Nov. 1, 1966 C. L. SPEES 3,282,228

TANK CAR

Filed Feb. 18, 1964

2 Sheets-Sheet 1

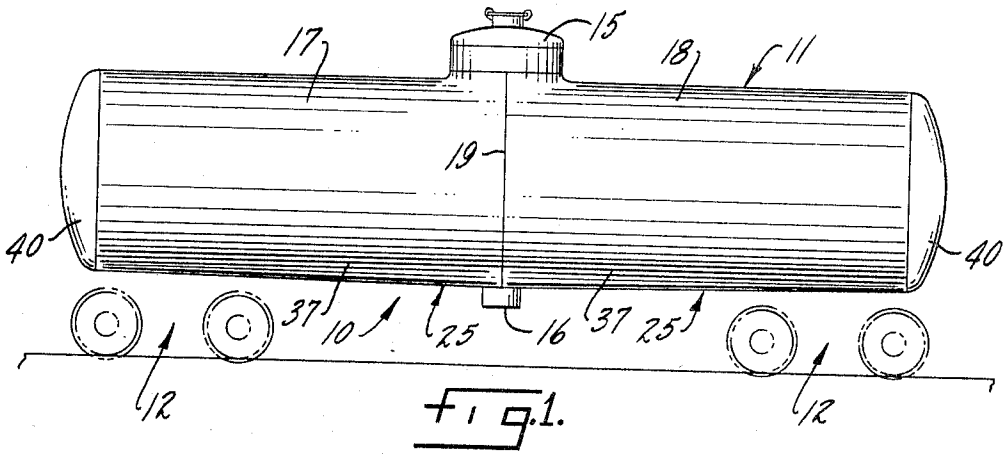


Fig. 1.

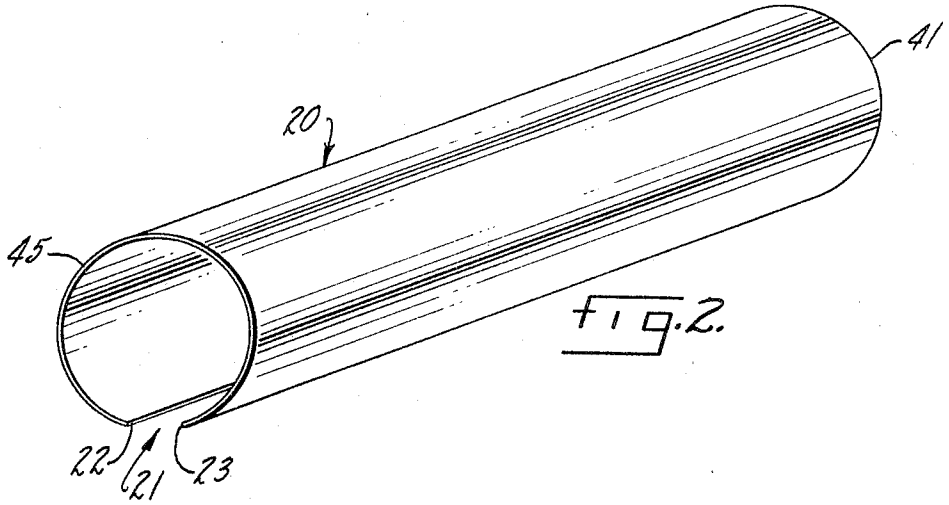


Fig. 2.

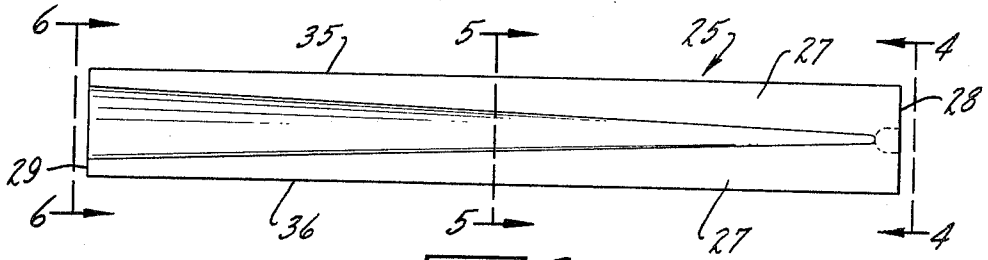


Fig. 3.

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Nov. 1, 1966 C. L. SPEES 3,282,228

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Filed Feb. 18, 1964 2 Sheets-Sheet 2

Fig. 4.

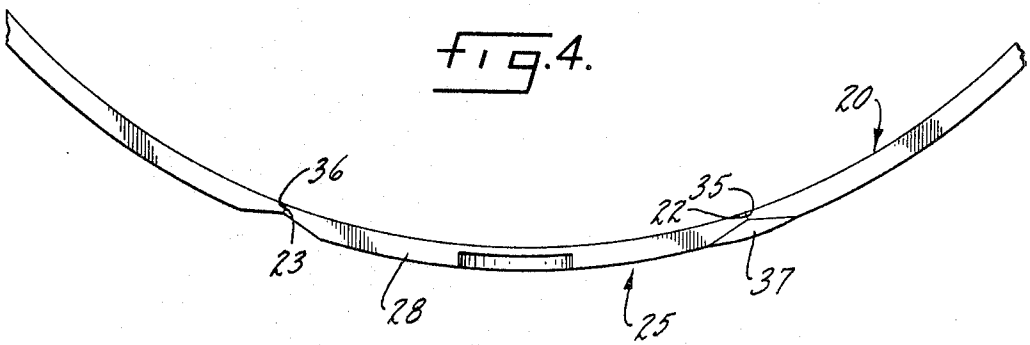


Fig. 5.

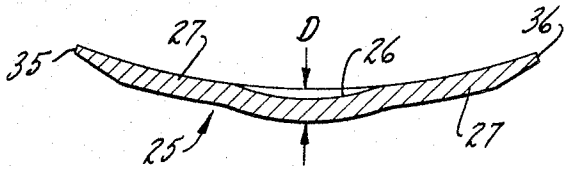
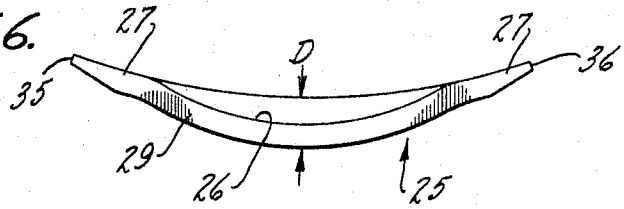


Fig. 6.



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TANK CAR

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1 Claim. (Cl. 105—358)

The present invention relates in general to the construction of storage tanks and more particularly to storage tanks of the type incorporated in railway tank cars and the like. It deals specifically with a storage tank construction and method of fabrication.

In elongated, generally cylindrical storage tanks such as incorporated in railway tank cars, for example, it is often desirable to have the bottom of the tank slope toward the center of the car for drainage purposes. One method of accomplishing this end is to construct the tank by joining two truncated conical plate sections at their bases, after rotating the sections slightly inwardly about their bases to establish a straight top on the tank. Another construction accomplishing the same end is illustrated in United States Patent No. 2,011,176. The latter involves a complicated tank bottom and underframe structure, as will be recognized.

It is an object of the present invention to provide a new and improved method of fabricating a storage tank.

It is another object to provide a new and improved method of fabricating a storage tank incorporating a center drain arrangement.

It is still another object to provide a new and improved method of fabricating a railway tank car type storage tank having its bottom sloping toward the center for drainage purposes.

It is yet another object to provide a fabricating method which is simpler and less expensive than those methods heretofore utilized.

It is a further object to provide a new and improved storage tank construction incorporating a simple and relatively inexpensive drain arrangement.

The foregoing and other objects are realized in accordance with the present invention by providing a new and improved storage tank construction, including a drain arrangement, and its method of fabrication. The invention resides in forming two substantially right cylindrical tank sections from steel plate or the like. Each tank section is formed so that a gap of predetermined width remains between the longitudinally extending adjacent free edges of the tank section. A troughed bottom section also formed of steel plate or the like and having a width substantially equal to the width of the gap is then fitted into the gap in each cylindrical tank section and welded in place.

The troughed bottom sections are identical and are formed with a double radius of curvature, the radius of the outer or major curvature portion of each bottom section being substantially equal to the radius of curvature of the right cylindrical sections, while the radius of the inner or minor curvature portion is variable along the length of each bottom section.

The radius of curvature of the inner or minor curvature portion of each bottom section varies from a relatively small radius adjacent the outer end of the bottom section to a relatively larger radius adjacent the inner end. A widening and deepening trough is provided extending from the outer ends of the storage tank toward the center thereof. With the tank in its normally horizontal position, a simple and inexpensive drainage system is thus provided, with the tank being drained at bottom center.

The invention, both as to its organization and method of operation, taken with further objects and advantages

thereof, will best be understood by reference to the following description taken in connection with the accompany drawings, in which:

FIGURE 1 is a side-elevational view of a railway tank car incorporating a storage tank embodying features of the present invention;

FIGURE 2 is a perspective view of one of the two substantially cylindrical tank sections utilized in fabricating the storage tank embodying features of the present invention;

FIGURE 3 is a plan view of a bottom section of the tank illustrated in FIGURE 1, prior to being joined to the mating cylindrical section illustrated in FIGURE 2;

FIGURE 4 is an enlarged end view taken along line 4—4 of the bottom section in FIGURE 3, with portions of the mating cylindrical tank section shown;

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

FIGURE 6 is an end view taken along line 6—6 of FIGURE 3.

Referring now to the drawings, and particularly to FIGURE 1, a railway tank car is illustrated generally at 10. The tank car 10 includes a substantially cylindrical tank 11 embodying features of the present invention, supported in a well known manner on a pair of diagrammatically illustrated railway trucks 12. The tank 11 has a filler top assembly 15 of well known construction situated atop its mid-section, and a drain assembly 16 mounted on the bottom of the tank 11, at its mid-section.

As has been pointed out, it is in the construction and method of fabrication of the tank 11 that the present invention resides. As such, it will be seen that the invention is applicable to storage tanks incorporated in other environments; tank trucks or stationary tank arrangements, for example. Regardless, it is significant that a storage tank 11 having a desirable center drain capacity is simply, expeditiously, and relatively inexpensively constructed, according to the present invention.

Still referring to FIGURE 1, it will be seen that the tank 11 is actually comprised of two substantially identical tank half-sections 17 and 18 joined at the center line 19 of the tank. The filler top assembly 15 and the drain assembly 16 are mounted on the tank 11 at the center line 19, as will be recognized. Since the tank half-sections 17 and 18 are mirror images of each other, a detailed description of the construction and fabrication of the tank half-section 18 will suffice to a description of the construction and fabrication of both sections 17 and 18, of course.

Referring now to FIGURE 2, a first step in the method of constructing the half-section 18 of the tank 11 embodying features of the present invention involves forming a rectangular steel plate approximately sixteen feet long into the virtually completed cylinder 20. This is preferably accomplished by suitable and well known rolling techniques which form no part of the present invention. The cylinder 20 is preferably rolled so that it has a diameter of approximately 99 inches, while a gap 21 of approximately 24 inches is left between its longitudinally extending free edges 22 and 23.

Coincidental with the fabrication of the cylinder 20, a bottom plate 25 illustrated in FIGURE 3 is formed from a steel plate or the like by stamping, for example. The bottom plate 25 is of a length equal to the cylinder 20, 16 feet in this instance, and of a width substantially equal to the width of the gap 21 between the longitudinally extending free edges 22 and 23 of the cylinder. In other words, the bottom plate 20 is dimensioned to fit precisely in the gap 21 of the cylinder 20.

The construction of the bottom plate 25 is particularly significant to the present invention and, referring to FIGURES 3–6, is seen to include a center trough portion 26

bracketed by side portions **27**. The side portions **27** are identical in configuration and curved to a radius substantially equal to the radius of the cylinder **20**. On the other hand, the trough portion **26** is formed with an ever increasing radius from the outer end **28** of the plate **25** to the inner end **29** thereof.

As seen in FIGURES 4–6, the curve of the trough portion **26** proceeds from a relatively small radius adjacent the end **28** of the bottom plate **25** to a relatively large radius at the inner end **29**. At its greatest radius end, however, it will be noted that the trough portion **26** radius is necessarily smaller than the radius of the cylinder **20**. At the same time, as will also be recognized, the depth D of the trough portion **26** increases as the radius of curvature of the trough portion **26** increases from the outer end **28** to the inner end **29** of the plate. The result is a widening and deepening trough approaching the inner end **29** of the bottom plate **25**.

With a bottom plate **25** fabricated in the foregoing manner, it is appropriately seated in a suitable construction jig (not shown), in position to be joined with a mating cylinder **20**. The mating cylinder **20** is lowered into position in the jig with suitable handling equipment so that its longitudinally extending free edges **22** and **23** mate with the longitudinally extending free edges **35** and **36** of the bottom plate section **25**, as best illustrated in FIGURE 4. The bottom plate section **25** is then welded in place in the cylinder **20**, as at **37**.

When a second cylinder **20** and the bottom plate **25** have been fabricated and joined in the foregoing manner, generally concave end sections **40** are suitably joined by welding or the like to the outer free ends **41** of each cylinder **20**. The concave end sections **40** are, of course, also joined to the outer free end **28** of a corresponding bottom plate **25** at the same time. With the completion of this operation, the two half-sections **17** and **18** of the tank **11** are substantially complete.

The two half-tank sections **17** and **18** are then suitably joined by welding or the like at the inner free edges **45** of the cylinders **20**. At the same time, of course, the inner free edges **29** of corresponding bottom plates **25** are also welded.

With the tank half-sections **17** and **18** joined in the foregoing manner, suitable provisions are made for mounting the filler top assembly **15** and the drain assembly **16** on the joined tank half-sections at their juncture line **19**. The assemblies **15** and **16** might be mounted on prefabricated apertures (not shown) or on apertures formed with appropriate techniques after the fabrication of the tank **11**. They are not described further here since the details of their construction form no part of the present invention. Suffice it to say that the top filler assembly **15** is utilized to introduce stored material to the tank **11**, while the material is drained from the tank **11** for ultimate utilization through the drain assembly **16**.

In the present instance, with the tank **11** appropriately mounted on railway trucks **12**, it is ready for operation. In operation, the mirror image trough portions **26** in each of the tank half-sections **17** and **18** provide a widening and deepening trough from the outer ends of the tank **11** toward the center drain assembly **16**. Drainage is fast

and effective, belying the simplicity of the construction of the tank **11**, as compared with broadly similar draining tank constructions heretofore utilized.

The simplicity of the construction and fabrication methods for the tank **11** embodying features of the present invention assures relatively low cost factors in the construction of a tank car **10** or the like, of course.

Collaterally, as would be expected, the production time is substantially shorter for tank cars **10** of the type incorporating a tank **11** embodying features of the present invention. This, of course, is merely an added cost saving factor.

While the embodiment described herein is at present considered to be preferred, it is understood that various modifications and improvements may be made therein, and it is intended to cover in the appended claims all such modifications and improvements as fall within the true spirit and scope of the invention.

What is desired to be claimed and secured by Letters Patent of the United States is:

A center drain storage tank for incorporation in a railway tank car or the like, comprising: partial cylinder means disposed in substantially horizontal relationship, said partial cylinder means defining a gap along its bottom between longitudinally extending free edges of the cylinder means, bottom means seated in said gap and secured to said free edges of the cylinder means, said bottom means defining trough means extending from adjacent the opposite ends of said cylinder means substantially toward the center thereof, and drain means in said bottom means in communication with said trough means, said bottom means comprising a pair of elongated bottom plates having substantially arcuate cross-sectional configurations, each of said bottom plates including longitudinally extending outer portions with a predetermined radius of curvature equal to the radius of curvature of said partial cylinder means and a longitudinally extending inner portion, each inner portion having a constantly increasing radius of curvature from adjacent its outer end to adjacent its respective inner end, whereby said trough means constantly deepens from the outer ends of said bottom plates to the adjacent inner ends of said bottom plates, said bottom plates being welded together at adjacent inner ends where said inner portions have their greatest radius of curvature.

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