June 28, 1932. J. J. McBRIDE 1,864,606

CAR TANK

Filed April 27, 1929 2 Sheets-Sheet 1

Fig. 1.

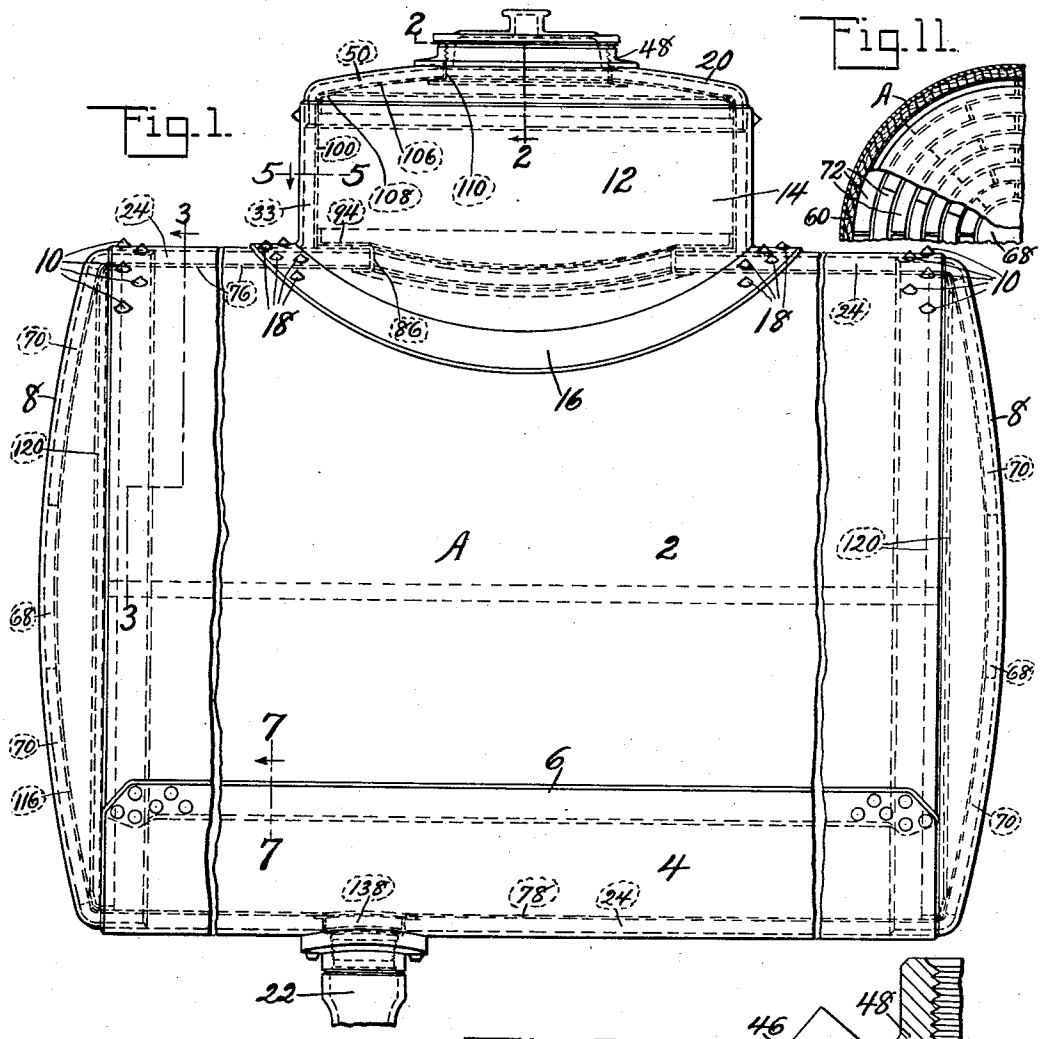

Fig. 11.

Fig. 2.

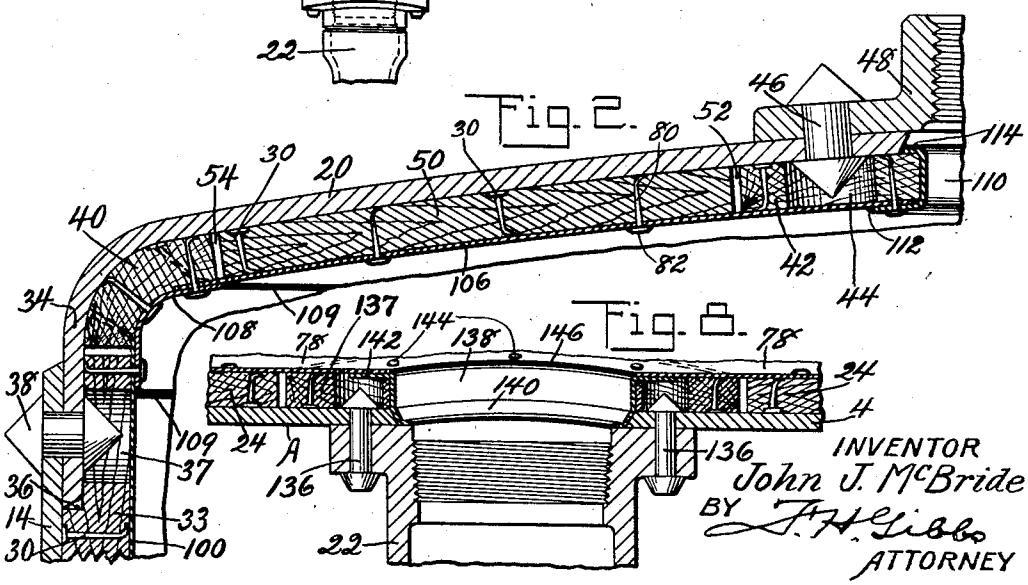

Fig. 8.

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CAR TANK

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Fig. 4.

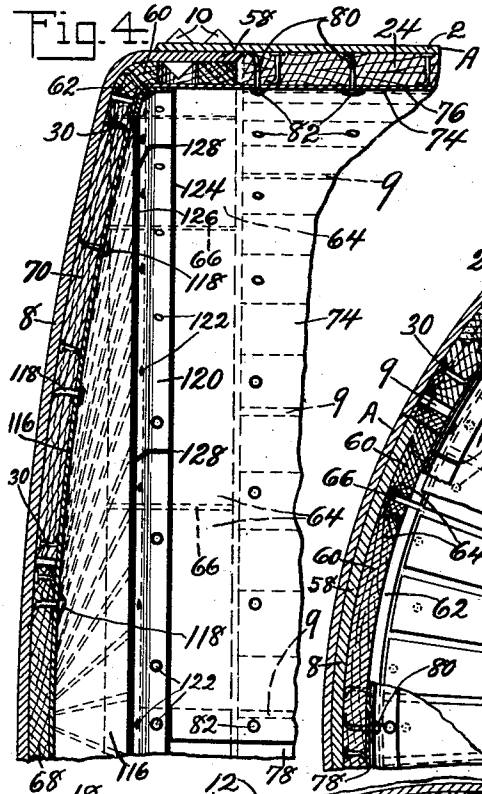


Fig. 3.

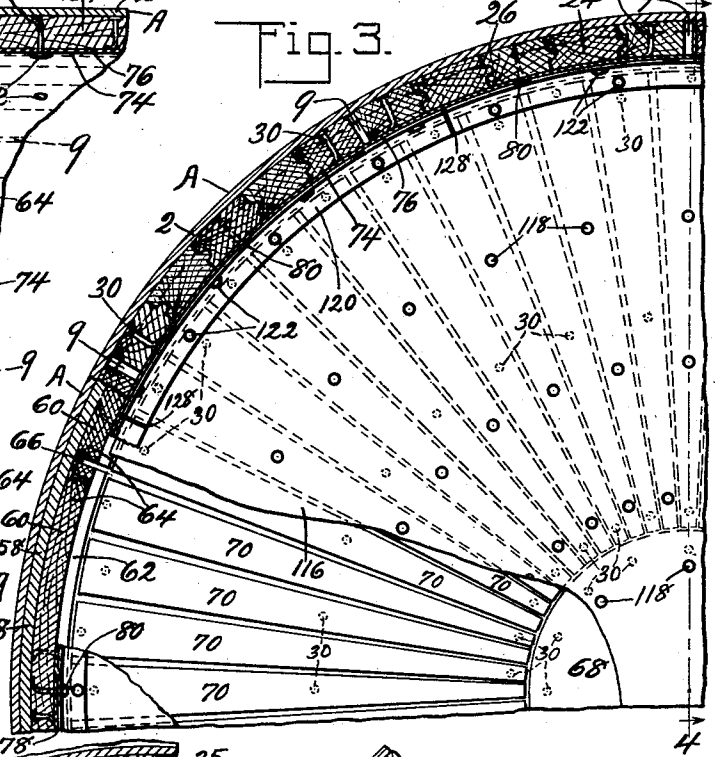


Fig. 5.

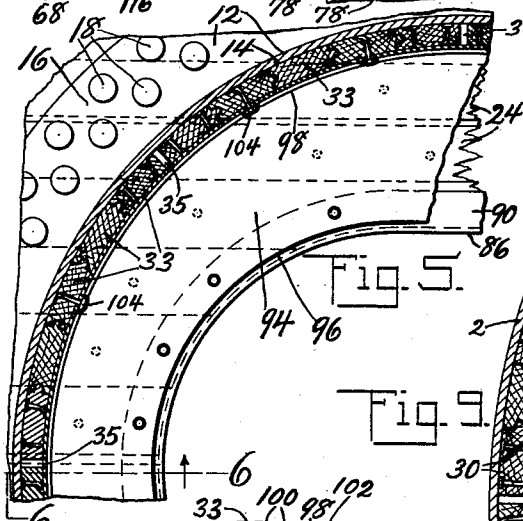


Fig. 6.

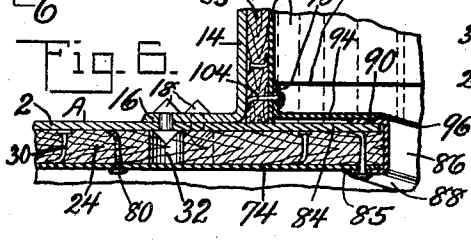


Fig. 9.

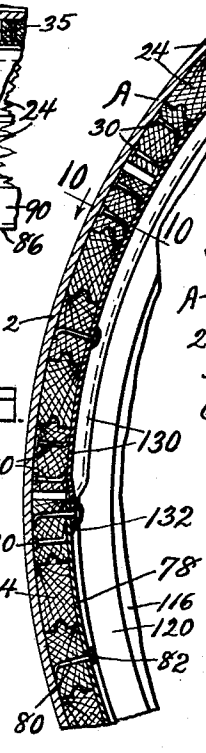


Fig. 10.

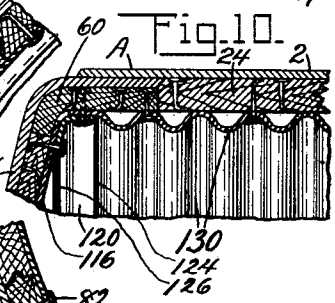
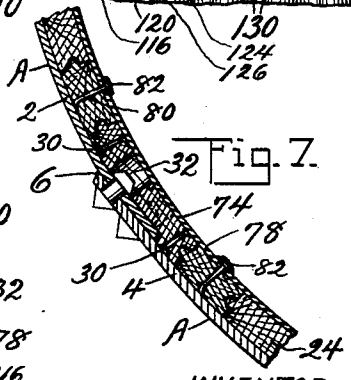


Fig. 7.



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Patented June 28, 1932 1,864,606

UNITED STATES PATENT OFFICE

JOHN J. McBRIDE, OF BAYONNE, NEW JERSEY, ASSIGNOR TO AMERICAN CAR AND FOUNDRY COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY

CAR TANK

Application filed April 27, 1929. Serial No. 358,537.

This invention relates generally to containers and has particular reference to car tanks, although the invention is susceptible of use generally in receptacles for the transportation of oils, gasoline and other petroleum products, milk and acids.

The usual car tank is formed of steel sheets riveted or otherwise connected together. Such a tank presents of course an inner surface of a metal which easily corrodes. Further, corrosion discolors petroleum products, particularly gasoline, and the value thereof is correspondingly reduced for the reason that the value of gasoline depends on color; gasoline being sold on a color test. In the transportation of milk, for example, it is manifestly necessary that it be not in contact with a corrosive surface.

In view of the aforesaid disadvantages, and others which will be and are apparent to those skilled in the art, the present invention aims to provide a car tank having a lining which is corrosion resistant to a high degree. The lining may be of aluminum, copper, nickel, tin or any other suitable or desired metal, dependent upon the use to which the car is to be subjected.

Another object of the invention is the provision of an insulated lined tank.

Still another object of the invention is the provision of a car tank the interior of which is wholly lined with a metal which is corrosion resistant to a high degree.

As another object, the invention contemplates the provision of a tank which is provided with an internal lining of high corrosion resistant properties and which interior is smooth from end to end of the tank whereby corners and crevices which are difficult to clean out and in which bacteria may germinate, are eliminated.

A further object of this invention is the provision of a car tank having a lining of high corrosion resistant properties which is reinforced to aid in the retention thereof in the tank.

A still further object of the invention is the provision of a car tank having a lining of high corrosion resistant properties and a cushion interposed between the lining and the tank sheets and to which the lining is secured; the cushion possessing insulating properties.

Other objects and advantages of this invention will be apparent from the following description taken in conjunction with the accompanying drawings in which:

Figure 1 is a broken side elevation of a tank lined in accordance with the present invention;

Fig. 2 is a sectional view on the line 2—2, Fig. 1;

Fig. 3 is a sectional view on the line 3—3, Fig. 1;

Fig. 4 is a sectional view on the line 4—4, Fig. 3;

Fig. 5 is a sectional view on the line 5—5, Fig. 1;

Fig. 6 is a sectional view on the line 6—6, Fig. 5;

Fig. 7 is a sectional view on the line 7—7, Fig. 1;

Fig. 8 is a sectional view of a portion of the lined tank, taken at the discharge outlet;

Fig. 9 is a sectional view of a portion of a tank, showing modified form of lining;

Fig. 10 is a sectional view on the line 10—10, Fig. 9; and

Fig. 11 is a sectional view showing a modified form of tank head lining.

Car tanks are at the present time usually formed of steel sheets bent to arcuate form and riveted together to form a cylindrical body with heads secured to the open ends thereof. Sometimes the sheets are welded together and other instances are present in the art of tanks which are formed of metal possessing corrosion resistant properties, such, for example, as aluminum and nickel steel. A tank formed entirely of aluminum is extremely expensive to manufacture. This also applies to nickel steel tanks. In order to reduce the cost of manufacture of a tank the interior of which possesses corrosion resistant properties, it is desirable to provide a lining of some sort for the interior of the tank while forming the tank in the usual manner.

The drawings disclose a car tank, but this is merely by way of example, as obviously containers other than car tanks may be lined

within the spirit and scope of this invention. Car tanks may be formed of any desired number of sheets, but ordinarily they are formed of two, three or four sheets. The example in the drawings shows a tank formed of two sheets, indicated at 2 and 4; sheet 2 being the upper sheet and sheet 4 being the lower sheet. The sheets are connected by longitudinal seams 6 (of which only one is shown—see Fig. 1) to form a cylindrical body A having open ends which are closed by heads 8 riveted to the sheets 2 and 4 as at 10. The tank is provided with a dome 12 arranged over the usual manhole opening in sheet 2 and comprising a dome sheet 14 having a lower attaching flange 16 riveted as at 18 to the sheet 2; the dome also including the dome head 20 having a manhole opening as clearly shown in Fig. 2. The tank is also provided with a discharge outlet 22. So far, the construction described is more or less conventional, as will be recognized by anyone skilled in the art.

In lining steel tanks, several problems are present, one of the most important being the problem of providing a lining which will not sag under actual use conditions. Various attempts have been made to solve this problem by various methods of connecting the lining directly to the steel tank sheets. Welding the lining directly to the tanks sheets has been tried, but not found wholly satisfactory, for the particular types of lining which can be welded to the steel sheets are limited to linings of such character as are weldable to steel—and this, obviously, does not apply to every metal. Further, in applying metal linings to car tanks the relative coefficients of expansion of steel and the lining metal must be considered. Car tanks are subjected in use to extreme punishment, and therefore the attachment of a lining must be such as to withstand this punishment, otherwise the utility of the invention is either eliminated or correspondingly reduced.

The present invention is designed to overcome the defects existent in tanks in which the lining is attached directly to the tank sheets, and in addition, provides a construction in which the tank is more or less insulated. Generally speaking, I provide an intermediate element between the lining and tank sheets which not only serves as an insulator and an attaching medium for the metallic lining, but further provides a cushioning element to relieve the lining of shocks due to end thrusts of the lading, vibration of the car or other causes, whereby the lining is maintained in proper position in the tank and is maintained against sagging.

As shown in Fig. 4, the body A of the tank is first lined with wood strips 24 arranged longitudinally of the tank and connected by a tongue and groove connection, as shown at 26 (see Fig. 3). The body is entirely lined from end to end, the wood lining being omitted of course at the tank manhole opening and discharge outlet (see Figs. 6 and 8); and at intervals 9, adjacent wood strips are separated to provide spaces to permit unrestrained expansion of the wood. These wood strips, or in other words the wood lining, are held to the tank sheets by suitable fasteners, such for example as the clinch nails 30, which latter are preferably spot welded to the tank sheets at their heads.

From the description just above, it can be seen that the body A is lined from end to end with wood. For convenience in applying the wood lining to the body the same is formed, in effect, of a plurality of longitudinally arranged spaced panels each formed of connected strips. At places where the wood lining is arranged over internal rivet heads, such for example at the seam 6 or the attachment of the dome flange 16, the wood strips are provided with openings 32 into which the rivet heads extend. An example of this is shown clearly in Fig. 6.

The dome is also lined with wood; and now, referring to Figs. 2, 5 and 6, it can be seen that the dome sheet 14 has secured thereto by fasteners such as the clinch nails 30, a wood lining formed of vertically arranged wood strips 33 connected together by a tongue and groove connection. At intervals, adjacent strips are separated to provide expansion spaces 35 (see Fig. 5). Ordinarily, the sheet 14 overlaps the flange 34 of the dome head 20 and the upper ends of the wood strips at this part are reduced in thickness to provide a recess 36 for an obvious purpose; the strips also having openings 37 therein into which the inner heads of dome head rivets 38 extend. At the angle defined by the flange 34 of the dome head 20, a wood angle ring 40 is secured to the dome head to line that portion of the dome. Around the manhole opening in the dome head a wood annulus 42 is secured by clinch nails; the annulus being provided with openings 44 which receive the heads of the rivets 46 which secure the dome ring 48. The dome head between the annulus 42 and angle ring 40 is preferably lined with wood strips 50 radiating from points adjacent the annulus 42 in a construction similar to that hereinafter described with reference to the tank heads; spaces 52 and 54 being provided between the annulus 42 and ring 40 and the ends of strips 50, respectively, to permit expansion of the wood strips 50 and the rings 40 and 42.

The tank heads are indicated at 8 and each thereof is lined with wood. Two types of wood lining are shown; and referring now to Figs. 3 and 4, the heads are secured to the body of the tank by rivets 10; the heads each having an attaching flange 58 arranged inside the tank body. Secured to the head 8 inside the flange 58 is a wood liner which, in

effect, is a ring 60 having a flange 62 arranged in the angle defined by the flange 58. The ring 60 is formed of a plurality of segments 64 the adjacent edges of which are spaced from each other as at 66. Secured to the tank head 8 at about the center thereof is a wood disc 68. The remaining portion of the tank head is lined with wood strips 70 which radiate from the disc (see Fig. 3) and which have their ends arranged adjacent to, but spaced a slight distance from the ring 60 and disc 68, respectively. In the drawings, the strips 70 are shown as gradually increasing in width toward the ring 60, but this is merely by way of example in order to line a maximum area of the tank head. The strips 70 are spaced each from the other, and obviously a greater or lesser number of strips may be employed if desired; one fundamental purpose of this invention being of course the provision of a means to which a metallic tank lining may be secured.

Fig. 11 shows a modified form of head liner in which the head between the disc 68 and ring 60 is lined with a plurality of concentrically arranged wooden rings 72 each formed of arcuate segments the adjacent ends of which are spaced from each other. Referring back now to Fig. 2, it will be apparent that the dome head can be lined in a manner similar to that just described with reference to either Figs. 3 and 4 or Fig. 11.

As before mentioned, the invention contemplates the lining of the tank with metal of any preferred type, and as will be seen the wood or other insulating lining serves the additional function of supporting the metal lining.

Referring now to Fig. 4, the tank body is lined with metal sheets arranged circumferentially in the tank. In practice, a plurality of sheets will be employed, arranged side by side throughout the length of the body and connected at abutting edges by welding or soldering, or the sheets may overlap at adjacent edges and be seamed and soldered at the seams. In Fig. 4, a portion of one of the sheets is shown, the same being designated as 74 and comprising an upper section 76 and a lower section 78, the edges of section 76 lapping the edges of section 78. The metal lining sheets are secured directly to the wood liner by suitable fasteners, such as the clinch nails 80, driven through the metal lining and into the wood lining. In this connection, if the metal lining is aluminum, then aluminum nails may be employed, and it is obvious that with various types of metal linings, nails of the same character may be employed for securing purposes. After nailing the metal lining sheets to the body, each of the nail heads is preferably covered with either solder or weld metal which possesses the same corrosion resistant properties as those of the lining. Such a construction is indicated at 82 and it will be seen that by welding or soldering over the nail heads the possibility of the lading leaking past the nails and penetrating the wood lining is avoided.

The metal lining is continued from end to end of the body.

At the manhole in the tank sheet 2 (see Fig. 6) the metal lining terminates adjacent the edge of the wood liner. In the form of tank shown in the drawings, the attaching flange 16 and the dome sheet 14 are arranged some distance away from the manhole, thereby providing in effect a shelf 84 in the dome. The manhole edge is lined with a channel ring 86, the lower chord 88 of which overlaps the edge of the lining sheet 74 at the manhole and is preferably welded or soldered to the lining sheet as shown at 85. The upper chord 90 is arranged on the shelf 84, or to be more exact, on the edge of the tank sheet 2 around the manhole. In practice, the ring 86 is formed with one flange and is inserted into the manhole in position therein and then the other flange is formed by beating the ring on to either the lining sheet 74 or the tank sheet 2, as the case may be.

The extended portion or shelf 84 of the tank sheet is covered or lined by a flanged ring 94 the edge of which is welded or soldered at 96 to the ring 86 and the flange 98 of which overlaps the lower end of a metallic liner tube 100 and is welded or soldered thereto as at 102. The tube 100 lines the dome sheet and extends upwardly in the dome with the upper edge lapping the wood ring 40 (see Fig. 2) and is secured to the dome sheet liner by suitable fasteners such as the clinch nails 104.

Secured to the dome head wood liner strips 50 by suitable fasteners such as clinch nails is a metal liner sheet 106 having a central opening the edge of which lies adjacent the inner edge of the annulus 42. The outer edge of the sheet 106 (which sheet obviously is circular to conform to the shape of the dome head 20) overlaps the ring 40, as shown in Fig. 2. In order to line the angle formed by the flanged ring 40, a metal angle ring 108 is secured to said ring 40 with its edges overlapping the liner tube 100 and the sheet 106; the said ring 108 being permanently secured to the tube 100 and sheet 106 by being annularly welded or soldered thereto, as shown at 109. In practice, the ring 108 may be formed of a plurality of connected segments, if desired; the segments being arranged end to end and welded or otherwise connected together. This may be necessary because of the fact that the ring 108 is too large to permit its insertion through the manhole opening in the dome head. For lining the tank at the manhole, a channel ring 110 is provided which is welded or soldered to sheet 106 at 112 and to the dome head 20 at 114. It will usually be necessary to form the sheet 106 of a plurality of segments and then

weld the same or solder said segments together in position against the lining strips 50.

As shown in Fig. 4, the sheet 76 at the ends of the tank may extend and overlap the ring 60. The tank heads are each lined with a metal sheet 116 secured to the wood liner by the nails 118, and the edge of the sheet laps the ring 60. To form a leak-proof joint at the tank heads, an angle ring 120 is provided the legs of which overlap the head liner 116 and the sheet 74. The ring 120 is secured to the wood liner by suitable fasteners such as nails 122, and the edges of said ring are welded or soldered at 124 and 126 to the liner sheet 74 and head liner sheet 116, respectively. The ring 120 is preferably formed of a plurality of segments arranged end to end as shown clearly in Fig. 4, and, if desired, abutting ends may be connected by weld metal or solder 128.

Figs. 9 and 10 disclose a modification of the body lining directed specifically to providing a self-reinforcing metal liner sheet for the upper section of the tank. The upper lining sheet in this instance is designated as 130 and, like sheet 74, is arranged circumferentially in the tank and has its ends lapping and connected to the lower sheet 78 by suitable fasteners such as the clinch nails shown. The two sheets 130 and 78 are preferably connected at their meeting portions by weld metal or solder 132 to provide a leak-proof joint, as hereinbefore described. The upper sheet 130 is longitudinally corrugated, the corrugations extending approximately from end to end of the sheet, leaving of course the attaching edges at each end of the sheet. The sheet when applied as shown in Figs. 9 and 10 provides reinforcing elements arranged circumferentially of the tank, or in other words, transverse to the longitudinal axis of the tank whereby to strengthen the sheet when it is applied as shown in said figures, the sheet being self-reinforcing to prevent sagging thereof during the use of the tank.

Fig. 8 discloses the lining of the tank at the discharge outlet portion thereof. The tank bottom is provided with an opening around which, on the outer surface of the tank, a discharge outlet 22 is secured by the rivets 136. Secured to the tank sheet around the opening therein is a wood ring 137 having openings therein to receive the inner heads of rivets 136. The wood lining formed of the strips 24 is interrupted at this portion of the tanks, the ends thereof being slightly spaced from the wood ring 137, as clearly shown in Fig. 8.

The discharge opening through the tank is lined with an annulus 138 having an inwardly directed flange 140 at its lower edge and an upper outward flange 142 overlying the wood ring 137 and underlying the metal liner sheet 78; the annulus 138 being, of course, formed of the same type of metal as the sheet 78 and being welded or soldered thereto as shown at 146. Fasteners such as clinch nails 144 secure the lining 78 and annulus 138 in assembled position.

From the above description, it is believed that the construction of the tank of the present invention will be fully apparent to those skilled in the art. It can be seen that a tank is provided which is entirely lined with a metal of high corrosion resistant properties, the interior of the tank being relatively smooth from end to end. It can further be seen that the lining itself is protected against distortion or sagging due to its attachment to an intermediate lining such as the wood strips or any other suitable or desired material; the wood serving not only as a supporting medium for the metallic liner, but also possessing certain insulating properties which are desirable. Other insulating mediums than wood may be used within the concept of this invention, as will be obvious, and the invention is not restricted to a wood lining. It can be seen also that because of the interposed medium between the lining and the tank shell, the lining is prevented from distortion because the interposed medium acts as a cushion to relieve the lining of severe shocks due to vibration of the tank or end shocks of the lading against the tank heads.

The drawings show one embodiment of the invention, but it is not to be understood that the invention is restricted to the specific details of construction shown in said drawings, as the latter are for illustrative purposes only and various changes in the form and proportions of the device shown may be made within the scope of the appended claims without departing from the spirit of the invention.

What is claimed is:

1. In a riveted car tank, a wood liner secured to the inner surface thereof and provided with openings receiving the rivet heads, high corrosion resistant sheets arranged circumferentially in the tank and connected together and secured directly to the wood liner, and head liners connected with the sheets.

2. In a cylindrical car tank, a body portion having heads at the ends thereof, a plurality of longitudinally extending spaced wood panels secured to the inner surface of the body portion and each formed of a plurality of wood strips, a flanged wood ring secured to the inner surface of the tank at the angle between the heads and body portion, a wood disk secured to each head at substantially the center thereof, and wood lining strips secured to the heads between the disk and wood ring.

3. In a cylindrical car tank, a body portion having heads at the ends thereof, a plurality of longitudinally extending spaced wood panels secured to the inner surface of the body portion and each formed of a plurality of wood strips, a flanged wood ring secured

to the inner surface of the tank at the angle between the heads and body portion, a wood disk secured to each head at substantially the center thereof, and wood lining strips secured to the heads between the disk and wood ring, said strips being spaced each from the other to permit expansion of individual strips unrestricted by other strips.

4. A car tank comprising steel tank sheets and steel heads secured thereto, a plurality of spaced panels secured to the tank sheets and each formed of connected wood strips arranged longitudinally of the tank, a wood lining secured to the steel heads, circumferentially arranged sheets formed of metal possessing high corrosion resistant properties positioned in the tank, fasteners securing the metal sheets to the wood strips, means covering the exposed portions of said fasteners formed of a metal possessing substantially the properties of the sheets in the tank, and a metallic liner for the heads secured to the wood liner and formed of the same metal as the before-mentioned sheets in the tank.

5. In a car tank having a body portion and end closures, means to which a metal liner may be secured to support the latter comprising a plurality of spaced panels formed of wood strips arranged longitudinally of the body portion, a central wood disk secured to the end closures, wood strips radiating from the disk, and a wood annulus secured to and lining the tank between the ends of the panels and radiating strips.

6. A lined car tank comprising a steel body portion and steel heads secured thereto, a wood lining secured to the inner surface of the tank and covering substantially the interior thereof but having a plurality of expansion spaces, sheets formed of a metal possessing high corrosion resistant properties arranged in the tank and connected together and secured directly to the wood lining, a sheet at each head secured to the wood lining and having its edge arranged adjacent the first mentioned sheets, and a metal member connecting the two named sheets.

7. In a car tank, a wood liner secured to the body and heads thereof, a metallic liner secured to the wood liner in the body portion, a metallic liner secured to the wood liner at the heads, and means connecting the two mentioned metallic lines comprising a metallic annulus connected to adjacent edges of the before-mentioned metallic liners and secured to the wood liner.

8. In a cylindrical car tank, a lining therefor comprising wood strips secured to the inner surface of the tank and extending longitudinally thereof, and metallic sheets arranged circumferentially in the tank and secured directly to the wood strips.

9. In a cylindrical car tank, a body portion and heads closing the ends thereof, and means for lining the tank comprising a wood lining formed of sections extending longitudinally of the body portion, wood sections secured to the heads and radiating from adjacent the center thereof, circumferentially arranged metal liner sheets secured to the body wood lining, and metal head liner sheets secured to the wood lining at the heads and connected with the body portion metal liner sheets.

10. In a car tank, means for securing a metal liner in the interior thereof comprising a compressible liner secured to the inner surface of the tank and formed of spaced sections.

11. In a car tank, a metallic lining therefor comprising sheets arranged circumferentially in the tank and provided with corrugations in the upper portions thereof extending transversely of the tank.

12. In a car tank, a metallic lining therefor comprising sheets arranged circumferentially in the tank and provided with longitudinal corrugations in the upper portions thereof extending transversely of the tank.

13. In a car tank, a wood lining therefor, and a metallic lining for the tank comprising lower sections secured to the wood lining at the bottom of the tank and extending upwardly for a portion only of the circumference of the latter, and upper sections secured to the wood lining and arranged in the upper portion of the tank and extending downwardly along the sides with the ends thereof overlapping and secured to the ends of the lower sections, said upper sections being longitudinally ribbed whereby to provide transversely extending rigidifying elements to maintain the upper sections against sagging.

14. In a car tank, a body portion having a manhole and a dome surrounding the same, a wood lining in the tank having an opening therein at the manhole, a metal liner secured to the wood liner and provided with an opening at the manhole, and an annular metal channel in the manhole having the flanges thereof overlapping the upper edge of the manhole and the metallic lining respectively.

15. In a car tank, a body portion having a manhole and a dome surrounding the same, a wood lining in the tank having an opening therein at the manhole, a metal liner secured to the wood liner and provided with an opening at the manhole, and an annular metal channel in the manhole having the flanges thereof overlapping the upper edge of the manhole and the metallic lining respectively. a wood liner for the dome, a metal liner secured to the dome wood liner, and a metal annulus secured to the upper flange of the channel and to the metal liner of the dome.

16. In a car tank, a wood lining secured to the body portion and heads thereof, and provided with expansion spaces, a highly corrosion resistant lining arranged in contact with the wood lining, fasteners connect-

ing the corrosion resistant lining to the wood lining, corrosion resistant caps over the exposed portions of the fasteners to seal the wood lining against leakage past the fasteners, a corrosion resistant lining secured to the heads, and a highly corrosion resistant angle ring secured to the wood lining at the heads and overlapping and welded to adjacent edges of the body and head linings.

17. In a car tank, a metal lining therefor formed of a metal possessing high corrosion resistant properties and including connected sheets at the lower portion of the tank, and connected sheets arranged circumferentially of the tank at the upper portion thereof having the ends thereof welded to the lower sheets and provided with longitudinal stiffening elements arranged in circumferential relation with respect to the tank.

18. In a car tank, a metallic liner therefor, and means for securing the liner in position in the tank comprising a compressible medium interposed between the tank and the liner and secured to the tank, said liner being attached to said compressible medium.

In witness whereof I have hereunto set my hand.

JOHN J. McBRIDE.