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G. E. TILEY

TANK CAR

Filed March 26, 1925

Fig. 1.

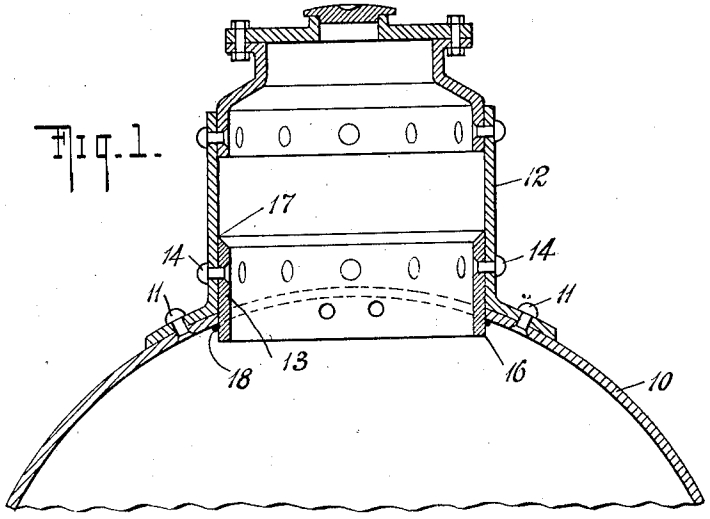
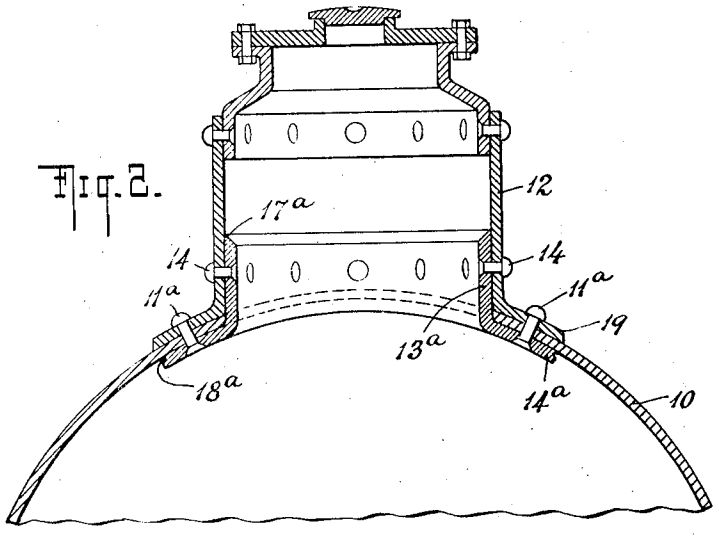


Fig. 2.



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UNITED STATES PATENT OFFICE.

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TANK CAR.

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This invention relates to railway tank cars and particularly to that type thereof which is used for the transportation of certain acids, especially sulphuric acid. Sulphuric acid, for example, is usually prepared and shipped in concentrated condition and in large quantities for industrial purposes. When in its concentrated condition, the acid does not react with or corrode the steel employed for the tank car construction, but when the acid is in dilute condition, it will attack the steel and rapidly destroy the same. In spite of the fact that the acid is always shipped in concentrated condition in tank cars, it has been found that dilute acid solutions are formed in the dome of the cars and in the upper portions of the tanks adjacent thereto. The formation of the corroding, dilute acid solutions is probably due to the presence of moisture in the air in the dome. At any rate, the water vapor condenses on the inside walls of the dome and forms drops of dilute acid solution. These drops trickle down along the inside wall of the dome, some collecting about the connecting joint of the dome to the main body portion of the tank, and some following the inside wall of the upper part of the tank to points some distance below the connecting joints. Serious corrosion of the tank metal is thus manifested, not only in the dome and the joint thereof to the tank, but also in the upper tank sheets. If the corrosion were limited to the metal of the dome, it would be necessary only to replace or renew the dome from time to time, but as the upper sheets of the tank are also attacked and as the replacement of such sheets is more difficult and costly, the corrosion thereof becomes highly objectionable.

The problem of preventing corrosion is further complicated by the requirements and specifications of the railway associations for tank cars used for the transportation of acids. Because of these requirements, the size of the opening permitted to be cut in the shell of the tank is restricted to comparatively small dimensions relatively to the size of the dome unless such openings are specially reinforced. If the small, un-reinforced opening is employed, the top sheets of the tank adjacent to the opening form a shelf upon which the dilute solutions collect, while if the opening is enlarged and its edges are reinforced, the number of joints in which the acid may be injuriously effective is increased. Both of these types of construction are unsatisfactory.

It is the principal object of this invention to provide a new and improved construction for not only preventing this corrosion of the tank sheets but also for reinforcing the top sheets adjacent to the dome opening. The construction according to the invention is such that the means for preventing the corrosion also serves to reinforce the top sheets without increasing the number of joints in which the acid may collect, while at the same time, the reinforcement serves as a means for preventing the corrosion.

Other objects will be apparent to those skilled in the art to which this invention relates from a perusal of the following specification and by reference to the accompanying drawing forming a part hereof. In said drawing, Fig. 1 is a fragmentary, central, vertical section of a tank car illustrating a satisfactory example of a construction embodying my invention and Fig. 2 is a similar view of another constructional example.

The numeral 10 indicates the side walls of the main portion of a tank car to the upper part of which is secured, as by the rivets 11, the dome 12. In the example shown in Fig. 1, a ring 13 of any suitable metal is placed within the lower part of the dome 12 and is secured to the side walls thereof by the rivets 14. The lower edge of the ring extends downwardly, as indicated at 16, below the dome opening formed in the side walls 10, and forms a protective lining which covers the line of junction between the dome sheet and the side walls 10. The upper edge of the ring is preferably chamfered, as indicated at 17, and is calked inwardly into the dome sheet at the edge of the chamfer, to prevent any drops of fluid which may collect upon the inner wall of the dome above the ring from flowing down between the dome sheet and ring. The joint formed between the inner edge of the dome opening in the side walls 10 of the tank and the ring 13 is preferably welded, as indicated at 18, to prevent any of the acid contents of the tank which splash upwardly from working in between the ring and dome sheet.

In Fig. 2, the downwardly projecting portion of the ring 13^a is in the form of an annular flange 14^a which contacts with the

inner face of the side walls 10 and is preferably conterminous with the flange 19 of the dome 12. By forming the ring with the flange as shown in Fig. 2, and extending the rivets 11^a through the dome flange 19, the side walls, and the flange 14^a, the resulting reinforcement due to the flange compensates for the weakening caused by cutting out the opening for the dome and produces a strong structure. The upper edge of the ring 13^a is also chamfered as at 17^a and calked in the same manner as the ring shown in Fig. 1, while the outer edge of the flange 14^a may either be calked or welded to the inner face of the top sheet, as indicated at 18^a to prevent seepage of the acid between said flange and the top sheets of the tank.

In both forms of the invention illustrated, any fluid that may condense upon the inner walls of the dome will flow downwardly along the rings and will drop therefrom into the main body of the acid from the lowermost edges of the rings, thereby preventing any of the fluid from following or flowing along the upper sheets of the side walls 10 of the tank. As the rings cover the connecting joints between the dome and tank, access of the dilute acid solutions to, and the collection thereof about, such joints is prevented. In addition to protecting the connecting joints and the upper sheets of the tank from corrosion, the rings, shown in both the illustrated examples, also serve to reinforce the upper sheets of the tank and compensate for the weakening thereof due to the presence of the more desirable, larger dome opening.

I claim:

1. In a tank car having a dome opening and a dome secured thereto about said opening, a combined reinforcing and protecting ring mounted within said dome to cover the connection joint between said dome and tank and projecting downwardly into said tank below the inner surface of the upper sheets of said tank adjacent to said dome, whereby any liquid collecting upon the inner surface of the dome is conducted from the dome to the interior of the tank without contacting with the inner surface of the upper sheets of said tank.

2. In a tank car having a dome opening and a dome secured thereto about said opening, a combined reinforcing and protecting ring mounted within said dome to cover the connecting joint between said dome and tank, said ring having its lower edge shaped to conduct any liquid collecting upon the inner surface of said dome into the interior of the tank without contacting with the inner surface of the upper sheets of said tank.

3. In a tank car having a dome opening and a dome secured thereto about said opening, a combined reinforcing and protecting ring mounted within said dome to cover the connecting joint between said dome and tank, said ring having an annular laterally projecting flange arranged in contacting engagement with and projecting below the inner surface of the upper sheets of said tank, said flange being of sufficient thickness to conduct any liquid collecting upon the inner surface of said dome into the interior of the tank without contacting with the inner surface of the upper sheets of said tank.

4. In a tank car having a dome opening, a dome provided with an annular, laterally projecting, attaching flange surrounding said opening, a combined reinforcing and protecting ring mounted within said dome to cover the connecting joint between said dome and flange, said ring being provided with a laterally projecting flange arranged in contacting engagement with and projecting below the inner surface of the upper sheets of said tank adjacent to said dome, said flange being of sufficient thickness to conduct any liquid collecting upon the inner surface of said dome into the interior of the tank without contacting with the inner surface of the upper sheets of said tank, and securing means passing between both of said flanges and the upper sheets of said tank.

5. In a tank car having a dome opening and a dome secured thereto adjacent to said opening, and means associated with said dome and projecting downwardly into said tank below the inner surface of the upper sheets thereof to prevent fluid which flows downwardly along the inner walls of said dome from following the inner surfaces of the upper sheets of said tank.

In testimony whereof I have hereunto set my hand.

GEORGE E. TILEY.