Oct. 14, 1941. R. A. NORBOM 2,259,319

DEMOUNTABLE TANK BODY

Filed Sept. 18, 1940 2 Sheets-Sheet 1

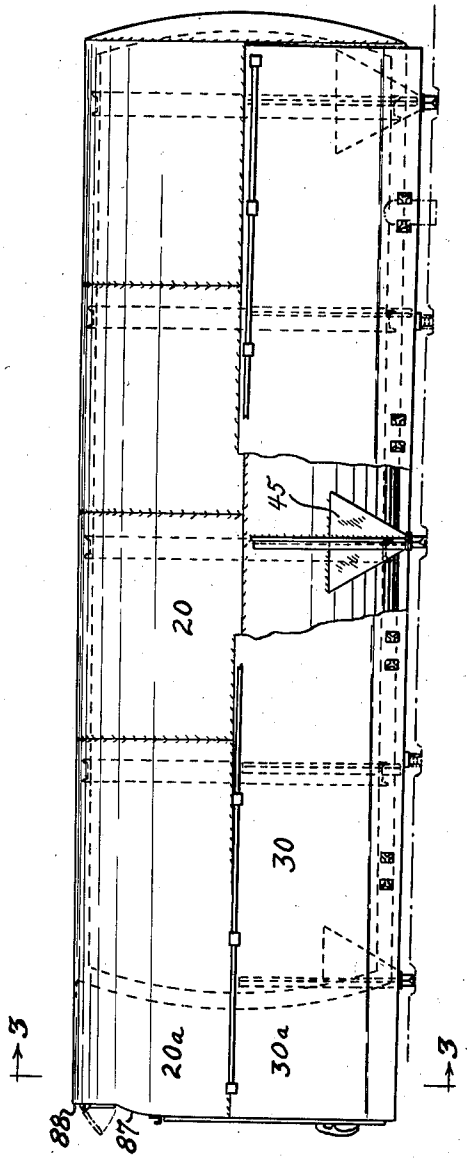

Fig. 1

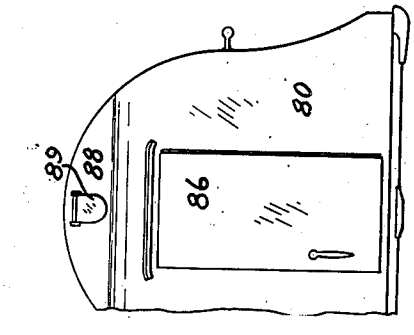

Fig. 2

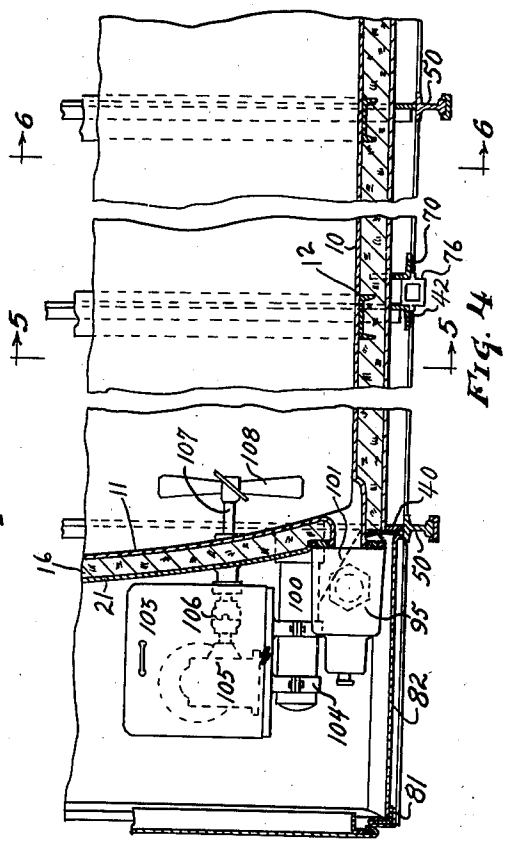

Fig. 4

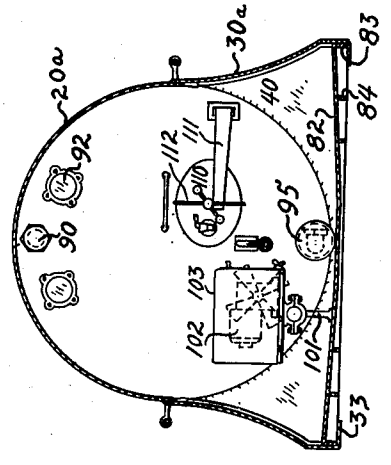

Fig. 3

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DEMOUNTABLE TANK BODY

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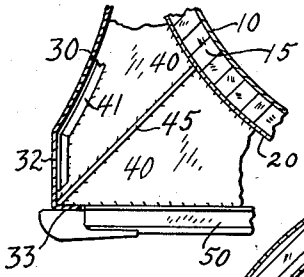

FIG. 6

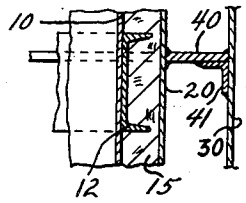

FIG. 8

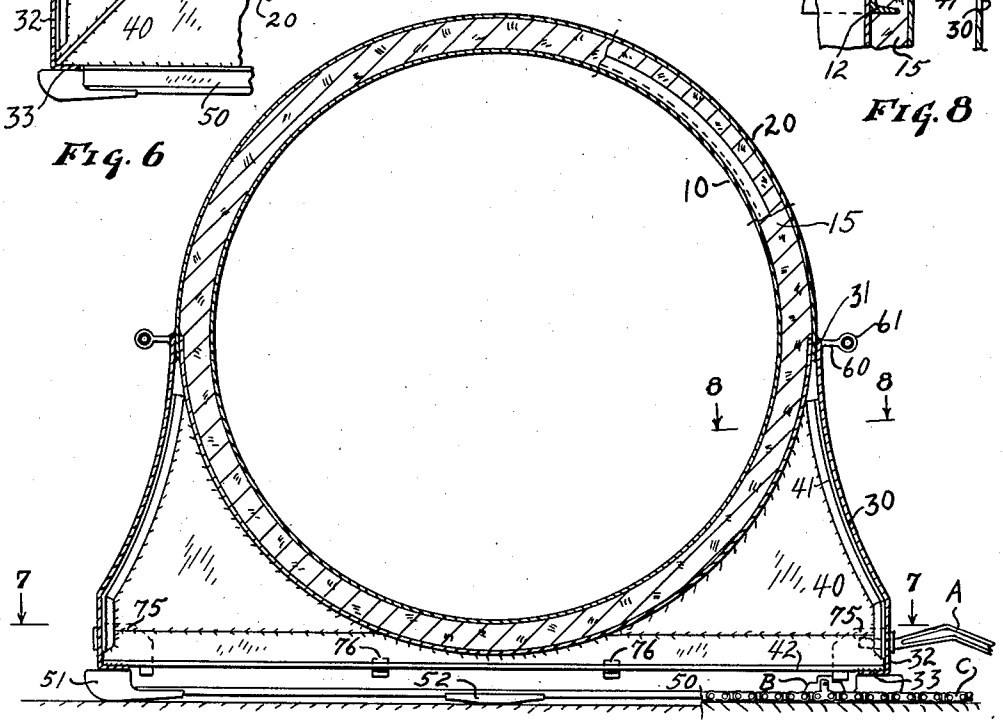

FIG. 5

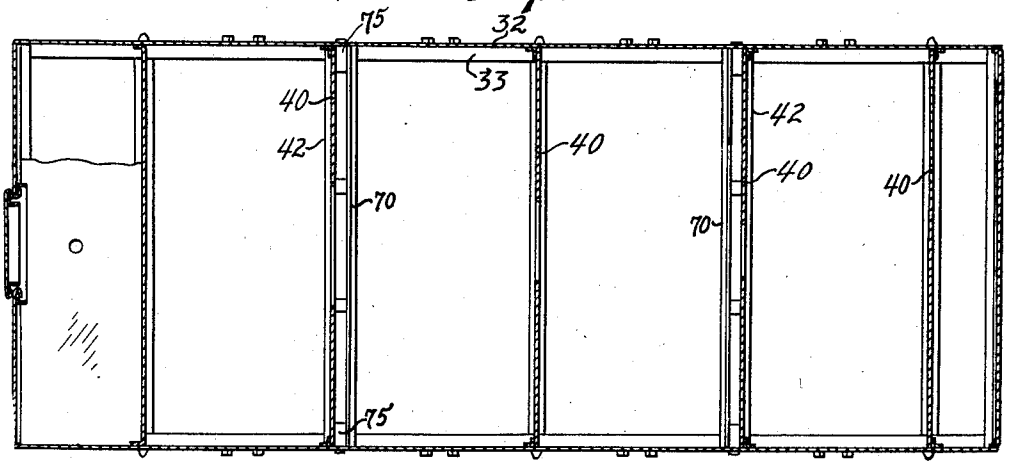

FIG. 7

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DEMOUNTABLE TANK BODY

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Application September 18, 1940, Serial No. 357,271

10 Claims. (Cl. 280—5)

The present invention is an improvement on demountable tank body shown in my pending application, Serial No. 349,695 filed August 2, 1940. Like that application, the body includes a horizontal tank, a vestibule at the end thereof and a cradle supporting the tank and vestibule and provided on its underside with skid rails to enable its transference. The tank body is designed especially for containers of large capacity which are adapted to be mounted lengthwise on railway cars and transferred thereto from a highway truck placed alongside of the car.

The object of the present invention is to simplify and cheapen the construction, and render it lighter without sacrificing strength or stiffness, as well as to increase the convenience of handling and improve the appearance. The improvements relate especially to the carrying cradle, and the construction of the vestibule and its connection with the tank and cradle.

The invention is illustrated in the drawings hereof and is hereinafter more fully described.

In the drawings, Fig. 1 is a side elevation of the tank body, the side skirt being broken away to show the construction behind it; Fig. 2 is an end view of the tank looking at the vestibule; Fig. 3 is a section taken on the line 3—3 of Fig. 1, showing the interior of the vestibule; Fig. 4 is a central vertical section through a portion of the tank and vestibule; Fig. 5 is an enlarged cross section of the tank body, as indicated by the line 5—5 on Fig. 4; Fig. 6 is a fragmentary vertical section through the tank and cradle in a plane indicated by the line 6—6 on Fig. 4; Fig. 7 is a horizontal section of the tank body through the base frame, the section being indicated by the line 7—7 on Fig. 5; Fig. 8 is a fragmentary detail of the tank, bolster plate and side skirt, in a plane indicated by the line 8—8 of Fig. 5.

The tank proper of this invention may comprise an inner shell 10, preferably cylindrical, a correspondingly shaped outer shell 20, and intermediate insulation 15, each of the shells have convex ends flanged at their edges and welded to the shells and carrying intermediate insulation. The head at one end of the tank is indicated at 11, 21 and 16 respectively, in Fig. 4, the construction of the other end being the same.

The inner shell is shown as braced by band 12 extending about it at suitable intervals along the length of the shell, this band being preferably of channel shape with its flanges facing outwardly as shown in Figs. 4 and 8.

The cradle, which rigidly carries the tank described, comprises an open frame horizontal on its underside, concave on its top and converging inwardly and upwardly at its side edges. More particularly the frame comprises a series of transverse bolsters the upper edges of which are welded directly to the outer shell of the tank and the end portions of which abut and are secured to side plates. These plates in the present invention extend upwardly and inwardly and form side skirts connected at their upper ends to the tank, while at their lower ends they are flanged inwardly and form longitudinal side sills.

As shown for instance in Fig. 5, each side member comprises of a skirt 30, the upper end of which is welded to the tank at 31, adjacent its horizontal diameter, the skirt end extending downwardly and outwardly, preferably slightly concave on the outer side. At the lower end of the concave portion 30 the skirt depends vertically as at 32 and then extends inwardly horizontally as at 33. This vertical and horizontal portion of the skirt makes an effective side sill for the cradle.

The bolster plates indicated at 40 have their upper edges snugly fitting the outer shell of the tank for nearly half of its circumference and are welded directly to the shell. At their ends the bolster plates abut the portions 32 and 30 of the side skirts and are there welded to them reinforced by angle bars 41 to which they are also welded.

Some of the bolster plates 40, at their bottom edges abut the vertical flanges of angle bars 42 to which they are welded. These angle bars extend over the side flanges 32 and are welded to them so that they become effective cross sills. Other bolster plates at their lower edges abut the top of the transverse skid rails 50 to which they are welded. These rails are formed like railroad rails and their top flanges thus form flanges for the lower edges of the bolster plates and constitute transverse sills.

The bolster plates are not only welded at their top edges to the outer shell of the tank but are further connected therewith by bracing gussets 45 which are triangular members welded at one edge to the bolster plate and at the other edge to the tank shell. These gusset plates as indicated in Figs. 1 and 6 extend from the same shell downwardly at an angle of about 45° to the reentrant angle at the base of the side skirt.

The upper half of the outer shell overlaps the lower half of the outer shell and is there welded to it and to the side skirts. Adjacent the junction of these parts, I secure outwardly projecting brackets 60 which carry hand rails 61.

The skid rails 50 on the underside of the cradle are inverted railroad rails or of similar construction. They carry on their underside shoes 51 at the ends, and preferably an intermediate shoe 52. These shoes being designed to ride on suitable supporting surfaces on the railway car or highway truck. Such surfaces, for instance, may be horizontal flanges of upwardly facing channel bars on such vehicles.

Located parallel with the lower edges of those bolster plates which are continued by the angle bars 42 are transverse angle bars 70 welded at their ends to the side sills, while between the angle bars are distance blocks welded to both of the bars. This makes a very rigid and stiff cross sill.

The distance blocks are also available for engagement by the transfer mechanism on the highway vehicle. As shown, there are two of these distance blocks adjacent each end of the cross member designated 75 adapted for engagement with a push-and-pull bar A, Fig. 5, as hereinafter mentioned, while intermediately there are located two or more other blocks designated 76. All of these blocks have lugs or portions extending downward below the bottom plane of the bolsters or cross bars, and any of these lugs are adapted to be engaged by the propelling mechanism on the highway vehicle. I have indicated in Fig. 5 an upstanding lug B on a propelling chain C which may be mounted on a highway truck and travel thereon in a direction transverse of the body and thus operate to shift the body in the direction in which the chain may be moving.

Such an arrangement as just outlined is effective for moving the body in either direction when it is directly over the chain. To move the body when it is beyond the region of the chain, the push-and-pull bars A are provided which are connected at one end to the body, as indicated in Fig. 5, and at the distant edge to the chain. This provides means for drawing a body off of the car to a position over the chain on the truck, or for completing its movement from the truck onto the car.

Returning to the cradle shown, it will be seen that it is very light construction and at the same time rigid. The outer shell of the tank forms a top cord for the bolster girders, the lower cords of which are the base angle bars and the additional cross bars heretofore mentioned, or the skid rails themselves. Finally, the combined side sill and side skirt not only firmly braces the bolsters at the end and forms a longitudinal girder with the shell member acting as a top cord and the inward flange as a bottom cord. All of the parts mentioned are firmly united by welding as indicated in the drawings.

The vestibule of my tank is formed with its upper portion as a continuation of the outer shell of the tank and its lower portion as a continuation of the side skirt. The upper portion of the tank referred to is a semi-cylinder extending from one head to the other and continuing integrally beyond the head which is at the left hand end in Fig. 4 to form the upper half of the vestibule as indicated at 20*a* in Fig. 1. Likewise, integral continuations of the skirts indicated at 30*a* in Fig. 1 form the sides of the vestibule.

The end shell of the tank and the endmost bolster plate 40 form the inner wall of the vestibule. The front or exposed end of the vestibule is made by a plate 80 vertical for the most part and confirming at its edges to the contour of the top half of the tank and the side skirts and at its edges welded to such parts. This front panel 80 of the vestibule is flanged inwardly at 81 at its bottom, and reinforced by a nesting angle bar, thus making an effective end sill.

The inward flange of the end plate and the top flange of the first skid rail and the inward flanges 32 and 33 of the side sills form supports for the vestibule floor 82. This floor comprises a plate flanged downwardly at its four edges to rest on such cradle flanges. The flanging at the side edges 83 is of greatest extent, so that the floor inclines downwardly toward the longitudinal center line for draining purposes as indicated at Fig. 3. Suitable longitudinal bars 84 brace the floor intermediately.

The vestibule end wall 60 is provided with a suitable entrance door 86. Above this door, the top portion of the end wall is bent inwardly, as at 87, and then upwardly at 88, and this portion has an entrance opening normally covered by a depending hinged flap 89. This provides for admission to the interior of the vestibule of a suitable filling hose adapted to be attached to a filling nipple 90 leading into the tank adjacent its top. Inspection windows 92 in this end of the tank aid in the filling operation.

Within the vestibule is provided the discharge valve 95 from the tank. The tank is preferably tipped slightly toward the vestibule so that the entire contents may be discharged through the discharge valve.

The end wall of the tank also supports a motor in the vestibule for operating an agitator within the tank. To this end I have provided a projecting tubular bar 100 mounted in a flange secured to the end wall of the tank and braced by a gusset 101 secured to the end wall and bar. The motor designated 102 is mounted in a suitable casing 103 secured by straps 104 to the bar 100. This motor operates reduction gearing in a casing 105 from which the driven shaft is connected by a coupling 106 with the shaft 107 of the agitator 108, the latter shaft extending through a stuffing box secured to the tank shells.

In the end of the tank which forms the inner face of the vestibule there is preferably a man-hole which is normally closed by a closure plate 110 supported by a swingable bracket 111 and normally locked by suitable lock 112.

It will be seen that my tank with its vestibule and supporting cradle is one continuous streamlined structure. The upper portion is semi-cylindrical from one end to the other and the sides flare outwardly slightly to furnish a broad base for firmly carrying the tank and providing engagement for the desired skid rails and for means for attachment of the transferring mechanism. The entire construction is light and at the same time thoroughly braced to provide a tank readily adapted to withstand the strain of railroad or highway transportation.

By making the side skirts slightly concave outwardly as shown, I prevent the sheet being inadvertently bent from true position between bolsters, and I cause the upper edge to form an accurate tangent with the side of the tank, resulting in a simpler welding operation. The concave skirt, making a reverse curve with the upper portion of the tank and terminating in the flat vertical face appropriate to a base gives the entire structure a neater appearance than where the skirts are continuous planes. At the same

time, the vertical lower portion of the side skirt, together with the inturned flange at the bottom, constitutes a very effective side sill.

I claim:

1. In a tank body, the combination of a double shell cylindrical tank, transverse bolsters beneath the tank welded to the outer shell, side skirts at the ends of the bolsters welded to said bolsters and to the outer shell of the tank, the top half of the outer shell of the tank extending beyond the head of the tank to form the roof and a portion of the sides of a vestibule at the end of the tank, the two side skirts being extended beyond such head of the tank to form lower portions of the sides of the vestibule, the endmost bolster at the end of the tank forming the inner wall of the vestibule, an upright closing plate forming the outer wall of the vestibule and having a doorway through it with a door, and a floor extending across the bottom of the vestibule supported by inwardly flanged edges of the side skirts.

2. The combination of a horizontal tank, transverse bolsters supporting the same secured to the tank, side skirts secured to the ends of the bolsters, the top portion of the tank and the end portions of the side skirts projecting beyond the head of the tank and a wall attached to such projecting portions, whereby a vestibule is provided at the end of the tank, said end wall at its lower end being flanged inwardly to make an end sill, and a floor for the vestibule supported in part by said inward flange of the end wall.

3. A tank body having a horizontal tank, a cradle with transverse bolsters beneath the tank secured to it, side skirts across the ends of the bolsters secured to such ends and to the tank, the upper portion of the tank and the side skirts projecting beyond the head forming that end of the tank to form the walls of a vestibule, an upright sheet forming the end of the vestibule, the top portion of said end sheet being diverted inwardly toward the tank, an entrance opening through such inwardly diverted top portion with means for closing such opening, and an entrance passageway from the vestibule into the tank through the end of the tank adjacent to the top of such end.

4. In a tank body, the combination of a horizontal tank, transverse bolster plates welded at their upper edges to the tank, transverse flanged members welded to the lower portions of the bolsters and reinforcing them, angle bars parallel with the reinforces and spaced therefrom, distance pieces between the angle bars and reinforces welded to both of them, and side skirts across the ends of the bolsters having bottom flanges beneath the reinforces and angle bars.

5. A combination of a horizontal tank, transverse vertical bolster plates concave on their upper edges and straight on their lower edges, the upper edges being welded to the tank, transverse skid rails directly beneath the bolster plates, the lower edges of the bolster plates being welded directly to the tops of the skid rails.

6. A combination of a horizontal tank, a set of vertical bolster plates concave on their upper sides, welded at their upper edges to the tank, transverse skid rails beneath some of the bolster plates, said plates engaging the tops of the skid rails and welded to them, transverse reinforcing angle bars to which the lower edges of other bolster plates are welded, angle bars parallel with the last mentioned angle bars and spaced therefrom, distance pieces between the adjacent angle bars and welded to them, side skirts welded at their upper edges to the side of the tank and intermediately to the outer ends of the bolster plates, said side skirts being flanged inwardly to extend beneath the said transverse angle bars to which they are secured.

7. A combination of a horizontal tank, transverse bolsters welded to the tank, side skirts welded at their upper edges to the tank and to the outer ends of the bolsters, said side skirts being flanged inwardly at their lower ends to extend beneath the bolsters, gusset plates welded to the sides of the bolster plates and extending diagonally downward from the tank to which the upper edge is welded substantially to the reentrant angle of the side skirts and their flanges.

8. The combination of a horizontal tank, a base frame including transverse bolsters supporting the tank and secured to it, side skirts secured to the ends of the bolsters, said side skirts being flanged inwardly at their lower edges to make side sills, the top portion of the tank and the end portions of the side skirts projecting beyond the head of the tank and an end wall attached to such projecting portions to make a vestibule, said end wall at its lower end being flanged inwardly, intermediate longitudinal braces resting at one end on the inward flange of the end wall and at the other end on the base frame, and a floor extending from one side skirt to the other and mounted on said braces.

9. In a tank body, the combination of a base frame including members acting as longitudinal side sills, transverse beams and bolster plates secured at the lower edges to the transverse beams and concave at their upper edges, a tank rounded on the bottom and seating in such concavities, the bolsters being welded to the tank, and gusset plates welded at their edges to the bolster plates and the under shell of the tank.

10. In a demountable tank body, the combinaiton of a base frame including members acting as side sills and transverse beams, upright bolster plates secured to the transverse beams, a double wall tank resting on the bolster plates, the outer shell of the tank being welded directly to the top edges of the bolster plates, skid rails beneath the base frame of the tank secured to some of the transverse beams thereof, means on the base frame for attaching propelling mechanism, side skirts extending upwardly from the side sills and secured at their upper edges to the side of the tank adjacent to ends of its horizontal diameter, a vestibule at the end of the tank comprising an end wall, a floor and side walls, the lower portions of the side walls being substantially continuations of the side skirts and the upper portion being substantially a continuation of the upper portion of the tank, the vestibule being supported at its base by extensions of the base frame, and an opening through the end wall of the tank accessible within the vestibule.

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