March 14, 1967 S. P. HALCOMB ETAL 3,308,769

RAILWAY TANK CAR

Filed July 26, 1965

4 Sheets-Sheet 1

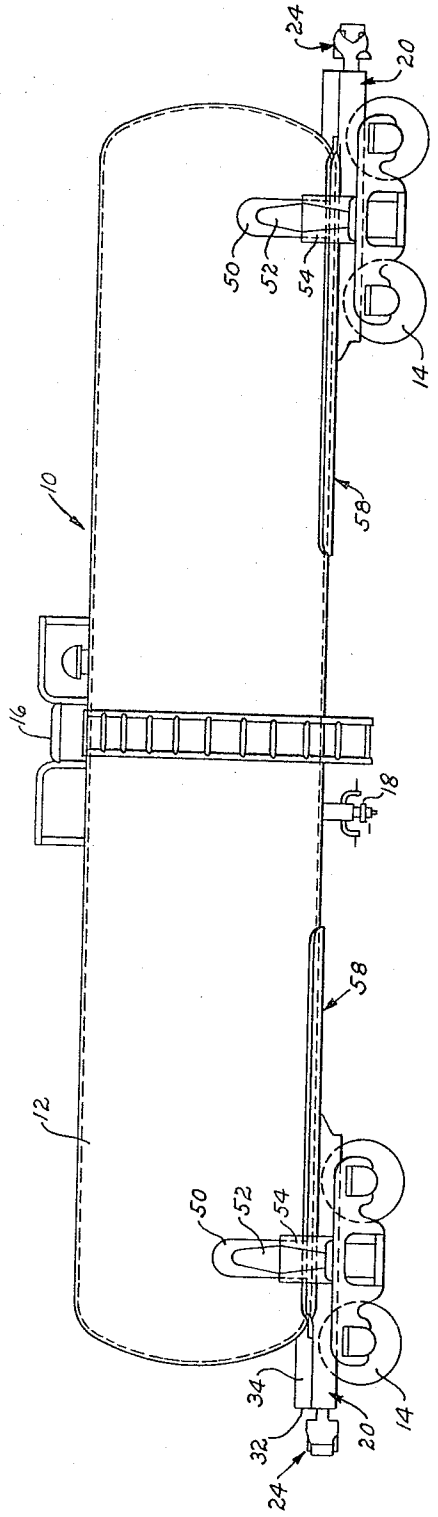


FIG. 1.

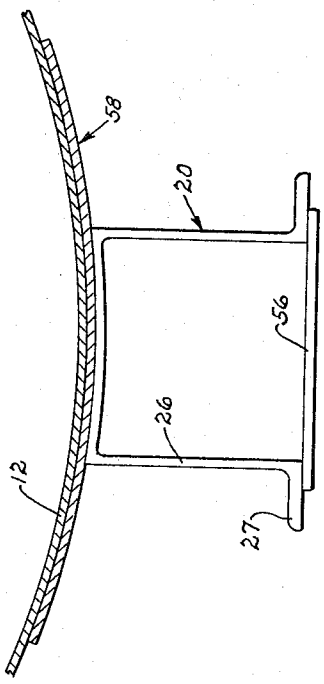


FIG. 5.

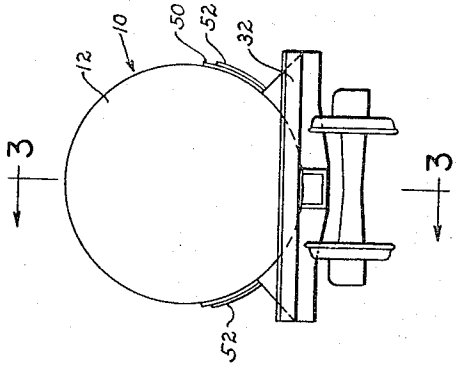


FIG. 2.

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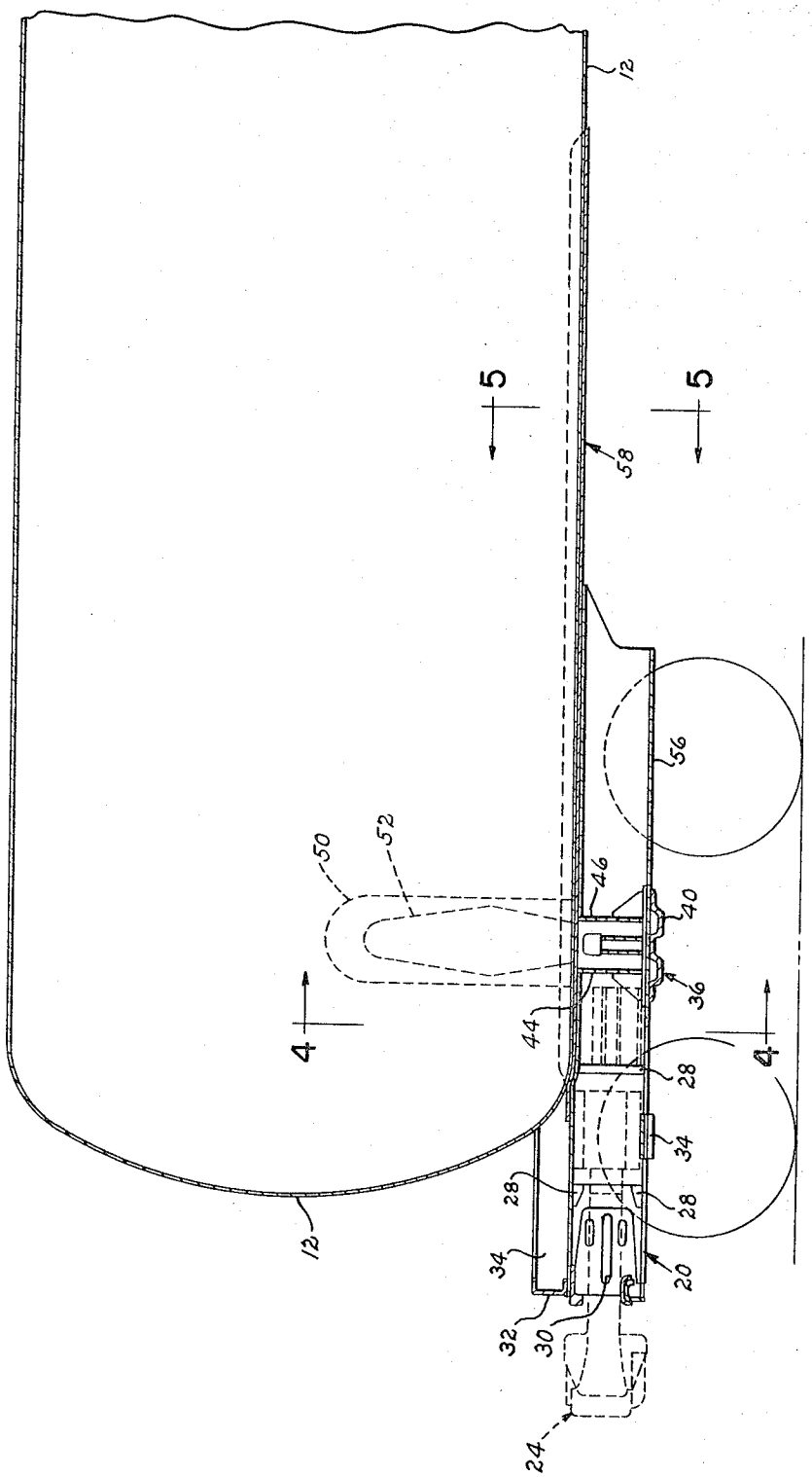


FIG. 3.

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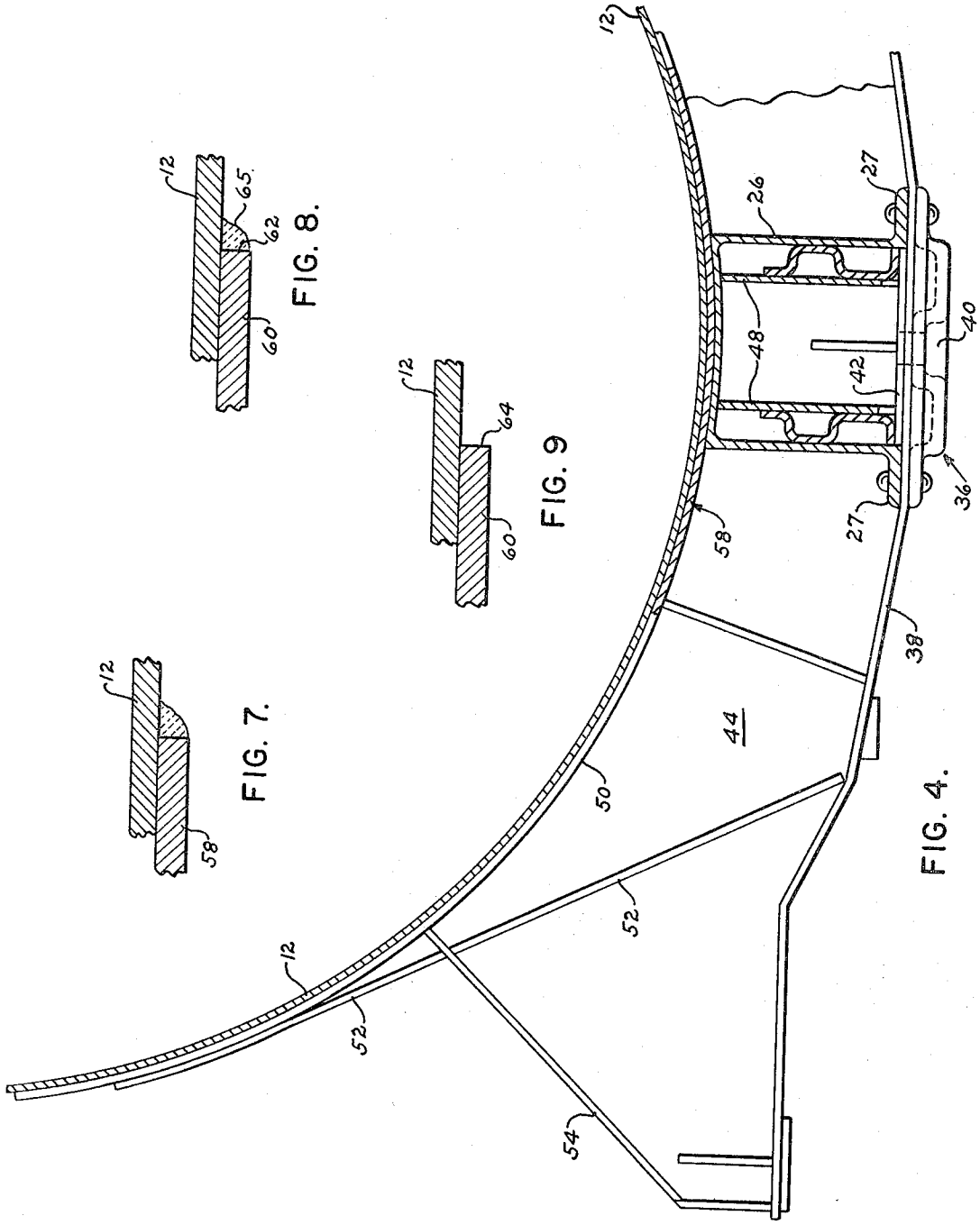


FIG. 4.

FIG. 8.

FIG. 9

FIG. 7.

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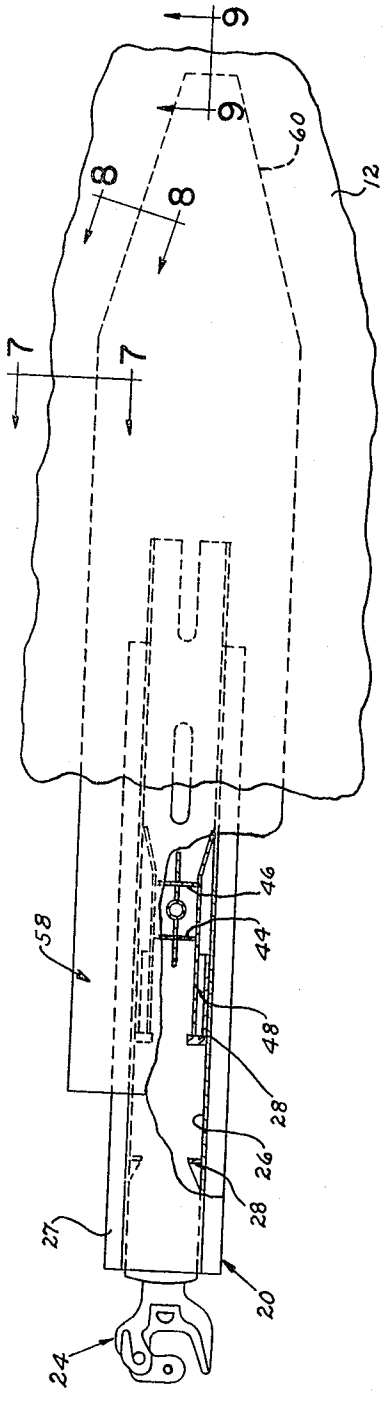


FIG. 6.

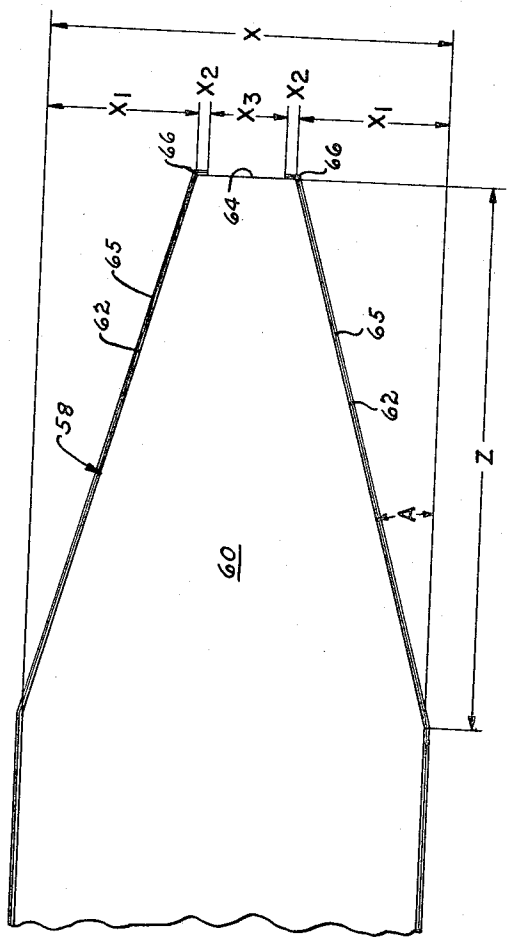


FIG. 10.

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3,308,769

RAILWAY TANK CAR

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Filed July 26, 1965, Ser. No. 474,856
5 Claims. (Cl. 105—362)

This invention relates to railway tank cars and more particularly to a railway tank car having an end stub center sill on each end of the car.

In railway tank cars without a center sill extending the length of the car, buff and draft forces exerted adjacent the car are normally transmitted from the couplers and draft gears to the stub sills and then to the tank shell through the bolster structures and saddle plates. Stresses induced by the stub center sills may be relatively high upon the exertion of relatively large impact forces and it is desirable to have the saddle plates transmit the stresses to the tank shell along generally the entire length of the saddle plates in a somewhat uniform manner with a minimum of stress concentrations. The saddle plates are normally welded to the tank shell and if high stress concentrations occur, particularly adjacent the inboard ends of the saddle plates, breaks in the welds may result. Further, particularly if the tank shell is of a relatively small thickness, such as ¼ inch, rupture of the tank shell may result from such stress concentrations upon the repeated exertion of relatively high impact forces.

It is an object of the present invention to provide a railway tank car having end stub center sills in which buff and draft forces from the coupler structure are easily transmitted to the tank shell and dissipated.

It is a further object of this invention to provide such a railway tank car in which the forces exerted by the end stub center sills and the center plates are easily transmitted to the tank shell with a minimum of stress concentrations.

The present invention comprises a railway tank car having a stub center sill structure adjacent each end and a saddle plate secured to the tank shell extending inwardly from the inboard end of each center sill structure. The saddle plate has its inner end portion tapered and terminating in a transverse edge extending perpendicularly to the centerline of the car with a major portion of the length of said transverse edge being unsecured to the superjacent tank shell. The tapered end portion is welded along its side edges to the tank shell and the stress is dissipated by the tank shell and saddle plate with a minimum of stress concentrations. It has been found that a taper of certain dimensions for the saddle plate results in an optimum taper for the most effective and efficient dissipation of stresses while minimizing stress concentrations. The taper which has been found most effective has been formed with the side edges of the end portion extending inwardly at an angle of around fifteen (15) degrees with respect to the longitudinal centerline of the railway car.

The invention accordingly comprises the construction hereinafter described, the scope of the invention being indicated in the following claims.

In the accompanying drawings, in which one of various possible embodiments of the invention is illustrated,

FIGURE 1 is a side elevation of a railway tank car constructed in accordance with this invention;

FIGURE 2 is an end elevation of the railway tank car shown in FIGURE 1;

FIGURE 3 is an enlarged partial sectional view of the railway car shown in FIGURES 1 and 2 taken generally along line 3—3 of FIGURE 2;

FIGURE 4 is an enlarged sectional view taken generally along line 4—4 of FIGURE 3;

FIGURE 5 is a sectional view taken generally along line 5—5 of FIGURE 3;

FIGURE 6 is a fragmentary top plan view of certain parts removed from the railway car, the saddle plate being indicated between the center sill structure and the tank shell;

FIGURE 7 is a section taken generally along line 7—7 of FIGURE 6;

FIGURE 8 is a section taken generally along line 8—8 of FIGURE 6;

FIGURE 9 is a section taken generally along line 9—9 of FIGURE 6; and

FIGURE 10 is an enlarged plan of the tapered end portion of the saddle plate.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

Referring to the drawings for a better understanding of the invention, I show a railway tank car generally designated 10 comprising a generally cylindrical shell 12 supported on trucks 14. Shell 12 has an upper dome structure 16 for receiving lading, such as liquids and the like, and a lower discharge valve structure 18 for discharging the lading.

An end stub center sill structure generally designated 20 is positioned at each end of car 10 and has a draft gear pocket adapted to receive a draft gear and coupler structure generally designated 24. As shown in FIGURE 4, the end portion of stub center sill structure 20 forward of shell 12 comprises a pair of connected Z-shaped members forming a hat-shaped sill member 26 with lower flanges 27. Draft gear lugs 28 are secured to the inner surface of sill member 26 to provide stops for draft gear and coupler structure 24. A slot 30 in sill member 26 is adapted to receive a key for draft gear and coupler structure 24. An end sill 32 extends transversely across the width of car 10 and a stub side sill 34 extends between end sill 32 and shell 12 on each side of car 10.

Referring particularly to FIGURES 3 and 4, a bolster structure generally designated 36 has a lower cover plate 38 and a center plate 40 secured thereto adapted to receive the kingpin of an associated truck 14. A reinforcing plate 42 is positioned over cover plate 38. Extending across the width of car 10 are vertical bolster webs 44 and 46. Reinforcements 48 extend between webs 44 and 46 and outwardly from web 44 to adjacent stops 28. A cradle pad or plate 50 is supported on sill member 26 and follows the outer contour of shell 12 to a position slightly below the horizontal centerline of shell 12. A side brace plate 52 on each side of shell 12 is secured along its upper edge to shell 12 and along its lower edge to bolster lower cover plate 38. A bolster end cover plate 54 on each end of bolster structure 36 is secured to lower cover plate 38 along its lower edge and to shell 12 along its upper edge. As shown in FIGURE 3, center sill structure 20 has a bottom cover plate 56 extending from bolster structure 36 to the inboard end of the sill structure 20.

Referring particularly to FIGURES 6–10 and forming this invention, an arcuate saddle plate is generally designated 58 and is secured, such as by welding, along its lower surface to center sill member 26. Saddle plate 58 extends inwardly beyond the inboard end of sill member 26 for a considerable distance as shown particularly in FIGURES 3 and 6. In order to dissipate effectively and efficiently the buff and draft forces transmitted from draft gear and coupler structure 24 and center sill structure 20, it is desirable to minimize any stress concentrations formed between tank shell 12 and saddle plate 58 as shell 12 is normally of a relatively small thickness, such as 5/16 inch. A stress concentration of a sufficient magnitude along tank shell 12 will tend to produce a rupture or a

weld break. For this purpose, saddle plate **58** has a tapered end portion **60** forming side edges **62** terminating at a transverse end edge **64** extending transversely of the longitudinal centerline of railway car **10**. Each side edge **62** preferably tapers inwardly toward the longitudinal centerline of railway car **10** at an angle A of around fifteen (15) degrees with respect to the longitudinal centerline of the car. Angle A may be between around ten (10) degrees and twenty (20) degrees.

In order to minimize stress concentrations along transverse edge **64**, it is necessary that the length of edge **64** be a certain minimum distance. It has been found that a length of at least six inches for edge **64** is desirable to permit optimum distribution of the stresses along the length of saddle plate **58**. Side edges **62** are welded at **65** along their entire length to shell **12**. Edges **62** terminate in junctures **66** with transverse edge **64** to form corners thereat. In order to minimize any stress concentrations at junctures **66**, edge **64** is welded for a relatively short distance from each juncture **66** as denoted by letter X2 in FIGURE 10. The remaining length of edge **64** as denoted by letter X3 is not secured to tank shell **12** as shown in FIGURE 9.

As a specific example of suitable dimensions for end portion **60** and referring particularly to FIGURE 10, the length of end portion **60** is indicated by letter Z and may be around four (4) feet. The entire width of end portion **60** is denoted by letter X and may be three (3) feet. The welded length of edge **64** is denoted by letter X2 and may be one inch with distance X3 being seven (7) inches. Distance X1 may be thirteen and one-half (13½) inches to provide a ratio between X1 and Z of around four to one which is a general ratio to be maintained.

Forces are transmitted from the coupler and draft gear structure **24** through stops **28** to center sill member **26**. Saddle plate **58** is welded to center sill member **26** and the stress is dissipated into tank shell **12** along the length of saddle **58** with a minimum of stress concentration. The employment of a saddle plate having a tapered end portion and an unsecured end edge permits a somewhat uniform distribution of stress along the length of the saddle.

In view of the above, it may be seen that several objects of the invention are achieved and other advantageous results attained.

As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A railway tank car comprising a generally cylindric-like body shell, a bolster structure adjacent each end of the body shell having a cradle secured to the body shell, a stub center sill structure adjacent each end of the car extending inwardly beyond the bolster structure, a coupler and draft gear structure carried by each center sill structure, a saddle plate secured between each stub center sill structure and the body shell and extending inwardly beyond the center sill structure, said saddle plate being generally arcuate and conforming to the outer adjacent surface of the body shell, said saddle plate extending inwardly beyond the inner end of said adjacent stub center sill structure and having an inner end portion of a reduced cross-sectional area, said end portion having opposed side edges converging inwardly of the car in a straight line direction to provide a gradual decrease in width of the end portion, said end portion terminating inwardly of the car in a transverse edge extending transversely of the longitudinal centerline of said car and connecting said side edges, said saddle plate being welded along said opposed side edges to said body shell, and a major portion of the length of said transverse edge being unsecured to the body shell thereby to minimize stress concentrations along said transverse edge and to permit stress to be dissipated primarily along said welded opposed side edges.

2. A railway tank car as set forth in claim **1** wherein the length of said transverse edge is a minimum of around six inches, said transverse edge being welded to said body shell immediately adjacent the juncture of said transverse edge with each side edge thereby to aid in dissipating the stress at said juncture.

3. A railway tank car as set forth in claim **1** wherein each opposed side edge of said end portion tapers inwardly toward the longitudinal centerline of the car at an angle between about 10° and 20° with respect to the longitudinal centerline of the car.

4. A railway tank car comprising a generally cylindric-like body shell, a bolster structure adjacent each end of the body shell having a cradle secured to the body shell, a stub center sill structure adjacent each end of the car extending inwardly beyond the bolster structure, a coupler and draft gear structure carried by each center sill structure, a saddle plate secured between each stub center sill structure and the adjacent body shell and extending inwardly beyond the center sill structure, said saddle plate being generally arcuate and conforming to the outer adjacent surface of the body shell, said saddle plate extending inwardly beyond the inner end of said adjacent stub center sill structure and having an inner end portion of a reduced cross-sectional area, said end portion having opposed side edges tapering inwardly of the car, said end portion and said opposed edges terminating inwardly of the car in a transverse edge extending transversely of the centerline of said car and connecting said opposite edges, said saddle plate being welded along the entire length of said opposed edges to said body shell, a major portion of the length of said transverse edge being unsecured to the body shell thereby to minimize stress concentrations at said transverse edge and to permit stress to be dissipated primarily along said welded opposed side edges, said transverse edge being welded to said body shell immediately adjacent the juncture of said transverse edge with each side edge thereby to aid in dissipating the stress at said junctures and to minimize stress concentrations thereat.

5. A railway tank car as set forth in claim **4** wherein the length of said transverse edge is a minimum of around six inches, said transverse edge being welded to said tank shell from the juncture of each side edge for a distance not substantially exceeding one inch.

References Cited by the Examiner

UNITED STATES PATENTS

3,139,841	7/1964	Krause	105—360
3,139,842	7/1964	Moyes et al.	105—360
3,252,431	4/1966	Phillips	105—360

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