May 31, 1966 K. F. GLASER ETAL 3,253,556

GONDOLA RAILWAY CAR

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Fig. 1.

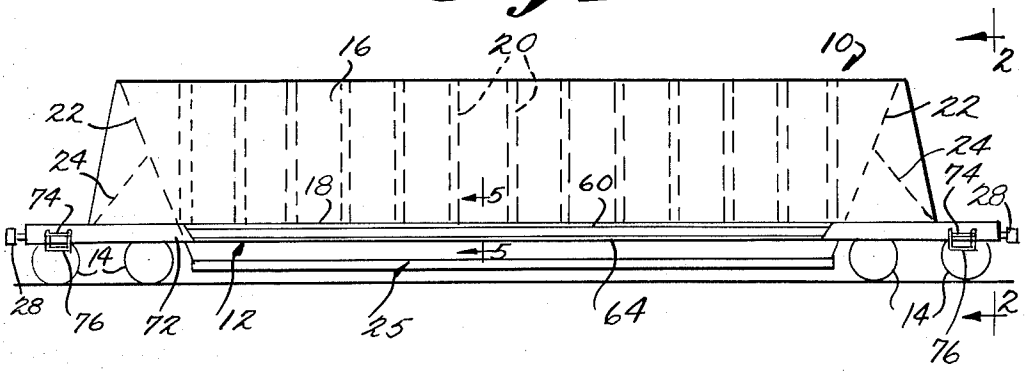


Fig. 2.

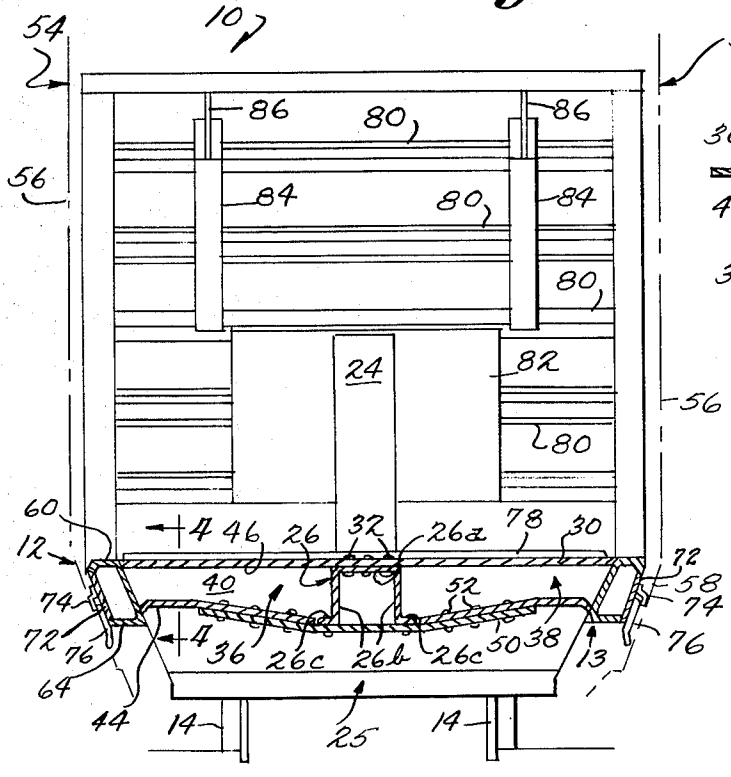


Fig. 4.

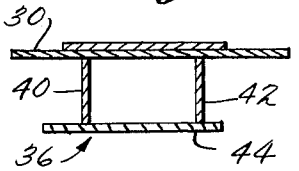
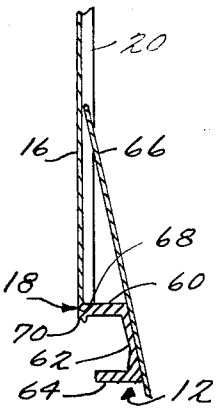


Fig. 5.



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Fig. 3.

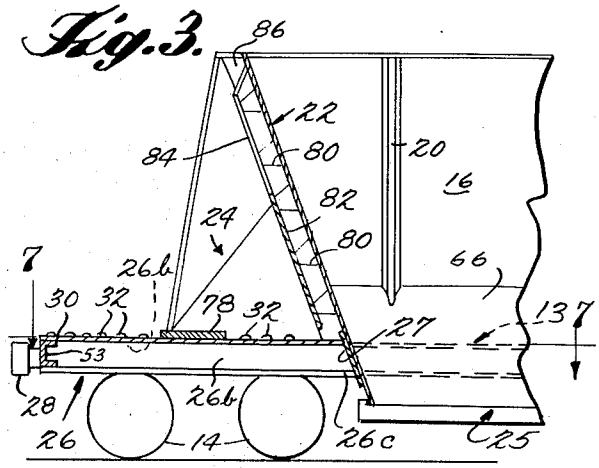


Fig. 7.

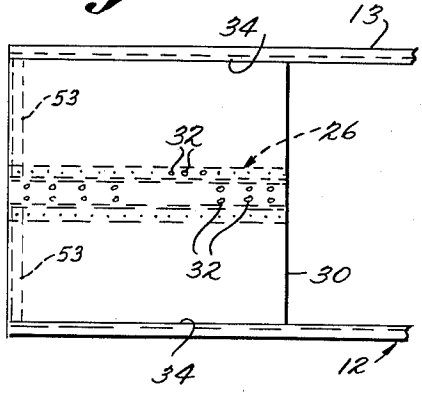
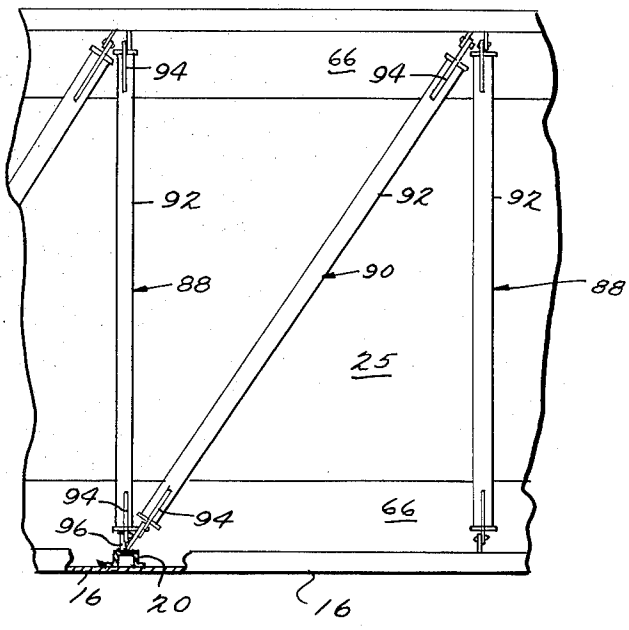


Fig. 6.



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GONDOLA RAILWAY CAR

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This invention relates to railway car construction and in particular to an improved construction and arrangement of the frame with the side and end walls of the car to provide increased load capacity while retaining proper strength and side clearance.

It is a primary object of the invention to provide a railway car, such as a gondola car or tank car having a pair of novelly arranged and constructed side sills extending the length of the car and an improved end construction by which compressive forces are transmitted from the draft lug to the car frame and by which the car end walls are supported against forces created by the load during deceleration of the car.

It is a further object to provide a car of the above type constructed substantially completely of aluminum and in which the arrangement is designed to employ a minimum amount of metal while providing strength and rigidity necessary for carrying the heavy loads typical of this type of car.

It is a further object to provide a side sill construction for a railway car in which the sills are disposed at or below the level of decreasing maximum width and are constructed of outwardly facing channel members, each having a downwardly and inwardly extending web so as to increase loading capacity while maintaining the standard side clearance for this portion of the car.

It is another object to provide a railway car having a short center stub sill which receives the impact forces from the draft lug of the car and transmits them to laterally spaced elongated side sills by means of a horizontal shear plate secured to the stub sill and the side sills.

It is yet another object to provide a railway car having an inclined end wall which is braced so as to resist longitudinal forces transmitted to and from the load by a rigid brace member of substantial transverse area engaging the end wall.

It is a still further object to provide a gondola car having end walls braced as described above wherein the end walls are reinforced by external horizontal ribs or corrugations and wherein the brace is secured to the ribs.

The invention will be more fully understood from the following detailed description taken with the drawings in which:

FIGURE 1 is a schematic side elevational view of a gondola car;

FIGURE 2 is an end view, on an enlarged scale, of the car of FIGURE 1 partly in section and looking in the direction of the arrows 2—2 in FIGURE 1;

FIGURE 3 is a schematic, longitudinal, vertical sectional view of one end of the car;

FIGURE 4 is a fragmentary sectional view taken on the line 4—4 of FIGURE 2;

FIGURE 5 is a fragmentary sectional view taken on the line 5—5 of FIGURE 1; and

FIGURE 6 is a fragmentary top plan view of the railway car.

FIGURE 7 is a fragmentary view taken substantially on line 7—7 of FIGURE 3.

Referring to FIGURE 1, there is schematically illustrated therein a gondola car **10** of the drop bottom type which embodies the principles of the present invention. The car includes a pair of horizontally spaced

elongated side sills **12, 13** which are supported near their ends by track-engaging wheels **14** journalled in the usual manner on trucks (not shown). A vertically flat side wall **16** of trapezoidal shape is welded along its lower edge **18** to the top of each side sill **12, 13** and is reinforced along its inner surface by spaced vertical channel members **20**.

Near each end of the car **10** an inclined end wall **22** extends upwardly and longitudinally outwardly between the side walls **16** and is welded thereto. Each end wall **22** is braced by an inclined brace **24** which extends upwardly and longitudinally inwardly from about the level of the side sills **12, 13** to about the midpoint of the end wall **22**. The bottom dump doors and mechanism for operating them, illustrated at **25**, are conventional and are located along the lower edge of the car.

Referring to FIGURES 2, 3 and 4, one of the important features of the invention lies in the relationship of a short center stub sill **26** at each end of the car **10** to the side sills **12, 13** and to the end walls **24**. Longitudinal center stub sills of steel have been in use for some years on certain types of railway cars and are conventionally constructed in the shape of an inverted channel formed in two opposite longitudinal halves which are welded together along their upper edges. Each of the stub sills **26** of the present invention may be of this general type and, as shown, consists of a horizontal web **26*a***, depending legs **26*b*** and outwardly extending flanges **26*c*** at the lower ends of the legs. The outer end of each stub sill **26** terminates slightly inwardly of the end of the car **10** and is adapted in any suitable manner to receive a draft lug **28**. The inner end of each sill **26** abuts a transverse inclined plate **27** which is adjacent the outer surface of the lower portion of the end wall **22**.

The car **10** is, of course, subjected to very large impact forces applied at the draft lugs **28** during use and these forces are transmitted directly to the stub sills **26**. Since the stub sills are short, the force must be transmitted to the side sills **12, 13** where it will be resisted without plastic deformation of the material. According to the invention this is accomplished by a shear plate **30** riveted as at **32** to the top of the stub sill **26** and welded to the side sills **12, 13** as at **34**.

As is conventional in railway cars, a bolster arrangement is provided at each end. In the present end construction two bolster units **36, 38** are disposed on opposite sides of the stub sill **26** and extend transversely to the side sills **12, 13**. As seen in FIGURES 2 and 4, the left bolster unit **36** is an inverted channel-shaped member having upstanding legs **40** welded to a horizontal web **44** which extends laterally beyond the legs **40, 42**. Along its upper edge **46** and outer edge **48** the bolster unit **36** is welded to the shear plate **30** and to the side sill **12**, respectively. A pair of vertical steel gusset plates (not shown) extending transversely of the car **10** are welded along one edge to the leg **26*a*** of the center sill **26** and are riveted to the webs **40, 42** near the inner ends of the latter. The opposite bolster unit **38** is of the same construction. The truck (not shown) for the wheels **14** is pivoted on a plate **50** which is riveted to the webs of the bolster units **36, 38** and to the flanges **26*c*** of the center sill **26** by means of rivets **52**.

An end sill arrangement, also conventional, is provided at each end of the car in the form of two inwardly facing channel members **53** which extend transversely of the car. The channel members **53**, or end sills, are disposed just below the shear plate with their inner ends abutting the web **26*b*** of the stub sill **26** and their outer ends abutting the respective side sills **12** and **13**.

Another important feature of the invention lies in the construction and arrangement of the side sills **12** and **13**

to provide maximum load capacity within the permissible transverse dimensions of the car **10**. All railway cars are constructed within certain transverse dimensions which are standard in the industry to assure that the cars will clear all switches, platforms and the like during use. These dimensions are smaller near the lower part of the car than near the upper part, and as seen in FIGURE 2 are determined by a clearance line **54** on each side of the car **10**. Each clearance line **54** includes an upper vertical portion **56** and a lower, inwardly inclined portion **58**. In railway car construction it is desirable to locate the side sills of the car as low as possible and as far apart as possible in order to achieve maximum load capacity. However, these two features are mutually exclusive because of the inwardly inclined portion **58** of the clearance line. It has been the usual practice heretofore to locate the side sills above the point at which the clearance line **54** begins to incline inwardly because this arrangement sacrifices less capacity than placing the sills closer together at a lower level.

In the present arrangement, however, the side sills **12** and **13** are disposed below the point of narrowing transverse dimensions but are shaped so as to reside completely within the clearance lines **54**. As seen in FIGURES 2 and 5, the sills **12** and **13** are constructed in the shape of outwardly facing channel members having upper and lower legs and an inwardly and downwardly inclined web. Only the left sill **12** will be described in detail and it will be understood that the right sill **13** is of identical construction.

The left side sill **12** is disposed so that its upper horizontal leg **60** is substantially on a level with the point at which the clearance line **54** begins to incline inwardly. The inwardly extending web **62** is parallel to the inclined portion **58** of the clearance line, and the lower horizontal leg **64** is about the same width as the upper leg **60** and is thereby inwardly offset from the upper leg **60**. A downwardly and inwardly inclined side plate **66** is secured to the surface of the web **62** facing the center of the car **10** and to the side wall **16** at its junction therewith and serves to support and guide the load toward the bottom dump doors. The vertical channel members **20** pass through slots in the plate **66**.

As best seen in FIGURE 5, the outer upper leg **60** of the sill **12** has an upwardly facing shoulder **68** along the outer edge thereof for receiving the lower edge of the side wall **16** which is welded thereto at **18**. Opposite the shoulder **68** is a downwardly facing shoulder **70** adapted to receive the upper edge of a short side plate **72** which is welded across the inner edges of both the legs **60** and **64**. As seen in FIGURE 1, a side plate **72** is provided only at the ends of the side sill **12**, thus leaving the channel open for most of the length of the car **10**. Conventional ladder rungs **74** and **76** are secured to the plate **72** inside the inclined portion **58** of the clearance line.

A further feature of the invention lies in the arrangement and construction of the end walls **22** for enabling shock forces to be transmitted to and from the load near the center of gravity of the car when loaded and for preventing rocking movements of the stub sill **26** about a transverse axis. This construction cooperates with the center stub sill construction to provide a compact and relatively lightweight arrangement. The principal element of the arrangement is the inclined brace **24** which, as seen in FIGURES 2 and 3, extends between the shear plate **30** and the outer surface of the end wall **22** intermediate the upper and lower ends thereof. The brace **24** is a thick triangular member of hollow construction secured along its lower horizontal edge to the top of the shear plate **30** directly above the stub sill **26** and along an adjoining edge to the end wall **22**.

More in particular, part of the lower edge of the brace **24** is welded to a relatively narrow transverse plate **78** which is welded to the shear plate **30**, and part is welded directly to the shear plate **30**. The rear surface of the

end wall **22** is provided with a plurality of vertically spaced, inwardly facing, horizontal channels **80** welded thereto, and an inclined end plate **82** is welded to the exterior of the channels **80**. The edge of the brace **24** facing the end wall **22** abuts the end plate **82** and is welded thereto. The surface area of the end plate **82** is substantial so that compressive forces on the end wall in the direction of the longitudinal axis of the car **10** will not collapse or distort those channels **80** engaged by the end plate **82**.

Other features of the end wall construction include a pair of relatively narrow transversely spaced straps **84** extending upwardly along the channels from the top of the end plate **82**. The straps **84** are welded to the outer surfaces of the channels **80** and above the uppermost channel **80** are bent toward the end wall **22** and welded thereto. A single thin rib **86** extends from the bent portion of each strap **84** to the top of the end wall **22**.

While the car **10** is of the bottom dump door type it is also adapted to be emptied by being inverted by appropriate equipment which rotates the car about a longitudinal axis. In order to prevent deflection of the side walls **16** when the car **10** is being rotated, the top of the car **10** is provided with trusses extending between the side walls **16**.

As seen in FIGURE 6, spaced transverse trusses **88** are connected to opposite vertical channels **20** and diagonal trusses **90** of the same type are connected to alternate channels **20**. Each truss **88**, **90** includes a body portion **92** of generally oval tubular construction and end plates **94** extending therefrom. A generally V-shaped bracket **96** is secured to each vertical channel **20** with the legs of the V extending toward the center of the car, and each of the truss end plates **94** is secured to one leg of a bracket **96** as by means of bolts.

With the exception of the stub sill **26** and the gussets (not shown) for connecting the stub sill to the bolster units **36**, **38** substantially all the components of the car **10** are constructed of aluminum. All aluminum-to-aluminum joints or connections are welded and the aluminum-to-steel connections are riveted.

It will thus be appreciated that the use of aluminum together with the design of the side sills, stub sill, shear plate and brace provide a car of greatly reduced weight. That is, the reduced weight is effected not only by the use of aluminum, but also by the improved design which provides the necessary strength at a savings in metal. While the inclined side sill construction which permits lower side sills and corresponding greater capacity is of primary value in a gondola car, it will be understood that this feature is not limited to use in this type of car. Similarly, the stub sill and brace construction are of great value in a gondola car but may also be used in, for example, a tank car in which similar problems of transmitting longitudinal forces to and from the load are involved. It will be apparent also that various modifications of the described construction are contemplated within the scope of the invention and that the details of the embodiment described above are not intended to be limiting except as they appear in the appended claims.

What is claimed is:

1. In a gondola railway car: two horizontally spaced apart rigid side sills extending from one end of the car to the other; a stub center sill disposed midway between and parallel to said side sills at one end of the car; end sill means extending transversely of said car and connecting said stub center sill to said side sills; horizontal plate means fixed to the top of said stub center sill and fixed to said side sills; and end wall disposed adjacent the inner end of said stub center sill and extending upwardly and longitudinally outwardly; and inclined brace means extending upwardly and inwardly toward said end wall and having one end secured to said end wall and having the other end secured to said horizontal plate means at a location intermediate the ends of said stub center sill;

and means interconnecting the inner end of said stub center sill with said side sills and said end wall whereby rocking movement of said stub center sill about an axis transverse to said car is prevented.

2. Apparatus as in claim 1 wherein bolster means secures said horizontal plate means to said side sills.

3. Apparatus as in claim 2 wherein said stub center sill is an inverted channel member.

4. Apparatus as in claim 2 wherein said brace means includes a plate engaging said end wall over a substantial portion thereof intermediate the upper and lower edges of said end wall.

5. Apparatus as in claim 2 wherein said end wall is provided with elongated exterior horizontal reinforcing elements and wherein a plate means is disposed between and secured to the brace means and to the outermost surfaces of said reinforcing elements.

6. Apparatus as in claim 2 including side walls extending longitudinally beyond said end wall and secured to said end wall and to said horizontal plate means.

7. Apparatus as in claim 2 wherein said side sills are disposed below the level at which the maximum transverse dimension of said car must decrease as a result of the inwardly inclined clearance line stipulated for railway cars.

8. Apparatus as in claim 2 wherein said side sills, plate means, end wall, and brace means are constructed of aluminum and wherein said stub center sill is constructed of steel.

9. In a railway car having a horizontal longitudinal frame extending from one end of the car to the other for supporting a load-carrying container having side walls and end walls, the improvement in the arrangement of said frame with an end wall comprising: an upwardly and outwardly inclined end wall; a flat plate of substantial width and length, but of lesser area than said end wall secured to the outside surface of said end wall intermediate the upper and lower edges thereof; an upwardly and longitudinally inwardly inclined brace secured to said plate and disposed on the center line of said car; support means for said brace secured to the lower surface thereof and to the remainder of said frame, said support means including a stub center sill and end sill means, the latter extending transversely of the car and connecting said stub center sill to said frame, said brace being disposed intermediate the ends of said stub center sill; and means interconnecting the inner end of said stub center sill with said frame and said end wall, whereby said brace and said interconnecting means prevent rocking movement of said stub center sill about an axis transverse to said car.

10. Apparatus as in claim 9 wherein said end wall is provided with vertically spaced elongated exterior horizontal reinforcing members and wherein said plate is secured to the outermost surfaces of said members.

11. Apparatus as in claim 9 wherein the side walls of said car extend beyond said end wall and are secured to said end wall and to said support means.

12. Apparatus as in claim 9 wherein said center sill is an inverted channel member.

13. In a railway car having longitudinal frame members extending substantially the length of the car on each side of the centerline thereof for supporting a load carrying container having side and end walls, the improvement which comprises: a stub center sill disposed at one end of said car along the centerline thereof; plate means overlying said center sill and rigidly interconnecting said stub center sill to the frame members on either side thereof; a brace directly above said stub center sill, said brace extending upwardly and inwardly and including a hollow triangular member secured along one edge to said plate and disposed intermediate the ends of said stub center sill so as to abut an end wall of said load-carrying container; and means interconnecting the inner end of said stub center sill with said longitudinal frame members and said end wall, whereby said brace and interconnecting means prevent rocking movement of said stub center sill about an axis transverse to said car.

14. In a gondola railway car: two horizontally spaced apart rigid side sills extending from one end of the car to the other, each of said side sills including a channel member facing outwardly of said car, each channel member having an upper leg, a lower leg offset inwardly from said upper leg and a downwardly and inwardly inclined web; a stub center sill disposed midway between and parallel to said side sills at one end of the car; end sill means extending transversely of said car and connecting said stub center sill to said side sills; horizontal plate means fixed to the top of said stub center sill and fixed to said side sills; an end wall disposed adjacent the inner end of said stub center sill and extending upwardly and longitudinally outwardly; inclined brace means disposed inwardly from the outer end of said stub center sill, said brace means being secured to the top of said plate means opposite said stub center sill at a location intermediate the ends of said stub center sill and secured to the outside surface of said end wall, said brace means extending upwardly and inwardly toward said end wall and means interconnecting the inner end of said stub center sill with said side sills and said end wall whereby said brace and interconnecting means prevent rocking movement of said stub center sill about an axis transverse to said car.

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