Aug. 22, 1967 S. P. HALCOMB 3,336,879

RAILWAY TANK CAR

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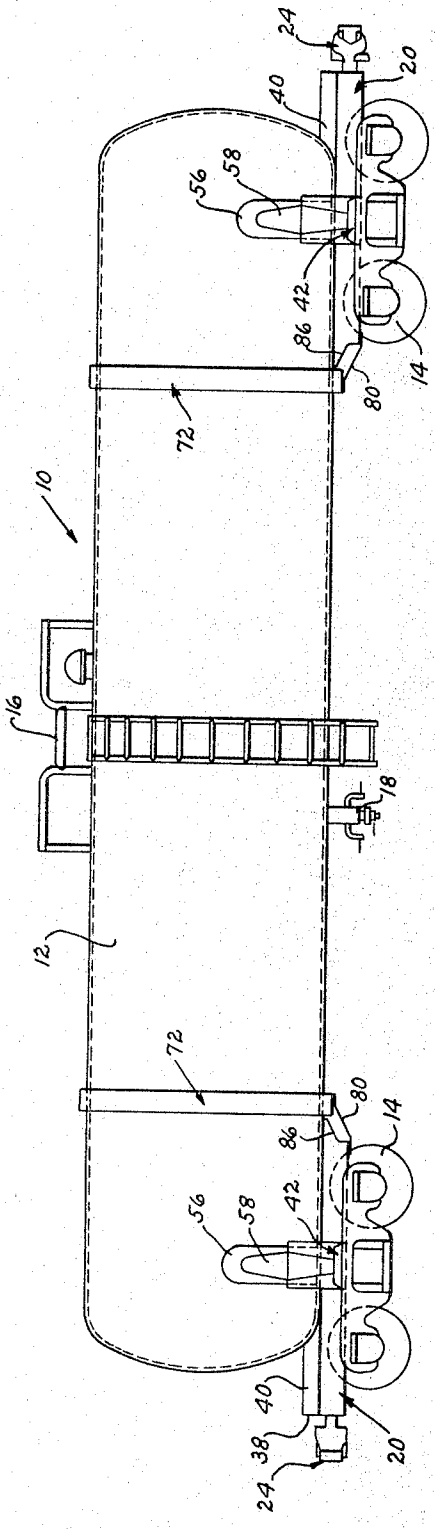


FIG. 1.

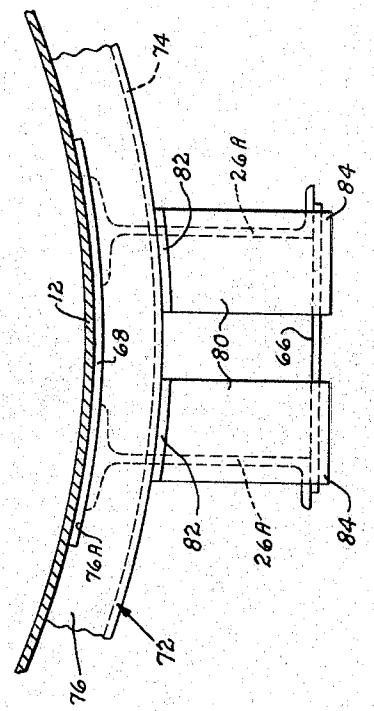


FIG. 6.

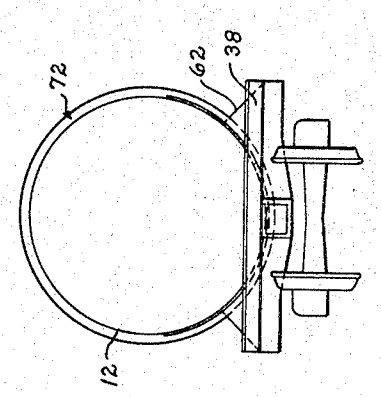


FIG. 2.

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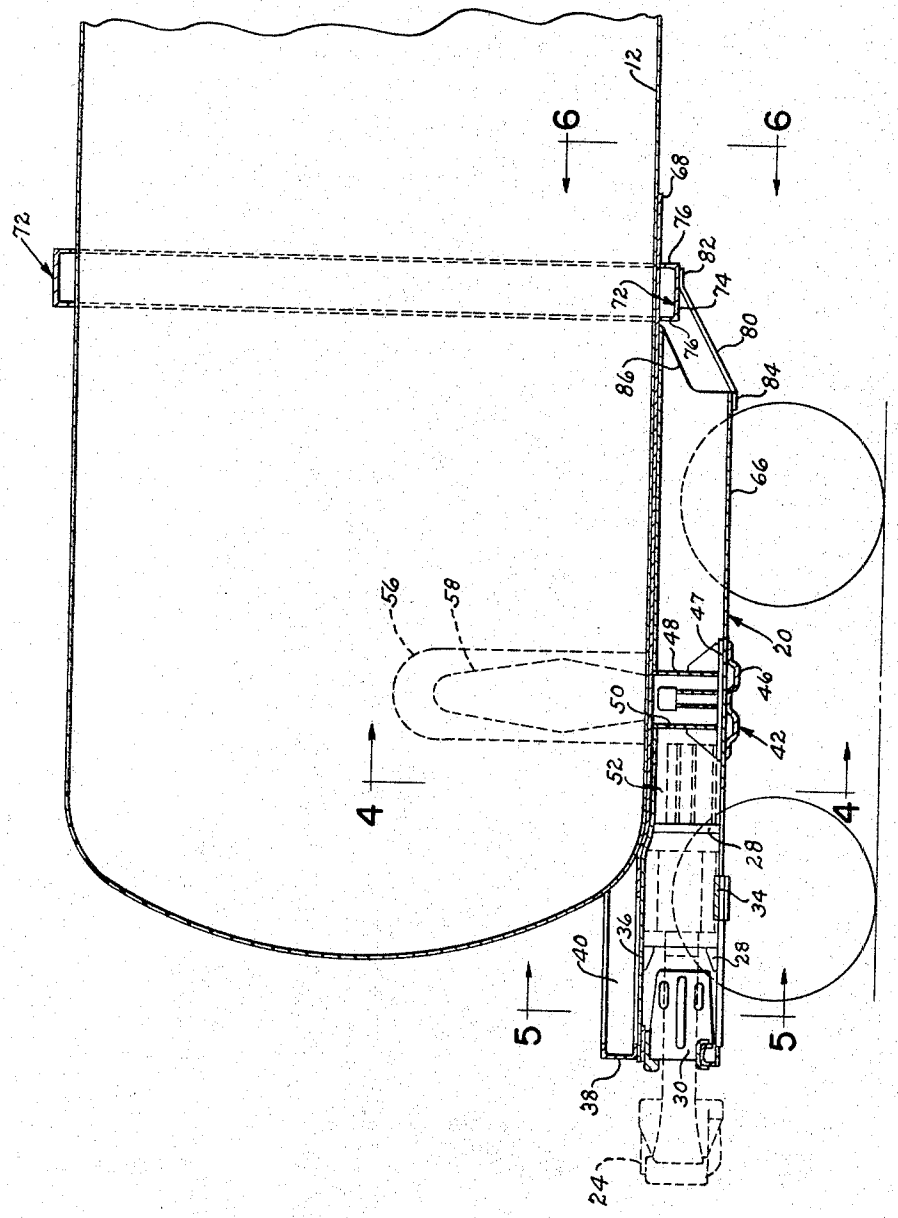


FIG. 3.

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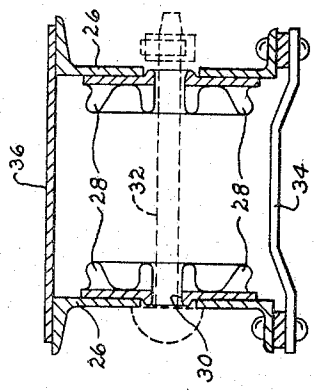


FIG. 5.

FIG. 4.

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United States Patent Office 3,336,879 Patented Aug. 22, 1967

3,336,879

RAILWAY TANK CAR

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Filed May 28, 1965, Ser. No. 459,566
2 Claims. (Cl. 105—358)

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

In railway tank cars without a center sill extending the length of the car, impact or buff forces exerted against 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. A moment created by eccentric loading is exerted by the stub center sills and may be relatively high upon the exertion of relatively large impact forces. The eccentric load or force transmitted through the stub center sills produces a tendency for the inboard ends of the sills to punch or push upwardlly into the tank shell under a punching force. As tank shells may be of a relatively small thickenss, such as ¼ inch, failure or rupture of the tank shell adjacent the inboard ends of the stub center sills may be effected 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 impact 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 moment or eccentricity exerted by the end stub center sills is easily dissipated.

The present invention comprises a railway tank car having a stub center sill structure on each and a ring extending around the tank shell adjacent the inboard end of each center sill structure. The punching force transmitted from the stub center sill structure reacts against the adjacent ring and the ring dissipates partically all of the punching force transmitted by the adjacent sill structure. A certain minimum section modulus is required in the ring in order to dissipate the punching force. In order to obtain the necessary section modulus, each ring includes a web extending in a vertical plane outwardly from the shell and an integral plate or flange extending in a horizontal plane and spaced outwardly of the tank shell in concentric relation. The employment of a ring to dissipate the punching force permits a relatively short length saddle plate as the forces are concentrated at the ring where they are dissipated.

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 longitudinal section of one end portion of the railway car shown in FIGURES 1 and 2 showing the stub center sill structure and the reinforcing ring;

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

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

FIGURE 6 is a sectional view taken generally along line 6—6 of FIGURE 3.

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 5, the end portion of stub center sill structure 20 forwardly of shell 12 comprises a pair of channel-shaped sill members 26. Draft gear lugs 28 are secured to the inner surface of sill members 26 to provide stops for draft gear and coupler structure 24. A slot 30 in sill members 26 is adapted to receive a key 32 for draft gear and coupler structure 24. A lower strap 34 and an upper cover plate 36 form the draft gear pocket with adjacent sill members 26.

An end sill 38 extends transversely across the width of car 10 and a stub side sill 40 extends between end sill 38 and shell 12 on each side of car 10.

Referring particularly to FIGURES 3 and 4, a bolster structure generally designated 42 has a lower cover plate 44 and a center plate 46 secured thereto adapted to receive the kingpin of an associated truck 14. A reinforcing plate 47 is positioned over cover plate 44. Extending across the width of car 10 are vertical bolster webs 48 and 50. Reinforcements 52 extend betweeen webs 48 and 50 and outwardly from web 50 to adjacent stops 28. Center sill structure 20 beneath shell 12 comprises sill members 26A having an upper inner flange 54 thereby to provide an increased support beneath shell 12. A cradle pad or plate 56 follows the outer contour of shell 12 to a position slightly below the horizontal centerline of shell 12 and is supported along the upper edges of vertical webs 48 and 50. A side brace plate 58 on each side of shell 12 is secured along an upper edge to shell 12 and along its lower edge to bolster lower cover plate 44. Additional end reinforcing webs 60 and 62 support shell 12 on bolster structure 42.

As shown in FIGURE 3, center sill structure 20 has a bottom cover plate 66 extending from bolster structure 42 to the inboard end of the sill structure 20. To reinforce tank shell 12 in its lower support area, an arcuate saddle plate 68 is secured to center sill members 26A along their entire length and extends beyond the inner ends of sill members 26A. Saddle plate 68 thus forms a support for tank shell 12 and reinforces the tank shell in the greater stress areas.

Referring particularly to FIGURES 3 and 6 and forming this invention, a ring generally designated 72 extends about the outer circumference of tank shell 12 adjacent each end thereof and slightly inboard of the inner ends of center sill members 26A. Ring 72 is of a channel-shape having an outer body web 74 concentric with shell 12 and integral legs 76 secured to the outer surface of shell 12. Legs 76 have cutout portions 76A to receive saddle plate 68 as shown in FIGURE 6. Legs 76 form annular ribs extending about the circumference of shell 12. To aid in transmitting stress and punching force to ring 72 from stub center sill structure 20, end straps 80 have upper horizontal flanges 82 secured to web 74 and lower horizontal flanges 84 secured to bottom cover plate 66. It is to be understood that ring 72 may be secured directly to sill members 26A, if desired.

In order to obtain an adequate section modulus for dissipating the punching force transmitted from draft gear and coupler structure 24 and center sill structure 20 upon the exertion of buff forces, a web extending in a

generally vertical plane in combination with a web generally concentric with shell **12** is desirable. While a T-shaped section could be employed, such a design would extend a greater distance from the surface of shell **12**. The use of a channel-shaped ring permits a projection of a lesser dimension on the outer surface of tank shell **12**. The inboard ends of center sill members **26A** have tapered upper projections **86** secured to saddle plate **68** closely adjacent ring **72** as shown in FIGURE 3. Tapered projections **86** transfer stresses to saddle plate **68** without creating high stress concentrations.

Stress is transmitted from the coupler and draft gear structure **24** through stops **28** to the center sill members **26A**. Saddle plate **68** is secured to sill members **26A** and the shearing stress is dissipated primarily by saddle plate **68** into tank shell structure **12**. The punching force, however, is transmitted by saddle plate **68** and sill members **26A** to ring **72** and practically the entire punching force is removed by the concentric ring **72** extending around tank shell **12** adjacent each end of the railway car. Shell **12** commonly has a thickness of around $\frac{7}{16}$ inch with thicknesses between around $\frac{1}{16}$ inch and $\frac{9}{16}$ inch being satisfactory. Thus, it is desirable to provide reinforcement to take the punching force which is relatively large upon buff forces or impact forces exerted against the coupler structure **24**. As ring **72** extends about the entire circumference of shell **12** in a 360° circle, the punching force is distributed along the entire circumference of shell **12**.

While it is possible that the punching force could be dissipated in shell **12** by extending saddle plate **68** and center sill members **26A** a considerable distance, the use of ring **72** permits a relatively short length saddle plate **68** and relatively short length stub center sill members **26A** since a relatively large force may be reacted by ring **72**. The present invention thus provides a railway tank car with stub center sill structures in which the eccentricity or moment is easily dissipated.

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 extending inwardly beyond the center sill structure, said saddle plate being generally arcuate and conforming to the outer adjacent surface of the body shell, a moment dissipating structure disposed generally adjacent the inner end of each center sill structure adjacent each end of the car and being of an annular shape extending concentrically about the outer periphery of the tank shell, said moment dissipating structure including an annular rib extending in a generally vertical plane and secured to the adjacent saddle plate and the body shell, said center sill structure including a pair of spaced center sill members each having a vertical web and upper lower flanges, the inner ends of said vertical webs tapering from their lower flanges to their upper flanges and spaced slightly from said moment dissipating structure, and a connecting member extending between and secured to said lower flanges and said moment dissipating structure for transferring stress therebetween whereby moment transmitted from the coupler and draft gear structure to the center sill structure and saddle plate is dissipated by the moment dissipating structure.

2. 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 separate stub center sill structure adjacent each end of the car extending inwardly beyond the bolster structure and comprising a pair of spaced vertical webs having lower flanges, a coupler and draft gear structure carried by each stub center sill structure, a saddle plate secured between each stub center sill structure and the body shell extending inwardly beyond the adjacent center sill structure, said saddle plate being generally arcuate and conforming to the outer adjacent surface of the body shell, and an external ring-shaped moment dissipating structure connected directly to the inner end of each stub center sill structure and secured about the entire outer periphery of the body shell, said ring-shaped moment dissipating structure comprising an annular rib extending in a vertical plane about the body shell and an annular flange secured to the rib generally at right angles thereto in outwardly spaced generally concentric relation to the body shell whereby moment transmitted from the coupler and draft gear structure to the center sill structure and saddle plate is dissipated about the periphery of the tank shell by the moment dissipating structure thereby permitting a relatively short length saddle plate and center sill structure.

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