroughly demonstrated in the **"BLISS"** and **"MOSKOWITZ"** Systems of Electric Car Lighting. Actual figures obtained from operating conditions on a large number of railroads indicate conclusively the superior advantages of these two Systems over all others. ¶ PERFECT REGULATION with LOWEST OPERATING COSTS are assured to the purchaser.

COMMUNICATE WITH NEAREST OFFICE FOR COMPLETE INFORMATION

The United States Light and Heating Co.

General Office: 30 Church St., New York

"Bliss System of Electric Car Lighting." NEW YORK CHICAGO

"National" Batteries. MILWAUKEE

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PINTSCH LIGHT

The Inverted Mantle lamp for Pintsch Gas is now in service on over 5,700 cars. The merits that are interesting railroad managements include:
Unexcelled brilliancy of 99.5 candle power per lamp.
Demonstrated cost approximately one cent per hour.
Flat flame lamp equipment available for alteration at minimum cost, resulting in threefold greater illumination and increased tank capacity
Pintsch System has been applied to over 165,000 cars throughout the world.

VAPOR LIGHT

This system uses carburetted air in conjunction with the Pintsch inverted mantle lamps. The apparatus employed closely resembles that used in the Pintsch equipment and is particularly adapted for use on Branch Lines.
One charge will burn 200 hours and supply five lamps of 100 candle power each.

ELECTRIC LIGHT

Safety Axle-Driven Dynamo Equipment—now operating successfully on leading railroads—has demonstrated its reliability.
A product of sixteen years' experience.
High grade of materials and workmanship.
Generator of simple, strong and durable construction and of most practical design.
Regulator giving effective control and economy in the use of current.
Equipments either sold or operated under contract.

STEAM HEAT

Car Heating Specialists. Direct Steam and Hot Water Systems designed to give positive regulation of temperature and economy in steam. The Thermo Jet System is automatic and operates with or without pressure as desired. Steam tight couplers, traps, end-train pipe valves and other appliances.

THE

Safety Car Heating & Lighting Company

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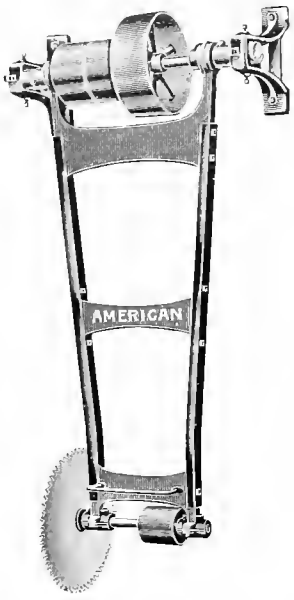
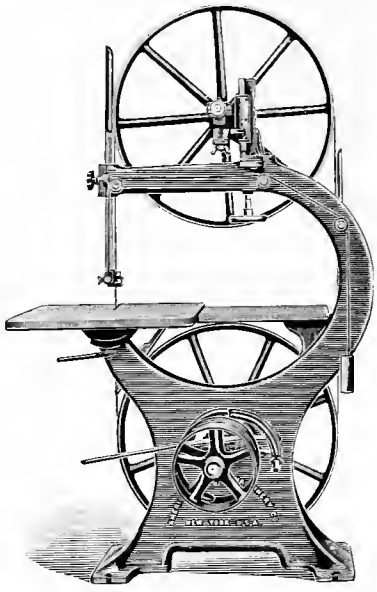
WE MAKE A LINE OF



Band Saws
Swing Cut-Off
and
Table Cut-Off
Saws

Combined Rip
and Cut-Off
Saw Benches
and other



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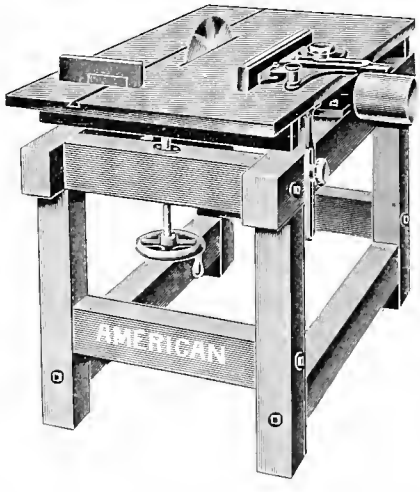
as Planers and Matchers, Surfacers, Boring Machines, etc., adapted to CAR SHOPS and Planing Mills

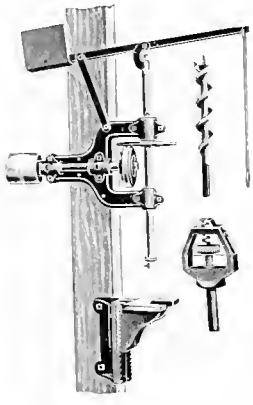


Also a full
line of

CIRCULAR SAW MILLS

and other Saw Mill Equipment

Catalog Free



AMERICAN SAW MILL MACHINERY CO.

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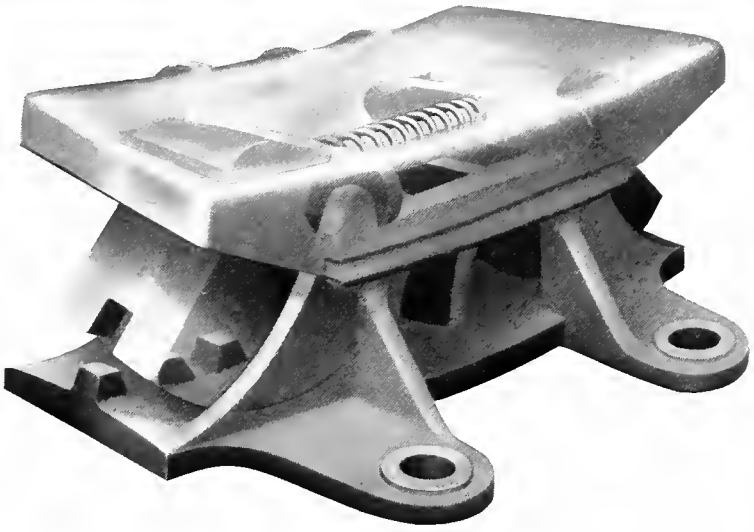
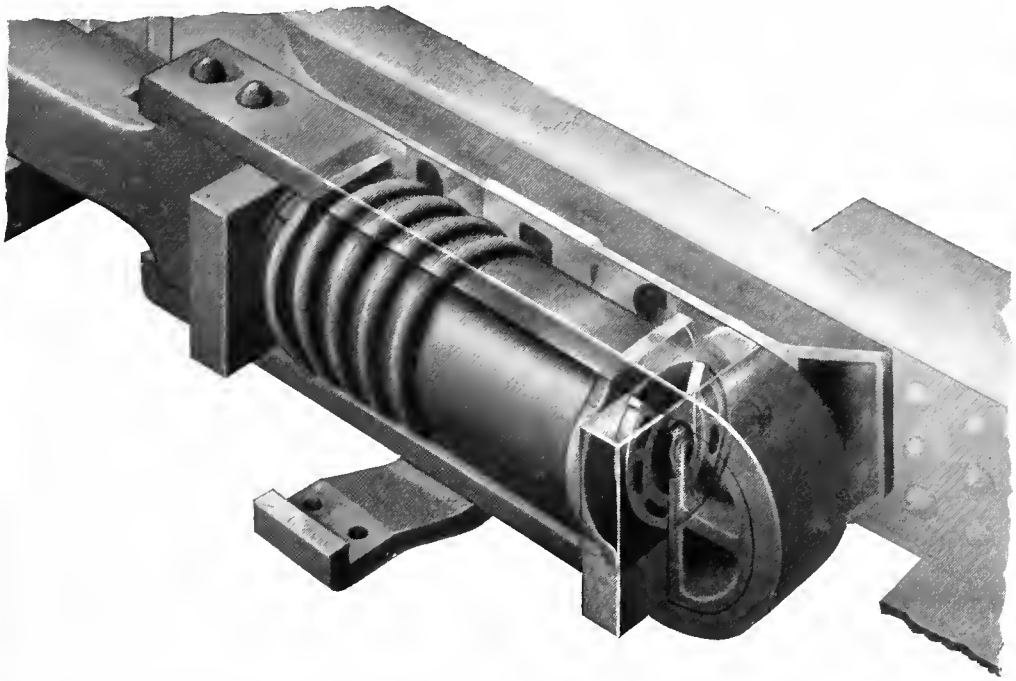


GRAVITY SIDE BEARINGS



FRICTION DRAFT GEAR

"THE ROOKERY" CHICAGO

CLEVELAND CITY FORGE & IRON CO.

FORGINGS

RAILROAD STRUCTURAL MACHINERY

TURNBUCKLES
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YOKE RIVETS
AIR BRAKE PINS
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GRAB IRONS
BRAKE LEVERS
UPSET RODS
PRESSED STEEL SPECIALTIES

WE ARE THE LARGEST MAKERS
AND ARE MAKERS OF THE

Largest Turnbuckles
IN THE WORLD

FORGINGS WHERE ACCURATE
WORK IS REQUIRED A SPECIALTY

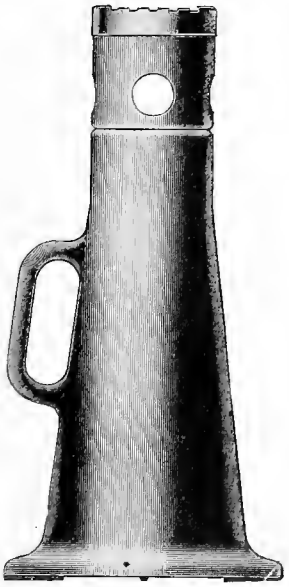
CLEVELAND CITY FORGE & IRON CO.

NEW YORK OFFICE,
No. 11 Broadway.

CLEVELAND, OHIO

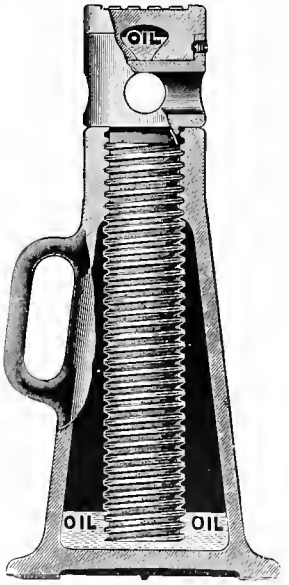
USE THE **CHAPMAN JACK**

PATENTED



A PERFECT RAILROAD JACK
ALWAYS RELIABLE
ALWAYS SAFE
ALWAYS LUBRICATED
ALWAYS FREE FROM DIRT and RUST
ALWAYS READY FOR USE
ALL SIZES

The Chapman Jack Co.
CLEVELAND, OHIO



JACKS

For Car Shop Use

There is a Joyce-Cridland Jack for every requirement in the building or repairing of cars and locomotives. Among others, we might mention the

DOUBLE-MOVEMENT JACKS

with which the load is raised twice as fast as with an ordinary jack, and no more power is required.

Broad Base Hydraulic Jack.

TELESCOPING JACKS

which have a rise equal to their height and can be used in cramped places.

TRAVERSING JACKS

with rapid movement lift.

JOURNAL JACKS

the lightest and most convenient jack on the market; a 15-ton jack weighs only 34 pounds.

AUTOMATIC GEARED JACKS

capable of lifting the heaviest locomotives and which replace a hydraulic jack for many classes of work.

HYDRAULIC JACKS

of any tonnage and size, having automatic speeding device, and capable of standing under load an indefinite time without settling.

We have special bulletins on any of the above jacks which we would be glad to send upon application. See pages 433, 434 and 675 of this book for further illustrations and description.

Joyce-Cridland Co.

Dayton, Ohio

Makers of Over 250 Types and Styles of Jacks

New York Office, - 136 Liberty Street

The New Type of Hydraulic Jack, known as the

"UNIVERSAL"

offers the following advantages:

It has a double pump, which allows a variation in speed to suit a light or heavy load.

It can be used horizontally or vertically.

It can be lowered by the lever or by the valve handle.

It can be freed from obstructions which might lodge on the valve seats by opening the valves and working the lever.

It is operated in the usual way, excepting in respect to the valve handle.

RICHARD DUDGEON

Inventor and Original Manufacturer of the Hydraulic Jack

BROOME AND COLUMBIA STREETS
NEW YORK

See illustrations in text pages—Figure numbers 3378-3385, 3391, 6915, 6917-6919.

GREENLEE —CAR SHOP— MACHINERY

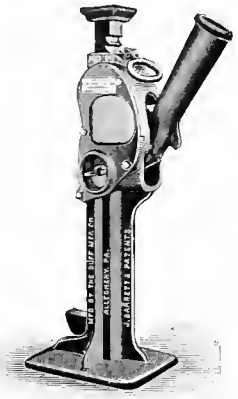
See Pages 663 and 664

Greenlee Bros. & Co.

CHICAGO ROCKFORD, ILL.

BARRETT RATCHET GEARED RATCHET CAR JACKS
DUFF BALL BEARING SCREW JACKS
DUFF-BETHLEHEM FORGED STEEL HYDRAULIC JACKS

Every type, kind or size of Jack for TRACK, CAR, LOCOMOTIVE and BRIDGE Departments



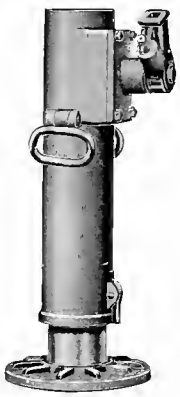
No. 19. Barrett Car Jack.

Duff-Bethlehem Forged Steel Hydraulic Jack. (Broad Base Type).

THE DUFF-BETHLEHEM FORGED STEEL HYDRAULIC JACKS are ENTIRELY STEEL FORGINGS, eliminating Joints and Packings and all expense and trouble common to **all other** HYDRAULIC JACKS. They are from 30% to 60% **lighter** in weight than **any** other Jack of equal capacity, extend **full length** vertically or horizontally and are enormously powerful, the **full** capacity being raised by one man, and each Jack capable of a large overload.

We make the largest line of **High Grade Jacks** in the world and are **specialists** in Jacks for Car and Motive Power Departments.

SEND FOR FULL LINE OF PRINTED MATTER.



Duff Ball Bearing Screw Jack.

THE DUFF MANUFACTURING COMPANY

(Established 1883)

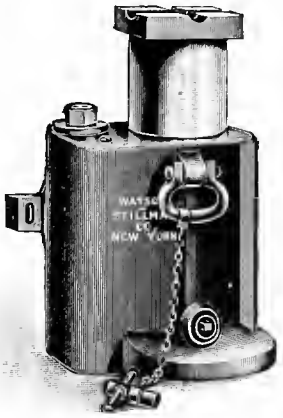
50 Church Street, New York **Pittsburg, Pa.**

FAIRBANKS, MORSE & CO., CHICAGO, AGENTS FOR RAILROAD DEPT.

HYDRAULIC TOOLS

For Car Shops and Every Other Railroad Purpose

WE make Punches, Shears, Riveters, Presses, Benders, Pumps, Accumulators, Jacks, etc., which embody every improvement for getting the greatest speed, efficiency and economy from hydraulic power. Our large line, consisting of over 3,500 standard tools, probably offers a model that will meet your requirements. If not, we are prepared to build on short notice and at reasonable price.



Our engineering experience covers over fifty years in the manufacture of hydraulic tools, and we use only the best materials. Every Watson-Stillman tool is guaranteed. They must make good on every claim or they may be returned.

WRITE FOR OUR LATEST RAILWAY CATALOG

THE WATSON-STILLMAN CO.

1583 HUDSON TERMINAL BUILDINGS, NEW YORK

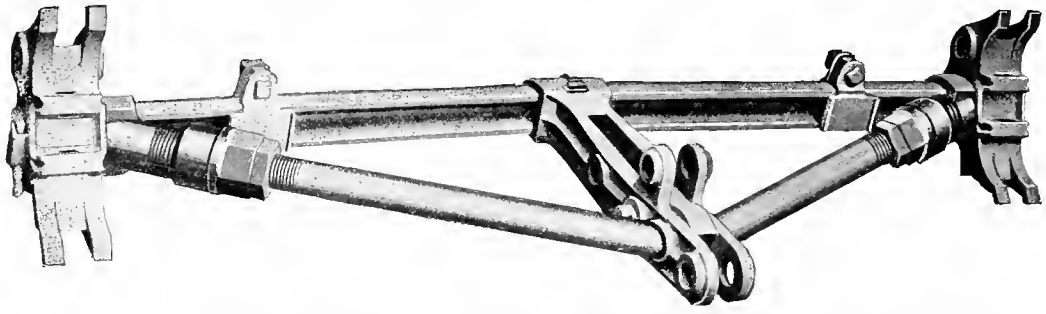
Our "L N Creco" Brake Beam

FOR USE WITH THE LATEST DEVELOPMENT OF THE AIR BRAKE ON HEAVY STEEL PASSENGER EQUIPMENT

Withstands load of 40,000 lbs. with only 1-16 in. deflection

GREATER CAPACITY IF DESIRED

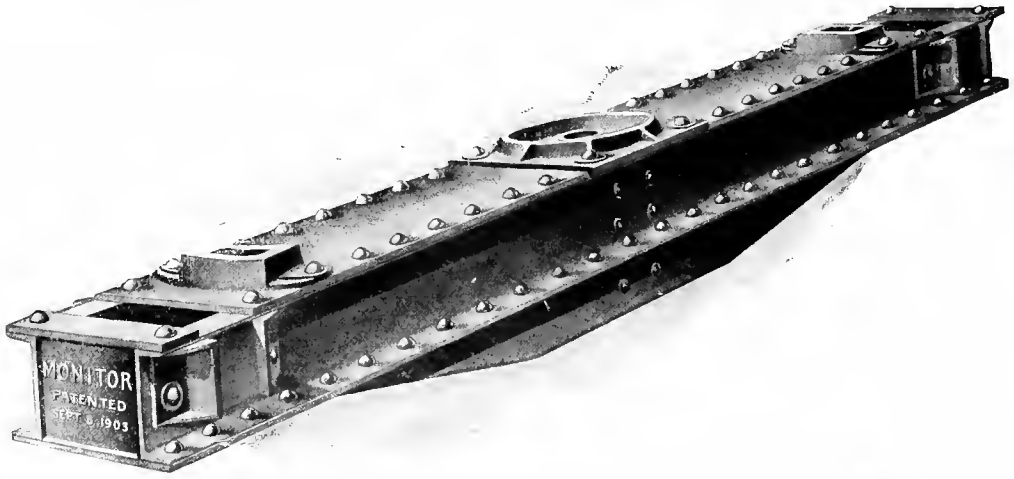
This beam interchanges with our Diamond Special High Speed and 2½-inch National Hollow Passenger beams, takes the same adjustable heads and no more space for application to trucks.



CRECO, NATIONAL HOLLOW, DIAMOND, KEWANEE, RELIANCE, NINETY-SIX, STERLINGWORTH and MONARCH, and other types of metal brake beams. BEAMS BUILT FOR ALL CLASSES OF RAILWAY EQUIPMENT AND REQUIREMENTS.

DIAMOND SPECIAL HIGH SPEED PASSENGER BEAMS

28,000 lbs. at 1-16 inch deflection



MONITOR BOLSTERS

EXCEL ALL OTHERS IN STRENGTH, SAFETY, DURABILITY, ECONOMY.

CRECO ROLLER SIDE BEARINGS, CRECO SLACK ADJUSTERS, CRECO JOURNAL BOXES, CRECO BRAKE JAWS.

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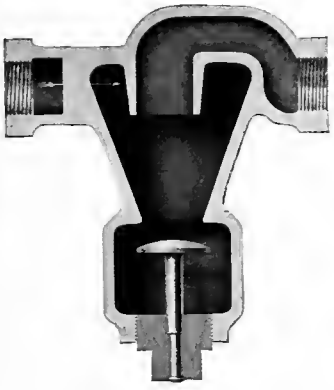
Westinghouse

Air Brake Equipment



Westinghouse Centrifugal Dirt Collector

Prevents pipe scale, sand, cinders, dirt or other foreign matter of any kind reaching the triple valve.

Westinghouse Type "K" Triple Valve

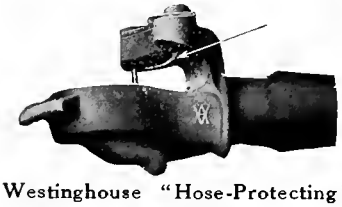
The special features of quick service, uniform release and uniform recharge have made possible smooth operation and easy control of long freight trains, better control of short trains, higher tonnage ratings on grades, and a material economy in air consumption.

Westinghouse Galvanized Annealed Steel Hose Clamp

Made from a drop forging and will last indefinitely. It is tougher, stronger and more uniform than malleable iron clamps.

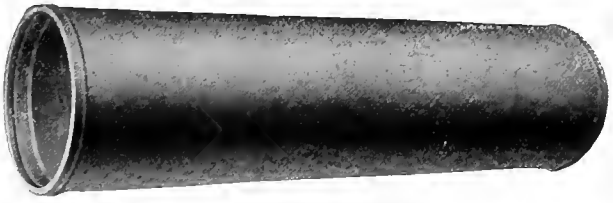
Westinghouse Self-Locking Angle Cock

Locks the handle in both open and closed positions. It cannot be moved by accident, but must be raised and moved by hand.



Westinghouse "Hose-Protecting" Coupling

Interchangeable with old-style coupling. The flexible bead permits the disengagement of the couplings, when cars are separated, before the pull is sufficient to damage the hose.



Westinghouse Enameled Reservoir

The special enamel coating, inside and outside, is permanent and flexible, resisting blows and vibrations, and protects the reservoir against corrosion due to moisture, acids or other causes.

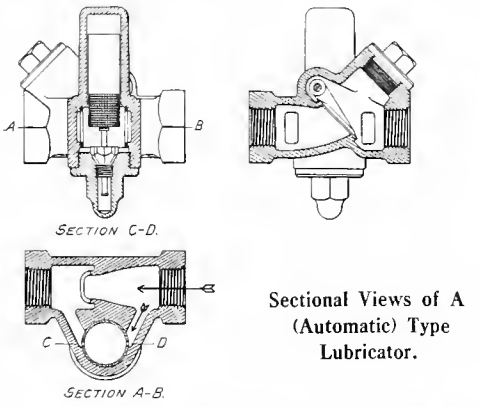
The Westinghouse Air Brake Co.

The Air Brake Builders — **GENERAL OFFICES, PITTSBURG, PA.**

BOSTON, Exchange Building
BUFFALO, Ellicott Square Building
CHICAGO, Railway Exchange Building.
CINCINNATI, Traction Building
COLUMBUS, Columbus Sav. & Trust Bldg.
DENVER, Majestic Building
HOUSTON, TEX., 403 Hawthorne Ave.
MEXICO CITY, MEXICO, 4a Calle Pte de Alvarado, No. 100
NEW YORK, City Investing Building
RICHMOND, American Nat. Bank Bldg.
ST. LOUIS, 1932 North Broadway
ST. PAUL, Endicott Building
SAN FRANCISCO, Pacific Building
PORTLAND, ORE., Couch Building

FOR CANADA, Canadian Westinghouse Co., Limited, Hamilton, Ontario.

AUTOMATIC LUBRICATION for TRIPLE VALVES and BRAKE CYLINDERS



Sectional Views of A (Automatic) Type Lubricator.

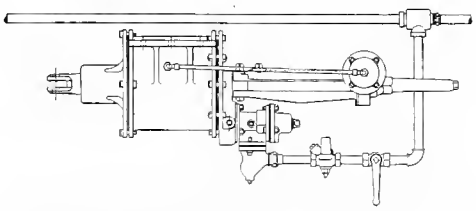


Diagram Showing Application of Emery Lubricator to Passenger Car Equipment.

The accompanying cut illustrates the device and shows its position in the brake system on passenger car equipment.

The use of this device will insure the continuous and proper lubrication of triple valves and brake cylinders without the necessity of removing for cleaning or oiling. The supply of lubricant passing from the lubricator to the triple valve and brake cylinder is regulated by the flow of air and is automatic in its distribution.

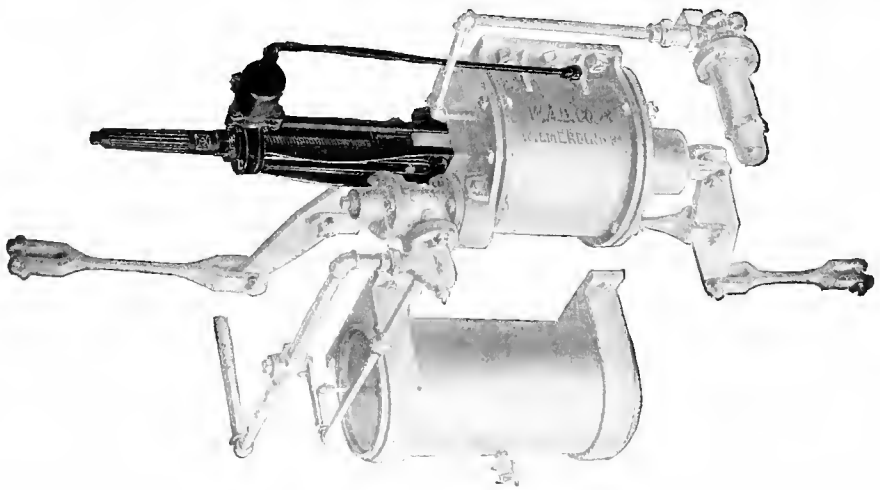
Slide valves wear longer and remain tight and brake cylinder packing leathers have a greatly increased life, with no tendency to leak through porosity.

Manufactured by

The Emery Pneumatic Lubricator Co.

ST. LOUIS, - - MO.

Westinghouse
American Automatic Slack Adjuster



Automatically Regulates Piston Travel

Its use secures Uniform Piston Travel — Maximum Brake Efficiency — Saving of Brake Shoes

Minimum Wear of Adjuster Parts — Device does not Operate until Adjustment is Required

FOR INFORMATION ADDRESS THE

AMERICAN BRAKE COMPANY

ST. LOUIS, MO.

GUILFORD S. WOOD

RAILWAY NECESSITIES

Mechanical Rubber Goods; P. & W. Air Hose Preservative; Car Vestibule Diaphragms; Inlaid Linoleum; Cocoa Mattings; Upholsterers' Leather; Rolled Steel Tie Plates.

WOOD'S FLEXIBLE NIPPLE END PROTECTOR

FOR AIR BRAKE HOSE

See the Flexible Wire Cover

Greatly lessens wear where wear is the most severe. Saving in hose is many times greater than the small cost of

WOOD'S PROTECTOR

Prevents chafing and abrasion.

THE MONOGRAM BRACKET

FOR THE END OF TRAIN PIPES

Makes Shifting Impossible

Is Furnished in Seven Different Patterns

For a Metal End Sill with Webb Outside.
For a Metal End Sill with Flange Outside.
For a Pressed Steel End Sill.
For a Wood End Sill.
For Steam Hose on Passenger Coaches.
For Air and Signal Pipes on Passenger Coaches.

ONCE APPLIED, REDUCES THE COST OF MAINTENANCE TO A MINIMUM

GREAT NORTHERN BUILDING

CHICAGO

THE T. H. SYMINGTON CO.

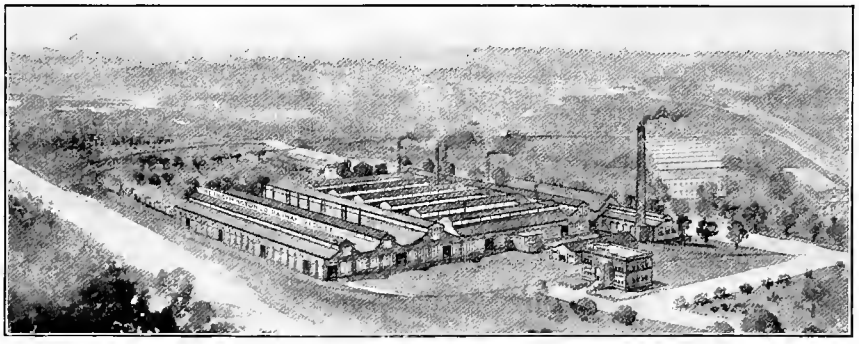
Manufacturers of

RAILWAY SPECIALTIES

and

Miscellaneous Malleable Castings

OF HIGHEST GRADE



ROCHESTER PLANT.

NEW YORK **BALTIMORE** **CHICAGO**

SYMINGTON JOURNAL BOXES

SEE PAGE 528

SYMINGTON FLEXIBLE DUST GUARDS

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FARLOW DRAFT GEAR

SEE PAGE 261

BALTIMORE CENTER BEARINGS

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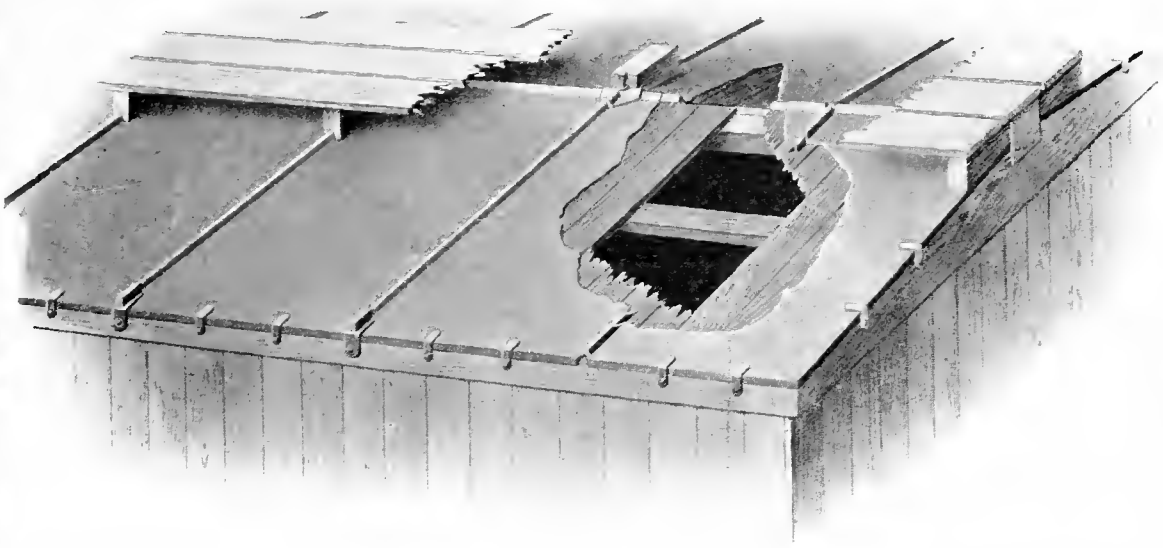
SYMINGTON ROLLER SIDE BEARINGS

SEE PAGE 529

Murphy; American Outside Roof

(250,000 Now in Service)



Reduces Height of Car Two Inches | **Reduces Width of Car Six Inches** | **Reduces Weight of Car 1200 Lbs.**

Reduces Cost of Car from Three to Ten Dollars

No Roof Boards to Burn or Blow off — **Never Break or Tear as Sheets are not Nailed**

Use Our Type F Angle Carline

Wedges are inserted to take up any shrinkage of plates

Decreases Dead Weight | **Increases Head Room** | **Stronger Construction**

Cannot be Damaged from Coal Loading or Freight Handling

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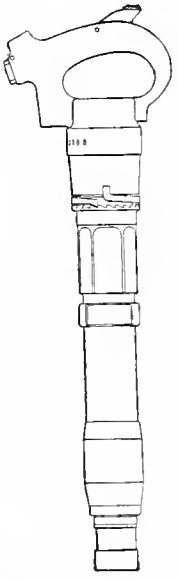

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Locomotive Driving Tires

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Multiple Unit Control System

Automatic control of trains provided by the Sprague-General Electric Type "M" Multiple Unit System improves railway service in many ways:

Master Controller

Life of equipment is increased by limiting amount of current taken by the motors.

The most efficient acceleration is assured.

Uniform acceleration results in maximum comfort to passengers.

Motormen can concentrate their attention to the track ahead.

The apparatus illustrated represents the latest developments in the automatic form of Type "M" Control.

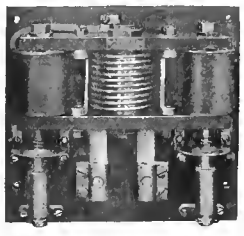
Exclusive Features of G. E. Multiple Unit Control

Two Pick-Up Circuits from double relay insure positive automatic operation over wide range of voltage.

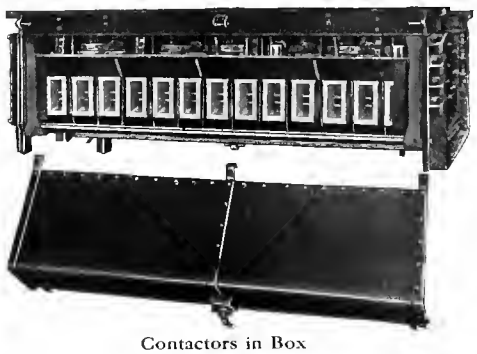
Line Current Operation of Contactors provides operating voltage high enough to break down any dirt or oil films on the control contacts. Slight accumulations of dirt do not therefore affect the operation of the control.

Magnetic Operation of Contactors causes a quick make and break of motor circuits, preventing excessive arcs and resultant burning.

Reduced Liability of Motor Arc Over results from reversing fields instead of armatures, by keeping positive lead always connected to same brush. Reverser can be used for braking without chance of damage.



Double Pick-Up Current Limit Relay



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6 and 12 inch Steel Handle
36 and 48 inch Key Model Wrenches

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WRENCHES

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6 to 72 INCH LONG

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OR YOUR SUPPLY HOUSE

Solution of Compressed Air Power Units

FOR ALL DEPARTMENTS OF RAILWAY SERVICE

"BOYER" RIVETING HAMMERS should always be used for driving your rivets.

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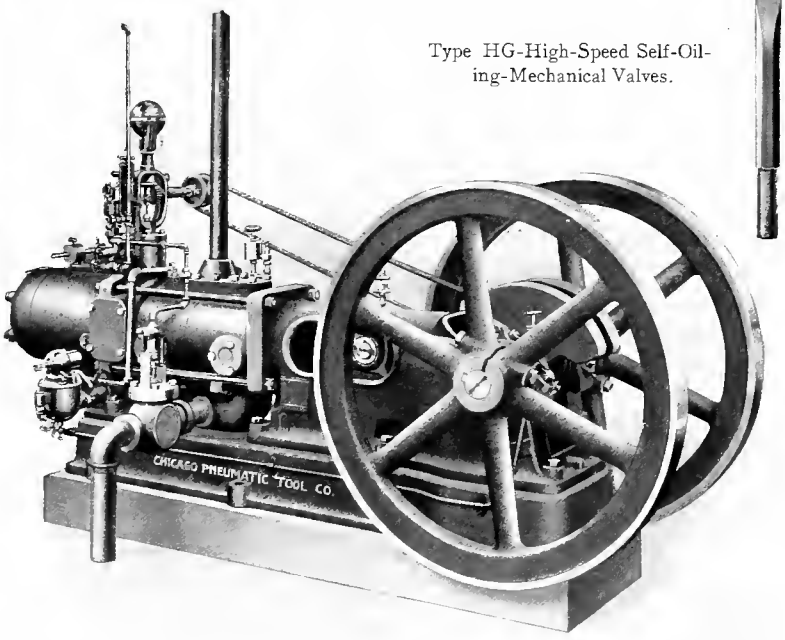

"BOYER" or "KELLER" CHIPPERS for general all-round chipping and calking.

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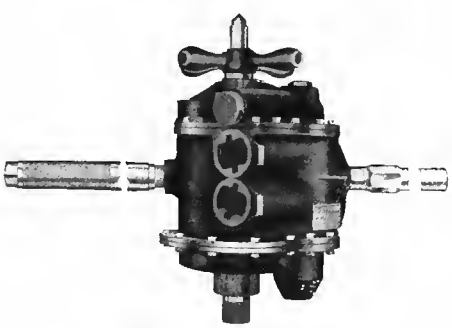
Size BW "Little Giant" Drill

are made in types and sizes to meet every condition in the machine shop, car shop or maintenance of bridges and buildings.



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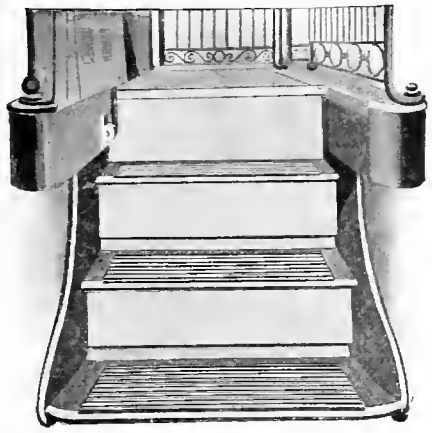

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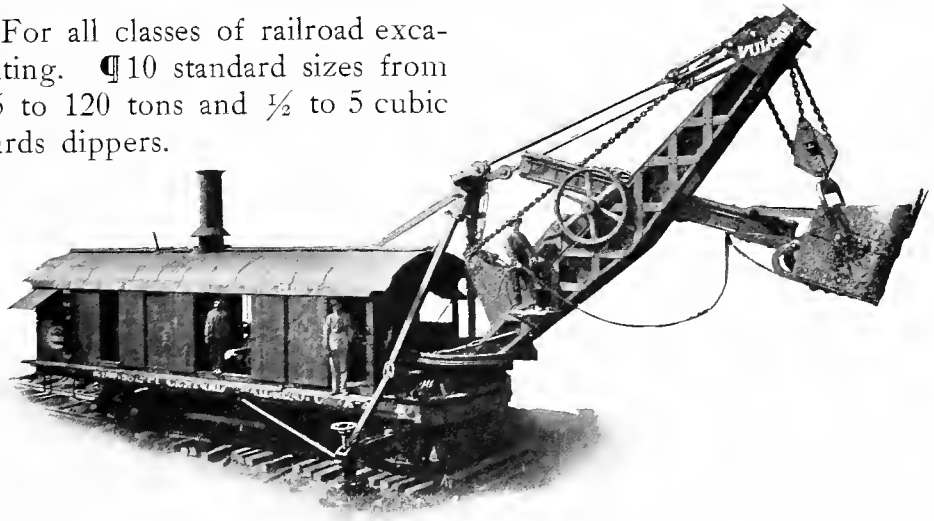

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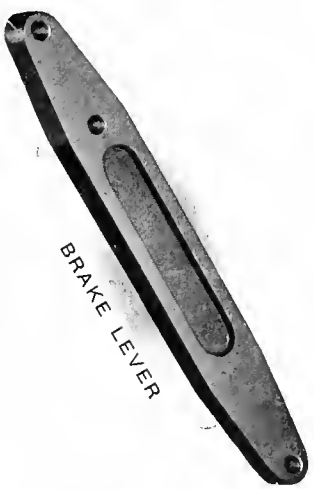

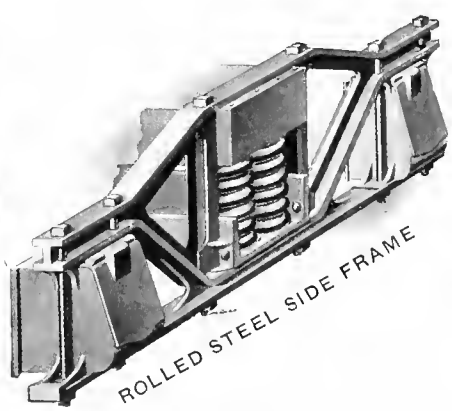

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